

## Intended Nationally Determined Contributions (INDCs) -Continued

### Parties

Grenada  
Guatemala  
Guinea  
Guinea-Bissau  
Guyana  
Haiti  
Honduras  
Iceland  
India  
Indonesia  
Iran  
Iraq  
Afghanistan  
Israel  
Jamaica  
Japan  
Jordan  
Kazakhstan  
Kenya  
Kiribati  
Kuwait  
Kyrgyzstan  
Lao Peoples Democratic Republic  
Lebanon  
Lesotho  
Liberia  
Liechtenstein  
Madagascar  
Malawi  
Malaysia  
Maldives  
Mali  
Marshall Islands  
Mauritania  
Mauritius  
Mexico  
Micronesia  
Monaco  
Mongolia  
Montenegro  
Morocco  
Mozambique  
Myanmar  
Namibia  
Nauru

Nepal  
New Zealand  
Niger  
Nigeria  
Niue  
Norway  
Oman  
Pakistan  
Palau  
Papua New Guinea  
Paraguay  
Peru  
Philippines



## **GRENADA**

Grenada is pleased to present its iNDC pursuant to decision 1 CP/19 and decision 1 CP/20 of the United Nations Framework Convention on Climate Change.

### **Introduction**

Grenada is a small island developing state located in the south eastern Caribbean, made up of several islands all with its own individual characteristics.

Grenada's total emissions are not significant in the global context with 2010 emissions being 251, 649 tons of co2 - 0.0005% of total global emission. Notwithstanding this, Grenada is committed to fighting climate change and making its contributions to reducing greenhouse gas emissions in the context of the new legally binding agreement that will be adopted in December 2015 and will be applicable to all parties.

Grenada is committed to a low carbon emission development pathway which would have significant economic benefits as well as reduce its carbon footprint. Historically Grenada has been highly dependent on the importation of fossil fuels to meet its energy production and transportation needs, however in recent years efforts have been made to introduce alternative technologies into the energy mix. Electricity production from the use of solar has already surpassed 2% and is increasing as more businesses and individuals are taking advantage of the incentives provided to use solar technologies. Recent studies on geothermal power have given a conservative estimate of a 15MW potential.

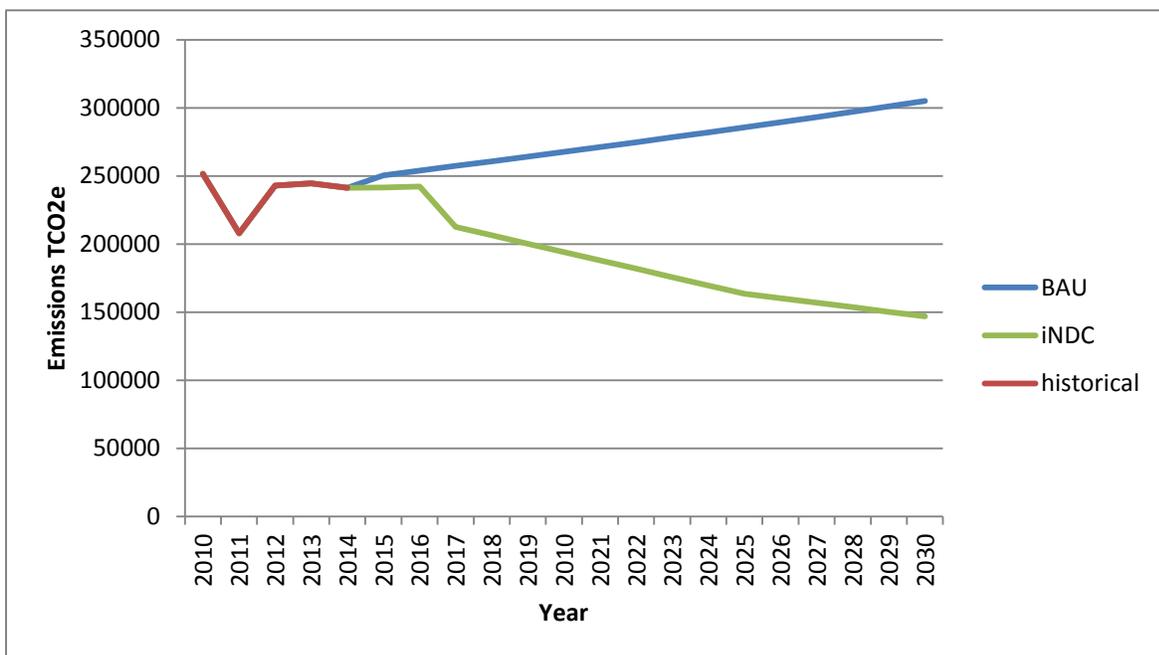
National initiatives in the context of the Government's budgetary cycle relative to "Building the new economy"; Agriculture; Infrastructural Development; Energy; Sports and working in partnership with the private sector are examples of present priority policy positions that could provide entry points for support, integration or implementation of the iNDC at a later stage of the process.

Grenada is very vulnerable to the anticipated impacts of climate change and is already experiencing changes in its climate system, evidenced by increased incidence of drought, longer dry seasons, shorter rainy seasons, increased temperature, coastal degradation and intrusion of saline water into aquifers, among others. Grenada's main economic sectors, tourism and

agriculture, can be severely impacted by climate change and present a serious blow to an economy that is already in critical condition. The majority (85%) of Grenada's land cover is made up of forests, agricultural crop lands and other perennial tree crops (50%) such as the main economic crops of cocoa and nutmeg, therefore efficient management and protection of our natural resources are a major priority.

## Intended Nationally Determined Contribution

Grenada commits to reducing its Greenhouse gas emissions by 30% of 2010 by 2025, with an indicative reduction of 40% of 2010 by 2030.



## Information provided in order to facilitate clarity, transparency, and understanding

### Scope and Coverage:

#### *Gases:*

- Carbon Dioxide,
- Methane

#### *Sectors:*

- Electricity,
- Transport,
- Waste,
- Forestry

#### *Percentage of total greenhouse gas emissions:*

100%

CFCs emissions are covered under the Montreal protocol. Emissions of other gases such as Nitrous oxide are assumed to be very little as to be considered negligible

### Quantifiable Information

#### *Timeframe and reference point:*

Grenada's target is for 2025. Indicative target is 2030

The reference point used is 2010

#### *Accounting approach for land sector:*

Grenada's land sector is made up of forested areas (dry and moist), cropland (abandoned, annual and perennial), grazing land, mangroves and beaches and shrub and grassland. For the purposes of this INDC Grenada's focus is the forested areas. The estimated tons of carbon per hectare of forest are 17,841.46.

*Metric:*

100yr global warming potential in accordance with IPCC AR4 guidelines

*Use of markets:*

Grenada currently uses no market mechanisms but is willing to explore the potential of market mechanisms and other mechanisms under the UNFCCC process that demonstrate environmental integrity.

*Domestic laws, regulations, and measures relevant to implementation:*

Grenada has been using the following policies as guiding principles for low carbon development. National Energy Policy 2011, Grenada Protected Area Systems Plan 2012, National Climate Change Policy and Action Plan (2007-2011)

*Relationship with inventory:*

Grenada's last inventory was completed in 1994 under its First National Communication to the UNFCCC. The information derived through the INDC process will be fed into Grenada's Second National Communication which will begin towards the end of 2015.

*Methodology*

The World Resources Institute's (WRI's) *Mitigation Goal Standard* and the *Policies and Actions Standard* served as the main methodologies that guided the analysis of Grenada's emissions trajectories and the approach to identifying policies and actions that can contribute to GHG emission mitigation by the target year.

**Fairness and Ambition**

Grenada's contribution is ambitious as it exceeds the requirements for SIDS that were decided upon at COP20 in Lima. Decision 1 CP/20 para 11 states that "small island developing states may communicate information on strategies, plans and actions for low greenhouse gas emission development..."

Grenada believes that all countries should play their part in reducing emissions and have therefore taken on an absolute emission reduction target in keeping with a comparative level of effort required globally by all parties to the agreement to be adopted in Paris at COP21.

### **Planning process**

Grenada INDC process was a government driven process. A technical committee was formed as a sub-group from the National Climate Change Committee and comprised of relevant Ministries including representatives from the Ministry of Agriculture, Lands, Forestry, Fisheries and the Environment and the Energy Division in the Ministry of Finance.

This committee, with the assistance of research institutions, coordinated the process of gathering data and conducting calculations and compiling information. This committee was also charged with coordinating national stakeholder engagement as well as gaining the final approval from Cabinet. The committee met with key stakeholders from the key sectors and the proposals contained herein have been endorsed by these stakeholders.

### **Support for implementation**

Grenada's INDC will cost USD\$161,430,500.00 to implement through 2025. Grenada anticipates meeting these costs through access to multilateral and bilateral support including through the Green Climate Fund, multilateral agencies and bilateral arrangements with development partners. These funds will be used to leverage the limited national resources and technical capacities that are available for combatting climate change.

## **Additional Information**

### **MITIGATION**

Grenada has shown its commitment to the reduction of its greenhouse gas emissions over the years by signing on to several international and regional initiatives and expressing commitment to a number of United Nations processes relative to Climate Change, Small Island Developing States, Biological Diversity, and the Millennium Development Goals. Additionally, Grenada is committed to energy related initiatives articulated at the global level through: Vision 20/30 GSEII, Carbon War Room Initiative for Renewable Energy, Caribbean Challenge Initiative, Sustainable Energy for All, the Caribbean Renewable Energy Development Programme, the Blue Economy Initiative, and the Energy and Climate Partnership for the Americas Caribbean Initiative.

In addition to these global and regional initiatives, the locally created “homegrown programme” Energy for the Poor/Sustainable Energy, is being implemented.

Grenada’s National Energy Policy serves as the main guideline for the Government to achieve sustainable energy and low carbon development. Its purpose is to:

- Create an appropriate, enabling and dynamic incentive regime, both regulatory and institutional, to achieve a more diversified and sustainable energy sector;
- Place energy sector management and development within the framework and principles of sustainable development to facilitate the transition to sustainable energy production and use; and
- Use energy as a tool for sustainable development and build resilience into a newly restructured economy to guarantee its citizens a sustainable quality of life.

A combination of actions already planned and national contribution actions will result in a reduction of Grenada’s greenhouse gas emissions by almost 50% of projected BAU by 2025. These include tax reduction incentive for use of solar panels and solar water heaters, installation of more energy efficient light bulbs in some government buildings. Grenada’s new electricity regulations and act, to be completed by end of 2015 for implementation, would open the door to allow new interest in renewable energy and energy efficiency methodologies in Grenada.

## **Grenada's National Contribution**

### ***Electricity***

Grenada depends largely on imported fossil fuels for energy production. Electricity production produced an average 48% of Grenada's GHG emissions in the 2010 to 2014 period. Grenada plans a 30% reduction in emissions through electricity production by 2025 with 10% from renewables and 20% from energy efficiency measures. To achieve this goal Grenada needs to produce 20MW hours of electricity from renewable sources at a conservative 45% portfolio capacity factor. This will emerge in the form of 10MW from solar, 15MW from geothermal and 2 MW from wind. Energy efficiency actions to reduce emissions include retrofitting of all buildings (20% reduction), establishment of policies for energy efficiency building codes for all building sectors (30% reduction) and implementation of energy efficiency in hotels (20% reduction).

### ***Transport***

The transport sector (land and marine) contributed an average 39% of Grenada's greenhouse gas emissions in the 2010 to 2014 period. Grenada plans to reduce its emissions in the transport sector by 20% by 2025. In order to meet its commitment Grenada plans to undertake several policies/actions including introduction of biofuel blends (specifically liquefied natural gas and diesel blend), implementation of gasoline and diesel taxes and implementation of fuel efficiency standards for vehicles through incentives.

### ***Waste***

The waste sector contributed to approximately 10% of Grenada's emissions. Grenada currently has plans to construct a controlled (or capped) landfill with engineering techniques to compact and cover the waste and collect the methane gas generated for electricity production. Any methane not captured from the landfill will be released into the atmosphere. However, it is possible with this process to reduce methane emissions from waste by 90%. Activities such as waste reduction, sorting and recycling can further reduce GHG emissions in the waste sector.

### **Forestry**

Grenada currently has 3,900 hectares of protected forest, a total of 11% of its forested area, an equivalent of 1344,141 tCO<sub>2</sub>. Grenada has a National obligation to protect 17% of its terrestrial area as part of the Aichi Target under the convention on Biological diversity. Additionally, as part of the Caribbean challenge initiative Grenada pledged to protect 20% of its terrestrial area.

Carbon sequestration and consequent accumulation rate of tons of carbon per hectare per year would be significantly increased (more than double) in Protected Areas where project activities are proposed. The replacement of the invasive bamboo with fast growing indigenous species that are ecologically adapted to the particular Protected Areas will undoubtedly sequester more carbon than that of bamboos. The additional support from the project will reduce incidents of forest fires (caused by uncontrolled fires of neighboring farmers/private land owners). Reduction

in forest fires will consequently contribute to less carbon emission into the atmosphere. Grenada is also currently undergoing development of its land policy which will address land use change in the future and rehabilitation and protection of specific areas.

## **ADAPTATION**

As a small island developing state Grenada is particularly vulnerable to the impacts of climate change, as evidenced by the impacts of extreme events and the occurrences of increased forest fires, crop loss, water shortages and incidence of pests and diseases occurring in recent years. As such, Grenada recognizes the need to reduce its vulnerability and strengthen the resilience of its land and people to the projected impacts of climate change. It is currently undertaking several projects in this regard, including addressing alternative/sustainable livelihoods and improving benefits of ecosystem services. Grenada's past and current adaptation actions have been in keeping with a robust National Climate Change Policy and Action Plan (NCCPAP) (2007-2011). Grenada is currently undertaking a review of the NCCPAP as part of the National Adaptation Planning (NAP) process. Grenada's resilience building plan is also in line with regional adaptation strategies.

Grenada's key economic sectors like agriculture and tourism are extremely vulnerable to the impacts of climate change. All of Grenada's economic areas including towns and ports are located on the coast, with the single airport on the island being one of the most vulnerable in the region to sea level rise. Any future adaptation plan must take into account the vital nature of these areas and accordingly contain steps to allow them to maintain their functions. Maintaining a healthy natural environment is also imperative as part of Grenada's efforts to reduce vulnerability to climate change and ecosystem based adaptation is a priority for Grenada

Grenada has realized the need to take an integrated approach to adaptation by linking local activities with national policies and sector specific experiences. Mainstreaming climate change adaptation activities into national development planning is a major focus and several actions have been identified to support resilience building at all levels. These include:

1. Enhancing institutional framework: establishing an integrated and coordinated approach to addressing climate change can help minimize capacity gaps in the system while ensuring coherence and cohesion at the local and national level. The objective is to evaluate and enhance the existing institutional framework to improve capacity to develop and institute plans for climate change adaptation at the local and national level.

Grenada has re-established its National Climate Change Committee which provides overall guidance and support to on climate change activities on the Island. Grenada has also began improving its institutional capacity by selecting climate change focal points in all line ministries and conducting trainings in climate change risk analysis and general as well as sector specific climate change knowledge. Grenada is also undertaking activities

to increase its potential to access international climate funding, the National Designated Authority for the Green Climate Fund has been formalized and actions to strengthen it are underway.

2. **Building Coastal resilience:** Grenada's economy is very dependent on healthy coastal areas, our beaches, coral reefs and mangroves all provide many ecosystem, social and economic benefits, therefore it is important to protect them from the adverse impacts of climate change. Grenada is in the advanced stages of developing its integrated coastal zone management policy and management system with the aim of facilitating integrative planning and management processes with the view to preserving and enhancing coastal ecosystems and ecosystem services while enabling social and economic development. As part of the policy development Grenada had to undertake a detailed mapping of the coastal features to provide a definition of the coast. Grenada has also re-established its beach monitoring program under new terms of reference and stronger institutional backing. Grenada is also undertaking several community ecosystem based adaptation actions including coral restoration, mangrove rehabilitation, all with alternative livelihood implications
3. **Improving water resource management:** The management of water resources, like that of the coastal environment is crucial to the long term development of Grenada as a nation. The goal is promoting and maintaining equitable and sustainable use of the water sources and their watersheds. In addition, improved capture, storage, distribution and conservation of water increases the adaptive capacity of individuals and communities.

Grenada has recently completed a vulnerability assessment of the water sector and developed a national adaptation plan and action plan for the water sector, mapping and water quality testing of informal water sources. Rain water harvesting activities are currently underway in some remote communities to improve water collection and storage.

4. **Building the resilience of communities:** It has become increasingly evident that buy in at the local levels can go a long way in aiding the success of adaptation actions. Grenada is committed to engaging community groups and NGOs in participating in activities geared at building resilience to climate change. A people that are knowledgeable about the expected threats and the actions that can be taken to reduce their vulnerabilities to these threats can help inform actions and policies that can further build their resilience. There is a need for capacity building at all levels for this approach to be more beneficial for all.

Grenada has already taken steps to assist CBOs and NGOs to become formalized to enable easier access to funding, and formal capacity building activities including training in communication of climate change information, training in GIS data collection and mapping, inclusion of representatives of NGOs and CBOs on various steering

committees. Grenada has also launched a funding programme where community groups can access funding for small climate change adaptation projects in an effort to help communities build their resilience

Implementation of further actions to reduce the level of vulnerability is severely constrained by the lack of capacity, human resources, technology, financial resources, data, knowledge and awareness. It is important to make use of existing new and emerging technologies such as early warning systems to reduce the impact of extreme events. Grenada is currently undertaking its technology needs assessments (TNA) and has selected the water, agriculture and tourism as the focal sectors. Water was identified as the more dominant crosscutting sector. The results of the TNA will provide the necessary information on technology needs for Grenada to continue its resilience building activities.



## REPÚBLICA DE GUATEMALA

### CONTRIBUCION PREVISTA Y DETERMINADA A NIVEL NACIONAL

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#### 1. PRESENTACION

Ante la urgencia de asumir una acción colectiva necesaria para evitar un incremento de la temperatura y variabilidad climática peligrosa; en concordancia con las decisiones 1/CP.19 y 1/CP.20 de la Conferencia de las Partes de la Convención Marco de Naciones Unidas sobre Cambio Climático (CMNUCC); respondiendo al llamado de Lima<sup>1</sup>, y en su esfuerzo por contribuir a alcanzar el objetivo contenido en el Artículo 2 de la Convención, Guatemala presenta ante el Secretariado de la CMNUCC su “**Contribución Prevista y Determinada a Nivel Nacional**” (INDC por sus siglas en inglés).

Guatemala es particularmente vulnerable a los efectos de Cambio Climático, de los cuales tendrá que soportar una carga anormal y desproporcionada, situación que amenaza a su población, su patrimonio, la producción de alimentos y los medios de subsistencia, impidiendo que el desarrollo económico y social prosiga de manera sostenible. Lo anterior, pone de manifiesto la necesidad de hacer un llamado mundial al cumplimiento de las responsabilidades comunes pero diferenciadas y, con ello, a la provisión de recursos robustos, sostenibles, transparentes, predecibles y adicionales. que acompañen el desarrollo de este INDC que presenta el país al igual que el de los otros países más vulnerables.

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<sup>1</sup> (1/CP.20, párrafo 12).

La presentación de este INDC sucede en el contexto de un país que recién ha estabilizado una crisis política. En este escenario, que el Consejo Nacional de Cambio Climático (creado por el Decreto 7-2013<sup>2</sup>, en adelante Ley Marco de Cambio Climático, y conformado por entidades gubernamentales, universidades, pueblos indígenas, campesinos, sector privado, organizaciones no gubernamentales) impulsa el cumplimiento de los compromisos del Estado frente a la Convención Marco de Naciones Unidas sobre Cambio Climático y se une en un esfuerzo de país, para que éste, no obstante sus condiciones y circunstancias, responda al llamado mundial de las Naciones.

Las contribuciones contenidas en el INDC se incorporaran al Plan Nacional de Desarrollo –KATUN 2032- del país en un esfuerzo articulado, coherente y sistémico con los Objetivos de Desarrollo Sostenible (ODS) al 2030, con un enfoque bajo en emisiones. Lo anterior, cumpliendo con los mandatos de la Política Nacional de Cambio Climático (Acuerdo Gubernativo 329-2009), la Ley Marco de Cambio Climático y sus salvaguardas (Art. 3), los derechos humanos, la equidad de género, los derechos de los pueblos indígenas y los principios reconocidos internacionalmente por el país.

Este INDC se presenta sin perjuicio de la naturaleza jurídica que éste llegue a tener, así como el contenido de un protocolo u otro instrumento o resultado, que se acuerde con fuerza legal, aplicable a todas las partes bajo el Marco de la Convención en referencia.

## **2. CONTEXTO**

Guatemala cuenta con gran riqueza natural y cultural. Se encuentra entre los 19 países **Megadiversos** del planeta, con un 33.7% de su territorio con cobertura forestal. Sus bosques nativos contribuyen significativamente con los medios de vida de las poblaciones locales. Alrededor de un tercio del territorio nacional ha sido declarado área protegida y cuenta con gran riqueza de bienes y servicios ecosistémicos. La riqueza pluricultural del país y los conocimientos tradicionales y ancestrales de sus diferentes pueblos, constituye un potencial para la implementación del INDC.

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<sup>2</sup> Ley Marco para Regular la Reducción de la Vulnerabilidad, la Adaptación Obligatoria ante los Efectos del Cambio Climático y la Mitigación de Gases de Efecto Invernadero.

El país siendo parte de un istmo y se ubica en una región altamente vulnerable, situada entre tres placas intercontinentales y con características hídricas y geomorfológicas particulares. Localizado en una zona de convergencia intertropical y en la zona de influencia de los fenómenos del Niño y de la Niña y entre el Océano Atlántico y Pacífico lo hace vulnerable y frágil. Se encuentra en la ruta de los huracanes y tormentas tropicales del Caribe<sup>3</sup>.

Guatemala está expuesta a eventos extremos. En los últimos dieciséis años (1998 al 2014), se han registrado un total acumulado de ocho eventos hidro-meteorológicos extremos ligados al cambio climático (los huracanes y tormentas tropicales Mitch, 1998; Stan, 2005; Agatha, 2010; y algunas depresiones tropicales y sequías importantes). Las pérdidas y daños acumulados ascienden a más de US\$ 3,5 mil millones de dólares, distribuidos principalmente en los sectores afectados de infraestructura, agricultura y salud. Entre 1998 y 2010, la variabilidad climática ocasionó pérdidas económicas en el sector agrícola en el orden de los US\$ 1,85 mil millones.

Se prevé el aumento de la magnitud y la frecuencia de fenómenos naturales tales como tormentas, sequías, heladas, que impactan especialmente a las poblaciones más vulnerables del país y que conlleva: I) la reducción de la disponibilidad y calidad del agua; II) el desplazamiento de plagas, vectores, comensales, depredadores y enfermedades a nuevas zonas geográficas; III) las alteraciones y bloqueos en la cadena alimenticia en los sistemas terrestres y marino-costeros; IV) el aumento de incendios forestales por sequías y plagas; V) la pérdida de infraestructura; VI) el aumento de la inseguridad alimentaria por pérdida de cosechas; VII) la destrucción de espacios naturales y diversidad biológica; VIII) los impactos negativos sobre todos los medios de subsistencia humana, la identidad cultural y los conocimientos tradicionales y ancestrales; y, IX) la reducción de la cantidad y de la calidad del suelo; entre otros.

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<sup>3</sup> Según el Germanwatch (2015) por varios años, Guatemala, se ha mantenido en el listado de los diez países más vulnerables a nivel global.

Según la Estrategia Internacional para la Reducción de Desastres (UNISDR) y datos del IPCC, ANEXO I.8 e), la vulnerabilidad socio-ambiental del país se manifiesta en los altos niveles de pobreza imperantes (aproximadamente el 51% de la población en pobreza y el 15% en pobreza extrema), el 49% desnutrición infantil y el bajo índice de desarrollo humano (IDH). Los grupos poblacionales más impactados son los pueblos indígenas, los agricultores de subsistencia, los pescadores artesanales y, entre ellos, las mujeres y los niños.

No obstante ser Guatemala la economía más grande de Centroamérica, se ubica dentro de los países con mayores niveles de desigualdad en Latinoamérica, con altos índices de pobreza –particularmente en zonas rurales y pueblos indígenas- y con tasas de desnutrición crónica y de mortalidad materno-infantil de los más altos en la región. Lo que resulta en el Índice de Desarrollo Humano (IDH) más bajo de Latinoamérica.

Sobre la base de información del Banco Mundial (Banco de Guatemala) país ha mantenido un crecimiento económico promedio anual del 4.2% entre 2004 y 2007. Se prevé que el crecimiento anual promedio en 2015-2016 será de 3.6%, impulsado por el consumo privado y un aumento en las exportaciones y las remesas. Sin embargo, los impactos relacionados a la variabilidad climática en Guatemala tiene un efecto de 1.3% a 3.7% anual en producto interno bruto (PIB) y se estima que entre el 40% y 70% del impacto está en el sector agrícola.

En términos de emisiones de gases de efecto invernadero (GEI), Guatemala contribuye con menos del 0.1% de las emisiones mundiales y sus emisiones son 2.48 tCO<sub>2</sub>e/cápita, al año 2005 cifra considerablemente menor al promedio de las emisiones *per cápita* de la región de Latinoamérica y el Caribe (4.6 tCO<sub>2</sub>e/cápita).

El Estado de Guatemala ha iniciado acciones concretas para enfrentar los desafíos que representa el cambio climático. Guatemala cuenta con una Política Nacional de Cambio Climático y una de las primeras leyes de cambio climático a nivel mundial: Ley Marco de Cambio Climático, mediante la cual se creó el Consejo Nacional de Cambio Climático (Art. 8), que integra a los sectores del país (gobierno, municipalidades, alcaldes y autoridades indígenas, privado, campesino, organizaciones no gubernamentales, indígena y universidades).

Adicionalmente, existen esfuerzos de otros sectores de la sociedad, tales como: la Mesa Nacional, la Mesa Indígena de Cambio Climático, el Sistema Guatemalteco de Ciencias del Cambio Climático, el Instituto Privado de Investigación sobre Cambio Climático del gremio azucarero.

### **3. MITIGACIÓN**

#### **3.1. ENFOQUE METODOLÓGICO**

Guatemala ha realizado cuatro inventarios nacionales de emisiones GEI correspondientes a los años 1990, 1994, 2000 y 2005. La metodología empleada para el cálculo de los Inventarios Nacionales de Gases de Efecto Invernadero, corresponde a las “Directrices del IPCC para la realización de los de 1996”, asumiendo los valores de los potenciales de calentamiento global (GWP, por sus siglas en inglés) del segundo informe del IPCC (SAR).

Únicamente el inventario del año 1990 ha sido oficializado mediante la Primera Comunicación Nacional. Los inventarios adicionales se encuentran en proceso de revisión y serán presentados como parte de la Segunda Comunicación Nacional.

El análisis de la tendencia mostrada en los cuatro inventarios realizados señala que en el período 1990-2005 el país ha tenido un crecimiento de emisiones promedio correspondiente a 0.90 millones de toneladas de CO<sub>2</sub> equivalente por año. Asimismo, las emisiones reportadas en el último inventario disponible (año base 2005) muestran que el país emitió un total de 31.45 millones de toneladas de CO<sub>2</sub> equivalente (ver Figura 1). Los inventarios usados en el estudio base incluyeron todas las emisiones de los sectores energía, procesos industriales, agricultura, desechos y –UTCUTS-. No se incluyeron en estos inventarios las remociones del sector UTCUTS.

Aplicando el crecimiento tendencial del período 1990-2005 a las emisiones base del año 2005, se proyectó una emisión total para el año 2030 de 53.85 millones de toneladas de CO<sub>2</sub> equivalente, que corresponde al valor base sobre el cual se calculan las reducciones propuestas.

## 3.2. RESUMEN CUANTIFICABLE DE ASPIRACIÓN

### 3.2.1. Propuesta No Condicionada

De acuerdo al principio de responsabilidades comunes pero diferenciadas y sus actuales capacidades, Guatemala planifica lograr una reducción del 11.2% de sus emisiones GEI totales del año base 2005 proyectado al año 2030. Esta reducción del 11.2% implica que las emisiones, en un escenario tendencial (BAU por sus siglas en inglés) de 53.85 millones de toneladas de CO<sub>2</sub> equivalentes para el año 2030, serán reducidas a un valor de 47.81 millones de toneladas de CO<sub>2</sub> equivalentes en ese año.

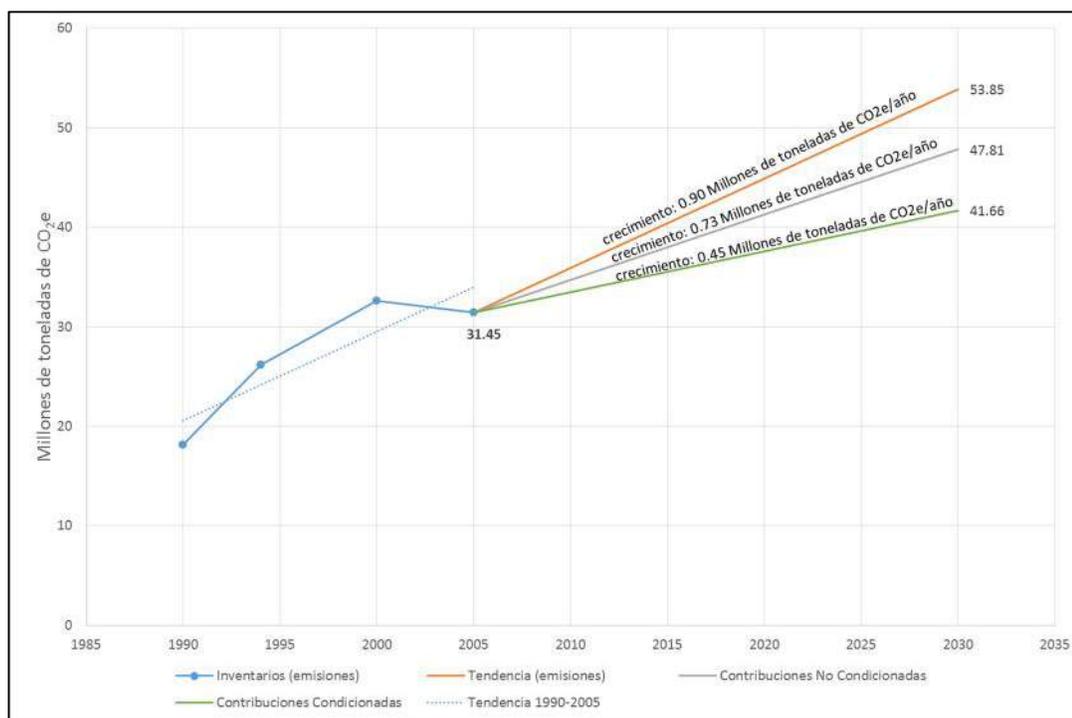


Figura 1. Tendencias de emisiones y contribuciones de Guatemala

### 3.2.2. Propuesta Condicionada

Guatemala plantea una reducción más ambiciosa que la anterior, de hasta el 22.6% de sus emisiones GEI totales del año base 2005 proyectado al año 2030. Esta reducción del 22.6% implica que las emisiones, en un escenario tendencial (BAU) de 53.85 millones de toneladas de CO<sub>2</sub> equivalentes para el año 2030, serían reducidas a un valor de 41.66 millones de toneladas de CO<sub>2</sub> equivalentes en ese año (ver Figura 1). Como condición para alcanzar esta meta ambiciosa, será necesario contar con el apoyo técnico y financiero necesario proveniente de recursos internacionales públicos y privados, nuevos y adicionales.

Los sectores de la economía nacional con mayor necesidad de soporte para la implementación de las políticas y estrategias de reducción de emisiones son: bosques, agricultura y transporte.

El subsector transporte presenta oportunidades de inversión para el mejoramiento de la movilidad urbana basada en transporte masivo eficiente que favorezca la productividad de todos los sectores del país y contribuya a una reducción significativa de las emisiones.

Los datos presentados en este INDC se encuentran en un proceso de revisión constante, junto con una mejora continua en los sistemas de monitoreo de emisiones de GEI. Por lo tanto, es posible que se den cambios y se realicen cambios y ajustes posteriores.

### **3.2.3. Supuestos**

Las contribuciones anteriormente descritas se podrán alcanzar, si se dan supuestos como los siguientes:

- a) Se da una dinámica de formación de capital para el país similar al promedio observado en las últimas dos décadas, un crecimiento estable del sector financiero y una tendencia a una estabilidad macroeconómica.
- b) Ningún acontecimiento nacional relevante, perjudica la asignación de recursos financieros a nivel nacional e internacional y no es necesario reorientar actividades y políticas públicas, restando financiamiento a temas priorizados para el país como educación, salud y seguridad.
- c) Se prioriza la implementación de estrategias, políticas y acciones en temas de cambio climático definidas en la ley marco respectiva y los tratados, convenios y acuerdos internacionales en la materia.
- d) Se aumenta la competitividad del país y con ello, la inserción más eficiente a la economía global.

- e) Se considera la potencial participación del país en los mecanismos de mercado de carbono que sean estables.
- f) Se tiene acceso a tecnologías más eficientes y costo efectivas que permitan alcanzar reducciones de emisiones GEI y mantener el monitoreo correspondiente.

#### **3.2.4. Plazo y/o periodo de aplicación**

El periodo de aplicación es 2016 – 2030, con revisiones periódicas de acuerdo con los ciclos que se establezcan en el nuevo acuerdo, utilizando de base la información de los años 1990-2005. Esto permite al país mejorar la métrica y contabilidad de las emisiones, así como también una reorientación de las líneas de acción de ser necesario.

#### **3.2.5. Ámbito de aplicación y cobertura**

Cobertura: a nivel nacional.

Gases de Efecto Invernadero: Dióxido de carbono (CO<sub>2</sub>), metano (CH<sub>4</sub>) y óxido Nitroso (N<sub>2</sub>O) (expresados en CO<sub>2</sub> equivalente).

Sectores emisores: energía, uso del suelo y cambio de uso del suelo y silvicultura, agricultura, desechos y procesos industriales.

### **4. DE LA ADAPTACIÓN**

Guatemala es un país que sufre los efectos del cambio climático que, por sus características sociales y económicas es considerado muy vulnerable. El Estado de Guatemala, a través de varios instrumentos nacionales, promueve y propone la reducción transversal de la vulnerabilidad y mejoramiento de los procesos de adaptación en sectores clave; estableciendo para esto de manera prioritaria fortalecer los procesos de adaptación en:

- Salud humana
- Zonas marino costeras
- Agricultura, ganadería y seguridad alimentaria
- Recursos forestales, áreas protegidas
- Conservación y gestión de ecosistemas estratégicos
- Infraestructura
- Gestión integrada de los recursos hídricos
- Calidad de la infraestructura productiva

- Protección del suelo
- Gestión integral de Reducción de Riesgo de Desastres.

En cumplimiento con la ley marco de cambio climático, actualmente se está desarrollando el plan de acción nacional de adaptación y mitigación al cambio climático, el cual se debe actualizar de acuerdo a los resultados de las futuras comunicaciones nacionales. A partir de dicho Plan, cada institución del gobierno elaborará sus planes estratégicos institucionales para hacer frente al cambio climático de acuerdo a su mandato legal, lo que implica una fuerte incidencia en el proceso de planificación nacional y su vínculo con el presupuesto general de la Nación.

En materia de reducción de riesgo de desastres vinculados a eventos climatológicos extremos, el país desarrolla un proceso de unificación de información climática y el desarrollo de sistemas de alerta temprana; sin embargo, aún existen barreras de carácter tecnológico, financiero y cultural que requieren de un mayor apoyo para agilizar la capacidad de respuesta de las instituciones y la población. La ley marco de cambio climático (Art. 14) dispone la elaboración de guías metodológicas para la gestión de riesgo, la reducción de la vulnerabilidad y el mejoramiento de la capacidad de adaptación.

En el tema agropecuario y de seguridad alimentaria, el sistema de monitoreo de cultivos - coordinado entre instancias de gobierno y programas del sector privado y enfocados en seguridad alimentaria nutricional y agencias de cooperación internacional-, prioriza aquellas acciones que tenga efecto directo en la producción de alimentos, principalmente para el autoconsumo y subsistencia en zonas prioritarias.

La mayor parte de la población está vinculada al sector agropecuario y existe la necesidad de facilitar a los productores las herramientas necesarias y la tecnología para enfrentar el cambio y la variabilidad climática en el sector que promueva buenas prácticas de adaptación que propicie el ajuste de los sistemas agro productivos frente al entorno cambiante del clima y sus derivaciones.

En materia de reducción de riesgo de desastres vinculados a eventos climatológicos extremos, se inició un proceso de unificación de información climática y el desarrollo de sistemas de alerta temprana; sin embargo, aún existen barreras de carácter tecnológico, financiero y cultural que requieren de un mayor apoyo para agilizar la capacidad de respuesta de la población y sus instituciones.

## **5. MECANISMOS DE IMPLEMENTACIÓN**

Los mecanismos de implementación se refieren a los instrumentos, instituciones, políticas, estrategias, planes, programas o proyectos de apoyo para alcanzar la aspiración del país para la efectiva reducción de gases de efecto invernadero.

La ley marco de cambio climático creó, a nivel político, el consejo nacional de cambio Climático orientado a velar por la aplicación de esa ley. Adicionalmente, se han creado unidades técnicas especializadas en los Ministerios de Ambiente, Agricultura, Energía y Minas, Finanzas, Relaciones Exteriores y otras dependencias como: Consejo Nacional de Áreas Protegidas, Instituto Nacional de Bosques, Instituto de Sismología, Vulcanología, Meteorología e Hidrología.

La ley marco de cambio climático dicta las directrices nacionales del proceso de planificación y programación de la inversión pública para integrar la variable del cambio climático y ordena la elaboración del plan de acción nacional de adaptación y mitigación, el cual se encuentra en construcción. Con base a ese Plan, la ley ordena que se desarrollen los planes estratégicos institucionales de reducción de la vulnerabilidad, adaptación y mitigación al cambio climático vinculados a la planificación nacional y al presupuesto de la Nación.

La ley marco de cambio climático también creó el sistema nacional de información (Art. 9) sobre cambio climático que contendrá información en temas de mitigación y adaptación.

En cuanto a los ecosistemas marino-costeros, se cuenta con una Política para el Manejo Integral de las Zonas Costeras de Guatemala (Acuerdo Gubernativo 328-2009) que ya considera la variable del cambio climático y es coherente con la Política Nacional de Cambio Climático.

Entre las acciones relevantes se considera la implementación de la estrategia nacional de diversidad biológica y su plan de acción 2012 - 2022, que permita la integración de la diversidad biológica en la adaptación y mitigación al cambio climático y la valoración de los conocimientos ancestrales de los pueblos indígenas, reconociendo el papel de los modelos económicos campesinos e indígenas, culturalmente pertinentes en la adaptación al cambio climático.

En el tema de reducción de riesgos, se impulsa la Política Nacional para la Reducción de Riesgo a los Desastres, enfocada en la implementación de las líneas de acción para el cumplimiento de la meta que establece el Plan Nacional de Desarrollo (Katún 2032), en la cual se establece que el 100% de las instituciones públicas y los gobiernos locales aplican criterios de territorios ciudades y municipios resilientes

En cuanto a la adaptación y su relación a la salud humana, el país establece de manera prioritaria el cumplimiento y apoyo al desarrollo del plan estratégico institucional del Ministerio de Salud Pública y Asistencia Social y del Instituto Guatemalteco de Seguridad Social (IGSS), tomando en cuenta los siguientes temas: enfermedades vectoriales que se puedan incrementar y otras relacionadas a la variabilidad y el cambio climático.

Actualmente se elabora una Estrategia de Desarrollo con Bajas Emisiones que considerará los aspectos de financiamiento y asistencia técnica para la implementación de políticas públicas, estrategias y programas específicos en todos los sectores.

Guatemala persigue que la implementación de los mecanismos de mitigación y adaptación, cuando sea posible, tengan el propósito múltiple de incidir en la mitigación, en la adaptación y en la reducción de la vulnerabilidad al cambio climático. A continuación, se especifican los mecanismos principales, ordenados por sector de emisión conforme lo establece la CMNUCC.

## 5.1. MITIGACIÓN

### Energía

- Matriz de generación eléctrica del país con un enfoque al aumento del aprovechamiento de fuentes renovables. Actualmente, el Sistema Nacional Interconectado (SNI) cuenta con generación eléctrica del 69.72% renovable y se espera que para el año 2030, la generación eléctrica sea del 80% a partir de fuentes renovables.
- La Política Energética 2013-2027 en sus ejes: 1) Seguridad del abastecimiento de electricidad a precios competitivos, 4) Ahorro y uso eficiente de la energía y 5) Reducción del uso de la leña en el país a través de La Estrategia Nacional de Uso Eficiente y Sostenible de la Leña.
- Ley de incentivos para el desarrollo de proyectos de energía renovable (Decreto 52-2003).
- Norma técnica para la conexión, operación, control y comercialización de la generación renovable –NTGDR- y los usuarios auto-productores con excedentes de energía.
- Subsector transporte: implementación y mejora del sistema Transmetro (BRT por sus siglas en inglés) actualmente en operación en la ciudad de Guatemala. Además, se impulsara una normativa para establecer un programa de incentivos fiscales y subsidios enfocados en el uso de energías limpias para el transporte público y privado, incluyendo normativa para regular las emisiones de GEI en el transporte público colectivo e individual (Art. 21).
- Implementación del Plan Nacional de Energía, estipulado en la Ley marco de Cambio Climático (Art. 18).

### Uso y Cambio de Uso de la Tierra y Silvicultura:

- Implementación de la Estrategia de Reducción de las Emisiones por Deforestación y Degradación de Bosques -REDD+-: actualmente se encuentra en desarrollo acoplándose a una visión de mejora e integración a los instrumentos de política pública en el sector forestal.
- Implementación de las Agendas de Cambio Climático de las instituciones públicas relacionadas al cumplimiento del Art. 20, de la Ley Marco de Cambio Climático principalmente con la Implementación de la Estrategia de Biodiversidad y Cambio Climático.

- En el país se cuenta con un Sistema Guatemalteco de Áreas Protegidas (SIGAP), que abarca un 33% del territorio nacional.
- Fortalecimiento para el Sistema Nacional de Prevención y Control de Incendios Forestales -SIPECIF-.
- Continuidad de la implementación y cumplimiento de instrumentos de política de gestión forestal en la que resaltan: la nueva Ley de Fomento al Establecimiento, Recuperación, Restauración, Manejo, Producción y Protección de Bosques de Guatemala -PROBOSQUE, Decreto 02-2015-, el Programa de Incentivos Forestales -PINFOR- y Programa de Incentivos Forestales para Poseedores de Pequeñas Extensiones de Tierra de Vocación Forestal o Agroforestal –PINPEP-, Estrategia Nacional de Restauración del Paisaje Forestal con una meta de 1.2 millones de hectáreas, la Estrategia de Vínculo entre Bosque Industria y Mercado y la Estrategia Nacional para el Combate de la Tala Ilegal.

#### Agricultura

- La existencia de una Política Agropecuaria para fortalecer el Sistema Nacional de Extensión Rural -SNER-, entre otros programas vinculados al Plan de Acción para la Implementación de la Política Nacional de Desarrollo Rural Integral.
- El planteamiento de planes operativos anuales institucionales vinculados con el sector agrícola programados en función de las micro-cuencas.
- La implementación de la Política de Riego con enfoque integrado del recurso hídrico.

#### Desechos

- Existencia de una Política de Desechos Sólidos (actualmente en elaboración), por parte del Ministerio de Ambiente y Recursos Naturales –MARN-, para consolidar las acciones en este sector.
- Implementación del Reglamento de Aguas Residuales -Acuerdo Gubernativo 236-2006-, como un instrumento para el tratamiento de las emisiones producidas por este sector.

### Procesos Industriales

- Desarrollo y coordinación para el involucramiento del sector privado a través de acciones enmarcadas en la Política de Producción más Limpia, que se implemente como una herramienta de la competitividad y la gestión ambiental.
- Existencia de un Programa de Incentivos que motive actividades voluntarias de reducción o absorción de emisiones GEI, (Art. 19).

## **6. MECANISMOS FINANCIEROS**

El Fondo Nacional del Cambio Climático –FONCC-, como un importante instrumento financiero para la implementación de la ley (Art. 24), junto con el Fondo Nacional de la Conservación, FONACON y el Fondo Nacional para la Reducción de Desastres, regulado en el Art. 15 de la Ley Decreto 109-96; son instrumentos para canalizar recursos nacionales e internacionales necesarios para prevenir y/o enfrentar los efectos del cambio climático. Por ley, todos los fondos deben contar con los aportes determinados en el Presupuesto de Ingresos y Egresos del Estado.

Guatemala ya cuenta con la Autoridad Nacional Designada –MARN- para la implementación del Fondo Verde del Clima como principal instrumento financiero de la CMNUCC.

Guatemala se encuentra participando en la Iniciativa Global de Finanzas para la Biodiversidad -BIOFIN- y está desarrollando un Programa Nacional de Reducción de Emisiones para REDD+ que contará con un mecanismo financiero a nivel nacional, para el pago por resultados por reducción de emisiones en bosques.

Se ajustará y actualizará la Estrategia Financiera Nacional de Lucha contra la Desertificación y la Sequía.

Adicionalmente Guatemala cuenta con una serie de mecanismos que apoyan la implementación de diversas políticas y leyes, entre estos: el fondo de canje de deuda por naturaleza con Estados Unidos y los programas de incentivos forestales existentes establecidos por las leyes, Programa de Incentivos Forestales PINFOR y Programa de Incentivos Forestales para Poseedores de Pequeñas Extensiones de Tierra de Vocación Forestal o Agroforestal, PINPEP.

Recientemente (24 de septiembre, 2015) en otro esfuerzo nacional, se ha aprobado la Ley de Fomento al Establecimiento, Recuperación, Restauración, Manejo, Producción y Protección de Bosques en Guatemala –PROBOSQUES-.

El Gobierno de Guatemala actualmente se encuentra por implementar con el Gobierno de la República Federal de Alemania un Canje de Deuda por Adaptación al Cambio Climático en zonas vulnerables. Se espera seguir promoviendo este tipo de instrumentos con otros países desarrollados o emergentes.

No obstante lo anterior, los recursos del presupuesto del Estado no son suficientes para cubrir la extensa y profunda brecha para poder atender los efectos del cambio climático y alcanzar los compromisos del INDC y las metas de los ODS al 2030, la construcción de capacidades, la adaptación, la reducción de la vulnerabilidad y la mitigación. Razón por la cual el país hace un llamado a la comunidad internacional para que, cumpliendo con una responsabilidad común pero diferenciada, se provea al país de recursos financieros adicionales al financiamiento para el desarrollo –ODA-.

Gobierno de Guatemala  
Ministerio de Ambiente y Recursos Naturales  
MARN  
Guatemala, 29 de Septiembre 2015.



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**REPUBLIC OF GUINEA**

**INTENDED NATIONALLY DETERMINED  
CONTRIBUTION (INDC) UNDER THE UNITED  
NATIONS FRAMEWORK CONVENTION ON CLIMATE  
CHANGE (UNFCCC)**

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*September 2015*

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## LIST OF ACRONYMS AND ABBREVIATIONS

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CDM	Clean Development Mechanism
ECOWAS	Economic Community of West African States
FAO	Food and Agriculture Organization
GEF	Global Environment Facility
GHG	Greenhouse gas
INC	Initial National Communication of the Republic of Guinea
INDC	Intended Nationally Determined Contribution
LDC	Least Developed Country
LUCF	Land-Use Change and Forestry
MEEF	Guinean Ministry of the Environment, Water and Forestry
NAMA	Nationally Appropriate Mitigation Actions
NAPA	National Adaptation Plan of Action
PNC-COP21	<i>Plateforme Nationale de concertation COP21</i> (National Consultation Platform COP 21)
PRSP-III	2013-2015 Poverty Reduction Strategy Paper
REDD+	Reducing Emissions from Deforestation and Forest Degradation
RGPH	<i>Recensement Général de la Population et de l'Habitation</i> (General Census of Population and Housing)
SDAM	<i>Schéma directeur d'aménagement de la mangrove</i> (Mangrove management and development plan)
SE4All	Sustainable Energy for All
UNFCCC	United Nations Framework Convention on Climate Change

# SUMMARY

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**Background:**

- Population: 7.2 million (RGPH 1996)
- Demographic growth rate: 3.1%/p.a. (RGPH 1996)
- GHG emissions: 2.1 tonnes CO<sub>2</sub>eq/per capita in 1994
- Guinea's share of global emissions: less than 0.1%
- GDP growth: 3.9% in 2012 (PRSP-III)
- Share of agriculture in GDP: 20.1% in 2014 (World Bank)
- Poverty rate: 55.2% in 2012 (PRSP-III)

**Year of reference:** 1994

**Commitment period:** 2016-2030

Contribution conditional upon international support.

**Sectors concerned:** Agriculture, forestry, energy, water resources, coastal zone, livestock, fisheries and mines

**Estimated level of mitigation:** -13% greenhouse gas (GHG) emissions in 2030 as compared to 1994 (Initial National Communication of the Republic of Guinea), excluding Land-Use Change and Forestry (LUCF)

**Estimated funding needs:**

- Adaptation: up to US\$1.7 billion over the period
- Mitigation: at least US\$6.5 billion over the period for the energy sector alone

## 1. NATIONAL CONTEXT

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### NATIONAL DEVELOPMENT GOALS AND SUSTAINABLE DEVELOPMENT STRATEGY PRIORITIES

Coming 178th (out of 187 countries) on the Human Development Index, the Republic of Guinea suffers from severe structural vulnerabilities, despite recent progress. The national poverty rate stood at 55.2% in 2012, meaning that 6.2 million Guineans were living below the poverty line. Around one child in every three was suffering from malnutrition in 2012. In short, few Millennium Development Goals (MDGs) are likely to be reached in 2015. Nevertheless, against a background of strong demographic growth (with the population doubling every 25 years), there is an urgent need to speed up and diversify economic growth to meet the present social challenges whilst not placing undue constraints on future generations.

Sustainable development is therefore still a priority if the vital needs of the Guinean population are to be addressed. Moreover, the greenhouse gas (GHG) emissions of the Republic of Guinea are well below the global average.

### OBJECTIVE OF THE INDC OF THE REPUBLIC OF GUINEA

The Republic of Guinea ratified the United Nations Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol in 1993 and 2005 respectively. Since then, it has worked out strategies to combat climate change, including its Initial National Communication, on the basis of an inventory of greenhouse gases (GHG) taken in 2001 (based on emissions in 1994). A second inventory was taken in 2011 (emissions in 2000), but has not yet led to the submission of a new National Communication. Finally, the Republic of Guinea prepared its National Adaptation Plan of Action (NAPA) in 2007 and undertook several projects to implement the plan.

Guinea must now face up to two major challenges: lifting its people out of poverty and ensuring the country's food security – with a population growing at 3% per year and expected to reach 18 – 20 million in 2030. Its ambition is also to move from the status of Least Developed Country (LDC) to that of Emerging Country by 2030, which means that GDP must grow by 5-7% per year. Bearing in mind these aims and population growth, Guinea's energy needs may well double in the space of 20 years. Consequently, **assuming that practices and systems remain unchanged, the estimated annual emissions growth rate is +4.4%**, i.e. slightly more than doubling every 20 years.

Guinea has particularly abundant natural resources, especially forests, meaning that it is considered as a carbon sink (Initial National Communication, 1994). In addition, more than 1000 watercourses and four of the major West African rivers rise in the country. These resources are under severe threat from the impact of

climate change and regional population flows are likely to increase the pressure. Because of its geographical location, Guinea could become a refuge for people from neighbouring Sahelian countries to the north, especially pastoralists who are more seriously affected by drought and changes in rainfall patterns. Moreover, Guinea is of great significance to the aluminium industry in the world, as it holds more than one third of the planet's bauxite reserves.

For all these reasons and with a view to making the most effective contribution possible to its own and its neighbours' sustainable development, Guinea seeks to become a stabilizing influence in the sub-region by 2030, as a result of:

- ⇒ preserving and enhancing its water resources;
- ⇒ striving to keep its status as a carbon sink;
- ⇒ exploiting its soil and sub-soil resources on a rational basis;
- ⇒ stimulating thinking at ECOWAS level with a view to greater consideration of climate change issues in the Regional Transhumance Plan.

There are several possible ways of achieving these aims, such as developing renewable energies, improving energy efficiency, reducing pressure on the forests through sustainable management of forestry resources and land, developing and improving farming and pastoral practices to cope with climate change, etc.

## **THE PROCESS OF PUTTING TOGETHER GUINEA'S INDC**

The National Environment Department of the Ministry of Environment, Water and Forestry (MEEF) is responsible for co-ordinating the implementation of government policy on combating climate change and also deals with GHG inventories.

The **National Consultation Platform** on COP21 (hereinafter PNC-COP21) was set up on the initiative of the MEEF to mobilize representatives of the State, technical departments, civil society and the private sector so that Guinea's voice could be heard, taking on board contributions from all relevant institutions and every level of society. Its objectives include the development of information and communication concerning COP 21 and raising the awareness of civil society and economic operators. It comprises a high-level (ministerial) segment and 11 thematic panels which helped to draw up the INDC.

## **2. ADAPTATION COMMITMENTS**

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### **JUSTIFICATION FOR THE INCLUSION OF ADAPTATION IN THE INDC**

Promoting sustainable economic development that takes account of adaptation to climate change is key to anticipating impacts and thus being able to reduce the expense and damage they can cause. In this regard, it is vital to include Guinea's main adaptation challenges in the INDC, in order to draw the attention of the international community to the massive efforts that the country needs to make to cope with the negative impacts of climate change, as well as to shoulder its responsibilities in relation to the vulnerability of the West African sub-region.

Guinea finalized its National Adaptation Plan of Action (NAPA) in 2007, having identified the following vulnerable sectors: crop and livestock farming; water; and the coastal and forest zone. The NAPA also helped to identify the groups most vulnerable to climate change in different regions of the country, including in particular poor communities in rural areas such as farmers and small producers (men and women) and people whose livelihood mainly depends on the use of natural resources (hunters, fishermen, salt producers, etc.).

Guinea has ratified the other two Rio conventions and put together national strategies to combat desertification and soil degradation, as well as conserve biodiversity. Implementation of these two strategies will also facilitate adaptation to climate change.

### **IMPACTS OF CLIMATE CHANGE**

With its present favourable climate for agriculture (average annual rainfall of 1200 mm in the North and North-East, 4000 mm in Conakry and up to 1800 mm in the mountains of Fouta-Djalón), Guinea is both exposed and sensitive to climate change and has very little capacity to adapt. The main impacts of climate change affecting

the country include: i) an overall increase in average temperatures; ii) a drop in average annual rainfall especially in North-West and North-East Guinea, together with a change in the frequency and intra-year distribution of precipitations; and iii) the rising sea level (around 80 cm by 2100). These new climate conditions could therefore have negative consequences for many different sectors.

Nevertheless, even with altered rainfall patterns, Guinea should still continue to enjoy more favourable climatic conditions than its neighbours to the north and could become a more important transhumance destination for Sahelian herds than it is now, resulting in serious conflicts over land use.

### **CURRENT AND PLANNED COMMITMENTS**

Guinea is both sensitive and exposed to climate change. Located at the gates of the Sahel, one of the regions of the world most affected by climate change, Guinea must quickly reduce its vulnerability for the benefit of both its own people and its neighbours.

**In order to deal with the local consequences of climate change – for which it actually bears no historic responsibility – the Republic of Guinea hereby undertakes the following commitments:**

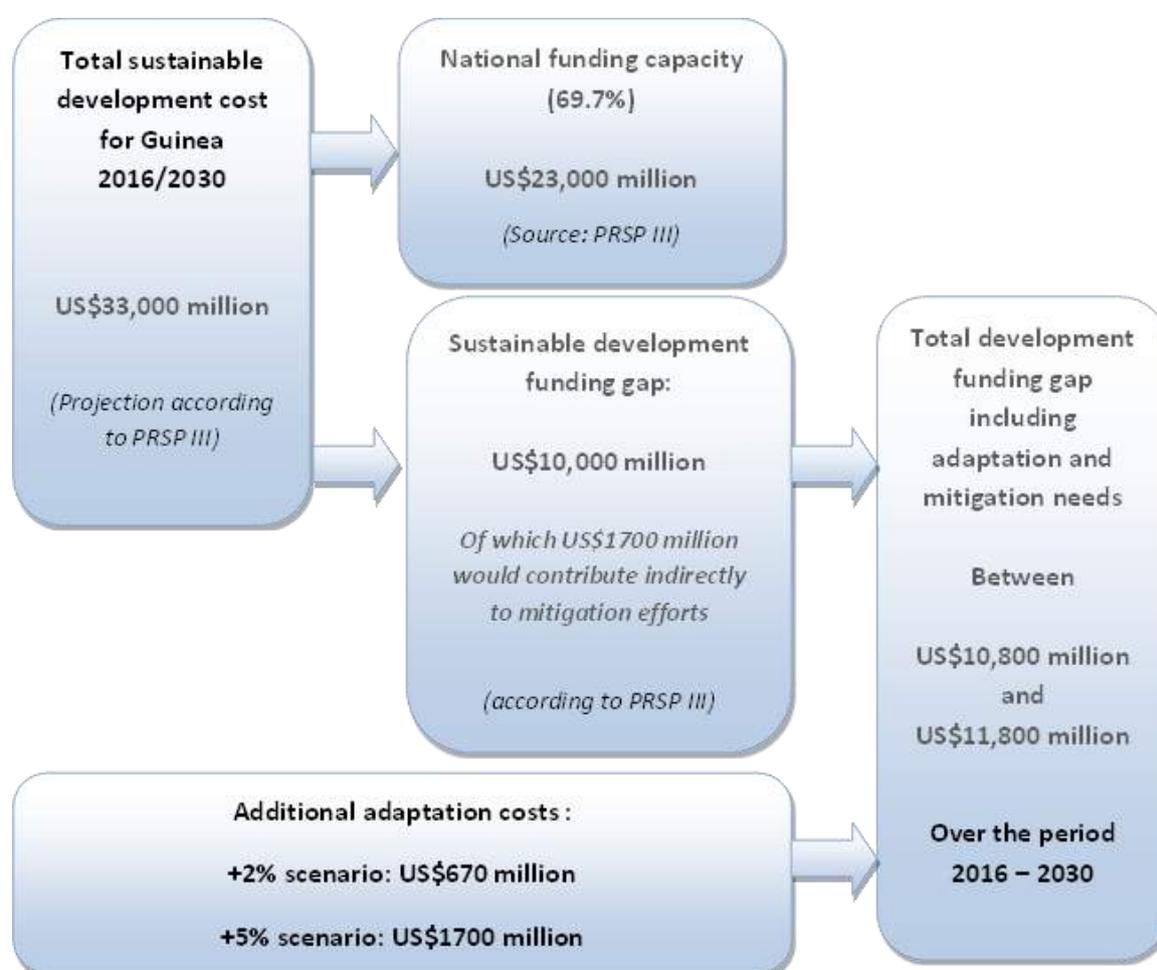
Commitment	Context and description of the commitment	Actions
<p><b>Preserve the quality and quantity of water resources, for the benefit of the people of Guinea and the West African region</b></p>	<p>Guinea is considered as the "water tower of West Africa". Four catchment basins of key importance to the sub-region, particularly due to their potential in terms of economic development and maintenance of biodiversity, have their source in Guinea. As a result of climate change, the flow rate of watercourses will be reduced, possibly by as much as 50% of the current daily average by 2100. For example, the flow of the Niger River is likely to reduce everywhere by between 16 and 28% (sensitivity 2.5°C) and up to 23-54% (sensitivity 4.5°C). Given Guinea's strategic location upstream of the main West African catchment basins, choices in respect of water resource management will inevitably have impacts downstream, beyond the borders of Guinea. These international implications mean that Guinea has an even greater responsibility to manage its resources appropriately in the face of climate change.</p>	<p>Priority Actions:</p> <ul style="list-style-type: none"> <li>- Preserve and restore the riparian forests at the spring heads and along the banks, in particular on cross-border watercourses;</li> <li>- Ensure the preservation of the banks and beds of national and transnational watercourses.</li> <li>- Seek alternatives to uses and offtake that are detrimental to water quality (brickmaking, dredging of riverbeds to obtain minerals, etc.);</li> <li>- Ensure that the climate change dimension is taken on board in the institutional and legal frameworks and by the organizations responsible for managing and developing cross-border catchment areas;</li> <li>- Set up a system of hydro-ecological monitoring of international rivers.</li> </ul>
<p><b>Put in place the measures needed to protect, conserve and manage ecosystems, revive economic activities and boost the resilience of communities in its coastal zone</b></p>	<p>The coastal zone is of strategic importance to Guinea. It is the country's leading economic area and holds around 38% of its population. It also plays a key role for the agricultural and energy sectors and accounts for 24% of national rice production. Potentially arable land on the coast amounts to 1.3 million hectares, including 380,000 ha under cultivation every year. Various cereal, fruit and vegetable crops and tubers are grown in the mangrove hinterland. More than 140,000 ha of the 385,000 ha of mangroves currently in existence have been converted into rice paddies. As regards energy, the mangroves in the zone provide 60% of domestic energy for the capital and the main coastal towns.</p> <p>The coastal zone is particularly vulnerable to climate change due to the rising sea level and intensified coastal erosion, leading to adverse effects on fishery resources, the destruction of infrastructure in coastal towns and villages and the disappearance or salinization of the rice paddies.</p> <p>All these factors mean that the coastal zone is under extreme pressure from the economic activities being undertaken there; the anarchic urbanization that arises from the lack of a Coast Code and non-compliance with the Land Code; and the impacts of climate change.</p>	<ul style="list-style-type: none"> <li>- Update the Mangrove Management and Development Plan (SDAM) ;</li> <li>- Reduce the sources of mangrove degradation;</li> <li>- Include adaptation in local development plans and spatial planning tools;</li> <li>- Enhance scientific knowledge of the coast as a whole;</li> <li>- Develop rice production by improving yields through use of varieties better able to cope with the impact of climate change (particularly ingress of salt water).</li> <li>- Extend the pilot initiatives already launched, especially the Increased Resilience and Adaptation to Adverse Impacts of Climate Change in Guinea's Vulnerable Coastal Zones (RAZC) project, to all the municipalities on the coast.</li> </ul>
<p><b>Support the adaptation efforts of rural communities to develop agro-sylvo-pastoral techniques enabling them both to continue their activities and preserve the</b></p>	<p>Food security is not currently guaranteed in Guinea. The priority is therefore to increase production, despite the risk of falling yields as a result of the impact of climate change.</p> <p>Farming practices capable of ensuring sustainable management of land and water resources and limiting GHG emissions are to be encouraged.</p>	<ul style="list-style-type: none"> <li>• Diversification of agricultural production;</li> <li>• Development of agro-ecological fish-farming techniques;</li> <li>• Low-input varieties and cropping techniques suited to a drier climate;</li> <li>• Controlled irrigation;</li> <li>• Inclusion of the climate change dimension in budgeting and development plans, programmes and projects;</li> <li>• Development of hydro-agricultural</li> </ul>

resources on which they rely		schemes; <ul style="list-style-type: none"> <li>• Development of techniques to conserve and process agricultural, forestry and fish-farming products;</li> <li>• Better management of pastoralism, especially transnational pastoralism, so as to limit degradation of grazing and soil and reduce the risks of usage conflicts.</li> </ul>
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## GAPS, BARRIERS AND NEEDS

The Republic of Guinea faces considerable socio-economic challenges in addition to the current and future impacts of climate change. Four main barriers to meeting these adaptation needs have been identified:

1. The huge costs of adaptation, coming on top of the funding gap in respect of vital development and poverty reduction needs (source: Poverty Reduction Strategy Paper 2013-2015 – DRSP-III). Funding needs for adaptation (in addition to development funding needs) are estimated at between US\$670 million and US\$1700 million. The success of international efforts to keep global warming below +2°C would of course help to reduce the impacts and related costs.



By way of example, the total cost of the "Mano River Union Ecosystem Conservation and International Water Resources Management" project amounts to US\$31 million over five years. Funding needs for the water resources commitment alone could therefore amount to around US\$300 million for the three international catchment basins over the period 2015-2030.

2. Gaps in terms of reliable, robust climate data as well as all statistical data relating to natural resource management;

3. Inadequate integration via government institutions and local authorities of the adaptation dimension in development planning;
4. Obsolescence of, and failure to comply with, spatial planning schemes.

### 3. MITIGATION COMMITMENTS

#### JUSTIFICATION FOR THE REFERENCE YEAR, COMMITMENT PERIOD AND SECTORS COVERED

Guinea issued its Initial National Communication to the UNFCCC on the basis of data from 1994. That year was therefore considered as a benchmark and all the GHG emission results have been extracted or extrapolated from the data in that document.

Furthermore, for the energy sector, full use has been made of the data for the years 2011 – 2014 produced by the *Sustainable Energy for All* (SE4ALL, 2014) programme, which sets targets for 2030.

For the sake of simplicity and clarity and in line with the objectives of the PRSP III, emissions avoided by means of SE4ALL activities have been assessed over the period 2015-2030.

The inventory of greenhouse gases made for the Initial National Communication (based on emissions for 1994) shows that the **energy, land-use change and forestry (LUCF) and agriculture** sectors are the main emitters. As they therefore represent a strategic priority for Guinea in terms of mitigation, they have been included in the INDC.

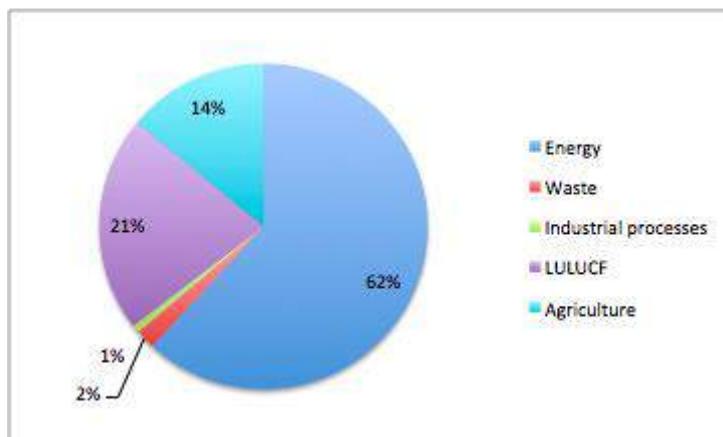


Figure: GHG emissions balance sheet according to the INC, excluding GHG sequestration (1994 data)

The absence from this INDC of commitments relating to the "industrial processes" and "waste" items is due to the fact that:

- these sectors have, according to the assessments made (Initial National Communication, work on the Second National Communication), **much lower emissions than the others**, bearing in mind emission calculation methodologies and the unstructured nature of these sectors;
- collection and treatment of rubbish and wastewater is still very limited, despite the importance to the population of this sector in terms of environmental preservation, quality of life and health. Nevertheless, in view of projected demographic growth which will affect the level of emissions from the waste sector, Guinea's national contribution could, when next revised, include this sector on the basis of better knowledge of the respective emissions through the establishment of appropriate facilities and management procedures.

The 1994 INC takes account of the following trends (continuing through to 2030):

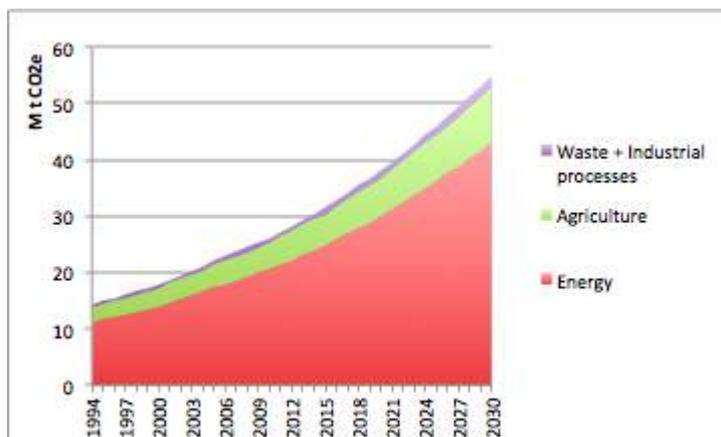


Figure: Guinea's projected emissions (excluding LUCF) (source: according to 1994 INC)

The emissions growth rate is taken as 4.4% per year over the period, with emissions rising from 2.1 to 2.7 tonnes CO<sub>2</sub>eq per capita. In total, that would mean a doubling over 20 years and emissions of some 55m tonnes CO<sub>2</sub>eq in 2030.

## MITIGATION COMMITMENTS AND POTENTIAL

**With a view to joining in global efforts to decarbonize economies, the Republic of Guinea hereby undertakes the following commitments:**

Commitment	Context and description of the commitment	Objectives	Expected emission reductions <sup>1</sup>
<b>Produce 30% of its energy (excluding wood-energy) from renewable energy sources (SE4ALL)</b>	<p>The four energy sources making up the Guinean energy mix (in 2011) are: biomass (77%); imported hydrocarbons (22%); hydroelectricity (around 1%); and new and renewable sources such as solar, wind and biogas (about 0.02%).</p> <p>Guinea has a structural and growing electricity production deficit due to a combination of rapidly strengthening demand (which is likely to rise further in coming years, especially with the expected development of major mining sites) and slowly increasing supply due to lack of investment and the gradual deterioration of production facilities. The government's aim is nevertheless to make electricity available to 100% of its population by 2030 (as against 18.1% in 2011).</p>	<p>In line with the work undertaken as part of the SE4ALL programme, Guinea aims between now and 2030 to:</p> <ul style="list-style-type: none"> <li>• Commission hydro-power stations producing 1650 MW (127MW in 2011);</li> <li>• Install an additional 47MW (3MW in 2011) of solar and wind power;</li> <li>• Increase the supply of biofuels and other modern energies (40k toe of butane and biogas, 3000 kWc of biofuels).</li> </ul>	<p>The mitigation potential of this commitment is calculated as a <b>total of 34m tonnes CO<sub>2</sub>eq over the next 15 years.</b></p>
<b>Support the dissemination of technologies and practices that are energy-efficient or use alternatives</b>	<p>Biomass energy (essentially firewood and charcoal) accounted for 77% of gross primary consumption in 2011 and is used as their main energy source by more than 85% of households. This situation is reflected in gradual loss of forest cover in the urban supply areas and environmental degradation (especially affecting the soils).</p>	<p>Consequently, Guinea aims between now and 2030 to reduce final demand for firewood and charcoal by 50% per capita (in urban and rural areas) as compared to 2011, particularly through:</p> <ul style="list-style-type: none"> <li>• organization of local industrial supply chains to enable the introduction of at least 1</li> </ul>	<p>The mitigation potential of this commitment is calculated as a <b>total of 23m tonnes CO<sub>2</sub>eq over the next 15 years.</b></p>

<sup>1</sup>The expected emission reductions take account of "suppressed demand" according to a population growth scenario of +3% per year and GDP growth of +5% per annum.

<p><b>to wood-energy and charcoal</b></p> <p><b>(SE4ALL and Biodiversity Strategy)</b></p>	<p>The efficiency of traditional fuels is very low (between 5% and 15% energy yield depending on the technology used). Biomass energy supply chains cover several important areas where technologies and know-how can be applied to improve energy efficiency (production and consumption).</p> <p>Several programmes to disseminate improved stoves have therefore been put together and implemented since 1985, together with sustainable biomass management policies. In 1998, the Guinean government adopted a sector-based policy to manage traditional energies. One of the components is aimed at improving carbonization equipment for charcoal production. As a result of these policies, 256,711 stoves have been disseminated, saving 506,253 tonnes of wood-energy and thereby safeguarding 6575 ha of forest cover. The Integrated Programme of Access to Modern Energy Services (PRONIASE) plans to disseminate 10,000 improved wood- and charcoal-fired stoves and 2000 improved charcoal production kilns in 2015. Another programme aims to develop efficient wood-fired stoves for rural areas.</p>	<p>million improved stoves;</p> <ul style="list-style-type: none"> <li>• establishment of 5000 wood carbonization units giving a better charcoal yield;</li> <li>• replacement with butane (40k toe);</li> <li>• extension of pilot initiatives to disseminate improved smokehouses and stabilized earth blocks.</li> </ul>	
<p><b>Improve the energy performance of the Guinean economy</b></p> <p><b>(SE4ALL)</b></p>	<p>There is significant energy-saving potential in all the national energy supply chains operational in Guinea and the various economic sectors. The energy intensity of the Gross Domestic Product (GDP) has been assessed at 0.55 koe /US\$1 produced.</p> <p>The overall efficiency of Guinea's energy system in 2011, measured through the "useful energy to gross energy consumption" ratio, is around 19%.</p>	<p>The objective is to double this ratio between now and 2030, particularly through:</p> <ul style="list-style-type: none"> <li>• A 50% improvement in electricity yields in relation to the baseline situation (2011);</li> <li>• A reduction in the specific consumption of the transport, residential and public administration sectors brought about by improving the quality of the transport fleet; promoting public transport; disseminating solar streetlamps and low-energy lamps and electrical appliances; and implementing efficiency standards in building design.</li> </ul>	<p><b>The available data cannot currently support an assessment of the mitigation potential of this commitment.</b></p>

### GAPS, BARRIERS AND NEEDS

The investment needed to meet the SE4ALL targets in Guinea is calculated at US\$8179 million in current value over 20 years (2011-2030). This equates to around US\$409 million annual investment over 20 years, including activities ongoing since 2011.

At present, only 20% of the funds for this investment plan have actually been raised by the government of Guinea. **The funding needs for the rollout of renewable energies and energy efficiency alone are therefore calculated at more than US\$6.5 billion.**

<p><b>Make the exploitation of mineral resources climate-compatible</b></p>	<p>The <b>development of the mining sector</b> represents one of the major economic challenges for Guinea, given its potential in terms of jobs and tax revenue. As the mining sector is destined to become one of the pillars of the Guinean economy, there is an opportunity to make it a <b>model for the integration of climate issues</b> (mitigation/adaptation) throughout the value chain.</p>	<ul style="list-style-type: none"> <li>• Strengthen enforcement of the 2013 Mining Code, one of the pillars of which is respect for the environment and compliance with the Environment Code (and its implementing provisions);</li> <li>• Insist that the impacts of climate change are taken into account by all traditional or modern mining projects in their</li> </ul>	<p>The mitigation potential of this commitment (energy efficiency component) could be up to a <b>total of 9m tonnes CO2eq over the next 15 years.</b></p>
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	<p>Mines currently in operation account for around 25% of State revenue. The country's main mineral resources are bauxite (more than 30% of world reserves), iron ore (9 billion tonnes), diamonds, gold, etc. They are worked by multinationals, some of which have been active in Guinea since the 1960s. Small-scale (especially gold and diamond) mining is also expanding and directly or indirectly occupies more than 100,000 people.</p> <p>The industrial mining sector is the leading consumer of conventional energy (electricity and hydrocarbons) in Guinea. It comprises self-producers of power who consume almost half (47%) of the conventional primary energy available.</p>	<p>Environmental and Social Management Plans;</p> <ul style="list-style-type: none"> <li>• Evaluate the feasibility of establishing and operating a financial mechanism for the mining sector to fund the contribution to the fight against climate change;</li> <li>• Boost the sector's energy efficiency (the potential for improving energy efficiency has been assessed at 51,016 toe/year);</li> <li>• Supply this sector with electricity from renewable sources as far as possible. Predicted future power demand from the mining sector alone, in a high-growth scenario (with two aluminium foundries and one steelworks), could absorb more than 80% of the hydroelectric potential (6000 MW) identified to date.</li> </ul>	
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### GAPS, BARRIERS AND NEEDS

The major mining companies are partially applying the new requirements of the 2013 Mining Code with regard to carrying out environmental and social impact studies prior to any damaging intervention, compulsory compensation and rehabilitation of former mines. This Social and Environmental Responsibility (SER) commitment could be backed up with the inclusion of risks related to climate change and a requirement to reduce the carbon footprint of mining throughout the value chain.

Traditional mine-working, on the other hand, is more difficult to regulate; making people aware of legal provisions and raising their awareness of environmental issues could offer ways forward.

The Environment Code and 2013 Mining Code provide for a certain number of taxes and royalties. The explosive growth of the sector, as anticipated by the Guinean administration, could therefore generate significant revenue. It might be appropriate to use some of this revenue, or establish a new tax, to fund the fight against climate change.

<p><b>Manage its forests sustainably</b></p>	<p>Guinea has a wealth of biodiversity, with dense humid forests in the south-east, dry forests in the north, dense mesophilous forests between Boké, Kindia and Mamou, and mangrove forests. These are special places for the conservation of large mammals, birds, batrachians, many families of invertebrates, etc. Various endemic species are found in the forests.</p> <p>In 1994, according to the Initial National Communication, its forests meant that Guinea was a carbon sink.</p> <p>In the absence of available forest inventories (the last dates back more than 20 years), it is difficult to get a precise idea of how far deforestation has gone in Guinea. However, there is no doubt that it is rapid due to human pressure (i.e. firewood collection, urbanization and farming). AGRYHMET spoke in 2005 of a 10.3% reduction in the area of mangroves and a 33% shrinkage of the whole forest area over the period 1972-2000.</p>	<ul style="list-style-type: none"> <li>• Stabilize the area of mangroves between now and 2030 (peak deforestation in 2020; more systematic replanting measures will have been introduced by then, together with measures in respect of technological alternatives to limit wood-energy consumption and measures to intensify rice production);</li> <li>• Run reafforestation programmes throughout the country, covering 10,000 ha per year, and ensure sustainable management of replanted areas;</li> <li>• Ensure effective conservation of classified forests and protected areas by means of strengthening supervisory arrangements (Guinean Parks and Nature Reserves Office and nature conservators); awareness-raising; participatory management; and enforcement of the criminal sanctions set out in the Forest Code.</li> </ul>	<p><b>The available data cannot currently support an assessment of the mitigation potential of this commitment.</b></p> <p>The INC nevertheless estimated that the LUCF sector <b>stocked 21m tonnes CO2eq in 1994.</b></p>
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## GAPS, BARRIERS AND NEEDS

The main constraints on this commitment stem from the inadequacy of financial and human resources, the gaps in scientific knowledge concerning the pace of forest degradation and the low level of local community involvement in sustainable forest management.

Priority must be given to robust enforcement of regulations (the 1999 Forest Code and the Environment Code) and a review of the mangrove management and development plan (SDAM).

The National Forest Fund and Environmental Protection Fund have nowhere near enough additional resources to fulfil these commitments, especially as regards reforestation programmes and sustainable management of replanted areas. A more detailed assessment of the arrangements for topping up funds is required, especially to cover needs relating to the protection and enhancement of forest resources.

## 4. EQUITY AND AMBITION

The Republic of Guinea, classed amongst the Least Developed Countries, faces considerable socio-economic challenges.

The **GHG emissions of the Republic of Guinea are very low** in relation to the global average; the country was even considered by the INC to be a carbon sink<sup>2</sup>. **Guinea's share of global GHG emissions was well below 0.1% in 2010.**

Despite this, the Republic of Guinea is planning to implement mitigation measures which will mean **a deviation of around -13% from the 'business as usual' scenario by 2030, not counting its storage capacity through land use and forestry (excluding LUCF).**

## 5. PROCESS OF PLANNING, IMPLEMENTING AND MONITORING THE INDC

### CROSS-CUTTING ACTIVITIES NEEDED TO PUT THE INDC INTO PRACTICE

If the INDC commitments are to be fulfilled, four urgent cross-sector measures must be implemented with support from the international community:

- Meet the significant needs for robust, accessible data, cross-sector medium-term strategic planning documents and monitoring of natural resources (gathering data on water and forest resources, together with meteorological data); these needs can be partially covered through bilateral agreements with some regional-scale organizations;
- Promote the inclusion of climate change issues, especially regarding adaptation, in planning and budgeting at local, sectoral and national level;
- Take account of gender issues in all development programmes and projects;
- Make information on environmental law and the causes and impacts of climate change widely available and accessible so as to raise public awareness and educate the Guinean population as a whole.

### SPECIFIC ACTIVITIES TO IMPLEMENT THE INDC

<b>Legislative and regulatory framework</b>	Preparation and enactment of legislation governing the implementation and monitoring/evaluation of the INDC and the decisions and resolutions of the UNFCCC, along the lines of a framework law on the environment and climate change.
	Preparation and enactment of sectoral legislation governing the implementation of the INDC.
<b>Institutional framework</b>	Maintenance of the National consultative platform on policy to combat climate change (PNC-COP21), tasked with monitoring and evaluating INDC implementation, as a consultative body.
	Appointment of climate correspondents within each Ministry receiving regular training

<sup>2</sup> The absence of recent data, particularly in terms of forest inventory, makes it impossible to establish whether this situation still persists: *a priori*, the increases in population and economic activity since 1994 will have put greater pressure on the carbon sinks.

	<p>concerning the integration of climate issues.</p> <p>Creation of a steering committee within the National Council for the Environment and Sustainable Development, comprising experts from research institutes, the National Environment Department, Water and Forestry Department, Impact Studies Department and climate correspondents, to monitor and evaluate public policy on combating climate change. This committee should have its own funds to ensure that it can fulfil its functions.</p> <p>Enhancement of the resources allocated to the inclusion of climate issues in the Local Development Plans (Ministry of Spatial Planning and Decentralization) and Urban Development Plans.</p> <p>The Republic of Guinea has ratified the three main United Nations Conventions: CBD (1993), UNCCD (1997) and UNFCCC (1993). In this regard, better co-ordination of the focal points for each of these conventions could help to create synergies.</p>
<b>Putting the INDC into operation</b>	<p>Completion, on an urgent basis, of:</p> <ul style="list-style-type: none"> <li>- The 2nd National Communication on climate change;</li> <li>- Registration of the NAMA proposal with the UNFCCC;</li> <li>- The prospective studies Guinea Vision 2035 and Guinea Vision 2040.</li> </ul>
	<p>Carrying out complementary studies in the short term:</p> <ul style="list-style-type: none"> <li>- 3rd national GHG inventory;</li> <li>- Forest inventory, particularly with a view to a potential REDD+ strategy proposal;</li> <li>- Urgent review from the climate change perspective of the Land Code; Forest Code; Environment Code; Conakry Planning Scheme and Urban Development Programme; and the SDAM;</li> <li>- Refine the study of methods for funding the INDC commitments, including through involvement of the carbon markets and private investment.</li> </ul>
	<p>Integrate the activities necessary for INDC implementation in the 2016-2020 five-year plan (under preparation) and corresponding budget.</p>
	<p>Boost the resources available to the Guinean administration for:</p> <ul style="list-style-type: none"> <li>- Collection and processing of climatological and hydrological data;</li> <li>- Collection and processing of maregraphic data;</li> <li>- Collection and processing of data on forests (mapping and remote sensing).</li> </ul>
	<p>Translate the INDC into operational sectoral programmes.</p>
<b>Updating/revision</b>	<p>Revision following COP21, if necessary.</p> <p>Then revision following delivery of the 2nd National Communication.</p> <p>Followed by review every five years by the steering committee on monitoring/evaluation.</p>

## 6. MEANS OF IMPLEMENTATION

The Republic of Guinea plans to employ the following means to implement its INDC:

<b>National Budget</b>	<p>The National Development Budget is the primary potential resource for fulfilling the INDC commitments.</p> <p>A National Forestry Fund and an Environmental Protection Fund were set up in 1985 and 1987 respectively, but struggle to collect the revenue deriving from environmental taxes and royalties. Some studies put a figure of around US\$40 million per year on this loss of income.</p> <p>Feasibility study on the establishment of a National Climate Fund.</p>
<b>Regional integration</b>	<p>Sub-regional integration of electricity production could help Guinea to move further towards exploiting its hydroelectric potential, whilst ensuring cost sharing.</p> <p>This remark also applies to management of cross-border catchment basins.</p>
<b>International donors</b>	<p>Budget support required for the operation of the bodies responsible for monitoring/evaluation of public policies to combat climate change.</p> <p>The GEF funds several projects to combat climate change in Guinea; it is assisted by UNDP. A project to conserve the ecosystems of the Mano River Union and manage international water resources is co-funded by the GEF. It is hoped that this support will be continued and enhanced.</p>

	<p>The World Bank is currently funding a programme of support to governance in the mining sector, including an environmental component. Discussions have begun with the French Development Agency (AFD) on strengthening enforcement of the Mining Code as regards compensation for environmental degradation caused by mining activities. Such support is keenly awaited for the fulfilment of the INDC commitment concerning mining.</p> <p>Institutional support will be sought for capacity-building to enable Guinea to appoint and seek accreditation of a national implementing entity, thereby gaining direct access to the Green Fund.</p> <p>As an LDC, Guinea needs strong support from the Green Fund particularly for programmes relating to food security and energy efficiency.</p>
<b>Carbon markets</b>	<p>Guinea is a Non-Annex I country under the United Nations Framework Convention on Climate Change (UNFCCC) and classed as a Least Developed Country (LDC). It supports the inclusion of the international carbon markets, such as the Clean Development Mechanism (CDM), in a post-2020 agreement on climate and proposes that such an instrument, coupled with an appropriate accounting system (Measuring, Reporting and Verification – MRV), should be used to help fund certain investments in low-carbon, climate change resilient infrastructure. Guinea considers that some of the low-carbon development options contained in this INDC, or additional activities, could be funded wholly or in part through the international transfer of carbon assets, whilst taking considerations of environmental integrity and transparency into account.</p> <p>Nevertheless, as no CDM project has been validated so far in Guinea, capacity-building would be essential.</p> <p>Furthermore, the Republic of Guinea has not yet formulated a REDD+ strategy, although it is in contact with the FAO to assess the country's needs in this connection.</p>
<b>Private funding</b>	<p>The Republic of Guinea is particularly short of resources to meet the investment needs of its national budget. Increased resort to private finance could, in this connection, help to step up fulfilment of the commitments. Efforts made to improve the business climate (Guinea's progress in the World Bank <i>Doing Business</i> ranking bears witness to this) are likely to increase the investment propensities of private operators.</p> <p>In this regard, it can be seen that the social and environmental framing of private investment is somewhat uneven. Relatively exemplary in the case of the mining sector, regulation is less restrictive in other sectors (e.g. forests). Use of public-private partnerships should therefore be preceded by in-depth evaluation.</p> <p>Finally, the Guinean diaspora could make a more active contribution to the country's low-carbon, climate change resilient development, namely by redirecting its financial flows (around US\$150 million per year) towards the formal sector.</p>



# **Intended Nationally Determined Contributions (INDC)**

**September 2015**

## INTRODUCTION

In his quality of Party Non Annex I (NAI) of the United Nations Framework Convention on Climate Change (UNFCCC), also as a Least Development Country (LDC) and Small Independent Developing State (SIDS), Guinea-Bissau has the great honor to communicate its Intended Nationally Determined Contributions (INDC), as well as all pertinent information aiming at clarity, transparency and understanding of its contributions.

This INDC is inspired on the second generation of the National Poverty Reduction Strategy (PRSP II) aligned with the National Strategic Plan – TERRA RANKA 2015-2025. All they have mainstreamed the priorities of the National Action Plan for Climate Change Adaptation (NAPA, 2006).

## NATIONAL CONTEXT

Guinea-Bissau is located in the West African north-western Inter-tropical zone, 10°59' - 12°20' north latitude and 13°40' - 16°43' west longitude, with an area of 36,125 km<sup>2</sup>. Poverty eradication is one of the key objectives of the Guinea-Bissau Government. The country's population is estimated at 1,548,159 inhabitants (2014) with a growth rate of 2.2% in 1991-2009. According to the results of the Light Survey on Poverty Assessment (ILAP II, 2010) 69.3% of Guineans are poor and 33% are extremely poor. Guinea-Bissau is an integral part of the LDC group. The Gross Domestic Product (GDP) per capita is estimated at USD 750 (2014) with a real growth rate of GDP of 2.9%. According to the United Nations Development Programme Report / Unit of Policy and Strategy (2014) the country was ranked 177 in the world ranking and had a Human Development Index (HDI) of 0.396. It is a country with considerable natural capital. It has significant water resources, translated into 130 km<sup>3</sup>/ year of surface water and 445 km<sup>3</sup>/year of groundwater, a vast and rich maritime territory (54,000 km<sup>2</sup> in 270 km of coastline), considerable biodiversity within West Africa. Nearly 10% of its territory is covered by mangrove, perhaps the most significant proportion of the world. Currently about 15% of the country's land and maritime territory is a sanctuary for the preservation of biodiversity and this percentage is expected to increase to 26% in 2020.

Guinea-Bissau is also considered a SIDS country, part of the AIMS region of SIDS (Africa, Indian and South China Sea), due to its island characteristics, with an archipelago consisting of over 88 islands and islets.

Guinea-Bissau environment is an exceptional ecosystem and one of the weakest in the world. The main environmental challenges revolve around deforestation/soil erosion and the coastal area, biodiversity conservation and quality of water resources. Forest fires destroy more than 120 hectares of forest per year. On the other hand Guinea-Bissau is an absolute Green House Gas (GHG) sink country, i.e., it is contributing to global climate change mitigation whilst being one of the most affected countries by climate change consequences. This determines the focus of the country on climate change.

Adaptation and risk reduction are priorities. Nevertheless, the country has identified

additional mitigation actions that may constitute contributions (INDC). The implementation of these measures, both for adaptation and mitigation purposes requires financial resources, access to technology and capacity building, to be provided by external partners.

The Guinean state has the organization and legal framework to meet challenges regarding environmental issues: Law 1/2011 of 2 March approved the Basic Environment Law.

In terms of adaptation the country has defined as priorities Food Security, Water Resources, Coastal and Forests in its NAPA (2006).

The mainstreaming of climate change into strategies and development policies is under way to achieve the Millennium Goals for Development, a major lever for sustainable development.

The FAO provided financial support to the government of Guinea-Bissau to integrate the climate change dimension into the National Agricultural Investment Plan - Programme 4.7 – Adaptation of agriculture to climate change.

A wide range of policies, strategies and plans were drawn up and adopted with assistance from development partners including:

- National Environmental Management Plan (2004)
- National Plan for Natural Resource Management
- National Biodiversity Strategy (2004) and 5th National Biodiversity Report (2015)
- Protected Areas Strategy (2007-2011 and 2014-2020)
- Livestock Development Policy Letter (2010)
- Programme of Action to Fight Drought and Desertification (2006, 2011)
- Coastal Zone Master Plan (1993)
- Food Security Strategy
- National Food Security Plan
- Letter of Agricultural Development Policy (2002)
- National Plan for Agricultural Investment (revised in 2014/15)
- Strategy for Water Supply and Sanitation with reference to MDGs (final draft 2010)
- Water Master Plan (1997)
- Integrated Financing Strategy for Durable Land Management (2011)
- Sustainable Financing Strategy of Adaptation to climate change in the short, medium and long term (2013);
- Energy Master Plan 2013)
- Regional Policies on Renewable Energy and Energy Efficiency;
- SE4All (Universal Access to Energy) - 2014
- National Plan for Renewable Energy (NREAP) - 2014
- National Plan for Energy Efficiency (2014)
- Forestry Master Plan
- Management Plan of Cryogenic Fluids (2013)
- Management Plan of HCFC Gases (2013)
- Forest Management Plan (2013)
- National Action Plan on Persistent Organic Pollutants (2013)

- Letter of Energy Development Policy (2005)
- Domestic Energy Strategy (2005)
- National Plan for Household Energy (2007)

### ADAPTATION CONTRIBUTION

1. Rationale and process for the development of adaptation in INDCs

The country's environment is increasingly vulnerable to the impacts of global climate change, which further compounds the problem and makes the forest sector vital to environmental protection and to the overall reduction of disaster risk.

In the same way as with mitigation, the cost benefit analysis on adaptation at national level has not yet been made. It is expected that with an increase in the area of protected areas from 15% to 26% the capacity of adaptation of national ecosystems through the protection of soil reinforcement against erosion from water and wind order will increase, and the coast's protection against the rising sea level and other types of erosion.

The reasons behind the inclusion of the adaptation component in any given national contribution were based on the fact that the country is a sink of greenhouse gases and is highly vulnerable to the impacts of climate change (AR4/IPCCC, Africa's Adaptation Gap Report, 2013, and Germanwatch, 2013) and requires external support to have a resilient development bearing in mind that it is a LDC. Thus, INDCs are seen as a mechanism to raise the national adaptation programme to at an international level in order to attract technical, financial and capacity building support for implementation.

2. Summary of trends of climate change impacts and vulnerabilities.

The National Programme of Action for Adaptation to Climate Change of Guinea-Bissau found that gradual increases in temperature and reductions in rainfall will significantly reduce agricultural productivity and exacerbate water shortages. It is therefore necessary and urgent that the Guinea-Bissau Government take initiatives such as the development of new, more resistant , crops and changes in agricultural systems in order to increase the resilience of its agriculture to climate change, the protection of coastal ecosystems and adopt measures to reduce long term risks, like the integration of climate change into local development plans, forest management plans and soil occupancy and, generally speaking, in development policies and strategies.

	<p>These changes are intended primarily to increase the food security of populations of rural areas in order to enhance their adaptation capacity, reducing pressure on forest and fishery resources and improving access to safe water for human consumption and livestock.</p> <p>All these trends and impacts have been observed and documented: National Second Communication on Climate Change (NSC); PRSP I and II, PANA, National Action Plan to Combat Drought and Desertification (NAP/CDD) and TERRA RANKA which is a major concern for the country.</p>
<p>3. Reports view of the short and long-term adaptations, objectives and goals.</p>	<p>The country plans in the short term to implement the following actions with financial, technological and capacity building support from the international community:</p> <ul style="list-style-type: none"> <li>• Increase the percentage of protected areas from 15% to 26% and ensure its management, and an effective implementation of the Forest Act and the moratorium to ban the felling and export of timber over the next five years;</li> <li>• Conduct a nationwide forest inventory;</li> <li>• Develop an agro-ecological zone and forest management;</li> <li>• Strengthen the existing capacity to participate in the REDD+ mechanism and consequently raise the national effort to combat the adverse impacts of climate change.</li> <li>• Increase the adaptation capacity of national ecosystems through soil protection against water and wind erosion, and protecting the coast against rising sea levels and other types of erosion.</li> </ul> <p>In the medium and long term Guinea-Bissau undertakes, provided there is financial, technological and capacity building support from the international community starting from the new climate agreement and green fund, to:</p> <ul style="list-style-type: none"> <li>• Develop a national reforestation and sustainable management of forest and agro forestry ecosystems programme by 2025;</li> <li>• Develop scientific and technical research on adaptation of new productive varieties with broad spectrum tolerance to climate adverse effects by 2025;</li> <li>• Reduce illegal and indiscriminate felling of trees by 2030;</li> </ul>

	<ul style="list-style-type: none"> <li>• Promote forestry/plantation of species resistant to drought and low rainfall by 2030;</li> <li>• Develop an Integrated Management Programme for the Coastal Zone by 2025;</li> <li>• 80% renewable energy in the national energy mix by 2030;</li> <li>• Energy efficiency - reduce energy losses up to 10% in the 2030 time span;</li> <li>• 80% of universal access to electricity by 2030;</li> <li>• As a SIDS draw up a profile of Vulnerability &amp; Resilience to climate change in the country.</li> </ul> <p>The long-term objectives embodied in the introduction of "climate proofing" in sectors of activity through outlets/introduction:</p> <ul style="list-style-type: none"> <li>• Short- cycle and drought resistant seeds;</li> <li>• Hydro-agricultural Planning;</li> <li>• Introduction of farming techniques resilient to the effects of climate change;</li> <li>• Introduction of rapid growth fodder plant for animal feeding;</li> <li>• Preparation of contingency plans for the management of climate risks and natural disasters;</li> <li>• Capture and storage of rainwater (water retention basins and mini-dams) for water management in the dry season;</li> <li>• Construction of grain banks and seeds;</li> <li>• Infrastructure (roads, bridges, houses, etc).</li> </ul>
<p>4. Current Report on planned adaptation and support actions.</p>	<p>Guinea-Bissau has made internal efforts to become resilient to the effects of climate change.</p> <p>For greater efficiency, the initiatives taken in the context of climate change should not be isolated efforts, limited to the individual projects of adaptation or mitigation of climate change. These initiatives must be part of a consistent perspective of integration into a broader policy framework, developing strategic and programmatic approaches that integrate climate policy development, planning policy and action at national, regional and local levels, involving all sectors of the national economy and integrating all other dimensions of environmental management and natural resources, including biodiversity conservation, the sustainable management of land and water.</p> <p>These initiatives essentially aim to increase the food security</p>

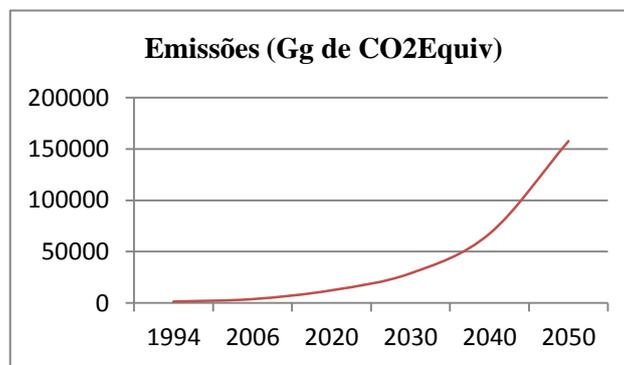
	<p>of the populations of rural areas in order to enhance their adaptation capacity, reducing pressure on forest and fishery resources and improving access to safe water for human consumption and livestock.</p> <p>The strategy promotes the combination of external financing, internal financing and innovative financing (to be created or existing) and its effective and transparent management in line with national priorities.</p>
<p>5. Gaps and Barriers</p>	<p>In addition to financial, technological and backup capacity building barriers, specific barriers were identified namely:</p> <p><b>Human capacities:</b> The following aspects stand out regarding human capacity mainly:</p> <ul style="list-style-type: none"> <li>• Poor development of education, training and research on climate change in particular with regard to the vulnerability and adaptation dimensions;</li> <li>• Insufficient scientific training on certain aspects such as vulnerability, adaptation and mitigation of climate impact;</li> <li>• Weak mastery by national stakeholders of climate change issues and challenges;</li> <li>• Poor habit of keeping a documentation and filing system;</li> <li>• Constant political and governance instability.</li> </ul> <p><b>Skills:</b> At this level the following constraints should be singled out:</p> <ul style="list-style-type: none"> <li>• Weak capacity by national institutions in the areas of research and systematic observation in the field of weather and water sciences (meteorological, hydrological and oceanographic services);;</li> <li>• Lack of specialized staff in the field of climate change;</li> <li>• Lack of a national database (hydrological, hydro geological, forest surveys) that is accessible and structured to produce a proper assessment of vulnerability and adaptation;</li> <li>• Low capacity of surveillance and monitoring units of long-term climate parameters;</li> <li>• Lack of coherent, specific and good resolution models for the assessment of vulnerability and adaptation applicable to all sectors;</li> <li>• Lack of effective systems of weather and hydrological</li> </ul>

	<p>forecasts;</p> <ul style="list-style-type: none"> <li>• Lack of a national centre specializing in research on climate change;</li> <li>• Insufficient material resources for collection, filing, analysis and communication (GIS, Remote Sensing, etc.) at national level.</li> </ul> <p><b>Financial:</b> The following difficulties in this area are worth mentioning:</p> <ul style="list-style-type: none"> <li>• Weak financial capacity by the state and research institutions to collect, file and analysis weather and renewable natural resources ;</li> <li>• Shortage of financial resources to purchase certain data and software necessary for an assessment of vulnerability and adaptation;</li> <li>• Insufficient financial resources to build capacity and set up a perennial system of assessment of vulnerability and adaptation;</li> <li>• Weak resource mobilization to fund programs and adaptation strategies.</li> </ul>
6. Needs summary	<p>The nationwide adaptation cost-benefit analysis has not been undertaken yet.</p> <p>The Strengthening Resilience and Adaptation Capacity of Agricultural and Water Sectors to Climate Change in Guinea-Bissau Project (PRRCASAHAC-GB) carried out a cost-benefit analysis to adaptation in the Gabu region, east of the country, taking into account as a reference the development trend. This analysis showed that Guinea-Bissau's efforts to adapt to climate change will be considerable. Guinea-Bissau requires approximately USD 42 million for the implementation of adaptation projects in all reference sectors in the two administrative sectors (Pitche and Pirada) in the Gabu region. It should be noted that the country has eight (8) administrative regions and all of them are equally vulnerable.</p> <p>Capacity strengthening has a direct effect on improving decision-making and planning for comprehensive risk management for both public and private actors regarding events associated with climate variability and change in the sectors of forest, water and energy, agriculture and livestock, health, fishing and civil protection.</p> <p>Promoting research and research for development, regional and international exchanges to improve and improve</p>

	applicability of knowledge acquired by participants.
7. Monitoring and progress reports	<p>The country is drafting a proposal for a monitoring system and progress reports that meets national needs and comply with international requirements for monitoring activities and progress of National Determined Contributions (INDC), with different projects implemented and/or ongoing:</p> <p>Example 1: Project of stored carbon quantification and the carbon sink capacity of forest vegetation in Guinea-Bissau - CARBOVEG-GB (2007-2009) - Monitoring and Reporting, funded by the Portuguese Environment Agency - APA), with the overall objective of contributing to assist the forestry sector of Guinea-Bissau in the emerging carbon market,</p> <p>Example 2: Think Global and Local Action Project (2007-2009) - Monitoring and Reporting, funded by the University of Twente (Netherlands), through the UNFCCC Focal Point, TOD / ITC institute in collaboration with Enda Tiers Monde / Enda Energy Program, It aimed at the Quantification of Living Biomass above the soil (BVAS) Stocked Carbon (CO<sub>2</sub>) and carbon equivalent (CO<sub>2</sub> equiv) in community forest reserve Djalicunda.</p>
<b>MITIGATION CONTRIBUTION</b>	
1. Deadline	2020-2030
2. Type of Contribution	The type of Guinea-Bissau mitigation contribution embodied in the implementation of policies and planned actions.
3. Targeted level	Concerning the arguments utilised in the Development of Goals and National Priorities, the context of climate change as part of its economic, social and environmental situation, the contributions of Guinea-Bissau in the area of mitigation are conditioned by financial, technological and capacity building assistance the country receives from abroad.
4. GEE Reduction	<p>According to the GHG inventory (Second National Communication, 2006) and the CARBOVEG-GB Project (2010) Guinea-Bissau is an absolute sink of greenhouse gases, given the high potential for sequestration of its forest sector.</p> <p>It is known, through the above-referenced inventories, that the main responsible for emissions in Guinea-Bissau is the change in the use of land and forests. Deforestation is responsible for emitting large amounts of CO<sub>2</sub> into the atmosphere. The estimates show a decline of around 625,000 m<sup>3</sup> of wood per year.</p> <p>Therefore, the main mitigation measure to be adopted by</p>

the country, which may be a national contribution, is related to reforestation. The second sector that contributes more to GHG emissions is the energy sector. Despite the fact that global average electrification rate of the country is about 12%, Guinea-Bissau was, is and remains one of the countries facing the greatest need of access to modern forms of energy in Africa and the world. In this sector an increase in electric power capacity of at least 90 MW 2020 using petroleum products (diesel and heavy fuel oil) is planned.

Combining the development trend described in the two sectors the trend is for increasing emissions, according to the following figure:



The measures that Guinea-Bissau has appraised so far as contributions are as follows:

- I. Establish and schedule a new forestry policy. The vision is of a sustainable management of forest resources - including through conservation and restoration of forests - to enhance a socio-economic balance that meets the needs of communities and ensures their accountability;
- II. Conduct studies on the energy potential of the country and set the energy development incorporating the largest possible potential of renewable energies in the energy mix;
- III. Develop and establish a legal framework through a national strategy for long-term low-carbon development.

5. Means of Implementation

Meeting the recommended goal requires an overall investment not inferior to 200 million USD by 2020 and 500 million between 2020 and 2030 foreign aid.

According to the mitigation measures identified, the skills and technologies required are:

	<p>I. Reforestation and forest conservation;  II. Electric power generation systems from renewable energies (hydro, photovoltaic systems, wind systems).</p> <p>Capacity building has a direct effect on improving decision-making and planning for integrated management of development that contains a low carbon dimension.</p> <p>The promotion of research for the development, regional and international exchanges leading to the improvement and better applicability of knowledge acquired by participants in mitigation issues.</p>
6. Sectors	Guinea-Bissau's contribution to GHG emission reduction covers the forestry and energy sectors.
7. Gases	CO <sub>2</sub> , CH <sub>4</sub> , NO <sub>x</sub>
8. Calculation methodology	<p>Mitigation measures were selected based on the documents and consultation with stakeholders. Due to the nonexistence of detailed preliminary studies to formulate concrete quantifiable actions, the period until 2020 should be devoted to in-depth studies to enable the implementation of measures in the forestry industry and energy. For example, reforestation, conservation of other forests and a programme for the inclusion of renewable energies sources in the country's energy mix.</p> <p>I.e., it was not possible in the early stage of formulation of the planned contributions of Guinea-Bissau to perform calculations to support our projections due to lack of data. Therefore, it is proposed that the period up to 2020 be dedicated to the development of in-depth and detailed studies in the two sectors (forestry and energy) and of the respective relevant measures. Only then would it be possible to perform calculations that would allow an analysis of the mitigation potential for Guinea-Bissau, allowing at the same time the making of a proposal for an ambitious and fair contribution.</p>
9. Implementation of institutional arrangements	In addition to the legal table on national circumstances, for the mitigation analysis, we took into account: The United Nations Framework Convention on Climate Change and the Kyoto Protocol ratified on 27th October 1995 and 18th November, 2005, respectively. National Poverty Reduction Strategy (PRSP II) and National Strategic Document – TERRA RANKA 2015-2025.
10. How fair and adequate?	Guinea-Bissau is a net GHG sink country, but it is nevertheless willing to make efforts to further reduce their emissions depending on the financial, technological and

	capacity building support that it may receive from the international community.
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GUYANA'S REVISED  
INTENDED NATIONALLY DETERMINED CONTRIBUTION

## Introduction

**People can build a future that is more prosperous, more just, and more secure. Our report, *Our Common Future*, is not a prediction of ever increasing environmental decay, poverty, and hardship in an ever more polluted world among ever decreasing resources. We see instead the possibility for a new era of economic growth, one that must be based on policies that sustain and expand the environmental resource base. And we believe such growth to be absolutely essential to relieve the great poverty that is deepening in much of the developing world.**

**The hope for the future is conditional on decisive political action now to begin managing environmental resources to ensure both sustainable human progress and human survival. We are not forecasting a future; we are serving a notice - an urgent notice based on the latest and best scientific evidence - that the time has come to take the decisions needed to secure the resources to sustain this and coming generations. We do not offer a detailed blueprint for action, but instead a pathway by which the peoples of the world may enlarge their spheres of cooperation.**

**Report of the World Commission on Environment and Development 1987: *Our Common Future*, led by Norway's Prime Minister Gro Bruntland with Sir Shridat S. Ramphal representing Guyana**

Notwithstanding the best efforts of many processes, the global community is once again severely challenged by the failure of the international system to act decisively to curb one of the main consequences of ignoring limits: climate change as a consequence of an increase in greenhouse gases resulting from human activity and industrial processes.

The Conference of the Parties (COP) that will be convened in Paris in December is one more attempt by the international system of the United Nations to convene governments, multilateral and bilateral agencies, the private sector, and NGOs and to engage citizens the world over. The goal is a binding agreement to arrest the descent into a world where the increase in global temperatures by 2.7 – 3 degrees threatens the very existence of some states, importantly the small island and coastal low-lying developing states (SIDS), including Guyana. These states lack the capacity – financial and otherwise - to withstand more frequent catastrophic climate events, if there is no agreement to reduce global emissions.

The essential question in 2015 is the same as it was in 1987: Will nations continue a pattern of development that uses and abuses the Earth's resources in a manner that will guarantee the misery and destruction of countless millions, or to commit to a new pathway that will permit future generations to live in harmony with nature and each other?

It is in this context, and in accordance with the Warsaw COP Decision 1/CP.19 and Lima 1/CP.20 and the Guyana Constitution that Guyana submits this *revised* Intended Nationally Determined Contribution to the UNFCCC as our contribution to the global effort to combat climate change.

## **Country profile**

Guyana has a long, proud history of forest conservation, with our indigenous peoples as the original stewards and conservators over their 7000-year-long legacy of wise use and accumulated traditional knowledge. Kaieteur National Park (est. 1929) was the first protected area in Amazonia. Sixty years later, in 1989, Guyana made a bold offer to the international community to share the responsibility to manage the pristine million-acre Iwokrama Rainforest “in a manner that will lead to lasting ecological, economic and social benefits to the people of Guyana and to the world in general”. Throughout our history, successive governments have contributed to national forest policy and the sustainable management of our state forests. In spite of some challenges, the Guyana Forestry Commission (GFC) and its predecessor, the Guyana Forestry Department, have been recognized for their professional management of the nation’s 13.6 million hectare commercial forest patrimony. Because of this leadership and foresight, and with the vigilance and related contributions of civil society advocates and organizations, Guyana has maintained one of the lowest deforestation rates on Earth (peaking at 0.079% in 2012 and 0.065 % in 2014).

With the world's second highest percentage of rainforest cover (85%), Guyana commands globally important carbon stocks (19.5 GtCO<sub>2</sub>eq). As one of only a handful of countries that are net carbon sinks, Guyana's forests sequester more carbon than the nation's human activities generate. Guyana's 18.48 million forested hectares in total hold carbon in unusually high density (up to 350 tons/hectare), and store some 5.31 gigatons of carbon. That amounts to approximately 6,638 tons/person, the second highest forest carbon stock per capita of any country on Earth.

Between 2009 and 2015, with our partner the Kingdom of Norway, Guyana embarked on the world's first national-scale, payment-for-performance forest conservation agreement which provided financing for Guyana's innovative and pioneering Low Carbon Development Strategy (LCDS). This ground-breaking agreement established a model for the important contribution of high forest cover/low deforestation rate (HFLD) countries to the international fight to mitigate climate change. The viability of this REDD+ model relies on Guyana's highly-regarded national forest Measurement, Reporting and Verification System (MRVS).

Guyana has led in the development of a nationwide MRVS and integrated Community MRV (CMRV) models. Through the Opt-in Mechanism, currently being developed, indigenous communities will have the opportunity to 'Opt-in' to Guyana's REDD+ programme through a consultative process that ensures community consensus based on FPIC principles and a benefit-sharing and governance framework.

Although rich in natural resources – including gold, diamonds, bauxite and timber – and with a population of less than 800,000, Guyana is classified as a lower-middle income developing country, and remains one of the poorest countries in South America and the Caribbean.

Consequently, Guyana's enormous forest carbon stocks, together with other significant ecosystems services - including abundant fresh water and biodiversity- make it the ideal country to continue to test and refine the economic viability of REDD+ payment schemes. Guyana is prepared to continue to sustainably manage, conserve, and protect this patrimony for the benefit of ourselves and all humanity. In return, we must obtain benefits to improve the wellbeing and quality of life of Guyanese. The economic and other benefits that can accrue from REDD+ and the Green Economy it supports need to be comparable with or superior to those obtainable from current extractive economic activities including artisanal gold mining, recognizing that this activity supports the livelihoods of many thousands of Guyanese.

Recalling Principal Seven of the Rio Declaration and UNFCCC's commitment to "common but differentiated responsibility", Guyana is offering to defer the pursuit of our historic natural resource exploitation-based economy, and offer our huge carbon stocks to the world if, in return, our sustainable human development needs and the cost of deferring business as usual are met by financial support from the international community in a predictable, just and equitable manner.

*Common But Differentiated Responsibility has two matrices. The first is the common responsibility, which arises from the concept of common heritage and common concern of humankind, and reflects the duty of States to equally share the burden of environmental protection for common resources; the second is the differentiated responsibility, which addresses substantive equality: unequal material, social and economic situations across States; different historical contributions to global environmental problems; and financial, technological and structural capacity to tackle those global problems. In this sense the principle establishes a conceptual framework for an equitable allocation of the costs of global environmental protection.*

In the delivery of all contributions, Guyana will be cognizant of, and respect, national and international commitments to human rights, including those of indigenous peoples and local communities and the needs and concerns of all other vulnerable groups.

Guyana remains committed to the fight against global climate change and the success of COP21 in developing an international system that will effectively limit global temperature increase to 1.5C and make manifest the commitment of developed and developing nations to the agreed goal of common and differentiated responsibility for sustainable development. Therefore, in accordance with the Warsaw COP Decision 1/CP.19 and Lima 1/CP.20, Guyana is pleased to submit this, our revised Intended Nationally Determined Contribution (INDC) to the UNFCCC.

## **PLANNING PROCESS**

Guyana has employed a broadly consultative process to develop its intended nationally determined contributions through an Inter-Agency Task Force established by Cabinet. This Task Force oversaw the process of developing the submission. A small technical team, led by Guyana's lead negotiator, prepared the first draft, which was reviewed by the Task Force to produce a second draft. The second draft was presented at two public meetings in September 2015 – one for civil society in general and the second targeting representatives of indigenous organizations and communities. The third draft was approved by Cabinet and was submitted to the UNFCCC prior to October 1.

Based on a second round of civil society review and inputs, an amended document was produced and presented at a national consultative conference, jointly coordinated by Government and Civil Society, at which a finalized consensus document was agreed. This revised INDC was approved by Cabinet and submitted to the UNFCCC as Guyana's revised INDC.

## **Type of commitment**

While we look forward to broad-based and economically holistic emission reduction commitments from developed countries, the contribution of Guyana and other developing countries will in the main be policy-based including measures to reduce the normative "business as usual" growth in emissions. As a developing country, a coastal low-lying SIDS state, and one of few net carbon sink countries, Guyana proposes the following policies, measures and actions, both conditional and unconditional.

## **Coverage**

Coverage is at the national level for the sectors covered in this INDC.

## **Gases**

The greenhouse gas taken into account in this INDC is carbon dioxide.

## **Sectors covered**

Guyana's intended contributions will focus on the forest and energy sectors, where the majority of our current and historic emissions are produced.

While it is true that agriculture is a considerable source of other greenhouse gas (methane and nitrous oxide) emissions, and should be part of the general global mitigation agenda, for SIDS, LDCs and the African Group, domestic agriculture is critical to our food security and rural livelihoods. Agriculture in Guyana, as elsewhere, is under threat from the adverse effects of climate change, including floods and droughts. Given its small scale, and concentrated as it is along the narrow coastal strip where Guyana's most productive soils are found, our agriculture is particularly vulnerable to sea level rise and other adverse effects of climate change. Our contributions are therefore focused entirely on CO<sub>2</sub> emissions and Guyana's agriculture is treated purely as an adaptation issue in this INDC.

## **Time frame**

The time frame associated with Guyana's INDC is for the period up to 2025.

## **Methodology/Metric**

Methodologies and metrics are consistent with IPCC guidance.

## **Use of land use and forestry sector**

Guyana will utilize a combination of conservation and sustainable management of its forests in the fight against climate change.

## **Use of markets**

Outside our bilateral agreement with Norway, Guyana does not currently see viable opportunities in carbon trading markets; however this does not preclude participation in green consumer markets at all levels. Guyana's robust MRV system can ensure the integrity of our emission reduction efforts as we engage with carbon-neutral markets as a means of maximizing the value of our exports and providing internationally attractive, verifiable low carbon products.

## **CONTRIBUTIONS**

Guyana's overarching contribution goal is to achieve a Green Economy via a low-emission economic-development pathway. We intend to continue the transition of our economy to realize improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities. This includes the pursuit of a resilient, low-carbon, socially-inclusive economy that provides a better quality of life for all within the ecological limits of our planet, particularly as it pertains to our common global climate.

Guyana's Low Carbon Development Strategy (LCDS) was first formulated in 2008. Implementation of the LCDS has been financed primarily with Guyana REDD+ Investment Fund (GRIF) resources earned under the Guyana Norway Agreement (GNA). With additional, timely, adequate and accessible resources, Guyana can build on this achievement and the lessons learned over the past five years to embark on a more inclusive and comprehensive path to a low-emission Green Economy. More specifically, with the provision of adequate resources, Guyana can increase its share of renewable energy by 100% by the year 2025.

Our intended contributions are presented below.

### **Forestry i) Unconditional contributions**

Guyana is willing to continue making the following contributions unconditionally:

Continue and improve ongoing work to realize sustainable forest management. GFC will ensure compliance with the various Codes of Practice that govern the timber industry using local resources.

Forest monitoring will maintain a high level of timber legality, with the GFC committing 50% of its staff to field monitoring from its 54 forest monitoring stations countrywide. These efforts will maintain a low rate of illegal logging (at less than 2% of production).

Guyana is also prepared to finalize and implement the Voluntary Partnership Agreement (VPA) under EU- FLEGT. The VPA is expected to be finalized in 2016 and to provide independent accreditation of forest legality and management practices throughout Guyana's timber industry.

We are prepared to improve added- value activities locally to assist in creating a higher potential for carbon storage in long-use wood products. This could also potentially reduce the pressure on forest resources as derivation of a higher value may result in reduced harvest levels.

Indigenous people own and manage some 14% of Guyana's lands. The culture and traditions of Guyana's indigenous peoples are rooted in sustainable use of nature, evident in the forests and other natural ecosystems maintained through centuries on the lands they have customarily occupied and used. Guyana will strengthen its support for indigenous communities as they continue the stewardship of their lands and *inter alia* the benefits that accrue from any REDD+ activities from these lands. If they choose to, communities will be supported to better manage their transition to more market-based means of provisioning for their social and cultural well-being in ways that continue the tradition of wise use. Indigenous peoples themselves, through the full application of the FPIC process, in keeping with the stated policy in the LCDS, will decide whether or not to include their titled lands as part of Guyana's REDD+ programme. Policies will also be implemented to reflect equity between the extractive sector and indigenous peoples as the nation moves to genuinely ensure that the fight against climate change continues.

## **ii) Conditional Contributions**

### **Avoided Deforestation**

Guyana's proposal for a Reference Level for REDD+ is based on the Combined Reference Level approach, in which a global forest carbon emissions loss of 0.44%, as concluded by Baccini et. al. 2012 is used, along with Guyana's historic emissions level for the period 2000 to 2009 (0.06%) as established in the GNA. Using a total carbon stock of forests in aboveground and belowground biomass of 19,197,411,268 tCO<sub>2</sub>e, Guyana's Proposed Reference Level for its REDD+ Programme is 48.7 MtCO<sub>2</sub>e. Through this approach, Guyana can continue to avoid emissions in the amount of 48.7 MtCO<sub>2</sub>e annually if adequate incentives are provided.

To contribute to avoided deforestation and achieve an effective REDD+ programme, Guyana will implement policies measures, and incentive programmes, to engender broader participation of civil society and the private sector in actions to avoid deforestation and forest degradation. The Guyana Government is cognizant of the need for comprehensive land use planning in order to efficiently management and rationally exploit our national resources.

In summary, avoided emissions contributions resulting from reforms in the timber and mining industries can contribute up to 48.7 MtCO<sub>2</sub>e to the global mitigation effort through the implementation of the Emission Reduction Programme described in greater detail below.

### Emission Reduction Programme for Forests

Given that the bulk of Guyana's emissions emanate from mining and logging activities, our Emissions Reductions Programme (ERP) will therefore focus on making these industries more efficient and compliant with our targets. With adequate resources, Guyana will develop a suite of ERP measures that will include:

- the conservation of an additional 2 million hectares through Guyana's National Protected Area System and other effective area-based conservation measures as per Guyana's commitment under the UNCBD, including the protection of conservancies and reservoirs and their watersheds and the watersheds upstream of new hydro-power sites. Existing mangrove forests will be counted in this target and the mangrove restoration programme along the vulnerable coast will be expanded.

Timber harvesting contributed 40% of Guyana's emissions from land use between 2001 and 2012. In the timber industry the ERP will:

- Use of Reduced Impact Logging (RIL). Reducing the incidental and collateral damage during tree felling by about 10% and the damage from skid trails by about 35% (avoiding mid-size trees during skidding), could reduce the annual emissions by 13.5%. This translates to a reduction of about 430,000 tCO<sub>2</sub> per year.

This will result in a reduction of the annual emissions from the timber industry from 3.5M tCO<sub>2</sub> to 2.3M tCO<sub>2</sub>, a 20% reduction from historic levels for this driver, and an 11% reduction in the overall historic level.

- Guyana is in the process of reviewing compliance of significant timber concession agreements with a view to determining if they meet agreed targets.

A wider review to determine the most optimal use of these lands will be undertaken. If, in fact, REDD+ can provide adequate incentives, Guyana would be prepared to reduce the area to be logged in favour of conservation concessions and to further the development of non-timber forest products and other forest-based services while recognizing the need for livelihoods.

Our MRVS has verified that small scale gold mining resulted in 89% of the deforestation recorded in Guyana over the past three years. To address this, the ERP will include actions by the Guyana Geology and Mines Commission (GGMC) to implement policy reforms, education, and incentives for integrated planning and management of the mining sector. This will support the transformation of the mining sector by 2020 and include actions to:

- Implement mineral mapping in the mining districts to identify economically exploitable deposits. This will significantly reduce deforestation by avoiding clearing of forest cover from lands which contain only marginal mineral deposits. A significant portion of Guyana's deforestation results from forest clearing for mining that does not generate a profit.
- Implement awareness and incentive programmes to improve the efficiency of technologies and practices in the mining industry. This will include replacing inefficient mercury-based technology with more efficient technologies, such as shaker-tables and centrifuge systems that can increase gold recovery rates from 30% to 80%. Currently, low recovery rates cause miners to often return to previously mined areas when technology or economic circumstances favour them doing so. Improved recovery efficiency would make reprocessing of sites unnecessary and better facilitate cost-effective reforestation and recovery of mined sites.
- Implement policies to institute mandatory, nation-wide land reclamation and reforestation of mined areas.

### Forest Governance

Guyana has made significant progress in complying with EU-FLEGT for our timber exports to the European Union. Additional resources are required to build institutional and private sector capacity to meet other trade and supply conditions such as the Lacey Act, FSC certification and other procurement requirements.

### MRVS

A comprehensive and robust MRV system, one of the most advanced of its kind, has been developed under Guyana's REDD+ programme. The development of this system has contributed considerably to the global understanding of how small forested tropical countries can reliably and cost-effectively measure and report on its forest carbon

emissions. Guyana is willing to build on the lessons learnt thus far to complete and maintain its MRVS if adequate financial resources are provided to do so.

### **Implementation cost**

The cost of implementation of these forest-conservation initiatives in total is estimated to be determined annually.

## **Energy**

### **Unconditional Contributions**

Guyana is in the process of reviewing our options toward the rapid expansion of a renewable energy supply. Our goal is to develop a mix of wind, solar, biomass and hydropower to supply both the demand of the national grid and the energy requirements for towns and villages in Guyana's hinterland.

Guyana will seek to construct and/or promote the construction of small hydro systems at suitable locations such as Moco Moco, Kato and Tumatumari. Guyana will power all of the six newly established townships, starting with Bartica, using renewable energy sources. Currently, Guyana has installed cogeneration from bagasse to power sugar mills. Independent power producers and suppliers are being encouraged to construct energy farms and sell energy to the national grid. Preliminary approvals have been given for a 26MW wind farm.

The Government of Guyana will continue to work closely with farmers in agricultural areas across Guyana to encourage the use of bio-digesters to reduce waste, produce biogas and provide affordable, healthy and efficient cooking means at the household level.

Legislation has been enacted to remove import duty and tax barriers for the importation of renewable energy equipment, compact fluorescent lamps and LED lamps to incentivize and motivate energy efficient behavior. Guyana will continue to conduct energy audits and replace inefficient lighting at public, residential and commercial buildings to reduce energy consumption. Public education and awareness programmes will continue to play a major role in providing consumers with information and tools to reduce energy consumption and expenditure. Guyana will implement other policies to encourage energy efficiency and the use of renewable energy, including building codes and net-metering of residential renewable power.

We expect that these unconditional contributions will significantly reduce Guyana's energy consumption.

### **Conditional Contributions**

Guyana is committed to eliminating our near complete dependence on fossil fuels. Given our solar, wind and hydropower potential and relatively small national demand,

we believe that with adequate and timely financial support, Guyana can develop a 100% renewable power supply by 2025. Assessment of the potential of the renewable power sources will be undertaken to determine the most cost effective and efficient means of developing this potential; to this end an independent review of the Amaila Falls Project is to be undertaken with the assistance of the Kingdom of Norway.

### **Assumptions and Risks**

It is assumed that Guyana and Norway will agree to renew and extend our bilateral agreement.

It is further assumed the Green Climate Fund will be fully operationalized and begin disbursing from 2016.

It is also assumed that SIDS, and in particular coastal low-lying countries such as Guyana, will receive preferential access and special consideration in access to financing.

It is also assumed that REDD+ and renewable energy programmes and projects will be resourced in a predictable, adequate and timely manner.

### **Fairness, Equity and Ambition**

Guyana is a highly vulnerable developing country within SIDS. Guyana's aggregate emissions in 2004<sup>[1]</sup> were 0.004617GtCO<sub>2</sub>eq, representing one hundredth of one per cent of the world total emissions for that year. This, paired with the carbon sequestration of our 18.48 million hectares of natural forests and our extremely low historic deforestation rates (0.06%) makes Guyana one of the world's few net carbon sink countries. Given our status as a net carbon sink, and a lower-middle-income developing state our proposed contributions to the fight against climate change is fair, equitable, and ambitious.

### **Adaptation**

See Annex 1

### **Means of Implementation**

Implementation of Guyana's iNDC is estimated at US\$ (to be determined) divided between the forestry, energy, and adaptation activities (shown in the Annex).

## ANNEX 1 - ADAPTATION

### **Contributions**

#### Unconditional contributions

With its limited resources, Guyana will continue basic work on integrated water management infrastructure, which includes the construction, rehabilitation and maintenance of conservancies and canals, and sea defenses, water supply and sanitation, as well as the introduction of new agricultural techniques such as hydroponics and fertigation. Climate change considerations will be mainstreamed in all sectors of national development.

The GoG is currently in the process of preparing a Climate Resilience Strategy and Action Plan (CRSAP) which is expected to provide a comprehensive framework for adaptation and resilience building in Guyana. Guyana will continue and finalize its work on the CRSAP, but will require significant resources to implement it.

#### Conditional contributions

Given the requisite support, Guyana will undertake actions in the following areas:

- Implementation of the CRSAP.
- Upgrading infrastructure and other assets to protect against flooding.
- Mangrove restoration.
- Hinterland Adaptation Measures.
- Development and implementation of Early Warning Systems.
- Enhanced weather forecasting including microclimate studies and localized forecasting.
- Development and introduction of crop varieties which are:
  - o Flood resistant,

- o Drought tolerant,
  - o Disease resistant.
- Develop environmental and climate change awareness programmes at all levels.
- Developing innovative financial risk management and insurance measures.

### **Means of Implementation**

In order to implement its conditional adaptation actions, including infrastructural development works, Guyana will require an estimated US\$ 1.6 Billion in the period to 2025.

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[1] Guyana's most recent GHG inventory was completed for this year and is contained in our second national communication to the UNFCCC.



**REPUBLIQUE D'HAÏTI**

**MINISTÈRE DE L'ENVIRONNEMENT**

**Contribution Prévus Déterminées au niveau National**

Septembre 2015

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## PRÉAMBULE

Nous sommes heureux de présenter la *Contribution Prévues Déterminées au niveau National (CPDN)* de la République d'Haïti qui donne des informations pertinentes sur l'effort proposé pour faire face aux aléas climatiques. Ce document fixe les orientations sur lesquelles reposeront les actions de l'Etat haïtien au cours des quinze prochaines années pour s'adapter aux changements climatiques et réduire de 31% ses émissions de Gaz à Effet de Serre (GES) par rapport à un scénario tendanciel, d'ici à 2030. Avec cet effort, Haïti demeure l'un des pays du globe terrestre les moins émetteurs de GES.

L'élaboration de la CPDN découle d'un consensus fort entre les pouvoirs publics, la société civile et le secteur privé sur les objectifs à atteindre. De nombreux intervenants ont donc contribué à l'élaboration de ce document qui répond adéquatement aux besoins et aux intérêts du peuple haïtien et s'inscrit dans la droite ligne du Plan Stratégique de Développement d'Haïti (PSDH), du Plan Action National d'Adaptation (PANA) et de la Deuxième Communication Nationale sur les changements climatiques.

Les défis sont nombreux pour le gouvernement et le peuple haïtiens. Haïti doit prendre les mesures nécessaires pour, à la fois, propulser son développement, s'adapter aux changements climatiques et contribuer à la réduction des émissions de gaz à effet de serre. Pour cela, il nous paraît important de lier la lutte contre le réchauffement climatique à l'objectif de pays émergent d'ici à 2030 fixé dans le PSDH. Ainsi, notre CPDN est articulée autour de quelques enjeux qui nous paraissent prioritaires :

- la gestion intégrée des ressources en eau et des bassins versants ;
- la gestion intégrée des zones côtières et la réhabilitation des infrastructures ;
- la préservation et le renforcement de la sécurité alimentaire notamment par le développement de la bioéconomie ;
- la transition énergétique pour réduire la dépendance aux énergies fossiles ;
- l'information, l'éducation et la sensibilisation.

Les engagements pris dans la CPDN représentent un besoin en financement global de 25.387 milliards USD. Haïti s'attend donc à une véritable conjonction des efforts de la communauté internationale pour continuer à soutenir la lutte contre le changement climatique en vertu du principe « des responsabilités communes mais différenciées », consacré par la Déclaration de Rio sur l'environnement et le développement.

Dominique PIERRE  
Ministre de l'Environnement

## TABLEAU RÉSUMÉ DE LA CONTRIBUTION D'HAÏTI

Périmètre	Territoire national
Année de référence	2000
Période de mise en œuvre	2016-2030
Type de contribution	Conditionnelle et inconditionnelle
Secteurs pris en compte	<p>Atténuation</p> <p>Energie, AFAT (Agriculture, Foresterie et Affectation des terres), Déchets.</p> <p>Adaptation</p> <p>Agriculture et sécurité alimentaire, Zones côtières, Ressources en eau, Habitat et aménagement du territoire, Santé, Education, Finances publiques.</p>
Gaz concernés	CO <sub>2</sub> , CH <sub>4</sub> , N <sub>2</sub> O.
Cible inconditionnelle	Réduire de 5% les émissions de GES par rapport au scénario de référence
Cible conditionnelle	Réduire de 26% les émissions de GES par rapport au scénario de référence
Besoins en financement pour la mise en œuvre	25.387 milliards USD (Atténuation: 8.773 milliards USD et Adaptation: 16.614 milliards USD)

## 1. INTRODUCTION

Conformément aux objectifs de son Plan Stratégique de Développement (2012-2030), et en ligne avec les stratégies nationales d'adaptation aux changements climatiques et d'atténuation des émissions des gaz à effet de serre (GES), la République d'Haïti communique sa Contribution Prévues Déterminées au Niveau National (CPDN). Petit Etat Insulaire en Développement (PEID) situé dans la région des Caraïbes et seul PMA du continent américain, le pays est très vulnérable aux effets du dérèglement climatique exacerbés par la forte dégradation de son environnement et sa faible capacité de réponse. Les événements climatiques extrêmes (cyclones, sécheresses, inondations) constituent un frein de taille aux efforts de développement du pays. Il en résulte que la priorité d'Haïti est l'adaptation aux changements climatiques et la réponse aux pertes et dommages.

A travers cette Contribution, Haïti entend : (i) améliorer sa résilience face aux catastrophes liées au changement climatique ; (ii) répondre aux pertes et dommages causés par les phénomènes climatiques extrêmes et (iii) contribuer à l'effort mondial de limitation de l'augmentation de la température de la planète en dessous de 2°C.

Il s'agit pour le pays de s'engager résolument sur la voie d'un développement sobre en carbone et résilient aux changements climatiques, en limitant ses pertes récurrentes de PIB liées aux catastrophes climatiques, en augmentant le stock de carbone et en diminuant sa dépendance énergétique aux énergies fossiles.

## 2. MÉTHODOLOGIE D'ÉLABORATION DE LA CONTRIBUTION D'HAÏTI

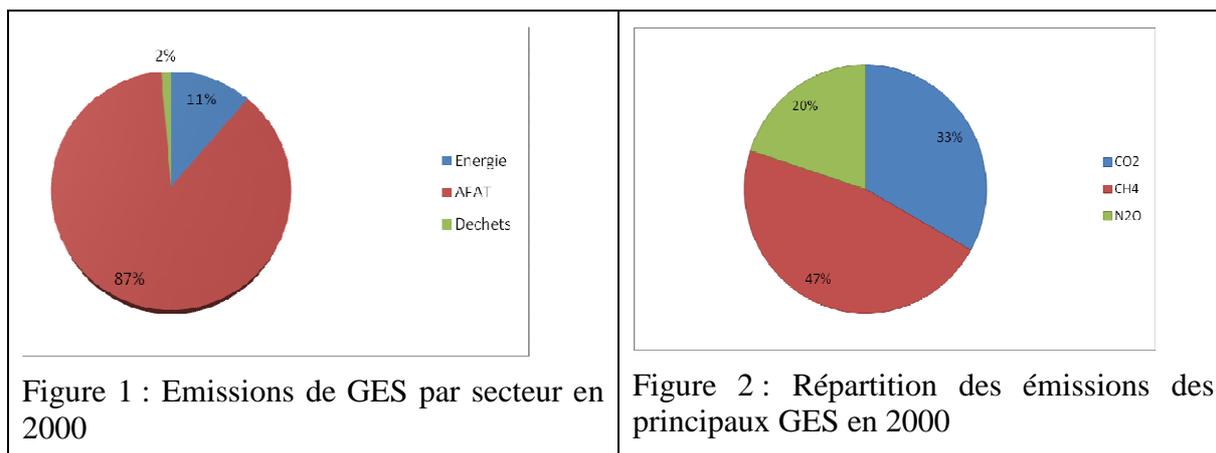
L'élaboration de la Contribution d'Haïti est le fruit d'un large processus de concertation. La démarche participative adoptée a permis de :

- passer en revue les principaux documents stratégiques nationaux: Plan Stratégique de Développement d'Haïti (PSDH), Plan d'Action National d'Adaptation (PANA), 1<sup>ère</sup> et 2<sup>ème</sup> Communications nationales sur les changements climatiques, Feuille de route pour un système énergétique durable en Haïti, Politique du Ministère de l'Agriculture des Ressources Naturelles et du Développement Rural (MARNDR) pour l'aménagement des bassins versants, Stratégie de Montage de l'Agence Nationale des Aires protégées (ANAP), Plan de relance de la filière café, Profil climatique d'Haïti, Scaling-up Renewable Energy Program (SREP), Programme Pilote sur la Résilience Climatique (PPCR);
- consulter les parties prenantes (ministères sectoriels, société civile, secteur privé, agences de développement etc.) pour définir les priorités du pays en matière d'adaptation ainsi que le niveau d'ambition en matière d'atténuation et ;
- valider les choix arrêtés dans quatre (4) ateliers régionaux (nord, centre, sud et îles adjacentes).

### 3. SITUATION DE RÉFÉRENCE DES ÉMISSIONS DE GAZ À EFFET DE SERRE (GES) EN HAÏTI

#### 1.1 PROFIL DES ÉMISSIONS DE GES D'HAÏTI

Selon le dernier inventaire des GES réalisé<sup>1</sup>, Haïti n'a émis que 7,832 Mt d'eqCO<sub>2</sub> en l'an 2000. La population était de 8.578 millions d'habitants et le PIB de 3357.89 millions de dollars US. Le profil des émissions par secteur et par les principaux gaz est présenté dans les figures ci-dessous.



Entre 1995 et 2000, les émissions haïtiennes de GES ont crû de 20% soit un rythme de 3.1% par an (voir Figure 3). Sur cette période, la population et le PIB ont augmenté respectivement de 1.9% et de 4%.

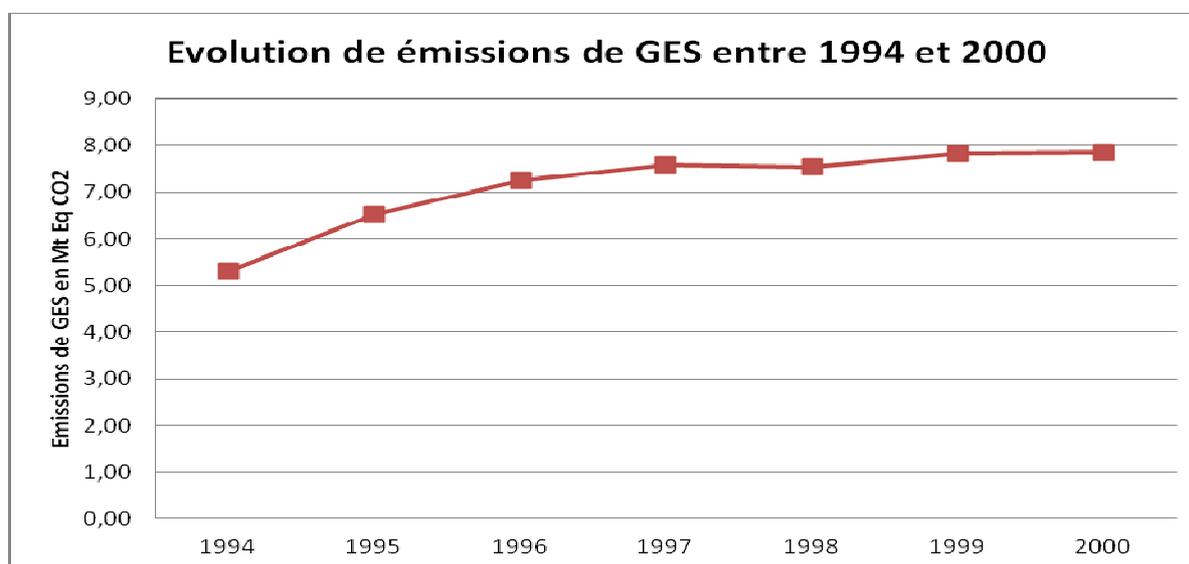


Figure 3: Evolution des émissions de gaz à effet de serre en Haïti de 1994<sup>2</sup> à 2000

1 2<sup>ème</sup> communication nationale sur les changements climatiques (2013)

2 Dans la Deuxième communication nationale d'Haïti, les émissions liées au secteur de l'Energie de 1994, année d'embargo sur les produits pétroliers, ont été approximées à partir des données de 1995. C'est pourquoi on ne considère pas 1994 dans l'analyse de la croissance des GES.

#### 4. CONTRIBUTION D'HAÏTI EN MATIÈRE D'ATTÉNUATION

En matière d'atténuation, la République d'Haïti compte réduire ses émissions de 31% par rapport au scénario de développement tendanciel, représentant en valeur absolue 45.24 Mt éq-CO<sub>2</sub>. Cet effort, illustré dans la figure 4, est réparti comme suit :

Objectif inconditionnel	<b>Réduction des émissions de 5%</b> par rapport au scénario de référence à l'horizon 2030, soit un cumul de 10 Mt éq-CO <sub>2</sub> .
Objectif conditionnel	<b>Réduction des émissions de 26% supplémentaires</b> par rapport scénario de développement tendanciel à l'horizon 2030, soit un cumul de 35.24 Mt éq-CO <sub>2</sub> .

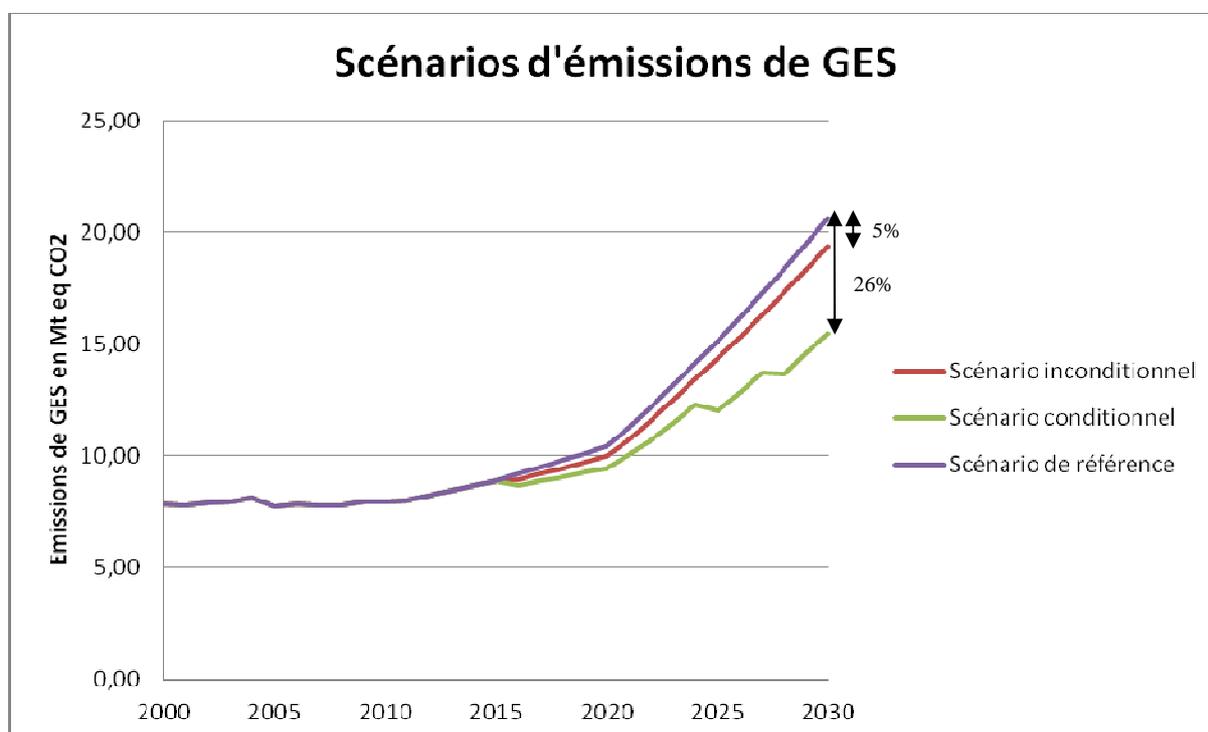


Figure 4: Différents scénarios d'émissions de GES de 2000 à 2030

Les activités relatives aux scénarios conditionnels et inconditionnels sont présentées en annexe.

## 1.2 HYPOTHÈSES ET APPROCHES MÉTHODOLOGIQUES

Période	2016- 2030
Approche adoptée	Approche mixte basée à la fois sur résultats et actions.
Type de contribution	Réduction des émissions de GES par rapport au scénario de développement tendanciel à travers notamment des projets d'énergies renouvelables et de séquestration de carbone.
Périmètre	Territoire national
Gaz à effet de serre ciblés	Dioxyde de carbone (CO <sub>2</sub> ), méthane (CH <sub>4</sub> ), protoxyde d'azote (N <sub>2</sub> O)
Secteurs couverts	<p><b>Energie</b></p> <ul style="list-style-type: none"> <li>▪ Demande d'énergie (ménages, industries, transport durable et commerce)</li> <li>▪ Offre d'énergie (forêt de production de bois-énergie, production de charbon de bois, production d'électricité)</li> </ul> <p><b>Agriculture, Forêt et changement d'affectation des terres (AFAT)</b></p> <ul style="list-style-type: none"> <li>▪ Amélioration de pâturage par des légumineuses</li> <li>▪ Parcs nationaux forestiers</li> <li>▪ Boisement et reboisement</li> <li>▪ Agroforesterie</li> </ul> <p><b>Déchets</b></p> <ul style="list-style-type: none"> <li>▪ Déchets solides municipaux</li> </ul>
Scénario de développement tendanciel (Business Usual) As	Ce scénario prend en compte les politiques et stratégies en place traduites dans le Plan Stratégique de Développement d'Haïti (PSDH)- Haïti émergent 2030.
Scénarios d'atténuation	Les scénarios d'atténuation, tant inconditionnel que conditionnel, seront mis en œuvre à travers les projets cités au tableau 1 en annexe.
Potentiel de réchauffement global (PRG) 100 ans réf. IPCC version révisée 96	Les valeurs utilisées sont celles recommandées par le Groupe Intergouvernemental des Experts sur l'évolution du Climat (GIEC) selon la décision 17/CP.8 de la CCNUCC, pour la préparation des inventaires nationaux des Gaz à Effet de Serre (GES). PRG CO <sub>2</sub> =1 PRG CH <sub>4</sub> = 21 PRG N <sub>2</sub> O =310
Méthodologie pour l'estimation des émissions	<p>L'inventaire des GES de 2000 a été réalisé suivant les lignes directrices du GIEC 1996, version révisée.</p> <p>Les scénarios d'émissions ont été élaborés à partir du <i>logiciel Long range Energy Alternatives Planning System (LEAP)</i> pour le secteur de l'énergie. Ils se reposent sur les données d'activités, les projections de population et les perspectives macroéconomiques et sectorielles prévues dans le plan stratégique de développement d'Haïti (PSDH)- Haïti émergent 2030.</p> <p>Les émissions du secteur AFAT ont été estimées à partir de l'outil EX-ACT, version 4 et celles des déchets suivant les lignes directrices du GIEC 1996, version révisée.</p>
Marché du carbone	La République d'Haïti envisage d'accéder aux marchés du carbone pour financer une partie des mesures conditionnelles de sa Contribution.

### 1.3 ÉQUITÉ ET AMBITION

En 2000, les émissions de GES en Haïti n'ont représenté que 0.03 % de l'ensemble des émissions mondiales. Les émissions per capita calculées pour la même année étaient de 0.91 TCO<sub>2</sub>eq. Malgré son statut de seul Pays Moins Avancé (PMA) de l'hémisphère américain et de Petit Etat Insulaire en Développement fortement victime des catastrophes liées au climat, la République d'Haïti croit fermement au principe de *responsabilités communes mais différenciées* et veut participer à l'effort mondial de réduction des émissions pour atteindre les objectifs de limitation du réchauffement global en deçà des 2°C. Au terme de cette contribution, le pays veut réduire ses émissions de 31% par rapport au scénario de référence. Cependant compte tenu des capacités limitées du pays, l'atteinte de cet objectif ambitieux en rapport à son potentiel d'atténuation nécessite le support financier, technique et technologique de la communauté internationale.

## 5. CONTRIBUTION EN MATIÈRE D'ADAPTATION

Haïti, située dans le bassin caribéen, se trouve exposée à beaucoup de phénomènes liés au climat. Les variations du régime pluviométrique, de la température, de la fréquence des tempêtes tropicales sont parmi tant d'autres signaux climatiques observés à travers le pays.

Les scénarios établis en Haïti montrent d'ici à 2030 un accroissement de la température (de 0.8°C à 1°C), une diminution de la pluviosité annuelle de 6 à 20%, un décalage de la saisonnalité des pluies et une augmentation du niveau moyen de la mer. En 2014, Haïti a été classée au quatrième rang mondial de vulnérabilité aux effets des changements climatiques<sup>3</sup>.

Au cours des dix dernières années, le pays a souvent été victime des perturbations du climat qui se manifestent surtout par un changement du régime hydrique des bassins versants, l'augmentation des périodes de sécheresses et des pertes en vies humaines dues aux inondations provoquées par les tempêtes tropicales. Les coûts cumulés des impacts du dérèglement du climat sans prendre de mesures préventives sont estimés à 1,8 milliards USD et à 77 millions USD en prenant des mesures d'adaptation à l'horizon 2025<sup>4</sup>.

Compte tenu des différents impacts observés et anticipés, des mesures ont été prises pour augmenter la résilience du pays aux impacts des phénomènes extrêmes liés au climat. Ainsi, en 2006, Haïti a élaboré son Plan d'Action National d'Adaptation (PANA) et met en œuvre un ensemble d'activités découlant du PANA et son Programme Pilote sur la Résilience Climatique (PPRC). De même des efforts d'aménagement du territoire sont en cours pour diminuer la vulnérabilité du pays. Les mesures n'ont néanmoins pas l'ampleur et l'intensité nécessaires pour répondre aux besoins nés des changements en cours notamment en matière de démographie et d'écosystèmes.

Les différentes actions prioritaires identifiées dans le Plan d'Action National d'Adaptation (PANA) ne sont pas toutes mises en œuvre à cause d'un manque de financement et de la faible capacité des institutions publiques. L'accès difficile au financement et aux ressources technologiques appropriées, l'inexistence de cadre réglementaire et législatif en matière d'adaptation au changement climatique constituent autant d'obstacles à la réalisation des activités prévues. En ce sens, le pays a besoin d'un renforcement de capacité technique et institutionnel et d'un soutien technologique et financier pour franchir ces barrières.

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3 L'Atlas des Changements climatiques et des risques environnementaux de Maplecroft

4 Estimation des coûts des impacts du changement climatique en Haïti (MDE, 2015)

## **5.2.- PRIORITÉS ET OBJECTIFS D'ADAPTATION**

Les priorités du pays en matière d'adaptation aux changements climatiques sont :

- La gestion intégrée des ressources en eau et des bassins versants ;
- La gestion intégrée des zones côtières et la réhabilitation des infrastructures ;
- La préservation et le renforcement de la sécurité alimentaire ;
- L'information, l'éducation et la sensibilisation.

Aux termes de cette contribution, Haïti s'engage d'ici 2030 à:

- Intégrer dans les stratégies sectorielles de développement les effets des changements climatiques ;
- Aménager les 15 bassins versants stratégiques les plus vulnérables aux événements climatiques extrêmes suivant le schéma d'aménagement du territoire ;
- Protéger les zones côtières face aux impacts des changements climatiques ;
- Développer la bio-économie, l'agriculture climato-intelligente et biologique.

## **6. PROCESSUS DE PLANIFICATION**

Pour la mise en œuvre de sa CPDN, le pays entend définir au cours de la période 2016-2020:

- Sa Politique Nationale sur les Changements Climatiques ;
- Son Plan National d'Adaptation (PNA) ;
- Son Plan de réponse aux pertes et dommages climatiques ;
- Ses Plans d'aménagement du territoire par région ;
- et sa Politique Nationale Forestière.

Par ailleurs pour cette période, le pays vise à:

- Réviser son cadre institutionnel et légal par rapport aux objectifs de la contribution ;
- Mettre en place le système MRV et les Mesures d'Atténuation Appropriées au niveau National (MAAN).

## **7. CADRE INSTITUTIONNEL ET MOYENS DE MISE EN ŒUVRE**

Le cadre institutionnel existant pour la mise en œuvre des actions dans le domaine des changements climatiques repose essentiellement sur le Ministère de l'Environnement à travers sa direction de lutte contre les changements climatiques. Pour la mise en œuvre de la CPDN, le chef du gouvernement haïtien affirmera son leadership sur le dossier et la coordination sera assurée par le Ministère de l'Environnement en collaboration directe et continue avec le Comité National sur les Changements Climatiques (CNCC) qui sera mis en place. Ce comité sera constitué des représentants des ministères sectoriels, des collectivités territoriales, de la société civile et du secteur privé et aura pour mandat d'assurer le pilotage, le suivi et le rapportage des activités de l'engagement d'Haïti. L'aspect genre sera pris en compte dans tout le processus d'implémentation de la CPDN.

L'enveloppe financière globale pour la mise en œuvre des actions prévues dans cette contribution est évaluée à **25.387 milliards USD** dont 16.614 milliards USD pour les actions d'adaptation et 8.773 milliards USD pour les actions d'atténuation. Les mesures d'atténuation conditionnelles et inconditionnelles représentent respectivement des montants de 7.999 milliards USD et 773.519 millions USD. Cela nécessitera:

- l'accès direct au Fonds Vert pour le Climat (GCF - Green Climate Fund) et aux autres fonds pour les mesures d'atténuation conditionnelles et les activités liées à l'adaptation (annexe 8.2) notamment l'élaboration et la mise en œuvre du Plan National d'adaptation ;
- l'accès aux différents mécanismes de marchés comme la Réduction des Emissions dues à la Déforestation et à la Dégradation (REDD+) et le Mécanisme pour un Développement Propre (MDP) ;
- un renforcement des capacités institutionnelles ;
- des transferts de technologie s'appuyant sur des évaluations de besoins en technologie (EBT).

La République d'Haïti appelle à la création d'un fonds d'urgence en faveur des Petits Etats Insulaires en Développement (PEID) et des PMA leur permettant de prendre des mesures post-urgence suite aux catastrophes liées au dérèglement climatique. Elle souhaite par ailleurs la mise en place, dans le nouveau régime climatique post 2020, d'un mécanisme international de réduction d'émissions à l'instar du Mécanisme pour un Développement Propre (MDP) guidé par des principes d'intégrité environnementale, de transparence et d'absence de double-comptage. Haïti est favorable à la mise en place rapide d'un tel marché afin de mobiliser le potentiel même avant 2020.

## 8 ANNEXE

### 8.1 MESURES D'ATTÉNUATION

#### Mesures d'atténuation conditionnelles

Secteur	Objectifs stratégiques/opérationnels
Energie	<ul style="list-style-type: none"><li>▪ Augmenter à 47% la part des énergies renouvelables dans le système électrique haïtien d'ici 2030 (hydro 24.5%, éolien 9.4%, solaire 7.5%, biomasse 5.6%)</li><li>▪ Installer à l'horizon 2030 (4 Parcs Eoliens : 50 MW, Hydroélectricité : 60MW additionnels, Parcs solaires : 30 MW, Biomasse : 20 MW)</li><li>▪ Réduire la consommation de bois-énergie de 32% d'ici à 2030</li><li>▪ Mettre en place de forêts énergétiques bien gérées (10 000 ha d'ici 2030)</li><li>▪ Elaborer et mettre en œuvre les MAAN du secteur du transport</li><li>▪ Promouvoir l'utilisation de réchauds éco énergétiques en remplacement des foyers traditionnels (gain d'énergie de 25-30% par réchaud).</li><li>▪ Améliorer l'efficacité énergétique des fours de production de charbons de bois (faire passer les rendements de 10- 15% à 30-45%).</li><li>▪ Diffuser 1 000 000 lampes à basse consommation pour la substitution des ampoules à incandescence.</li></ul>
AFAT	<ul style="list-style-type: none"><li>▪ Planter 137.500 ha de forêt d'ici à 2030 en privilégiant les espèces locales dont 100.000 ha de manière conditionnelle entre 2020 et 2030.</li><li>▪ Protéger et conserver les parcs nationaux forestiers existants (10 500 ha) d'ici 2030.</li><li>▪ Protéger, conserver et étendre des forêts de mangroves existantes (19 500ha) d'ici 2030.</li><li>▪ Restaurer, valoriser et étendre des systèmes agroforestiers existants (au moins 60.000 ha additionnels entre 2020 et 2030).</li><li>▪ Améliorer la qualité du pâturage en particulier du cheptel bovin avec des légumineuses.</li><li>▪ Préserver les aires marines protégées (AMP) du pays.</li></ul>
Déchets	Définir et mettre en œuvre une Politique Nationale de Gestion des déchets solides (Plans de gestion suivant le modèle 5RVE : Réduction à la source, Récupération, Réemploi, Recyclage, Réutilisation, Valorisation et Enfouissement).

## Mesures d'atténuation inconditionnelles

Secteur	Objectifs stratégiques/opérationnels
Energie	<ul style="list-style-type: none"> <li>▪ Installer à l'horizon 2020, 37.5 MW additionnels d'hydroélectricité</li> <li>▪ Contrôler, réglementer l'importation des véhicules usagés.</li> </ul>
AFAT	<ul style="list-style-type: none"> <li>▪ Protéger et conserver les parcs nationaux forestiers existants (10 500ha) d'ici 2030.</li> <li>▪ Protéger et conserver les forêts de mangroves existantes (10 000ha) d'ici 2030.</li> <li>▪ Boiser/reboiser: plantation de 2500ha de forêt par an de 2016 – 2030</li> <li>▪ Protéger des aires marines protégées (AMP) dans la côte sud d'Haïti</li> </ul>

## 8.2 MESURES D'ADAPTATION DÉCOULANT DU PANA

Secteurs/ zones vulnérables	Besoins d'adaptation
Agriculture et Sécurité Alimentaire	<ul style="list-style-type: none"> <li>▪ Développement de cultures et utilisation des techniques agricoles adaptées au changement climatique.</li> <li>▪ Conservation des ressources génétiques agricoles.</li> <li>▪ Développement de l'aquaculture.</li> <li>▪ Conservation et régénération des sols.</li> <li>▪ Techniques plus efficaces d'utilisation des ressources en eau.</li> <li>▪ Cultures résistantes à la sécheresse adaptées au contexte haïtien.</li> <li>▪ Réduction des risques de désastres dans les parties les plus vulnérables aux sécheresses.</li> <li>▪ Développement de cultures adaptées à l'eau salinisée.</li> <li>▪ Techniques de génie rural valorisant les matériaux et main d'œuvre locaux.</li> <li>▪ Développement de l'énergie thermique des mers pour la production d'eau douce.</li> <li>▪ Développement de Technologies pour la conservation, la transformation et la valorisation des produits agricoles;</li> <li>▪ Renforcement des systèmes de surveillance météorologique et de prévision des rendements agricoles.</li> </ul>
Zones côtières	<ul style="list-style-type: none"> <li>▪ Développement d'une stratégie nationale visant l'adaptation des zones côtières face aux impacts des changements climatiques.</li> <li>▪ Planification pour protéger et relocaliser les infrastructures à risque face aux impacts des changements climatiques.</li> </ul>

	<ul style="list-style-type: none"> <li>▪ Réduction des risques de désastres dans les zones les plus vulnérables aux inondations, et intégration de migrations (internes et internationales) et réimplantation planifiée de communautés comme stratégie d'adaptation.</li> <li>▪ Mise en place d'infrastructures résilientes aux évènements climatiques adverses.</li> <li>▪ Etudes coûts-bénéfices de la relocalisation et réimplantation planifiée de communautés.</li> <li>▪ Adoption de mesures de protection, conservation et gestion durable des écosystèmes de mangroves.</li> <li>▪ Surveillance côtière, gestion durable de la pêche.</li> <li>▪ Amélioration de l'autonomie et de la sécurité des petits bateaux de pêche.</li> <li>▪ Conservation et protection de la biodiversité marine et des récifs coralliens.</li> <li>▪ Appui à la gestion communautaire des aires marines protégées.</li> </ul>
Ressources en eau	<ul style="list-style-type: none"> <li>▪ Approvisionnement en eau des communautés par la construction de barrages, citernes familiales, impluviums, lacs collinaires...</li> <li>▪ Elaboration d'un Atlas des ressources en eau dans un système d'information géographique.</li> <li>▪ Protection physique et administrative (arrêtés communaux) des sources en eau.</li> <li>▪ Amélioration du remplissage des nappes phréatiques par des activités de reboisement, barrières physiques (murs secs) et biodynamiques (haies vives) dans les zones de captation.</li> </ul>
Bassins versants	<ul style="list-style-type: none"> <li>▪ Restauration des stations hydrométéorologiques des bassins versants stratégiques d'Haïti.</li> <li>▪ Renforcement des capacités des comités de gestion des bassins versants.</li> <li>▪ Aménagement de 15 bassins versants stratégiques à partir des plans de cogestion établis.</li> <li>▪ Reboisement des zones amont.</li> <li>▪ Développement d'initiatives liées au paiement pour des services écosystémiques dans les bassins versants.</li> <li>▪ Régulation du débit des cours d'eau, protection et restauration des sols.</li> </ul>
Etablissements humains	<ul style="list-style-type: none"> <li>▪ Elaboration et mise en œuvre de Plans d'urbanisme et de Développement Durable des villes à risques d'inondation, en incluant les mouvements et déplacements internes de la population et la réduction de risques de désastres dans les zones les plus vulnérables.</li> </ul>

	<ul style="list-style-type: none"> <li>▪ Mise à jour du Plan National de Gestion des Risques et Désastres (PNGRD) intégrant les risques liés au Changement climatique.</li> <li>▪ Renforcement du Système National de Gestion des risques et des Désastres.</li> <li>▪ Renforcement des systèmes d'alerte précoce aux catastrophes naturelles.</li> <li>▪ Elaboration et mise en œuvre des plans de gestion de risques et désastres au niveau local dans les villes les plus importantes/vulnérables.</li> <li>▪ Renforcement des normes de construction.</li> </ul>
Education	<ul style="list-style-type: none"> <li>▪ Production, communication et diffusion des connaissances liées aux changements climatiques, y inclus les migrations (écoles primaires, secondaires et Universités).</li> <li>▪ Sensibilisation au niveau national sur les causes et les effets des changements climatiques et les stratégies d'adaptation.</li> <li>▪ Renforcement de la Direction Changement Climatique du Ministère de l'Environnement.</li> </ul>
Santé publique	<ul style="list-style-type: none"> <li>▪ Amélioration de l'accès à l'eau potable pour prévenir les maladies d'origine hydrique.</li> <li>▪ Amélioration de l'accès aux soins de santé.</li> <li>▪ Mise en place d'un système de surveillance dans les périphéries des zones de forage.</li> <li>▪ Prise en compte du changement climatique dans la planification et la mise en œuvre des projets de santé au niveau national et local.</li> </ul>
Finances publiques	<ul style="list-style-type: none"> <li>▪ Appui au secteur des assurances pour la prise en charge des pertes issues des désastres naturels et climatiques.</li> <li>▪ Adoption de mesures d'incitations fiscales favorisant les énergies renouvelables, la production locale notamment la bio économie.</li> <li>▪ Soutien aux finances publiques en élaborant et en mettant en œuvre une stratégie de gestion financière des risques de désastres/ risques climatiques.</li> <li>▪ Développement et fortification des instruments financiers qui permettent d'augmenter la capacité de mobiliser des ressources à la suite des catastrophes naturelles et de réduire la volatilité budgétaire qu'impliquent ces dernières.</li> <li>▪ Augmentation de la résilience de l'investissement public en améliorant la compréhension et l'évaluation des risques posés par les menaces climatiques.</li> </ul>



## CONTRIBUCIÓN PREVISTA Y DETERMINADA A NIVEL NACIONAL

### INDC-Honduras

## Contexto nacional

Por su ubicación geográfica en la parte más ancha del istmo centroamericano, la República de Honduras se encuentra permanentemente expuesta a eventos meteorológicos extremos que están siendo exacerbados por el cambio climático. Las características biofísicas y topográficas del país, así como los niveles de pobreza, le confieren una alta vulnerabilidad ante eventos de esta índole. Por ello, en el estudio para el 2015 del Índice de Riesgo Climático Global de Germanwatch, se identifica a la República de Honduras como el país más afectado a nivel mundial por eventos climáticos extremos en el periodo 1994-2013.

Para la República de Honduras, con un porcentaje de emisiones de gases de efecto invernadero menor al 0.1% del total mundial, la prioridad indudablemente es la adaptación al cambio climático. Sin embargo, tal y como este documento demuestra, el país está también comprometido a apoyar la lucha contra el cambio climático, bajo el principio de responsabilidades comunes pero diferenciadas, y a contribuir con medidas de mitigación. Asimismo, la República de Honduras está comprometida en la adopción de un nuevo acuerdo legalmente vinculante aplicable a todas las Partes, y aspira a que bajo este nuevo instrumento jurídico se limite el aumento de la temperatura media global a 1.5 °C.

A nivel nacional, la Ley de Cambio Climático, la Estrategia Nacional de Cambio Climático y la Ley Agroforestal para el Desarrollo Rural, esta última en proceso de aprobación, articulan la política pública en varios ejes fundamentales encaminados a tener un desarrollo bajo en carbono y resistente a los efectos del cambio climático que promueva la adaptación y traiga co-beneficios a la población. En esta visión se fomenta la transformación de la sociedad a una cultura de producción y consumo sostenible, que gestiona con equidad y eficacia los riesgos, la protección del medio ambiente y los recursos naturales, y promueve una adecuada adaptación al cambio climático. Esto supone un enorme reto dadas las circunstancias nacionales, condiciones territoriales y las características ambientales que se suman y superponen a los desafíos del cambio climático.

La República de Honduras cree necesario que las políticas y medidas para luchar contra el calentamiento global se centren en el “rostro humano” del cambio climático. Para ello, las acciones a realizar deben mejorar las condiciones de vida de las personas que por su situación pueden ser más vulnerables al cambio climático. Estas acciones deben asegurar una perspectiva transversal de derechos humanos y de equidad de género, garantizando que las mujeres, pueblos indígenas y afro-hondureños tengan una participación plena y efectiva en la toma de decisiones. Este mensaje de esperanza está ya incluido en las políticas de la República de Honduras dentro del plan estratégico de gobierno “Plan de Todos para una Vida Mejor”.

Finalmente, cabe destacar que la Contribución Prevista y Determinada a Nivel Nacional de la República de Honduras se ha diseñado en base a las capacidades nacionales, condiciones de financiamiento previstas y las circunstancias nacionales.

## Mitigación

<b>Tipo de contribución</b>	Basada en los resultados
<b>Contribución</b>	
<b>Tipo</b>	Reducción de emisiones relativa a la línea base del escenario Business As Usual (BAU)
<b>Contribución</b>	<p>Reducción de un 15% de las emisiones respecto al escenario BAU para el 2030 para el conjunto de sectores contenido en este escenario BAU. Este compromiso está condicionado a que el apoyo sea favorable, previsible y se viabilicen los mecanismos de financiamiento climático.</p> <p>Adicionalmente, la República de Honduras se compromete, como objetivo sectorial, a la forestación/reforestación de 1 millón de hectáreas de bosque antes de 2030. Asimismo, a través de la NAMA de fogones eficientes se espera reducir en un 39% el consumo de leña en las familias, ayudando en la lucha contra la deforestación.</p>
<b>Información para facilitar la claridad, transparencia y comprensión</b>	
<b>Plazos y/o períodos de implementación</b>	
<b>Plazo para la implementación</b>	El periodo de implementación es 2012-2030, con una revisión cada 5 años. La primera revisión se realizará después de la finalización de la Tercera Comunicación Nacional, para poder recibir los insumos de la misma.
<b>Alcance y cobertura</b>	
<b>Alcance de los gases incluidos en la contribución</b>	Dióxido de carbono (CO <sub>2</sub> ), metano (CH <sub>4</sub> ) y óxido nitroso (N <sub>2</sub> O).
<b>Sectores/fuentes cubiertos por la contribución</b>	Energía, Procesos Industriales, Agricultura y Residuos.
<b>Geografías cubiertas por la contribución</b>	Todo el territorio nacional
<b>Suposiciones y enfoques metodológicos</b>	
<b>Metodología para la contabilidad de las emisiones</b>	Estimación preliminar de la serie de emisiones cuantificadas durante la preparación del INDC (serie 1995-2012). Estimaciones basadas en las Directrices del IPCC 1996 para los inventarios nacionales de gases de efecto invernadero, en línea con las estimaciones incluidas en las Comunicaciones Nacionales existentes.

<b>Potenciales de calentamiento global</b>	<p>Valores de los Potenciales de Calentamiento Global (GWP, por sus siglas en inglés) del Segundo Informe del IPCC para un período de residencia en la atmósfera de 100 años, en línea con las estimaciones incluidas en las Comunicaciones Nacionales existentes:</p> <ul style="list-style-type: none"> <li>• CH<sub>4</sub> = 21</li> <li>• N<sub>2</sub>O = 310</li> </ul>
<b>Enfoque para el uso del suelo, cambio de uso del suelo y emisiones de la silvicultura</b>	<p>A fecha de presentación de este informe, no ha sido posible realizar estimaciones sólidas de este sector debido a la falta de información de base contrastada y la gran incertidumbre existente. Sin embargo, la República de Honduras se compromete a proporcionar una estimación de las emisiones y sumideros del sector LULUCF dentro del marco del actual proyecto de la Tercera Comunicación Nacional.</p>

#### Información cuantificable sobre el punto de referencia

<b>Emisiones del desarrollo normal de la actividad (BAU) en el año meta</b>	<p>Escenario BAU de proyección de emisiones basado en el crecimiento económico, poblacional y en las tendencias de emisiones históricas en ausencia de políticas de cambio climático. El escenario se construyó en el año 2015 tomando como punto de partida la estimación preliminar de la serie de emisiones cuantificadas durante la preparación del INDC (1995-2012).</p> <p>Este escenario BAU se considera una estimación preliminar que será actualizada y mejora dentro del marco del actual proyecto de la Tercera Comunicación Nacional.</p> <p>La trayectoria que describen las emisiones en dicho escenario es la siguiente:</p> <ul style="list-style-type: none"> <li>- Año 2012: 18.915 Gg de CO<sub>2</sub>eq</li> <li>- Año 2020: 22.027 Gg de CO<sub>2</sub>eq</li> <li>- Año 2030: 28.922 Gg de CO<sub>2</sub>eq</li> </ul>
<b>Metodología de proyección de referencia</b>	<p>La metodología de estimación del escenario BAU se ha basado en los mismos principios metodológicos seguidos para la estimación de las emisiones históricas.</p> <p>Las variables de actividad usadas están basadas en las proyecciones económicas, poblacionales o sectoriales existentes en el país.</p>

#### Legítimo y ambicioso

La INDC de la República de Honduras es realista, ambiciosa y equitativa; está basada en los avances nacionales a la fecha, tiene en cuenta las capacidades y circunstancias del país, y busca aportar al objetivo de la Convención Marco de Naciones Unidas sobre Cambio Climático (establecido en su artículo 2).

<b>Legitimidad</b>	<p>El nivel propuesto es legítimo. En términos de emisiones, la República de Honduras representa menos del 0.1% de las emisiones mundiales. Las emisiones per cápita de 2012 (2,38 t CO<sub>2</sub>eq / hab. y año) están por debajo de la media de Latinoamérica y El Caribe, sin embargo, la tendencia de las emisiones de algunos sectores económicos son importantes, en especial, transporte, energía y residuos.</p>
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<b>Ambición</b>	<p>El nivel propuesto es ambicioso. La República de Honduras es un país de ingresos bajos, que tiene que hacer frente a una serie de desafíos al desarrollo, como son: la pobreza, educación, salud, seguridad, que se superponen al desafío de la adaptación y al desacoplamiento de las emisiones de la economía.</p> <p>El tamaño y capacidad económica del país determinan el potencial de mitigación y adaptación en ausencia de financiamiento internacional. Sin embargo, la República de Honduras aspira a reducir significativamente el sector con más emisiones, es decir, la producción de energía eléctrica, al tiempo que se cubren las nuevas necesidades nacionales derivadas del aumento poblacional y económico. Toda esta estrategia se alinea con una estrategia de desarrollo de bajas emisiones de carbono.</p>
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## Proceso de planificación

<b>Proceso de planificación</b>	<p>Listado de grandes ejes existentes:</p> <ul style="list-style-type: none"> <li>• Ley de Cambio Climático</li> <li>• Estrategia Nacional de Cambio Climático</li> <li>• Plan Estratégico de Gobierno (2014- 2018) “Plan de Todos para una Vida Mejor”</li> </ul> <p>Procesos abiertos:</p> <ul style="list-style-type: none"> <li>• Proceso Nacional de Finanzas del Clima</li> <li>• Plan Nacional de Adaptación al Cambio Climático</li> <li>• Actualización del Plan de Acción de la Estrategia Nacional de Cambio Climático</li> <li>• Ley Agroforestal para el Desarrollo Rural</li> </ul> <p>Estos instrumentos articulan la política pública en torno a ejes estratégicos, donde se han establecido indicadores para lograr un desarrollo bajo en carbono, tanto a nivel económico como social buscando la mitigación al cambio climático, y así como una efectiva adaptación al cambio climático. Además, en consultas multisectoriales se han identificado acciones específicas para la adaptación y la mitigación.</p> <p>La elaboración de este INDC ha incluido un proceso de participación de los principales actores implicados, incluyendo talleres participativos y reuniones sectoriales.</p>
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## Medios de implementación

<b>Financiación</b>	<p>La República de Honduras ha iniciado la preparación de un Plan de Inversión en el tema de cambio climático. A través del cual, se busca movilizar financiamiento climático que permita alcanzar los objetivos establecidos en la INDC, además de aquellos que se establecerán en el Plan Nacional de Adaptación.</p> <p>Dicho Plan de Inversión surge de las necesidades de financiamiento y de fortalecimiento institucional identificadas mediante un diagnóstico de las capacidades y limitaciones actuales, realizado en el país, para acceder y gestionar fondos climáticos. También se está elaborando una revisión del gasto público en términos de cambio climático que servirá de insumo para el Plan de Inversión de cambio climático. Asimismo, se ha constatado que la República de Honduras difícilmente puede hacer frente a dichas necesidades sin apoyo externo, dado los recursos limitados de los que dispone el país.</p>
<b>Necesidades tecnológicas</b>	<p>Actualmente, la República de Honduras está realizando una evaluación de las necesidades tecnológicas que servirá de base para la creación del Plan de Acción Tecnológico.</p>
<b>Apoyo de creación de capacidad</b>	<p>Uno de los cuatro pilares de la Dirección de Cambio Climático de la Secretaría de MiAmbiente es la Gestión del Conocimiento. Honduras pretende, a través del Observatorio de Desarrollo Sostenible y Cambio Climático de reciente creación en el país, apoyar la generación de información, gestión del conocimiento y monitoreo periódico de indicadores climáticos. Se busca que el Sistema de Información de los INGEI que se elaboran periódicamente dentro de las Comunicaciones Nacionales esté bajo este observatorio. Se busca que este observatorio incluya una componente principal de fortalecimiento de capacidades.</p>

## Perspectiva de género

La República de Honduras reconoce los diferentes efectos del cambio climático en los distintos grupos humanos en condición de vulnerabilidad. Asimismo, entiende que la perspectiva de género es un aspecto esencial a incluir en un modelo de desarrollo nacional sostenible. Por tanto, reconoce el rol de la mujer como agente de cambio fundamental, que debe ser tenido en cuenta en la toma de decisiones que permitan el desarrollo de una sociedad baja en carbono y resistente ante los efectos del cambio climático.

## Adaptación

La República de Honduras considera la adaptación al cambio climático como una prioridad para reducir la vulnerabilidad del país. Asimismo, existen oportunidades para fomentar las medidas y acciones de mitigación que también aumentan la capacidad de adaptación de su población, así como sus sistemas naturales y productivos. Todo esto queda plasmado en la Ley General de Cambio Climático y la Estrategia Nacional sobre Cambio Climático que describe acciones, así como planes y acciones para proteger, conservar y restaurar los ecosistemas costeros marinos y terrestres y su biodiversidad; gestión integral de riesgo y vulnerabilidad sectorial.

### Perdidas y daños

Por su ubicación geográfica, la República de Honduras se encuentra permanentemente expuesta a eventos hidrometeorológicos extremos. Aunado a lo anterior, las características biofísicas y topográficas del país, pese a derivar en una abundante riqueza natural, le confieren una alta vulnerabilidad ante eventos de esta índole. Esta situación se ve agravada por los altos niveles de degradación a la cual están sujetos los sistemas naturales, principalmente por causa de las intervenciones humanas mal planificadas y la falta de conciencia de las poblaciones en torno al manejo de estos recursos, entre otros factores.

El impacto devastador del Huracán y Tormenta Tropical Mitch en el mes de octubre de 1998, implicó la pérdida de más de 14,000 vidas, más de medio millón de damnificados, la pérdida de 20 años de inversiones en materia de infraestructura vial e hidráulica, 3,800 millones de dólares (equivalente al 70% del PIB de ese mismo año) y la caída del aparato productivo del país, sumiendo a la República de Honduras en una crisis cuyas secuelas persisten hasta la actualidad. Pese a que los fenómenos extremos como Mitch y el Huracán Fifi en el año 1974, constituyen los referentes de la vulnerabilidad física, ambiental, económica y social del país, no debe perderse de vista la elevada incidencia de fenómenos recurrentes que, año con año, provocan la pérdida de vidas, viviendas, infraestructura y medios de producción. Estos fenómenos recurrentes afectan de forma dramática el desarrollo del país y crean eternos círculos de “inversión-reconstrucción” que se constituyen en un permanente desgaste de la economía estatal y de la iniciativa privada.

El cambio climático tiende a exacerbar la incidencia, magnitud y frecuencia de eventos hidrometeorológicos extremos y sus efectos adversos, provocando mayores presiones sobre los sistemas naturales y humanos existentes. Honduras enfrenta los efectos adversos del Cambio Climático que se han manifestado en la forma de una mayor incidencia de huracanes, lluvias torrenciales e inundaciones, sequías olas de calor, ascenso de la temperatura, disminución de precipitación, agotamiento del agua, pérdida de productividad de la tierra y de cultivos, incremento del nivel del mar, aumento de enfermedades tropicales. Asimismo, la mayor frecuencia y magnitud de los fenómenos de la variabilidad climática como “El Niño” y “La Niña”, aspectos relevantes que se anticipa, impactarán con mayor intensidad en las próximas décadas.

Cabe destacar que además de la exposición a la cual está sujeta el territorio nacional ante los eventos/fenómenos referidos, la baja capacidad adaptativa y alta sensibilidad de la población, derivado del alto porcentaje de esta que se encuentra bajo la línea nacional de pobreza, entre otros factores, contribuye a que durante los últimos años, el Índice de Riesgo Climático Global de la organización Germanwatch, sitúe a Honduras como uno de los países más afectados a nivel mundial por los efectos adversos del cambio climático.

### Medidas de adaptación

En la República de Honduras, la adaptación al cambio climático ha logrado un mayor protagonismo en los últimos años, abriéndose espacio dentro de una agenda de país que hasta muy recientemente había sido

dominada casi en su totalidad por la mitigación al cambio climático y los mercados de carbono. Los sectores del país identificados como prioritarios por la Estrategia Nacional de Cambio Climático (ENCC) son:

- Recursos Hídricos
- Gestión de Riesgos
- Agricultura, suelos y seguridad alimentaria
- Bosques y biodiversidad
- Sistemas costero marinos
- Salud humana
- Infraestructuras (en especial la energía hidroeléctrica)

La República de Honduras ha avanzado positivamente en el establecimiento de un marco normativo e institucional favorable para trabajar en la reducción de su vulnerabilidad ante el cambio climático, como lo demuestran, entre otros, la Estrategia Nacional de Cambio Climático, la Ley de Cambio Climático, la Estrategia Nacional de Seguridad Alimentaria y Nutricional, Plan de Acción Nacional de Lucha Contra la Desertificación, Estrategias de Adaptación al Cambio Climático para el Sector Agroalimentario, Salud y Caficultura. Actualmente, están en marcha una serie de procesos de planificación estratégica en cambio climático coordinados por la Dirección Nacional de Cambio Climático, entre los cuales destacan: Plan de Acción de la Estrategia Nacional de Cambio Climático, Evaluaciones de Necesidades Tecnológicas, Plan de Inversión de Cambio Climático, Estrategia Nacional REDD+ y el Plan Nacional de Adaptación.

Actualmente, se está desarrollando el Plan Nacional de Adaptación y se espera que sus insumos proporcionarán información actualizada y detallada sobre la vulnerabilidad, con el fin de priorizar y concentrar esfuerzos de adaptación futuros. Se prevé contar con un avance de este plan para finales del 2015, por lo cual las medidas contenidas dentro de este INDC son parciales. Sin embargo, el documento final del Plan Nacional de Adaptación previsto para el 2016, recogerá los insumos proporcionados por los demás procesos de planificación estratégica en cambio climáticos actualmente en proceso de generación, incluyendo los INDC.

El sector agroalimentario en la República de Honduras constituye uno de los sectores de mayor importancia económica y a la vez uno de los más vulnerables ante el cambio climático. Dada la importancia de este sector, se han priorizado sus medidas de adaptación. Entre las identificadas en la Estrategia Nacional de Cambio Climático destacan las siguientes:

- **Cambio de prácticas agrícolas:** implantación de sistemas agroforestales “Quesungual”; reducción de la carga de fertilizantes; uso de abonos orgánicos de absorción lenta; cambios en los calendarios de cultivos; incentivación de la producción de semillas criollas adaptadas a las condiciones locales; introducción de plantas repelentes de insectos en cultivos establecidos; modificación o eliminación de las prácticas de quemas agrícolas inapropiadas; medidas para la lucha contra la erosión; programas de micro-riego en agricultura de laderas; prácticas de control biológico de plagas y enfermedades; desarrollo de sistemas de fertilización orgánica; e, impulso de estímulos y/o inductivos a la producción agrícola orgánica, incluyendo incentivos fiscales y financieros
- **Cambios en las prácticas ganaderas:** modificaciones en el tiempo de pastura; siembra de pastos mejorados; implantación y difusión de la ganadería intensiva bajo estabulación; y, limitación de la quema de potreros para el control de ácaros en el ganado.
- **Fortalecimiento de las capacidades e investigación:** selección y desarrollo de variedades y especies de cultivos y pastos resistentes a sequías, inundaciones y mayores; implantación del

programa nacional de Manejo Integrado de Plagas; diseño e implementación de un programa nacional de investigación sobre biodiversidad; investigación y desarrollo de biocidas naturales; fomento del establecimiento de centros regionales de investigación y de un programa nacional de divulgación; y, desarrollo de sistemas sostenibles basados en la agroecología.

- **Sociedad y legislación:** mejora de la tenencia de la tierra; diversificación de la producción agrícola nacional y, particularmente, la agricultura de subsistencia; fortalecimiento de las políticas y estrategias de seguridad alimentaria del país; mejora de los sistemas de almacenamiento, procesamiento y preservación de la producción agropecuaria; y, desarrollo de fincas modelo para la difusión de mejores prácticas de cultivo.

Finalmente, otro sector priorizado por su relevancia a nivel nacional es el sector marino-costero. La República de Honduras posee un área territorial de 112,492 km<sup>2</sup> y una Zona Marina Económica Exclusiva de 226,955 km<sup>2</sup>. La costa caribeña de Honduras, la cual forma parte del Gran Ecosistema Marino del Caribe, tiene aproximadamente 650 Km de longitud. El Arrecife Mesoamericano – que se extiende desde México, hasta Belice, Guatemala y Honduras, así como a tres grupos de islas: Las Islas de La Bahía y el Archipiélago de los Cayos Cochinos; Los Cayos y Bancos Miskitos; y las Islas del Cisne más pequeñas. El grupo de las Islas de la Bahía comprendido por Roatán, Utila, Guanaja y los Cayos Cochinos tiene uno de los mejores arrecifes y es fundamental para el desarrollo del turismo del país. Estas islas están rodeadas por arrecifes de coral que respaldan pesquerías importantes. La costa norte de Roatán disfruta de una barrera de coral casi continua. Además de los arrecifes de coral, hay otras características del ecosistema marino-costero que son igualmente esenciales para su salud y productividad. Estos incluyen los manglares, los humedales, las camas de pasto marino y las playas de arena.

Los ecosistemas costeros y marinos de la República de Honduras son objeto de amenazas asociadas al cambio climático. El aumento de la temperatura del agua incrementa la frecuencia de los eventos de blanqueamiento coralino, mientras que la elevación del nivel del mar afecta la fotosíntesis de los corales al reducir la cantidad de luz que les llega, causando también inundaciones y retrocesos en el límite de los manglares e incremento de la erosión causada por las olas. Por otro lado, los escenarios del cambio climático sugieren cambios en la velocidad de los vientos y volúmenes de precipitación, entre otros factores, propiciando condiciones que favorecerán la pesca, no obstante, de no tomarse las medidas del caso, esto podría resultar en una sobre-explotación del recurso pesquero, adicional a la actual.

En virtud de lo anterior, por la importancia económica que representan para el país, por constituir la principal fuente de sustento de grupos indígenas y afro-hondureños y demás comunidades costeras, y por su alta vulnerabilidad, resulta imprescindible la implementación de estrategias que promuevan/ logren mantener la integridad y funcionamiento de estos ecosistemas.

## Submission by Iceland to the ADP

### Iceland's Intended Nationally Determined Contribution

#### Introduction

Iceland is committed to the UNFCCC negotiation process towards adopting a protocol, another legal instrument or an agreed outcome with legal force under the Convention, applicable to all Parties, in line with the objective of keeping global warming below 2°C.

#### Iceland's Intended Nationally Determined Contribution

Iceland aims to be part of a collective delivery by European countries to reach a target of 40% reduction of greenhouse gas emissions by 2030 compared to 1990 levels. A precise commitment for Iceland within such collective delivery has yet to be determined, and is dependent on an agreement with the European Union and its Member States and possibly other countries. Under such an arrangement, Iceland will ensure fulfillment of its fair share of the collective delivery of the 40% target by: a) continuing participation in the EU Emissions Trading Scheme and b) determining a target for emissions outside the EU-ETS by the same methodology as applied to EU Member States. In the event that an agreement on collective delivery is not reached, Iceland will determine a national target by other methods and communicate it to the UNFCCC.

In constructing a target for Iceland that can be seen as fair in an international comparison and contributing to a global goal, Iceland considers it to be most transparent to set a target based on common methods applied in the European Union and the European Economic Area. Almost half of Iceland's emissions is currently regulated by the EU Emissions Trading Scheme, and Iceland will continue to be part of the EU-ETS after 2020 due to its commitments under the Agreement on the European Economic Area. Iceland also uses a comparable method to the EU to determine a target for non-ETS emissions, as specified in an agreement between Iceland and the EU and its Member States on joint fulfillment of commitments under the Kyoto Protocol during the second commitment period. Iceland foresees that a post-2030 target for Iceland will be constructed in a similar fashion, based on the current arrangement. In the event that an agreement is not reached, Iceland will determine its INDC in another manner and communicate it to the UNFCCC, but it should be noted that Iceland's participation in a common European market in emissions credits under the EU-ETS complicates the determination of a simple economy-wide target for Iceland, as credits under the EU-ETS are traded freely in a common market, with limited influence by Icelandic authorities.

#### Information provided in order to facilitate clarity, transparency, and understanding

<b>Base year</b>	1990
<b>Time frames / periods for implementation</b>	2021—2030
<b>Scope and coverage</b>	All main sectors: Energy; Industrial processes and product use; Agriculture; Waste; Land Use, Land-Use Change and Forestry
<b>GHGs</b>	The INDC includes the following GHGs: <ul style="list-style-type: none"><li>• Carbon dioxide (CO<sub>2</sub>)</li><li>• Methane (CH<sub>4</sub>)</li></ul>

	<ul style="list-style-type: none"> <li>• Nitrous oxide (N<sub>2</sub>O)</li> <li>• Hydrofluorocarbons (HFCs)</li> <li>• Perfluorocarbons (PFCs)</li> <li>• Sulfur hexafluoride (SF<sub>6</sub>)</li> <li>• Nitrous trifluoride (NF<sub>3</sub>)</li> </ul>
<b>Planning process</b>	Iceland has a national implementation plan for climate mitigation in place, aimed at ensuring Iceland's compliance with commitments in the Kyoto Protocol until 2020. Iceland takes part in the EU Emissions Trading Scheme, as part of the European Economic Area; this participation is seen as continuing after 2020, regulating over 40% of Iceland's emissions.
<b>Assumptions and methodological approaches</b>	<p>IPCC Guidelines 2006 and IPCC 2013 KP Supplement.</p> <p>Iceland intends to include LULUCF in its post-2020 contribution to climate mitigation, in accordance with established and accepted methodology for LULUCF accounting. In particular Iceland intends to employ afforestation and revegetation to contribute to its goals. Iceland will also use wetland restoration as part of its climate efforts, and possibly other LULUCF activities. Accounting for the land sector will be decided upon later, with reference to established methodology and based on the progress made internationally towards a common framework for land sector accounting.</p> <p>Iceland will take part in the EU Emissions Trading Scheme after 2020, which currently regulates approximately 40% of Iceland's emissions. Iceland will possibly take part in other European markets for emissions credits, as part of its intention to take part in collective delivery of post-2020 climate mitigation goals, but mitigation efforts are seen as coming primarily through domestic efforts.</p>
<b>Consideration of fairness and ambition</b>	By taking part in collective delivery of a 2030 target of -40%, and by applying common or comparable rules that apply to the European Union and its Member States and possibly more European countries, Iceland considers its intended contribution to be ambitious and fair and transparent as far as effort is concerned.

### **Additional clarifications on emissions from Iceland**

In determining Iceland's efforts for climate mitigation, and assessing their ambition level and fairness, it is useful to look at Iceland's circumstances regarding size and the proportional impact of relatively large single projects, the high percentage of renewable energy, and Iceland's high level of integration into European carbon markets, notably through participation in the EU-ETS and Iceland's participation in joint commitment under the second commitment period of the Kyoto Protocol. These factors are briefly explained here below.

Iceland's electricity production and heating comes almost 100% from renewable energy, with minimal emissions. This was mostly achieved before 1990. This means that Iceland must look to other sectors for mitigation options, including transport, agriculture, fisheries, industrial processes, waste and LULUCF. Iceland considers the utilization of its renewable energy sources to have global benefits from a climate change mitigation perspective.

Iceland is a party to the EU-ETS, due to membership of the European Economic Area, and over 40% of Iceland's emissions fall under the trading scheme. It is foreseen that this will continue after 2020. For a small economy like Iceland access to markets is important, as it provides flexibility that bigger economies do not need to the same extent; a single project can contribute a high percentage of emissions in a small economy like Iceland's but hardly register in bigger economies.

## INDIA'S INTENDED NATIONALLY DETERMINED CONTRIBUTION:

### WORKING TOWARDS CLIMATE JUSTICE

ॐ द्यौः शान्तिरन्तरिक्षं शान्तिः  
पृथिवी शान्तिरापः शान्तिरोषधयः शान्तिः ।

*“Om dyauh śāntir antariksam śāntih prithvi śāntih āpah śāntih osadhayah śāntih”*

*-- Yajur Veda 36.17*

**{{Unto Heaven be Peace, Unto the Sky and the Earth be Peace, Peace be unto the  
Water, Unto the Herbs and Trees be Peace}}**

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## INTRODUCTION

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India has a long history and tradition of harmonious co-existence between man and nature. Human beings here have regarded fauna and flora as part of their family. This is part of our heritage and manifest in our lifestyle and traditional practices. We represent a culture that calls our planet Mother Earth. As our ancient text says; "Keep pure! For the Earth is our mother! And we are her children!" The ancient Indian practice of Yoga, for example, is a system that is aimed at balancing contentment and worldly desires, that helps pursue a path of moderation and a sustainable lifestyle. Environmental sustainability, which involves both intra-generational and inter-generational equity, has been the approach of Indians for very long. Much before the climate change debate began, Mahatma Gandhi, regarded as the father of our nation had said that we should act as *'trustees'* and use natural resources wisely as it is our moral responsibility to ensure that we bequeath to the future generations a healthy planet.

The desire to improve one's lot has been the primary driving force behind human progress. While a few fortunate fellow beings have moved far ahead in this journey of progress, there are many in the world who have been left behind. Nations that are now striving to fulfill this 'right to grow' of their teeming millions cannot be made to feel guilty of their development agenda as they attempt to fulfill this legitimate aspiration. Just because economic development of many countries in the past has come at the cost of environment, it should not be presumed that a reconciliation of the two is not possible.

It is possible for people to live in harmony with nature by harnessing its potential for the benefit of mankind without undue exploitation leading to irretrievable damage and consequences that block the progress of others. There is a need to evolve a set of precepts, a kind of commandments, especially for the youth of the world, that help in developing a unified global perspective to economic growth so that the disparity in the thinking of the 'developed' and 'developing' countries could be bridged. The removal of such barriers of thought and the creation of a regime where facilitative technology transfer replaces an exploitative market driven mechanism could pave the way for a common understanding of universal progress. If climate change is a calamity that mankind must adapt to while taking mitigation action withal, it should not be used as a commercial opportunity. It is time that a mechanism is set up which will turn technology and innovation into an effective instrument for global public good, not just private returns.

The challenge of climate change calls for extraordinary vision, leadership, compassion and wisdom. Human ingenuity and intellect will also play an important role in addressing this challenge. The cumulative accumulation of greenhouse gases (GHGs) historically since industrial revolution has resulted in the current problem of global warming. This is further compounded by the tepid and inadequate response of the developed countries even after the adoption of the United Nations Framework Convention on Climate Change (UNFCCC) and delineation of obligations and responsibilities. As a result, an 'emission' ambition gap has been created calling for enhanced global actions to address it. India, even though not a part of the problem, has been an active and constructive participant in the search for solutions. Even now, when the per capita emissions of many developed countries vary between 7 to 15 metric tonnes, the per capita emissions in India were only about 1.56 metric tonnes in 2010. This is because Indians believe in nature friendly lifestyle and practices rather than its exploitation. By enhancing their efforts in keeping with historical responsibility, the developed and resource rich countries could reduce the burden of their action from being borne by developing countries that carry the additional responsibility of finding resources to meet their development needs and strive to improve their Human Development Index (HDI).

With the responsibility of ensuring a reasonable HDI for the country and the economic progress of its vast population, India has attempted to follow a path 'cleaner' than the one followed by many countries in the past. Today these countries may be in the forefront of

development, even providing a model of growth to other developing countries. However, if India compares the emission intensity of its GDP (Gross Domestic Product) in PPP (Purchasing Power Parity) terms at present with those countries at a similar level of development, it is seen that their emissions then were far more than India's at present. This is as much on account of India being open and innovative in embracing new technology and a cleaner way of doing things, as it is from the inherent principles of sustainability ingrained in its thought process.

If the world indeed is concerned about its new investments to be climate friendly, it must consider the opportunity provided by a country like India where economic growth could be achieved with minimum levels of emissions by employing new technologies and finance for achieving low carbon growth. Developed countries can certainly bring down their emission intensity by moderating their consumption, and substantially utilize their investments by employing them for development activities in countries housing a vast majority of people barely living at subsistence level. The ratio of emission avoided per dollar invested and economic growth attained would be relatively more favourable in case of investments made in India.

Mahatma Gandhi had once said, "One must care about the world one will not see". Indeed, humanity has progressed when it has collectively risen to its obligation to the world and responsibility to the future.

### **2015 Agreement**

India is committed to engaging actively in multilateral negotiations under the UNFCCC in a positive, creative and forward-looking manner. Our objective is to establish an effective, cooperative and equitable global architecture based on climate justice and the principles of Equity and Common But Differentiated Responsibilities and Respective Capabilities, under the UNFCCC. Such an approach should be anchored in the vision inspired by Mahatma Gandhi's famous exhortation; "*Earth has enough resources to meet people's needs, but will never have enough to satisfy people's greed*". We must promote sustainable production processes and also sustainable lifestyles across the globe. Habit and attitude are as much a part of the solution as Technology and Finance. It must be understood that poverty is a big

polluter; so is the extravagant way of life and a profligate pattern of consumerism a grave threat to environment.

As we put together the new global compact for enhanced actions, it is critical to ensure that it is comprehensive, balanced, equitable, and pragmatic. It should address all the elements including Adaptation, Mitigation, Finance, Technology Transfer, Capacity Building and Transparency of Action and Support. At the same time, the genuine requirements of developing countries like India for an equitable carbon and development space to achieve sustainable development and eradication of poverty needs to be safeguarded. Achievement of these goals requires adherence to the principles and provisions of the UNFCCC. As the Prime Minister of India, while addressing the United Nations on 25<sup>th</sup> September 2015, has said; “We all believe that international partnership must be at the centre of our efforts, whether it is development or combating climate change. And, the principle of common but differentiated responsibilities is the bedrock of our collective enterprise. When we speak only of climate change, there is a perception of our desire to secure the comforts of our lifestyle. When we speak of climate justice, we demonstrate our sensitivity and resolve to secure the future of the poor from the perils of natural disasters”.

India’s contribution takes into account its commitment to conservation of nature as well as the imperatives of meeting the competing demand of resources for addressing the challenges of poverty eradication, food security and nutrition, universal access to education and health, gender equality and women empowerment, water and sanitation, energy, employment, sustainable urbanisation and new human settlements and the means of implementation for enhanced action for achieving among others, the sustainable development goals for its 1.2 billion people.

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## **I. NATIONAL CIRCUMSTANCES**

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Climate change is a major challenge for developing countries like India that face large scale climate variability and are exposed to enhanced risks from climate change. Few countries in the world are as vulnerable to the effects of climate change as India is with its vast population that is dependent on the growth of its agrarian economy, its expansive coastal areas and the Himalayan region and islands. It also entails tradeoffs with economic growth and social

development in the short run that needs to be factored in the policy matrix, where eradication of poverty is one of the foremost priorities.

India accounts for 2.4% of the world surface area, but supports around 17.5% of the world population. It houses the largest proportion of global poor (30%), around 24% of the global population without access to electricity (304 million), about 30% of the global population relying on solid biomass for cooking and 92 million without access to safe drinking water. The average annual energy consumption in India in 2011 was only 0.6 tonnes of oil equivalent (toe) per capita as compared to global average of 1.88 toe per capita. **It may also be noted that no country in the world has been able to achieve a Human Development Index of 0.9 or more without an annual energy availability of at least 4 toe per capita.** With a HDI of 0.586 and global rank of 135, India has a lot to do to provide a dignified life to its population and meet their rightful aspirations.

India is a developing country with a per capita GDP (nominal) of around USD 1408 per annum. However, this doesn't reflect the wide disparities amongst its people and regions. Around 363 million people (30% of the population) live in poverty, about 1.77 million people are houseless and 4.9% of the population (aged 15 years and above) are unemployed. The per capita electricity consumption stands low at 917 kWh, which is barely one third of the world's average consumption.

A recent national socio-economic census indicates that economic and social deprivations are much higher in terms of availability of proper houses, access to education, lifeline availability of energy, and stable sources of income. This is more so in rural India where 48% of the households lack basic socio economic services and were categorized as deprived. India also has the largest cattle and buffalo population in the world of about 300 million, which faces multiple challenges including diseases, inadequate supply of fodder etc. as a result of changing climate.

**Given the development agenda in a democratic polity, the infrastructure deficit represented by different indicators, the pressures of urbanization and industrialization and the imperative of sustainable growth, India faces a formidable and complex challenge in working for economic progress towards a secure future for its citizens.**

The following projected key macro indicators are a reflection of India's future needs as the economy grows in the coming years:

<b>Indicator</b>	<b>India in 2014</b>	<b>India in 2030</b>
<b>Population (billion)<sup>a</sup></b>	1.2	1.5
<b>Urban population (million)<sup>b</sup></b>	377 (2011)	609
<b>GDP at 2011-12 prices (in trillion)<sup>c</sup></b>	INR 106.44 (USD 1.69)	INR 397.35 (USD 6.31)
<b>Per capita GDP in USD (nominal)<sup>c</sup></b>	1408	4205
<b>Electricity demand (TWh)<sup>c</sup></b>	776(2012)	2499

Source: a: Population Foundation of India; b: UN World Urbanization Prospects, 2014; c: Government of India.

Almost all the macroeconomic models predict that anticipated needs in the future will be large. Rapid urbanization in the country will be one of the most dominant trends in the coming years. It is expected that about 40% of the population in 2030 would be urban as against 30% currently. As population expands and incomes grow, this shift will likely be realized alongside demographic changes that will exponentially increase the demand for urban amenities like housing, energy, transport, water, waste disposal. It is estimated that more than half of India of 2030 is yet to be built. In a way, India's development process is doubly challenging. It not only has to complete the current unfinished development agenda, it has to strategise for future pressures that may increase the magnitude of this development gap. India realises that economic growth and development have to be guided by the key concerns of sustainability, because none of us have the luxury, any longer, of ignoring the economic as well as the environmental threat that a fast-deteriorating ecosystem poses to our fragile planet. India believes that development and environment are not adversaries but can go hand in hand, if environmental sensibilities can be imbibed. Equitable, inclusive and sustainable development would be the key to a new model of growth that India is committed to pursue, which can be fostered and facilitated by a collaborative approach among the Developing and the Developed countries.

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## II. POLICY FRAMEWORK

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India's environment policy is anchored in the Constitution of India, Article 48-A of the Constitution states that *"The State shall endeavour to protect and improve the environment and to safeguard the forests and wildlife of the country"*.

The Indian development process is guided by the aspiration of making India prosperous and progress on the path of *"Development without Destruction"*.

The broad policy framework on environment and climate change is laid down by the **National Environment Policy (NEP) 2006**, which promotes sustainable development along with respect for ecological constraints and the imperatives of social justice. The current development paradigm reiterates the focus on sustainable growth and aims to exploit the co-benefits of addressing climate change along with promoting economic growth. The **National Action Plan on Climate Change (NAPCC)** provides a sharper focus on required interventions. Currently, NAPCC is implemented through eight National Missions, outlining priorities for mitigation and adaptation to combat climate change. The broad policy initiatives of the government are supplemented by actions of the State Governments, Non-governmental Organizations (NGOs), initiatives of the private sector and other stakeholders. 32 States and Union Territories have put in place the **State Action Plan on Climate Change (SAPCC)** attempting to mainstream climate change concerns in their planning process.

Many other national strategies and policies supplement the above efforts. The **Energy Conservation Act** has been enacted to encourage efficient use of energy and its conservation. The **National Policy for Farmers** focuses on sustainable development of agriculture. The **National Electricity Policy (NEP)** underscores the focus on universalizing access to electricity and promoting renewable sources of energy, as does the **Integrated Energy Policy (IEP)**.

**Policies to promote actions that address climate concerns also include fiscal instruments like coal cess, cuts in subsidies, increase in taxes on petrol and diesel, market mechanisms including Perform Achieve and Trade (PAT), Renewable Energy Certificates (REC) and a regulatory regime of Renewable Purchase Obligation (RPO). The institutional arrangement for offtake of renewable power will be further strengthened.**

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### III. INDIA'S PROGRESS IN COMBATING CLIMATE CHANGE

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In recognition of the growing problem of Climate Change, India declared a voluntary goal of reducing the emissions intensity of its GDP by 20–25%, over 2005 levels, by 2020, despite having no binding mitigation obligations as per the Convention. A slew of policy measures were launched to achieve this goal. *As a result, the emission intensity of our GDP has decreased by 12% between 2005 and 2010. It is a matter of satisfaction that United Nations Environment Programme (UNEP) in its Emission Gap Report 2014 has recognized India as one of the countries on course to achieving its voluntary goal.*

India has a definite plan of action for clean energy, energy efficiency in various sectors of industries, steps to achieve lower emission intensity in the automobile and transport sector, a major thrust to non-fossil based electricity generation and a building sector based on energy conservation.

India's on-going mitigation and adaptation strategies and actions are detailed in the following sections, along with the expected direction of activities in the near future.

#### 1. MITIGATION STRATEGIES

##### *1.1 CLEAN AND EFFICIENT ENERGY SYSTEM*

Energy is a vital input for production and growth. Considering universal energy access and energy security as one of the fundamental development goals for the country, Government of India (GoI) has undertaken a two pronged approach to cater to the energy demand of its citizens while ensuring minimum growth in carbon emissions. On the generation side, the Government is promoting greater use of renewables in the energy mix mainly through solar and wind power and shifting towards supercritical technologies for coal based power plants. On the demand side, efforts are being made to efficiently use energy through various innovative policy measures under the overall ambit of Energy Conservation Act.

The energy intensity of the economy has decreased from 18.16 goe (grams of oil equivalent) per Rupee of GDP in 2005 to 15.02 goe per Rupee GDP in 2012, a decline of over 2.5% per annum.

### 1.1.1 Promotion of Clean Energy

**India is running one of the largest renewable capacity expansion programs in the world.**

Between 2002 and 2015, the share of renewable grid capacity has increased over 6 times, from 2% (3.9 GW) to around 13% (36 GW). This momentum of a tenfold increase in the previous decade is to be significantly scaled up with the aim to achieve 175 GW renewable energy capacity in the next few years. India has also decided to anchor a global solar alliance, InSPA (International Agency for Solar Policy & Application), of all countries located between the Tropic of Cancer and the Tropic of Capricorn.

- 1) **Wind energy** has been the predominant contributor to the renewable energy growth in India accounting for 23.76 GW (65.2%) of the renewable installed capacity, making India the 5<sup>th</sup> largest wind power producer in the world. With a potential of more than 100 GW, the aim is to achieve a target of 60 GW of wind power installed capacity by 2022.
- 2) **Solar power** in India is poised to grow significantly with Solar Mission as a major initiative of the Government of India. Solar power installed capacity has increased from only 3.7 MW in 2005 to about 4060 MW in 2015, with a CAGR of more than 100% over the decade. The ambitious solar expansion programme seeks to enhance the capacity to 100 GW by 2022, which is expected to be scaled up further thereafter. A scheme for development of 25 *Solar Parks, Ultra Mega Solar Power Projects*, canal top solar projects and one hundred thousand solar pumps for farmers is at different stages of implementation. Government of India is also promoting solarization of all the 55,000 petrol pumps across the country out of which about 3,135 petrol pumps have already been solarized.
- 3) **Biomass energy** constitutes about 18% of total primary energy use in the country and more than 70% of the country's population depends on it. However, it is currently used in an inefficient manner with high levels of indoor pollution. A number of programmes have been initiated for promotion of cleaner and more efficient use, including biomass based electricity generation. It is envisaged to increase biomass installed capacity to 10 GW by 2022 from current capacity of 4.4 GW.
- 4) **Hydropower** contributes about 46.1 GW to current portfolio of installed capacity, of which 4.1 GW is small hydro (upto 25 MW) and 41.99 GW is large hydro (more than 25 MW). Special programmes to promote small and mini hydel projects, new and efficient

designs of water mills have been introduced for electrification of remote villages. With a vast potential of more than 100 GW, a number of policy initiatives and actions are being undertaken to aggressively pursue development of country's vast hydro potential.

- 5) India is promoting **Nuclear Power** as a safe, environmentally benign and economically viable source to meet the increasing electricity needs of the country. With a 2.2% share in current installed capacity, total installed capacity of nuclear power in operation is 5780 MW. Additionally six reactors with an installed capacity of 4300 MW are at different stages of commissioning and construction. Efforts are being made to achieve 63 GW installed capacity by the year 2032, if supply of fuel is ensured.
- 6) **Clean Coal policies:** Coal based power as of now accounts for about 60.8% (167.2 GW) of India's installed capacity. In order to secure reliable, adequate and affordable supply of electricity, coal will continue to dominate power generation in future. Government of India has already taken several initiatives to improve the efficiency of coal based power plants and to reduce its carbon footprint. All new, large coal-based generating stations have been mandated to use the highly efficient supercritical technology. Renovation and Modernisation (R&M) and Life Extension (LE) of existing old power stations is being undertaken in a phased manner. **About 144 old thermal stations have been assigned mandatory targets for improving energy efficiency.** Coal beneficiation has been made mandatory. Introduction of ultra-supercritical technology, as and when commercially available is part of future policy. **Besides, stringent emission standards being contemplated for thermal plants would significantly reduce emissions.**
- 7) **National Smart Grid Mission** has been launched to bring efficiency in power supply network and facilitate reduction in losses and outages. **Green Energy Corridor** projects worth INR (Indian National Rupee) 380 billion (USD 6 billion) are also being rolled out to ensure evacuation of renewable energy.

The Government's goal of *Electricity for All* is sought to be achieved by the above programs that would require huge investments, infusion of new technology, availability of nuclear fuel and international support.

### 1.1.2 Enhancing Energy Efficiency

With the goal of reducing energy intensity of the Indian economy, Ministry of Power through Bureau of Energy Efficiency (BEE) has initiated a number of energy efficiency initiatives. The **National Mission for Enhanced Energy Efficiency (NMEEE)** aims to strengthen the market for energy efficiency by creating a conducive regulatory and policy regime. It seeks to upscale the efforts to unlock the market for energy efficiency and help achieve total avoided capacity addition of 19,598 MW and fuel savings of around 23 million tonnes per year at its full implementation stage. The programmes under this mission have resulted in an avoided generation capacity addition of about 10,000 MW between 2005 and 2012 with government targeting to save 10% of current energy consumption by the year 2018-19. Demand Side Management programmes have been launched to replace existing low-efficiency appliances:

- 1) During the last decade, there has been rapid transformation of **efficient lighting in India**. The sales of Compact fluorescent lamps (CFLs) have risen to about 37% of the total lighting requirements in 2014 from 7.8% in 2005. India has also launched an ambitious plan to replace all incandescent lamps with Light-emitting diode (LED) bulbs in the next few years leading to energy savings of upto 100 billion kilowatt hours (kWh) annually.
- 2) **Standards and Labeling Programme** launched by the Government of India enables consumers to make informed decision by providing information about the energy consumption of an appliance. Currently, 21 equipment and appliances are labeled. The programme has contributed to an increase of 25% to 30% in the energy efficiency of an average refrigerator or air-conditioner in 2014 compared to those sold in 2007. **Super-Efficient Fan** (that uses half as much energy as the average fan) programme has been launched. Further, two sets of **Corporate Average Fuel Consumption standards** for cars have been notified, with one coming into force in 2017 and the second set in 2022.
- 3) **Partial Risk Guarantee Fund for Energy Efficiency (PRGFEE)**, a risk sharing mechanism to provide financial institutions with a partial coverage of risk involved in extending loans for energy efficiency projects, and **Venture Capital Fund for Energy Efficiency (VCFEE)**, a trust fund to provide “last mile” equity capital to energy efficiency companies, have been established.
- 4) The **Energy Conservation Building Code (ECBC)** sets minimum energy standards for new commercial buildings. Eight states have already adopted and notified the ECBC, and

over 300 new commercial buildings have become compliant. The Code would be made more stringent to promote construction of even more (Near-Zero) energy-efficient buildings. “**Design Guidelines for Energy Efficient Multi-storey Residential buildings**” have also been launched.

- 5) In order to both recognize energy-efficient buildings, as well as to stimulate their large scale replication, India has developed its own building- energy rating system **GRIHA (Green Rating for Integrated Habitat Assessment)**, based on 34 criteria like site planning, conservation and efficient utilization of resources etc. A number of buildings including Commonwealth Games Village have been rated using GRIHA system. Indira Paryavaran Bhawan, the headquarters of Central Government’s Ministry of Environment, Forest & Climate Change is a model building of Government of India and has received LEED India Platinum and a 5 Star GRIHA rating. It is a ‘Net Zero Energy’ building with 100% onsite power generation.

## ***1.2 ENHANCING ENERGY EFFICIENCY IN INDUSTRIES***

Infrastructure sectors, viz. electricity, coal and cement have seen a growth rate of 4.5% in the year 2013-14. The recent initiatives like **Make in India, Digital India**, creating **National Industrial Corridors**, streamlining environment and forest approvals, labour reforms and undertaking other measures for the ease of doing business have also fuelled the spurt in their growth rates. Amidst all this, policies to enable industries reduce their energy consumption play a critical role as an instrument for sustainable environment through various interventions like:

- 1) **Perform, Achieve and Trade (PAT)**, as a market based energy efficiency trading mechanism, at present covers 478 plants (designated consumers) in eight energy-intensive industrial sectors accounting for one-third of total energy consumption in the country. The mandated decrease in the specific energy consumption under PAT programme has led to a decline of 4 to 5% in their specific energy consumption in 2015 as compared to that in 2012. Energy Saving Certificates (ESCerts) are issued to consumers who over-achieve the target. The scheme is to be widened and deepened to include additional sectors like railways, electricity distribution and refineries in the next cycle and would cover more than half the commercial energy consumed in India.

- 2) **Zero Effect, Zero Defect (ZED):** The **Make in India campaign** with ZED is a policy initiative to rate Medium & Small Industries on quality control and certification for energy efficiency, enhanced resources efficiency, pollution control, use of renewable energy, waste management etc. using ZED Maturity Assessment Model. **The scheme launched in 2015, envisages coverage of about 1 million medium and small enterprises.**

### ***1.3 DEVELOPING CLIMATE RESILIENT URBAN CENTERS***

Government of India in recent times has launched a number of schemes for transformation and rejuvenation of urban areas including **Smart Cities Mission, Atal Mission for Rejuvenation and Urban Transformation (AMRUT)** and **National Heritage City Development and Augmentation Yojana (HRIDAY):**

- 1) Under the **Smart Cities Mission**, 100 **smart cities** are planned with the objective to develop new generation cities, which will provide core infrastructure and a decent quality of life to its citizens by building a clean and sustainable environment. Smart solutions like recycling and reuse of waste, use of renewables, protection of sensitive natural environment will be incorporated to make these cities climate resilient.
- 2) **Atal Mission for Rejuvenation and Urban Transformation (AMRUT)**, a new urban renewal mission has been launched by Government of India for 500 cities with focus on ensuring basic infrastructure services such as water supply, sewerage, storm water drains, transport and development of green spaces and parks by adopting climate resilient and energy efficient policies and regulations.

### ***1.4 PROMOTING WASTE TO WEALTH CONVERSION***

India recognizes the dual benefits that can arise from efficient waste disposal leading to enhanced environmental benefits along with conversion to energy. Incentives are being granted to cities to take up waste to energy conversion projects.

- 1) The **Waste to Energy** capacity is sought to be enhanced. Government is also encouraging conversion of waste to compost by linking it with sale of fertilizers and providing market development assistance.

- 2) Government has invested significantly in **Solid Waste Management (SWM)** projects over the years and has provided INR 25 billion (USD 397 million) as grant in aid to states and Urban Local Bodies specifically for SWM through public-private partnerships.
- 3) Similarly, initiatives on waste water management would cover an additional population of 41 million and enhance recycling and reuse of treated water. There are about 816 Sewage Treatment Plants (522 operational and rest at different stages of construction and planning) having a combined capacity of 23,277 million of liters per day across 28 States and Union Territories.
- 4) Government of India has recently launched a one-of-its kind ‘**Swachh Bharat Mission**’ (**Clean India Mission**) with the objective of making the country clean and litter free with scientific solid waste management in about 4041 towns covering a population of 306 million. It aims to construct 10.4 million individual household toilets and 0.5 million Community and Public Toilets.

### ***1.5 SAFE, SMART AND SUSTAINABLE GREEN TRANSPORTATION NETWORK***

In the endeavor towards a low carbon economy, India is focusing on low carbon infrastructure and public transport systems like **Dedicated Freight Corridors** and energy efficient railways to reduce their environmental impact.

- 1) Indian Railways handles 3 million tonnes of freight and 23 million passengers daily and is the world’s third largest network. The endeavor is to increase the share of Railways in total land transportation from 36% to 45 %, thereby decreasing the load on less efficient diesel operated road traffic.
- 2) **Dedicated Freight Corridors (DFCs)** have been introduced across the country. In the first phase, two corridors viz. 1520 km Mumbai-Delhi (*Western Dedicated Freight Corridor*) and 1856 km Ludhiana-Dankuni (*Eastern Dedicated Freight Corridor*) are being constructed. The project is expected to reduce emissions by about 457 million ton CO<sub>2</sub> over a 30 year period. With a number of energy efficiency measures undertaken, Indian Railways has achieved 19.7% improvement in Specific Fuel Consumption for Freight Service Locomotives and 21.2% improvement for Coaching Service Locomotives during the last 10 years. Indian Railways is also installing solar power on its land and roof tops of coaches.

- 3) Recognizing its fuel efficiency, environmental friendliness and cost effectiveness, the Government is promoting growth of Coastal Shipping and Inland Water Transport. To enhance the inland waterways transport, Government has announced the implementation of **Jal Marg Vikas** for capacity augmentation of National Water Way -1. It is also proposed to establish integrated Waterways transportation grid with a view to connecting all existing and proposed National waterways with road, rail and ports connectivity. Another initiative in this direction is the **Sagarmala Project** with the objective to augment port-led development and promote efficient transportation of goods. **Bharatmala Project** which envisions constructing about 5,000 km of road network all along the coastal areas will further provide connectivity to these ports.
- 4) **The vision of Urban Transport policies is to focus on moving ‘people’ rather than ‘vehicles’, in which Mass Rapid Transit System (MRTS) would play an important role.**
- 5) **Around 236 km of metro rail have been made operational in the country. Further, about 550 km are under construction and 600 km under consideration for different cities across the country including Ahmedabad, Pune, and Lucknow. Delhi Metro, which has become India’s first MRTS project to earn carbon credits, has the potential to reduce about 0.57 million tonnes of CO<sub>2</sub>e annually.** Delhi Metro has also initiated installation of 9 solar power generation facilities and plans to increase their number.
- 6) The mass-transit and urban transport projects initiated under the National Urban Renewal Mission also have positive climate change impacts in the long-run. About 39 urban transport and mass rapid transport projects have been approved and about 19 projects have been completed so far.
- 7) **Solar powered toll plazas** have been envisaged as a mandatory requirement for toll collection across the country.
- 8) India has recently formulated **Green Highways (Plantation & Maintenance)** Policy to develop 140,000 km long “tree-line” with plantation along both sides of national highways. 1% of total civil cost of projects is to be set aside to implement the policy.
- 9) With a view to facilitating international commuting by highways, Government of India has approved signing of the **Bangladesh, Bhutan, India and Nepal (BBIN) Motor**

**Vehicle Agreement** to promote safe, economical efficient and environmentally sound road transport in the sub-region and support regional integration.

- 10) **Faster Adoption and Manufacturing of Hybrid & Electric Vehicles** in India (FAME India) is a scheme formulated as part of the **National Electric Mobility Mission Plan 2020** (NEMMP) to promote faster adoption and manufacturing of hybrid and electric vehicles in the country by providing incentives.
- 11) Under the **Vehicle Fuel Efficiency Program**, Government of India in 2014 finalized country's first passenger vehicle fuel-efficiency standards. They will take effect beginning in April 2016, and set the efficiency targets for new cars. The standards will keep 50 million tons of CO<sub>2</sub> out of the atmosphere. **India aims to improve fuel standards by switching from Bharat Stage IV (BS IV) fuels to Bharat Stage V (BS V)/ Bharat Stage VI (BS VI) across the country in the near future.**
- 12) **National Policy on Biofuels** has adopted an aspirational target of 20% blending of biofuels, both for bio-diesel and bio-ethanol. The government also launched the **National Bio-diesel Mission** identifying *Jatropha curcas* as the most suitable tree-borne oilseed for bio-diesel production. With the intention of further promoting biofuels, India has begun consultations on allowing 5% blending of biofuels in diesel that would be consumed by bulk users such as the railways and defence establishments.

#### **1.6 PLANNED AFFORESTATION**

India is one of the few countries where forest and tree cover has increased in recent years transforming country's forests into a net sink owing to national policies aimed at conservation and sustainable management of forests. As per the latest assessment, forests and tree cover has increased from 23.4% in 2005 to 24% of the geographical area in 2013. Government of India's long term goal is to bring 33% of its geographical area under forest cover eventually.

- 1) With its focus on sustainable forest management, afforestation and regulating diversion of forest land for non-forest purpose, India has been successful in improving carbon stock in its forest by about 5%, from 6,621.5 million tons in 2005 to 6,941 million tonnes in 2013.
- 2) Initiatives like **Green India Mission (GIM)** aim to further increase the forest/tree cover to the extent of 5 million hectares (mha) and improve quality of forest/tree cover on

another 5 mha of forest/non-forest lands along with providing livelihood support. It is expected to enhance carbon sequestration by about 100 million tonnes CO<sub>2</sub> equivalent annually.

- 3) These efforts have been further augmented by policies like National Agro-forestry Policy (NAP), REDD-Plus policy, Joint Forest Management; National Afforestation Programme and proposed devolution of about USD 6 billion under Compensatory Afforestation to states.

### ***1.7 ABATEMENT OF POLLUTION***

India has recently launched many programmes and schemes to address the problem of pollution:

- 1) **Continuous Emission Monitoring System (CEMS)** mandates the highly polluting industries to install 24X7 real time monitoring of emission and effluent discharge points.
- 2) **Common Effluent Treatment Plants (CETPs)** are being set up to treat the effluent emanating from the clusters of compatible small - scale industries.
- 3) The **Fly Ash Utilisation Policy** makes it mandatory to use only fly ash/ fly ash based products in construction of buildings, roads and reclamation / compaction of land within a radius of 100 km from a coal or lignite based thermal power plant, thus displacing the cement use. It also mandates utilisation of **Fly Ash** for backfilling or stowing of the mines.
- 4) Standards related to effluent discharge have been modified for over 2000 industries focusing on reducing quantity of waste water generation, conservation of water, promote **Zero Liquid Discharge (ZLD)** and use of treated effluent for irrigation.
- 5) In 2014, a **National Air Quality Index (AQI)** was launched for Indian cities. AQI is based on six pollutants and is notified every day serving as public information tool to disseminate information on air quality in qualitative terms.
- 6) Amendment of **Municipal Solid Waste Management (Management and Handling) Rules** is underway which will emphasize on proper segregation of waste at source; enhance waste processing and implementation of scientific landfills. Similarly, Bio-Medical Waste (Management & Handling) Rules, Plastic Waste Management Rules, e-waste (Management) Rules and Hazardous and Other Wastes (Management and

Transboundary Movement) Rules are being amended for a more scientific, technology driven, regulated and participative environment management.

### ***1.8 CITIZENS AND PRIVATE SECTOR CONTRIBUTION TO COMBATING CLIMATE CHANGE***

Citizens of India are an integral part of country's strategies to combat climate change. The Constitution of India vide Article 51-A lays down that it as a fundamental duty of every citizen to *“protect and improve the natural environment including forests, lakes, rivers and wildlife and to have compassion for living creatures”*.

Policies like **Swachh Bharat Mission (Clean India Mission)**, cleaning of our rivers, achieving energy efficiency are all examples of policies which are contingent upon full participations of India's citizens for their successful implementation.

In addition to being involved in Government initiatives related to climate change and resource efficiency, **private sector** has also embarked on a number of voluntary actions. It plays a key role in sustainable development efforts in the country, some of which are enumerated below:

- 1) Companies Act 2013 directs companies having a certain level of profits, to spend 2% of their annual profit on **Corporate Social Responsibility (CSR)** activities. Estimates indicate that a fair share of the available CSR funding of about INR 220 billion (USD 3.5 billion) annually will be invested in environment initiatives from this window.
- 2) The Indian industry has also participated in voluntary carbon disclosure programmes whereby they report their carbon management strategy and GHG emissions. Latest Report by **Carbon Disclosure Project, India** indicates a reduction of 165 million metric tonnes of CO<sub>2</sub> equivalent by Indian industries. **“India GHG Programme”** is another voluntary programme to support development of India-specific emission factors and for corporates to measure their carbon footprints.
- 3) Indian industry has undertaken many initiatives to reduce their water consumption. A study of 100 companies over a 5 year period covering 12 sectors indicate that the Indian companies on an average have been reducing their specific water consumption by 2.8 to 3 % per year. A few companies have achieved ‘water positive’ status.

- 4) **Smart Power for Environmentally-sound Economic Development (SPEED)** is a program that aims at electrification of rural areas based on a decentralized renewable energy system.
- 5) India currently has about 2.68 billion sq. ft. of registered green building space across 3,000 projects (second largest in the world), of which 600 are certified and fully functional.
- 6) **GreenCo Rating System** is first of its kind in the world which assesses companies on their environmental performance across 10 different parameters to help them develop a roadmap to improve further.
- 7) **New Ventures India (NVI)** is an initiative to support cleantech entrepreneurs in developing their business plans and access finance and markets.
- 8) The **Small and medium-sized enterprises (SME) Cluster Programs for Energy Efficiency** covers more than 150 clusters all over the country and has resulted in substantial energy saving, quality improvement and improved competitiveness. Another initiative by SIDBI (Small Industry Development Bank of India) in 500 SMEs spread over 40 industrial clusters is expected to save annually 30,000 tonnes of GHG emissions.

## 2. ADAPTATION STRATEGIES

The adverse impacts of climate change on the developmental prospects of the country are amplified enormously by the existence of widespread poverty and dependence of a large proportion of the population on climate sensitive sectors for livelihood. Hence for India adaptation is inevitable and an imperative for the development process. It is of immediate importance and requires action now.

Vulnerabilities in India differ among states, among regions and among different groups of people within the same region due to substantial variations in topography, climatic conditions, ecosystems as well as diversity in its social structures, economic conditions and needs of different communities.

A range of actions have been introduced to address it. Out of the eight National Missions on Climate Change five mission focus on adaptation in sectors like agriculture, water,

Himalayan ecosystems, forestry, Capacity building and Knowledge management. Climate plans at the sub national level also focus significantly on adaptation.

Besides these targeted programmes, India has also implemented a series of schemes which strengthen adaptive capacities of the vulnerable communities. India's expenditure on programmes with critical adaptation components has increased from 1.45% of GDP in 2000-01 to 2.82% during 2009-10. Expenditure on human capabilities and livelihoods viz. poverty alleviation, health improvement and disease control and risk management, constitutes more than 80% of the total expenditure on adaptation in India.

India's adaptation policies in some of the crucial sectors are outlined below:

## **2.1 AGRICULTURE**

Agriculture is the source of livelihood for nearly two-thirds of the population in India. It is predominantly rainfed covering about 60% of the country's net sown area and accounts for 40% of the total food production. Droughts and floods are frequent and the sector is already facing high degree of climate variability. The performance of agriculture sector has a direct bearing on food supplies and food security. India is projected to become the most populated country by 2030 and will need to produce an additional 100 million tonnes of food grains to feed the large population. In the agriculture sector, the need for comprehensive risk management and insurance is further enhanced due to these reasons.

Keeping in view the above challenges, Government of India is implementing policies/missions targeting various threats facing agriculture. Some of the important ones are **National Food Security Mission, Mission for Integrated Development of Horticulture, National Mission for Sustainable Agriculture, Paramparagat Krishi Vikas Yojana** to promote organic farming practices, **Pradhan Mantri Krishi Sinchayee Yojana** to promote efficient irrigation practices and **National Mission on Agricultural Extension & Technology**.

- 1) The **National Mission on Sustainable Agriculture (NMSA)** aims at enhancing food security and protection of resources such as land, water, biodiversity and genetics. The mission focuses on new technologies and practices in cultivation, genotypes of crops that have enhanced CO<sub>2</sub> fixation potential, which are less water consuming and more climate

resilient. India has developed 580 district level (covering many states) contingency plans based on early warning systems and other weather forecasting systems.

- 2) Government of India adopted a mega project called the **National Initiative on Climate Resilient Agriculture (NICRA)**. Its four main modules include Natural Resource Management, improving crop production, livestock and fisheries and institutional interventions.
- 3) A Scheme has been launched to provide in mission mode **Soil Health Card** to every farmer. Additionally, **100 mobile soil-testing laboratories** have been setup across the country.
- 4) **National Agroforestry Policy (NAP)** of India aims at encouraging and expanding tree plantation in complementarity and integrated manner with crops and livestock. It will help protect and stabilize ecosystems, and promote resilient cropping and farming systems to minimize the risk during extreme climatic events. It will also complement achieving the target of increasing forest/ tree cover.

## **2.2 WATER**

India identifies water as the most critical component of life support system. The total catchment area is 252.8 million hectare (mha), covering more than 75% of the total area of the country. The adaptation strategies for the water sector focus on enhancing efficient use of water, ensuring access and tackling the adverse impact of Climate Change. The trans-boundary and regional issues also need to be factored in.

- 1) The main objective of India's **National Water Mission (NWM)** is "conservation of water, minimizing wastage and ensuring its more equitable distribution both across and within States through integrated water resources development and management". One of the key goals of the mission is to enhance water use efficiency by 20%.
- 2) **Groundwater** is the major component of the total available water resources. Rapid expansion of groundwater use in India in the last three decades has resulted in a steep decline in the groundwater table in vast areas of the country. **Rainwater harvesting**, which offers a promising solution to replenish and recharge the groundwater is a significant component of Watershed Development Programme, taken up under different schemes of the central and state governments. Several municipal authorities, including

Delhi have amended their existing building bye-laws, making it compulsory for every large house or hotel (200 yards or more in area) to undertake rainwater harvesting.

- 3) **Neeranchal** is a recent programme by Government to give additional impetus to watershed development in the country.
- 4) Another important initiative relating to rivers is the **National Mission for Clean Ganga** which seeks to rejuvenate the river along its length of more than 2,500 km through multifarious activities such as pollution inventorization, assessment and surveillance and laying of sewage networks, treatment plants etc.
- 5) The total flood prone area in the country is about 45.64 million ha. Existing flood management mechanisms involve both Central and State Government.
- 6) Government of India has also set up the **National River Conservation Directorate** for conservation of rivers, lakes and wetlands in the country and improving the water quality which covers stretches of 40 rivers in 190 towns spread over 20 States.

### **2.3 HEALTH**

Climate change will increase health related stress from extreme weather-related disasters such as wider spread of vector-borne diseases as malaria and dengue and increasing frequency of heat and cold waves.

India is now formulating a '**Health Mission**' under the ambit of NAPCC to evolve strategies for mitigating, containing and managing the adverse impact of Climate Change on health. The mission aims at analysing epidemiological data, identify vulnerable population and regions, build knowledge base and expertise, increase awareness and community participation.

Apart from the overall public health infrastructure at the national and sub national levels, the Government of India has launched programmes like **Integrated Disease Surveillance Programme (IDSP)**, **National Vector Borne Disease Control Programme (NVBDCP)** to deal with vector borne diseases like malaria, dengue etc. As part of this programme India aims to eliminate malaria by 2030.

## **2.4 COASTAL REGIONS & ISLANDS**

India has a long coastline of 7517 km including island territories, and encompasses total 73 districts in the 9 maritime states and 2 Union Territories. The coastal districts house 14.2% of India's total population. India has been identified as one of the countries which are most vulnerable to the impact of accelerated sea level rise due to global warming:

- 1) India has demarcated vulnerable areas on the coasts and declared them as **Coastal Regulation Zone (CRZ)** with restrictions imposed on setting up and expansion of industries, operations and processes in these areas.
- 2) India is also implementing programmes for **Integrated Coastal Zone Management (ICZM)**. The vision of the project is to build national capacity for implementation of comprehensive coastal management through ecological management, conservation and protection of critical habitats, coastal geomorphology and geology of coastal and marine areas, coastal engineering, socio-economic aspects, policy and legal issues and other related fields in the area of coastal governance.
- 3) Mapping and demarcation of coastal hazard lines for development of emergency response plans is being carried out in all the coastal states and union territories.
- 4) Another initiative to protect coastal livelihood is '**Mangroves for the Future (MFF)**' coordinated by International Union for Conservation of Nature (IUCN) in India.
- 5) Similar to Small Island Developing States, the 1,238 Indian islands are vulnerable to loss of coastal wetlands including mangroves and salt water intrusion in fresh water aquifers. With changing climate, islands are highly susceptible to frequent and more intense tropical cyclones and associated storm surge, droughts, tsunamis and volcanic eruptions, which will have adverse impact on economy of these islands and health of their inhabitants.
- 6) The Government notified the **Island Protection Zone (IPZ)** in 2011 with the objective of ensuring livelihood security to the local communities, conserving and protecting coastal stretches, and promoting development in a sustainable manner. The IPZ focuses on disaster risk reduction through bioshields with local vegetation (mangroves) and other soft protection measures, and the conservation of beaches and sand dunes.

## **2.5 DISASTER MANAGEMENT**

The Indian subcontinent is among the world's most disaster prone areas. Almost 85% of India's area is vulnerable to one or multiple hazard. 23 States and Union Territories covering 45.64 million hectares of land are subject to floods, and are prone to flood disasters. India's annual average flood damage during the period 1996-2005 was INR 47.45 billion (USD 753.2 Million)

India has been able to establish a holistic disaster risk reduction and response apparatus at national, state and district levels with the aim of reducing existing levels of vulnerability, prevention, and mitigation of disasters and also to provide appropriate response, rehabilitation and reconstruction. Strategies include early warnings and communications, construction and sustainable maintenance of multi-purpose cyclone shelter, improved access and evacuation, enhanced capacity and capability of local communities to respond to disaster and strengthening disaster risk mitigation capacity at central, state and local levels

The link between Adaptation, Disaster Risk Reduction and Loss and Damage is important. It has been witnessed that the occurrence of flash floods, extreme weather events, droughts etc. has increased in frequency and become more unpredictable. The Sendai Framework for Disaster Risk Reduction has laid down a road map for required response. There is an urgent need for finance to undertake activities for early warning system, disaster risk reduction, loss and damage and Capacity building at all levels. The indigenous locally appropriate knowledge and technology may also be used for the purpose.

In order to achieve these goals, India has set up Disaster Relief Funds at all levels and launched the **National Disaster Relief Fund**, which is financed through the levy of a cess.

## **2.6 PROTECTING BIODIVERSITY & HIMALAYAN ECOSYSTEM**

**Biodiversity:** India, a mega diverse country with only 2.4% of the world's land areas, harbours 7-8% of all recorded species, and 4 out of 34 global biodiversity hotspots. In order to protect the biodiversity from changing climate, India has developed a biogeographic classification for conservation planning, and has mapped biodiversity rich areas in the country. The protected area network has increased from 427 (3.34% of total geographical area) in 1988 to 690 (5.07% of total geographical area) in 2014.

**Himalayan Ecosystem:** The Himalayas form the most important concentration of snow covered region outside the polar region. It is highly sensitive to global warming. The detailed glacier inventory of Indian Himalayas indicates presence of 9579 glaciers in the Himalayas, some of which form the perennial source of major rivers.

The **National Mission for Sustaining the Himalayan Ecosystem (NMSHE)** addresses important issues concerning Himalayan Glaciers and the associated hydrological consequences, biodiversity and wildlife conservation and protection, traditional knowledge societies and their livelihood and planning for sustaining of the Himalayan Ecosystem. Government has also launched **National Mission on Himalayan Studies** to complement NMSHE with the objective of building a body of scientific and traditional knowledge along with demonstrating replicable solutions to the problems in thematic areas including natural resource management, capacity building, long-term ecological monitoring etc.

## **2.7 RURAL LIVELIHOODS SECURITY**

The rural areas are highly prone to stress and pressures from natural resource exploitation. In this context, schemes for rural development and livelihood programmes are very relevant. The **Mahatma Gandhi National Rural Employment Guarantee Scheme in India (MGNREGS)**, with a budgetary annual allocation of about INR 347 billion (USD 5.5 billion) in 2015-16, aims at enhancing livelihood in the rural areas. A vast majority of works under this programme aim at strengthening natural resource base of the rural economy and are linked to land, soil, and water.

Another important programme of the Government is the **National Rural Livelihoods Mission** which has the objective to cover 70 million rural poor households, across 600,000 villages in the country through self-managed self help groups and federated institutions to support the rural communities in strengthening their livelihood.

## **2.8 ADAPTATION ACTIONS UNDER STATE ACTION PLANS ON CLIMATE CHANGE**

All the 29 states and 7 Union Territories in India are preparing a State level action plan to deal with the challenges of climate change incorporating local needs and priorities. SAPCCs are envisioned to encompass the vision of the NAPCC and aligned with the 8 National

Missions. SAPCCs describe in detail the impact of climate and vulnerability assessment, adaptation, mitigation options and financing and capacity building needs to implement the identified interventions. Key sectors covered by SAPCCs include agriculture, water, habitat, forestry, health and disaster management among others.

## **2.9 KNOWLEDGE MANAGEMENT & CAPACITY BUILDING**

India attaches great significance to knowledge creation and capacity building for climate change.

1. A network of 127 institutions called “**INCCA**” (Indian Network on Climate Change Assessment) has been set up to share knowledge and work in a collaborative manner on climate change issues.
2. The Department of Science & Technology has also initiated creation of **Climate Change Centers** at the state level especially in the Himalayan region. All the state governments have established links with local research institutions to ensure a continuous updating of their SAPCCs.
3. As a move towards competency based system, Government of India has also implemented **National Training Policy**, through which each Ministry and Department earmarks about 2.5% of its salary budget for training. A part of this budget is used for training in climate change and sustainable development issues as well.
4. Government has recently launched “**Skill India**” with the target to provide skill training in various sectors including sustainable development to about 400 million people by 2022.

### **3. India’s Climate Change Finance Instruments**

Maximum share of India's current climate finance comes from budgetary sources, as most of the resources for adaptation and mitigation are built into the ongoing sectoral programmes. The availability of funds for such purposes is largely guided by the overall resources and requirement of different sectors.

At the same time India is not relying solely on budgetary resources and is experimenting with a careful mix of market mechanisms together with fiscal instruments and regulatory interventions to mobilize finance for climate change.

### 3.1 National Funds

To augment the availability of assured targeted resources, Government of India has set up two dedicated funds at the national level for mobilizing financing for mitigation and adaptation respectively.

- 1) **Cess on Coal:** India imposed a cess on coal in 2010 @ INR 50 (USD 0.8) per tonne of coal. Recently it has been quadrupled to INR 200 (USD 3.2) per tonne of coal. The coal cess translates into a carbon tax equivalent, using the emission factor for coal, of around USD 2 per tonne. This forms the corpus for the **National Clean Environment Fund**, used for financing clean energy, technologies, and projects related to it. The total collection of INR 170.84 billion (USD 2.7 billion) till 2014-15 is being used for 46 clean energy projects worth INR 165.11 billion (USD 2.6 billion).
- 2) India has set up a **National Adaptation Fund** with an initial allocation of INR 3,500 million (USD 55.6 million) to combat the adaptation needs in sectors like agriculture, water, forestry etc. in addition to sectoral spending by the respective ministries.

### 3.2 Other Fiscal Instruments and Incentives for Low Carbon Growth

Some of the other fiscal measures incentivizing green actions in India are as follows:

- 1) With a series of steps taken recently, India has **cut subsidies and increased taxes on fossil fuels (petrol and diesel)** turning a carbon subsidy regime into one of carbon taxation. Further, in its effort to rationalize and target subsidies, India has launched ‘*Direct Benefit Transfer Scheme*’ for cooking gas, where subsidy will be transferred directly into the bank accounts of the targeted beneficiaries. In fact, over the past one year India has almost cut its petroleum subsidy by about 26%.
- 2) Recent actions have led to an implicit carbon tax (USD 140 for petrol and USD 64 for diesel) in absolute terms. This is substantially above what is now considered a reasonable initial tax on CO<sub>2</sub> emissions of USD 25- USD 35 per tonne. Estimates suggest that these measures will help India achieve a net reduction of 11 million tonnes of CO<sub>2</sub> emissions in less than a year.
- 3) **Tax Free Infrastructure Bonds** of INR 50 billion (USD 794 million) are being introduced for funding of renewable energy projects during the year 2015-16.
- 4) **Finance Commission (FC) Incentive for creation of carbon sink:** Another important initiative has been the 14<sup>th</sup> FC recommendation on incentives for forestry sector. The

devolution of funds to states from the federal pool would be based on a formula that attaches 7.5 % weight to the area under forest. According to the estimations based on 14<sup>th</sup> FC data, this initiative has effectively given afforestation a massive boost by conditioning about USD 6.9 billion of transfers to the states based on their forest cover, which is projected to increase up to USD 12 billion by 2019-20. Implicitly, India is going to transfer to states roughly about USD 174 per hectare of forest per year which compares very favorably with other afforested countries.

#### **4. External Cooperation: A Critical Enabler**

Over the years, the carbon intensity of the Indian economy has decreased, in large part, due to the adoption of new and innovative technologies which address climate mitigation and climate adaptation. The development, adoption and dissemination of these technologies has been an ongoing process which has led to, *inter-alia*, increased energy efficiency and an increasing share of renewables in the electricity grid. This has been facilitated by several bilateral and multilateral collaborative efforts both in the public and private sector.

At the same time, climate friendly technologies, adapted and deployed in India are also being utilized in other countries, particularly in developing countries, through bilateral cooperation. This development and transfer of technologies, both into the Indian market and from India into other markets, will continue to sustain future decreases in the carbon intensity of the Indian economy and increases in the share of renewables in the electricity-mix.

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## IV INDIA'S INDC

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Keeping in view its development agenda, particularly the eradication of poverty coupled with its commitment to following the low carbon path to progress and being sanguine about the unencumbered availability of clean technologies and financial resource from around the world, *India hereby communicates its Intended Nationally Determined Contribution (INDC) in response to COP decisions 1/CP.19 and 1/CP.20 for the period 2021 to 2030:*

1. To put forward and further propagate a healthy and **sustainable way of living** based on traditions and **values of conservation and moderation**.
2. To adopt a **climate friendly and a cleaner path** than the one followed hitherto by others at corresponding level of economic development.
3. To **reduce the emissions intensity of its GDP by 33 to 35 percent by 2030 from 2005 level**.
4. To achieve about **40 percent cumulative electric power installed capacity from non-fossil fuel based energy resources by 2030** with the help of transfer of technology and low cost international finance including from Green Climate Fund (GCF).
5. To **create an additional carbon sink of 2.5 to 3 billion tonnes of CO<sub>2</sub> equivalent** through additional forest and tree cover by **2030**.
6. To **better adapt** to climate change by enhancing investments in development programmes in sectors vulnerable to climate change, particularly agriculture, water resources, Himalayan region, coastal regions, health and disaster management.
7. To mobilize **domestic and new & additional funds** from developed countries to implement the above mitigation and adaptation actions in view of the resource required and the resource gap.
8. To **build capacities**, create domestic framework and international architecture for quick diffusion of cutting edge climate technology in India and for joint collaborative R&D for such future technologies.

To achieve the above contributions, India is determined to continue with its on-going interventions, enhance the existing policies as detailed in previous sections and launch new initiatives in the following priority areas:

- 1) Introducing new, more efficient and cleaner technologies in thermal power generation.
- 2) Promoting renewable energy generation and increasing the share of alternative fuels in overall fuel mix.
- 3) Reducing emissions from transportation sector.
- 4) Promoting energy efficiency in the economy, notably in industry, transportation, buildings and appliances.
- 5) Reducing emissions from waste.
- 6) Developing climate resilient infrastructure.
- 7) Full implementation of Green India Mission and other programmes of afforestation.
- 8) Planning and implementation of actions to enhance climate resilience and reduce vulnerability to climate change.

India has also revisited the National Missions under the NAPCC in the light of new scientific information and technological advances and identified new missions or programs on wind energy, health, waste to energy, and coastal areas. It is also redesigning the National Water Mission and National Mission on Sustainable Agriculture.

It is clarified that India's INDC do not bind it to any sector specific mitigation obligation or action, including in agriculture sector. India's goal is to reduce overall emission intensity and improve energy efficiency of its economy over time and at the same time protecting the vulnerable sectors of economy and segments of our society.

The successful implementation of INDC is contingent upon an ambitious global agreement including additional means of implementation to be provided by developed country parties, technology transfer and capacity building following Article 3.1 and 4.7 of the Convention.

## 5. MEANS OF IMPLEMENTATION

### 5.1 CLIMATE CHANGE FINANCE REQUIREMENT

Finance is a critical enabler of climate change action. However, an overall assessment and quantification of finance requirements for adaptation and mitigation for a country with so much diversity and demand is a difficult task given the rapid pace of changing technologies and innovation. Estimates by various studies vary in projecting precise requirements but converge on the enormity of funds that would be needed.

Preliminary estimates indicate that India would need around USD 206 billion (at 2014-15 prices) between 2015 and 2030 for implementing **adaptation actions** in agriculture, forestry, fisheries infrastructure, water resources and ecosystems. Apart from this there will be **additional investments needed** for strengthening resilience and disaster management. An Asian Development Bank Study on assessing the costs of climate change adaptation in South Asia indicates that approximate adaptation cost for India in **energy sector alone** would roughly be about USD 7.7 billion in 2030s. The report also projects the economic damage and losses in India from climate change to be around 1.8% of its GDP annually by 2050. **Mitigation requirements are even more enormous.** Estimates by NITI Aayog (National Institution for Transforming India) indicate that the mitigation activities for moderate low carbon development would cost around USD 834 billion till 2030 at 2011 prices.

India's climate actions have so far been largely financed from domestic resources. A substantial scaling up of the climate action plans would require greater resources. A detailed and full scale assessment of international climate finance needs will be finalized at a later stage and would depend on the gap between actual cost of implementation of India's plans and what can be made available from domestic sources. While this would evolve over time, a preliminary estimate suggests that at least USD 2.5 trillion (at 2014-15 prices) will be required for meeting India's climate change actions between now and 2030.

### 5.2 REQUIREMENT FOR TECHNOLOGY TRANSFER & SUPPORT

In the rapidly and ever evolving realm of technology development, it is difficult to project future requirement of technologies. Transfer and grounding of technologies and their knowhow would be key to enhancing adaptation and mitigation measures in developing countries. It also calls for meaningful and adequate financing for the required cutting edge

technologies. It is in this context that India has advocated global collaboration in Research & Development (R&D), particularly in clean technologies and enabling their transfer, free of Intellectual Property Rights (IPR) costs, to developing countries. IPR costs can also be borne from the GCF through a separate window.

It is also to be appreciated that every country has different requirements of technology and different capabilities of handling technologies depending on trained and skilled manpower, supporting infrastructure, intellectual environment etc. Knowledge creation, eco-system design for innovation and development, and technology deployment would be a continuous requirement in this process.

In its pursuit of low carbon growth, India would be focusing on technologies that need to be moved from lab to field and those that require targeted global research along with those that are still in the realm of imagination. One of the important areas of global collaborative research should be clean coal and fossil fuel, energy management and storage systems for renewable energy. Given the current stage of dependence of many economies on coal, such an effort is an urgent necessity. A preliminary and illustrative list of some of the technologies (which will evolve over time) is at **Annexure A**.

### ***5.3 CAPACITY BUILDING NEEDS***

India's efforts will require proper training and upgrading of skills across sectors. While no firm assessments have been made, it is evident that substantial resources will be required to implement capacity building programmes both nationally and across the states to address climate change challenges. It is expected that the international mechanism will support such initiatives including formation of Thematic Knowledge Networks, further expand activities under Global Technology Watch Group, establishing more intensive state centric knowledge and awareness creating activities and training of professionals in different aspects of renewable energy and supporting research and development institutions for pre-competitive research.

Though a firm projection is difficult, rough estimates indicate that around 2.5% of Government's salary budget would be required for capacity building initiatives, while some part of it would need to be financed internationally.

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## V. CONSIDERATION ON FAIRNESS AND AMBITION

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India's INDC is based on the 1992 convention. In terms of the provision on Article 3.1 and 4.7, this submission by India represents the utmost ambitious action in the current state of development. Both in terms of cumulative global emissions (only 3%) and per capita emission (1.56 tCO<sub>2</sub>e in 2010), India's contribution to the problem of climate change is limited but its actions are fair and ambitious.

The recent decisions of the Government represent a quantum jump in our aspirations in climate change actions starting with the manifold scaling up of our renewable energy targets to the programme on Smart Cities, cleaning of rivers and Swachh Bharat Mission (Clean India Mission). The initiatives have demonstrated unparalleled vision and strong political initiatives of the Government. It is expected that developed countries will re-examine their pre 2020 actions in the light of substantial action taken by developing countries like India to ensure that the ambition gap is substantially bridged.

Through this INDC, India has shown its commitment to combat climate change and these actions are indeed important contributions to the global effort. However, our efforts to avoid emissions during our development process are also tied to the availability and level of international financing and technology transfer since India still faces complex developmental challenges. The critical issue for developing nations is the gap between their equitable share of the global carbon space and the actual share of carbon space that will be accessible to them. The transfer of appropriate technologies and provision of adequate finance will have to be a determined contribution of the developed countries, which will further enable the developing countries to accomplish and even enhance their efforts. It is expected that developed countries would recognize that without means of implementation and adequate resources, the global vision is but a vacant dream. Addressing the United Nations Summit for the adoption of Post-2015 Development Agenda in September 2015, the Prime Minister of India, Shri Narendra Modi said; "We should forge a global public partnership to harness technology, innovation and finance to put affordable clean and renewable energy within the reach of all. Equally, we must look for changes in our lifestyles that would make us less dependent on energy and more sustainable in our consumption. It is equally critical to launch a global education programme that prepares our next generation to protect and conserve

Nature. I hope that the Developed World will fulfil its financing commitments for development and climate change, without in any way putting both under the same head”.

India’s INDC is fair and ambitious considering the fact that India is attempting to work towards low carbon emission pathway while endeavoring to meet all the developmental challenges the country faces today. Through this submission, India intends to reduce the emissions intensity of its GDP by 33 to 35 % by 2030 from 2005 level. This commitment is further echoed in India’s actions in climate change adaptation with setting up its own ‘National Adaptation Fund’.

The current policy framework also includes a favorable environment for a rapid increase in renewable energy, move towards low carbon sustainable development pathway and adapting to the impacts of climate change. It represents the highest possible efforts as evident from the multiple initiatives of the Government of India.

Accordingly, India’s development plans will continue to lay a balanced emphasis on economic development and environment.

*India reserves the right to make additional submissions on Intended Nationally Determined Contribution (INDC) as and when required.*

## Recent Initiatives of the Government of India

Under the leadership and vision of Hon'ble Prime Minister Shri Narendra Modi, Government of India has taken a number of measures to promote sustainable development and address the threat of climate change at national and sub-national level.

The first step was revisiting the National Missions under the National Action Plan on Climate Change (NAPCC). Government is proposing to set up new missions on Wind Energy, Health, Waste to Energy, Coastal Areas and redesigning the National Water Mission & National Mission on Sustainable Agriculture. Other initiatives include:

### **MITIGATION STRATEGIES**

- Green Generation for Clean & Energy Secure India: **more than 5 times increase** in Renewable Capacity from 35 GW (upto March 2015) to **175 GW by 2022**.
- **National Solar Mission** scaled up five-fold from 20 GW to **100 GW by 2022**. Kochi Airport is the World's first airport to fully run on solar power.
- **Solar powered toll plazas** envisaged for all toll collection booths across the country.
- **National Smart Grid Mission** launched for efficient transmission & distribution network.
- **Green Energy Corridor projects** being rolled out to ensure evacuation from renewable energy plants.
- Nationwide Campaign for **Energy Conservation** launched with the target to save **10% of current energy consumption** by the year 2018-19.
- Launched **Smart Cities Mission** to develop new generation cities by building a clean and sustainable environment.
- **National Heritage City Development and Augmentation Yojana** (HRIDAY) launched to bring together urban planning, economic growth and heritage conservation in an inclusive manner.
- **Atal Mission for Rejuvenation and Urban Transformation** (AMRUT) is a new urban renewal mission for 500 cities across India.
- Launched one-of-its kind 'Swachh Bharat Mission' (**Clean India Mission**) to make country clean and litter free by 2019.

- **Zero Effect, Zero Defect (ZED)** with **Make in India** campaign to enhance energy & resource efficiency, pollution control, use of renewable energy, waste management etc.
- Formulated **Green Highways (Plantation & Maintenance) Policy** to develop 140,000 km long “tree-line” along both sides of national highways.
- Faster Adoption and Manufacturing of **Hybrid & Electric Vehicles (FAME India)** to promote faster adoption and manufacturing of hybrid and electric vehicles.
- Country's first **passenger vehicle fuel-efficiency standards** finalized.
- Policies to increase production of **energy efficient 3 phase locomotives** and switchover to 100% of these locos from 2016-17 onwards.
- Policy directive issued to use **5% bio-diesel in** traction fuel in diesel locomotives.
- **National Air Quality Index** launched with One Number, One Color and One Description to give the status of air pollution in a particular city.

### **ADAPTATION STRATEGIES**

- Launched **Soil Health Card Scheme**. Additionally, 100 mobile soil-testing laboratories setup across the country.
- **Paramparagat Krishi Vikas Yojana** launched to promote **organic farming** practices.
- The **Pradhan Mantri Krishi Sinchayee Yojana** launched to promote **efficient irrigation** practices.
- **Neeranchal** is a new programme to give additional impetus to **watershed development** in the country.
- Launched **National Mission for Clean Ganga (Namami Gange)** which seeks to rejuvenate the river.
- **National Bureau of Water Use Efficiency (NBWUE)** proposed for promotion, regulation and control efficient use of water.
- **‘Give It Up’ Campaign** launched to encourage citizens to give up subsidy on cooking gas to meet the needs of the truly needy citizens, thereby promote shift away from inefficient use of biomass in rural areas.

### **CLIMATE FINANCE POLICIES**

- Setting up of INR 3,500 million (**USD 55.6 million**) **National Adaptation Fund**.
- **Reduction in subsidies** on **fossil fuels** including diesel, kerosene and domestic LPG.
- **Coal cess quadrupled** from INR 50 to **INR 200 per tonne** to help finance clean energy projects and Ganga rejuvenation.
- Introduction of **Tax Free Infrastructure Bonds** for funding of renewable energy projects.

**Illustrative list of some of the Technologies (Mitigation perspective)**

**Clean Coal Technologies (CCT)**

- Pulverized Combustion Ultra Super Critical (PC USC)
- Pressurised Circulating Fluidised Bed Combustion, Super Critical, Combine Cycle (PCFBC SC CC)
- Integrated Gasifier Combined Cycle (IGCC)
- Solid Oxide Fuel Cell (SOFC), Integrated Gasifier Fuel Cell (IGFC)
- Underground Coal gasification (UCG)

**Nuclear Power**

- Pressurized water reactor, Integral pressurized water reactor, Advanced Heavy Water Reactor (AHWR)
- Fast breeder reactor (FBR)
- Accelerated-driven systems in advanced nuclear fuel cycles

**Renewable Energy**

- Yeast /enzyme based conversion to high quality hydrocarbon fuels
- Conversion of pre-treated biomass to fuels and chemicals
- Gasification technologies like fluidised bed, plasma induced etc. for power generation
- Wind Energy technologies:
  - Development of smaller and efficient turbines
  - Wind turbines for low wind regime
  - Designs of offshore wind power plants
- Solar PV technologies:
  - Based on p-type silicon wafers and n-type silicon wafers
  - Hetero junction with Thin Interfacial (HIT) Module, Back Contact Back Junction (BCBJ) Modules
  - Crystalline silicon photovoltaic cells of > 24 % cell efficiency
  - High efficiency Concentrating PV (CPV)
  - Non-silicon based solar PV technologies
- Composite cylinders for on-board hydrogen storage
- Advanced biomass gasification technologies
- Low temperature Polymer Electrolyte Membrane Fuel Cell (PEMFC) for stationary power generation and for vehicular applications
- Energy storage technologies for bulk storage and Renewable Energy integration, frequency regulation, utility Transmission & Distribution applications and for community scale projects.



## INTENDED NATIONALLY DETERMINED CONTRIBUTION REPUBLIC OF INDONESIA

### National Context

Indonesia is a nascent yet stable democracy and the fourth most populous country in the world. Despite continuous, multi-decade economic growth, approximately 11% of Indonesia's population is living below the poverty line. To lift people out of poverty, the Government of Indonesia (GOI) is promoting economic development projected to average at least 5% per year in order to reduce the poverty rate to below 4% by 2025, as mandated by the Indonesian Constitution, inter alia, that "*every person shall have the right to enjoy a good and healthy environment.*" As climate change becomes a reality, Indonesia must continue to seek a balance between its current and future development and poverty reduction priorities.

Indonesia's strategic development goals, known as the *Nawacita* (or Nine Agenda Priorities), charts the transitional path towards realizing meaningful and long-term changes, aligning Indonesia's vision as a politically sovereign and economically self-reliant nation with deep roots in its cultural identity. These priorities are consistent with the national commitment to climate change resilience, where climate change adaptation and mitigation are integrated as cross-cutting priorities of the National Medium-Term Development Plan. As the largest archipelagic country in the world, with its internationally recognized Archipelago Doctrine (*Wawasan Nusantara*), Indonesia also needs to articulate its maritime vision in its development priorities.

Given its pivotal geographic position in the global ocean conveyor belt (thermohaline circulation), and its extensive tropical rainforests, with high biodiversity, high carbon stock values and energy and mineral resources, Indonesia recognizes its role to play in combatting global climate change. Nevertheless, Indonesia is also vulnerable to natural disasters that will likely be exacerbated by climate change, especially in low-lying areas throughout the archipelago. Therefore Indonesia views integrated land- and ocean-based climate change adaptation and mitigation efforts as a critical strategic consideration in achieving climate resilience in food, water and energy.

Indonesia's Intended Nationally Determined Contribution (INDC) outlines the country's transition to a low carbon future by describing the enhanced actions and the necessary enabling environment during the 2015-2019 period that will lay the foundation for more ambitious goals beyond 2020, contributing to the concerted effort to prevent 2°C increase in global temperature. For 2020 and beyond, Indonesia envisions achieving archipelagic climate resilience as a result of comprehensive adaptation and mitigation programs and disaster risk reduction strategies. Indonesia has set ambitious goals for sustainability related to production and consumption of food, water, and energy. These goals will be achieved by supporting empowerment and capacity building, improved provision of basic services in health and education, technological

innovation, and sustainable natural resource management, in compliance with principles of good governance and broader constituency strengthening.

## **Mitigation**

According to Indonesia's Second National Communication of 2010, national greenhouse gas (GHG) emissions were estimated to be 1,800 MtCO<sub>2</sub>e in 2005. This represents an increase of 400 MtCO<sub>2</sub>e compared to 2000. Most emissions (63%) are the result of land use change and peat and forest fires, with combustion of fossil fuels contributing approximately 19% of total emissions. It is important to note that fossil energy resource extraction also contributes to land use change emissions. The Indonesia baseline uses the business as usual scenario of emission projections starting in 2010, based on historical trajectory (2000-2010), projected increases in the energy sector and the absence of mitigation actions.

In 2009, Indonesia voluntarily pledged to reduce emissions by 26% on its own efforts, and up to 41% with international support, against the business as usual scenario by 2020. Since then Indonesia has promulgated relevant legal and policy instruments, including the national action plan on GHG emissions reduction as stipulated in Presidential Regulation (PERPRES) No. 61/2011 and GHG inventory through Presidential Regulation (PERPRES) No. 71/2011. Beyond 2020, Indonesia envisions an even bolder commitment to emission reductions. Based on the country's most recent emissions level assessment, the unconditional reduction target is 29% of the business as usual scenario by 2030. In order to support the beyond 2020 target, Indonesia recognizes the need for consolidating both methods and data sources to ensure the high degree of accuracy.

Indonesia has taken significant steps to reduce emissions from Land Use, Land-Use Change and Forestry (LULUCF) by instituting a moratorium on the clearing of primary forests and by prohibiting conversion of peat lands from 2010-2016. Those ongoing efforts will be strengthened through protection and conservation of its remaining forests by reducing deforestation and forest degradation, restoring ecosystem functions, as well as sustainable forest management which include social forestry through active participation of the private sector, small and medium enterprises, civil society organizations, local communities and the most vulnerable groups, especially *adat* communities, and women - in both the planning and implementation stages. A landscape-scale and ecosystem management approach, emphasizing the role of sub-national jurisdictions, is seen as critical to ensuring greater, more enduring benefits from these initiatives.

In energy sector, Indonesia has embarked on a mixed energy use policy, with at least 23% coming from new and renewable energy by 2025. Indonesia has also established the development of clean energy sources as a national policy directive. Collectively, these policies will put Indonesia on the path to de-carbonization.

For the waste management sector, the GOI is committed to develop a comprehensive strategy to improve policy and institutional capacity at the local level, enhance management capacity of urban waste water, reduce landfill waste by promoting the "Reduce, Reuse, Recycle" approach, and the utilization of waste and garbage into energy production. The GOI is committed to further reduce emissions from the waste management sector by 2020 and beyond, through

comprehensive and coherent policy development, institutional strengthening, improved financial and funding mechanisms, technology innovation, and social-cultural approaches.

## **Adaptation**

As an archipelagic state with extensive low-lying areas, Indonesia is highly vulnerable to the adverse impacts of climate change. Indonesia has already experienced extreme climate events such as floods and drought, and will likely see long-term effects from sea level rise. As the Indonesian population grows, climate change-induced natural disasters will impact a greater number of people and their assets, making it more difficult for them to rise out of poverty. It is believed that climate change will increase the risk of hydro-meteorological disasters, which make up 80% of disaster occurrences in Indonesia. The poorest and most marginalized populations tend to live in high-risk areas that are prone to flooding, landslides, sea level rise, and water shortages during drought. Most of these areas have experienced rapid urbanization, reaching 50% in 2010.

Climate change presents significant risks for Indonesia's natural resources that will, in turn, impact the production and distribution of food, water, and energy. Therefore, the GOI considers climate mitigation and adaptation efforts as an integrated concept that is essential for building resilience in safeguarding food, water and energy resources. The GOI has made significant efforts towards developing and implementing a National Action Plan on Climate Change Adaptation (RAN-API) which provides a framework for adaptation initiatives that has been mainstreamed into the National Development Plan.

The GOI will implement enhanced actions to study and map regional vulnerabilities as the basis of adaptation information system, and to strengthen institutional capacity and promulgation of climate change sensitive policies and regulations by 2020. The medium-term goal of Indonesia's climate change adaptation strategy is to reduce risks on all development sectors (agriculture, water, energy security, forestry, maritime and fisheries, health, public service, infrastructure, and urban system) by 2030 through local capacity strengthening, improved knowledge management, convergent policy on climate change adaptation and disaster risks reduction, and application of adaptive technology.

## **Planning Process**

The GOI has demonstrated its strong commitment to institutional development by establishing the Directorate General of Climate Change, under the Ministry of Environment and Forestry. Established by Presidential Regulation No 16 of 2015, the Directorate General serves as the National Focal Point for the Conference of the Parties (COP) of the United Nations Framework Convention on Climate Change (UNFCCC) to effectively facilitate ongoing relevant programs and processes being implemented by a variety of government sectors and stakeholders. Since climate change has local to national and international dimensions, coordination and synergy will continuously be enhanced between the Ministry of Environment and Forestry with Ministry of National Development Planning (BAPPENAS) in the context of climate change and national development and with Ministry of Foreign Affairs in the context of climate change and international negotiations.

To further strengthen institutional capacity, Indonesia is developing appropriate legal instruments for environmental protection and management, spatial planning, renewable energy, and coastal and small islands management. In addition to these legal instruments, Indonesia has created regulatory frameworks specifically on climate change mitigation, and the National Action Plan on Climate Change Adaptation (RAN-API).

In the preparation of the INDC, the GOI has conducted consultations with various stakeholders representing academia, the private sector, and civil society organizations; these consultations have included workshops and consultations organized at both the national and local levels. The preparation of the INDC has taken into account the Post-2015 Sustainable Development Goals (SDG) particularly on taking urgent action to combat climate change and its impacts, promoting food security and sustainable agriculture, achieving gender equality, ensuring the availability and sustainable management of water, access to affordable, reliable, and renewable energy for all, sustained, inclusive and sustainable economic growth, resilient infrastructure, sustainable consumption and production patterns, conservation and sustainable use of the oceans, seas and marine resources, and protecting, restoring and promoting sustainable use of terrestrial ecosystems, sustainably managing forests, combating desertification, and halting and reversing land degradation and biodiversity loss.

### **Strategic Approach**

Indonesia requires a comprehensive and thorough plan to effectively implement sustainable production and consumption patterns, benefiting from the diversity of traditional wisdom of our indigenous institutions, known as the *adat* communities. Broader constituency building is also deemed critical through effective engagement with faith based networks as well as the existing interfaith movement. Therefore, the strategic approach of Indonesia's INDC is predicated on the following foundational principles:

- Employing a landscape approach: Recognizing that climate change adaptation and mitigation efforts are inherently multi-sectoral in nature, Indonesia takes an integrated, landscape-scale approach covering terrestrial, coastal and marine ecosystems, implemented through capacity building of the sub-national jurisdictions.
- Highlighting existing best practices: Recognizing significant strides in multi-stakeholder efforts in combating climate change, Indonesia intends to scale up the diversity of traditional wisdom based as well as innovative climate mitigation and adaptation efforts by government, the private sector, and communities.
- Mainstreaming climate agenda into development planning: Recognizing the importance of integrating climate change into development and spatial planning and the budgeting process, Indonesia will include key climate change indicators in formulating its development program targets
- Promoting climate resilience in food, water and energy: Recognizing the need to fulfill the needs of a growing young population for food, water and energy, Indonesia will improve its management of natural resources to enhance climate resilience by protecting and restoring key terrestrial, coastal and marine ecosystems.

In order to maintain consistent and credible accounting of the monitoring, reporting and verifying (MRV) program, Indonesia has established Presidential Regulation (PERPRES No. 71, 2011) that were designed to take into account national characteristics and circumstances.

Indonesia's commitment to a low carbon future outlines enhanced actions and puts in place the necessary enabling environment for the 2015-2019 period that will lay the foundation for more ambitious goals beyond 2020. This would provide opportunities for building coherent actions at the national level, with particular emphasis on research, resource mobilization through partnerships, and international cooperation. The Indonesian Environmental Protection and Management Law of 2009 secures the legal framework to support 2015-2019 enhanced action strategies and actions, which would serve as enabling conditions for long-term policy of 2020 and beyond. However, to achieve long-term policy goals, a comprehensive legal harmonization of all relevant matters related to climate change is seen as critical to meet the daunting challenges of climate change mitigation and adaptation.

### **Information to Facilitate Clarity, Transparency and Understanding**

#### **Reduction Level**

##### **(a) Unconditional Reduction**

Indonesia has committed to reduce unconditionally 26% of its greenhouse gases against the business as usual scenario by the year 2020.

The above commitment is a necessary prerequisite for embarking on a bolder commitment to further reductions by 2020 and beyond by outlining an emissions reduction plan using an evidence-based and inclusive approach. The commitment will be implemented through, , effective land use and spatial planning, sustainable forest management which include social forestry program, restoring functions of degraded ecosystems, improved agriculture and fisheries productivity, energy conservation and the promotion of clean and renewable energy sources, and improved waste management.

As stated earlier, Indonesia is committed to reducing emissions by 29% compared to the business as usual (BAU) scenario by 2030, as a fair reduction target scenario based on the country's most recent assessment of the 2010's National Action Plan on GHG Reduction. The BAU scenario is projected approximately 2.881 GtCO<sub>2</sub>e in 2030.

##### **(b) Conditional Reduction**

As articulated in the aforementioned Unconditional Reduction Indonesia's target should encourage



support from international cooperation, which is expected to help Indonesia to increase its contribution up to 41% reduction in emissions by 2030.

Indonesia's additional 12% of intended contribution by 2030 is subject to provision in the global agreement including through bilateral cooperations, covering technology development and transfer, capacity building, payment for performance mechanisms, technical cooperation, and access to financial resources.

<b>Type</b>	Emissions reduction relative to a Business As Usual (BAU) baseline
<b>Coverage</b>	Nationwide with a landscape and ecosystem management approach in both adaptation and mitigation efforts by building and strengthening sub-national jurisdictional capacity.
<b>Scope</b>	<ul style="list-style-type: none"><li>• Carbon Dioxide (CO<sub>2</sub>)</li><li>• Methane (CH<sub>4</sub>)</li><li>• Nitrous Oxide (N<sub>2</sub>O)</li></ul>
<b>Baseline</b>	BAU scenarios of emission projection started in 2010, with each sector having various data year interval. For example, the historical data of land-based sector is available from 1990-2012, as seen in Indonesian FREL-REDD+ submission.
<b>Fair and Ambitious</b>	<p>Indonesia GDP growth rate has slowed between 2010-2015, from 6.2-6.5% per annum to only 4.0% (first quarter 2015). Indonesia's population has increased at an average rate of 1.49% during the period of 2010-2010, posing challenges for Indonesia in fulfilling energy demand, ensuring food security, and fulfilling livelihood needs. At the same time, poverty alleviation remains a challenge for Indonesia, with 10.96% of the population still living in poverty in 2014, and the unemployment rate at 5.9%.</p> <p>Despite the challenges common to other developing countries, Indonesia is committed to transition its current development pathway toward climate resilience in a phased approach. The pathway towards de-carbonization of the economy will be fully integrated into Indonesia's National Medium-Term Development Plan for the period 2019-2024.</p> <p>Indonesia also considers to work on finding the</p>

peaking time of national GHGs emissions necessary to meet the national sustainable development objectives while contributing to the global efforts to fight against the dangerous impacts of climate change.

**Perspectives on Vulnerable Groups, including Gender and Adat Communities**

These policies and actions include an emphasis on encouraging participation of the most vulnerable groups, including *adat* communities, the poor, and women, in order for the measures to be effectively implemented, and provide equitable benefits for all citizens.

**Key Assumptions on Mitigation**

**Metric Applied**

Global Warming Potential (GWP) on a 100 year timescale in accordance with the IPCC's 4th Assessment Report.

**Methodology for Estimating Emissions**

Inventory is based on 2006 IPCC Guidelines for National Greenhouse Gas inventories and the IPCC GHG for LULUCF.

All data will refer to the National Inventory System of Greenhouse Gases (SIGN SMART), UNFCCC Biennial Update Report (BUR), and FREL-REDD+ document.

**Baseline**

Assumptions used for baseline projection and policy scenarios for the 2020 to 2030 period are:

- Long-term economic growth will still be influenced by land use governance, tenurial issues energy consumption, and quality of infrastructure connecting the archipelago.
- Beside GDP per capita, population growth, energy intensity and value added, the increasing demand of both domestic and international market on natural resources based commodities influence the dynamic behavior of each sector and the economy.
- Policy scenario for post 2020 in the energy sector refers to Electricity Supply Business Plan (RUPTL) 2015-2024 and National Energy Policy (KEN).

**Measurable, Reportable, Verifiable (MRV)**

Indonesia commits to periodically communicate its greenhouse gases emissions from various sectors, including the status of emission reduction efforts and results to Secretariat of UNFCCC. Indonesia is

currently preparing the Third National Communication Report (TNC), to be submitted by 2016. Indonesia produced the Biennial Update Report (BUR) along with the INDC document.

### **Coverage**

#### • **Sectors/Source Categories**

1. Energy (including Transport)
2. Industrial Processes and Product Use
3. Agriculture
4. Land-use, Land-use Change and Forestry
5. Waste

#### • **International Market Mechanisms**

Indonesia will meet its unconditional commitments regardless of the existence of international market mechanisms. Indonesia welcomes bilateral, regional and international market mechanisms that facilitate and expedite technology development and transfer, payment for performance, technical cooperation, and access to financial resources to support Indonesia's climate mitigation and adaptation efforts towards a climate resilient future.

### **Review and Adjustment**

The INDC reflects the most recent information and analysis by the Government of Indonesia. As a developing country, Indonesia will likely experience dynamic changes due to national and global economic changes. In this regard, the INDC will be reviewed and adjusted, as necessary, up to the time of Indonesia's ratification to the legal instrument to be agreed in COP-21.

## **Annex Indonesia Climate Resilience Strategy**

### **I. Introduction**

The Government of Indonesia considers climate mitigation and adaptation efforts as an integrated concept that is essential for building resilience in safeguarding food, water and energy resources. Indonesia also views its development pathway towards climate resilience as consistent with its commitment to contribute to the global effort for achieving Sustainable Development Goals (SDGs). These global agendas will be contextualized given Indonesia's unique archipelagic geography, and its position within the global ocean conveyor belt (thermohaline circulation) and its extensive tropical rainforests, with their high biodiversity and high carbon stock value. Indonesia is also a nascent yet stable democracy and the fourth most populous country in the world, with the largest generation of young people and the most working-age people in its history.

### **II. Indonesia's Vulnerability to Climate Change**

As an archipelagic country with extensive low-lying and small island areas, Indonesia is highly vulnerable to the adverse impacts of climate change. Indonesia has already experienced extreme climate events such as floods and drought, and is anticipating long-term impacts from sea level rise. As the Indonesian population grows, climate change-induced natural disasters will affect a greater number of people and their assets, making it difficult for them to escape poverty.

Climate change is believed to increase the risk for hydro-meteorological disasters, which make up 80% of disaster occurrences in Indonesia. The poorest and most marginalized populations tend to live in high-risk areas that are prone to flooding, landslides, sea level rise, and water shortages during drought.

As the country with the second longest coastline in the world, Indonesia faces a high risk of coastal inundation and sea level rise that may affect up to 42 million people living in low elevation coastal zones. Most of these areas have experienced rapid urbanization, reaching 50% in 2010.

The vulnerability of Indonesia's coastal zone is also affected by the rate of deforestation and forest degradation. The loss of forest ecosystems leads to the loss of critical environmental services, providing for water catchment areas, preventing erosion and floods, and protecting against the loss of biodiversity.

In order for Indonesia to reduce its vulnerability to climate change, it must strengthen its climate resilience by integrating its adaptation and mitigation efforts in development planning and implementation.

### III. Priority Actions for Climate Resilience

In 2010 the Government of Indonesia pledged to reduce emissions by 26% (41% with international support) against the business as usual scenario by 2020. The current administration, under President Joko Widodo, has determined priority actions within the national *Nawa Cita* (Nine Priority Agendas) framework, which includes protecting Indonesia's citizens, encouraging rural and regional development, improving the quality of life, and improving productivity and global competitiveness. These core missions are consistent with the national commitment toward a climate change-resilient development path, in which climate change adaptation and mitigation constitute an integrated and cross-cutting priority of the National Medium-Term Development Plan. The following priorities for enhanced actions in 2015-2019 will be fully integrated into Indonesia's National Medium-Term Development Plan in 2020.

#### *Enabling conditions for climate resilience*

Indonesia's pathway toward climate resilience must be developed by building a strong foundation based on the following enabling conditions:

- Certainty in spatial planning and land use
- Tenurial security
- Food security
- Water security
- Renewable energy

#### *Economic resilience*

Climate change presents significant risks for Indonesia's natural resources that will in turn impact the production and distribution of food, water and energy. As the population grows, there will be increasing pressures on Indonesia's already limited resources. As a response, Indonesia plans to build resilience into its food, water and energy systems through the following enhanced actions:

- Sustainable agriculture and plantations
- Integrated watershed management
- Reduction of deforestation and forest degradation
- Land conservation
- Utilization of degraded land for renewable energy
- Improved energy efficiency and consumption patterns

#### *Social and Livelihood Resilience*

Climate change impacts the day-to-day lives of all Indonesians, but most severely Indonesia's most vulnerable populations. Climate change-induced natural disasters will impact a greater number of people living below the poverty line, preventing asset accumulation. Rising food,

water and energy prices, which often follow drought, floods, and other disasters, will drive the poor further into poverty. Socio-economic disparity will potentially contribute to political instability in regions most affected by climate change. To prevent further disparity, Indonesia plans to build social resilience through the following actions:

- Enhancement of adaptive capacity by developing early warning systems, broad-based public awareness campaigns, and public health programs;
- Development of community capacity and participation in local planning processes, to secure access to key natural resources;
- Ramping up disaster preparedness programs for natural disaster risk reduction;
- Identification of highly vulnerable areas in local spatial and land use planning efforts.
- Improvement of human settlements, provision of basic services, and climate resilient infrastructure development.
- Conflict prevention and resolution.

#### *Ecosystem and Landscape Resilience*

As an archipelagic country with high biodiversity, Indonesia's highly diverse ecosystems and landscapes provide various environmental services such as watershed protection, carbon sequestration, disaster risk reduction, etc. In order to build climate resilience, Indonesia must protect and sustain these environmental services by taking an integrated, landscape-based approach in managing its terrestrial, coastal and marine ecosystems. The following are enhanced actions to support ecosystem and landscape resilience:

- Ecosystem conservation and restoration
- Social forestry
- Coastal zone protection
- Integrated watershed management
- Climate resilient cities.



**Department of Environment  
Islamic Republic of Iran**

**Intended Nationally Determined  
Contribution**

**19 November 2015**

## **1. Introduction**

The Islamic Republic of Iran, in recent decades, has always supported the international efforts to mitigate greenhouse gas emissions (GHGs) and to adapt to the impacts of climate change, on the basis of the principle of “Common But Differentiated Responsibilities” (CBDR). Despite various obstacles such as unjust sanctions, the eight year imposed war upon Iran (1980-1988) which put Iranian young and talented human resources at risk, as well as hosting millions of refugees from the neighboring countries, Iran has implemented comprehensive programs over the last three decades in the field of sustainable development. In the coming years, however, economic growth, social development, poverty eradication and environmental sustainability continue to be the main priorities of the national development agenda.

In spite of the desire to move towards low-carbon economy and to implement and achieve its objectives, young population and national development requirements on the one hand, and availability of hydrocarbon resources from the other hand, have made the national development to rely on the energy-intensive industries. These have made upward trend of GHGs emissions in the country inevitable.

Dependence of the national economy on revenues from production and export of oil and its byproducts - that are high-carbon intensive- have made the economy, public welfare, resources and technology of the country, vulnerable to mitigation of GHGs emission. These adverse impacts from the point of view of response measures to climate change, have turned the Islamic Republic Iran to a suitable candidate, to the attention of developed country parties to the Convention, in the areas of finance, technology transfer and capacity building support (according to articles 4.8 and 4.9 of the UNFCCC).

This intended program, inclusive of unconditional and conditional participation in mitigating GHGs emission as well as in terms of areas related to adaptation, is in its entirety, subject to the removal of economic, technological and financial restrictions and in particular termination of unjust sanctions imposed on Iran during the past several decades, as well as non-imposition of restrictions or sanctions in the future.

Obviously, due to the long-term impacts of unjust sanctions and restrictions, capacity development and creation of suitable institutional structures will be a time consuming process and constrain achieving objectives of this program, even if international financial and technical support as well as technology transfer are provided. The Islamic Republic of Iran, while has no legally binding commitments under the Convention to reduce greenhouse gas emissions, while emphasizing the voluntary nature of its actions, presents its “Intended Nationally Determined Contribution”, as endorsed by the Cabinet of Ministers, in the following macro-areas of mitigation, vulnerability and adaptation.

It is noteworthy that, this document does not constitute committing the Islamic Republic of Iran, in any way, in a binding manner, with regard to the measures that will be undertaken in its various economic and industrial sectors.

## **2. Mitigation of Greenhouse Gases**

- Time frame: 1<sup>st</sup>, January 2021 to 31<sup>st</sup>, December 2030;
- Base year of calculation ( upon available information): 2010;
- GHGs concerned: SF<sub>6</sub>, PFCs, HFCs, NF<sub>3</sub>, CO<sub>2</sub>, CH<sub>4</sub>, N<sub>2</sub>O.

### **A. Unconditional Mitigation Action**

On the basis of national capabilities, financial resources available and requirements of the national development program, taking into account GHGs emission scenarios, the Islamic Republic of Iran intends to participate by mitigating its GHGs emission in 2030 by 4% compared to the Business As Usual (BAU) scenario.

This level of unconditional emission reduction will be achieved through development of combined cycle power plants, renewable energies and nuclear power, as well as reduction of gas flare emissions, increasing energy efficiency in various consuming sectors, substituting high-carbon fuels with natural gas, strategic planning for utilizing low-carbon fuels, intensifying economic diversification and participation in market-based mechanisms at the national and international levels.

Moreover, in accordance with progress in the implementation of national development plans, and access to international financial resources as well as transfer of required technologies under the Convention, the BAU scenario will be updated in the future years. It should be noted that the process of implementing our unconditional mitigation of GHGs emission will be facilitated and speeded up, only in the absence of any forms of restrictions and sanctions.

## **B. Conditional Mitigation Action**

Subject to termination and non-existence of unjust sanctions, availability of international resources in the form of financial support and technology transfer, exchange of carbon credits, accessibility of bilateral or multilateral implementation mechanisms, transfer of clean technologies as well as capacity building, the Islamic Republic of Iran has the potential of mitigating additional GHGs emission up to 8% against the BAU scenario (i.e. 12% in total).

These additional mitigation actions will be achieved through focusing on energy sector and industrial processes, as well as conservation and development of forests, sustainable agriculture and waste management. “Market-based mechanisms” and transfer of environment friendly technologies under the legal regime of UNFCCC as well as transfer of management practices, play a key role in successful and result oriented conditional mitigation actions.

### **C. Calculation Method and Verification Process and Reporting**

Emission calculations are based on the IPCC 2006 guidelines, hence GHGs emissions mitigation planned are to benefit from national Monitoring, Reporting and Verification (MRV) mechanisms becoming operational by the end of 2020. This is to verify and control the implementation of national mitigation actions. In addition, the progress of national mitigation actions will be accelerated by enforcement of national fuel consumption and emissions standards.

### **D. Mitigation Ambition and Proportionate Assessment (Fairness)**

Taking into account the potentials and economic capabilities of Islamic Republic of Iran, its growing young population, the need for creation of job opportunities and with due regard to priorities identified in the national development programs, our intention to mitigate GHGs emission on a voluntary basis, is a clear manifestation of willingness of the country to cooperate in promotion of global public good at the regional and international levels.

The Islamic Republic of Iran has already included a program to mitigate GHGs emission in its "Fifth 5 Year National Development Plan" (2010 to 2015), targeting 30% reduction in energy intensity. Unfortunately, due to the unjust sanctions imposed on our economic, financial and technological sectors, not only this target was not achieved, but energy intensity was increased in recent years.

## **E. Financial and Technological Needs**

Due to the significant share of energy sector in emissions (more than 90%) and consequently the high potential of this sector in emissions mitigation, its major technological requirements are as follows:

- Technologies needed to curb and utilize gas flares;
- Reducing natural gas leakage in the distribution networks;
- Increasing efficiency through the development of CHP and combined-cycle power plants;
- Reducing transmission and distribution electricity losses;
- Energy demand optimization and management; and
- Use of renewable and alternative energy resources (like nuclear power) as well as biofuels, biogas, waste to energy production and CCS.

The total annual investments needed to achieve unconditional and conditional GHGs mitigation are about 17.5 and 52.5 billion US dollars respectively. Also such actions could be leveraged at the domestic level, through, inter alia, development of sound financial mechanisms; economics of energy, in areas such as reducing and gradual phasing out of energy subsidies; the National Environmental Fund; formulation of a master plan to promote the role of private sector, particularly in the energy sector; and optimization of energy efficiency, through establishment of service companies.

## **F. National Contribution to UNFCCC Goals**

Bearing in mind the status of the Islamic Republic of Iran as a major developing country with a growing economy, the national development plan of the country aims to achieve 8% economic growth annually, with an emphasis on energy and industrial sectors in the next fifteen years. Iran, in a bid to effectively contribute to the regional and global mitigation of GHGs emission, intends to mitigate GHGs emissions through national legislation on energy productivity as well as implementation of the "Low-carbon Economy", in conformity with the objectives of UNFCCC.

### **3. Adaptation and Vulnerability to Climate Change**

#### **A. Vulnerability**

The Islamic Republic of Iran is a unique country around the world, which has prepared costly and comprehensive operational plans, not only to mitigate GHGs emissions - subject to provision of national and international support - but also for considerable increase of public and private investments in adaptation actions due to its high vulnerability to climate change, especially in the recent years.

Reduction of the levels of agricultural production, sharp drops in surface runoffs and underground water storage, increase of mean temperature with its consequences (heat exhaustion and spread of some diseases), increased hot-spots of dust and sand storms (with high health and industrial adverse impacts) as well as extreme vulnerability of biodiversity and natural resources are some of the direct and indirect extreme impacts of climate change. Also, increased air pollution due to lack of appropriate technology support with its increased health risks is another aspect of the country's vulnerability. The reduction of approximately 50% of

surface runoffs, increased flood occurrence index by 52% and growth in imports of agricultural products, all, clearly indicate serious impacts of climate change in Iran.

It is predicted that in the next 15 years (up to 2030) the amount of surface runoffs will continue to decrease by 25% and the mean temperature will raise by more than 1.5° C. This increase in temperature is equal to increased losses of national programmable water by about 20 to 25 billion cubic meters. Moreover, in the last ten years, the amount of renewable water of the country has decreased from 130 to 90 billion cubic meters per year. Due to the changing trends of climate change and hydrological parameters, agricultural production and economy has faced significant damages amounting to 3.7 billion USD (based on fixed prices) annually from 2015 to 2030 compared to 2010.

Iran is also experiencing the increasing trend of drying wetlands, as an important indicator of the climate change impact. Therefore, taking into account the following facts, Iran ranks under the category of vulnerable countries, on the basis of articles 4.8 and 4.10 of the UNFCCC:

- Geographical location and economic structure;
- A third of the global average precipitation;
- 3 times more evaporation than the global average;
- 3 times more per capita deserts than the global average;
- One-third of global average per capita forests;
- Desert hot-spots of 7.5 million hectares;
- High rates of soil erosion;

- High frequency of extreme climatic events such as floods and droughts; and Forest fires and outbreaks of pests and diseases such as pastures with drying Oak forests.

## **B. Adaptation**

Undertaking adaptation actions in the major vulnerable economic sectors in Iran would be very costly. Amongst these, investment in water resources infrastructure is focused on demand management, increasing productivity in the water sector, increasing efficiency and reducing losses in water yield, water networks and providing new water resources. The total investment is estimated to be about 100 billion US dollars (2010 fixed prices).

Also according to the country's development plans and the need to improve the environment, protecting natural resources and ensuring food security, the total needed investment in these sectors is approximately 40 billion US dollars (2010 fixed prices).

Adaptation programs undertake a wide spectrum of actions which require additional international financial resources and technology transfer that should be provided in parallel with GHGs mitigation programs.

## **C. Technological Needs for Adaptation**

Taking into account the vulnerability areas and national adaptation scenarios, the most important diverse and pertinent technological needs of the country are listed below:

- Modern and eco-friendly and climate smart agricultural technology and practices for scattered local communities in 2/3 of the country's area;

- Modern environmental friendly technologies for supplying water (desalination, recycling and water treatment);
- Development of on-line monitoring network of climate observation system;
- General Circulation Models (for national and regional application with monitoring and observing features for forest fires);
- Access to new and environmentally sound technologies for industrial production, as well as forest fire fighting systems; and
- Early-warning and monitoring systems of climate extreme events, dust and sand storms and access to global satellite data.

#### **D. National Strategy for Climate Change**

Iran's national strategy for climate change which includes mitigation and adaptation, as well as the national Plan of Action to combat dust and sand storms will be finalized in the near future. All actions in the three forthcoming national development plans are intended to be in coherence and harmonized with this INDC. The time line of this document covers three five year national development plans (2016 to 2030). During this period, this INDC may be revised every five years or less as deemed appropriate, through modification of national development priorities in the fields of mitigation and adaptation.

# وثيقة المساهمات المحددة وطنياً تجاه الإتفاق الجديد لتغير المناخ

## العراق

تقدم هذه الوثيقة إستجابة لدعوة إتفاقية الأمم المتحدة الاطارية لتغير المناخ

10/11/2015

لا تشكل هذه المساهمة تعهداً ملزماً للعراق وإنما هي مساهمة وطنية طوعية لبيان ماتم إتخاذه من إجراءات وما يحتاج إليه العراق من دعم وإستقرار داخلي لتحقيق مساهمة فعلية مع المجتمع الدولي لتثبيت إرتفاع نسب إنبعاثات ثنائي أوكسيد الكربون وبما يتلائم مع مصالحه الوطنية وخطته التنموية آخذين بنظر الإعتبار الوضع الإستثنائي والظروف القاهرة التي يمر بها العراق نتيجة للهجمة الشرسة التي يتعرض لها من قبل عصابات داعش الارهابية وما يرافقه من تراجع كبير في النمو الاقتصادي، بالتالي فإن العراق ينظر إلى مساهماته بالتوازي مع المبادئ الأساسية لإتفاقية الأمم المتحدة الإطارية لتغير المناخ ويؤكد على دعوة الدول المتقدمة للإلتزام في مساعدة الدول الهشة والمتأثرة نتيجة التغير المناخي لتمكينها من تكييف أوضاعها وتقديم الدعم لها وفق مبادئ الإتفاقية الاطارية.



## ملخص تنفيذي

يقدم هذا التقرير الخاص بمساهمة العراق الوطنية المحددة في سياق إتفاقية الأمم المتحدة الإطارية لتغير المناخ رؤية العراق فيما يتعلق بالتعاون مع المجتمع الدولي في مجال التخفيف من الانبعاثات والتكيف مع آثار تغير المناخ على أراضيه. منذ إنضمام العراق للإتفاقية وهو يعمل جاهداً للإيفاء بالتزاماته تجاهها وهذا ما دعاه لتأسيس مركز متخصص لتغير المناخ يأخذ على عاتقه حسابات وجرّد انبعاثات غازات الدفيئة ويرسم استراتيجيات التخفيف والتكيف لتغير المناخ في البلد.

يود العراق أن يعبر عن سروره بأن يكون جزءاً من المجتمع الدولي في تقديم مساهماته المحددة وطنياً لمشاركة توجه العالم نحو تثبيت الارتفاع بدرجة الحرارة الى مادون الدرجتين مئويتين  $2^{\circ}\text{C}$  عن معدلاتها قبل الثورة الصناعية. ويأتي هذا التقرير إستجابةً الى دعوة مؤتمر الدول الاطراف التاسع عشر للاتفاقية.

إن العراق ومن خلال مركز التغيرات المناخية الذي يعد الهيكل الوطني المناط به عملية التنسيق الوطني والإقليمي والدولي لإنجاز هذه الوثيقة الوطنية التي تعبر عن رغبتنا بمشاركة العالم، والتي تم إعدادها من خلال فريق عمل وطني مشكل من الجهات المعنية الحكومية وغير الحكومية ومنظمات المجتمع المدني ذات العلاقة. لقد قام المركز آنفاً بالتنسيق المطلوب بين هذا الفريق وأعضاء اللجنة الوطنية الدائمة للتغيرات المناخية وتمت المصادقة عليه وطنياً وبإعتماد منهجية التشاور مع الجهات آنفاً وأصحاب القرار وبخبرات وطنية ومن خلال إقامة العديد من ورش العمل توجت بورشة عمل لصانعي السياسات العليا داخل البلد حضرها كافة صنّاع القرار من ذوي العلاقة لضمان تقديم تقرير يمثل تطلعات العراق نحو مستقبل آمن يضمن حق الأجيال الحالية والقادمة في عيش كريم وبموارد مستدامة.

أعتمدت بكتابة هذه الوثيقة الإستراتيجية والخطط الوطنية المقررة كافة ومن أهمها الإستراتيجية الوطنية المتكاملة للطاقة والإستراتيجية الوطنية للبيئة والإستراتيجيات الأخرى ذات الصلة.

رغم معاناة العراق المعروفة والتي من أهمها الوضع الأمني والركود الاقتصادي والتي تمثل تحديات خطيرة تجعل من الصعوبة بمكان تطبيق آليات التنمية المستدامة، ومع ذلك فإن العراق يقدم هذه الخطة الطموحة والتي تشمل أهداف تخفيض بمعدل ١٤% أقل من الانبعاثات لغازات الدفيئة مقارنة بأنماط العمل المعتادة خلال الفترة من عام ٢٠٢٠ وحتى عام ٢٠٣٥.

تتكون خطة التخفيف آنفاً من شقين، أولهما تخفيض ١% من مجمل انبعاثاتنا لعام ٢٠٣٥ وحسب الإمكانيات الوطنية المتاحة في حال تم تحقيق الأمن والسلام والموارد الاقتصادية أما الشق الثاني فيحتوي خطة طموحة تضمن تخفيض ١٣% من أقصى انبعاثاتنا لعام ٢٠٣٥ والتي بإمكانها أن توفر أدنى حد من الرفاهية للشعب العراقي يتم تنفيذها عند توفر الدعم المادي والتقني من صناديق الإتفاقية ومن الشراكات الدولية التي نطمح ان تكون داعمة للعراق.

كما تتضمن هذه الوثيقة قوائم بإجراءات التكيف مع تغير المناخ في القطاعات المتأثرة بشكل حاد في الوقت الحاضر والأكثر عرضة للتأثر مستقبلاً وذات المساس الأكبر بالأمن المائي والغذائي للشعب مما يعيق طموحاتنا في التنمية المستدامة وتطوير الاقتصاد، وخاصة تزايد شحة المياه وبشكل غير مسبوق، تدهور الأراضي، التصحر، وفقدان الغطاء النباتي والتنوع البيولوجي وما ينتج منها من تأثيرات على المستوى الصحي والاجتماعي، حيث ستساهم هذه الإجراءات في تعزيز المرونة تجاه الآثار الواقعة والمحتملة للتغير المناخي على هذه القطاعات.



## الظروف الوطنية

يعد العراق اكثر الدول هشاشة لتغير المناخ في الشرق الاوسط والذي من المتوقع ان تكون تاثيراته المستقبلية كبيرة على المجتمع العراقي حيث واجه العراق وسياجه تحديات حقيقية وفريدة نتيجة الزيادة الملحوظة في المعدلات السنوية لدرجات الحرارة والتناقص المضطرد في المعدلات السنوية لهطول الأمطار وظواهر متطرفة جدا نتيجة التغير المناخي، وهو ما يؤكد بان تكون تاثيرات تغيرات المناخ ملحوظة علي قطاعات المياه، الزراعة، الصحة، والتنوع البيولوجي نظراً لهشاشتها التركيبية بجانب غياب القدرة المؤسسية والتقنية وغيرها من التدابير اللازمة لمواجهة الآثار وتقليل المخاطر المتعلقة بتغير المناخ.

من جانب آخر فإن القطاعات الاقتصادية الوطنية تعاني من تباطيء في النمو، إزداد حدة مع الزيادة غير المسبوقة بدرجات الحرارة والتي أدت الى زيادة الضياعات بالطاقة الكهربائية وباتت تأثيراتها واضحة من خلال التدني الملحوظ في المستويات الحالية للطاقة الكهربائية المتوفرة للفرد العراقي، حيث إن أعلى إنتاج للكهرباء في العراق على مر العقود الاربع الماضية لم يوفر ٢٤ ساعة كهرباء باليوم للمواطن العراقي وان إنتاج الكهرباء الكلي في الوقت الحاضر هو ١١٠٠٠ ميغا واط مقارنة مع الإحتياج الفعلي للبلد وهو ٢٣,٠٠٠ ميغا واط عدا اقليم كردستان، بينما من المتوقع ان تزداد الحاجة للكهرباء لتصل الى ٤٢,٠٠٠ ميغا واط عام ٢٠٣٠. علماً بأن صافي الطاقة الكهربائية المزودة للفرد العراقي وصلت في عامي ٢٠١٣ و ٢٠١٤ الى حوالي (١,٣٧٥) كيلو واط. ساعة. سنة لكل شخص بينما تصل هذه النسبة في دول الجوار للعراق حوالي (٨,٠٠٠) كيلو واط. ساعة. سنة لكل شخص. فضلا عن ذلك فإنه ونتيجة للظروف المناخية وانخفاض منسوب المياه والأعمال العسكرية فقد تأثرت محطات توليد الطاقة الكهرومائية من السودان، حيث إنخفض إنتاج الطاقة الكهرومائية من ١٨٤٦ ميغاواط الى ٤٠٠ ميغاواط فقط.

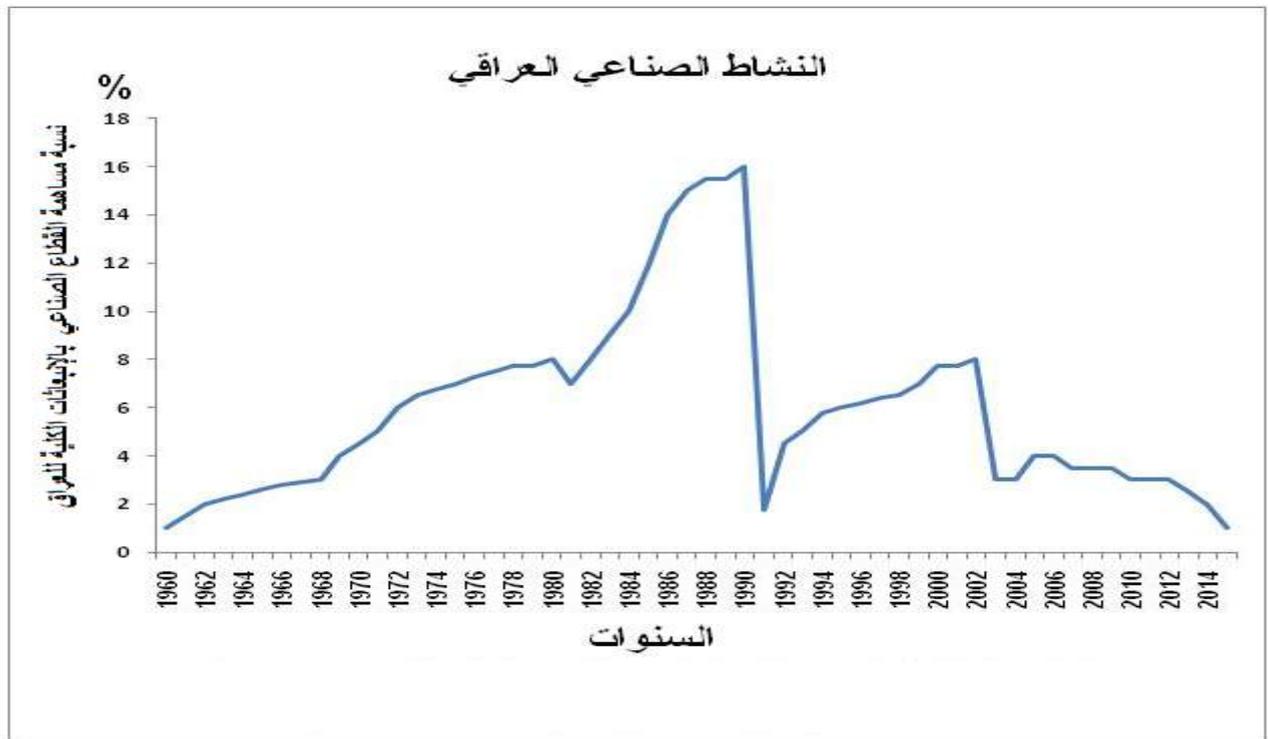
بالإضافة الى ماسبق فإن الاقتصاد والعمل تعرض الى انهيار كبير وتوقف تام وصل الى الصفر تقريباً عام ٢٠١٤ في مساحات واسعة تصل الى ثلث العراق تشمل مدن كبيرة من غرب وشمال العراق نتيجة لهجرة السكان بسبب احتلال تنظيم داعش الإرهابي، حيث سجلت المنظمة الدولية للهجرة في العراق وجود ما يقارب ٥٢٨,٦٠١ أسرة نازحة داخل العراق كما بلغ عدد أفراد هذه الأسر حوالي ٣,١٧١,٦٠٦ وذلك منذ شهر كانون الثاني لعام ٢٠١٤.

يجدر الإشارة الى إنه رغم النمو السكاني في العراق خلال العقود الأربعة الأخيرة وتزايد انبعاثات العالم من ثنائي أوكسيد الكربون CO<sub>2</sub> الى الغلاف الجوي إلا ان اقتصاد العراق والعمل بالأنماط المعتادة لم يكن بالمستوى المطلوب الذي يلبي حاجة المجتمع العراقي وكان متذبذباً بشكل واضح وانخفض الى مستويات مقاربة للصفر خلال عام ١٩٩١ وفي عام ٢٠٠٣ على التوالي بسبب الحروب (الشكل ١) يبين تذبذب النشاط الصناعي في العراق بين عام ١٩٦٠ و ٢٠١٥)

شهد قطاع النقل المدني في العراق تدهوراً شديداً بعد عام ١٩٩١ فقد إنخفض عدد الطائرات من ٦٣ طائرة عام ١٩٨٠ الى طائرتين فقط عام ٢٠٠٣، كما تقلص عدد رحلات القطارات بعد عام ٢٠٠٣ بشكل كبير وإنخفض عدد باصات النقل العام داخل بغداد من ١٥٢٧ بضمنها ٣٠٠ باص من نوات الطابقيين عام ٢٠٠٢ الى ٨٤ باص من نوات الطابقيين عام ٢٠١٤. يقدر الإنخفاض الحاصل بقطاع النقل العام حوالي ٩٠%، ونتيجة لذلك فقد نما قطاع النقل الخاص بالمقابل ليصل الى حوالي ٨٠% التي أدت الى غلبة نمط التنقل: (سيارة لراكب واحد فقط) نتيجة للظروف الأمنية وللإعتبارات الأمنية والاجتماعية التي أثرت على المجتمع العراقي بشكل مباشر.

على الرغم من ان انبعاثات العراق قليلة جداً ولا تكاد تذكر مقارنة بانبعاثات دول العالم الأخرى حيث تصل نسبة مساهمته بالانبعاث الى مايقارب (٠,٢%) من اجمالي الانبعاثات العالمي لغازات الدفيئة وحسب بيانات الأمم

المتحدة للأعوام من ١٩٩٠ ولغاية ٢٠١١، إلا ان العراق يؤمن بان الحل لمشكلة تغير المناخ يجب ان تساهم فيها كل الدول وضمن مبادئ إتفاقية الأمم المتحدة الإطارية لتغير المناخ، المبنية على أساس المسؤولية المشتركة ولكن المتباينة وفقاً لمبدأ الإنصاف حيث بدأ العراق ومنذ وقت مبكر لإنضمامه للإتفاقية بالعمل على تنفيذ مشاريع ودراسات إستراتيجية لإدخال الطاقات النظيفة والمتجددة والإدارة البيئية السليمة للكربون وزيادة رقعة المساحات الخضراء، كما تم البدء بمشاريع تتعلق بإدخال وقود غاز البترول كوقود للمركبات بالإضافة الى أنواع الوقود التقليدي المستخدم ومشاريع أخرى رائدة في هذه المجالات وللكتير من القطاعات الوطنية ومن ضمنها العمل على تحويل الإنارة للعديد من الشوارع الرئيسية في بغداد للعمل بالطاقة الشمسية ووضع خطط مستقبلية لتحويل بعض محطات توليد الطاقة الكهربائية الى محطات الدورة المركبة للتقليل من إستخدام الوقود وزيادة الإنتاج، إلا ان معظم هذه المشاريع قد توقفت تماماً وذلك نتيجة التهديدات الأمنية لتنظيم (داعش) الإرهابي الذي تسبب بنتائج كارثية أثرت على كافة قطاعات الحياة وهددت الأمن والسلم المجتمعي، ناهيك عن الأعداد الغفيرة للنازحين داخلياً وخارجياً، بالإضافة إلى زيادة تضرر القطاع الإقتصادي المتضرر أصلاً من انخفاض أسعار النفط وسيطرة التنظيم الإرهابي على عدد من آبار النفط والمنشآت النفطية والصناعية وإضطراب العراق لتخصيص جزء كبير من موازنته لتمويل العمليات العسكرية لمواجهة هذا التنظيم المتطرف وتحرير المدن المحتلة وإعادة إعمار المناطق المحررة من سيطرته، وسيطلب ذلك المزيد من التخصصيات المالية وهو ما سيؤثر سلباً على خطة العراق في تحقيق الأهداف التنموية التي يطمح في تحقيقها مستقبلاً حيث يعد ذلك تحدياً يستنزف طاقات البلد الاقتصادية والعلمية والبشرية في مواجهة الارهاب والذي على المجتمع الدولي أن يساندنا لصد هذه الهجمة الشرسة لما تمثله من خطر على كافة دول العالم ولن يقتصر خطرها على بلدنا، وإن تمكيننا من توفير الأمن للعراق سيساهم في توفير الأمن للعالم أجمع، كما إنه سيساعدنا على النهوض بواقعنا البيئي والمباشرة بالعمل وفق منهجيات منظمة لإعادة البنى التحتية والتكيف مع التغير المناخي ومواجهة تأثيراته.



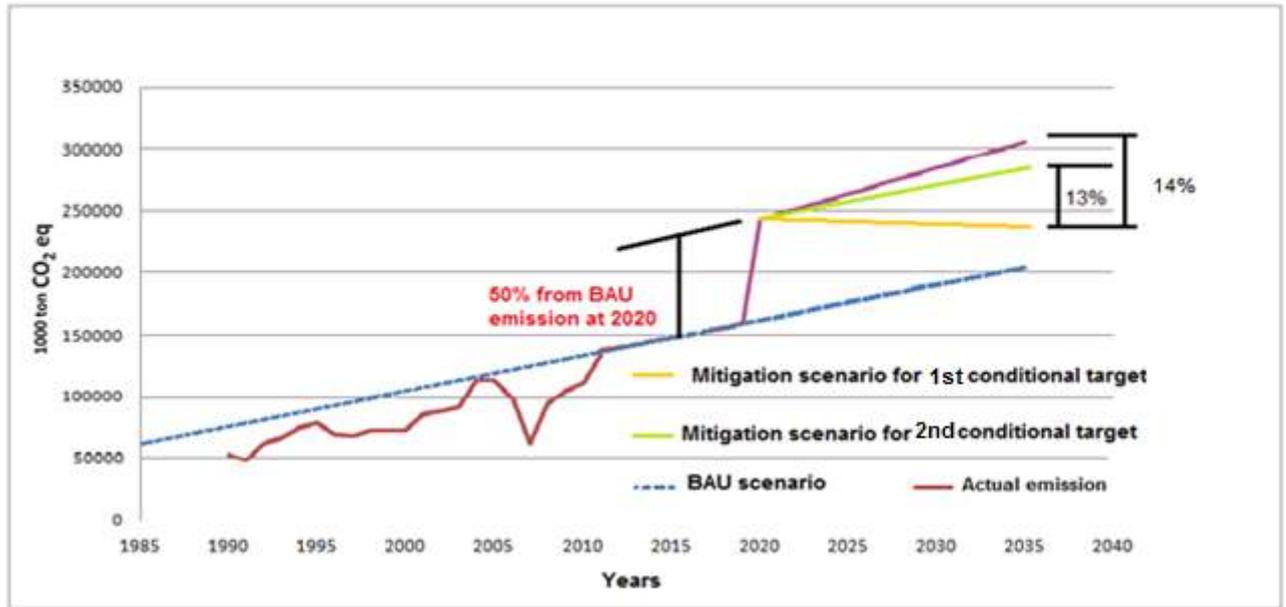
شكل (١) مخطط تقريبي للنشاط الصناعي في العراق بين عام ١٩٦٠ و ٢٠١٥



## المساهمات الوطنية لإجراءات التخفيف من الانبعاثات:

العراق يدعم التوجه الحالي في مشاركة الدول بمساهماتها المحددة وطنياً في الاتفاق الجديد مع ضرورة ان تكون مبنية على مبدأ الوضوح والشفافية في عرض بيانات غازات الدفيئة وتنفيذ ماحدته كل دولة من نسب التخفيض فيها من اجل الوصول الى الهدف العالمي وهو تثبيت الارتفاع بدرجات الحرارة الى مادون الدرجتين مؤبطين. ونتيجة الظروف الصعبة التي يمر بها العراق فانه يحتاج على الاقل الى ١٥ سنة من السلام وتوقف التهديدات الأمنية من أجل القيام بتحول تدريجي وحقيقي ومبرمج لإستخدامات الطاقة والإستثمار في قطاع الطاقات المتجددة والإدارة البيئية السليمة للكربون وإعداد إستراتيجيات وطنية وتشريع قوانين ستساعد على تنفيذ هذه السياسات. إن العراق سيسعى الى خفض انبعاثاته بنسبة ١٤% من حجم الانبعاثات الكلي المتوقع في عام ٢٠٣٥ في حالة الإعتدال الكلي على مصادر الوقود الأحفوري مع تحقيق زيادة بالعمل المعتاد في مجمل الإستثمار في قطاع الطاقة الكهربائية بحلول عام ٢٠٢٠ لضمان تأمين الحصة الكافية للفرد العراقي من الكهرباء تضمن له العيش الكريم وتمكنه من تكييف أوضاعه مع الإرتفاع المتزايد بدرجات الحرارة. ومن الجدير بالذكر فإن العراق قادر في حال تحسن الظروف الأمنية وفي ظل ظروفه الإقتصادية المحدودة على أن ينفذ ١% من التخفيض المذكور ضمن نسبة الـ ١٤% من خلال كل الخطط والإستراتيجيات ذات العلاقة والتي تشمل الإستراتيجية الوطنية المتكاملة للطاقة (٢٠١٣-٢٠٣٠)، الإستراتيجية الصناعية في العراق حتى عام ٢٠٣٠، إستراتيجية تطوير القطاع الخاص حتى عام ٢٠٣٠، الإستراتيجية الوطنية لحماية بيئة العراق وخطة العمل التنفيذية الملحقة بها، وهو يحتاج للدعم الدولي من خلال صناديق الإتفاقية والشراكات الدولية بما يكفي لتنفيذ المتبقي من النسبة أعلاه (١٣%).

تم رفع سقف خط الأساس للعمل المعتاد لمقدار النصف ابتداءً من عام ٢٠٢٠ وذلك للسماح بتنمية قطاع الكهرباء لضمان حصول المواطن العراقي على الكهرباء وبشكل مستمر خلال اليوم. يوضح الشكل (٢) سيناريوهات الأساس وسيناريوهات التخفيف لمجمل انبعاثات العراق لغازات الدفيئة خلال الاعوام (١٩٩٠-٢٠٣٥).



شكل (٢) يوضح سيناريو الاساس وسيناريو التخفيف لمجمل انبعاثات العراق لغازات الدفيئة خلال الاعوام من ١٩٩٠ ولغاية عام ٢٠٣٥

يعطي الجدول (١) نبذة عن منهجية تحديد المساهمات الوطنية الأنفة الذكر والموضحة في الشكل (٢) المشار اليه سابقاً.

**جدول (١) توضيح الفرضيات والمنهجيات المتعلقة بالتخفيض من الانبعاثات**

<p>تخفيض الانبعاثات من الكميات المتوقعة لها لعام ٢٠٣٥ بناء على سيناريو أنماط العمل المعتاد</p>	<p>نوع الهدف المتعلق بالتخفيف</p>
<p>كافة القطاعات الاقتصادية</p>	<p>القطاعات الاقتصادية المستهدفة</p>
<p>ثنائي أكسيد الكربون المكافئ</p>	<p>غازات الاحتباس الحراري المستهدفة</p>
<p>الانبعاثات المتوقعة لعام ٢٠٣٥ والمراد تخفيضها ابتداءً من عام ٢٠٢٠ وفي حال تحقق الأمن والاستقرار. *تم اعتماد فرضية زيادة الانبعاثات لخط العمل المعتاد منذ عام ٢٠٢٠ وذلك لضمان وصول الكهرباء للمواطنين ابتداءً من عام ٢٠٢٠.</p>	<p>تعريف سيناريو الاساس</p>
<p>الانبعاثات المخفضة ابتداءً من عام ٢٠٢٠ ولغاية ٢٠٣٥ وتتضمن شقين الأول يشمل تخفيض انبعاثات يصل الى (١%) من مجمل انبعاثات عام ٢٠٣٥ من خلال تنفيذ عدد من المشاريع (١٥ مشروعاً) وهو يقع ضمن الإمكانيات الوطنية للتخفيض في حال إستتب الأمن والسلام داخل البلد، أما الشق الثاني فيشمل تخفيض انبعاثات يصل الى (١٣%) من مجمل انبعاثات عام ٢٠٣٥ من خلال تنفيذ عدد من المشاريع (٢٧ مشروعاً) وهو مشروط بتوفر الدعم من صناديق الإتفاقية والشراقات الدولية بالإضافة الى توفر الأمن. **تم اعتماد النسب آنفاً بناءً على تقديرات الخبراء الوطنيين في ظل قلة المعلومات والبيانات المتوفرة وقد تتغير هذه النسب في حال إستجدت معلومات أخرى بإستخدام أنظمة أخرى تعطي توقعات دقيقة مثل نظام نمذجة الطاقة طويلة الأمد (LEAP).</p>	<p>تعريف سيناريو التخفيف</p>
<p>تم اعتماد الانبعاثات المقدره للعراق من قبل الأمم المتحدة منذ عام ١٩٩٠ ولغاية عام ٢٠١١ وذلك لكون العراق قد قام بتقدير انبعاثاته ضمن البلاغ الوطني فقط لعام ١٩٩٧ نتيجة لقلة البيانات المتوفرة وتم إستقرار الانبعاثات المستقبلية ومنذ عام ٢٠١١ ولغاية عام ٢٠٣٥ بإعتماد التحليلات الإحصائية اعتماداً على الخطوط التوجيهية للهيئة الدولية الحكومية المعنية بتغير المناخ لعام ١٩٩٦ وتم إستخدام المعلومات من الجهات الوطنية ذات العلاقة.</p>	<p>منهجيته تقدير الانبعاثات ونتائج التخفيف المتعلقة بالمساهمات الوطنية المقصوده في قطاع الطاقه والقطاعات الاخرى</p>

- ملاحظة: النسب والبيانات الواردة عرضة للتغيير في ضوء أية معطيات جديدة من ناحية دقة المعلومات المتعلقة بالسيناريوهات الأساس والتخفيف وللعراق الحق بتغييرها اعتماداً على هذه المعطيات الجديدة بحلول عام ٢٠٢٠.  
- سيناريو التخفيف غير المشروط: سمي بهذا الاسم لكونه غير مشروط بتقديم الدعم الدولي ولكنه مشروط بتحقيق الأمن والسلام داخل البلد وتوفير الموارد المالية.

مما سبق فإن العراق ينوي ان يطرح (١٤%) من العمل الكلي للاستثمار في قطاع الطاقة النظيفة والمتجددة وإدارة الكربون ابتداءً من عام ٢٠٢٠ ولغاية ٢٠٣٥. ان هذا الهدف يعد هدفاً طموحاً ولكن من الممكن الوصول اليه في حالة تفهم المجتمع الدولي للظروف الاستثنائية التي يمر بها العراق وتقديم الدعم والمساعدة له وبشكل

إستثنائي فضلاً عن إننا نتطلع للعمل مع شركاء دوليين من أجل التعاون في الاستثمار المشترك وتنفيذ خطتنا الطموحة والعمل على تثبيت الانبعاثات ومحاولة السيطرة على النمو السكاني. قد تكون من اهم واسرع المشاريع التي يجب البدء فيها هي اعادة الاعمار وبناء المناطق المدمرة الواسعة في غرب وشمال العراق باستخدام التقنيات الحديثة منخفضة الكربون لتكون نواة لتوسع المشاريع المستقبلية لغاية ٢٠٣٥. علاوة على ذلك فان العراق يرى بأن موقعه الجغرافي المهم سيوفر له فرصة كبيرة في المستقبل ليكون مركز لنقل الطاقة المتجددة بين الغرب والشرق وهذا سيساعد بشكل كبير في التبادل الاقتصادي في قطاع الطاقة البديلة ويطرح العراق كبلد فاعل ولاعب اساسي في تخفيض انبعاثات غاز ثنائي أوكسيد الكربون CO<sub>2</sub> الى الغلاف الجوي في منطقة الشرق الاوسط وعلى المستوى القاري ايضا. ان هذا التوجه المستقبلي يحتاج الى تطوير السياسات العامة للبلاد ابتداءً من عام ٢٠٢٠ وفتح ابواب التعاون مع دول المنطقة في مجالي التخفيف والتكيف.

كما ذكر سابقاً فإن للعراق محاولات جادة لتطوير العمل في قطاع الطاقات المتجددة منذ عام ٢٠٠٣ وقد انشأ مؤسسات تعنى بالطاقات المتجددة في العديد من وزارات الدولة فضلاً عن ذلك فان العراق عازم على إدخال تقنيات الطاقة النظيفة والمنخفضة الكربون في القطاعات المختلفة وأهمها الكهرباء والصناعة والنقل وإدارة النفايات والإسكان بالإضافة الى قطاع النفط والغاز من خلال العمل على استثمار الغاز المصاحب لإنتاج النفط الخام الذي يحرق حالياً وصولاً إلى استثمار معظم الكميات المنتجة وتقليل الاعتماد على الوقود الثقيل المستخدم لأغراض توليد الطاقة الكهربائية وكذلك الاستخدامات الأخرى ومنها قطاعات النقل والصناعة بالإضافة الى تحسين مواصفات المنتجات النفطية لتكون وفق أحدث المواصفات العالمية وذلك من خلال إنشاء مصافي متطورة وتأهيل وتطوير مصافي النفط الحالية. أما في قطاع الكهرباء الذي يعتمد اعتماداً كبيراً على المنتجات النفطية (خصوصاً وقود الديزل وزيت الوقود)، أكثر من الغاز الطبيعي، فإن الإنتاج الكلي للكهرباء في الوقت الحاضر يعتمد على اربعة انواع من محطات انتاج الكهرباء وهي البخارية والغازية والديزل والكهرومائية، والعراق لديه خطط جادة لمعالجة النقص الحاد بالطاقة باستبدال المحطات المتقادمة والتحول التدريجي نحو انتاج انظف بإنتهاج اربعة محاور: تحويل نوع الوقود المستخدم من السائل إلى الغاز، التحول الى نظام الدورات المركبة في التوليد بانتاج طاقة كهربائية دون استخدام ووقود إضافي، استخدام الطاقات المتجددة، ترشيد الاستهلاك ورفع كفاءة الطاقة وتحسين واقع المنظومة لقطاعي النقل والتوزيع. وفي قطاع الصناعة هناك توجهها لتنفيذ العديد من المشاريع الصناعية بطريقة الانتاج الانظف وابتهاج استراتيجية تعتمد على المحاور الأربعة التالية ١- الطاقات المتجددة، ٢- تدوير الحرارة لإنتاج الطاقة الكهربائية، ٣- تطوير العمليات الصناعية.

٤- تنفيذ مشروع إستراتيجي لإصطياد وتخزين غاز ثنائي اكسيد الكربون في التراكيب الجيولوجية (CCS).

لدى وزارة النقل خطة طموحة لتخفيض انبعاثات غازات الدفيئة بالمحاور الأربعة التالية:

١- التحول إلى نمط النقل الجماعي داخل المدن وبين المحافظات، ٢- تفعيل قانون النقل المستدام الذي تم قطع أشواط كبيرة من إنجازه ليتم إقراره وهو يهدف إلى مراعاة الإقتصاد في كميات الوقود المستخدمة في قطاع النقل والتشغيل الأمثل لوسائط النقل ودعم التنمية الوطنية، ٣- تسيير خطوط السكك الحديدية الحديثة بموازاة خطوط النقل البري للمحافظة على نوع استخدام الأراضي الزراعية، ٤- استخدام طائرات بمحركات أكثر كفاءة في إستهلاك الوقود ونظام تشغيل أكثر فاعلية وكفاءة، و٥- تحسين نوعية الوقود المستخدم في المركبات وإستخدام النوعيات الأقل انبعاثاً منها.

يوضح الجدول (٢) حزم المشاريع التي بالإمكان تنفيذها لكل سيناريو مقترح:

جدول (٢) حزم المشاريع التي بالإمكان تنفيذها وفق سيناريو التخفيف

القطاع	حزمة المشاريع التي بالإمكان تنفيذها ضمن السيناريو المشروط الأول (%١)	حزمة المشاريع التي بالإمكان تنفيذها ضمن السيناريو المشروط الثاني (%١٣)
الكهرباء	<p>١- التحول الى الدورات المركبة في انتاج الطاقة الكهربائية.</p> <p>٢- تحسين أداء المنظومة الكهربائية للحفاظ على الإستمرارية والإستقرار مع وجود درجة عالية من الموثوقية.</p>	<p>١-زيادة الاستثمار في التحول الى الدورات المركبة.</p> <p>٢- الشروع في برامج ترشيد الاستهلاك وكفاءة الطاقة.</p> <p>٣-إستخدام الطاقات النظيفة والجديدة والمتجددة.</p> <p>٤-تقليل الخسائر الفنية في قطاعي التوزيع والنقل.</p> <p>٥-تطوير محطات الطاقة الكهرومائية في إقليم كردستان وهذا سيؤدي الى مساهمة الطاقة الكهرومائية بـ ٣,٣% من إجمالي توليد الطاقة الكهرومائية بحلول عام ٢٠٣٥ بإفتراض تأهيل سد الموصل.</p>
الصناعة	<p>١- تدوير الحرارة: لإنتاج الطاقة الكهربائية والإستفادة منها بدلا من هدرها والإستفادة منها لأغراض الإنتاج.</p> <p>٢- تطوير بعض العمليات الصناعية لتحقيق خفض في الانبعاث ويشمل بعض الصناعات الموجودة حاليا والمزمع إنشاؤها مثل صناعة الأسمدة.</p> <p>٣- استبدال بعض أنظمة الحرق الآلي في مصانع الطابوق التي تنتمي إلى القطاع الخاص بأنظمة حرق أكثر كفاءة وصديقة للبيئة.</p> <p>٤- استبدال بعض أنظمة الحرق الآلي في مصانع الطابوق التي تنتمي إلى القطاع الخاص بأنظمة حرق أكثر كفاءة وصديقة للبيئة.</p>	<p>١- تنفيذ مشروع استراتيجي لإصطياد وتخزين ثاني اكسيد الكربون في تراكيب الأرض.</p> <p>٢- تطوير العمليات الصناعية لتحقيق خفض في الانبعاث ويشمل جميع الصناعات الموجودة حاليا والمزمع إنشاؤها مثل صناعة الأسمدة.</p> <p>٣- استبدال أنظمة الحرق الآلي في مصانع الطابوق التي تنتمي إلى القطاع الخاص بأنظمة حرق أكثر كفاءة وصديقة للبيئة.</p> <p>٤- إنشاء المشاريع الصناعية في القطاعين العام والخاص ضمن مشاريع المدن والمجمعات الصناعية التي ترغب وزارة الصناعة والمعادن بتنفيذها لتشجيع الصناعات الخاصة بتصنيع أو تجميع المنتجات بما في ذلك خلايا الطاقة الشمسية والأجهزة والمعدات العاملة بالطاقة الشمسية، كالمسخانات، الإضاءة، الثلاجات، السيارات، المضخات والمواد وغيرها.</p>
قطاع النفط والغاز	<p>١- العمل على إستثمار الغاز المصاحب لإنتاج النفط الخام الذي يحرق حالياً وصولاً الى إستثمار معظم كميات المنتجة وتقليل الإعتماد على الوقود الثقيل المستخدم لأغراض توليد الطاقة الكهربائية وكذلك الإستخدامات الأخرى ومنها قطاع النقل وقطاع الصناعة.</p>	<p>١- تحسين مواصفات المنتجات النفطية لتكون وفق أحدث المواصفات العالمية وذلك من خلال إنشاء مصافي متطورة وتأهيل وتطوير مصافي النفط الحالية.</p> <p>٢- إستخدام الغاز البترولي المسال (LPG) كوقود للمركبات لتقليل الإعتماد على البنزين في البلد.</p> <p>٣- إستثمار الغاز المصاحب لإنتاج النفط الخام من الحقول الوطنية.</p>
	<p>١- إصدار قانون النقل المستدام.</p> <p>٢- إعتماد برنامج لزيادة الوعي بين</p>	<p>١-تسيير خطوط السكك الحديدية بموازاة خطوط النقل البري للمحافظة على نوع إستخدام الأراضي الزراعية.</p>

<p>٢- استخدام طائرات بمحركات أكثر كفاءة في إستهلاك الوقود ونظام تشغيل أكثر فاعلية وكفاءة.</p> <p>٣- العمل على وضع معايير ومواصفات وطنية لإستيراد المركبات والمعدات الأخرى للتأكد من أنها لا تتجاوز الإنبعاثات العالمية.</p> <p>٤- التحول التدريجي نحو النقل الجماعي من خلال زيادة أعداد باصات النقل العام.</p>	<p>السكان.</p> <p>٣- تطبيق أنظمة الفحص الدوري للمركبات لضمان عدم تجاوز إنبعاثها للمحددات الوطنية.</p>	<p>النقل</p>
<p>١- تنفيذ تقنيات الطاقة الكهروضوئية للكهرباء الموزعة في المناطق والمدن الصغيرة.</p> <p>٢- تصميم متكامل يتضمن استخدام تكنولوجيا العدادات الذكية داخل المباني.</p> <p>٣. الطاقة الشمسية الكهروضوئية المتكاملة في المباني.</p> <p>٤. تعزيز إنتاج واستخدام مواد البناء والمنتجات المحلية الصديقة للبيئة.</p>	<p>١- استخدام تقنيات الإنارة الموفرة للطاقة.</p> <p>٢- استخدام تقنيات العزل الحراري.</p> <p>٣- إصدار كودات البناء الأخضر.</p> <p>٤- استخدام التصميم الفعال للمباني للإستفادة القصوى من الإضاءة والطاقة الشمسية.</p>	<p>الإسكان</p>
<p>١- استخدام تقنية البلازما لإنتاج الطاقة الكهربائية من النفايات.</p> <p>٢- تطبيق نظام متكامل لإدارة النفايات.</p> <p>٣- استثمار الميثان الناجم عن مواقع طمر النفايات.</p>	<p>١. إصدار قانون إدارة النفايات الصلبة، مما يشجع على تحويل النفايات إلى طاقة، والقضاء على حرق النفايات، وتدوير النفايات.</p>	<p>النفايات</p>
<p>١- إدارة الأراضي.</p> <p>٢- تحسين تقنيات زراعة الأرز وتحسين إدارة السماد الطبيعي للحد من انبعاثات <math>CH_4</math>.</p> <p>٣- تحسين تقنيات استخدام الأسمدة النيتروجينية للحد من انبعاثات <math>N_2O</math>.</p> <p>٤- تحسين نوعية المحاصيل الزراعية المنتجة.</p>	<p>١- وضع نظام لحماية وصيانة الغابات الطبيعية وزيادتها.</p>	<p>الزراعة</p>

### إجراءات التكيف:

النظم الطبيعية في العراق والمعتمدة على مياه نهري دجلة والفرات هي مساهم أساسي وتأريخي في إستقرار مناخ العراق والعالم سيما في العشرة آلاف سنة الأخيرة، إلا إن هذه النظم قد تعرضت للكثير من الضغوط على مدى العصور تمثلت بسوء الإدارة والحروب المتعاقبة والتغيرات المناخية التي فاقمت من هشاشتها وإستنزاف إمكانياتها على الإستدامة.

العراق يؤمن بان حل مشكلة تغير المناخ يحتاج لمشاركة كل القطاعات وان تضطلع الاطراف بمسؤولياتها وفقا لمبادئ الاتفاقية الاطارية ومنها مبدأ المسؤولية المشتركة ولكن المتباينة ، لذلك وبجانب اجراءات التخفيف المنفذه والمخطط لها فانه عازم على عمل اجراءات كثيرة من اجل التكيف مع تاثيرات تغير المناخ ذلك إنها قد أثرت بشكل كبير ومباشر على أغلب القطاعات التي تمس الأمن الغذائي والمائي والإقتصادي للمواطن العراقي، والتي تفاقمت مشاكلها بعد دخول تنظيم داعش الإرهابي للأراضي العراقية وإحتلاله لجزء منها ومما لا يخفى

على الجميع فقد كان للبيئة في العراق نصيب كبير من الاضرار الناجمة عن هذه الهجمة الارهابية من خلال سيطرة هذا التنظيم على عدد من السدود المائية للتحكم بمصادر المياه، ولكون العراق يعاني من شحة في المياه بسبب قيام الدول المتشاطئة معه والمسيطرة على منابع نهري دجلة والفرات وروافدهما بعدم الإلتزام بالمعاهدات الدولية التي تضمن حصول العراق على حصته المائية المقررة دولياً مما شكل عامل ضغط جديد وتهديداً للإقتصاد العراقي وتأثيراً مباشراً على الأمن الغذائي والمائي للمواطن العراقي، إلا إنه ورغم كل هذه المصاعب فإن العراق لا يدخر جهداً في ان يلعب دوراً ايجابياً في هذا التوجه الدولي، وبما ينسجم مع مصالحه الوطنية وحق العراقيين في العيش الكريم وبما لا يشكل مساساً بسيادته الوطنية.

تشير التوقعات المبنية على النماذج المناخية العديدة الوطنية الى زيادة مضطربة تتراوح بين ٠,٩ درجة مئوية منذ عام ٢٠٠٧ وتصل الى ٣,٥ درجة مئوية عند عام ٢١٠٠، وهو ما يزيد من حرجة الموقف في بلد إرتفعت فيه درجة الحرارة عن الـ(٥٠) درجة مئوية لعدة أيام في السنة، هذا ناهيك عن التناقص الواضح في المعدلات السنوية لهطول الأمطار والتي من المتوقع أن تشهد كمياتها إنخفاضاً جوهرياً يزيد عن ٣٠% في عام ٢١٠٠ عن معدلاتها خلال الفترة ١٩٣٨-١٩٧٨ وفق تنبؤات الهيئة العامة للأنواء الجوية والرصد الزلزالي العراقية، وهذا يعد مؤشراً جلياً لأسباب الزيادة الواضحة في حدوث الحالات الجوية المتطرفة وازدياد شدتها وتواترها وتكرارها مثل موجات الحر، الجفاف، والهطول الغزير وبشكل مفاجيء، فهناك مثلاً موجات كبيرة من الجفاف التي أدت الى ازدياد رقعة التصحر وهو ما أثر في تزايد حالات الغبار والعواصف الغبارية خلال السنة التي أدت الى زيادة ملحوظة بعدد حالات الربو في المجتمع العراقي سيما بين الاطفال وكبار السن وانتشار الامراض والسرطانات بشكل ملحوظ في السنوات الاخيرة.

فضلا عن ذلك فان تغير المناخ قد فاقم مشكلة شحة المياه في نهري دجلة والفرات، حيث تشير تقديرات البنك الدولي لعام ٢٠١١ الى وجود نقص وشحة في مصادر المياه المتجددة مقارنة مع الإحتياج الفعلي خلال الفترة من عام ٢٠٠٠ ولغاية ٢٠٠٩ تصل الى ١٦% بينما من المتوقع أن تصل هذه النسبة الى ٣٧% خلال الفترة من ٢٠٢٠ ولغاية ٢٠٣٠ والتي ستزداد لتصل الى ٥١% خلال الفترة من ٢٠٤٠ ولغاية ٢٠٥٠ وهذا الأمر يفسر سبب الإنهيار الكبير الحاصل في قطاع الزراعة وهو ما ترك آثاره الواضحة على الإنتاج الزراعي والنظم الطبيعية والتنوع البيولوجي وينذر بإمكانية تجاوز كثير من النظم الطبيعية خط العتبة واحداث تغيير حقيقي وغير مسبوق في هذه النظم وفقدان الخدمات الاقتصادية التي تقدمها للسكان المحليين والانواع وكذلك انقراض الانواع المستوطنة وسيادة الانواع الغازية والدخيلة وازاحة الانواع باتجاه الشمال فضلا عن التغيير الديموغرافي للمناطق وهجرة السكان من هذه المناطق. علاوة على ذلك فان تغير المناخ يهدد المناطق الساحلية البحرية المطلة على الخليج سيما في محافظة البصرة جنوبي العراق من جراء ارتفاع مستوى سطح البحر واحترار المياه وتزايد حموضتها والتاثير على الشعب المرجانية والتنوع البيولوجي في البيئة البحرية وفقدان مساحات من الأراضي الساحلية، هذا ناهيك عن تاثيراته على قطاعات الري والزراعة والصحة بالإضافة الى قطاع الطاقة مما وأد ضغطاً على الاقتصاد الوطني وتهديداً لإستقرار البلد وجعل من الصعوبة تحقيق التنمية المستدامة في قطاعاته الحيوية كافة.

يوفر هذه التقرير أساساً لبناء رؤية مستقبلية للعراق في مجال التكيف والتي ستمثل الحد الأدنى من المرونة تجاه الآثار الواقعة والمحتملة للتغير المناخي خاصة فيما يتعلق بتقليل المخاطر المحدقه بالقطاعات الهشة كما تم التطرق اليه انفاً والتي تمثل ركناً أساسياً لتحقيق التنمية المستدامة. يتطلب بناء الرؤية المباشرة بإعداد إستراتيجية وطنية للتكيف مع وضع خطة تنفيذية لها تركز على إيجاد وسائل ناجعة لإستدامة مصادر المياه ومعالجة الشحة المائية الحادة وتردي نوعيتها وذلك لضمان مواجهة الظواهر والمخاطر الناجمة عن الجفاف والتي من أهمها شحة المياه واثارها على الأمن المائي والغذائي، التصحر، وحركة الكثبان الرملية والعواصف الغبارية واثارها الصحية، وتدهور الموائل الطبيعية. ونتيجة للظروف الصعبة التي يمر بها العراق، فإن تنفيذه لها سيحتاج الى تعاون إقليمي ودولي لتمكين العراق من الحصول على حصته المائية الكافية لتنمية القطاع الزراعي وحماية

صحة الإنسان وحماية النظم الطبيعية والتنوع البيولوجي وتعزيز المرونة تجاه الآثار ومخاطر الكوارث المرتبطة بالسياسات المحلية لتغير المناخ وتعزيز التكيف في القطاعات الهشة.

ونظراً للعلاقة التآزرية بين القطاعات، فإن إعداد وتنفيذ استراتيجية وخطة عمل وإجراءات التكيف لكل قطاع من القطاعات الرئيسية المتأثرة بالتغير المناخي وفي إطار الإستراتيجيات الوطنية والقطعية المتعلقة بها مثل الإستراتيجية الوطنية للمياه، الإستراتيجية الوطنية للزراعة (في طور الإعداد)، الإستراتيجية الوطنية للتنوع البيولوجي والخطة التنفيذية في العراق للفترة (٢٠١٥-٢٠٢٠)، وإطار العمل الوطني للإدارة المتكاملة لمخاطر الجفاف في العراق، سيفضي إلى تعزيز القدرة الوطنية لمواجهة الآثار الواقعة والمحملة لتغير المناخ على القطاعات المختلفة وبصفة خاصة تلك القطاعات الأكثر حساسية وعرضة للتأثر وكما يأتي:

### إجراءات التكيف المطلوبة لقطاع المياه في العراق:

١- إعادة تأهيل سد الموصل لضمان إستقراره وتوسيع مهرب وقناة الثرثار الفيضانية في مقدمة سدة سامراء، وإعادة تأهيل القناة الإروائية والمحافظة على مقطع نهر دجلة داخل مدينة بغداد والإنتهاء من المبازل الرئيسية تعد من أكثر مشاريع الهندسة المدنية أهمية. سيكلف هكذا مشروع مايزيد عن ١١ مليار دولار. في حال عدم التمكن من إعادة تأهيل سد الموصل، فإن الخيار الأفضل هو إنشاء سد بادوش ليعمل على تخزين كمية مياه مساوية لما يخزنه سد الموصل وهو ما إقترحه الدراسة الإستراتيجية لموارد المياه والأراضي في العراق (٢٠١٤).

٢- إدخال طرق الري الممكن (الرش والتنقيط) في جميع أنحاء البلاد وهو سيكلف ٤٥,٥٤٣ مليار دولار على مدى السنوات العشرين المقبلة. وإذا ما فشل ذلك التحديث فإنه سيكون بمثابة نهاية الزراعة في العراق وما يترتب عليها من زيادة بمعدلات البطالة والهجرة من الريف الى المناطق الحضرية وإنعدام الأمن الغذائي.

٣- توسيع ناظم الثرثار الفيضاني والقناة مقدم سدة سامراء لإستيعاب ١٣٥٠٠ م<sup>٣</sup>/ثا ودراسة القدرة الإستيعابية لقناة الورار والمجرة لضمان إمكانية إستخدام بحيرتي الحبانية والرزازة للسيطرة على الفيضانات مع تحسين منشآت السيطرة القائمة وضمان إن تكون مواقع التخزين غير المرتبطة بالجدول في حالة سليمة لإستقبال مياه الفيضان.

٤- زيادة عدد منشآت معالجة المياه لتكون قادرة على تجهيز ٦,٤ مليار متر مكعب من المياه سنوياً لقطاع البلديات بحلول عام ٢٠٣٥ على إقتراض إجراء تحسينات في كفاءة الإستهلاك.

٥- تحسين وتوسيع شبكة أنابيب المياه وتحقيق تناقص مضطرب في خسائر شبكة التوزيع والتوسع بإستخدام العدادات لمراقبة الإستهلاك.

٦- التوسع في عدد منشآت معالجة الصرف الصحي حيث أنه بحلول عام ٢٠٣٥، تكون هذه المنشآت قادرة على معالجة ٢,٠٧٨ مليار م<sup>٣</sup> من المياه لكل سنة ليتم إعادتها الى الأنهار ويأتي هذا المشروع مترامناً مع تأهيل القطاعات الصناعية لتزيد من إمكانياتها على إعادة إستخدام المياه وبنسبة ٢٥%، وهو ما سيتطلب أكثر من ٨٠ مليار دولار.

٧- تحسين برنامج رصد نوعية المياه الموجود في وزارة الموارد المائية من خلال توسيع مواقع أخذ العينات لتغطية أنهار الزاب الأعلى والأسفل والعظيم وديالى.

٨- تأهيل مشاريع الري الكبرى في العراق وربطها تدريجياً بمصببات المبازل الرئيسية أو أحواض التبخير وعدم إعادتها الى الانهار ومجري المياه العذبة.

٩- إنشاء سدة على شط العرب مقدمة ميناء الفاو في حالة عدم التمكن من المحافظة على تامين تدفق مائي لا يقل عن ٥٠ متر مكعب في الثانية من مياه نهر دجلة على طول شط العرب لمنع تقدم اللسان الملحي الى مدينة البصرة.

١٠- الحاجة لمزيد من الدراسات لتقييم مدى ملائمة الإستمرار بإستخراج المياه الجوفية وكذلك إجراء الدراسات والبحوث لدراسة أحواض تغذية المياه الجوفية للمساعدة في استعادة مخزون المياه الجوفية وتحسين الظروف لسحب مستدام، حيث إنه بحلول عام ٢٠٣٥ سيكون الحد الأقصى للسحب المستدام للمياه الجوفية حوالي ٥,٢٤٣ مليار م<sup>٣</sup>، والتي تمثل حوالي ٨,٨% من مصادر المياه العذبة المتوفرة في ذلك الوقت.

١١- إنشاء سدود في منطقة اقليم كردستان لملائمة طوبوغرافيتها بحيث تعتمد على تجميع مياه الامطار في فصل الشتاء لان اقليم كردستان يقع ضمن مناطق مضمونة الامطار، والعمل علي عدم اعطاء إجازات للأبنية التي تزيد مساحتها عن ١٠٠٠ م<sup>٢</sup> وخاصة المشاريع السكنية الا في حال جعل قاع هذه الأبنية كخزان لجمع مياه الأمطار لإستعمالها في سقي الحدائق وللغسل.

١٢- إعادة إستخدام مياه البزل لمختلف القطاعات وذلك من خلال:

- إستخدامه في إنشاء الأحزمة الخضراء للتقليل من ظاهرة التصحر، خاصة وإنه من المتوقع أن يجمع المصب العام ما يقارب ٣,٤٧٤ مليار م<sup>٣</sup> من مياه البزل في السنة بحلول عام ٢٠٣٥ وهذا المقدار سيوفر كمية كافية من المياه لدعم تطوير الأحزمة الخضراء في جميع أنحاء وسط وجنوب العراق (حيث تبلغ الإحتياجات المائية المقدرة حوالي ٠,٣١٣ مليار م<sup>٣</sup>/سنة).

- إستخدامه في إنعاش الأهوار ومنها هور الحمار والذي بالإمكان أن يتم تأمين ما يقارب الـ ٢,٤٥ مليار متر مكعب/سنة من مياه المصب العام له.

\*ملاحظة: كافة الكلف المذكورة للمشاريع الخاصة بتكيف قطاع المياه هي كلف تخمينية أولية وهي تخضع للتغيرات في اسعار السوق المحلية والعالمية.

### المخاطر المحتملة:

١- في حال عدم توفر الموارد الإقتصادية لتنفيذ المشاريع أنفاً فإن ذلك سيتسبب بخسارة في الإنتاج الزراعي تصل لأكثر من ٢ مليون دونم مما يعني إنخفاض الانتاج الزراعي بنسبة تصل ٢٠% على مدى السنوات العشرين القادمة.

٢- في حال لم يتم تأهيل سد الموصل فإن العراق سيواجه خطر كبير من الفيضانات ولن يتمكن من تحقيق أهدافه عام ٢٠٣٥ في مختلف القطاعات بما في ذلك توليد الطاقة.

### قضايا مُلحة بالنسبة لقطاع الموارد المائية في العراق:

١- ضرورة التوصل الى اتفاقات مع الدول المجاورة المتشاطئة مع العراق من أجل الحصول على حصة العراق من المياه وبنوعيات ملائمة للإستخدامات المختلفة والتي إن لم تتحقق فإنه لن يتم تقديم خدمات كبيرة في عام ٢٠٣٥ نظراً لضخامة النقص بالإمدادات المائية وإن التدفقات البيئية الدنيا لا يمكن أن تكون مضمونة في كافة أنحاء العراق.

٢- ضرورة توفر الموارد المالية لتنفيذ المشاريع المذكورة ضمن الدراسة الإستراتيجية لأهميتها.

٣- لا بد من ضمان التدفق الأدنى لمحطات الطاقة ومآخذ محطات الإسالة لان ذلك ان لم ينجز سيكون تحدياً واضحاً في هذا المجال.



## إجراءات التكيف المطلوبة لقطاع الزراعة:

يعتبر المزارعون وصغار الفلاحين ومربوا الماشية وجميع الفئات المرتبطة بالإنتاج الزراعي أبرز المتأثرين بصورة مباشرة من تداعيات التغير المناخي على الزراعة وينعكس ذلك التأثير بالنتيجة على نظم توفير الغذاء لجميع السكان نتيجة انخفاض الإنتاج الزراعي النباتي والحيواني باعتباره مصدر الغذاء فضلاً عن التأثيرات الاقتصادية والاجتماعية على شريحة واسعة من المجتمع نتيجة انخفاض دخل المزارعين والهجرة من الريف إلى المدينة وغيرها من التأثيرات.

بالرغم من بعض الاجراءات التي اتخذتها الحكومة العراقية التي يمكن اعتبارها اجراءات تكيف مع التغيرات المناخية كمحاولات استخدام وسائل الري الحديثة وإنشاء محطات المراعي الطبيعية ومشاريع تثبيت الكثبان الرملية وإنشاء الواحات الصحراوية اعتماداً على المياه الجوفية ونشر محطات مراقبة الطقس والمناخ الزراعي إلا إنه مازالت هناك حاجة لإتخاذ المزيد من اجراءات التكيف مثل تحسين ادارة الزراعة المطرية باستخدام الري التكميلي، رفع كفاءة الري في الزراعة المروية، استنباط اصناف محاصيل متحملة للجفاف ومقاومة للملوحة، انشاء نظام رصد وانذار مبكر، تعزيز قدرات خزن محاصيل الحبوب، حفر الابار المائية لأغراض الشرب ورعي الماشية في المناطق الصحراوية، تكثير النبات الطبيعي في المناطق الرعوية وخاصة في البادية الغزبية، استخدام اساليب المكافحة المتكاملة للآفات الزراعية وتقليل الاعتماد على المبيدات الحشرية، ادخال وإستنباط أصناف نباتية مقاومة للأمراض ومتوائمة مع التغيرات المناخية، العمل على تطوير سلالات من الماشية متكيفة مع التغيرات المناخية ومقاومة للأمراض وذات إنتاجية عالية وتشجيع إجراء البحوث والدراسات الخاصة بأثر التغيرات المناخية على الزراعة وطرق التكيف، بالإضافة إلى انشاء الاحزمة الخضراء حول المدن.

## إجراءات التكيف المطلوبة لقطاع التنوع البيولوجي:

بدأ العراق جدياً بحماية النظم الطبيعية و أعلن أول محمية طبيعية في الأهوار الوسطى عام ٢٠١٣. كذلك تم ترشيح الأهوار في جنوب العراق وهي أكبر منطقة أراضي رطبة في الشرق الأوسط من قبل اليونسكو UNESCO لتكون موقع تراث طبيعي عالمي، فضلاً عن ذلك هناك عمل متسارع في إقليم كوردستان لحماية الغابات في الجبال والتنوع البيولوجي. ان العراق يحاول حماية ١٧% من النظم الطبيعية وتكوين شبكة محميات طبيعية على إمتداد البلد لغاية ٢٠٣٥.

لا بد من التركيز على مجموعة من تدابير التكيف لتعزيز وضع المحميات الطبيعية، والتي منها منطقة الأهوار، وتوجيه الجهود الوطنية نحو إجراءات لزيادة مرونة التنوع البيولوجي الشامل تجاه تغير المناخ بطرق متعددة، ومنها:

١. مكافحة أو إزالة التهديدات التي يتعرض لها التنوع البيولوجي والأنواع الطبيعية/ النظم الإيكولوجية.
٢. إنشاء شبكة محميات ذات قنوات توفر مسارات هجرة وانتشار للحيوانات والنباتات و إتاحة تفادي حالات الإنقراض المحلية. ويعمل العراق حالياً تحت مظلة الإتفاقيات الدولية ومنها إتفاقية التنوع البيولوجي وبوتوكول قرطاجنة على إعلان ما يقارب ١٥ محمية وطنية لغاية عام ٢٠٢٠ كجزء من هدف الإتفاقية وهو حماية ١٧٪ من المساحة الكلية للعراق.
٣. لزيادة مرونة المناطق المحمية الجديدة عند إنشاءها، من المهم تحقيق مجموعة من الإجراءات، مثل:

- الحفاظ على الغطاء النباتي الطبيعي عبر التدرجات البيئية (كتدرجات خط الطول والعرض وتدرجات رطوبة التربة، الخ)
- إقامة مناطق عازلة حول المحميات الطبيعية
- الحد من تجزئة الموائل وبناء الطرق
- المحافظة على التنوع الوراثي ضمن وبين اعداد الأنواع المحلية
- تطوير وتنفيذ قانون إطاري يراعى الحياة الفطرية (الحيوانات والنباتات) لتنظيم الصيد وصيد الأسماك وجمع وتداول الموارد الطبيعية من خلال تحديد مواسم وطرق تنفيذ هذه الفعاليات.
- فرض عدد من المحاذير والعقوبات المعنية بإدخال المواد الضارة والأنواع الخطرة (مثل الأنواع الغازية) إلى النظم الطبيعية.
- تطوير الإطار التشريعي الوطني المعني بالمحميات، ليركز على تنظيم الأنشطة السياحية.

### قطاع الصحة:

بات مما لاشك فيه تأثير تغير المناخ على الصحة في العراق وهو ما سيزيد من معدل الوفيات والإصابة ببعض الأمراض التي قد تنتقل بواسطة المياه والأغذية الملوثة ومنها بعض الأمراض الانتقالية كالكوليرا والملاريا والتيفوئيد والأمراض غير الانتقالية كالإصابة بأمراض الجهاز التنفسي كالحساسية والربو والأزمات القلبية وأمراض سوء التغذية. إن آثار تغير المناخ على الصحة تعتمد على الكثير من العوامل منها نظم سلامة الصحة العامة والمجتمع والسلوك والجنس والحالة الاقتصادية للفرد وربما ظهور حالات مرضية غير معتادة ناتجة عن ارتفاع درجات الحرارة بصورة غير مسبوقة وفي غير الاوقات المعتادة مما قد يحفز انواع من الحشرات الناقلة للأمراض او حتى الميكروب او الفايروس المرضي الى تغيير نمط ودورة حياته مما يؤثر سلبا على الصحة العامة ويصبح الانسان امام هذه الحالة مضطرا الى البحث عن وسائل اخرى غير موجودة سابقا للتكيف مع الحالة الجديدة ومعالجة اثارها كجزء من التكيف مع اثار تغير المناخ وهذا يختلف من منطقة إلى أخرى و حسب حساسية السكان ومدى التعرض لآثار تغير المناخ.

لقد سعت الحكومة العراقية من خلال العديد من الخطط والبرامج إلى توسيع نطاق خدمات الرعاية الصحية الأساسية لجميع المواطنين مجانا. وتبنت وزارة الصحة في العراق خلال الفترة الماضية نظاماً صحياً يعتمد الرعاية الصحية الأولية كركيزة أساسية ويتضمن تقديم الخدمات الصحية وفق معايير الجودة باعتبارها مستوى الخدمات الأول المقدم للمواطن مع ضمان تكامل تلك الخدمات مع المستوى الثاني (المستشفيات العامة) والمستوى الثالث (المراكز التخصصية) تحت إشراف وزارة الصحة، من خلال تطبيق نظام طب الأسرة في المراكز الصحية والعمل بنظام الزائر الصحي.

### إجراءات التكيف المطلوبة لقطاع الصحة:

على الرغم مما سبق من إجراءات وطنية الأ إنه ما زالت هناك حاجة ملحة إلى وضع تدابير تكيف واضحة ومحددة تساعد الجهات الصحية المختصة في العراق على الإستعداد وتخفيف التأثيرات السلبية التي قد تزيد من ضعف الأوضاع الصحية، وذلك من خلال تعزيز النظم الصحية وخدمات الصحة العامة، تأمين وصول مياه الشرب النظيفة للسكان، متابعة مناطق توالد البعوض والحشرات الاخرى الناقلة للأمراض، وإعداد الدراسات حولها، متابعة خدمات الصرف الصحي وتحسين البنى التحتية لها للحد من الأمراض التي قد تتفاقم مع تغير المناخ، إنجاز برامج مراقبة تفشي الأمراض المعدية، والتركيز على التوعية الصحية.



## إرتفاع مستوى البحر وقطاع السياحة:

رغم ضيق الساحل العراقي على الخليج الا ان الكثير من الدراسات تشير الى احتمال حدوث تاثيرات كبيرة نتيجة لإرتفاع مستوى البحر على الاراضي العراقية وخصوصا جنوب العراق المهدد بالغرق والذي تتركز فيه الكثير من الاراضي الزراعية وبساتين النخيل بالإضافة الى المنشآت الصناعية والثروة النفطية المتركزة في محافظة البصرة الساحلية على وجه التحديد ناهيك عن تأثير ارتفاع درجة الحرارة والحموضة لمياه البحر على النظم الايكولوجية للبيئة البحرية واحتمالية هجرتها من منطقة الى اخرى بعيدة عن المياه الاقليمية للعراق بالإضافة الى تأثير هذه العوامل الناتجة عن التغيرات المناخية على الشعب المرجانية التي يكثر تواجدها في الخليج العربي والبحر الاحمر والتي تعد احد المناطق السياحية التي يرتادها السواح سنويا باعداد كبيرة لذلك فان تاثيرات تغير المناخ على البحر تولد ضغطا كبيرا على العراق وبتجاهات زراعية وصناعية وسياحية بالإضافة الى تاثيرها على الثروة النفطية للعراق مما يحتاج فيه وبشكل ملح موقف جاد للمجتمع الدولي معه لمواجهة هذه المشكلة والتكيف معها.

## إجراءات التكيف المطلوبة:

بالإضافة الى الاجراءات الإستراتيجية التي ننتظر وقوف المجتمع الدولي معنا لإتخاذها من خلال اعداد إستراتيجية وطنية للتكيف وخطة عمل لتنفيذها لابد من التركيز الان على السياحة الدينية والتراثية التاريخية البديلة كمورد اقتصادي بديل عن السياحة الساحلية خصوصا وان العراق فيه الكثير من المواقع التاريخية الحضارية يعود تاريخها الى اقدم العصور بالامكان تأهيلها والإستفادة منها لهذا الغرض ناهيك عن وجود العتبات المقدسة التي يرتادها الاف بل ملايين الزوار أثناء المناسبات الدينية. كما لابد من الابتعاد عن المناطق الساحلية في اقامة المنشآت الصناعية قدر الامكان تحسبا لهذا الخطر القادم بالإضافة الى ضرورة الإهتمام بالدراسات والبحوث في هذا المجال وتأسيس الدراسات الأكاديمية ودعم مركز علوم البحار في جامعة البصرة لتشجيع الدراسات الاكاديمية والبحوث المبنية على التجارب العلمية لتوضيح الصورة امام العالم في هذا المجال.

## مبادئ موجبة الإلتزام بها:

إضافة لما تقدم ولتسهيل مساهمة جميع الأطراف في الإتفاق الجديد ومشاطرة العالم القلق الذي يعيشه من جراء تزايد الانبعاثات وارتفاع درجات الحرارة العالمية وتفاقم مشكلة التغير المناخي ولتكون جميع الاطراف جزءا من الحل يرى العراق ضرورة ان تكون المبادئ التالية نصب اعين المجتمع الدولي في الإتفاق الجديد المتضمن لأي نتيجة او صيغة قانونية ملزمة بشأن تغير المناخ وان تكون هذه المبادئ جزءا لا يتجزأ من هذا الإتفاق وكما يلي:

- 1- التاكيد على طوعية هذه المساهمات وعدم الزام الدول النامية وخصوصا الاكثر هشاشة والاقل انبعاثات منها باي التزام إضافي في الإتفاق الجديد وان يكون الدعم المقدم لها متناسبا مع قلة انبعاثاتها ومقدار هشاشتها وتاثير قطاعاتها بتغير المناخ.
- 2- أن تكون الإتفاقية الإطارية ومقررات موتمرات الأطراف هي الأساس الذي يستند إليه الإتفاق الجديد ومنها مبدأ المسؤولية المشتركة ولكن المتباينة وفقا للإمكانات والمصالح الوطنية والمسؤولية التاريخية في حدوث مشكلة التغير المناخي وغيرها من الأسس التي تضمن لكل ذي حق حقه، بالإضافة الى خطة بالي وبرنامج نايروبي وإطار كانكون وغيرها لأنها تمثل إرثاً اتفقت عليه الأطراف وتاريخياً وجهداً طويلاً لابد من الحفاظ عليه والإستفادة منه.
- 3- التزام الدول المتقدمة بخفض انبعاثاتها وبرفع مستوى الطموح في هذا الخفض لسد الفجوة بين الواقع الفعلي لهذه الانبعاثات وتوجه المجتمع الدولي في العمل على تثبيت الإرتفاع في درجة الحرارة العالمية الى ما دون 2 درجة مئوية.

- ٤- أن يتضمن الإتفاق الجديد العناصر الستة للإتفاقية (التكيف، التخفيف، الدعم او التمويل، نقل وتطوير وتوطين التكنولوجيا، بناء القدرات، الشفافية في الإجراءات)
- ٥- أن تلتزم الدول المتقدمة بدعم الدول النامية (خصوصاً ذات الإنبعثات الأقل والضرر الأكبر) في مجالات التكيف ونقل التكنولوجيا وبناء القدرات لتمكينها من مواجهة مشاكلها الناجمة عن تأثير تغير المناخ عليها وتسهيل إنجاز برامجها في التكيف والتخفيف.
- ٦- أن تلتزم الدول المتقدمة بتمويل آليات وصناديق الإتفاقية وتسهيل حصول الدول المتضررة على هذا التمويل وان تكون أكثر جدية في تنفيذ وعودها بتمويل صندوق المناخ الأخضر بمبلغ ١٠٠ مليار دولار أمريكي سنوياً حتى عام ٢٠٢٠ لدعم الدول النامية وخصوصاً المتضررة والأكثر هشاشة منها.
- ٧- لا يجوز إعادة كتابة الإتفاقية الإطارية أو إعادة تفسيرها أو صياغتها أو هيكلتها وإنما لابد ان تكون أساساً لصياغة الإتفاق الجديد.
- ٨- أن يكون هناك عملاً دولياً جاداً لتحديد آليات فعالة لمساعدة الدول النامية المشار إليها وخصوصاً النفطية منها على مواجهة تأثيرات تدابير الإستجابة التي تتخذها الدول المتقدمة والتركيز على الدول الهشة منها لتنويع موارد إقتصادها.
- ٩- أن يكون هناك دعماً إستثنائياً للعراق في هذه الظروف التي يعيشها خصوصاً وأنه يخوض حرباً ضروساً ضد الإرهاب وعلى أرضه مما ساهم في إراقة دماء ابنائه وهدر أموال طائلة وتدمير البنى التحتية له وتأخره عن التقدم لسنوات طويلة إضافة الى أن العراق قد تعرض الى مظلومية لسنوات طويلة بسبب الحروب التي مرت عليه.
- ١٠- ان يستمر العمل بآليات الدعم المقررة او التي قيد الإقرار وتسهيل الوصول الى أموالها لتسريع الحصول عليها وتسريع إنجاز المشاريع لمواجهة تغير المناخ وتأثيراته.



**ISLAMIC REPUBLIC OF AFGHANISTAN**

**Intended Nationally Determined Contribution**

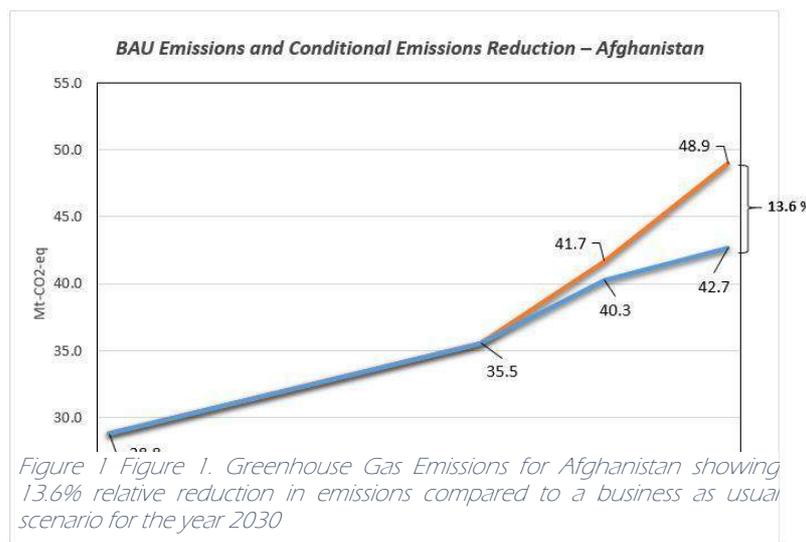
**Submission to the United Nations Framework Convention on Climate Change**

**21 September 2015**

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The Islamic Republic of Afghanistan hereby communicates its Intended Nationally Determined Contribution (INDC) and information to facilitate understanding of the contribution.

<b>Executive Summary</b>	
Base Year:	2005
Target Years:	2020 to 2030
Contribution Type:	Conditional
Sectors:	Energy, natural resource management, agriculture, waste management and mining
Gases Covered:	Carbon dioxide (CO <sub>2</sub> ), methane (CH <sub>4</sub> ), and nitrous oxide (N <sub>2</sub> O)
Target:	There will be a 13.6% reduction in GHG emissions by 2030 compared to a business as usual (BAU) 2030 scenario, conditional on external support.
Financial Needs:	Total: USD 17.405 billion <ul style="list-style-type: none"> <li>• Adaptation: USD 10.785 billion</li> <li>• Mitigation: USD 6.62 billion (2020-2030)</li> </ul>



## 1. Afghanistan's National Circumstances and Commitment to Climate Change

### Introduction

Afghanistan has extensive development and climate adaptation needs and, currently, low levels of greenhouse gas (GHG) emissions. Afghanistan remains one of the poorest countries in the world today, with an estimated population of 28.6 million (2015)<sup>1</sup> and a per capita GDP of USD 660.<sup>2</sup>

Afghanistan is highly prone to natural disasters throughout its 34 provinces.<sup>3</sup> As a result of climate change, it is anticipated that the incidence of extreme weather events, including heat waves, floods, and droughts will likely increase, as will climate change-linked disasters such as glacial lake outflows. The majority of Afghanistan's population relies directly or indirectly on the available natural resources for their livelihoods so with these climatic changes the foundation of the country's economy, stability, and food security is under threat.

Despite these challenges, Afghanistan can remain a low emission economy while developing rapidly if, under the Paris Climate Change Agreement, extensive financial and other resources are made available to allow Afghanistan to successfully develop and implement Low Emission Development Strategies (LEDS) and Highly Effective Adaptation and Development Strategies (HEADS).

Appropriate support in the form of finance, capacity building, technology and legal assistance is needed for Afghanistan to make substantial progress on social and economic fronts while maintaining low per capita GHG emission levels.

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### Description of Fairness and Ambition

Afghanistan recognizes that all countries in the world need to make rapid progress towards lowering, or maintaining if already low, per capita emission levels to avoid dangerous levels of global warming. It is therefore critical that under the Paris Agreement, financial resources, capacity building, technology transfer, and other support is provided to Afghanistan in order to enable it to implement LEDS and HEADS. This will allow Afghanistan to continue developing while maintaining low level of emissions and increasing adaptive capacity to climate change.

There would be lower costs and a clearer development path for Afghanistan if it pursued development using mainly fossil fuels, as other countries have. This would likely result in GHG emission in Afghanistan continuing to increase at current rates for the period to 2025 and beyond. However, given the extremely limited remaining global GHG emissions budget, Afghanistan requires the UNFCCC, the Global Environmental Facility (GEF), the Green Climate Fund (GCF), and other international institutional arrangements to provide the extra finance and other support needed to successfully implement LEDS across all sectors of its economy without compromising socio-economic development goals.

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### National Development Objectives

Despite suffering decades of instability and war, Afghanistan has made considerable development progress. Over the past 13 years notable achievements have been made in the areas of environment, agriculture, health, education, infrastructure, the economy, and the provision of other important basic services.<sup>4</sup>

Afghanistan's National Development Strategy (ANDS) is based on Afghanistan's Millennium Development Goals (MDGs). It identifies the environment as "a cross-cutting issue that underpins the entire social and economic development framework for the country." The National Environment Protection Agency (NEPA), mandated to address environmental concerns, continues to work with all parts of the Government of the Islamic Republic of Afghanistan (GIROA) to mainstream environmental and climate

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<sup>1</sup> CSO 2015 estimation

<sup>2</sup> IMF 2015 estimate for Afghanistan.

<sup>3</sup> NEPA (2009), *National Capacity Needs Self-Assessment for Global Environmental Management (NCSA) and National Adaptation Programme of Action for Climate Change (NAPA)*.

<sup>4</sup> (GIROA, 2015)

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change considerations into the country's national development framework. NEPA advocates for appropriate policies and measures that enable rapid development while ensuring good environmental and climate change outcomes. Afghanistan has developed its INDC with the conviction that countering the effects of climate change requires a commitment from all countries with regard to mitigation, and adaptation.

In terms of international commitments on climate change, Afghanistan joined the UNFCCC in 1992, and ratified the Kyoto Protocol in 2013. Afghanistan completed its National Adaptation Programmes of Action for Climate Change (NAPA) and National Capacity Needs Self-assessment for Global Environmental Management (NCSA) in 2009. Afghanistan submitted its Initial National Communication (INC) under the UNFCCC in 2012, and is currently preparing its Second National Communication (SNC) for submission to the UNFCCC in 2016. At present, Afghanistan is finalizing its national Climate Change Strategy and Action Plan (ACCSAP) as well as its National Adaptation Plan (NAP).

In 2015, as part of the INDC preparation process, NEPA convened a series of consultation and awareness-raising workshops to bring together decision-makers from government institutions and stakeholders from non-governmental organizations to develop the current INDC and establish a sustainable development vision for Afghanistan. Through this INDC process and existing policies and strategies, the overall vision that was developed for Afghanistan aims to enhance the adaptive capacity and resilience of its agriculture, environment, and population to climate change, while developing and implementing LEDS.

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### **Climate Change Trends, Impacts, and Vulnerabilities**

Afghanistan is ranked among the most vulnerable countries in the world to the adverse impacts of climate change.<sup>5</sup> Afghanistan's INC report has documented an increase of 0.6°C in the country's mean annual temperature since 1960. Based upon recent climate observations, precipitation patterns have decreased during springtime (March-May) by approximately 40.5mm; however, the total annual precipitation has only slightly decreased by approximately 30mm since there is a slight increase in precipitation from June until November. This implies that Afghanistan is already beginning to experience the initial adverse impacts of climate change.

Recent climate projections, based on Cordex regional climate models and representative concentration pathways (RCPs)<sup>6</sup>, indicate that Afghanistan will face an overall strong increase in mean annual temperature, considerably higher than global mean projections, when compared to a baseline period of 1986-2006. More specifically, under the "optimistic" scenario (RCP4.5), the mean of the model ensembles projects a warming of approximately 1.5°C until 2050 and of approximately 2.5°C until 2100. For the "pessimistic" scenario (RCP8.5), the models project an extreme warming of approximately 3°C until 2050, with further warming up to 7°C by 2100. Under both scenarios there are regional differences, with a higher temperature increases at higher altitudes compared to the lowlands.

For precipitation a significant ( $\alpha=0.05$ ) mean decrease of precipitation during springtime (March-May) for the North, the Central Highlands and the East for both scenarios from 2006 until 2050 between 5-10 percent is seen. This decrease is offset by a slight increase of precipitation during autumn and wintertime (October-December) in these regions. For the Hindu Kush area, a significant and substantial increase in precipitation during the winter season of approximately 10 percent is seen, whereas during spring season precipitation is projected to stay stable. For the arid South of the country, the models do not project significant trends for precipitation. The decrease of precipitation during spring is particularly relevant since during these months the main plant growth for agricultural production takes place. In addition, the decrease

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<sup>5</sup> DARA Climate Vulnerability Monitor (2012); GermanWatch Global Climate Risk Index (2013); and Notre Dame Global Adaptation Index (2014).

<sup>6</sup> Representative concentration pathways (RCPs) are GHG emission scenarios adopted by the IPCC to describe four possible climate futures depending on the levels of future global GHGs emitted. There are four RCPs: 1) RCP2.6, which assumes that GHG emissions peak between 2010-2020 and then decline; 2) RCP4.5, which assumes that GHG emissions peak around 2040 and then decline; 3) RCP6, which assumes that GHG emissions peak around 2080 and then decline; and 4) RCP8.5, which assumes that GHGs emissions continue to rise throughout the 21<sup>st</sup> century.

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is projected to take place in the regions with the highest agricultural productivity of Afghanistan (East, North, and Central Highlands). In combination with the overall increase in temperature and the related increase in evapotranspiration across the country, this will most likely negatively impact the hydrological cycle, agricultural productivity, and availability of water resources. Climatic changes are also likely to impact upon the spread of water, food and vector-borne diseases, presenting considerable health risks to both urban and rural populations. Finally, the aforementioned climate-induced risks and challenges can enhance social inequalities, poverty, and food insecurity causing considerable and fundamental threats to human life, livelihoods, property, political stability, the economy, and the environment in Afghanistan.

Based upon these climate change projections, Afghanistan's environment will experience considerable changes over the remainder of this century. Climate change, based on sound scientific analysis of climatic changes and uncertainties, must be mainstreamed into sectoral planning to reduce the negative impacts of climate change in Afghanistan and increase resilience, both in rural and urban areas.

## **2. Climate Change Adaptation**

### **Near- and Long-term Adaptation Visions, Goals and Targets**

Afghanistan's vision for addressing the adverse impacts of climate change through adaptation aims to protect the country and its population by enhancing adaptive capacity and resilience, effectively respond to the vulnerabilities of critical sectors, and efficiently mainstream climate change considerations into national development policies, strategies, and plans. In order to achieve this vision, a national strategy for climate change adaptation must include community level vulnerabilities and build up their adaptive capacities by investment in short- and long-term initiatives. Short-term action plans formed part of the 2009 NAPA, while the NAP will implement both short- and long-term priorities. These priorities include, but are not limited to:

1. Reducing vulnerability of the country and its population through enhancement of adaptive capacity and resilience, and deployment of disaster risk reduction approaches
2. Integrating climate change consideration into the national planning processes
3. Promoting economic development and sustainable rural livelihoods through sustainable management of environmental resources and increase access to modern forms of efficient and sustainable energy services
4. Improvement of technical capacity in governmental institutions
5. Adaptive and integrated land and water management
6. Improving access by rural communities and farmers to water to support food security, reduce poverty and improve agricultural productions
7. Raising awareness for people of Afghanistan on climate change impacts and adaptation measures

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### **Current Adaptation Undertakings and Support**

Afghanistan has initiated a number of steps to promote the country's sustainable development. In term of national development policies, plans, and legal frameworks, considerable effort has been placed on addressing environmental challenges, disaster risk reduction, food security, water security, protection of forest and rangelands, and biodiversity conservation, all of which have clear relevance to climate change adaptation. Some noteworthy examples of such policies and plans that have successfully and explicitly integrated climate change include:

- Afghanistan National Renewable Energy Policy (ANREP)
- National Water and Natural Resource Management Priority Programme
- Strategic National Action Plan for Disaster Risk Reduction (SNAP)
- National Environmental Action Plan (NEAP)
- National Comprehensive Agriculture Production and Market Development Programme
- Energy for Rural Development (ERDA)
- National Biodiversity Strategy and Action Plan (NBSAP)

Additional national development policies, strategies, and plans that currently do not mention climate change but have entry points for the further mainstreaming of climate change include:

- National Agricultural Development Framework (NADF)
- National Environment Strategy
- Energy Sector Strategy
- National Forestry Management Plan
- Rangeland Management Plan
- Strategic Policy Framework for the Water Sector

In term of programmes and projects, support provided by the international community and multilateral agencies have laid the groundwork for building Afghanistan’s adaptive capacity and resilience to climate change. Major contributors include the Tokyo Framework bilateral partners, Global Environmental Facility (GEF), which has provided support through enabling activities, mid-size projects, and full-size climate change adaptation projects funded by the Least Developed Countries Fund (LDCF), as well as bilateral donors, non-governmental organizations, and the United Nations. With the scale and urgency of Afghanistan’s adaptation needs, additional financial and other resources are strongly needed in order to effectively build the adaptive capacity and resilience of the country and its people before more severe impacts of climate change begin to be felt.

### Adaptation Needs and Means of Implementation (MOI)

Afghanistan faces a number of specific challenges in terms of addressing climate change through adaptation. These challenges include, but are not limited to, funding gaps, lack of expertise, lack of reliable historical climate data, weak public awareness about environmental issues, and security. Afghanistan has identified the following key actions as part of its National Adaptation Plan (NAP) in order to overcome existing gaps and barriers towards sufficiently addressing its climate change adaptation needs. The total estimated cost of full implementation of the NAP is USD10.785 billion over ten years.

Action- Planning, technology and capacity building needs	Technology Needs	Capacity Building Needs	Finance Needs (USD)
Development and adoption of the Afghanistan CCSAP.	--	--	Own contribution
Development of a system to monitor and assess vulnerability and adaptation to climate change.	Climate science technology	Climate science institutes with university	0.02 Billion
Identification and mainstreaming of climate change adaptation technologies into the sectoral policies, strategies and development plans, and promotion of regional and international cooperation and coordination for adaptation technology transfer.	Climate policy technologies and methods	Training Afghan climate policy experts	0.01 Billion
Strengthen and expand meteorological and hydrological monitoring networks and services, including a national database to archive and store meteorological and hydrological data.	Hydrological, meteorological and data equipment and integrated systems	Operators and analysts for hydrological, meteorological and data integrated systems	0.1 Billion
Development of water resources through rehabilitation and reconstruction of small-, medium-, and large-scale	Improved designs and methodologies for catchment management	Ecological engineering and spatial planning for water resources	0.75 Billion

infrastructure.	technology		
Planning for proper watershed management and promoted through community-based natural resources management.	Full catchment planning technology and models	Practitioners for watershed management	2.5 Billion
Increasing irrigated agricultural land to 3.14 M-ha, through restoration and development of Afghanistan's irrigation systems.	Eco-agriculture and climate friendly irrigation technology transfer to Afghanistan	Vocational and engineering capacity to design, build and maintain climate friendly irrigation networks and local schemes.	4.5 Billion
At least 10% of Afghanistan land area and the habitat of selected species under a system of conservation	Conservation ecology methods and tools	Protected areas and species ecologists, and ecological economists trained and working.	0.3 Billion
Behavioural change and opportunities for provision and development of alternative and renewable energy sources for 25% of the rural population above existing levels (15%), in order to contribute to a reduction in the unsustainable usage of natural resources and decreasing the strong reliance on fossil fuels by rural communities.	Technology transfer of renewable energy and sustainable energy	National centre for sustainable energy strengthened and expanded. Combine public and private competencies.	0.105 Billion
Regeneration of at least 40% of existing degraded forests and rangeland areas (the area covered will be approximately 232,050 ha for forestry; and 5.35 million ha for rangelands).	Forestry and rangeland management tools and methods transferred to Afghanistan	Practitioners group built in university, government and local delivery levels.	2.5 Billion
<b>TOTAL FINANCIAL RESOURCES NEEDED:</b>			<b>10.785 Billion</b>

### 3. Climate Change Mitigation

#### GHG Emissions and Mitigation Measures

Afghanistan has very low relative per capita GHG emissions. While 1990 emissions were at 0.2 metric tons CO<sub>2</sub> per capita, data indicates that per capita emissions were around 0.3 for 2010, making Afghanistan one of the lowest GHG emitters globally.<sup>7</sup> However, the country is on a growth path, which is expected to strengthen over the coming years, meaning GHG emissions are likely to increase. It is important that support be provided to Afghanistan to develop LEDS to minimize the increase in its GHG emissions.

Afghanistan's overall GHG emission figures (Table 1) demonstrate that the most important sources of CO<sub>2</sub> emissions are from the "Land-Use Change and Forestry" and "Energy" sectors.<sup>8</sup> In terms of CH<sub>4</sub> and N<sub>2</sub>O emissions, the agriculture sector is the major contributor.<sup>9</sup> It is therefore important that greater attention should be focused on GHG mitigation measures within these sectors. Afghanistan has only started to access UNFCCC technology transfer opportunities. It needs to build national capacity to navigate opportunities and play a more critical role in international negotiations.

The following mitigation options are designed to enable Afghanistan to make a mitigation contribution which is condition on support needs for financial and technical support being met.

<sup>7</sup> The World Bank, *CO<sub>2</sub> Emissions (Metric Tons Per Capita)*.

<http://data.worldbank.org/indicator/EN.ATM.CO2E.PC>

<sup>8</sup> NEPA & ADB (2007), *Afghanistan Greenhouse Gas Inventory Report*.

<sup>9</sup> IBID

2030 Mitigation Contribution	
Type of Contribution	<b>Conditional Target:</b> A relatively reduction in GHG emission is achievable through meeting Afghanistan's financial, technical, and technological needs in energy, forest and rangeland, industrial process and extractive industry, agriculture and livestock, and waste management sectors. Primarily focused is on sustainable process and development initiatives based on the outcomes of 2015 national consultation on LEDS and NAMA.
Gases	Carbon dioxide (CO <sub>2</sub> ), methane (CH <sub>4</sub> ), and nitrous oxide (N <sub>2</sub> O)
Sectors	<ul style="list-style-type: none"> <li>• Energy Production (hydropower, solar systems, wind and biomass, commercial, domestic: clean cook stoves and fuels, and solar energy)</li> <li>• Energy Efficiency (households, transport, industry, services, mining, agriculture)</li> <li>• Land Use, Forests and Rangelands (Afforestation and reforestation, natural forests, fuelwood from forest and orchards, rangelands rehabilitation)</li> <li>• Agriculture and Livestock (manure management, land use/change for agriculture)</li> <li>• Irrigation Infrastructure</li> <li>• Improved Cropping Systems</li> <li>• Industrial Processes and Extractive Industries (mining and extractives, gas and hydrocarbons, coal and minerals) end-use saving, and fuel shifts</li> <li>• Power plants: fuel shift to natural gas and renewables</li> <li>• Transport: more efficient vehicles, clean fuels, and alternative fuels</li> <li>• Waste Management (solid waste management and wastewater recycling/composing of biodegradable waste instead of landfill, and methane recovery from landfill)</li> <li>• Coal mines: gas recovery in coal mines</li> <li>• Rice paddies: modified rice strains</li> <li>• Mitigation measures for N<sub>2</sub>O include reduced fertilizer application; optimal timing of fertilizer application; nitrification inhibitors, less use of histosols (peat soils)<sup>10</sup>.</li> </ul>

Afghanistan's GHG inventory in Table 1 is calculated for each GHG emission sector for 2005<sup>11</sup> and business-as-usual projections based on the growth rate for a medium-term timeframe (2020-2030).

GHG emission sector	CO <sub>2</sub> Equivalent, Gg				2020	2025	2030
	CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O	Aggregated	CO <sub>2</sub> -eq, Gg	CO <sub>2</sub> -eq, Gg	CO <sub>2</sub> -eq, Gg
Energy	2,910.04	736.00	129.83	3,775.87	9,745.46	10,849.02	12,087.00
Industry	312.15	-	-	312.15	791.57	878.25	974.42
Agriculture	-	9,296.49	5,812.50	15,108.99	24,665.30**	29,578.77**	35,471.04**
Land use change and forestry	9,341.13	80.64	9.30	9,431.07	10,949.18	11,507.70	12,094.71
Waste	-	130.41	-	130.41	330.70**	366.91**	407.09**
Total GHG emission incl. LULUCF	12,563.32	10,243.54	5,951.63	28,758.49	46,482.20	53,180.64	61,034.25
Total GHG emission excl. LULUCF	3,222.19	10,162.90	5,942.33	19,327.42	35,533.02	41,672.95	48,939.54

\* Information used from ADB – Afghanistan Greenhouse Gas Inventory Report and projection for 2020-2030 using GACMO model

\*\* CH<sub>4</sub> (CH<sub>4</sub> emission x 21) and N<sub>2</sub>O (N<sub>2</sub>O emission x 310) counted as CO<sub>2</sub>-eq

<sup>10</sup> IBID

<sup>11</sup> IBID

<b>Climate Mitigation Gaps and Barriers and Support Needs</b> <b>USD 662 Million/Year from 2020</b>		
<b>Sector</b>	<b>Technology and Capacity Building Needs</b>	<b>Finance Needs (USD)</b>
Energy Efficiency in Buildings and in Transport Sector	Carbon finance and project development skills. Information on available technologies, measures, and financing skills. Traditional customs and administered pricing. Building codes, and standards on appliances and equipment. Clean cooking, heating and power projects.	100 million/Year
Energy	Human and institutional capacity for adoption of cleaner technology. Capital markets that encourage investment in decentralized systems. Information and intellectual property rights for mitigation technologies. Renewable energy, entry costs support, access to capital, and subsidies. Environmental compliance standards (emission and indoor).	188 Million/Year
Waste Management	Landfill management, decentralised wastewater treatment. Climate Project development skills.	74 Million/Year
Forest and Rangelands	Carbon sequestration on forest/rangelands, and forest carbon skills. Funding institutional capacity to monitor and verify projects. Better spatial planning for community and production agriculture. Reduce rural peoples' dependence on fuel for cooking and heating.	100 Million/Year
Industry and Mining	Cleaner coal mining, leave-it-in-the-ground approaches, combustion, and transportation of minerals. Hydrocarbon fields management. Technical industrial capacity to link basic industry and mining private and public sector with climate sector experts.	100 Million/Year
Agriculture and Livestock	National herd, reduction in fuel used, or cleaner fuel technologies. South-south collaboration on low-carbon agriculture, study tours. Funding for R&D activities. Improved national dataset on agriculture, food security data.	100 Million/Year



## **ISRAEL'S INTENDED NATIONALLY DETERMINED CONTRIBUTION (INDC)**

**Submission to the ADP**

**29 September 2015**

In accordance with Decisions 1/CP.19 and 1/CP.20, Israel hereby communicates its Intended Nationally Determined Contribution (INDC) to contribute to the global effort for achieving the objective of the United Nations Framework Convention on Climate Change.

Israel is committed to working towards an ambitious international agreement on climate change, applicable to all Parties and in line with the objective of an average global temperature increase below two degrees Celsius.

### **Mitigation target**

Israel intends to achieve an economy-wide unconditional target of reducing its per capita greenhouse gas emissions to 7.7 tCO<sub>2</sub>e by 2030 which constitutes a reduction of 26% below the level in 2005 of 10.4 tCO<sub>2</sub>e per capita. An interim target of 8.8 tCO<sub>2</sub>e per capita is expected by 2025.

According to the most recent national greenhouse gas inventory prepared by the Israeli Central Bureau of Statistics, Israel's greenhouse gas emissions in 2012 were 83.04 MtCO<sub>2</sub>e, which is equivalent to 10.5 tCO<sub>2</sub>e per capita. Under an updated Business as Usual (BAU) scenario greenhouse gas emissions are expected to increase to 105.5 MtCO<sub>2</sub>e in 2030. This will be equal to 10.0 tCO<sub>2</sub>e per capita. Implementation of Israel's national target will result in a reduction of 23.85 MtCO<sub>2</sub>e in 2030 bringing total emissions down to 81.65 MtCO<sub>2</sub>e.

## **Information to facilitate understanding**

### *Scope of INDC*

6 Greenhouse gases: Carbon Dioxide (CO<sub>2</sub>), Methane (CH<sub>4</sub>), Nitrous Oxide (N<sub>2</sub>O), Hydrofluorocarbons (HFCs), Perfluorocarbons (PFCs), Sulphur Hexafluoride (SF<sub>6</sub>)

### *Time period for implementation*

2016 – 2030

### *Coverage*

Sectors: Electricity generation, other energy sources, transportation, industrial processes, buildings, waste and agriculture

### *Metric applied*

The revised 1996 Intergovernmental Panel on Climate Change (IPCC) Guidelines for National Greenhouse Gas Inventories and the Global Warming Potential (GWP) values from the IPCC Second Assessment Report (1995)

### *Methodology*

The scenarios (BAU and abatement) were developed using the Long range Energy Alternatives Planning System (LEAP model). A cost benefit analysis was carried out on a range of abatement measures and technologies in various sectors. Mitigation potential was assessed in those sectors and combined for the whole economy.

## **Planning process**

An inter-ministerial committee, chaired by the Director General of the Ministry of Environmental Protection, examined the potential for reducing greenhouse gas emissions in 2030. The committee consisted of representatives from all relevant government ministries, public utility companies, industry and commerce, local government, environmental and non-governmental organizations, academia and other national and international experts from various disciplines. Specific working groups assessed and quantified the costs and benefits of over a hundred different abatement measures in each of the main sectors in the economy, including energy, transportation, buildings, industry and

waste. At the same time, removal of obstacles to implementation was examined.

Based on the comprehensive work and findings of the committee, a national emissions reduction target for Israel was formulated and is expected to yield significant benefits to the economy. Submitted jointly to the government by the Ministers of Environmental Protection, Finance and National Infrastructures, Energy and Water Resources the target was approved and includes sector specific targets:

- Energy efficiency - 17% reduction in electricity consumption relative to BAU scenario in 2030
- Renewable energy – 17% of the electricity generated in 2030 will be from renewable sources
- Public transport – 20% shift from private to public transportation.

### **Future development**

The government decision for the national target stipulates that within 45 days of approval, the relevant ministries are to submit to the government an outline of economy wide measures to be taken. It is anticipated that the implementation plan will consist of, inter alia, the following:

- The establishment of mechanisms leveraging large scale private funding together with public funding of energy efficiency projects;
- A program of tenders for renewable energy. The 17% renewable energy target is substantially more ambitious than Israel's current 10% target for 2020;
- Removal of barriers for the uptake of renewable energy;
- Measures to increase the use of natural gas. The recent discovery of additional natural gas reserves off the coast of Israel has and will continue to contribute to a partial switch from coal to natural gas in Israel's fuel mix and which contributed to GHG emissions reduction between 2012 and 2015. The government is now working on the further development of gas fields, expected to have significant mitigation potential;
- Further development of public transport systems in major metropolitan areas such as the construction of the Tel Aviv metropolitan light rail; the extension of the intercity rail system and of the Jerusalem light rail.

Initial steps have begun for the establishment of a national system for managing and monitoring greenhouse gas emissions. Quantitative and qualitative data collection and analysis will be carried out in order to track and record headway on implementation of the abatement measures. The inter-ministerial committee will perform a regular review process of the national strategy and recommend new policy instruments where necessary.

### **Consideration of fairness and ambition**

Taking into consideration its national circumstances, Israel believes its target to be fair and ambitious reflecting genuine efforts to move forward in a sustainable manner to facilitate the transition to a low-carbon and climate-resilient economy.

Israel contributes about 0.2% of global emissions. Israel's projected annual population growth is 1.8%, which is considerably higher than the OECD average. The assumption is that by 2030, Israel's population will be approximately 10.6 million as compared to 7 million in 2005 and 8.4 million in 2015. The annual GDP growth per capita is currently 1.7% and is also growing at a faster rate than the OECD average.

Considering this projected growth in population and GDP, we believe that a per capita target for GHG emissions reduction is fair and appropriate for Israel.

Israel is a small and densely populated country characterized by an expanding population and economic growth, facing land and water scarcity. Arid zones comprise over 45% of the area of the country while there is an exceptionally high degree of biological diversity that must be protected.

Electricity generation has been largely based on imported fossil fuels as Israel has no access to a number of widely used low-carbon sources of energy such as nuclear, hydro-electric and geothermal power. The country is an energy island, without the possibility of grid interconnectivity. There is limited surface area available for large-scale energy installations. The few available areas are subject to competing uses such as industrial development and housing, bio-diversity preservation, habitat conservation, agriculture and defense.

For many years, there has been significant use of solar heaters for water heating and greenhouse gas emissions from this source are substantially lower than the global average. An additional factor limiting Israel's abatement potential is its small heavy industry sector with relatively low emission levels.

Israel attains extremely high levels of water reuse (85%). However to meet increasing water demand several desalination plants have been constructed. These installations are comparatively energy efficient and currently account for 5% of energy consumption. Water scarcity may necessitate the construction of additional plants in the future.

### **Adaptation**

Israel is currently in the final stages of drafting its National Adaptation Plan which is the result of an inter-ministerial and non-governmental sectorial consultative process.

An Israeli Climate Change Information Center (ICCIC) was set up in cooperation with leading academic institutions. Its mandate is to compile a national scientific base on the impact of climate change on areas such as, water resources, biodiversity, public health and urban planning. The Center will prepare policy recommendations to be integrated into national and local adaptation plans and which will be relevant to the challenges being faced in the region as a whole.

# **Intended Nationally Determined Contribution of Jamaica**

## **Communicated to the UNFCCC**

### **1. The National Context**

Jamaica is a member of the group of Small Island Developing States (SIDS). An island nation in the Caribbean Sea, it is part of the group of islands known as the Greater Antilles that also includes Cuba, Puerto Rico, and Hispaniola, and of the Caribbean sub-region more generally. Jamaica acceded to the United Nations Framework Convention on Climate Change (UNFCCC) in 1995.

As a small island developing state, Jamaica is particularly vulnerable to the impacts of climate change not only in terms of our natural resources, but also its economic development, as sectors such as tourism, agriculture, fisheries, forestry and water are climate sensitive, as is social wellbeing. Jamaica's susceptibility to natural disasters has proven to be a major threat to the stability of human settlements and infrastructure.

At the international level, as a Party to the UN Framework Convention on Climate Change (UNFCCC) and its Kyoto Protocol, Jamaica has been active in negotiations pressing the case of small island developing states (SIDS) for there to be substantial reductions in the emission of greenhouse gases (GHG) and for adequate funding to be made available to assist SIDS which are not responsible for the high levels of GHG emissions. Despite not being a major emitter, Jamaica is nonetheless playing its part in reducing its GHG emissions through 'no regrets' mitigation actions, which can lead to reduced emissions as well as cost savings and social and environmental benefits for the country. Jamaica will also focus in the UNFCCC negotiations on approaches to address loss and damage associated with the adverse effects of climate change, including impacts related to extreme weather events and slow onset events, as where there are constraints and limitations to adaptation, then other means of addressing economic loss and damage from climate change impacts will have to be found.

*Vision Statement: Jamaica achieves its goals of growth and prosperity for its people while meeting the challenges of climate change as a country with enhanced resilience and capacity to adapt to the impacts and to mitigate the causes in a coordinated, effective and sustainable manner.*

## **2. Mitigation Contribution**

### **2.1 Scope**

Jamaica's intended nationally determined contribution covers actions in the energy sector (IPCC source category 1). It includes emissions of carbon dioxide, methane, nitrous oxide, nitrogen oxides, carbon monoxide, non-methane volatile organic compounds, and sulphur dioxide. The entire national territory of Jamaica is covered by the scope.

### **2.2 Policy Actions**

As Jamaica develops economically, it is expected that there will be some continued growth in emissions. However, Jamaica has undertaken a programme of modernization of energy infrastructure, diversification of energy sources towards cleaner and renewable fuels, and incentivising efficiency that is expected to significantly reduce emissions growth over time.

Jamaica will contribute to the global GHG emissions reduction by fully implementing energy policies that will ensure, *inter alia*, that:

- Jamaicans use energy wisely and aggressively pursue opportunities for conservation and efficiency
- Jamaica has a modernized and expanded energy infrastructure that enhances energy generation capacity and ensures that energy supplies are safely, reliably, and affordably transported to homes, communities and the productive sectors on a sustainable basis
- Jamaica realizes its energy resource potential through the development of renewable energy sources by increasing the share of renewable sources of energy in its primary energy mix to 20% by 2030
- Jamaica's energy supply is secure and sufficient to support long-term economic and social development and environmental sustainability
- Jamaica has a well-defined and established governance, institutional, legal and regulatory framework for the energy sector that facilitates stakeholder involvement and engagement
- Government ministries and agencies are a model/leader in energy conservation and environmental stewardship
- Jamaica's private industry embraces efficiency and ecological stewardship to advance international competitiveness and to move towards a green economy

These policies are expressed in the National Energy Policy 2009-2030.

### **2.3 Modelled Impact of Policy Actions on Emissions Growth Trajectory**

The effect of the energy policies was modelled and compared to a 'business-as-usual' (BAU) scenario of emissions growth without policy intervention, using 2005 as a base year. Under the BAU scenario, GHG emissions would increase by 37% by 2030 (see Table 1).

Jamaica's intended nationally determined contribution will mitigate the equivalent of 1.1 million metric tons of carbon dioxide per year by 2030 versus the BAU scenario. This is a reduction of

7.8% of emissions versus BAU. This target is predicated on the current level of implementation of the National Energy Policy and the existing pipeline of renewable energy projects.<sup>1</sup>

Jamaica will conditionally increase its ambition to a reduction of GHG emissions of 10% below the BAU scenario, subject to the provision of international support. This reduction target is based on enhanced implementation of the NEP. In particular, Jamaica seeks support for the expansion of energy efficiency initiatives in the electricity and transportation sectors, in line with sector action plans and policies currently under development.

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<sup>1</sup> These include interventions currently in place such as Wigton Wind Farm, as well as some projects that are projected under scenarios outlined by the Ministry of Science, Technology Energy and Mining in previous studies.

### 3. Information to Facilitate Clarity, Transparency and Understanding

**Table 3.1: Technical information on Jamaica's INDC**

Parameter	Information
Timeframe and/or period for implementation	2005 - 2030 (with an interim target in 2025)
Scope of gases included	Carbon dioxide, methane, nitrous oxide, nitrogen oxides, carbon monoxide, non-methane volatile organic compounds, sulphur dioxide
Sectors covered	Energy <sup>2</sup>
% of national emissions covered	CO <sub>2</sub> : 94% N <sub>2</sub> O: 12% CH <sub>4</sub> : 12% NO <sub>x</sub> : 100% CO:100% NMVOCs:84% SO <sub>2</sub> :99%
Geographies covered	All national territory
Methodology for emissions accounting	Revised 2006 IPCC Guidelines for National Greenhouse Gas Inventories
Contribution from market mechanisms	None
Type of contribution	Emissions reductions versus business-as-usual baseline growth scenario (fixed)
Base year	2005
Estimated emissions in base year	10,572 thousand metric tons of carbon dioxide equivalent (kT CO <sub>2</sub> eq)
BAU methodology	All categories of fuel used in the energy sector were assumed to grow at rates consistent with GDP growth rate, GDP per-capita growth rate or a compound annual growth rate calculated by best-fit regression on energy sector data from 2000-2005. Validation was done with data from 2005-2014. Details on the methodology used can be found at <a href="http://www.mwlecc.gov.jm">http://www.mwlecc.gov.jm</a>
BAU emission in target year	2025:13,443 kT CO <sub>2</sub> eq 2030:14,492 kT CO <sub>2</sub> eq
Mitigation scenario emissions in target year	Unconditional contribution 7.8% below BAU by 2030 2025:12,370 kT CO <sub>2</sub> eq 2030: 13,368 kT CO <sub>2</sub> eq  Conditional contribution contingent on international support: 10% below BAU by 2030 2025:12,099 kT CO <sub>2</sub> eq 2030:13,043 kT CO <sub>2</sub> eq

<sup>2</sup> The energy sector is defined in accordance with IPCC guidelines, and includes the transportation sector.

### **3.1 Choice of base year**

The year 2005 was the last year for which a complete inventory of Jamaica's GHG emissions exists.

### **3.2 Fairness and Ambition**

As modelled, Jamaica's INDC will result in emissions of the equivalent of 4.7 metric tons of carbon dioxide per person by 2030 (versus the equivalent of 5.1 metric tons of carbon dioxide per person under the BAU scenario). Global emissions of 4.8 equivalent metric tons of carbon dioxide per person by 2030 are consistent with 1.5 °C of warming. This target is more ambitious than the global goal of 2 °C, and consistent with Jamaica's long-standing negotiating position.

## **4. Planning Processes for Implementation**

Jamaica will implement this INDC through the Climate Change Policy Framework and the National Energy Policy 2009-2030. Additionally, Jamaica has developed a nationally appropriate mitigation action for the scale-up of renewable electricity that will be central to the full implementation of this INDC.

Institutionally, the Climate Change Division of the Ministry of Water, Land, Environment and Climate Change will be responsible for coordinating actions among government ministries, departments and agencies to implement the INDC, as well as creating an enabling environment for necessary private sector action.

## **5. Additional Information**

### **5.1 ADAPTATION**

#### **Background**

Jamaica is experiencing changes in variability in rainfall patterns and other climate parameters. While some of these changes are due to natural variability, some are attributable to climate change. The IPCC considers inhabitants of small islands, like Jamaica, to be some of the most vulnerable to climate change. This is because climate change will impact their societies, economies and ecosystems in ways that will increase vulnerabilities; for example with regard to food security, water supply, natural disasters, and human health. The impact of climate variability has already been experienced in some of these areas.

As a small island developing state, Jamaica is particularly vulnerable to the impacts of climate change not only in terms of our natural resources, but also our social wellbeing and our economic development, as sectors such as tourism, agriculture, fisheries, forestry and water are very climate sensitive. Jamaica's vulnerability to climate change impacts is further compounded by social issues such as poverty, the location of human settlements in high risk areas, environmental degradation, and instances of poorly constructed infrastructure and housing.

The severe weather events which have impacted the country over the years have severely/significantly affected the country's economic growth and development. Between 2001 and 2012, Jamaica experienced 11 storm events (including 5 major hurricanes) and several flood and drought events. These events resulted in combined loss and damage amounting to approximately J\$128.54 billion. In 2004, Hurricane Ivan caused losses equivalent to 8.0% of GDP. Hurricane Sandy (2012) accounted for J\$9.7 billion or 0.8% of 2011 GDP in direct and indirect damage, as well as increased expenditure by private and Government entities. The health, housing and education sectors experienced the greatest impact accounting for 48% of the total costs in damages. One death and 291 injuries resulted from Hurricane Sandy. These are but a few examples of the impacts of increased frequency of natural disasters.

### **Adaptation Planning Process**

At the national level, a number of projects on adaptation to climate change have been implemented. These include community-based adaptation and initiatives to raise the awareness of the public in general, and vulnerable groups in particular, regarding the impacts of climate change and how it can be addressed.

Jamaica's Vision 2030 Jamaica - National Development Plan provides the framework to ensure that climate change issues are integrated into national policies and development activities. The issue of adaptation to climate change is specifically addressed under National Outcome #14 'Hazard Risk Reduction and Adaptation to Climate Change'. The key related national strategies are: (i) develop measures to adapt to climate change, and (ii) develop mechanisms to influence the global rate of climate change.

Jamaica's Climate Change Policy Framework was prepared under a GoJ/EU/UNEP Climate Change Adaptation and Disaster Risk Reduction (CCADRR) Project. The policy development process involved a number of consultations, using as a basis, Vision 2030 Jamaica - National Development Plan and Jamaica's Second National Communication on Climate Change to the United Nations Framework Convention on Climate Change. The Climate Change Policy Framework is intended to support the goals of Vision 2030 by reducing the risks posed by climate change to all of Jamaica's sectors and development goals.

The Climate Change Policy Framework outlines the objectives, principles and strategies that the country will employ in order to effectively respond to the impacts and challenges of climate change, through measures which are appropriate for varying scales and magnitudes of climate change impacts. It is expected that, on the basis of this Policy Framework, the relevant sectors will develop or update, as appropriate, plans addressing climate change adaptation and mitigation.

The objectives of the Policy Framework are:

- I. To mainstream climate change considerations into national policies and all types and levels of development planning and to build the country's capacity to develop and implement climate change adaptation and mitigation activities.
- II. To support the institutions responsible for research, data collection, analysis and projections at the national level on climate change, its impacts, and appropriate

adaptation and mitigation measures, to facilitate informed decision-making and strategic actions at all levels.

- III. To facilitate and coordinate the national response to the impacts of climate change and promote low carbon development.
- IV. To improve communication at all levels on climate change impacts and also adaptation and mitigation related opportunities so that decision makers and the general public will be better informed; and
- V. To mobilize climate financing for adaptation and mitigation initiatives

The main sectors for the development of climate change strategies and action plans are tourism, agriculture, fisheries, forestry, water, energy, industry, human settlements and coastal resources, marine resources, human health, transportation, waste management, education, finance and disaster risk reduction and response management.

Jamaica intends to implement early actions to address our adaptation efforts through a number of Special Initiatives.

### **Institutional Framework and Actions Taken**

Since 2012, Jamaica has raised the profile of climate change issues by assigning the portfolio to a Ministry. Additionally, Jamaica has established a Climate Change Division (CCD), with a specific mandate to address climate change issues including adaptation.

Jamaica is in the process of appointing a Climate Change Advisory Board (CCAB) which shall comprise representatives of the public and private sectors, academia and non-governmental organizations appointed by the Minister with portfolio responsibility for climate change. This Board will provide a platform for the exchange of scientific and technical information on climate change and related issues of importance to Jamaica and advise the Minister and the CCD.

The Government has recognized that, given the cross-cutting nature of climate change, there is an urgent need to develop an integrated approach in order to effectively build resilience at all levels and to have the required enabling policies in place. To facilitate a multi-sectoral approach to climate change, the Government of Jamaica has established the Climate Change Focal Point Network (CCFPN), comprising representatives from key Ministries, departments and agencies. The focal points are responsible for coordinating the development and implementation of their respective sectoral strategies and actions with respect to climate change in collaboration with the CCD, and the integration of climate change considerations into their respective policies, plans and programmes. The focal points will ensure the preparation and provision of periodic monitoring reports on these strategies and action plans to the CCD, and have been provided with climate risk screening tools and other training to facilitate climate resilience in policy and project development. Over time, representation on the Network will be expanded to the sub-national level, to include representation from local government, civil society groups, community organizations and the private sector, to increase the reach and participation.

In addition, Jamaica is currently working on several sector strategies and action plans within the forestry, agriculture and fisheries sector. Additional sectors expected to be actioned in the near-term include human health, tourism, water, human settlement and coastal resources, transport, energy, waste and finance sectors. Jamaica is currently preparing its third National Communication and first Biennial Update Report with a focus on the health, forestry, agriculture, water and tourism sectors.

Jamaica has already taken steps to assist the public and private sectors, community based organizations and non-governmental organisations in implementing adaptation efforts by making it easier to access funding as well as avenues for capacity building activities, including training in communication of climate change information. The country has also prepared, in collaboration with other regional governments and the UNEP, a proposal to support the implementation of an Urban Ecosystem-Based Adaptation project in the capital city of Kingston. This Project will increase the resilience of Kingston using ecosystem based approaches.

In May 2009, Jamaica accepted the offer extended by the Sub-Committee of the Pilot Program for Climate Resilience (PPCR) to participate in the PPCR as one of the six countries in the Caribbean regional pilot program. The other five countries are Grenada, St. Vincent, St. Lucia, Dominica, and Haiti. The pilot programmes and projects that are being implemented under the PPCR in Jamaica are to be led by the Planning Institute of Jamaica, a statutory body under the Ministry of Finance & Planning, and the Ministry of Water, Land, Environment & Climate Change. The PPCR will build on the Hazard Risk Reduction and Climate Change Adaptation component of Vision 2030 Jamaica - National Development Plan and the Second National Communication to the United Nations Framework Convention on Climate Change (UNFCCC).

The implementation of additional actions to increase resilience by reducing vulnerability is severely constrained by limited/access to financial resources, data, knowledge and awareness, technical capacity, and human resources. Actions on which Jamaica intends to follow through, with provision of support (some of which have already started) will include:

- Development of sectoral climate change strategies and action plans and the integration of climate change considerations in national policies and sectoral and local development plans and programmes.
- A comprehensive climate change awareness and education programme, targeting politicians, policy makers, the private sector and the general population.
- A national spatial plan.
- Implementation of high priority adaptation programmes/projects with cross-cutting and national impact in the water, agriculture, tourism, health, human settlement and coastal resources sectors.
- Prioritising data-gathering in all national climate change related proposals or projects.
- Investment in the installation and maintenance of automatic weather stations at strategic locations across the island. This includes training in the skill set to keep the stations operational.
- Implementing a central and secure national database for climate data.
- Strengthening the human and technical capacities for real time monitoring of climatic variations.
- Enhancing research capacities (e.g. at Universities, National Meteorological Service) to undertake climate variability research specific to Jamaica.

- Downscaling existing global climate models to national and sub-national scales.
- The pursuit and generation of new downscaled future scenarios premised on the representative concentration pathways (RCPs) being focussed on by the IPCC.
- Wide dissemination of information.

## Submission of Japan's Intended Nationally Determined Contribution (INDC)

Japan is pleased to communicate its intended nationally determined contribution, as well as information to facilitate the clarity, transparency, and understanding of the contribution.

Climate change is a global challenge. To solve the problem, it is essential to establish a fair and effective new international framework which is applicable to all major Parties. Japan will contribute, in cooperation with other Parties, to the establishment of such an international framework at the twenty-first session of the Conference of the Parties (COP) to the United Nations Framework Convention on Climate Change (UNFCCC).

Thereunder, Japan will, together with all major emitters, undertake domestic emission reductions and also contribute to reducing global greenhouse gas (GHG) emissions through Japan's leading technologies and support for developing countries.

Having faced a drastic change in its circumstances with regard to energy due to the Great East Japan Earthquake and the accident at the Tokyo Electric Power Company's Fukushima Dai-ichi Nuclear Power Station, Japan decided the new Strategic Energy Plan last year as a starting point for reviewing and rebuilding our energy strategy from scratch.

Japan's INDC towards post-2020 GHG emission reductions is at the level of a reduction of 26.0% by fiscal year (FY) 2030 compared to FY 2013 (25.4% reduction compared to FY 2005) (approximately 1.042 billion t-CO<sub>2</sub> eq. as 2030 emissions), ensuring consistency with its energy mix<sup>1</sup>, set as a feasible reduction target by bottom-up calculation with concrete policies, measures and individual technologies taking into adequate consideration, *inter alia*, technological and cost constraints, and set based on the amount of domestic emission reductions and removals assumed to be obtained.

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<sup>1</sup> The term "energy mix" in this INDC refers to the "Long-term Energy Supply and Demand Outlook" for FY 2030, decided by the Ministry of Economy, Trade and Industry on July 16, 2015.

### *Fairness and Ambition*

- Japan's GHG emissions per gross domestic product (GDP) are 0.29 kg-CO<sub>2</sub>eq./U.S. dollar in 2013 and per capita are 11t-CO<sub>2</sub>eq./person in 2013, while the energy efficiency of the country as a whole (primary energy supply/GDP) is 95 t of oil equivalent/U.S. million dollars in 2013, all of which are already at the leading level among developed countries.
- While it is generally analyzed that the marginal cost of reducing GHG emissions is high in Japan due, *inter alia*, to the measures taken so far, the indicators noted above are projected to improve by around 20 to 40% by 2030 with further measures to reduce emissions.
- Japan's INDC is highly transparent and concrete, as it has been drawn up by accumulating concrete policies and measures for major sectors with clear breakdowns. Each Party's submission and sharing of information on each sector in this manner would contribute to improving transparency, ensuring fairness, and also enabling effective reviews. This would promote sector-by-sector actions, which would lead to fair and efficient reductions of global emissions.
- For example, with regard to Japan's industrial sectors, both steel (converter steel production) and cement (clinker production) have attained the world's highest level of energy efficiency, but further improvement is planned through specific policies and measures listed in the attached documents, such as promotion and enhancement of the industries' action plans towards a low carbon society.

### *Contribution towards achieving the objective of the Convention as set out in its Article 2*

- Towards achieving the ultimate objective of the UNFCCC, in order to hold the increase in global temperatures below 2 degrees Celsius, it is indispensable to take measures for long-term emission reductions globally. Japan's INDC is consistent with the long-term emission pathways up to 2050 to achieve the 2 degrees Celsius goal as presented in the Fifth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC), and with the goal the country upholds, namely, "the goal of achieving at least a 50% reduction of global GHG emissions by 2050, and as a part of this, the goal of developed countries reducing GHG emissions in aggregate by 80% or more by 2050". Japan will contribute proactively to these long-term reductions, through its GHG emission reduction measures presented in its INDC, and through actions that will be continuously taken into the future such as development and diffusion of low-carbon technologies and transition to a low-carbon socio-economic structure.

## Japan's Intended Nationally Determined Contribution (INDC)

Japan's INDC towards post-2020 GHG emission reductions is at the level of a reduction of 26.0% by fiscal year (FY) 2030 compared to FY 2013 (25.4% reduction compared to FY 2005) (approximately 1.042 billion t-CO<sub>2</sub> eq. as 2030 emissions), ensuring consistency with its energy mix, set as a feasible reduction target by bottom-up calculation with concrete policies, measures and individual technologies taking into adequate consideration, *inter alia*, technological and cost constraints, and set based on the amount of domestic emission reductions and removals assumed to be obtained.

## Information to facilitate clarity, transparency and understanding

Base years:

- FY 2013 and FY 2005; FY 2013 is the base year mainly used for presenting Japan's INDC.

Target year: Japan's FY 2030

Period for implementation : from April 1, 2021 to March 31, 2031 (FY 2021 to FY 2030)

Scope (Sectors, Gases, Coverage)

- Sectors: All sectors and categories encompassing the following:
  - (a) Energy
    - Fuel Combustion (Energy industries, Manufacturing industries and Construction, Transport, Commercial/Institutional, Residential, Agriculture/Forestry/Fishing, and Other)
    - Fugitive emissions from fuels
    - CO<sub>2</sub> transport and storage
  - (b) Industrial processes and product use
  - (c) Agriculture
  - (d) Land Use, Land-Use Change and Forestry (LULUCF)
  - (e) Waste
- Gases: CO<sub>2</sub>, CH<sub>4</sub>, N<sub>2</sub>O, HFCs, PFCs, SF<sub>6</sub> and NF<sub>3</sub>
- Coverage: 100%

## Planning process

- Japan's INDC has been developed, taking into account, *inter alia*, decisions of the COP, actions by other countries, progress in deliberations on a future framework under the Convention, and domestic consideration of the energy policies and its energy mix.
- The INDC was considered through discussions open to the public at the Joint Experts' Meeting of the Central Environment Council (Subcommittee on Global Warming Measurement after 2020, Global Environment Committee) and the Industrial Structure Council (INDC WG, Global Environment Subcommittee, Committee on Industrial Science and Technology Policy and Environment).
- Energy policies and the energy mix were considered through open discussions at the Advisory Committee for Natural Resources and Energy.
- The main policies and measures that are expected, at this time, to be implemented for reduction of GHG emissions and removals are listed in the reference information attached.
- Based on the discussions above, the Global Warming Prevention Headquarters (ministerial decision-making for global warming countermeasures) developed a draft INDC. After going through public comment procedure, it made a final decision on the INDC.
- Japan is to develop the Plan for Global Warming Countermeasures based on the Act on Promotion of Global Warming Countermeasures.

## Assumptions and methodologies

- Methodologies are in line with the Guidelines for National Greenhouse Gas Inventories prepared by the IPCC, and adopted by the COP.
- The metrics used for the total GHG emissions and removals is the Global Warming Potentials of a 100-year time horizon which were presented in the IPCC Fourth Assessment Report.
- Removals by LULUCF sector are accounted in line with approaches equivalent to those under the Kyoto Protocol.
- The Joint Crediting Mechanism (JCM) is not included as a basis of the bottom-up calculation of Japan's emission reduction target, but the amount of emission reductions and removals acquired by Japan under the JCM will be appropriately counted as Japan's reduction.
- These methodologies are subject to change depending on the progress of future international negotiations on estimating and accounting rules.

## Reference information

### 1. GHG emissions and removals

#### 1. GHG emissions reductions

##### (1) Energy-Originated CO<sub>2</sub>

Approximately 90% of GHG emissions in Japan is covered by energy-originated CO<sub>2</sub>. Emissions of energy-originated CO<sub>2</sub> will be reduced by 25.0% compared to FY 2013 level (24.0% reduction compared to FY 2005 level) (approximately 927 million t-CO<sub>2</sub>). The estimated emissions in FY 2030 in each sector are shown in Table 1.

Table 1 Estimated emissions of energy-originated CO<sub>2</sub> in each sector

	Estimated emissions of each sector in FY 2030	FY 2013 (FY 2005)
Energy originated CO <sub>2</sub>	927	1,235 (1,219)
Industry	401	429 (457)
Commercial and other	168	279 (239)
Residential	122	201 (180)
Transport	163	225 (240)
Energy conversion	73	101 (104)

[Value : million t-CO<sub>2</sub>]

##### (2) Non-energy originated CO<sub>2</sub>

The target is set as 6.7% reduction compared to FY 2013 level (17.0% reduction compared to FY 2005 level) (approximately 70.8 million t-CO<sub>2</sub>).

##### (3) Methane

The target is set as 12.3% reduction compared to FY 2013 level (18.8% reduction compared to FY 2005 level) (approximately 31.6 million t-CO<sub>2</sub>eq.).

##### (4) Nitrous oxide

The target is set as 6.1% reduction compared to FY 2013 level (17.4% reduction compared to FY 2005 level) (approximately 21.1 million t-CO<sub>2</sub>eq.).

Table 2 Estimated emissions of non-energy-originated CO<sub>2</sub>, methane and nitrous oxide

	Estimated emissions of each gas in FY 2030	FY 2013 (FY 2005)
Non-energy originated CO <sub>2</sub>	70.8	75.9 (85.4)
Methane (CH <sub>4</sub> )	31.6	36.0 (39.0)
Nitrous oxide (N <sub>2</sub> O)	21.1	22.5 (25.5)

[value : Million t-CO<sub>2</sub>eq.]

(5) Fluorinated gases (HFCs, PFCs, SF<sub>6</sub> and NF<sub>3</sub>)

The target is set as 25.1% reduction compared to Calendar Year(CY) 2013 level (4.5% increase compared to CY 2005 level) (approximately 28.9 million t-CO<sub>2</sub>eq.).

Table 3 Estimated emissions of fluorinated gases

	Estimated emissions in CY 2030	CY 2013 (CY 2005)
Fluorinated gases	28.9	38.6 (27.7)
HFCs	21.6	31.8 (12.7)
PFCs	4.2	3.3 (8.6)
SF <sub>6</sub>	2.7	2.2 (5.1)
NF <sub>3</sub>	0.5	1.4 (1.2)

[value : Million t-CO<sub>2</sub>eq.]

\* Fluorinated gases are estimated on a CY basis.

## 2. Removals by LULUCF

The target for removals is set as approximately 37 million t-CO<sub>2</sub> (corresponding to 2.6% reduction of total emissions in FY 2013 (corresponding to 2.6% reduction of total emissions in FY 2005)) (approximately 27.8 million t-CO<sub>2</sub> by forest carbon sinks measures (corresponding to 2.0% of total emissions in FY 2013 (corresponding to 2.0% reduction of total emissions in FY 2005)), and approximately 9.1 million t-CO<sub>2</sub> by cropland management, grazing land management and revegetation (corresponding to 0.6% reduction of total emissions in FY 2013 (corresponding to 0.7% reduction of total emissions in FY 2005))).

## 3. JCM and other international contributions

Japan establishes and implements the JCM in order both to appropriately evaluate contributions from Japan to GHG emission reductions or removals in a quantitative manner achieved through the diffusion of low carbon technologies, products, systems, services, and infrastructure as well as implementation of mitigation actions in developing countries, and to use them to achieve Japan's emission reduction target. Apart from contributions achieved through private-sector based projects, accumulated emission reductions or removals by FY 2030 through governmental JCM programs to be undertaken within the government's annual budget are estimated to be ranging from 50 to 100 million t-CO<sub>2</sub>. As part of international contributions other than the JCM, worldwide emission reduction potential in FY 2030 through the diffusion of leading technologies by Japanese industries' actions is estimated to be at least 1 billion t-CO<sub>2</sub>.

Japan will also actively contribute internationally towards, *inter alia*, human resource development and promotion of development and diffusion of technologies relating to emission reductions in developing countries.

2. Energy mix used for the bottom-up calculation of the emission reduction target

	FY 2030
● Final energy consumption	326 M kl
(Energy efficiency measures)	50 M kl

● Total power generation	approx. 1065 billion kWh
Renewables	approx. 22-24%
Nuclear power	approx. 22-20%
Coal	approx. 26%
LNG	approx. 27%
Oil	approx. 3%
(within renewables)	
Solar	approx. 7.0%
Wind power	approx. 1.7%
Geothermal	approx. 1.0-1.1%
Hydro power	approx. 8.8-9.2%
Biomass	approx. 3.7-4.6%

3. Measures which form the basis for the bottom-up calculation of the GHG emission reduction target

	FY 2030 emission targets (million t-CO <sub>2</sub> )	FY 2013 (FY 2005) (million t-CO <sub>2</sub> )	Measures
Energy-originated CO <sub>2</sub>	927	1,235 (1,219)	
Industry sector	401	429 (457)	<ul style="list-style-type: none"> <li>• Promotion and enhancement of the industries' action plans towards a low carbon society</li> </ul> <u>Iron and steel industry</u> <ul style="list-style-type: none"> <li>• Efficiency improvement of electricity-consuming facilities</li> <li>• More chemical recycling of waste plastic at steel plants</li> <li>• Introduction of next-generation coke making process (SCOPE21)</li> <li>• Improvement of power generation efficiency</li> <li>• Enhanced energy efficiency and conservation facilities</li> <li>• Introduction of innovative ironmaking process (Ferro Coke)</li> <li>• Introduction of environmentally harmonized steelmaking process (COURSE50)</li> </ul>

			<p><u>Chemical industry</u></p> <ul style="list-style-type: none"> <li>• Introduction of energy efficiency and conservation process technology in petrochemicals</li> <li>• Introduction of energy efficiency and conservation process technology in other chemical industry</li> <li>• Introduction of energy efficiency and conservation technology using membranes for distilling process</li> <li>• Introduction of technology which uses CO<sub>2</sub> as a feedstock</li> <li>• Introduction of chemical product production technology with inedible plant-based material</li> <li>• Introduction of electricity-generating waste water processing with microbe catalysis</li> <li>• Introduction of sealed plant factory</li> </ul> <p><u>Ceramics, stone and clay products industry</u></p> <ul style="list-style-type: none"> <li>• Introduction of conventional energy efficiency and conservation technologies (waste heat power generation, slag crusher, air-beam cooler, separator improvement, vertical roller coal mills)</li> <li>• Introduction of technology for using waste (e.g. waste plastic, etc.) as alternative thermal energy</li> <li>• Introduction of innovative cement production process</li> <li>• Introduction of glass melting process</li> </ul> <p><u>Pulp/paper/paper products manufacture industry</u></p>
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			<ul style="list-style-type: none"> <li>• Introduction of high-efficient pulp production technology using old paper</li> <li>• Introduction of high-temperature and pressure recovery boilers</li> </ul> <p><u>Cross-sectoral/Other</u></p> <ul style="list-style-type: none"> <li>• Introduction of high-efficient air conditioner</li> <li>• Introduction of industrial HP (heating-drying)</li> <li>• Introduction of industrial light</li> <li>• Introduction of low-carbon industrial furnace</li> <li>• Introduction of industrial motor</li> <li>• Introduction of high performance boiler</li> <li>• Direct use of recycled plastic flakes</li> <li>• Introduction of hybrid construction machine, etc.</li> <li>• Introduction of energy efficiency and conservation farming machinery</li> <li>• Introduction of energy efficiency and conservation equipment in horticultural facility</li> <li>• Switch to energy efficiency and conservation fishing vessels</li> <li>• Promotion of cooperative energy efficiency and conservation measures across the industries</li> <li>• Promote low-carbonization in special vehicles</li> </ul> <p><u>Factory energy management</u></p> <ul style="list-style-type: none"> <li>• Thorough implementation of energy management in the industry sector</li> </ul>
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Commercial and other sectors	168	279 (239)	<ul style="list-style-type: none"> <li>• Promotion of compliance of energy saving standards for newly constructed buildings</li> <li>• Energy efficiency and conservation buildings (remodeling)</li> <li>• Introduction of commercial-use water heater (latent heat collection water heater, commercial-use heat pump water heater, high-efficient boiler)</li> <li>• Introduction of highly efficient light</li> <li>• Introduction of refrigerant control technology (F-gases)</li> <li>• Improvement of energy efficiency and conservation performance of equipment by the top runner program, etc.</li> <li>• Thorough implementation of energy management in commercial sector with BEMS and energy efficiency diagnosis</li> <li>• Efficient use of light</li> <li>• Promotion of nationwide campaigns (thorough promotion of Cool Biz/Warm Biz, repair of local government buildings)</li> <li>• Expansion of shared use of energy</li> <li>• Promotion of measures for energy efficiency and conservation of/energy generation from sewerage systems</li> </ul>
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			<ul style="list-style-type: none"> <li>• Promotion of measures for energy efficiency and conservation/renewable energy in water business</li> <li>• Promotion of activities based on action plans of local governments (administrative business section)</li> <li>• Promotion of sorted collection and recycling of plastic containers and packaging</li> <li>• Low-carbonization of cities by improving urban thermal environments through measures against the urban heat island effect</li> <li>• Promotion of inter-ministry collaborative measures following the Roadmap of Global Warming Counter-measures, etc.</li> </ul>
Residential sector	122	201 (180)	<ul style="list-style-type: none"> <li>• Promotion of compliance of energy saving standards for newly constructed housing</li> <li>• Promotion thermal insulation in renovation of existing houses</li> <li>• Introduction of high-efficient water heater (CO<sub>2</sub> refrigerant HP water heater, latent heat collection water heater, fuel cell, solar water heater)</li> <li>• Introduction of high-efficient light</li> <li>• Improvement of energy efficiency and conservation performance of equipment by the top runner program, etc.</li> </ul>

			<ul style="list-style-type: none"> <li>• Thorough implementation of energy management in houses with HEMS and other smart meters</li> <li>• Promotion of nationwide campaigns (thorough promotion of Cool Biz/Warm Biz, and encouragement of purchase of upgraded, Home CO<sub>2</sub> advisor)</li> <li>• Increasing Johkasou energy efficiency and conservation</li> <li>• Promotion of inter-ministry collaborative measures following the Roadmap of Global Warming Counter-measures, etc.</li> </ul>
Transport sector	163	225 (240)	<ul style="list-style-type: none"> <li>• Improvement of fuel efficiency</li> <li>• Promotion of next-generation automobiles</li> <li>• Other measures in transport sector (traffic flow improvement, promotion of public transport, modal shift to railway, comprehensive measure for eco-friendly ship transportation, reduction of land transportation distance by selecting nearest port, comprehensive low-carbonization at ports, optimization of truck transport, energy consumption efficiency improvement of railways, energy consumption efficiency improvement of aviation, accelerated promotion of energy saving ships, making vehicle transport business more eco-friendly by eco-driving, promotion of collective</li> </ul>

			<p>shipment, promotion of Intelligent Transport Systems ITS (centralized control of traffic signals), development of traffic safety facilities (improvement of traffic signals, and promotion of the use of LED traffic lights), promotion of automatic driving, eco-driving and car sharing)</p> <ul style="list-style-type: none"> <li>• Utilization of the special zones system for structural reform for global warming measures</li> <li>• Promotion of inter-ministry collaborative measures following roadmap of global warming measures, etc.</li> </ul>
Energy conversion sector	73	101 (104)	<ul style="list-style-type: none"> <li>• Expanding renewable energy introduction to the maximum extent possible</li> <li>• Utilizing nuclear power generations whose safety is confirmed</li> <li>• Pursuit of high efficiency in thermal power generation (USC, A-USC, IGCC, etc.)</li> </ul>
Cross-sectional strategies	—	— (—)	<ul style="list-style-type: none"> <li>• Promotion of the J-Credit Scheme</li> </ul>

	FY 2030 emission targets (million t-CO <sub>2</sub> eq.)	FY 2013 (FY 2005) (million t-CO <sub>2</sub> eq.)	Measures
Non energy-originated CO <sub>2</sub>	70.8	75.9 (85.4)	<ul style="list-style-type: none"> <li>• Expansion of blended cement use</li> <li>• Reduction of municipal solid waste incineration</li> </ul>
CH <sub>4</sub>	31.6	36.0 (39.0)	<ul style="list-style-type: none"> <li>• Measures to reduce CH<sub>4</sub> emissions from agricultural soils (reduction of CH<sub>4</sub> emissions from paddy rice fields)</li> <li>• Reduction of municipal solid waste disposed of by direct landfill</li> <li>• Introduction of semi-aerobic landfill system for final disposal site of municipal solid waste</li> </ul>
N <sub>2</sub> O	21.1	22.5 (25.5)	<ul style="list-style-type: none"> <li>• Measures to reduce N<sub>2</sub>O emissions from agricultural soils (reduction of N<sub>2</sub>O emissions originated from fertilizer application)</li> <li>• Promote the advanced technologies in the sewage sludge incineration facilities</li> </ul>
Fluorinated gases	28.9	38.6 (27.7)	<ul style="list-style-type: none"> <li>• Measures to control overall emissions of fluorinated gases (Act on Rational Use and Proper Management of Fluorocarbons, emission control through industries' voluntary action plans, etc.)</li> </ul>
HFCs	21.6	31.8 (12.7)	
PFCs	4.2	3.3 (8.6)	
SF <sub>6</sub>	2.7	2.2 (5.1)	

	NF <sub>3</sub>	0.5	1.4 (1.2)	
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	FY 2030 removals targets (million t-CO <sub>2</sub> )	FY 2013 (FY 2005) (million t-CO <sub>2</sub> )	Measures
LULUCF sector	37.0	— (—)	<ul style="list-style-type: none"> <li>• Promote measures for greenhouse gas removals through the promotion of forest management/forestry industry measures</li> <li>• Promotion of soil management leading to the increase of carbon stock in cropland</li> <li>• Promotion of revegetation</li> </ul>
Forest management	27.8	— (—)	
Cropland management /Grazing land management	7.9	— (—)	
Revegetation	1.2	— (—)	



## Hashemite Kingdom of Jordan

### Intended Nationally Determined Contribution (INDC)<sup>1</sup>

#### Jordan's INDC Summary

Jordan nationally determines to reduce its greenhouse gas emissions by a bulk of 14 % until 2030. This contribution of GHGs reduction will be unconditionally fulfilled at, maximally, 1.5 % by the Country's own means compared to a business as usual scenario level.

However, Jordan, conditionally and subject to availability of international financial aid and support to means of implementation, commits to reduce its GHGs emissions by additional, at least, 12.5 % by 2030.

The outcome targets above are accompanied by a diverse combination of numerous GHGs cut-oriented actions in all involved sectors of emissions in addition to the adaptation actions in targeted sectors. These actions (policies, strategies, legislations, measures, etc) are articulated in this document. The methodological approaches underlying Jordan's INDC are included in this communication as well.

#### ملخص بالعربية

تنوي المملكة الأردنية الهاشمية القيام بالإسهامات المحددة وطنيا للحد من انبعاثات الغازات المسببة للاحتباس الحراري بنسبة تخفيف تصل لغاية 14٪ حتى عام 2030. علماً بأن الحد الأقصى لنسبة التخفيف غير المشروطة هي 1.5٪ مقارنة بمستوى السيناريو المعتاد. كما أن المملكة تلتزم بالحد من انبعاثات غازات الدفيئة بنسبة تصل على الأقل لغاية 12.5٪ بحلول عام 2030 مشروطة بتوافر المساعدات المالية الدولية ودعم وسائل التنفيذ.

يرافق الأهداف التخفيفية هذه مجموعة متنوعة من العديد من إجراءات التخفيف من غازات الدفيئة في جميع القطاعات المعنية بخفض الانبعاثات بالإضافة إلى إجراءات التكيف في القطاعات المعنية. وهذه الإجراءات (السياسات والاستراتيجيات والتشريعات والإجراءات، الخ) تم تضمينها في هذه الوثيقة مقرونة بالأساليب والمنهجيات التي أدت إلى تحديدها.

#### 1. Welcoming Remarks to Jordan's INDCs

The Government of the Hashemite Kingdom of Jordan (GoJ) welcomes you to Jordan's diversified (a wide rainbow of combination of outcomes and actions) INDC. Jordan believes that such contribution sets an ambitious target, proportionate to the circumstances of such a small developing country if necessary financial support and means of implementation made available to the country to implement such contribution. The unconditional outcome target is aiming at reducing Jordan's greenhouse gases (GHGs) emissions by 1.5 % by 2030 compared to a business as usual scenario levels. The conditional outcome target is aiming at reducing Jordan's GHGs emissions by 12.5 % by 2030. The two targets will be achieved based on implementing at least 70<sup>+</sup> projects (43 sectoral projects resulted from the mitigation scenario assessment articulated in the 2014 Third National Communication Report to UNFCCC and another around 27<sup>+</sup> sectoral priority projects proposed concurrently or newly planned and not listed in the TNC Report, i.e., proposed after the development of the TNC. The later group of projects was disseminated to INDC document by involved stakeholder line ministries and organizations in response to INDC formulation process. This 70<sup>+</sup> project 14-percent INDC of Jordan, of which many projects are now under execution by relevant institutions, will be implemented under the guidance of the overarching national *Climate Change Policy of the Hashemite Kingdom of Jordan 2013-2020*. The climate change policy of Jordan is a holistic nation-wide policy encompassed strategic objectives and measures for mitigation and adaptation. It is considered the first of its kind in the Arab Region and, in terms of sectoral coverage, in the Middle East, covering the pre-2020 period, which was developed voluntarily as a demonstration of the self-commitment of a small yet an ambitious country. The *Policy* itself as well will be extended at the end of its term to 2030 (another ambitious action-style contribution of Jordan) to concurrently go in line with and serve as an overarching umbrella guiding and monitoring the implementation of the 70<sup>+</sup>-project 14-percent GHGs emission reduction pathway of activities until 2030.

This combination of a holistic national-level *Policy* aiming at guiding sectoral objectives and measures, accompanied by an ambitious mitigation target decided upon by GoJ, which could be met systematically if sufficient support is effectively provided to the country, will be a first, yet a serious step in line with the 2°C objective.

The estimated cost to reach the 14% target is totaling USD 5,700,000,000 from which GoJ has already secured USD 542,750,000 by its own means to meet the unconditional target; which means the Country is in need of

<sup>1</sup> Jordan's INDC development process was supported by GIZ through the Global GIZ Project "Support to Selected Partner Countries in Developing their Intended Nationally Determined Contributions (GIZ-INDCs Global Project)" - A project of the International Climate Initiative (IKI).

USD 5,157,250,000 to fulfill its conditional target.

With regard to adaptation to climate change and before developing of the National Climate Change Policy of Jordan 2013-2020, which advanced concrete strategic objectives, measures, and instruments to adapt the Country to climate change impacts in each involved sector (water, coastal areas, agriculture/food security, health, tourism, biodiversity, and socioeconomic situation/poverty), Jordan conducted (2009-2013) a major joint program of water and health sectors' adaptation namely "Adaptation to Climate Change to Sustain Jordan's MDG Achievements" with a total budget of USD 4.13M. The program's outcomes were to develop sustained access to improved water supply sources, despite increasing water scarcity due to climate change and to strengthen the capacity for health protection and food security under conditions of water scarcity. Moreover, and in continuation of national actions, the Country mainstreamed climate change in its *National Strategy and Action Plan to Combat Desertification (2015-2020)* which was recently aligned with the global UNCCD 10 year Strategy. Jordan also mainstreamed climate change into the *National Biodiversity Strategy and Action Plan (2015-2020)*, which was also recently aligned with the global CBD-10 year Strategy.

Finally, all sustainable development-oriented plans in the country have led to a crowning national effort, which will be the development of a national strategy and action plan for transitioning towards the green economy in Jordan (2016-2025) which is currently under development. All of such climate change-response actions demonstrate the extraordinary efforts and the size of involvement of such a small country in the fight against climate change.

## 2. Climate Change and Sustainable Development Circumstances in Jordan

### 2.1. GHGs and climate change actions undertaken pre-2020

Based on the base year 2006, Jordan's share in global greenhouse gas emissions was 28,717 Gg of CO<sub>2</sub> eq., which is 28.72 million ton (Mt) of CO<sub>2</sub> equivalent (detailed breakdown of emissions shares per surveyed sectors and covered gases is provided in the TNC Report to UNFCCC and the accompanying inventory submitted in late 2014). The Country's bulk share of GHGs represents only around 0.06% of global total according to a global GHGs analysis conducted in 2010<sup>2</sup>. According to World Bank, the CO<sub>2</sub> metric tons per capita emission is 3.4 in 2010.

As Figure 1 below illustrates, energy (including transport)-related activities have the dominant share of GHGs emissions in Jordan totaling 73% followed by almost close percentage for both waste and industrial activities totaling 10% and 9% respectively. Activities from Agriculture and LULUCF have the lowest, also close percentages, of 5% and 3.0% respectively.

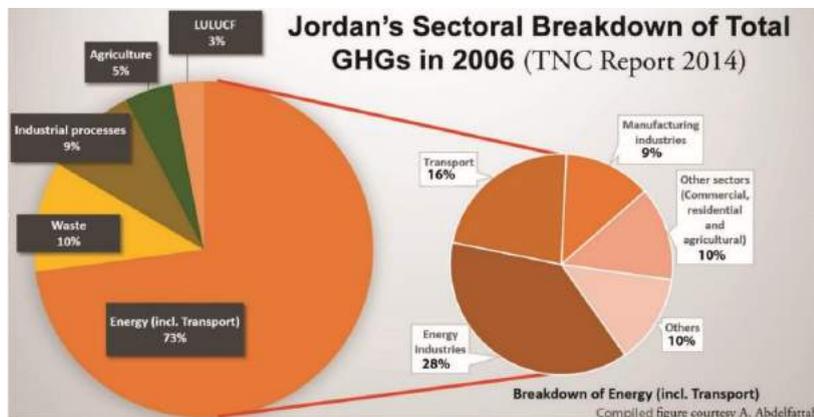


Figure 1. Jordan's greenhouse gas emissions by sectors in 2006.

These emissions are expected to grow according to the 2006 baseline scenario used in the TNC (2014) to 38,151 Gg, 51,028 Gg and 61,565 Gg of CO<sub>2</sub> eq. in the years 2020, 2030 and 2040 respectively due to normal growth models. The role of the energy sector and sub-sectors as the leading emitter of GHGs is expected to increase in the future from 73% of total emissions in the year 2006 to 83% in the year 2040 according to a BAU scenario. Therefore, it is anticipated to focus the mitigation efforts of the Country on this sector.

The baseline scenarios was based on 2014 conditions, which were deeply relying on imported fossil fuel and the delay in renewable and alternative energy projects as well as interruptions in gas supplies. Now, in 2015 the conditions have changed with more emphasis on renewable and gas. We believe when Jordan develops its BUR based on 2010 inventory the baseline scenario will lead to a peak year.

<sup>2</sup> United States Department of Energy's Carbon Dioxide Information Analysis Center (CDIAC) for the United Nations, 2010. The data only considers carbon dioxide emissions from the burning of fossil fuels and cement manufacture, but not emissions from land use, land-use change and forestry. Emissions from international shipping or bunker fuels are also not included in national figures.

Historically, Jordan was amongst the most active countries in the region with regard to involvement in international climate change efforts and response actions. Jordan was amongst the first group of developing countries to ratify the UNFCCC and make an accession to the Kyoto Protocol in 1994 and 2003 respectively. In response to its obligations towards the UNFCCC, Jordan prepared and submitted its Initial National Communication on Climate Change in 1997 and the Second National Communication in 2009. Moreover, Jordan has launched its Third National Communication Report to UNFCCC in December 2014. In line with that, Jordan has systematically continued its efforts in responding to climate change by developing and starting implementing national strategies and policies; of which Jordan, supported by UNDP, has developed a national climate change policy in 2013, the first comprehensive policy in the Arab Region and the Middle East as elaborated above.

However, Jordan, as a non-Annex I country, has, so far, no commitments for GHG emission reduction targets. Nevertheless, Jordan believes that there is a large potential for mitigation, even though Jordan's total GHG emissions are very small in absolute terms compared to other countries as indicated above. Developing full-fledged NAMA projects and capacity building in establishing and running an effective MRV system both on macro level and on sectoral and activity levels are highly needed since MRV is looked at as prerequisite for developing NAMAs. More dedicated efforts are needed to provide institutional capacity strengthening for data collection and management particularly with regard to mitigation. There is good improvement in renewable energy policies, strategies, laws and by-laws formulation but improving robust implementations still needs further work. However, there is now so much activities going on renewables in the Country. Private sector engagement in climate change activities is still not at the expectation level but slowly improving and good progress is taking place in investment in renewable energy sector particularly. However, the overwhelming majority of climate initiatives and projects in Jordan are still donor-driven. Thus, the pledged reduction of emissions by 2030 of 14 % compared to a BAU scenario levels still require substantial international financial support and a paradigm shift in national planning that includes the allocation of domestic resources for low carbon emission growth strategies.

## **2.2. Climate change vulnerability of Jordan and impacts**

Climate change is expected to affect sustainable development, economic growth and society. Based on outcomes from the latest Third National Communication Report to UNFCCC (2014), serious vulnerability and impacts results are expected based on modeling and projections analyses. Predicted trends indicated that the annual precipitation tends to decrease significantly with time. Simultaneously, the mean, maximum and minimum air temperature tends to increase significantly by 0.02, 0.01, and 0.03 °C/year, respectively. On the other hand, the relative humidity tends to increase significantly by an average of 0.08%/year. In addition, the dynamic projections predicted more extremely likely heat waves and likely drought events, dry days, and potential evaporation among other potential impacts (TNC 2014).

## **2.3. Sustainable development challenges in Jordan**

Located at the heart of the Middle East, Jordan is a small upper-middle income county with scarce natural resources (in particular water), and a small industrial base within the service sector (the later contributes around 70% of GDP) which dominates the economy. The country is shaped by its geography, history, geopolitics and scarcity in natural resources. The government identified poverty and unemployment as two of the most important challenges the Country faces. The challenge of meeting the increasing energy demands is another pressing issue. Before elaborating on the expected GHGs growth patterns and mitigation potential, it is important to present some information about Jordan especially in light of current development challenges impacted by economic and regional political situation.

The demographic characteristics of the Jordanian population show that the Jordanian development process faces a challenge in providing basic needs in such a developing country. Jordan has a total population of approximately 6.388 million. However, over the past decade, Jordan has seen considerable economic and social achievements; GDP per capita has increased from JD (1512) in 2004 to about JD (3670) in 2014. Jordan has also invested significant resources in infrastructure facilities serving the citizens, made remarkable human development achievements, maintained stability and attracted foreign and domestic investment. These achievements were accompanied by some challenges that are still unresolved, mainly the development gap between governorates, high unemployment rates, especially among young people and the relative decline in certain competitiveness indicators. However, the general situation in Jordan, the level of infrastructure, and the institutional development help Jordan to leap ahead and start addressing and overcoming challenges. His Majesty King Abdullah II has highlighted the most prominent challenges, the way to the future and the social and economic model that the country aspire in his letter to the government to develop a vision for the next decade.

In His Majesty Abdullah II Ibn Al Hussein's Opening Address at the World Economic Forum on the Middle East and North Africa, 2015, His Majesty highlighted the importance of securing reliable sources of energy saying {quote} "We also need to find the opportunities in challenge. To define our region by problems and not

*solutions is to miss huge potential. Rapid urbanization, education requirements, water scarcity, the need for reliable energy, building health and transport infrastructure: these are critical issues for most of our countries.”, “In Jordan, we are looking to new projects in urban development, water infrastructure, and a diversified, long-term energy platform” “Today, Jordan is bringing solar heating and lighting to our schools and offices, electric vehicles to our streets and industries, a digital system for our health sector, e-payments for transactions, even iris recognition for channeling assistance to refugees. These are just a few examples. You at this Forum, and your peers in the region, will create many, many more.” {end quotes}*

The high annual growth rates of demand for energy (4-5% for primary energy and 5.3% for demand for electricity) for the period 2015-2025 remains one of the highest in the world and thus is considered one of the Kingdom’s most significant development challenges. In 2013, total primary energy consumed in Jordan was about 8.2 million tons of oil equivalent, 82% of which were crude oil and oil derivatives, 11% natural gas, 3% renewable energy and imported electricity and 4% petroleum coke and coal. The national energy sector’s main concern is the provision of adequate energy for development with the least possible cost and best quality. The energy sector still suffers from extreme fluctuations of oil prices and the ability to secure constant and sustainable energy supply for the country.

While Jordan has achieved many sustainable development goals, sustaining these results and reducing the burden of the energy sector on economic and social development will increasingly depend on the transition to a sustainable energy future. The high cost of importing energy puts a heavy burden on the public budget already constrained by running costs. Since the prices of energy imports have increased with high risk in constant supplies, this situation spurred governmental action to improve energy efficiency and provide additional energy resources. The running policy of the GoJ in the field of energy was shaped through the adoption of the Updated Master Strategy of Energy Sector in Jordan for the period 2007-2020. The main goals of the Strategy are to secure reliable energy supply through increasing the share of local energy resources such as oil shale, natural gas in the energy mix, expanding the development of renewable energy projects, promoting energy conservation and energy efficiency and awareness and generating electricity from nuclear energy. The options include as will a diversification of Liquefied Natural Gas (LNG) possibly from Qatar or the new Leviathan Basin in the Eastern Mediterranean (thus, a new LNG port is already operational in Aqaba); new oil and gas pipelines from Iraq; and search for new shale potentials.

The running energy strategy is to transform the energy mix from one heavily reliant on oil and natural gas to one more balanced with a higher proportion of energy supplied by oil shale and renewable sources. The energy strategy sought to increase reliance on local energy sources to 25 % by 2015, and up to 39 % by 2020 as set in 2020 Energy Strategy. Placing more emphasis on the utilization of renewable energies will alleviate the dependency on the traditional energy sources, especially oil, which is imported from neighboring countries. This will also be paralleled with the reduction of energy produced from oil from 82% in 2013 to reach 50% in 2020.

The 2013 Arab Future Energy Index (AFEX) showed that Jordan has made progress in this regard, ranking second in the Arab region for renewable energy trends and the second for energy efficiency. The 2012 Energy Efficiency and Renewable Energy Law no. 13 is also a key enabler, providing incentives for sustainable energy solutions as Jordan seeks to increase renewable energy from 2% of overall energy in 2013 to 10 % in 2020, and to improve energy efficiency by 20 % by 2020.

The influx of Syrian refugees into Jordan has increased the demand for energy and electricity. In addition to long-standing structural challenges in the energy sector in terms of supply, demand as well as management, Jordan also faces exacerbating factors resulting from the increase of Syrian refugees, who comprise nearly 13 % of Jordan’s 6.388 million population. Although Syrian refugees and forced migrants fall within the lower-income bracket and average energy consumptions remain less impactful on the broad energy challenges in Jordan relative to core energy users in the Country, total residential energy consumption has risen significantly.

From another corner, the development of industrial and services sectors in Jordan, accompanied with the increase of Jordanian population and the increase of numbers of vehicles has resulted in an increase in the GHGs and pollution emitted to the ambient air in the last decades. Transport sector in Jordan is a major contributor to increasing emissions of greenhouse gases. With a percentage of 16% of emissions share to the bulk GHGs of Jordan, transport sector is the second source (after energy sector emitting 28%) of GHGs emissions in the country. The Ministry of Transport (MoT) launched a long-term national strategy 2014 in which the sustainable transport is one of its pillars. Mobility of people and freight is a widely shared goal amongst transport policy makers in Jordan; therefore, the MoT is obliged to form its policies in line with sustainable transport trend. One of the major objectives of the long-term transport strategy at MoT is to increase the total number of commuters using public transport as a percentage of the total number. In 2010 this percentage stood at 13 percent, 9 of which were taxis. It is anticipated that this percentage would increase by implementing programs and projects that will enhance the quality of service of the whole public

transit network to 25 percent by 2025.

The environmental sustainability of Jordan's transport strategies are focused on three main aspects, namely *emissions, energy consumption, and traffic reduction*. MoT believes it is important to reduce all emissions from transport sector (i.e. CO<sub>2</sub>, CO, PMx, NOx expressed in tons per day). MoT will also work on reducing percentage of fuel consumption (in tons per day) which might be achieved through the implementation of the transport strategy. With regard to traffic reduction, MoT will work on this contribution in terms of reduction of V-km at national level and in densely populated areas by type of vehicle (i.e. car, HGV, LGV and expressed in 1000v-km per day). MoT believes that introducing higher order public transit systems such as bus rapid transit (BRT) systems is key to improving the transport service in the country. MoT is already taking on the Zarqa- Amman project that would link to the Amman BRT system that is being implemented. Initial steps are being taken to tackle other probable viable routes including Salt- Sweileh- Baqaa.

Serious measures are being taken to implement the national railway system, which would be a cornerstone of the planned multimodal network that would play a major role in the ease of the transport of goods within the country and the surrounding region. With such system in place, the reductions of emissions from these activities are obvious. MoT believes that utilizing latest technology in the transit sector can add to the efficiency of operations; implementing applications that connect taxis to customers for instance can reduce idle time thus reducing energy usage thereby reducing emissions. Acquiring accurate data for origin and destination of passengers can pave the way for better route planning, thereby increasing the ride ability and shortening trip distances. Moreover, MoT is targeting to increase transport sector reliability. Adopting and implementing policies related to fleet characteristics would also enhance efficiency and reduce emissions. Issues related to fleet service life, replacement incentives, and reconfiguration of technical elements will have a positive effect on energy consumptions and reducing CO<sub>2</sub> and other greenhouse gases emissions.

#### **2.4. Demographic, economic and political challenges**

One of the main demographic and thus political determinants for Jordan and thus development implications is migration. Being at the crossroads of two major areas of instability and prolonged conflicts, Jordan has become the destination for several waves of forced migrants from Palestine and lately from Iraq and Syria. Since 2011, and until February 2015 Jordan has hosted over 650,000 refugees from Syria, with approximately three-quarters living in urban areas across the Country and one-quarter living in refugee camps in the northern region. The waves of refugee influxes are still on going, as the conflict has no foreseeable solution. Based on data from Department of Statistics (DOS) obtained at the end of 2014, the total number of unregistered Syrian people in Jordan is 750,000 people while the registered number with UNHCR is 650,000. The grand total number of Syrian in Jordan is 1.4 million persons.

Jordan has been affected by not only the adverse regional and global developments such as the political situations in the area but also by the continuing global financial and economic crises as well as the rise in commodity prices in the international markets. The rapid growths in economic activities, population and successive influxes of refugees over the last decade have imposed additional demands on energy resources. As matter of fact, Jordan is a country with limited indigenous energy resources. Jordan imports about 97% of its energy requirements, which includes mainly crude oil, oil derivatives and natural gas. Local sources cover the remaining 3% of requirements with renewable energy contributing only a small proportion to this mixture. This 97% import of energy needs is accounting for almost 20% of the GDP, which makes the country completely reliable on and vulnerable to the global energy market.

#### **2.5. A future sustainable development vision in favor of low-carbon economy**

Recently, the GOJ launched in mid of 2015 Jordan's 2025 National Visions and Strategy, which charts a path for the future and determines the integrated economic and social framework that will govern the economic and social policies based on providing opportunities for all. Jordan 2025 includes more than 400 policies or procedures with performance indicators (including energy, water, waste, agriculture and other mitigation-oriented sectoral policies, procedures and indicators) which will lead to reduction of GHGs that will be implemented through a participatory approach between the government, business sector and civil society. Most importantly, the 2025 National Vision and Strategy has set a 11% Key Performance Indicators (KPIs)-style "targets" for renewable energy share in the total energy mix in 2025 as well as increasing the percentage of the contribution of natural gas in the energy mix to 39%. Quoted from the Vision, "*There is no doubt that given the current financial pressures on our economy and its people and the elevated and continuing level of insecurity and conflict in our region, Vision 2025 is ambitious.*" Jordan is a small open economy with population growth rate much higher than the global average. Therefore, due to the small size of our local economy, it is difficult to deliver high-quality sustainable growth and create the number and quality of jobs needed to employ Jordanians over the next decade and beyond. Although we have made

significant progress over the past decade, significant challenges lie ahead as we seek to achieve greater and better quality prosperity for all Jordanians.

### 3. Jordan's Mitigation Contribution

#### 3.1. Mitigation outcomes

- Jordan has set a KPI-style "target" of 11% of renewable energy share in the total energy mix in 2025. This KPI is articulated in *Jordan 2025-A National Vision and Strategy* (launched June 2015).
- The unconditional GHGs reduction outcome target is aiming at reducing Jordan's GHGs by at maximum 1.5 % by 2030 compared to a business as usual scenario levels. This target will be arrived at based on implementing tens of projects, some of them are part of the 43 sectoral projects resulted from the mitigation scenario assessment articulated in the Third National Communication (TNC) Report to UNFCCC and some are priority projects proposed recently by GHGs emission sectors after developing the TNC and communicated to MoEnv. The implementation of some of these projects already started.
- The conditional outcome target is aiming at reducing Jordan's greenhouse gas emissions by at least 12.5 % by 2030. This target as well will be arrived at based on implementing tens of projects, some of them are part of the 43 sectoral projects proposed in the TNC Report to UNFCCC and some are priority projects proposed recently by GHGs emission sectors after developing the TNC and communicated to MoEnv. The implementation of some of these projects already started.

The estimated cost to reach the 14% target is totaling USD 5,700,000,000 from which GoJ has already secured USD 542,750,000 by its own means to meet the unconditional target, which means the Country is in need of USD 5,157,250,000 to fulfill its conditional target.

#### 3.2. Mitigation actions

##### National-level actions

- *Developing the National Strategy and Action Plan for Transitioning towards the Green Economy in Jordan 2016-2025.* This activity is currently under execution and the green growth strategy is expected to be developed in 2016.

##### Sectoral actions

##### i. Energy Sector

- *Developing and utilizing the local conventional and renewable sources of energy (expanding the development of renewable energy projects) and encouraging investment in renewable energy:* Raising awareness about the incentives provided by the renewable energy and energy conservation law; improving the attractiveness of renewable electricity tariff by basing the purchase price on the cost of production (depending on the energy source and size of the project); encouraging and supporting local industries to manufacture renewable energy components; implementing the power purchase agreements on the long-term from renewable energy producers; and activating the recently established *Renewable Energy and Energy Efficiency Fund (JREEEF)*.
- *Encouraging the use of solar energy for water heating:* through the provision of short-term support for the purchase of solar water heaters.
- *Requiring the implementation of green building codes:* by setting clear standards for construction, materials and land based on best practices; and requiring all new buildings in the public sector to comply with *Leadership In Energy & Environmental Design (LEED)*.
- *Rationalizing energy consumption in all sectors and improving their efficiency and raising awareness about the long-term financial benefits of energy efficiency:* Improving the collection of data on energy use patterns and identifying the most useful data on the efficiency of energy use for policy makers; providing appropriate financial incentives for energy efficiency projects; and providing funding to allow schools, hospitals and other facilities assessing the potential of saving energy, and making energy-related capital improvements in their facilities. Implementing programs of energy audits and energy efficiency measures in public and governmental buildings; conducting awareness campaign to promote solar water heaters in different sectors and awareness campaigns to promote energy efficiency through energy audit; and establishing In-House Show Room in the Ministry of Energy and Mineral Resources (MEMR's) premises to advise public people including professionals in how to save energy in all aspects.
- *Attracting private sector investment to the energy sector:* Reducing administrative obstacles in order to take advantage of the JREEEF to support investment in early stage.
- *Diversifying the sources and kinds of energy and diversifying sources of natural gas imports:* Ensuring

safe and flexible gas deals in the short, medium and long-terms and finding additional sources of natural gas to supply industries and distribution projects in cities (KPI-style “target” of 39% natural gas in the energy mix in 2025).

- Expanding the use of solar cooling in commercial and industrial facilities: Jordan has been experimenting the application of solar cooling technologies for use in commercial buildings and industrial process to help in introducing sustainable energy systems and reducing GHG emissions from the cooling sector. Successful attempts have been documented and the country is now ready for an expanded and upscale introduction of solar cooling technologies.

## **ii. Transport Sector**

iii. Transport is by far the largest energy consumer in the Kingdom and the second emitter of GHG according to the 3<sup>rd</sup> National Communication Report. Main programmes and projects under transport sectors are:

- Launching the MoT’s long term national transport strategy in 2014 in which the sustainable transport is one of its pillars;
- Increasing the total number of commuters using public transport as a percentage of the total number to 25 % by 2025;
- Introduction of the Zero Emission Electric Vehicle (ZEV) in Jordan will be implemented in various phases with the eventual deployment of 3000 charging stations ( on grid & off grid) by to support 10000 ZEVs by the private sector. The ZEV charging stations will be powered by renewable energy. The programme will be implemented through a partnership between the Greater Amman Municipality and the Ministry of Environment and the private sector within a Public Private Partnership (PPP) agreement. The outcomes of the initial phase will guide the upscaling of this programme in a wider context that goes beyond 2020. The Jordanian government in coordination with the private sector will develop the supporting legislation needed to ensure a secure and transparent introduction of the ZEV in the kingdom.
- Reducing all emissions from transport sector (i.e. CO<sub>2</sub>, CO, PM<sub>x</sub>, NO<sub>x</sub> expressed in tons per day);
- Reducing percentage of fuel consumption (in tons per day) achieved through the implementation of the transport strategy;
- V-km reduction at national level and in densely populated areas by type of vehicle (i.e. car, HGV, LGV and expressed in 1000v-km per day);
- Implementing the national BRT system;
- Implementing the railway system, which would be a cornerstone of the planned multimodal network that would play a major role in the ease of the transport of goods within the country and the surrounding region. With such system in place, the reductions of emissions from these activities are obvious;
- Increasing transport sector ridability through adopting and implementing policies related to fleet characteristics to enhance efficiency and reduce emissions thus yielding positive effect on energy consumptions and reducing CO<sub>2</sub> and other greenhouse gases emissions;
- Ensuring the inclusion of energy efficiency considerations when buying transport modals.

## **iv. Waste Management Sector**

- Developing a system for sorting, re-using and recycling (KPI-style “target” to reduce percentage of solid waste that is disposed of in landfills from 80% to 60% in 2025 and increasing percentage of treated and re-used solid waste from 20% to 40% in 2025.

## **v. Industries Sector**

- Encouraging investment in solar and wind energy projects near industrial clusters;
- Providing alternative energy sources and motivating local industry to use alternative energy sources;
- Implementing comprehensive programs for renewable energy and rationalizing energy through JREEFF, to include the provision of technical and financial support windows for programs and projects such as Revolving Fund, Equity Finance, Guarantees, and Grants to various sectors, including residential sector, as well as managing and organizing comprehensive awareness campaigns for renewable energy and energy efficiency .

## **vi. Water Sector**

- Improving energy use efficiency in water utilities, and implementing a number of projects based on renewable energy sources (hydropower, solar, wind) as well as biogas and energy production from sludge (KPI-style “target” to reduce energy used per billed cubic meter (billed kW/m<sup>3</sup>) from 4.175 in base year 2013 to 4.065 in 2015).
- Developing the Ministry of Water and Irrigation’s (MWI) Energy Efficiency and Renewable Energy Policy for the Jordanian Water Sector (2015) starting with utilization of sludge and other biosolids to generate energy, which is one of several projects announced under the policy, which seeks to achieve a 15 % reduction in energy consumption of billed water by the year 2025 through the introduction of economically feasible and environment-friendly power generation systems based on renewable energy sources.
- Introducing renewable energy as a source to supply water systems.

#### **vii. Agriculture and Food Security Sector**

- Afforesting 25% of barren forest areas in the rain belt areas on which the rate of precipitation exceeds 300 mm.

### **3.3. Up-front Information**

#### **3.3.1. Quantifiable information on the reference point (including, as appropriate, a base year):**

Baseline scenario/base year: A Business as usual scenario was used (but 2006 was used as a base year for GHG inventory in the TNC upon which the core component of Jordan’s INDCs were based).

Emissions in base year: **28.72.3 million ton (Mt) of CO<sub>2</sub> equivalent** (a sectoral breakdown of emissions shares per surveyed sectors is provided in Figure 1 above but a detailed sub-sectoral and gas type breakdowns of the GHGs are provided in the TNC Report and the accompanying inventory submitted to UNFCCC in late 2014).

#### **3.3.2. Time frames and/or periods for implementation**

Time frame of the commitment is until end of 2030. The quantified commitment by 2030 is relevant to the GHGs reduction targets while the other packages of mitigation actions (and tied KPI-based targets) are anticipated to be achieved by 2025 based on timeframe adopted by Jordan 2025-a National Vision and Strategy (launched in 2015).

#### **3.3.3. Scope and coverage**

Gases covered: Carbon dioxide (CO<sub>2</sub>); Methane (CH<sub>4</sub>); Nitrous oxide (N<sub>2</sub>O); Sulphur hexafluoride (SF<sub>6</sub>); Perfluorocarbons (PFCs); and Hydrofluorocarbons (HFCs).

Base year for gases covered: all 2006.

Sectors covered: energy (including transport), waste, industrial processes, agriculture and land-use, land-use change and forestry (LULUCF) and solvents.

Furthermore, GHG emissions from bunker fuels have also been estimated and reported as a memo item (these emissions are not included in the national GHGs inventory total). In addition to the sectoral approach, the reference approach has also been used for the estimation of CO<sub>2</sub> emissions from the overall fuel consumption figures for the time frame between 2000-2010.

#### **3.3.4. Planning processes and tracking of progress**

##### **Short-term**

Jordan’s well organized and institutionalized planning process for combating climate change has started in 2013 by voluntarily developing the *National Climate Change Policy for the Hashemite Kingdom of Jordan 2013-2020* as mentioned before. The provisions of this Climate Change Policy are being integrated/mainstreamed in environmental, social and economic policies and legislation in the Country. In particular, the Policy’s provision will be integrated in the National Green Growth Plan and Implementation Roadmap, which is currently under development and will be launched in 2016 and will cover six sectors (energy, water, waste, transport, tourism and agriculture). The INDC proposed for Jordan is envisioned as the core element of the said National Green Growth Plan. This helps dual implementation of the INDCs and the Country’s green growth plan.

The National Committee on Climate Change is mandated to monitor the progress in the implementation of the Climate Change Policy on the national level and thus the INDC. A large share of the objectives of the Policy will be implemented through sector strategies under the responsibility of the sector’s ministries (energy, water, agriculture, health, and others). Their progress will be monitored by each involved sector on the basis of the specific monitoring framework adopted in the respective sector’s policies and strategies.

##### **Medium- to long-terms**

The national implementation will be based on the time frame of the commitments, which is until end of 2030 for the GHGs reduction targets and until 2025 for the other packages of mitigation actions (and tied KPI-based targets) based on timeframe adopted by Jordan 2025 Vision. The GHGs reduction targets' achievement will be tracked through the information in Jordan's national inventories and Biennial Update Report (BURs). The preparation of the first BUR for Jordan will start in 2016 and is expected to be completed in late 2017. Jordan will strive to put in place a functioning MRV system for GHG inventory and mitigation progress based in the appropriate institutional and technological settings available. For the other packages of mitigation actions (and tied KPI-based targets) proposed in Jordan 2025, the Vision has set a "*Performance Management Framework for Implementation*" to assure that the policies, measures, and KPIs articulated in the Vision will be fulfilled. In each section of the 2020 Vision, a number of KPIs have been chosen to measure progress, and where possible, objective and internationally used KPIs have been selected. This is to ensure transparency in measuring progress. The governmental executive programs that will be prepared based on this Vision will measure progress in the short and medium terms. The time-period covered by the Vision was divided into three phases, and each phase will be evaluated to see what has, and what has not been, achieved in order to ensure continuing the implementation of policies and initiatives of the said Vision. The Prime Minister's *Delivery Unit* was re-established to follow up the most important initiatives proposed and overcome the obstacles facing the Vision's implementation in order to assure commitment and effective implementation.

### **3.3.5. Assumptions and methodological approaches including those for estimating and accounting for anthropogenic greenhouse gas emissions and, as appropriate, removals**

The INDCs of Jordan are based on the following methodologies and assumptions and methodological approaches:

As a non-Annex I country, the inventory information provided by Jordan is according to the guidelines for Parties not included in Annex I as required by decision 17/CP.8. The Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories (IPCC, 1997) have been used. In addition, and as encouraged by decision 17/CP.8, the IPCC Good Practice Guidance and Uncertainty Management in National Greenhouse Inventory (IPCC 2000) and the IPCC Good Practice Guidance on Land Use, Land Use Change and Forestry (IPCC 2003) have also been used specially in the uncertainty estimation. The UNFCCC software for Non-Annex I countries has been used for the preparation of the national inventory. Sectoral (bottom-up) approach has been used to estimate the GHG emissions and removals from the following sectors:

- Primary energy,
- Renewable energy,
- Energy efficiency,
- Transport,
- Industrial processes,
- Waste, and
- Agriculture

Furthermore, GHG emissions from bunker fuels have also been estimated and reported as a memo item (these emissions are not included in the national total). In addition to the sectoral approach, the reference approach has also been used for the estimation of CO<sub>2</sub> emissions from the overall fuel consumption figures for the time frame between 2000-2010. The direct GHGs whose emissions have been estimated in this national inventory are:

- Carbon dioxide (CO<sub>2</sub>);
- Methane (CH<sub>4</sub>);
- Nitrous oxide (N<sub>2</sub>O);
- Sulphur hexafluoride (SF<sub>6</sub>);
- Perfluorocarbons (PFCs); and
- Hydrofluorocarbons (HFCs)

Emissions of the following indirect GHGs also have been estimated and reported in this inventory:

- Oxides of nitrogen (NO<sub>x</sub>);
- Carbon monoxide (CO);
- Non-methane volatile organic compounds (NMVOC); and
- Sulphur dioxide (SO<sub>2</sub>).

However, as the indirect GHGs have not been allocated global warming potential, they are not included within Jordan's aggregate emissions. In the current inventory, tier one method has been used except for the estimation of emissions from domestic and international aviation where tier two methods was used based on the number of landing and take-off (LTOs), types of aircrafts and total fuel consumption and for the agriculture sector tier two was used for the first time. For the energy sector, available emission factors were used when applicable (a summary of GHGs breakdown for Jordan per sectors are illustrated in Figure 1 above).

The 43 GHG mitigation projects proposed in the mitigation scenario in the TNC covers the seven sectoral areas mentioned above. The cost, benefits and CO<sub>2</sub> emission reduction were analyzed for each proposed 43 mitigation projects in the TNC. Net present value method was used in the financial calculations, by converting all of the future revenues and costs over the period of the project based on today's cost. The same approach was utilized when calculating CO<sub>2</sub> emission reductions over the lifetime of the proposed projects. A discount rate of 8 % was used in all calculations. The discounted unit cost of reduced emissions is the quotient of the discounted net cash flow to the discounted emission reductions. If the analyzed mitigation projects are executed, they will lead to annual reductions of 3538 Gg in the year 2020; and are expected to increase to 5176 Gg in the year 2030, which represents around 9% of baseline emissions. Based on the unit abatement cost and abatement marginal cost curve, the most feasible options seem to be linked with the energy projects in general (energy efficiency and renewable energy projects with unit cost range from -13 to -274 JD/t CO<sub>2</sub>).

### **3.3.6. How Jordan considers that its intended nationally determined contribution is fair and ambitious, in light of its national circumstances**

Taking into consideration that global efforts to reduce greenhouse gas emissions must be differentiated according to a Party's responsibility and capability, Jordan believes that its very diversified INDC (a combination of a wide rainbow of outcomes and actions) set together an ambitious target relevance to its small amount of GHGs emission share and development circumstances. The Country's bulk share of GHGs represents only around 0.06% of global total according to a global GHGs analysis conducted in 2010. According to the World Bank, the CO<sub>2</sub> metric tons per capita emission is 3.4 in 2010 as said before. Nevertheless, this small share of GHG did not justify a reluctant reaction of the Country. To the contrary, Jordan, historically, was amongst the most active countries in the region with regard to involvement in international climate change efforts and engagement in response actions as explained above. Most importantly, Jordan has voluntarily developed a national climate change policy in 2013, the first comprehensive policy in the Arab Region and the Middle East. In fact, Jordan willingly developed the *National Climate Change Policy for the Hashemite Kingdom of Jordan 2013-2020*. This policy is considered the first national-level comprehensive planning initiative to deal with the global phenomenon of climate change in a holistic approach in the Country. However, Jordan, as any of non-Annex I countries, has, so far, no commitments for GHG emission reduction targets. Nevertheless, Jordan believes that there is a large potential for mitigation, eventhough Jordan's total GHG emissions are very small in absolute terms, and compared to other countries as indicated above.

From another angle, the modest income levels of the Country along with development challenges described above, mainly poverty and unemployment as two of the most important challenges the Country faces as well as limitation in natural resources and energy challenges along with the demographic characteristics of the Jordanian population all show that the Jordanian development process faces a big challenge in providing basic needs in such a developing country. Moreover, the rapid growths in economic activities, population and successive influxes of refugees over the last decade have imposed additional demands on energy resources. While Jordan has achieved many sustainable development goals, sustaining these results and reducing the burden of the energy sector on economic and social development will increasingly depend on the transition to a sustainable energy future. The high cost of importing energy puts a heavy burden on the public budget already constrained by running costs. There is no doubt that given the current financial pressures on our economy and its people and the elevated and continuing level of insecurity and conflict in our region, the INDC of Jordan specially those presented in the Vision 2025 are all fair and ambitious.

### **3.3.7. How Jordan's INDC contributes towards achieving the objective of the Convention as set out in its Article 2**

Compared to its very small share of GHGs, Jordan's very diverse spectrum of actions and outcomes of commitment with emphasis on those aiming at reducing its emissions by 14 % by 2030 relative to a business as usual levels puts this small country on a low carbon development track that is in line with the recommendations of the IPCC AR5 to reduce global emissions by minus 40 to 70 percent by 2050 below 2010 levels. The diverse package of national climate change legal documents, climate change-aligned sectoral strategies and policies and related action plans, the vigorously accelerated number of GHGs cut-oriented projects being developed in many sectors and the development of Energy Services Company (ESCOs), for which legislative and regulatory framework as well as certification mechanism are under development to organize their operations, all reflect the seriousness of the country in combating climate change and increasing the level of involvement in carbon market business. For such a small country, this huge number of GHGs reduction-oriented activities and projects will absolutely contribute towards achieving the objective of the Convention as set out in its Article 2.

## **4. Jordan's Adaptation Actions**

Current status of vulnerability and potential impact in relevant sectors as well as proposed sectoral strategic objectives, measures, and instruments to adapt to climate change impacts were advanced in the *Climate Change Policy of Hashemite Kingdom of Jordan 2013-2020* for each involved sector (water, coastal areas, agriculture/food security,

health, tourism, biodiversity, and socioeconomic situation/poverty). These strategic objectives, measures, and instruments will be revised and augmented accordingly later on in the coming few years to address post-2020 era (most probably up to 2030).

Example of other pre-2020 adaptation activities of the Country are: integrating climate change adaptation during aligning the *National Strategy and Action Plan to Combat Desertification (2015-2020)* with the UNCCD 10-Year Strategy as well aligning the Country's *National Biodiversity Strategy and Action Plan (2015-2020)* with the CBD 10-Year Strategy.

The cost of implementing the adaptation measures proposed to involved sectors were not estimated in the national Climate Change Policy. Thus, involved line ministries and NGOs were approached in 2015 by official letters sent through MoEnv requesting such institutions to provide a list of priority adaptation actions for post-2020 era on the top of those proposed in the 2013-2020 Policy, including estimated cost of such measures (already secured funds and anticipated funds). In light of responses received by MoEnv, the following section lists such envisioned adaptation actions and information.

#### **4.1. Water sector's adaptation actions**

It is highly evident that water resources in Jordan are very vulnerable to climate change. Previous strategic studies and legal documents (i.e. Jordan's Second Communication Report to UNFCCC (2009) and National Climate Change Policy (2013), and the latest TNC (2014)) all have identified that scarcity of water resources is one of the major barriers facing sustainable development in Jordan that will be further magnified by climate change. Expected reduced precipitation, maximum temperature increase, drought/dry days and evaporation are the main determinants of climate change hazards. The impact of the increased evaporation and decreased rainfall will result in less recharge and therefore less replenishment of surface water and groundwater reserves. In the long term, this impact will extend to cause serious soil degradation that could lead to desertification, exacerbating future conditions and worsening the situation of the agricultural sector due to the lack of sufficient water that will affect the income of the agriculture sectors. Low income will ultimately reduce the ability to the adaptation to climate change with families unable to respond to the pressing needs for replacing traditional water supplies with new methods that require more spending (purchasing drinking water from tanks). In addition to climate change, the increased demand for water in Jordan during the last decade has contributed significantly to reducing per capita shares. The natural growth of economic activities and population increase have been exacerbated by the continuous flow of refugees from Syria in particular and thus increase the demand for water.

One of the major pre 2020 studies Jordan conducted in the field of water (and health) sectors' adaptation was from 2009 to 2013 namely "*Adaptation to Climate Change to Sustain Jordan's MDG Achievements*". The study's goals were to developing sustained access to improved water supply sources, despite increasing water scarcity due to climate change and to strengthening the capacity for health protection and food security under conditions of water scarcity. The main adaptation knowledge products of the said project were:

- Water Safety Plans (WSPs) as a risk management approach to protecting drinking water safety in five pilot areas;
- Critical laboratory equipment was procured and installed in the Ministry of Health's (MoH) water testing labs;
- The capacity to adapt to climate change in the area of food security was strengthened through the identification and dissemination of climate resilient techniques;
- A model farm reusing treated wastewater was created for use as a training and demonstration center;
- Piloted interventions for showcasing, awareness campaigns targeting stakeholders at different levels, and training programmes enhanced the capacities of local communities, youths, decision makers and professionals in this regard. This included the establishment of the *International Center for Water and Environmental Research* at Al Balqa Applied University;
- Health vulnerability assessments and a national adaptation strategy and plans of actions for health protection from climate change were conducted in six critical areas: heat waves, nutrition, water and food-borne disease, vector-borne disease, occupational health and air-borne and respiratory diseases;
- Capacity to adapt to climate change was strengthened in the Zarqa River Basin (ZRB), where extensive studies were conducted to assess and model climate change impacts on water quality and availability as well as to identify adaptation measures addressing these impacts.

Other water adaptation projects implemented in Jordan in partnership with the MoEnv's key partners, mainly IUCN, were:

- The Regional Knowledge Network on Water (R-KNOW) implemented through Regional Knowledge Network on Systemic Approaches to Water Resources Management project (2011-2015). The project

aspired to create a Regional Knowledge Network on Water that will assist in strengthening the application of systematic approaches to water management and structured around the following thematic areas:

- Water and climate change.
- Water governance.
- Water, food and energy nexus.
- Sustainable water technologies.
- SWIM-Sustain Water MED project: It is one of the demonstration projects within the SWIM umbrella and addressed sustainable wastewater and sanitation management in the MENA region. The project was implemented from 2012- 2015. It operated in four countries including Jordan. Each of the demonstration projects addressed a different aspect pertaining to wastewater treatment and reuse as well as rainwater management to demonstrate effective and cost- efficient wastewater treatment and reuse technologies through pilot projects.
- Water-DROP Project: aimed at developing an Integrated Water Resources Management (IWRM) approach at the Mediterranean Basin level for managing the related cross-sector issues through the enforcement of multi-stakeholder partnerships, in particular with public and private actors. The project as well implemented 35 rain water harvesting cisterns for the rural community and schools in Balqa Governorate in order to harvest the water from the roofs.

The downscaled climate data on Jordan in general and on the pilot study area assessed in the TNC (2014) in particular suggest that the long-term temperature and precipitation averages, for the periods 2020-2050; 2040-2070; 2060-2100 show a slight increase in temperature with slight decrease in precipitation. Thus, the following summarizes the adaptation policies and measures proposed in the Water Sector in the TNC (2014) on the top of the strategic objectives and measures advanced previously in the National Climate Change Policy of Jordan (2013). Nearly all the low cost options for the development of new water resources are challenging in Jordan. Since all rivers and aquifers are highly exploited, few options are left for developing new sources of water for drinking and irrigation

*Adaptation measures & programs for the water sector include the following:*

**Residential water supply:**

- Reducing water losses in distribution pipes;
- Introducing water metering;
- Introducing water saving technologies such as low-flow toilets and showers, and efficient appliances;
- Collection of rainwater for gardens, toilets, and other applications;
- Promoting water saving by awareness campaigns.

**Irrigation:**

- Introducing water saving technologies in irrigation schemes such as drip, micro-spray, and night irrigation, etc;
- Introducing new varieties of crops that use less water and are salt-tolerant;
- Increasing the efficiency of irrigation systems;
- Reforming water pricing;
- Using groundwater more efficiently.

**Water quality:**

- Improving wastewater treatment plants (WWTP);
- Recycling wastewater;
- Developing river protection and sanitation zones;
- Improving chemical and biological monitoring.

**Socio-economic issues:**

- Training people of different ages and social statuses on water saving and sanitation methods;
- Increasing public awareness to water related issues;
- Introducing water cleaning and softening technology;
- Introducing policy measures to ensure the equity in access to water;
- Carrying out studies to estimate the impacts of hydrological disasters such as flash floods and thunderstorms;
- Improving the drought prediction and mitigation system.

The above measures can be grouped in the following programs:

**1- Groundwater protection**

Most groundwater aquifers are exploited at more than double of their safe yield. The sustainability of

irrigation in the highlands and the Badia areas will be greatly endangered unless strict measures are taken to address this issue. As such, the development and implementation of an action plan is needed in order to ensure that plans for groundwater protection, management, monitoring and restoration are defined, integrated and managed in a cost-effective manner. However, such action plan needs:

- A strong legal basis, given by laws and by-laws of the Water Authority, 2002;
- Guidelines and legal provisions;
- An administrative structure for implementation and survey;
- Public involvement;
- Measures will also continue to be taken to protect the groundwater resources from all sources of pollution.

In order to improve groundwater situation in Jordan, MWI is establishing an integrated program to assess the availability and exploitability of all resources at rates that can be sustained over long periods of time. The mining of renewable groundwater aquifers will be checked, controlled, and reduced to sustainable extraction rates. MWI will further encourage the application of applied research activities, including artificial recharge to increase groundwater supplies, and the employment of new technologies that will optimize operation and development of groundwater systems and promote more efficient and feasible uses.

## **2- Surface water development**

In Jordan, direct runoff from heavy rainfall lasts from less than an hour to very few days. This makes the management of this type of resource difficult. Possible measures are:

- Optimizing the development and use of this resource through supply-enhancing measures, including surface and subsurface storage, minimizing losses by surface evaporation and seepage, soil and water programs, and protecting surface water supplies from pollution;
- Development of sustainable management plans for surface water systems in Jordan Valley, conversion of open canal systems to a pressurized pipe system, giving priority to modernizing and upgrading systems, and precedence to water projects which make significant contributions to meeting rising municipal and industrial demands;
- Dams are required for storing flood waters during the wet winter seasons and releasing the water gradually during the summer seasons when the demand is high. Additionally, 'ordinary' reservoirs, so called desert dams (water harvesting) help increase groundwater recharge and provide water for pastoral use.

## **3- Demand management**

Mobilization of additional water resources can be achieved through:

- Artificial groundwater recharge;
- Surface water reservoirs;
- Water harvesting;
- Increased re-use of treated wastewater;
- Use of non-conventional water resources;
- Desalination;
- Weather modification (cloud seeding); and
- Transfer of water among different basins in Jordan.

Various projects have been set up to reduce water consumption and to enhance water use efficiency by:

- Reduction of losses from the supply networks;
- Introduction of water saving technologies;
- Public awareness campaigns on water consumption;
- Adaptation of different cropping patterns.

## **4- Water resources monitoring system (quantity and quality)**

- Ground water monitoring system;
- Surface water monitoring system; and
- Climate monitoring system.

The water sector investment according to the Executive Development Program for the coming 10 years (2025) is estimated to reach US\$ 4 billion.

## 4.2. Health sector adaptation actions

In addition to the general adaptation objectives, measures and instruments proposed for the health sector in the National Climate Change Policy of Jordan (2013-2020), as well as in the TNC, the Ministry of Health (MoH) issued the National Climate Change Adaptation Strategy, Plan of Action, and Early Warning System (EWS) to protect health from the potential impacts of climate change in 2013. The health sector's adaptation strategy, plan of action for the period 2013-2017, and EWS would have long-term potential for delivering improved health outcomes. The Strategy provides a roadmap to the health sector, as well as the many involved public agencies and organizations, to work jointly to improve the health of the Jordanian population, in particular the vulnerable groups (infants and children < 5 years, the elderly > 65 years, and pregnant women) in rural, desert, remote areas, and poverty pockets, and the environments in which they live, work, and play. The health sector's adaptation to climate change focuses on the adequate intervention measures required to reduce the impact of climate change on six climate-sensitive health issues, namely:

- Heat waves (health impacts of temperature related events);
- Water and food-borne diseases;
- Vector-borne diseases;
- Air-borne and respiratory diseases;
- Nutrition and food security; and
- Occupational health

The Action Plan (2013-2017) listed 24 proposed adaptation projects that fall under seven main categories as follows:

- Regulatory/legislative;
- Capacity building;
- Public education and communication;
- Surveillance and monitoring;
- Medical intervention;
- Infrastructure development; and
- Research and further information.

The proposed adaptation measures and projects are:

- Strengthening the preparedness and resilience of the health sector and increasing emergency rooms (ER) capacities;
- Building the needed capacities to conduct health vulnerability assessments;
- Educating and informing the public of the needed measures to protect health from the adverse impacts of climate change;
- Establishing an early warning system to trigger prompt public health intervention when certain variables exceed a defined threshold;
- Developing climate-informed disease control programs and surveillance systems using meteorological services to target vector control in time and space;
- Adopting more effective and rapid electronic exchange of surveillance data for rapid intervention, and establish, with the relevant ministry(ies), access to real-time air quality monitoring data to establish the link between respiratory diseases and air pollution and climate change;
- Introducing new indicators that are useful for protecting health, such as Air Quality Index, UV index, in cooperation with the relevant institutions; and
- Utilizing effective tools (e.g. GIS or Health Mapper) to link environmental and climatic factors to health outcomes.

Details of the projects can be found in "CHAPTER 9 ADAPTATION PROJECT PROPOSALS FOR THE SIX CLIMATE-SENSITIVE HEALTH ISSUES" in the National Climate Change Health Adaptation Strategy and Action Plan of Jordan, which can be accessed from the MoH's official website ([www.moh.gov.jo](http://www.moh.gov.jo)). The estimated total cost for implementing the above mentioned projects and measures is USD 15,000,000. The information of portions of funds secured by the involved sector's (government) own means versus amount of funds not secured is not available at the time of preparing this document and could be obtained from the health sector's involved officials..

## 4.3. Biodiversity, eco-systems, and protected areas adaptation actions

The expected impacts from climate change on ecosystems in Jordan according to climate exposure and sensitivity of ecosystems are droughts, forest dieback, and community composition change, expansion of drier biomes into marginal lands, habitat degradation and species loss. It was noticed that the highest vulnerable ecosystems are forests (especially in the north) and fresh water ecosystems (especially in Jordan Rift Valley), that highlights the priority to perform adaptation interventions within these two ecosystems. The ecological

vulnerability assessment results that covered important biodiversity and ecosystem sites within the pilot area including Dibeen PA and Khyouf SCA had high scores of vulnerability that is compatible with the overall conclusion all over the Country. Adaptation strategies and measures in biodiversity should be prepared and implemented in order to achieve sustainable, healthy and resilient ecosystems in the future under threats of climate change and other stressors. Jordan has conducted good number of adaptation projects for the biodiversity and protected areas for the pre-2020 period such as Royal Society for Conservation of Nature's (RSCN) project.

In addition to the adaptation strategies mentioned in Jordan's Third National Communication (TNC) on climate change (please refer to the TNC to capture the adaptation priorities), the GoJ, through its strategic partners, mainly RSCN, Royal Botanic Garden, and IUCN-ROWA, intends to carry out the following actions that are envisaged to contribute to increase the adaptive capacity of the country's ecosystems to climate change, these are:

- Conducting a comprehensive review of the National Network of Protected Areas. The sought revision will aim at identifying/validating climate-vulnerable ecosystems, extending conservation efforts in PA-surroundings and designing buffer zones as deemed necessarily for strengthening the adaptive capacities of key ecological hotspots (time frame : by 2020);
- Establishing, in partnership with RSCN, a specialized unit that is responsible for implementing the adaptation strategies, liaising with different national stakeholders and formulating a range of ecosystem adaptation projects within Jordan (time frame : by 2025);
- Undertaking more research on vulnerable ecosystems and communities and appropriate adaptation priorities, in addition to identifying indicator species and carry out monitoring programs on climate change impact on key species. (time frame : by 2030);
- Enhancing the resilience of local communities impacted by climate change in areas within and surrounding PAs (including community-based pilot adaptation projects) (time frame : by 2030).
- Embarking on land use planning as a tool for adaptation to climate change, given that land use planning reduces the future carbon impact of new developments as well as improving resilience against natural hazards associated with climate change such as, but not limited to, drought and floods) (time frame: by 2030).

The total cost of the above activities is USD 3,000,000. The information of portions of fund secured by involved sector's own means versus amount of funds not secured is not available at the time of preparing this document and could be obtained from the aforesaid sector.

#### **4.4. Agriculture/food security adaptation actions**

Agricultural production is closely tied to climate, making agriculture one of the most climate-sensitive of all economic sectors. In the study area selected as a pilot in the TNC (2014), the climate risks to the agricultural sector are immediate and an important problem because the majority of the rural population depend either directly or indirectly on agriculture for their livelihoods. TNC analyses demonstrated that most of agricultural areas in Jordan are rain-fed which makes agriculture in Jordan more susceptible to climate change.

The rural poor will be disproportionately affected because of their greater dependence on agriculture, their relatively lower ability to adapt, and the high share of income they spend on food. Climate impacts could therefore undermine progress that has been made in poverty reduction and adversely impact food security and economic growth in vulnerable rural areas. Poor in rural areas in Jordan are expected to face the most severe consequences of climate change through disruption of livelihood options that depend on natural resource management. The expected impacts of climate change, particularly reduced agricultural productivity and water availability, threaten livelihoods and keep vulnerable people insecure. Thus, the key adaptation measure to climate change in the agricultural/food security sector will be setting and implementing a sustainable agriculture policy addressing;

- Developing agronomic and crop strategies that are intended to offset either partially or completely the loss of productivity caused by climate change through the application of defense tools with different temporal scales, e.g. short term adjustments and long term adaptations, and spatial scales, e.g. farm, regional or national level adaptation;
- Modification of policies and implementation of action plans with emphasis on socio-economic strategies intended to meet the agricultural costs of climate change;
- Supporting environment friendly agriculture and permaculture designs as well as conservation and sustainable utilization of plant and animals genetic resources for food and agriculture that are climate resilient and adaptive to climate change especially landraces to improve rural sector adaptive capacity to changing environment to enhance food security;
- Maintenance of old Roman wells for water harvesting purposes and establishment of new wells in the rural area;
- Establishment of an integrated drought monitoring and early warning systems;

- Use of different crops varieties and modification of cropping pattern and crop calendar including planting and harvesting dates;
- Implementation of supplemental irrigation, water harvesting techniques, maximizing treated waste water re-use in agriculture, improving water use efficiency and the augmentation of drip irrigation in irrigated areas and utilization of saline water in the irrigation of crops tolerant to salinity;
- Establishment of desalinization units or sea water and use for agriculture;
- For rain-fed areas: adaptation measures include, but not limited to, improving soil water storage to maximize plant water availability by maximizing infiltration of rainfall; application of conservation agriculture, which involves minimum soil disturbance and encompasses land preparation techniques that improve soil fertility; managing crop residue and tillage and conserving soil and water; using of supplemental irrigation from harvested rainwater in the critical stages of crop growth achieved through on-farm rainwater harvesting and management system, i.e. small farm ponds for microirrigation using drip or sprinkler irrigation systems. Larger rainwater storage structures to be constructed to provide supplementary irrigation water to a number of small farms or fields by using the micro-dams;
- Selection of tolerant crop varieties: shifting to cultivating crops that are more tolerant to droughts or lower water requirements;
- Crop diversification: including integration of different varieties of crops, both food and cash crops which will increase farmers' income;
- Urgent need for restoration of the degraded forest ecosystem, protection of forest and reforestation to increase the green land area for compensation and equilibrium purposes for CO<sub>2</sub> fixation and release of O<sub>2</sub> since forestry sector face many challenges that result in reduction of forest vegetation cover in Jordan to sustain and keep ecosystem services from this vital ecosystem;
- Raising awareness and declarations on Climate Intelligent Agriculture and promoting utilization of renewable energy and uses in agricultural and food production sector for cooling and heating purposes, for example in poultry production, nurseries, green houses, olive mill etc;
- Model development of the soilless and hydroponic agriculture for medicinal and herbal plants and vegetables for water saving; and
- Establishment of an integrated national monitoring center for climate information and data based linking weather and climate information from all deployed centers.

The pre-2020 information of portion of fund secured by involved sector's (government) own means shows that the GoJ spent about USD 160,000,000 on adaptation projects and activities in the agriculture and food security sectors in the country from its own means. The amount of needed fund was not available at the time of preparing this document and could be obtained from officials active in this field.

#### **4.5. Sustainable development-oriented socioeconomic adaptation**

The pre-2020 contribution of Jordan in this regard is obvious from Jordan's position portrayed in the Climate Change Policy of Jordan 2013-2020 and the actions and activities lead by Ministry of Social Development (MoSD); National Aid Fund (NAF), and MoSD's partners addressing vulnerability and impact of climate change on socio-economic development particularly vulnerable groups (mainly the poor and women with emphasis on those living in rural areas). Major initiatives and actions that are contributed by Jordan for inclusion of social dimensions in adaptation and mitigation responses, in coordination with MoSD, include, but not limited to:

- Adopting poverty fight programs fostering providing housing for poor people and supporting micro-projects for poor communities in light of unusual severe seasonal cold and hot weather conditions prevailed in the last decade (the coldest/snowy condition of 2013/2014 in the last 10 years and a record hot year in the summer of 2015);
- Developing emergency relief and aid to those affected by impacts of seasonal heavy snow storms specially the unusual latest storms;
- Diversifying income sources for affected communities from severe hot and cold conditions;
- Proposing on the National Budget a cost of 90,000 JOD to providing solar energy cells for poor household complexes and Nursing Homes to reduce electricity bills and increase access to clean energy sources;
- Replacing 10 large engine vehicles of the Ministry's fleet with hybrid cars;
- Assisting poor household complexes by installing water harvesting wells; and
- Investigating role of severe hot and cold weather conditions on rates of society crimes.

Jordan actions on the path towards a sustainable development-oriented socio-economic adaptation and the country's efforts in investigating the alleviation of climate change impacts on vulnerable groups could be seen in the following perspectives and actions:

- With regard to socio-economic cost-benefit analysis of the climate change mitigation and adaptation in the context of green growth, Jordan actions in this aspect stems out from the Country's position

that the socio-economic costs and benefits of climate change mitigation can only be assessed together with the other cost and benefits related to climate change mitigation activities. Energy-efficiency measures, for example, will also have an impact on economic growth, technology innovation, reducing import dependency and reducing poverty, amongst others.

- Dependence of such vulnerable groups on natural resources that are susceptible to climate change. It was found that 20% of the population depends on agriculture for their income. Agriculture vulnerability especially the rain fed and irrigated was also discussed in detail in the Climate Change Policy of Jordan. These discussions lead to the conclusion that this 20% of population which is part of the poorest segment will be most susceptible to climate change impacts;
- Dependence of communities on ecosystem services (water springs, rangelands and natural vegetation in medicine, etc.) that could be affected by climate change;
- A lack of assets which hinders effective adaptation by the poor segments of population;
- Settlements in high-risk areas (i.e. drought prone) in Jordan are known to be of the lower income groups, a fact which magnifies the impact of climate change on poverty of these groups;
- Low levels of education and professional skills that prevent members of poor households for shifting to climate-resilient sources of income; and
- Though gender issues are still under-investigated in Jordan, the role of women in economy of rural areas is known to be substantial. Women in these areas are traditionally responsible for the household economy and are active in field work as well. Any negative impact of climate change will be most sensed by women. Women make crucial contributions in agriculture and rural enterprises in drylands as farmers, animal husbandry, workers and entrepreneurs through their indigenous knowledge.

Thus, Jordan is committed to the following climate change strategic objectives and actions as related to sustainable development-oriented socio-economic adaptation with emphasis on vulnerable groups and gender mainstreaming.

For post-2020 actions, GoJ through MoSD proposes to:

- Providing support to civil society organizations and NGOs active in climate change from CBO Support Fund;
- Conducting awareness programs targeting local communities and societies on energy efficiency;
- Maximizing number of poor household complexes and Nursing Homes benefiting from solar energy technologies and installing solar water heaters;
- Developing emergency and fast response plan to providing emergency relief and aid to those affected by impacts of seasonal severe cold (mainly during snow storms) and hot conditions and support programs for incomes of families impacted by drought;
- Integrating gender considerations and the interest of vulnerable group in climate change policies and strategies in all relevant sectors particularly in national strategies for social development, poverty eradication, childhood and early childhood development in Jordan and develop, compile, and share practical tools, information, and methodologies to facilitate the integration of gender into policy and programming;
- Ensuring that financing mechanisms on mitigation and adaptation address the needs and conditions for implementation of poor women and men equally;
- Building capacity at all levels to design and implement gender-responsive climate change policies, strategies and programs;
- Ensuring that sector ministries will adopt the Action Plans suggested by the Program for Mainstreaming Gender in Climate Change Efforts in Jordan, the action plans specified the objectives, the actions and the indicators required. MoEnv and NCCC to monitor and encourage the implementation.
- Aligning Jordan's INDC to the Sustainable Development Goals (SDGs) agreed by the international community in August 2015 which will cover all development goals until 2030. Special attention will be put on linking the mitigation and adaptation measures specified in the INDC and beyond to SDGs from 1-5 which focus on addressing challenges of poverty, education, health, gender equality and other socio-economic conditions;

- Aligning Jordan's INDC with the National Poverty Reduction Strategy (PRS) that was launched in 2013. The PRS contains a special chapter on the resilience and adaptation to climate change impacts in Jordan and the enhancement of social structure to adapt to climate change.
- Enhancing codes of buildings for newly established residential complexes targeting poor families to include proper insulation; and
- Supporting care giving houses for the orphans, people with special needs and elderly people with measures to install solar energy and production of own electricity needs.

## Intended Nationally Determined Contribution - Submission of the Republic of Kazakhstan

The Republic of Kazakhstan is fully committed to the UNFCCC negotiation process with a view to adopting a global legally binding agreement applicable to all parties at the Paris Conference in December 2015, with the ultimate aim of ensuring that global temperature rise does not exceed 2°C.

The Republic of Kazakhstan wishes to communicate the following Intended Nationally Determined Contributions (INDC), and intends to achieve an economy-wide **target of 15%-25% reduction in greenhouse gas emissions by 2030 compared to 1990**. In line with the Lima Call for Climate Action, the following quantifiable information is hereby submitted:

Intended Nationally Determined Contribution	
Party	Kazakhstan
Unconditional target	A 15% reduction in GHG emissions by 31 December 2030 compared to the base year
Conditional target	A 25% reduction in GHG emissions by 31 December 2030 compared to the base year, subject to additional international investments, access to low carbon technologies transfer mechanism, green climate funds and flexible mechanism for country with economy in transition.
Type	Economy-wide absolute reduction from base year emissions
Base year	1990
Gases covered	<ul style="list-style-type: none"> <li>• Carbon Dioxide (CO<sub>2</sub>)</li> <li>• Methane (CH<sub>4</sub>)</li> <li>• Nitrous Oxide (N<sub>2</sub>O)</li> <li>• Hydrofluorocarbons (HFCs)</li> <li>• Perfluorocarbons (PFCs)</li> <li>• Sulphur hexafluoride (SF<sub>6</sub>)</li> </ul>
Period	1 January 2021 – 31 December 2030
% of emission covered	100%

<p>Net contribution of international market based mechanisms</p>	<p>Kazakhstan supports inclusion of market based mechanisms in the 2015 agreement, and the opportunity to use carbon units recognised by the UNFCCC. Kazakhstan retains the option of using market based mechanisms under the UNFCCC. Kazakhstan will consider adequately discounting international units for compliance to ensure a contribution to net global emission reductions.</p>
<p>Planning process</p>	<p>Kazakhstan's long term objectives is to become one of the 30 most developed countries in the world by 2050. Following a path of low carbon economy growth Kazakhstan adopted the law "On energy saving and energy efficiency", "On Supporting the Use of Renewable Energy Sources" aiming at greater use of renewable energy sources.</p> <p>In order to emphasize its commitment to low carbon growth, Kazakhstan has adopted a Concept on transition to a «Green» Economy. For the implementation of the Concept, an action is developed, under which government programs on waste management, modernisation of housing and communal services, development of sustainable transport, conservation of ecosystems and enhancement of forest cover were adopted. The laws on extended responsibility of entrepreneurs and greening of vehicles are being formulated.</p> <p>The implementation of the «Green» Economy Concept, and adoption of related legislative acts, should lead to modernisation of key infrastructure and production technologies based on energy-efficient technologies, and will make a significant contribution to reducing the emissions of greenhouse gases.</p>

<p>Fair and ambitious targets, taking into account national circumstances</p>	<p>The target set represents a significant progression beyond the pledge of a 7% emission reduction of greenhouse gas emissions by 2020 compared to the 1990 base year. This target is ambitious, as Kazakhstan has undergone a period of consistent growth from 2000 – 2010 during which GDP growth reached 8.3%. GDP growth during this period has always exceeded that of the world average. Under a revised and conservative business as usual scenario which takes into account potentially lower GDP growth rates the target proposed by Kazakhstan amounts to a 22% reduction in GHG emissions by 2030 compared to BAU projected emissions. Under favourable economic conditions and an increase in oil prices, the unconditional target proposed by Kazakhstan would amount to a 34% reduction in GHG emissions by 2030 compared to BAU projected emissions.</p> <p>The ambitiousness and fairness of the statement are concluded by the current emissions of Kazakhstan that reached 80-85% from 1990. At the same time the aim of the government's economic policy of Kazakhstan is faster growth of GDP per capita to reach the current level of development of the countries of the OECD by 2030.</p>
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<p>How the INDC contributes to achieving the ultimate objective of the Convention (Article 2)</p>	<p>Recognizing the reality and taking responsibility, Kazakhstan intends to contribute to international efforts to combat climate change.</p> <p>The reduction or stabilization of greenhouse gas emissions in 2030 at 85% of emissions level in 1990 (absolute target) or more ambitious goal of reducing the overall, national emissions by 25% (conditional target), is a rather challenging target in economic and financial sense, achievement of which, among other things, should not lead to socio-economic tensions. The objectives set, will contribute to sustainable economic development and enable Kazakhstan to enter the path of low-carbon "green" development, and contribute to the achievement of the long-term global goal – to keep increase in global temperature below 2 degrees Celsius.</p>
<p><b>Key assumptions</b></p>	
<p>Global warming potential (GWP) applied</p>	<p>The GWP values adopted by decision 24/CP.19 of the Conference of the Parties to the UNFCCC</p>
<p>Methodologies for estimating emissions</p>	<p>Methodologies for estimating GHG emissions sourced from:</p> <ul style="list-style-type: none"> <li>• IPCC 2006 Guidelines;</li> <li>• IPCC 2013 Revised Supplementary Methods and Good Practice Guidance Arising from the Kyoto Protocol;</li> <li>• IPCC 2013 Wetlands Supplement.</li> </ul>
<p>Sectors covered</p>	<p>All IPCC sectors are covered, namely: Energy, Agriculture, Waste, Land Use, Land-Use Change and Forestry</p>



## MINISTRY OF ENVIRONMENT AND NATURAL RESOURCES

# Kenya's Intended Nationally Determined Contribution (INDC)

23 July 2015

### 1. Introduction

Kenya, like other countries in the region, is bearing the brunt of climate change impacts and the associated socio-economic losses. The situation is exacerbated by the high dependence on climate sensitive natural resources. In response to the challenges posed by Climate Change, Kenya has developed a National Climate Change Response Strategy (NCCRS 2010), National Climate Change Action Plan (NCCAP 2013), and a National Adaptation Plan (NAP) - under preparation which provides a vision for low carbon and climate resilient development pathway, while a National Climate Change Framework Policy and legislation are in their final stages of enactment to facilitate effective response to climate change. Kenya is operationalising these policies and plans through the implementation of climate change actions in various areas such as afforestation and reforestation, geothermal and other clean energy development, energy efficiency, climate smart agriculture, and drought management.

This document presents Kenya's Intended Nationally Determined Contribution (INDC) in response to decisions adopted at the 19<sup>th</sup> and 20<sup>th</sup> sessions of the Conference of the Parties to the United Nations Framework Convention on Climate Change (UNFCCC); that invite Parties to communicate to the Secretariat their INDCs, towards achieving the objective of the UNFCCC as set out in Article 2 of the Convention.

Kenya's INDC builds on the participatory multi-stakeholder and cross-sectoral consultative processes during the development of NCCRS and NCCAP at national and county levels. The contribution will also contribute towards the delivery of the Constitution of Kenya and the attainment of Vision 2030, the country's development blueprint.

#### 1.1 National Circumstances

Kenya is located in the Greater Horn of Africa region, which is highly vulnerable to the impacts of climate change. More than 80% of the country's landmass is arid and semi-arid land (ASAL) with poor infrastructure, and other developmental challenges. The country's economy is highly dependent on climate sensitive sectors such as agriculture that is mainly rain-fed, energy, tourism, water and health. Climate hazards have caused considerable losses across the country's different sectors over the years. The main climate hazards include droughts and floods which cause economic losses estimated at 3% of the country's Gross Domestic Product (GDP).

Kenya's total greenhouse gas (GHG) emissions are relatively low, standing at 73 MtCO<sub>2</sub>eq in 2010, out of which 75% are from the land use, land-use change and forestry (LULUCF) and agriculture sectors. This may be explained by the reliance on wood fuel by a large proportion of the population coupled with the increasing demand for agricultural land and



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urban development. The other significant emissions are from the energy and transport sectors, with the waste and industrial processes contributing negligible amounts.

Kenya strives to be a newly industrialised middle income country by 2030. This development is expected to increase emissions from the energy sector. The current energy mix, however, is mainly clean with deliberate efforts by Government towards enhancing geothermal, wind, solar and other clean energy development.

Climate change impacts continue to slow down the attainment of its national development goals. Kenya will continue making investments with both domestic and international resources to adapt to climate change and realise its abatement potentials.

## 2. Contribution

Kenya's INDC includes both mitigation and adaptation components based on her national circumstances and in line with decisions 1/CP.19 and 1/CP.20.

### 2.1 Mitigation

Kenya aims to achieve a low carbon, climate resilient development pathway.

Kenya will continue to implement the NCCAP (2013-2017), and subsequent action plans beyond this period to achieve this target. This will include the promotion and implementation of the following mitigation activities.

- Expansion in geothermal, solar and wind energy production, other renewables and clean energy options.
- Enhancement of Energy and resource efficiency across the different sectors.
- Make progress towards achieving a tree cover of at least 10% of the land area of Kenya.
- Clean energy technologies to reduce overreliance on wood fuels.
- Low carbon and efficient transportation systems.
- Climate smart agriculture (CSA) in line with the National CSA Framework.
- Sustainable waste management systems.

Kenya seeks to undertake an ambitious mitigation contribution towards the 2015 Agreement. Kenya therefore seeks to abate its GHG emissions by 30% by 2030 relative to the BAU scenario of 143 MtCO<sub>2</sub>eq; and in line with its sustainable development agenda. This is also subject to international support in the form of finance, investment, technology development and transfer, and capacity building.



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### 2.1.1 Information to facilitate clarity, transparency and understanding

<b>Timeframe for implementation</b>	The timeframe for implementation of the INDC is up to 2030.
<b>Scope of gases included in the contribution</b>	Carbon dioxide (CO <sub>2</sub> ), Methane (CH <sub>4</sub> ), and Nitrous Oxide (N <sub>2</sub> O) are prioritised.
<b>Sectors covered by the contribution</b>	The IPCC Guidelines for all sectors: Energy, Transportation, Industrial Processes, Agriculture, Forestry and Other Land Use (AFOLU) and waste sector.
<b>Assumptions and methodological approaches</b>	
<b>Methodology for emissions accounting</b>	<p>The IPCC Revised 1996 Guidelines for National Greenhouse Gas Inventories and the Good Practise Guidance and Uncertainty Management in National Greenhouse Gas Inventories were used to calculate the GHG emissions and removals as described in the Second National Communication. Emissions of carbon dioxide from the combustion of biomass are assessed but not counted towards the contribution.</p> <p>Future contribution from the extractive sector has not been included in the accounting.</p>
<b>Global warming potentials</b>	The carbon dioxide equivalent was calculated using the 100 year global warming potentials in accordance with the IPCC 2 <sup>nd</sup> Assessment Report.
<b>Approaches to land sector emissions</b>	<p>This includes emissions from the land use, land-use change and forestry (LULUCF) sector. Relevant national policy documents and the FAO's Global Forest Resource Assessment 2010 for Kenya were used. A global land-use data approach was used, as described in the 2003 IPCC Good Practice Guidance for LULUCF.</p> <p>A state and transition model consistent with the 1996 Revised IPCC Guidelines was used to calculate fluxes of CO<sub>2</sub> to (or from) the atmosphere and biomass carbon pools is the same as outlined in the 1996 Revised IPCC Guidelines. There is significant uncertainty in the BAU emission and mitigation potential estimates for this sector and work is underway to update and improve these estimates.</p>
<b>Contribution of International</b>	Kenya does not rule out the use of international market-based mechanisms in line with agreed accounting rules.



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<b>Market Based Mechanism</b>	
<b>Reference Point</b>	
<b>BAU emissions in the target year</b>	Business-as-usual (BAU) emissions are estimated to be 143 MtCO <sub>2</sub> eq by 2030. This excludes future exploitation in the extractive sector.
<b>BAU projection methodology</b>	The BAU projection methodology is detailed within the NCCAP and the Second National Communication (SNC), including key assumptions, drivers and methodologies for each sector. The base year is 2010. For geothermal energy, note that the BAU projection contained in the NCCAP and SNC has been revised to be consistent with the current level of geothermal deployment since the NCCAP was published.

### 2.2 Adaptation

As a minimal contributor to global GHG emissions, Kenya places significant priority on adapting to the effects of climate change.

#### 2.2.1 Programme of action for adaptation

The priority adaptation actions are presented in the NCCAP and further elaborated in the NAP. The actions are based on risk and vulnerability assessments across the MTP sectors. Many of the actions have strong synergies with mitigation actions. Kenya's capacity to undertake strong mitigation actions is dependent upon support for the implementation of these adaptation actions.

Kenya will ensure enhanced resilience to climate change towards the attainment of Vision 2030 by mainstreaming climate change adaptation into the Medium Term Plans (MTPs) and implementing adaptation actions. Any reasonable achievement of the adaptation goal will require financial, technology and capacity building support.

<b>MTP SECTOR</b>	<b>PRIORITY ADAPTATION ACTIONS</b>
<b>Energy</b>	Increase the resilience of current and future energy systems.
<b>Science, Technology and innovations</b>	Support innovation and development of appropriate technologies that promote climate resilient development.



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MTP SECTOR	PRIORITY ADAPTATION ACTIONS
<b>Public sector reforms</b>	Integrate climate change adaptation into the public sector reforms.
<b>Human Resource Development, Labour and Employment</b>	Enhance adaptive capacity and resilience of the informal private sector.
<b>Infrastructure</b>	Climate proofing of infrastructure (energy, transport, buildings, ICT).
<b>Land Reforms</b>	Mainstream climate change adaptation in land reforms.
<b>Education and training</b>	Enhance education, training, public awareness, public participation, public access to information on climate change adaptation across public and private sectors.
<b>Health</b>	Strengthen integration of climate change adaptation into the health sector.
<b>Environment</b>	Enhance climate information services.
	Enhance the resilience of ecosystems to climate variability and change.
<b>Water and irrigation</b>	Mainstream of climate change adaptation in the water sector by implementing the National Water Master Plan (2014).
<b>Population, urbanisation and housing</b>	Enhance the adaptive capacity of the population, urbanisation and housing sector.
<b>Gender, Vulnerable Groups and Youth</b>	Strengthen the adaptive capacity of the most vulnerable groups and communities through social safety nets and insurance schemes.
<b>Tourism</b>	Enhance the resilience of the tourism value chain.
<b>Agriculture, livestock development and fisheries</b>	Enhance the resilience of the agriculture, livestock and fisheries value chains by promoting climate smart agriculture and livestock development.
<b>Private Sector/ Trade; Manufacturing; Business Process Outsourcing, Financial services</b>	Create enabling environment for the resilience of private sector investment, demonstrate an operational business case.
<b>Oil and mineral resources</b>	Integrate climate change adaptation into the extractive sector.
<b>Devolution</b>	Mainstream climate change adaptation into county integrated development plans and implement the Ending Drought Emergencies Strategy.



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### 3. Fairness and ambition

Kenya believes that the key factors in determining the fairness of a contribution should include historical responsibility and respective capability to address climate change. The UNFCCC also recognises that the extent to which developing countries will meet their obligations under the Convention will depend on the level of support in terms of finance, technology and capacity building available.

Kenya's historical contribution is low, at 0.1% of the total global emissions, while the per-capita emissions are less than 1.26 MtCO<sub>2</sub>eq compared to the global average of 7.58 MtCO<sub>2</sub>eq<sup>1</sup>.

The country's capability to implement this contribution is also subject to limitations; with poverty alleviation and sustainable economic development being the key national objectives. Increasing the per-capita GDP growth equitably above the current levels of 4.1% is therefore a priority.

Nevertheless, Kenya places a high priority on response to climate change. In order to meet the below 2 °C objective, all countries will need to undertake mitigation based on the common but differentiated responsibilities and respective capabilities in accordance with the Convention. In addition, Kenya particularly notes that the Lima Call to Action agrees that each Party's contribution will "represent a progression beyond the current undertaking of that Party".

Kenya is determined to continue playing a leadership role in addressing climate change by communicating a fair and ambitious contribution. This intended contribution targets a high proportion of its mitigation potential, dependent on the level of support available. This will involve implementing the priority mitigation and adaptation actions in the NCCAP to achieve a low carbon climate resilient development in line with Vision 2030.

This is the first time that Kenya has stated an intended contribution to global mitigation efforts. In addition, Kenya's INDC represents her aspiration to increase the resilience to climate change by introducing a comprehensive programme for adaptation action across sectors in support of livelihoods, and economic well-being of the Kenyan people. This represents a high level of fairness and ambition in light of Kenya's national circumstances.

### 4. Planning process

Kenya's planning process on mitigation and adaptation hinges on the NCCAP and the NAP. The two shall be reviewed every five years to inform the MTP. The adaptation actions are

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<sup>1</sup> GHG time series 1990-2012 per capita emissions for world countries  
[http://edgar.jrc.ec.europa.eu/overview.php?v=GHGts\\_pc1990-2012](http://edgar.jrc.ec.europa.eu/overview.php?v=GHGts_pc1990-2012)



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further amplified in the NAP. Mitigation and adaptation actions are implemented across the various sectors at both the national and county government levels. The Ministry of Environment and Natural Resources coordinates the country's climate change affairs through the National Climate Change Secretariat (NCCS).

The planning process also takes cognisance of the Climate Change Bill (2014) that proposes several institutional reforms to enhance coordination of climate change adaptation and mitigation. These include the establishment of:

- A high level National Climate Change Council chaired by the President. The Council shall provide an overarching national climate change coordination mechanism and, among other roles, ensure the mainstreaming of climate change functions by the National and County governments, and approve and oversee the implementation of the NCCAP.
- A Climate Change Directorate as the lead agency of the government on national climate change plans and actions to deliver operational coordination; and provide technical assistance on climate change actions and responses to County governments.
- Kenya Climate Fund to be a financing mechanism for priority climate change actions and interventions approved by the Council.

In addressing climate change issues, public entities are required to undertake public awareness and consultations, and ensure gender mainstreaming, in line with the Constitution and the Climate Change Bill (2014).

### **5. Means of implementation**

Kenya's contribution will be implemented with both domestic and international support. It is estimated that over USD 40 billion is required for mitigation and adaptation actions across sectors up to 2030. Kenya will require international support in form of finance, investment, technology development and transfer, and capacity-building to fully realize her intended contribution. Further analysis will be necessary to refine the required investment cost and determine the domestic support.



**REPUBLIC OF KIRIBATI**

**INTENDED NATIONALLY DETERMINED CONTRIBUTION**

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## INTRODUCTION

The Republic of Kiribati is recognized as a Least Developed Country (LDC) and is ranked 170<sup>th</sup> of 186 countries on per capita GDP. Comprising 33 atolls and reef islands, the country is dispersed over 3.5 million square kilometres, giving rise to logistical issues in a country with unreliable connections. Kiribati's contribution to global warming is insignificant with emissions per capita (approximately 0.6tCO<sub>2</sub>e/capita in 2014) among the lowest in the world. The only major sector of emissions for Kiribati is energy (including transport), with slight contributions from agriculture and forestry.

The country is one of the most vulnerable countries to the adverse impacts of climate change. Inundation and erosion are frequent impacts of climate change destroying key areas of land - storm surges and wave-overtopping contaminate the fresh groundwater lens which is vital for the population's water security. An economic evaluation of the costs of climate change related risks has been estimated to be 35% of Kiribati GDP. The estimate takes into account only the potential impacts of climate change on coastal zone (US\$7-\$13 million a year) and water resources (US\$1-\$3 million a year).

In order to build island resilience to the adverse impacts and extreme events of climate change and in parallel with achieving the common development goals of Kiribati, the country relies mostly on external aid (donors) to finance its adaptation measures towards CC as the country is unable to meet the costs of adaptation on its own. Kiribati has received external assistance to formulate its *Kiribati Joint Implementation Plan on Climate Change and Disaster Risk Management* (KJIP) (2014) (comparable to NAPA required under UNFCCC) which defines priority adaptation measures to address current and ongoing risks from climate change. Similarly, the Kiribati Adaptation Project III (KAP), initiated by the World Bank, is currently ongoing. The need for Kiribati to build national capacity to facilitate direct access to climate change adaptation financing is a high priority in the immediate future.

In regards to mitigation, Kiribati has no obligation under the UNFCCC to reduce its emissions of greenhouse gases. Nonetheless, there have been significant efforts to date to reduce fossil fuel imports and increase domestic renewable energy use. These efforts include setting up of the Kiribati Solar Energy Company which provides solar lighting on rural islands and markets solar appliances; trialling of coconut oil based bio-fuel; and on-grid solar PV on urban islands.

### Situation Analysis

The revenue of Kiribati is drawn primarily from five main sources: (i) the sale of fishing licenses (access fees account for more than 50% of annual government revenue and add about 22% to the GDP); (ii) official development assistance; (iii) The Kiribati Revenue Equalization Reserve Fund (RERF); (iv) general taxation; and, (v) tariffs paid by households for services. A high dependency on donor contributions and a vulnerability to external economic and environmental factors add to the challenges faced by the country, and more specifically the infrastructure sector.

Thus public sector dominates the economy, accounting for more than half of estimated gross domestic product (GDP). The general level of demand is largely determined by the government's recurrent budget, half of which is funded by access license fees paid by foreign fishing vessels to catch tuna in Kiribati's exclusive economic zones and by earnings of Kiribati's reserve fund invested in overseas financial markets. Total demand draws in close to \$100 million of imports yearly, while yearly exports of goods are valued at around \$5 million. The balance of payments current account is sustained by factor income from abroad (i.e., tuna vessel fishing licenses, seafarers' remittances, and investment earnings) and grants received by government, churches, and other non-government organizations.

### **Issues and challenges**

As an atoll country, Kiribati is almost entirely dependent upon imported food and fuel. Subsistence farming and fishing are the primary economic activities. Some 18% of the population is in permanent employment, and over half of these work for the government. Approximately 47% of the population lives in South Tarawa, and this is a magnet for internal migration from the outer islands. South Tarawa provides opportunities for cash employment and consumption as well as access to higher education and specialist social services not available elsewhere in Kiribati. This has led to population growth of 5.2% in recent years into both North and South Tarawa. A UNDP study of poverty in Kiribati showed the highest incidence of basic needs poverty occurred in South Tarawa, affecting 18.3% of households and 24.2% of the population.

A whole-of-nation approach is being pursued by government to address the impacts of climate change and sea level rise and related environmental issues in Kiribati. The effects of climate change are seen as major challenge against developmental efforts which will require capacity building at all levels to manage and improve environmental, social and economic sustainability. Government is responsible for providing a platform on which to promote and raise awareness of climate change and sea level rise issues through a single coordinated body – Office of the Beretienti (President) through Policy Coordination and Strategic Risk Management Division. The latter is responsible for governance, policy coordination among relevant sectors including non-government organisations, vulnerability and risk management, capacity-building, awareness and media coordination, and coordination of national positions on international issues relating to the various multilateral environmental agreements including the UN Frameworks Convention on Climate Change.

As one of the most vulnerable countries in the world to the effects of climate change its ability to respond to climate risks is hampered by its highly vulnerable socio-economic and geographical situation. Low atolls, isolated location, small land area separated by vast oceans, high population concentration, and the costs of providing basic services make Kiribati, like all Small Island Developing States (SIDS), especially vulnerable to external shocks including the adverse impacts of climate change. Sea-level rise and exacerbated natural disasters such as drought and weather fluctuations pose significant and direct additional threats to sectors and resources central to human and national development. The country is located in relatively calm latitudes but its low atolls (in many places no more than 2m above mean sea level and only a few hundred meters wide) are subject to long-term sea level rise and, more immediately, are exposed to continuing coastal erosion and inundation during spring tides, storm surges and strong winds. The islands are subject to periodic storm surges with a return period of 14 years. By 2050, 18-80% of the land in Buariki, North Tarawa, and up to 50% of the land in Bikenibeu, South Tarawa could become inundated. Because of narrow islands, the entire population and most infrastructure is concentrated along the coast making it directly exposed to these climatic

threats. The results of sea level rise and increasing storm surge threaten the very existence and livelihoods of large segments of the population, increase the incidences of water-borne and vector-borne diseases undermining water and food security and the livelihoods and basic needs of the population, while also causing incremental damage to buildings and infrastructure. The *Climate Change in the Pacific Report* (2011) describes Kiribati as having a low risk of cyclones. However, in March 2015 Kiribati experienced flooding and destruction of seawalls and coastal infrastructure as the result of Cyclone Pam, a Category 5 cyclone that devastated Vanuatu. Thus Kiribati remains exposed to the risk that cyclones will strip the low lying islands of their vegetation and soil.

## MITIGATION

INFORMATION ON INTENDED NATIONALLY DETERMINED CONTRIBUTION	
PARTY: Republic of Kiribati	DATE: August 2015
Parameter	Information
Period for defining actions	Five year periods. Starting 2020, with reference to 2025 and ending in 2030
Type and level of Commitment	<p>All commitments are premised on: (a) a fair and ambitious agreement being reached, reflecting Common but Differentiated Responsibilities and Respective Capabilities; and (b) timely access to international climate change financing, capacity building and technology.</p> <p>Kiribati is a LDC SIDS with limited resources, that will nonetheless commit to reduce emissions by: <b>13.7% by 2025</b> and <b>12.8% by 2030</b> compared to a BaU projection.</p> <p>In addition to these quantified outcomes, Kiribati will proactively protect and sustainably manage its mangrove resources, as well as protect and enhance coastal vegetation and seagrass beds. Together these actions represent effective stewardship of more than 6 million tonnes of Carbon Dioxide stored, more than 100 times the current annual national emissions inventory.</p> <p>On the understanding that a global agreement addresses international assistance to access financial and technical resources, Kiribati can, with international assistance, contribute a further:</p> <ul style="list-style-type: none"> <li>&gt; 48.8% reduction in greenhouse gas emissions by 2025; and</li> <li>&gt; 49% reduction in greenhouse gas emissions by 2030, compared to the BaU projection.</li> </ul> <p><b>With appropriate international assistance, Kiribati can reduce its emissions by more than 60% (61.8%) by 2030.</b></p>
Reference year or period	The BaU projection is based on an extrapolation of historic data covering the period 2000-2014.
Estimated, quantified emissions impact	<p>In addition to the carbon storage in the ocean ecosystem, Kiribati's unconditional contribution will reduce emissions by 10,090tCO<sub>2</sub>e annually throughout the period 2020 to 2030.</p> <p>Kiribati's conditional contribution (with international assistance) will reduce emissions by 35,880tCO<sub>2</sub>e annually by 2025, and by 38,420tCO<sub>2</sub>e annually by 2030.</p>

INFORMATION ON INTENDED NATIONALLY DETERMINED CONTRIBUTION		
PARTY: Republic of Kiribati		DATE: August 2015
Parameter	Information	
Coverage	% of National emissions	INDC covers fossil fuels and marine sequestration. Fossil fuel use covers more than 98% of the reported national inventory
	Sectors	Energy sector: Power (approximately 48%) Transport (52%)  Maritime and coastal sector including mangrove, coastal vegetation and seagrass beds.
	Gases	Carbon dioxide only (estimated > 99% of inventory)
	Geographical boundaries	Whole of country
Further information, relevant to commitment type		Commitments are in the form of Outcomes and Actions. These are referenced as deviation from Business as Usual projections. BaU projections are based on fossil fuel consumption data for the period 2000-2014, with line of best fit extrapolation to 2030. The projection will be revised to include more accurate information with the Third National Communication.
Intention to use market based mechanisms to meet commitments		Kiribati will consider market based mechanisms to support establishment and operation of a National Climate Change Trust Fund.
Land sector accounting approach		NA for Land Use.  Appropriate methodologies drawn from international best practice to quantify sequestration from mangrove plantations.
Estimated macro-economic impact and marginal cost of abatement		TBD
Narrative supporting the fair-share assessment of the contribution		Kiribati is a LDC SIDS that is in no way responsible for the unfolding climate change catastrophe, yet Kiribati is extremely vulnerable to climate change impacts.  Current (2014) greenhouse gas emissions from Kiribati are approximately 63,000tCO <sub>2</sub> e/year. This is extremely small: representing approximately just 0.0002% of global emissions.  Kiribati also has very low per capita emissions, at just: 0.6tCO <sub>2</sub> per person in 2014. This is less than the average per capita emissions of sub-Saharan Africa (0.8tCO <sub>2</sub> /capita), and less than half of the estimated level required to stay below 2°C of warming, of around 1.5tCO <sub>2</sub> e/capita <sup>1</sup> .

<sup>1</sup> Using 2010 data from World Bank, <http://databank.worldbank.org/data/home.aspx>.

INFORMATION ON INTENDED NATIONALLY DETERMINED CONTRIBUTION	
PARTY: Republic of Kiribati	DATE: August 2015
Parameter	Information
	Accordingly, ANY contribution from Kiribati is more than fair, and must be considered ambitious, given the extraordinary circumstances of Kiribati.

### ***Mitigation Status and Context:***

Greenhouse gas emissions are the result of combustion of imported fossil fuels in the energy sector for:

- Electricity generation;
- Sea transport;
- Land transport;
- Kerosene for lighting on outer islands; and
- LPG and kerosene for cooking.

The vision for the Kiribati National Energy Policy (KNEP) is “available, accessible, reliable, affordable, clean and sustainable energy options for the enhancement of economic growth and improvement of livelihoods in Kiribati.” Reducing fossil fuel imports is the major goal, with the uptake of renewable energy along with further energy efficiency improvements on both the demand and supply sides, expected to replace more than one-third of fossil fuels for electricity and transport by 2025.

Reflecting the ambition of the Majuro Declaration<sup>2</sup>, Kiribati has identified targets focused on reductions in fossil fuel use by 2025 through increases in renewable energy and energy efficiency (RE and EE) in the following sectors and geographical areas:

- South Tarawa by 45% (23% RE and 22% EE);
- Kiritimati Island by 60% (40% RE and 20% EE);
- rural public infrastructure, including Southern Kiribati Hospital and Ice plants by 60% (40% RE and 20% EE); and
- rural public and private institutions such as boarding schools, Island Council, private amenities and households by 100%(100% RE).

### ***Actions***

In preparing its INDC, Kiribati considered mitigation actions that were currently planned and funded (as the Kiribati Contribution), and those that have been identified as technically viable with current technology suitable to the Kiribati context (as the Contribution conditional on adequate and timely international assistance), summarised in the Table below.

<sup>2</sup> ‘Majuro Declaration for Climate Leadership’ 2013. Pacific Islands Forum Leaders’ Meeting, Majuro, Republic of Marshall Islands.

Sector	Mitigation option	INDC type	Mitigation in 2025 (tCO <sub>2</sub> e)	% of 2025 projected inventory	Mitigation in 2030 (tCO <sub>2</sub> e)	% of 2030 projected inventory
<i>Mitigation options using Kiribati and current international assistance</i>						
Energy	1.3MW PV on-grid in South Tarawa	Kiribati	1910	2.6	1910	2.4
Energy	Outer Island and rural electrification (off-grid solar)	Kiribati	1100	1.5	1100	1.4
Ocean	Mangrove forest enhancement	Kiribati	7,080	9.6	7,080	9.0
		Total:	10,090	13.7	10,090	12.8
<i>Mitigation options requiring new and additional climate finance and technical assistance</i>						
Energy	Maximum use of RE & EE	Conditional on assistance	12,050	16.4	13,030	16.6
Energy	Use of coconut oil as biodiesel for electricity generation	Conditional on assistance	12,050	16.4	12,840	16.4
Energy	Use of coconut oil as biodiesel for transport	Conditional on assistance	11,780	16.0	12,550	16.0
		Total:	35,880	48.8	38,420	49.0

To be realised, the conditional mitigation Actions require a timely combination of capacity building, technology transfer, and financial support, primarily in the form of grants. Additional mitigation actions may be identified in the future.

Below is a brief summary of the activities proposed for off-grid electricity production, with estimates of financial resources required (in AUD):

- Activity 1 – Solar PV mini grid system for Southern Kiribati Hospital (2.4 million) - design, procure and install off-grid PV systems for the Southern main hospital (265kWp) to a level to support the fully equipped needs to operate the hospital. (not yet fully funded)
- Activity 2 – Outer Island Clinic solar system rehabilitation (\$230,000.00) - design, procure, and install 58 systems in total on 20 outer Islands to provide power for lighting and for HF communication radio. (not yet fully funded)
- Activity 3 – Mereang Taabwai Secondary Schools solar PV mini-grid (\$500,000.00) - design, procure and install off-grid PV systems (20 kWp) for the school to a level to

support a fully equipped computer lab, dormitory lighting, refrigerator/freezers, office equipment and audio-visual equipment. (funded/under implementation)

- Activity 4 – Junior Secondary School (JSS) system. (\$285,000.00) - design, procure and install off-grid PV systems for lighting and Charging Laptop computers of 2 classrooms and staff room in all JSS in the Outer Islands (410 Wp each). (not yet fully funded)
- Activity 5 – Solar Home System for Households. (1.5 million) - procure and install 3900 solar home system to cover up all remaining households in the Outer Islands. The system will provide basic lighting, phone and radio charging which will improve social-economic condition in the Outer Islands. (funded/under implementation)
- Activity 6 – Outer Island Council solar PV mini grid system (\$710,000.00) - design, procure and install off-grid PV systems (5 kWp each) for island council administrative centres in the Gilbert and Line Groups. (not yet fully funded)
- Activity 7 – Outer Island Fish Centres (\$610,000.00) - design, procure and install off-grid PV systems for the Fish Centres (3.75kWp each) in all the Islands to a level to support a fully equipped centres lighting, refrigeration and other equipment. (not yet fully funded)
- Activity 8 – Desalination Plant for vulnerable rural community. (\$115,000.00) – 19 systems for 12 community systems for solar water desalination plant will be procured and installed on 9 selected Islands. This activity will improve quality of life in households by providing portable water supply to the most vulnerable Islands in Kiribati. (not yet fully funded)
- Activity 9 – Outer Island Police Station solar system rehabilitation (\$60,000.00) - 23 solar systems (120 Wp each) will be procured and installed in all of the outer Islands for communication, lighting, etc at the Police stations and an additional 8 Police posts. (not yet fully funded)
- Activity 10 – Solar PV system for non-government vocational institutions: CCL Manoku and Alfred Sadd Institution (\$500,000.00) - design, procure and install off-grid PV systems (10 kWp) for each community institution to support the institution daily activities. (funded/under implementation)

## ADAPTATION

Kiribati has been working actively on climate change adaptation for 20 years, and with the development of pioneering tools and methodologies that are regarded as best practices regionally and internationally, has made and continues to make a considerable contribution to the global and regional adaptation planning and management process and pool of knowledge on building climate resilience. This contribution is made in the face of severe constraints and challenges confronted by Kiribati as a small island developing States (SIDS) and Least Developed Country (LDC). For Kiribati, where climate change threatens the very existence of the nation and population, adaptation is not an option – but rather a matter of survival.

### **Current climate, projected climate change and related assumptions**

Kiribati has a hot, humid, tropical climate with an average air temperature of 28.3°C and average rainfall of about 2100 mm per year in Tarawa (1980–1999). Its climate is closely related to the temperature of the oceans surrounding the small islands and atolls. Across Kiribati the average temperature is relatively constant year round. From season to season the temperature changes by no more than about 1°C. Kiribati has two seasons – te Au Maiaki, the dry season and te Au Meang, the wet season. The periods of the seasons vary from location to location and are strongly influenced by the seasonal movement of the South Pacific Convergence Zone (SPCZ) and the Inter-tropical Convergence Zone (ITCZ).

The six-month dry season (te Au Maiaki) for Tarawa starts in June, with the lowest mean rainfall in October. The wet season (te Au Meang) starts in November and lasts until April; the highest rainfall occurs from January to March, peaking with a mean of 268 mm in January. The highest rainfall usually occurs when the ITCZ is furthest south and closest to Tarawa; there are also high rainfalls, though to a lesser extent, when the SPCZ is strongest. The average sea-surface temperature of oceans around Kiribati is 29.2°C (1980–1999). As Kiritimati is 2000 km to the east from Tarawa, its wet season starts at a different time, from January to June, with the wettest months being March and April. Rainfall in the northeast of Kiribati is only affected by the ITCZ.

Across Kiribati there is a change in mean monthly rainfall towards the end of the year. There is however, a large variation in mean annual rainfall across Kiribati. A notable zone of lower rainfall, less than 1500 mm per year exists near the equator and extends eastwards from 170°E. On average, Tarawa at 1.1416°N receives just under 2100 mm, while the island of Butaritari at 3.1678°N only 350 km to the north, receives around 3000 mm. The climate of Kiribati, especially rainfall, is highly variable from year to year. Tarawa, for example, receives more than 4000 mm of rainfall in the wettest years, but only 150 mm in the driest. This huge range is similar in Kiritimati and has enormous impacts on water availability and quality, crop production, food security and health. The main reason for this variability is the El Niño–Southern Oscillation (ENSO). Many Kiribati islands lie within the equatorial waters that warm significantly during an El Niño event and cool during a La Niña event. As a result rainfall is much higher than normal during an El Niño and much lower during a La Niña. Maximum air temperatures tend to be higher than normal during El Niño years, driven by the warmer oceans surrounding the islands, while in the dry season minimum air temperatures in El Niño years are below normal. At Kiritimati, El Niño events also bring wetter conditions in both seasons and La Niña events bring drought. El Niño is generally associated with above-normal rainfall and strong westerly winds, while La Niña is associated with below-normal rainfall and the risk of drought.

The climate of Kiribati is changing and will continue to change in the future as a result of global climate change. Table 2 summarises the trends already observed in variables such as temperature, rainfall, sea level, extreme events and ocean acidification in Kiribati.

Table 2: Climate trends in Kiribati Observed over a period from 1950 to 2009

Climate Variable	Observed Trends
Air temperature	Annual and seasonal mean air temperatures are getting warmer: <ul style="list-style-type: none"> <li>• Maximum temperatures have increased at a rate of 0.18°C per decade.</li> <li>• Annual and seasonal minimum air temperatures have increased slightly more than the increase in maximum air temperatures.</li> </ul>
Sea-surface temperature	Water temperatures have risen since the 1970s: <ul style="list-style-type: none"> <li>• in the Gilbert Group by approximately 0.15°C per decade;</li> <li>• in the Line Group by approximately 0.1°C per decade; and</li> <li>• in the Phoenix Group by approximately 0.12°C per decade.</li> </ul> <p>Since 1950 the rise has been gradual in the waters around the Gilbert Islands, but it has been variable from one decade to the next in the Line and Phoenix Islands.</p>
Rainfall	Annual rainfall has increased: <ul style="list-style-type: none"> <li>• Annual and wet season rainfall has increased for Kiritimati but there is no trend in the dry season.</li> <li>• At Tarawa, rainfall data show no clear trends.</li> <li>• At both the above sites, rainfall has varied substantially from year to year.</li> </ul>
Droughts	The impact of droughts, usually associated with La Niña, can be severe in Kiribati; for example: <ul style="list-style-type: none"> <li>• In 1971, 1985, 1998 and 1999 annual rainfall was less than 750mm.</li> <li>• The recent drought from April 2007 to early 2009 severely affected the southern Kiribati islands and Banaba. During this period, groundwater turned brackish and the leaves of most plants turned yellow.</li> </ul>
Cyclones, severe storms and extreme sea levels	<ul style="list-style-type: none"> <li>• Tropical cyclones rarely pass between the Kiribati islands.</li> <li>• Between 1969/70 and 2009/10 three cyclones passed within 400km of Arorae Island in western Kiribati and three cyclones within 400km of Caroline Island in eastern Kiribati.</li> <li>• Storm surges and extreme sea levels occur occasionally.</li> </ul>
Sea level	Sea level has risen (see figure 6): <ul style="list-style-type: none"> <li>• Sea level measured by satellite altimeters has risen by 1–4mm per year (global average is 3.2 +/- 0.4mm per year).</li> <li>• Sea-level rise naturally fluctuates from year to year at levels of about 26cm. There are also decade to decade variations. These fluctuations over both timeframes are a result of phenomena such as ENSO.</li> </ul>
Ocean acidification	Ocean acidification has been increasing: <ul style="list-style-type: none"> <li>• Since the 18th century ocean has been slowly becoming more acidic. The aragonite saturation state has declined from about 4.5 in the late 18th century to an observed value of about 3.9 ± 0.1 by 2000.</li> <li>• 'Based [on] the large-scale distribution of coral reefs across the Pacific and the seawater chemistry, Guinotte et al. (2003) suggested that seawater aragonite saturation states above 4 were optimal for coral growth and for the development of healthy reef ecosystems, with values from 3.5 to 4 adequate for coral growth, and values between 3 and 3.5, marginal. Coral reef ecosystems were not found at seawater aragonite saturation states below 3 and these conditions were classified as extremely marginal for supporting coral growth' (KMS, BoM &amp; CSIRO 2011, Vol. 2, p.100).</li> </ul>

With many islands situated at 2 meters or less above sea level, Kiribati has already witnessed first hand the impacts of global climate change. According to the Pacific Regional Environment Programme (SPREP), two small uninhabited Kiribati islets, Tebua Tarawa and Abanuea, disappeared underwater in 1999. The United Nations Intergovernmental Panel on Climate Change predicts that sea levels will continue to rise due to climate change, and it is thus likely

that within a century the nation's arable land will become subject to increased soil salination and will be largely submerged, while other islands and atolls will share a similar fate to Tebutarawa and Abanuea and disappear altogether.

Table 3 provides climate change projections for Kiribati are based on up to 18 global climate models for up to three emission scenarios – low, medium and high – and three 20-year periods – centred on 2030, 2055 and 2090, relative to 1990. There is no single projected climate future for Kiribati, but rather a range of possible futures. Projections represent an average change over either the whole of Kiribati or over smaller but still broad geographic regions such as the Line Group. However, projections are not for specific locations such as towns. The projections listed in Table 3 are presented along with confidence levels based on expert judgement by scientists who conducted the analysis. The levels range from very high, high and moderate to low confidence.

Table 3: Climate projections for Kiribati over the 21<sup>st</sup> century

Climate Variable	Projected Changes
<b>Air temperature</b>	<p>Surface air temperature will continue to increase (very high confidence). Under a high emission scenario (see also Table 4):</p> <ul style="list-style-type: none"> <li>• Annual and seasonal mean temperature will increase by 0.3–1.3°C for the Gilbert Islands and by 0.4–1.2°C for the Phoenix and Line Islands by 2030 (high confidence).</li> <li>• Annual temperature increases could be greater than 3°C by 2090 (moderate confidence).</li> </ul> <p>(As there is no consistency in projections of future ENSO activity, it is not possible to project Interannual variability in temperature.)</p>
<b>Sea-surface temperature</b>	<p>Sea-surface temperature will continue to increase (very high confidence):</p> <ul style="list-style-type: none"> <li>• Sea-surface temperatures will increase by 0.6–0.8°C by 2035 and by 1.2–2.7°C by 2100 (Bell et al. 2011).</li> </ul> <p>(As there is no consistency in projections of future ENSO activity, it is not possible to project Interannual variability in sea-surface temperature.)</p>
<b>Rainfall</b>	<p>Rainfall patterns will change:</p> <ul style="list-style-type: none"> <li>• Wet season, dry season and annual average rainfall will increase (high confidence).</li> <li>• Annual and seasonal mean rainfall will increase (&gt;5%) by 2030. The majority of models simulate a large increase (&gt;15%) by 2090 (low confidence).</li> </ul>
<b>Extremes</b>	<p>There will be more extreme rainfall and very hot days:</p> <ul style="list-style-type: none"> <li>• The intensity and frequency of days of extreme heat and warm nights will increase and Cooler weather will decline (very high confidence).</li> <li>• The intensity and frequency of days of extreme rainfall will increase (high confidence).</li> </ul>
<b>Drought</b>	<p>The incidence of drought will decrease (moderate confidence):</p> <ul style="list-style-type: none"> <li>• In the Gilbert, Phoenix and Line Islands mild drought will occur approximately seven to eight times every 20 years by 2030, decreasing to six to seven times by 2090 (low confidence).</li> <li>• The frequency of moderate drought is projected to decrease from two or three times every 20 years by 2030 to once or twice by 2090 (low confidence).</li> <li>• Severe drought will occur approximately once or twice every 20 years by 2030, decreasing to once every 20 years by 2055 and 2090 (low confidence).</li> </ul>
<b>Sea level</b>	<p>Mean sea level is projected to continue to rise (very high confidence):</p> <ul style="list-style-type: none"> <li>• Mean sea level will rise by approximately 5–15cm by 2030 and 20–60cm by 2090 under the higher emissions scenario (moderate confidence; see Table 5 and Figure 5).</li> <li>• Interannual variability of sea level will lead to periods of lower and higher regional sea levels with levels similar to the past.</li> <li>• The sea-level rise combined with natural year-to-year changes will increase the impact of storm surges and coastal flooding.</li> </ul> <p>(Scientists warn that due to the melting of large ice sheets such as those in Antarctica and Greenland, rise could possibly be larger than predicted. But currently not enough is known to make predictions confidently.)</p>
<b>Ocean</b>	<p>The acidification of the ocean will continue to increase (very high confidence):</p>

<b>acidification</b>	<ul style="list-style-type: none"> <li>• The annual maximum aragonite saturation state will reach values below 3.5 by about 2045 in the Gilbert Islands, by about 2030 in the Line Islands, and by about 2055 in the Phoenix Islands. The aragonite saturation will continue to decline thereafter (moderate confidence).</li> <li>• Ocean pH will decrease by <math>-0.1</math> units by 2035 and by <math>-0.2</math> to <math>-0.3</math> units by 2100 (Bell et al. 2011).</li> <li>• Coral reefs are projected to degrade progressively with losses of live coral of <math>&gt; 25\%</math> by 2035 and <math>&gt; 50\%</math> by 2050 due to rising sea-surface temperatures and more acidic oceans (Bell et al. 2011).</li> </ul>
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Past La Niña events have shown that the impacts of droughts can be very severe in Kiribati. For example, in 1971, 1985, 1998 and 1999, annual rainfall was less than 750 mm. The recent drought from April 2007 to early 2009 severely affected the southern Kiribati islands and Banaba. During this period, copra production significantly declined, depressing the outer island economies which rely on copra as a main income source. The groundwater also turned brackish and the leaves of most plants turned yellow. During the 1970–1971 drought, a complete loss of coconut palms was reported at Kenna village on Abemama in central Kiribati.

The country is located in relatively calm latitudes but its low atolls (in many places no more than 2m above mean sea level and only a few hundred meters wide) are subject to long-term sea level rise and, more immediately, are exposed to continuing coastal erosion and inundation during spring tides, storm surges and strong winds. The islands are subject to periodic storm surges with a return period of 14 years. By 2050, 18-80% of the land in Buariki, North Tarawa, and up to 50% of the land in Bikenibeu, South Tarawa could become inundated. As a result of ENSO events, Tarawa already experiences significant natural fluctuations in sea level of about 0.5 metres. These fluctuations will affect the inundation potential of the atoll, particularly when combined with storm surges and the projected increase in sea level. The low-lying places along the atolls have already experienced coastal inundation from unexpected extreme high tides. The extreme high tides, when they coincide with the spring tide, result in a threshold of  $>2.8$  metres, as in 2010 when wave overtopping damaged infrastructure and properties. Because of narrow islands, the entire population and most infrastructure and agricultural production is concentrated along the coast making it directly exposed to these climatic threats. The results of sea level rise and increasing storm surge threaten the very existence and livelihoods of large segments of the population, increase the incidences of water-borne and vector-borne diseases undermining water and food security and the livelihoods and basic needs of the population, while also causing incremental damage to buildings and infrastructure.

### **Analysis of vulnerable sectors and segments of society**

Kiribati is one of the most vulnerable countries in the world to the effects of climate change. The country's ability to respond to climate risks is hampered by its highly vulnerable socio-economic and geographical situation. Low atolls, isolated location, small land area separated by vast oceans, high population concentration, and the costs of providing basic services make Kiribati, like all Small Island Developing States (SIDS), especially vulnerable to external shocks including the adverse impacts of climate change. Sea-level rise and exacerbated natural disasters such as drought and weather fluctuations pose significant and direct additional threats to sectors and resources central to human and national development and the provision of basic human needs.

The following factors are contributing to the nation's vulnerability to climate change and disaster risks, which apply across the various sectors:

- A high population and growth rate on South Tarawa in the Gilbert Group (50,182 inhabitants with a population density of 3,184 persons per square kilometer) as well as on Kiritimati in the Line Islands Group (5,586 inhabitants), which is due to: a high proportion of children and youth, high levels of fertility, low rates of contraceptive use, and disparities between the different islands of Kiribati (resulting in internal migration, displacement, and urbanisation), all effecting the resilience of the population and natural ecosystems;
- In fast-growing urban areas, especially South Tarawa with a growth rate of 4.4% and to a certain extent also North Tarawa and Kiritimati, the population pressure and lifestyle changes have strained the already limited freshwater resources - in many areas, the freshwater consumption rates are already exceeding the estimated sustainable yield of groundwater sources (such as in the Bonriki and Buota Water Reserves on South Tarawa);
- The increase in non-biodegradable waste usage in urban areas, as well as poor waste and sanitation management, result in limited access to unpolluted land and sea, degradation of land and ocean based ecosystems, and numerous isolated occurrences of diarrhoeal and vector borne diseases, all affecting the resilience of the population and natural ecosystems;
- Traditional food systems are declining in favour of imported food, and the number of people who preserve and apply traditional knowledge is decreasing, affecting food security;
- In rural outer islands, the people have limited access to employment opportunities, effective transport, communication, and community services such as education and health - these factors, combined with a high dependency on subsistence agriculture and coastal fisheries, make rural communities more vulnerable;
- Government revenue is declining and highly dependent on fisheries revenue (40–50%) with limited capacity to maximise the benefits of these resources;
- Many laws do not take into account sustainable management concerns, climate change predictions and disaster risks;
- Safety and emergency response capacities of Kiribati are limited;
- The low-lying atoll islands are already experiencing severe coastal erosion and inundation due to natural and human causes, leading to a loss of land, public and private buildings, and infrastructure.

In the long-term, the most serious concern is that sea-level rise will threaten the very existence of Kiribati as a nation. But in the short to medium term, a number of other projected impacts are of immediate concern. Of particular note is the concern as to whether the water supply and food production systems can continue to meet the basic needs of the rapidly increasing population of Kiribati.

The effects of climate change are felt first and most acutely by vulnerable and marginalised populations, including women, children, youth, people with disabilities, minorities, the elderly and the urban poor. Violence against women and children is a widespread issue within Kiribati society, which can be exacerbated in times of disasters when normal social protection may be missing. In addition, the population is facing stress due to the uncertainty over their livelihood, culture and homeland. Climate variability, climate change and disaster risks, in combination with the factors that make Kiribati particularly vulnerable to them, are affecting the environment and all socio-economic sectors, including agriculture, education, fisheries, freshwater, health, infrastructure, trade and commerce.

Table 4: Summary of potential climate change impacts on populations, key sectors and ecosystems

Increase in air temperature (°C)	<ul style="list-style-type: none"> <li>• Increased incidence of food-borne diseases</li> <li>• Increased incidence of heatstroke amongst labourers &amp; vulnerable members of society</li> <li>• Increased incidence of fires</li> <li>• Reduced productivity of livestock due to heat stress</li> <li>• Increased cost for air conditioning and refrigeration affecting disposable incomes of population and operational costs of business</li> </ul>
Increase in sea surface temperature (°C)	<ul style="list-style-type: none"> <li>• Increased incidence of coral bleaching leading to loss of biodiversity and coastal defences;</li> <li>• Migration of coastal fishery affecting food security and livelihoods</li> </ul>
Change in rainfall patterns and increased rainfall intensity	<ul style="list-style-type: none"> <li>• Increased incidence of water-borne, vector-borne and food-borne diseases;</li> <li>• Increased threat to food production and food security;</li> <li>• Increased incidents of invasive species.</li> </ul>
Increased incidence of extreme events (drought, storms)	<ul style="list-style-type: none"> <li>• Increased threat to food production and food security;</li> <li>• Increased threat to water quality and availability affecting human health;</li> <li>• Increased economic costs for development, maintenance and insurance;</li> <li>• Increased disruption to marine transportation affecting supply of basic needs;</li> <li>• Disruption to delivery of essential services;</li> <li>• Loss of life.</li> </ul>
Sea level rise compounded by storm surge	<ul style="list-style-type: none"> <li>• Increased coastal inundation and coastal erosion resulting in loss of land;</li> <li>• Increased loss of coastal biodiversity;</li> <li>• Increased salinization of ground water lens resulting in reduced access to safe drinking water;</li> <li>• Damage to and loss of homes and critical infrastructure;</li> <li>• Increased economic costs for development, maintenance and insurance;</li> <li>• Loss of cultural and historic sites;</li> <li>• Increase in conflict and stress due to loss of property and land, and forced migration.</li> </ul>
Ocean acidification	<ul style="list-style-type: none"> <li>• Increased loss of coastal and marine biodiversity affecting livelihoods, household incomes and food security.</li> </ul>

## ***National Adaptation Efforts including International and Regional Support for Adaptation***

The Kiribati government first became aware of climate change and sea level rise in the early 1990's, and requested scientific advice on whether there was any real cause for concern about sea level rise. The earliest studies could not provide information in that regard, but they were useful in making the Kiribati government more aware and knowledgeable about its geophysical environment and ecosystems, and sea level changes over the geological time span.

Subsequently but still during the early 1990s, more detailed studies were undertaken. A study area on a small island in Tarawa suggested certain areas to be liable to flooding from storm surges. This has been vindicated during storm surges in the 2000s. A study of Kiritimati island, which is the largest atoll in Kiribati and indeed in the world, indicated that the land had been rising. These studies, however, did not provide or take into account any sea level rise scenarios.

The US Country Study Programme, starting in 1995, was the first climate change project, and focussed on developing a country profile for Kiribati. Subsequently, the Kiribati *Initial National Communication* submitted to the UNFCCC in 2000 was one of the outputs of the Pacific Islands Climate Change Assistance Programme<sup>3</sup> to which Kiribati participated. Since the completion of the *Initial National Communication*, several studies and assessments have been undertaken by various international institutions on various vulnerable sectors relevant to climate change in Kiribati. These studies are important undertakings to highlight key vulnerabilities in Kiribati which require adaptive actions.

After PICCAP, funding for various enabling activities to be undertaken by LDCs was established in a decision of the UNFCCC, including the development of National Adaptation Plans of Action. Kiribati participated in the development of the NAPA and working with UNDP completed its NAPA document and submitted it to the UNFCCC in 2007. Concurrently with the preparation of the NAPA, Kiribati welcomed a World Bank initiative to start the Kiribati Adaptation Project (KAP) with co-finance from Government of Japan. The initial phase of KAP under the World Bank focussed on the preparation of Adaptation Project Implementation Plan for the second phase, and studies that were considered necessary to guide and inform a multi-year program on adaptation.

The second phase of KAP, that is KAP II, was completed in 2011 with many technical assessments produced on the coastal vulnerability relative to sea level scenarios, droughts information, water planning, design of coastal protection leading to the construction of some coastal protection structures, rainwater harvesting and construction of a community infiltration gallery in North Tarawa, and other improvement works on South Tarawa water supply.

The Kiribati Adaptation Program-Phase III (KAP III) builds on KAP II best practices in designing and implementing adaptation measures in water and civil works. The Project is being implementing physical investments and capacity building; emphasize community consultation/participation; and leverage other donor activities in pursuing climate resilient investments. It is expected that the project will move quickly to the implementation of investments on the basis of the extensive technical and analytical work already carried out during the preparation and implementation phase of KAP II. KAP III activities represent both climate change adaptation and natural hazard disaster reduction measures. In particular,

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<sup>3</sup> The PICCAP was executed through the South Pacific Regional Environment Programme (SPREP) with funding provided by the Global Environment Facility (GEF).

expansion of the ground water reserves is crucial to managing severe droughts which impose severe public health risks on Tarawa and require national emergency response. The proposed shoreline protection investments mitigate the effects of erosion of assets in the coastal zone, e.g. roads, and retain the width of water reserves to sustain freshwater lenses. KAP III main activities include: (i) improvements to water resource use and management with primary sub components of groundwater abstraction system; water reticulation including leakage detection; up-gradation of water supply at Tungaru Hospital; community awareness about water conservation; feasibility of developing treated water resources in South Tarawa; water legislations, etc. (ii) enhancement in coastal resilience with primary emphasis on continuation of shoreline protection works in South Tarawa; and advisory support and asset management of coastal infrastructure; (iii) institutional strengthening; and (iv) project management.

Funds for these adaptation projects have been from a variety of bilateral and multi-lateral grants. The principal delivery mechanism for climate change adaptation programs in Kiribati has been through intermediary organisations such as the World Bank, UNDP, UNEP, various bilateral organisations, and regional agencies such as SPC and SPREP. Currently, Kiribati is working with the World Bank, UNDP and SPREP to prepare adaptation projects for funding under the Green Climate Funds and the Global Environment Facility (GEF).

### **Adaptation Policy and Programs - Nationally determined adaptation needs, options, adaptive capacity enhancement**

A whole-of-nation approach is being pursued by government to address the impacts of climate change and sea level rise and related environmental issues in Kiribati. Climate change and disaster risks are being addressed in policies and strategies relating to population, water and sanitation, health and environment. Similarly disaster risk management is progressively being incorporated into policies and strategies relating to fisheries, agriculture, labour, youth and education. The new *Kiribati Integrated Environment Policy* encourages all government programs to collect, manage and use environmental data to safeguard the environment and strengthen resilience to climate change and disasters.

The *Kiribati Development Plan* (KDP) 2012–2015 is the overarching national development plan detailing national priorities. The KDP is linked to the Millennium Development Goals, the Pacific Plan and the Mauritius Strategy for Small Island Developing States (BPoA+10). The KDP has six broad key policy areas (KPAs). Climate change is incorporated into KPA 4 on environment, providing the link to the KJIP. The key objective of KPA 4 is to facilitate sustainable development by mitigating the effects of climate change through approaches that protect biodiversity and support the reduction of environmental degradation by the year 2015.

The *National Adaptation Program of Action* (NAPA) (2007) sets out a 3 year plan for urgent and immediate actions in the Republic of Kiribati to begin work in adapting to climate change. The goal of the NAPA was to contribute to and periodically complement a long term framework of adaptation through identifying immediate and urgent adaptation needs that are consistent with national development strategies and climate change adaptation policies and strategies. The objective is to communicate in a simplified way the identified immediate and urgent adaptation needs of Kiribati, which is also relevant to the national communication obligation required by the UNFCCC. These adaptation needs are identified through a participatory, consultative and multidisciplinary planning process. The NAPA outlines 9 priority projects valued at US\$11.983 million to address short-term (3 years) needs in critical sectors (water, coastal zone

management, agriculture, coastal infrastructure) and to strengthen national adaptive capacity and information systems.

The *National Framework for Climate Change and Climate Change Adaptation* (April 2013) establishes a framework for an effective national response to address the impacts of climate change that requires that climate change and climate change adaptation assume a prominent role within the national development planning process. This process is comprised of five main parts that include long range policy and strategy statements, namely: Kiribati Development Plan (KDP), annual GoK Budget, multi-year budget framework and Ministry Operational Plans (MOPs) and Public Enterprise Business Plans (PEBPs). This document extends the 2005 *Climate Change Adaptation Strategy* which was developed as part of the World Bank funded Kiribati Adaptation Project. Under this strategy the following five headings outline Kiribati action to strengthen its capability to meet the challenge of climate change. These are:

- Mitigation - aim to improve energy efficiency and enhance the use of renewable energy both on the main islands and in the outer islands;
- Integration of climate change and climate change adaptation into national planning and institutional capacity – aim to integrate climate change adaptation considerations into Kiribati Development Plan (KDP), annual GoK Budget, multi-year budget framework and Ministry Operational Plans (MOPs) and Public Enterprise Business Plans (PEBPs);
- External financial and technical assistance - have international climate change funds channeled directly into the mainstream activities of line Ministries involved with climate change adaptation as direct budget support as a national priority;
- Population and resettlement – aim to reduce the vulnerability of Kiribati to increasing physical risks caused by climate change by establishing host country agreements to government-sponsored and self-sponsored emigration to resettle I-Kiribati overseas and assist the inevitable migration of the population, due to climate change as and when this eventually arrives;
- Governance and services – aim to improve policy coordination and planning on climate change adaptation, strengthen capacity of government to implement climate change adaptation measures, and build improves technical services capacity to address risks from climate change;
- Survivability and self-reliance – ensure that risks associated with climate change and the intellectual and practical processes for the planning for the consequence of climate change are undertaken at the earliest opportunity.

The *Kiribati Joint Implementation Plan on Climate Change and Disaster Risk Management* (KJIP) (2014) has been developed to reduce the vulnerabilities to the impacts of climate change and disaster risks and to coordinate priorities so that investments will derive maximum value. The KJIP is part of the commitments Kiribati made under the Pacific Islands Framework for Action on Climate Change (PIFACC), the Regional Framework for Action on Disaster Risk Management endorsed by the Pacific Leaders in 2005 and the Pacific Islands Meteorological Strategy (PIMS) approved in 2012. The KJIP is consistent with these three inter-related regional frameworks, specifically in terms of the national priorities for actions. As party to the United Nations Framework Convention on Climate Change (UNFCCC), the Government sees the KJIP as its National Action Plan on climate change. Similarly, the KJIP is contributing to the implementation of the Hyogo Framework for Action (2005–2015) under the United Nations International Strategy on Disaster Risk Management (UNISDR) and the Climate Services priorities of the World Meteorological Organisation (WMO). The vision of the 9-year KJIP (2014 – 2023) is:

*I-Kiribati unique culture, heritage and identity are upheld and safeguarded through enhanced resilience and sustainable development.*

The goal of the KJIP is to increase resilience through sustainable climate change adaptation and disaster risk reduction using a whole of country approach. To reduce vulnerabilities and respond to observed and likely impacts of climate change and disaster risks, the KJIP identifies 12 major strategies, as follows:

- Strengthening good governance, policies, strategies and legislation;
- Improving knowledge and information generation, management and sharing;
- Strengthening and greening the private sector, including small-scale business;
- Increasing water and food security with integrated and sector-specific approaches and promoting healthy and resilient ecosystems;
- Strengthening health-service delivery to address climate change impacts;
- Promoting sound and reliable infrastructure development and land management;
- Delivering appropriate education, training and awareness programmes;
- Increasing effectiveness and efficiency of early warnings and disaster and emergency management;
- Promoting the use of sustainable renewable sources of energy and energy efficiency;
- Strengthening capacity to access finance, monitor expenditures and maintain strong partnerships;
- Maintaining the sovereignty and unique identity of Kiribati;
- Enhancing the participation and resilience of vulnerable groups

Each strategy has one or more key actions, sub-actions, outcomes and performance indicators (outcome- and output-based) to address climate change and disaster risks in response to the identified vulnerabilities and impacts. Detailed strategic plan with key actions, sub-actions, results and performance indicators, lead and support agencies and partners associated with each strategy, are provided as an Annex to the KJIP. All strategies and actions in the KJIP are inclusive of vulnerable groups, considering gender, youth and children, the elderly and people with disabilities.

### **Adaptation Capacity, Including Engagement of Private Sector and Civil Society in Adaptation and Climate Resilience Building**

The implementation of priority adaptation measures face serious institutional challenges such as a high staff turnover rates in senior executive positions, limited sector specific training, and a lack of clarity on internal roles and responsibilities. Furthermore, there are constraints on adaptation knowledge sharing, coordination and collaboration among ministries as well as with nongovernmental organisations (NGOs), the private sector, faith-based organisations and development partners.

There continues to exist knowledge, skill level and capacity gaps with regards to climate change adaptation and disaster risks throughout Kiribati society, particularly in the outer islands and among marginalised populations. A key challenge is to translate the climate science and predicted impacts into messages that the I-Kiribati population can relate to. In some instances there are cultural and religious barriers to awareness and action, such as cultural practices of guarding traditional knowledge and religious beliefs. There is very limited capacity at the

community level to undertake local level vulnerability mapping, adaptation planning and the implementation of priority adaptation interventions.

In 2007, Kiribati participated in a GEF-funded National Capacity Self Assessment (NCSA) to evaluate capacities for the implementation of the Rio Conventions, including the UNFCCC. A report on the thematic area of climate change was produced. The Report documents that the first climate change project undertaken by Kiribati government that focussed on capacity building was the US funded Climate Change In Country Studies. Key outputs of the project included:

- Institutional strengthening for climate change planning within the Environment and Conservation Division;
- The setting up of a Climate Change Study Team;
- Capacity building in understanding important resources such as the fresh ground water lens;
- Analysis of local climate data for comparison with global situation as given in IPCC Assessment Reports; and
- Incentives for officials to make efforts to understand certain IPCC Technical Reports.

Members of the Climate Change Study Team included representatives of key sectors such as meteorological services, water, land management, mineral resources, fisheries, public health, agriculture, energy, economic planning, and education. The private sector was represented by the USP Kiribati Centre. It was chaired by the most senior official of the Environment and Conservation Division, with a project coordinator being a member.

Capacity building continued under the Pacific Islands Climate Change Assistance Programme (PICCAP). Under this programme, the Climate Change Study Team (CCST) had a more focused agenda of preparing an Initial National Communication. Training modules on Vulnerability and Adaptation assessment became available from regional universities (Waikato University and the USP) which were attended by Kiribati nationals. A greenhouse gas inventory for 1994 was attempted and was included in Kiribati Initial National Communication.

After the completion of the PICCAP the Climate Change Study Team was temporarily inactive. However, the team was revived under the NAPA and KAP I projects. The NAPA and KAP I activities envisaged two committees for their management: the first is to provide policy direction for the projects, and the second to act as a technical committee. An Adaptation Steering Committee was formalized to give policy directions for the two projects, whilst the CCST deal with the technical works of the projects.

Due to a NAPA initiative, international advisors for the KAP were able to provide current climate tools for generating climate change scenarios. These scenarios were adopted in the Climate Change Adaptation Policy and Strategy that Cabinet approved. Prioritization criteria for NAPA proposed activities were also developed with the guidance of the advisors. In this way activities of the two projects were able to be harmonized.

Other capacity building initiatives have been undertaken over the years with support from a variety of development partners. The Climate Change Unit (CCU) of the ECD have benefited from regional trainings on various tools for assessing and planning for climate change impacts. In connection with the ADB consultancy on mainstreaming environmental concerns, a two day workshop was conducted for CCST members on climate change scenario generation based on past trends and incorporating global scenarios. Many members of the CCST and ECD staff attended a more recent training on the science of climate change and available tools and

information on climate prediction and mainstreaming. Additionally, efforts have been made to strengthen the meteorological services. Through an Australian regional project, the Meteorological Division has been strengthened in its capacity to develop and issue climate predictions. More meteorological stations were upgraded through KAP II and these will be supplemented by KAP III.

Since the submission of the Initial National Communication in 1999, there had been observed growing interests by academic and international organisations on Kiribati future vulnerabilities to the adverse impacts of climate change. This was evidenced by the number of Vulnerability and risk assessment conducted on specific sectors in Kiribati. These studies form part of a critical body of information that inform not only the Government of Kiribati in terms of their adaptation approaches but also the regional and international communities.

The strengthening of regulatory measures for the management and conservation of the environment is recognized as a key form of adaptation. With this in mind, the Kiribati government has strengthened the Environment Act of 1999 in a superseding Act. In addition, there are a number of other pieces of legislation which have implications for environmental management. The KJIP has indicated that it will be necessary to have a more detailed review of these legislations with a view to harmonize their effects for more effective environmental management and to build climate resilience.

The NCSA report indicated that although broad-based stakeholder consultation has been undertaken under the various adaptation programs and initiatives, public awareness and some mechanisms to communicate on timely basis climate and climate change information to the general public is still required. Attempts have been made but not on a continual basis and without well designed approach and clarity on target audiences, and contents. The NCSA report indicates that the approach of the Government to addressing capacity gaps is to address the root causes of those gaps. The Report identified the following gaps in capacity to manage risks from climate change:

Table 5: Root causes of issues and concerns relating to the management of climate change risks in Kiribati

Themes	Root causes
Understanding the science of climate change	<ul style="list-style-type: none"> <li>✓ Insufficient awareness and media programs on climate change</li> <li>✓ Insufficient dissemination of CC information to the public</li> <li>✓ Non-inclusion of climate change in national curriculum</li> <li>✓ Technical problems at Meteorological Office</li> <li>✓ Lack of meteorology information</li> <li>✓ Lack of skills to carry out V&amp;A assessments</li> <li>✓ Poor performance and/or incompetence of staff working on climate change planning and management.</li> </ul>
Vulnerability to climate change	<ul style="list-style-type: none"> <li>✓ Insufficient funding;</li> <li>✓ Insufficient human resource;</li> <li>✓ Lack of legislation;</li> <li>✓ Uncontrolled beach mining;</li> <li>✓ Destruction of mangroves;</li> <li>✓ Negligence to replant Mangroves;</li> <li>✓ Illegal construction of poor design of seawalls and causeways;</li> <li>✓ Lack of skills to carry out V&amp;A;</li> <li>✓ Poor Performance or incompetence of staff;</li> <li>✓ Lack of understanding on designs/technologies;</li> <li>✓ Limited vision to foresee climate change related impacts;</li> <li>✓ Insufficient data.</li> </ul>
Adaptation	<ul style="list-style-type: none"> <li>✓ Insufficient data collection on vegetation;</li> <li>✓ Insufficient data collection on land use and changes;</li> <li>✓ Uncontrolled land use;</li> <li>✓ Insufficient awareness and media programs on climate change adaptation;</li> <li>✓ Insufficient funding;</li> <li>✓ Insufficient human resource;</li> <li>✓ Lack of legislation;</li> <li>✓ Uncontrolled beach mining;</li> <li>✓ Insufficient data</li> </ul>

This final report of the Kiribati National Capacity Self Assessment (NCSA) Project presents a concise summary of key capacity issues affecting national ability to adequately manage risks from climate change, including: inadequate information management, limited financial resources, limited capacity to communicate, educate and raise awareness on key issues and influence behavioral change, limited coordination and integration amongst agencies and stakeholders to address environmental and climate change issues, weak enforcement of environmental laws and regulations, limited capacity to access development opportunities, limited mainstreaming of environmental and climate change issues into national strategies, plans and programmes, limited use of traditional knowledge and practices in environmental management and limited capacity to cope with reporting requirements of the conventions. The report ends with a presentation of the main capacity development actions needed to address the cross-cutting environmental and capacity issues.

The *Pacific Adaptation Strategies Assistance Programme – Kiribati National Stocktaking and Stakeholder Consultations Report* (October 2011) indicates that although previous adaptation project undertaken in Kiribati have built some level of capacity to manage climate change and sea level rise issues, these efforts are often hampered by the following:

- a) Lack of technical capacity and capabilities;
- b) Lack of reliable data and information relevant for informing adaptation decision-making;
- c) Lack of or low level of climate change and sea-level rise awareness at the community or village level;
- d) Lack of leadership across the various sectors;
- e) Lack of predictable resources to supplement the needs; compounded by,
- f) Growing complexity of emerging political climate change issues.

The *Kiribati Joint Implementation Plan on Climate Change and Disaster Risk Management* (KJIP) (2014) reports that the following capacity constraints are still to be addressed:

- a) Only a few sectors have transferred strategic actions to address climate and disaster risks into their annual Sector Operational Plans and Ministerial Plans of Operations and budgeting.
- b) Policies and strategies relating to human resource development, minerals and foreshore development, private sector development, investment, transport, communications, tourism and minerals do not explicitly consider climate change and disaster risks.
- c) Most laws need to be reviewed as, with the exception of the Disaster Management Act 1995, they do not regulate responses to climate change and disaster risks and impacts.

## **MEANS OF IMPLEMENTATION**

The effective implementation of the mitigation and adaptation measures will depend on **timely** accessibility, availability and provision of financial resources, technology and capacity building support. The provision of resources would build on, and where necessary, implement the various mitigation actions including grid-connected photovoltaic system under Japan PEC fund, the World Bank and UAE funds and continue with the implementation of the strategies and actions

espoused in the Kiribati Joint Implementation Plan for Climate Change and Disaster Risk Management (KJIP).

The Government of Kiribati intends to explore options for innovative and coordinated financing to implement the KJIP and community-based adaptation plans from varied sources such as multilateral and bilateral donors and regional and national funding mechanisms. Innovative financing approaches and operations will be explored, including options such as microfinance, carbon levies, subsidies, soft loans, emergency funds, sovereign insurance, contingent credit, catastrophe bonds, and intergovernmental risk insurance. Based on lessons learned and best practices from other SIDS such as Palau and the British Virgin Islands, the Government will investigate the viability of, amongst other measures: (i) setting aside the valued added tax (VAT) charged for fuel; (ii) charging carbon levies to offset greenhouse gas emissions for international air transport to the country; and (iii) charging fees for climate change research undertaken in the country. Such fees and charges will be used to establish and finance a climate change trust fund for priority climate change measures.

Additionally, the Government of Kiribati intends to build national capacity to facilitate direct access to international climate change financing including the Green Climate Fund so as to ensure that financing for climate resilience is country-owned and directed towards priority national needs and community-based adaptation plans. Based upon lessons learned from other SIDS, Kiribati will seek assistance under the “Readiness” program operated by the Green Climate Fund to establish the necessary legal, institutional and fiduciary management framework and accredit the National Implementing Entity (NIE) needed to facilitate direct access, thereby reducing dependence upon intermediary agencies for the design and implementation of priority adaptation interventions.

### **Indicative Costs and time line for provision of adaptation support**

The *Kiribati Joint Implementation Plan on Climate Change and Disaster Risk Management* (KJIP) (2014) reports that the overall gross indicative resource costs to implement the KJIP over the period 2013–2023 are estimated to be AUD 103,107,161 (approximately US\$75 million). Of this total, it is estimated that financial cost constitutes 96% of overall costs while the in-kind contributions constitute 4%. The costs by strategy are summarised in the table below. These costs are to implement the next phase in a constantly evolving adaptation program being implemented by Kiribati.

The implementation of the KJIP is to be financed through already existing strategies ranging from national budgets and other internal sources to overseas development assistance, additional climate change funding and humanitarian aid. It is expected that a considerable portion of the necessary financing will be provided in the forms of grants from the Green Climate Funds, Global Environment Facility (GEF), Adaptation Fund, and from various bi-lateral climate change programs.

### ***Addressing gaps in national, sector and community-level adaptation and climate resilience programs***

Most national policies and strategies such as NAPA, KJIP, and others emphasise the importance of engaging the widest possible circle of stakeholders (including NGOs, CSOs and the private sector) in order to achieve their environmental objectives. Kiribati Government is supporting NGOs and CBOs in the elaboration of national strategies and plans. However, with a focus on top-down adaptation mainstreaming, the current national implementation mechanism

has not ensured the greater synergy in the implementation, of community-based adaptation and climate resilience programs in alignment with national strategies and planning frameworks, so to effectively leverage the potential CSO and village communities' perspectives and engagement. It is the intention of the Government of Kiribati that a community-based vulnerability mapping, adaptation planning and management approach (tied to improved access to financing for community-based resilience-building projects) be employed on a whole of island basis that will build capacity in vulnerable villages for small scale localised adaptation actions which represents a critical contribution to the implementation and achievement of these national Climate Change and Disaster Risk Management policies and strategies. The Government of Kiribati will establish the institutional structures and strengthen capacities at the community level in order to support the country-wide implementation of community-based vulnerability mapping and adaptation planning, and the community-based design and implementation of priority resilience measures through improved access to financing for such measures. By fostering broader community engagement and ownership in building climate resilience at the local level, it is anticipated that long-term support will be sustained for priority adaptation interventions that address the basis needs of vulnerable villages and segments of society.

Table 6: Overall Costs by Strategy

Strategy	Cost (A\$,000)	%
Strategy 1: Strengthening good governance, policies & legislation	6,697,308	6
Strategy 2: Improving knowledge and information generation, management and sharing	5,555,248	5
Strategy 3: Strengthening and greening the private sector including small business	4,932,242	4
Strategy 4: Increasing water and food security with integrated and sector-specific approaches and promoting healthy and resilient ecosystems	4,693,577	4
Strategy 5: Strengthening health service delivery to address climate change impacts	472,747	2
Strategy 6: Promoting sound and reliable infrastructure development and land management	52,476,513	50
Strategy 7: delivering appropriate education, training and awareness programmes	7,478,480	7
Strategy 8: Increasing effectiveness and efficiency of early warnings and disaster emergency management	4,508,477	4
Strategy 9: Promoting use of sustainable renewable sources of energy and energy efficiency	15,340,322	11
Strategy 10: Strengthening capacity to access finance, monitor expenditures and maintain string partnerships	354,340	2
Strategy 11: Maintain the sovereignty and unique identity of Kiribati	180,532	1
Strategy 12: Enhancing the participation and resilience of vulnerable groups	417,375	2
<b>TOTAL</b>	<b>103,107,161</b>	<b>100</b>

The Government of Kiribati will also initiate measures to improve donor collaboration on climate change adaptation programming, and will establish the mechanisms for improved coordination amongst government agencies in the design and implementation of priority adaptation programs and projects as defined under the KJIP and community-based adaptation plans. A priority of the Government of Kiribati is to establish the Climate Change and Disaster Risk Management Unit in

the Office of the President (working in collaboration with the Department of Environment) as the gatekeeper, coordinator and entry point for climate change programming engagement with all development partners to ensure that all projects funded by external sources support the implementation of the KJIP and community-based adaptation plans. In the exercise of this function and responsibility, the Office of the President and the Department of Environment shall ensure that international climate change programming supports the implementation of the KJIP and community-based adaptation plans.

## **Equity**

The Republic of Kiribati is a smallest contributor to the greenhouse gas emissions by any measurable indicator and yet it is at the frontline of the wrath of climate change and sea level rise. Kiribati has a right to develop its economy and improve the well-being of its population. Thus Kiribati's contribution towards limiting the global temperature to below 2°C relative to pre-industrial levels provides a moral imperative as a global citizen. The government has embarked on a number of actions which will result in increasing the use of renewable energy technologies, improve energy security and reduction of GHG emissions. However, the main focus for long term sustainable development still remains adaptation to climate change by addressing the adverse impacts of climate change and its consequent sea-level rise.

# المساهمات المحددة والمعترمة على الصعيد الوطني

دولة الكويت – نوفمبر ٢٠١٥

## الهدف :

تنفيذاً لمقرر مؤتمر الأطراف التاسع عشر 1/CP.19 وبناء على المعلومات الواردة في مقرر مؤتمر الأطراف العشرين 1/CP.20 للاتفاقية والذي يقضي بدعوة الدول الأطراف لتقديم مساهماتها المحددة والمعترمة على الصعيد الوطني لما بعد عام ٢٠٢٠، قامت دولة الكويت بإعداد هذه الوثيقة وتقديمها لسكرتارية الاتفاقية لتشارك دول العالم مسيرة الحد من ظاهرة تغير المناخ بناءً على خطط وبرامج التنمية المستدامة على المستوى الوطني حتى عام ٢٠٣٥ .

تسعى دولة الكويت إلى التكيف مع الآثار والتبعات السلبية لظاهرة تغير المناخ ، كما انها تعمل من أجل الانتقال إلى نظام اقتصادي منخفض الانبعاثات من الكربون المكافئ بناءً على توقعات إنبعاثاتها المستقبلية في أنماط العمل كما المعتاد للفترة ما بين ٢٠٢٠-٢٠٣٥ وذلك من خلال جهودها الرامية لتحقيق الأولويات التنموية الإقتصادية والإجتماعية والبيئية في سياق التنمية المستدامة ، لذلك تولي دولة الكويت اهتماماً كبيراً بتنويع مصادر إنتاج الطاقة في البلاد مما يسهم في تجنب إزدياد غازات الدفينة بحلول عام ٢٠٣٥ .

## المقدمة:

تعتبر دولة الكويت من الدول السباقة في التوقيع على اتفاقية الأمم المتحدة الإطارية لتغير المناخ فقد انضمت للاتفاقية بتاريخ ١٩٩٤/١٢/٢٨ ودخلت حيز التنفيذ بتاريخ ١٩٩٥/٣/٢٨، كما تبعتها انضمام دولة الكويت لبروتوكول كيوتو الملحق باتفاقية الأمم المتحدة الإطارية لتغير المناخ بتاريخ ٢٠٠٥/٣/١١، ودخلت حيز التنفيذ بتاريخ ٢٠٠٥ / ٦ / ٩، حيث تشاطر دولة الكويت هاجس المجتمع الدولي بالحد من الآثار السلبية لظاهرة التغير المناخي، وتقر بأن الطابع العالمي لتغير المناخ يتطلب أقصى إمكانيات التعاون من جميع دول العالم والمشاركة في استجابة دولية فاعلة بتطبيق بنود اتفاقية الأمم المتحدة الإطارية لتغير المناخ UNFCCC وفقاً لمسؤولياتها المشتركة ولكن المتباينة كما ورد في الفقرة الأولى من المادة الرابعة والتي تنص على: " يقوم جميع الأطراف، واضعين في الاعتبار مسؤولياتهم المشتركة، وإن كانت متباينة وأولوياتهم وأهدافهم وظروفهم الإنمائية المحددة على الصعيدين الوطني والإقليمي " .

وفي هذا الإطار سيتم مراعاة معايير التنمية المستدامة لدولة الكويت ، كونها من الدول النامية وذات مصدر وحيد للدخل كما أقرت الاتفاقية في المادة الرابعة الجزء الثامن والذي ينص على : " لدى تنفيذ الالتزامات الواردة في هذه المادة يولي الأطراف الاهتمام التام لاتخاذ ما يلزم من إجراءات بموجب الاتفاقية، بما فيها الإجراءات المتعلقة بالتمويل والتأمين ونقل التكنولوجيا لتلبية الاحتياجات والاهتمامات المحددة للبلدان النامية الأطراف الناشئة عن الآثار الضارة لتغير المناخ و/أو أثر تنفيذ تدابير الاستجابة لتغير المناخ" والفقرة (ح) والتي تنص على أن " البلدان التي يعتمد اقتصادها اعتماداً كبيراً على الدخل الناشئ عن إنتاج وتجهيز وتصدير و/أو استهلاك أنواع من الوقود الأحفوري والمنتجات كثيفة الطاقة المرتبطة به".

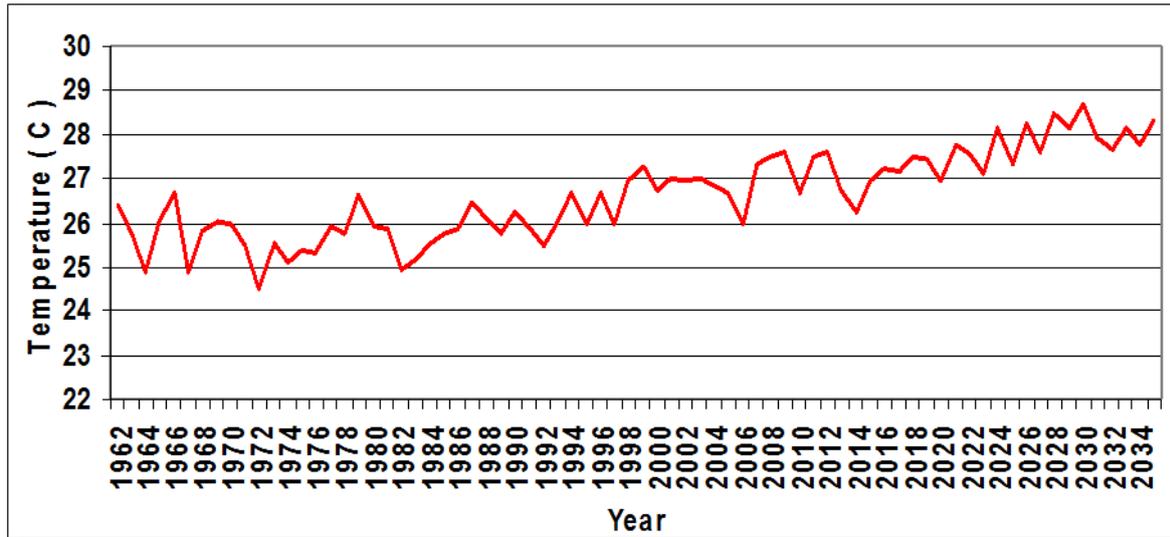
## ١. الظروف الوطنية لدولة الكويت

تقع دولة الكويت في الشمال الشرقي لمنطقة الشرق الأوسط وشمال أفريقيا بين خطي عرض ٢٨° ٣٠' و ٣٠° ٥٠' وخطي طول ٤٦° ٣٣' و ٤٨° ٣٠' في الشرق، وتبلغ مساحتها الكلية ١٧٨١٨ كيلو متراً مربعاً متضمنة تسع جزر غير مأهولة في منطقة الخليج العربي، وتعتبر حكومة دولة الكويت دستورية حيث يعتبر دستورها ذو طابع ديمقراطي يقوم بوضع القواعد التي تحكم السلطات الثلاث التشريعية والتنفيذية والقضائية .

### (أ) تأثيرات تغير المناخ على الكويت

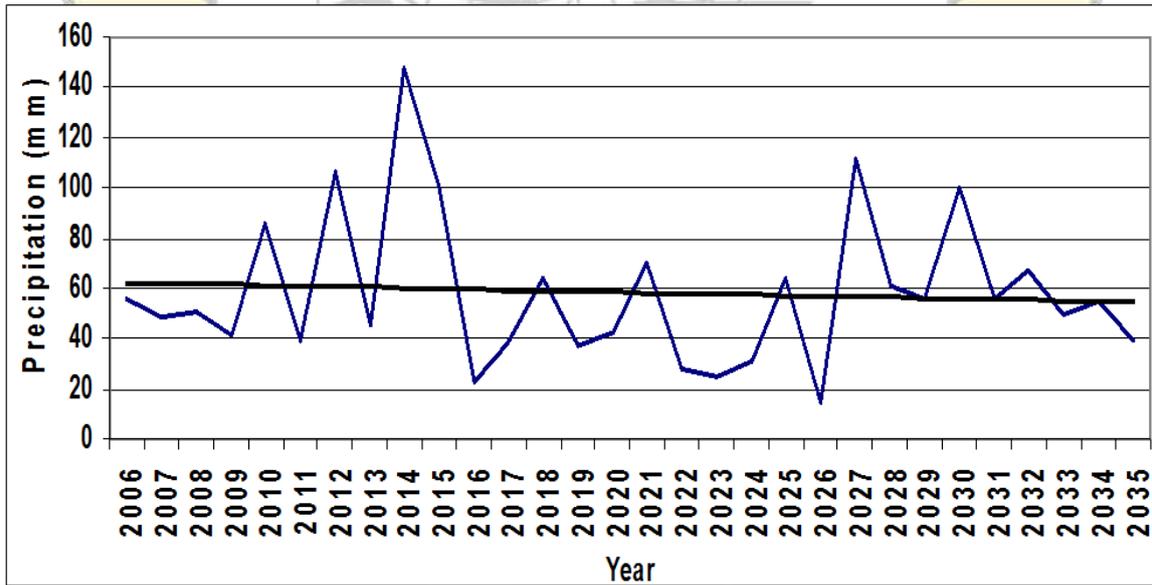
تتعرض دولة الكويت بحكم موقعها الجغرافي وظروفها المناخية وطبيعتها الجيولوجية وخصائص تربتها وسمات غطائها النباتي وأنماط استخدام أراضيها للعديد من التحديات البيئية منها ارتفاع معدلات درجات الحرارة، وارتفاع نسب الغبار العالق والأتربة المتساقطة وزيادة العواصف الرملية وقلة الأمطار الموسمية ومحدودية مصادر المياه وزيادة التصحر وانحسار الغطاء النباتي.

علما بأن هذه التحديات البيئية قد تفاقمت بشكل كبير مع بداية القرن العشرين نتيجة تغير المناخ العالمي، حيث تعاني دولة الكويت من ارتفاع في متوسط درجات الحرارة ، فمن المتوقع زيادة المتوسط السنوي لدرجات الحرارة بمقدار ١,٦ درجة سيليزية خلال الفترة من ٢٠١٠ الى ٢٠٣٥ لتصل إلى أعلى متوسط لها والبالغ ٢٨,٧ درجة سيليزية، حيث تصل الحرارة العظمى في أشهر الصيف والذي يمتد من شهر مايو وحتى أكتوبر لأكثر من ٥٠ درجة سيليزية في الظل ( الشكل رقم - ١ ) .



شكل ( ١ ) : متوسط درجات الحرارة السنوية المتوقعة خلال الفترة ١٩٦٢ - ٢٠٣٥

ويصاحب الارتفاع المتزايد في متوسط درجات الحرارة ندرة وشح في هطول الأمطار حيث بلغ معدل تساقط الأمطار السنوي ١١٦ ملم ومن المتوقع أن تتناقص مستويات هطول الأمطار بمعدل ٢ ملم سنوياً بالسنوات القادمة، مما سيتسبب في انخفاض مستوى المياه الجوفية في دولة الكويت ( الشكل رقم - ٢ ) .



شكل ( ٢ ) : متوسط كميات هطول الأمطار السنوية المتوقعة خلال الفترة ٢٠٠٦ - ٢٠٣٥

وتؤدي جميع العوامل السابقة إلى زيادة نسبة الجفاف والتصحر في دولة الكويت مما يؤدي إلى شدة تواتر العواصف الترابية في الدولة، حيث بلغ معدل تساقط الأتربة فيها ما يعادل ٥٥ طن/كم<sup>٢</sup> بالسنة بمجموع كلي يقارب مليون طن من الأتربة المتساقطة سنوياً على دولة الكويت ، ومن المتوقع أن تزداد شدة تواتر العواصف الترابية على دولة الكويت نتيجة الآثار السلبية لظاهرة تغير المناخ. فقد بدأت آثار تغير المناخ تظهر بشكل ملموس على هيئة تحديات حضرية حيث أصبحت العواصف الرملية أكثر تواتراً مع ارتفاع موجات الحرارة و انخفاض نسبة الأمطار المتساقطة في فصل الشتاء.

وتعتمد دولة الكويت اعتماداً كاملاً على عملية تحلية مياه البحر في الحصول على المياه العذبة حيث يأتي ٩٣% من إمدادات المياه من تحلية مياه البحر بينما تأتي النسبة المتبقية من استخراج المياه الجوفية غير المتجددة نتيجة قلة الأمطار، حيث تعتبر عملية تحلية مياه البحر عملية ذات استهلاك عالٍ للطاقة وتؤثر سلباً على الأنظمة الإيكولوجية البحرية والساحلية .

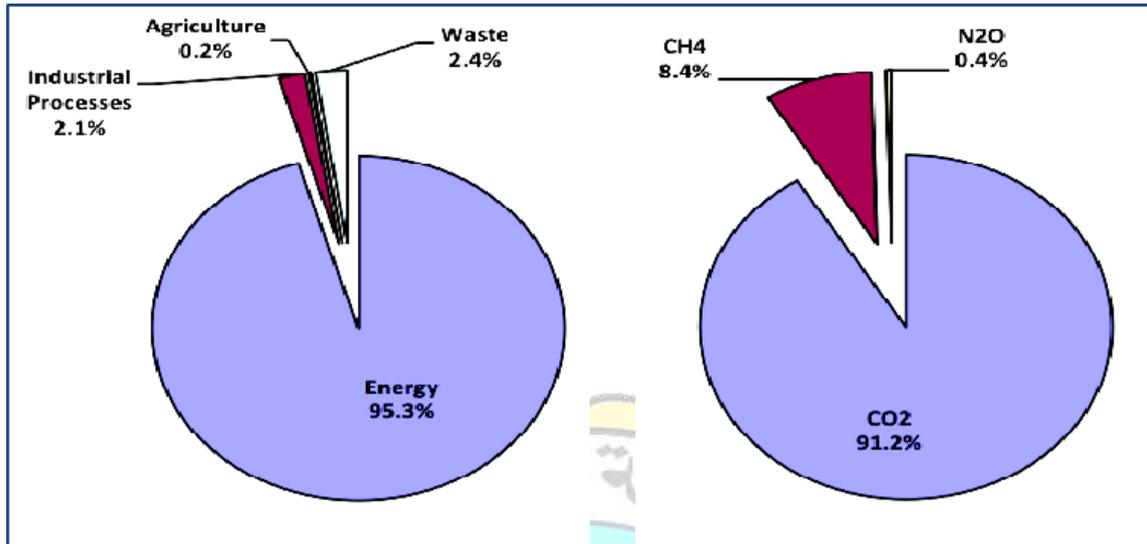
ونظراً لطبيعة الكويت الساحلية والمنخفضة فإنها عرضة للخطر الناجم عن ارتفاع منسوب البحار المرتبط بتغير المناخ، فبارتفاع مقداره (٠,٥ - ٢ متر) في منسوب البحار، يمكن أن تفقد الكويت ١,٤-٣ % من أراضيها الساحلية، مما يؤثر على ٥% من ناتجها المحلي الإجمالي، ووفقاً للفريق الحكومي الدولي المعني بتغير المناخ قد ترتفع مناسيب البحار العالمية بمقدار ١-٣ أمتار خلال هذا القرن.

بلغ التعداد السكاني لدولة الكويت ٣,٣٦٨٥٧٢ نسمة في عام ٢٠١٣ بزيادة مطردة خلال العقدين الماضيين بنسبة نمو تقارب ٤,١% ، ومع الاستمرار المتوقع في زيادة النمو السكاني، واقتران هذا النمو السكاني بالتنمية الحضرية السريعة وتوفير الخدمات الأساسية للسكان، وفي ظل الانخفاض العالمي في أسعار النفط وارتفاع تكلفة نسبة الدعم في الطاقة والمياه والإسكان، فإن دولة الكويت تواجه العديد من التحديات الإنمائية بما في ذلك تنويع وتعزيز فرص العمل التي توفرها بيئات عمل آمنة للمواطنين والمقيمين ، والتخطيط الحضري والإسكاني والبنية التحتية وتعزيز القدرات الوطنية لتنفيذ خطط التنمية ورصدها.

والجدير بالذكر أن دولة الكويت تعتبر دولة ذات مصدر وحيد للدخل فهي تعتمد في موازاتها العامة على استخراج وبيع النفط وبالتالي فإن اقتصاد الدولة معرض لمخاطر تقلبات أسعار النفط في العرض والطلب، وترتكز قاعدة الكويت الصناعية حول استخراج وتكرير وتصدير النفط حيث تبلغ عائدات التصدير أكثر من ٩٠% من إجمالي العائدات، وتمثل قيمة مساهمة النفط في الناتج القومي المحلي ٥١-٥٥% ، كما تعتمد الكويت بشكل كلي على الوقود الأحفوري لإنتاج الطاقة بنسبة ٨٣,٥% من النفط السائل و١٦,٥% من الغاز الطبيعي.

## (ب) توزيع انبعاثات غازات الدفيئة

مساهمة قطاع أنشطة الطاقة يوضحها الشكل (٣) بما يعادل ٩٥% من انبعاثات غاز ثاني أكسيد الكربون المكافئ من إجمالي الانبعاثات الوطنية، ويتبين أن العامل الرئيسي لانبعاثات دولة الكويت هو الاعتماد الكبير على الوقود النفطي السائل في معظم القطاعات، كما تعتمد المصادر الحالية لإنتاج الطاقة في دولة الكويت على النفط بنسبة ٩٠% والغاز الطبيعي بنسبة ١٠% ، وتستهلك محطات إنتاج الكهرباء والماء ٧٠% من النفط ومشتقاته بينما تأتي ٣٠% المتبقية من الغاز الطبيعي، كما يعتمد قطاع المواصلات على المشتقات النفطية السائلة بنسبة ١٠٠% .



شكل (٣) : توزيع نسب انبعاث غازات الدفيئة على حسب النوع والقطاع عام ١٩٩٤

## ٢. المساهمات المحددة والمعتمدة على الصعيد الوطني

### (أ) التخفيف:

يتمثل طموح دولة الكويت في التحول إلى اقتصاد منخفض من الكربون المكافئ وتجنب إزدياد انبعاثات غازات الدفيئة مقارنة بأنماط العمل كالمعتاد BUSINESS AS USUAL وذلك بناءً على خطط ومشاريع التنمية في الدولة، وتعمل على تحقيق هذا الهدف بشكل طوعي من خلال تنفيذ بعض المشاريع وسن القوانين والتشريعات بحسب ظروفها الوطنية، بشرط توافر الدعم المالي والفني والتكنولوجي من خلال آليات الاتفاقية على أن يتم تقدير كمية الخفض الناتجة عن المشاريع المقترحة لاحقاً.

### (أ-١) المشاريع:

تسعى دولة الكويت بالمساهمة في عملية تجنب إزدياد الانبعاثات عن طريق مشاريع وخطط التنمية للدولة ضمن أكثر القطاعات مساهمةً في انبعاثات غازات الدفيئة وهو قطاع أنشطة الطاقة الذي يمثل ٩٥% من إجمالي انبعاثات الدولة، وتتمثل تلك المشاريع في:

- تحسين منتجاتها النفطية وذلك بإنتاج الوقود النظيف بمواصفات بيئية لتزويد محطات توليد الطاقة بالوقود النظيف بحلول عام ٢٠٢٠، وهذا المشروع من شأنه خفض الانبعاثات الغازية من محطات توليد الطاقة والقطاع الصناعي بالدولة بشكل ملحوظ.

- إنشاء مصفاة جديدة بديلة عن أقدم مصفاة بالدولة والتي ستكون مطابقة للمواصفات البيئية العالمية في طريقة تشغيلها حيث إن كمية الانبعاثات الناتجة منها تعتبر منخفضة ومنتجات هذه المصفاة ستكون متوافقة مع المواصفات والمعايير العالمية .
- المشاريع المتعلقة بإنتاج الطاقة من النفايات البلدية الصلبة حيث سيتم البدء بتشغيل أول مشروع لها بحلول عام ٢٠٢٠ .
- إنتاج الطاقة من المصادر المتجددة (الطاقة الكهروضوئية – الطاقة الشمسية الحرارية – طاقة الرياح) حيث من المتوقع الوصول إلى الطاقة الإنتاجية القصوى من هذه المشاريع بحلول عام ٢٠٣٠ .
- مشروع أنظمة النقل الجماعي (المترو) .
- مشروع سكك الحديد لربط موانئ دولة الكويت لتحقيق تنمية متكاملة ومستدامة لنقل البضائع والركاب في الكويت وخارجها.

## (٢-أ) التشريعات والقوانين :

بدأت دولة الكويت بالإجراءات الرسمية لدراسة قانون رفع جزء من الدعم الحكومي عن البنزين بدءاً من مطلع عام ٢٠١٦ ودراسة إمكانية رفع الدعم التدريجي عن الكهرباء والماء مما سيساهم بشكل كبير في ترشيد الاستهلاك والتقليل من انبعاثات الغازات الدفيئة.

كما أقر مجلس الأمة الكويتي مؤخراً قانون حماية البيئة ويحمل رقم (٤٢) لسنة ٢٠١٤ والمعدل بقانون رقم (٩٩) لسنة ٢٠١٥ حيث يهدف هذا القانون إلى حماية البيئة ومصادر ها، ومكافحة التلوث، وتنمية الموارد الطبيعية، وحماية المجتمع وصحة الإنسان والكائنات الحية (قانون حماية البيئة، الهيئة العامة للبيئة ٢٠١٤) ، يتكون القانون من ١٨١ مادة تتناول قضايا التنمية والبيئة، وحماية البيئة الأرضية والمائية والجوية من التلوث، والتنوع البيولوجي، والإدارة البيئية، والعقوبات والمسئولية المدنية والتعويض عن الأضرار البيئية، وأحكام عامة ذات علاقة .

يتطرق قانون حماية البيئة ٤٢ / ٢٠١٤ في بعض أبوابه بشكل مباشر وغير مباشر إلى قطاع الطاقة، فذكرت المادة (١٢٢) و (١٢٣) من قانون حماية البيئة ضرورة استخدام أنظمة توفير الطاقة في منشآت الدولة الجديدة كما منع القانون استيراد أي أجهزة أو معدات لا تتطابق مع مواصفات حفظ الطاقة .

كما حث قانون حماية البيئة في المادة ( ١١١ ) جهات الدولة ذات العلاقة على وضع استراتيجيات وخطط وبرامج عمل بيئية مرتبطة في نطاق أعمالها .

وتبين مواد القانون اهتمام وتوجه الدولة إلى خفض انبعاث غازات الدفيئة في قطاع الطاقة عن طريق السعي لتحسين إدارة استهلاك الطاقة من خلال إرساء نظم وقواعد كفاءة الأجهزة المستخدمة وكفاءة استهلاك الطاقة في المباني (مواد البناء والتصميم ، نظم تكييف الهواء والإنارة .. إلخ) .

كما يمهد القانون البيئي الطريق لوضع واعتماد وتطبيق استراتيجية وطنية لخفض استهلاك الدولة من الطاقة وتنويع مصادر الطاقة وخاصة زيادة نسبة الطاقات النظيفة، وذلك لتحقيق رؤية حضرة صاحب السمو أمير دولة الكويت الشيخ/ صباح الأحمد الجابر الصباح، حفظه الله ورعاه، حيث أعلن سموه عن سعي دولة الكويت لزيادة احتياجاتها من الطاقة من مصادر الطاقة المتجددة بحلول عام ٢٠٣٠ .

## ( ب ) التكييف

تسعى دولة الكويت إلى الانتقال لنظام اقتصادي منخفض الكربون وقابل للتكيف مع تغير المناخ لتعزيز وحماية مواردها الطبيعية وتحقيق معايير التنمية المستدامة، حيث تعمل جاهدة للتكيف مع آثار تغير المناخ من ارتفاع في درجات الحرارة وشح الأمطار وارتفاع في مستوى سطح البحر وقلة مصادر المياه وتزايد شدة العواصف الترابية .

## (ب-١) المشاريع :

- تعزيز نظم المعلومات الساحلية : إنشاء مراكز التنبؤ والحماية من ارتفاع منسوب المياه، وذلك عن طريق جمع البيانات وتطوير المعلومات والمتطلبات الأساسية لرصد ارتفاع مستوى سطح البحر والتنبؤ به لتعزيز قدرة التخطيط الإستراتيجي للتكيف مع هذه الظاهرة بهدف حماية الخط الساحلي.
- التكيف مع العواصف الترابية : تقليص نسبة الأراضي الصحراوية المفتوحة من ٧٥% الى ٥١% وزيادة نسبة المناطق المحمية من ٨% الى ١٨% ، ومشاريع الأحزمة الخضراء في المناطق الصحراوية الأكثر هشاشة .
- الأمن الغذائي : الخطة الإنمائية لتطوير القطاع الزراعي وتعزيز دور القطاع الزراعي وزيادة معدلات نموه لرفع نسب الاكتفاء الذاتي .
- استخدام نظام تبريد الضواحي في المدن الإسكانية الجديدة : هذه المشاريع ستحقق خفض في الطاقة الكهربائية المستهلكة في تكييف وتبريد المنازل مما يعزز إمدادات الطاقة في الدولة بطريقة مستدامة .
- التكيف مع قلة مصادر المياه : عن طريق استخدام أنظمة ذات كفاءة أعلى مثل نظام التناضح العكسي في إنتاج المياه ، وحملات توعية المواطنين بترشيد استهلاك الكهرباء والماء واستخدام التقنيات الحديثة لترشيد الاستهلاك الأدمي للمياه وفي أغراض الزراعة والصناعة .

## (ب-٢) التشريعات والقوانين :

مع إصدار دولة الكويت مؤخراً قانون رقم ٤٢/٢٠١٤ الخاص بحماية البيئة وذلك إيماناً منها بأهمية المحافظة على التوازن البيئي بالدولة لخلق بيئة صحية لمواطنيها والمحافظة على استدامة مواردها الطبيعية للأجيال القادمة، كما أولى هذا القانون أهمية قصوى في بعض بنوده لمواضيع تتعلق بالتكيف مع الآثار السلبية لظاهرة تغير المناخ حيث نظم طرق استخدام واستهلاك الموارد الطبيعية ففي مجال حماية الأراضي البرية، فقد تطرقت المادتان ٤٠ و ٤١ من القانون لتنظيم عملية التخميم واستغلال الأراضي البرية في الرعي أو أي أنشطة أخرى قد تضر بالتربة مما يساهم في تقليل ظاهرة التصحر وهشاشة التربة، واختصت المادتان ١٠٢ و ١٠٣ بتنظيم المحميات الطبيعية وذلك للمحافظة على التنوع الأحيائي، أما فيما يتعلق بإدارة الموارد المائية فقد بينت المادتان ٨٨ و ٨٩ أساسات لوضع برنامج لإدارة المياه في البلاد واشترطات وضوابط الحفاظ على المياه فيها وذلك للتكيف مع ندرة الموارد المائية بالدولة، وللتكيف مع ارتفاع مستوى سطح البحر المتوقع وتأثيره على سواحل الدولة فقد اختصت المادتان ٦٦ و ٩٩ من القانون بالبيئة البحرية وضرورة إنشاء شبكة وطنية لرصد ومراقبة البيئة البحرية وعمل دراسات لمراقبة مستوى ارتفاع سطح البحر، ونظراً لتعرض دولة الكويت للعديد من الأزمات والكوارث الطبيعية كالعواصف الترابية والغبارية وموجات السيول المفاجئة وضع القانون المادة ١١٨ التي تنص على ضرورة إعداد خطط الطوارئ وخطط لإدارة الأزمات والكوارث الطبيعية.

أما على مستوى الأمن الغذائي فقد أصدرت الدولة قوانين تختص بحظر الصيد بشكل مطلق في جون الكويت للمحافظة على التنوع الأحيائي والمخزون السمكي، وقوانين تختص بحظر الصيد لبعض الأنواع من الأسماك والروبيان في المياه الإقليمية إلا في مواسم معينة لمنع استنزاف المخزون السمكي .

كما يسعى المشرع من خلال قانون حماية البيئة رقم ٤٢ لسنة ٢٠١٤ والمعدل بعض أحكامه بالقانون رقم ٩٩ لسنة ٢٠١٥ لتعزيز الثقافة البيئية في المجتمع الكويتي ونشر المعلومات المتعلقة بالبيئة على العامة لتغيير بعض أنماط السلوك لدى المواطنين والمقيمين لزيادة الوعي العام بمفهوم استدامة الموارد الطبيعية وحسن إستغلالها .

## ٣. عملية التخطيط والتطبيق

لكي تستطيع دولة الكويت تنفيذ إجراءات التخفيف من انبعاثات غازات الدفيئة والتكيف مع آثار تغير المناخ والوصول إلى معايير التنمية المستدامة فإنها بحاجة إلى توفر الدعم التكنولوجي و المالي من طرف المؤسسات القائمة ذات الصلة بالاتفاقية الإطارية مثل آلية التكنولوجيا التي تتألف من لجنة التكنولوجيا التنفيذية (TEC) ومركز شبكة تكنولوجيا المناخ (CTCN)، فضلاً عن صندوق المناخ الأخضر (GCF) وذلك عملاً بنص المادة ٤,٧ من الاتفاقية الإطارية على أن مدى تنفيذ البلدان النامية، ومن بينهم دولة

الكويت، لالتزاماتها بموجب الاتفاقية يتوقف على قيام الدول المتقدمة الأطراف بتوفير الدعم للبلدان النامية الأطراف في مجال التمويل ونقل التكنولوجيا ، وذلك لضمان إجراء تعاوني عالمي فعال بشأن تغير المناخ.

وستشرع دولة الكويت في إعداد استراتيجية التنمية منخفضة الانبعاثات (LEDs) وخطة عمل التكيف وسيوفر كلٌّ من مشروع البلاغ الوطني الثاني واستراتيجية التنمية (رؤية الكويت ٢٠٣٥) الإطار العام لإعداد هذه الخطط .

وتقوم الهيئة العامة للبيئة حالياً بإعداد اللائحة التنفيذية الخاصة بقانون حماية البيئة (٤٢) لسنة ٢٠١٤ والمعدل بقانون (٩٩) لسنة ٢٠١٥ وستتضمن هذه اللائحة تشريعات خاصة بمواضيع تغير المناخ مثل نظام الإبلاغ عن الانبعاثات والتكيف والتخفيف .

## ٤. الإنصاف والطموح

تولي دولة الكويت اهتماما كبيرا للمساعي الأممية الرامية لمواجهة ظاهرة الاحتباس الحراري، وتؤمن بأن التصدي لهذه الظاهرة هي مسؤولية مشتركة بين دول العالم وإن كانت بدرجات متباينة. لذلك تحرص دولة الكويت على رفع قدراتها في التعاطي مع القضايا ذات الصلة بالتغير المناخي، بشكل متزامن مع جهودها للتكيف مع الآثار السلبية لهذه الظاهرة وتبعاتها في البعدين الاجتماعي والاقتصادي ، كما ان إجمالي انبعاثاتها الحالية لا يشكل سوى ٠,٢٧% تقريباً من مجموع الانبعاثات العالمية لعام ٢٠١٣ ، وعلى الرغم من عدم مشاركتها في التسبب بهذه الظاهرة فإن موقع دولة الكويت الجغرافي جعلها عرضة لآثار تغير المناخ التي بدت ظاهرة بشكل كبير في السنوات الأخيرة من خلال ارتفاع كبير بدرجات الحرارة وندرة هطول الأمطار وزيادة العواصف الترابية والغبارية التي تتسبب في شل الحياة في الدولة والضرر بالصحة العامة للمواطنين والمقيمين مما يساهم بزيادة الخسائر والأعباء الاقتصادية على الدولة، هذا بالإضافة إلى احتمالية خسارة الدولة لأجزاء من خطها الساحلي نتيجة ارتفاع منسوب مياه البحر مما يهدد حوالي ١٧٤ ألف شخص بالخطر !!

وسوف تعاني دولة الكويت من العواقب والآثار الاقتصادية والاجتماعية من الآثار السلبية لتدابير الاستجابة لظاهرة تغير المناخ ، حيث تعتبر الكويت من الدول التي يعتمد اقتصادها على النفط والتي ستتأثر سلباً بالإجراءات والسياسات الدولية لاتفاقية تغير المناخ، فقد أعدت سكرتارية أوبك بالإضافة إلى الكثير من البيوت الاستشارية الدولية العديد من الدراسات التي أشارت في مجملها إلى أن الدول المنتجة والمصدرة للبتروول ستتضرر بشكل كبير جراء ما ستتبعه الدول وبالأخص الدول المتقدمة من سياسات وإجراءات لتخفيض انبعاثاتها من غازات الدفيئة (الاحتباس الحراري) نتيجة للتركيز المكثف على قطاعات الوقود الأحفوري وعلى وجه الخصوص النفط ومنتجاته.

ونظراً للظروف الوطنية لدولة الكويت التي تواجهها حالياً العديد من التحديات الاجتماعية والاقتصادية والبيئية ، ونظراً لتزايد عدد السكان وتزايد الطلب على الموارد وأهمها المياه والطاقة والانخفاض الذي سيقابله في الدخل القومي نتيجة لسياسات التخفيف من الدول المتقدمة، ومع الأخذ بعين الاعتبار مسؤولية الدولة في توفير فرص العمل والسكن والمحافظة على مستوى معيشة المواطنين فإن مساهمات دولة الكويت المحددة والمعتزمة على الصعيد الوطني تعتبر طموحة جداً وعادلة.

## ٥. الملاحظات العامة والافتراضات

قدمت دولة الكويت مساهماتها المحددة والمعتزمة على الصعيد الوطني بناءً على مشاريع وخطط التنمية للدولة والتي سيتم عرضها لاحقاً على مجلس الأمة الكويتي للاعتماد، وتكون هذه المساهمات مشروطة بتقديم الدعم المالي والفني والتكنولوجي من الدول المتقدمة ضمن آليات الاتفاقية الإطارية لتغير المناخ ، وتحفظ دولة الكويت بالحق في إعادة النظر في هذه المساهمة بناءً على المستجدات المستقبلية الخاصة بالظروف الوطنية للدولة والسياسة العامة للدولة وفي حال تم تعديل الاتفاقية أو قرارات مؤتمر الأطراف ذات الصلة قبل دخولها حيز التنفيذ على نحو يشمل قواعد أو أحكاماً تختلف مع الافتراضات التي تم بموجبها تقديم هذه المساهمة.



## **The Kyrgyz Republic**

### **Intended Nationally Determined Contribution**

Climate change is the greatest challenge and the most universal objective for the humanity. This global problem requires the immediate consistent actions by the world community.

The Kyrgyz Republic belongs to the furthestmost vulnerable countries to climate change, understands the importance of addressing the challenge and is making every effort to ensure that these initiatives are successful. Actions on climate change are reflected in the "National Sustainable Development Strategy of the Kyrgyz Republic for 2013-2017" and the "Program of the Kyrgyz Republic on Transition to Sustainable Development for 2013-2017."

The Climate Change Coordination Commission (CCCC), headed by the First Vice Prime Minister of the Kyrgyz Republic, coordinates all the activities in the Kyrgyz Republic related to climate change. The CCCC is composed of all heads of key ministries and divisions, representatives of the civil, academic and business sectors.

Actions for adaptation to climate change are developed and included in the "Priorities for Adaptation to Climate Change in the Kyrgyz Republic till 2017". The Kyrgyz Republic has developed the sectorial plans and programs for adaptation in all vulnerable sectors.

The Kyrgyz Republic's greenhouse gases (GHG) emissions are relatively low. In 2010, the contribution of the country to the total global GHG emissions from fossil fuel combustion was 0.023%, while the population was 0.079% of the world's total population, i.e. per capita GHG emission in the Kyrgyz Republic is less than one-third of the world average. However, the planned economic development will lead to a sharp increase in greenhouse gases emissions, which determines the need for resolute actions to reduce greenhouse gas emissions.

The intended nationally determined contribution is prepared in accordance with decisions of the Conference of the Parties to the UN Framework Convention on Climate Change (UNFCCC) 1 / CP.19 and 1 / CP.20.

<b>Contribution to adaptation</b>																	
1. The need to include adaptation in contribution	For the Kyrgyz Republic, a mountainous country that has a high vulnerability to the impacts of climate change, the implementation of adaptation actions is vital <sup>1</sup> .																
2. The most vulnerable sectors and expected economic losses in absence of adaptation actions	<table border="1"> <thead> <tr> <th><b>Sector</b></th> <th><b>Losses<sup>2</sup>, mln \$2005</b></th> </tr> </thead> <tbody> <tr> <td>Water resources</td> <td>718</td> </tr> <tr> <td>Agriculture</td> <td>70</td> </tr> <tr> <td>Energy</td> <td>200</td> </tr> <tr> <td>Emergencies</td> <td>38</td> </tr> <tr> <td>Healthcare</td> <td>110</td> </tr> <tr> <td>Forest and Biodiversity</td> <td>94.80</td> </tr> <tr> <td><b>Total:</b></td> <td><b>1230.80</b></td> </tr> </tbody> </table> <p>The current assessment of economic losses is the lower bound, as a result of the specific national assessment methods. The revision of the methods is envisioned. Reduction of economic losses in the hydro energy sector will be reached through mitigation actions.</p>	<b>Sector</b>	<b>Losses<sup>2</sup>, mln \$2005</b>	Water resources	718	Agriculture	70	Energy	200	Emergencies	38	Healthcare	110	Forest and Biodiversity	94.80	<b>Total:</b>	<b>1230.80</b>
<b>Sector</b>	<b>Losses<sup>2</sup>, mln \$2005</b>																
Water resources	718																
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Energy	200																
Emergencies	38																
Healthcare	110																
Forest and Biodiversity	94.80																
<b>Total:</b>	<b>1230.80</b>																
3. Adaptation target	To prevent the climate change related damage and losses in the country.																
<b>4. Resources required to reduce calculated losses, mln. \$ 2005</b>																	
4.1. Domestic costs <sup>3</sup>	213.40																
4.2. International support	1592.10																
4.3. Total	1937.50																
<b>5. Reduced economic losses, mln. \$ 2005</b>																	
5.1. Through domestic activities	135.60																
5.2. Through international support	1011.40																
5.3. Total	1230.80																
6. Monitoring and reporting	The monitoring over implementation of the adaptation contribution will be combined with a process of regular updating of the national priorities and sectorial adaptation programs and action plans. Preparation of the updated programs and plans will be based on assessments of the earlier adaptation plans' outcomes.																

<sup>1</sup> Priority Directions for Adaptation to Climate Change in the Kyrgyz Republic till 2017, sectorial Action Plans on adaptation to climate change in the Kyrgyz Republic, [www.nature.gov.kg](http://www.nature.gov.kg), [www.climatechange.kg](http://www.climatechange.kg)

<sup>2</sup> Annual losses under the temperature increase by 5<sup>0</sup>C relatively 1961-1990 level.

<sup>3</sup> Domestic costs hereinafter refer to resources within the funds allocated to ministries and institutions for the relevant year.

<b>Contribution to mitigation</b>	
1. Long term GHG emissions target	Limiting the per capita GHG emissions to maximum of 1.23 t/CO <sub>2</sub> , or 1.58 t/CO <sub>2</sub> in 2050 to achieve the below 2°C objective, with a probability of 66% and 50% respectively. Based on the IPCC and IEA developments in the context of the below 2°C objective, the target is communicated in CO <sub>2</sub> . For INDC monitoring, emission of other GHGs was accounted in CO <sub>2</sub> -eq (shown in Section 12).
2. Time frame	January 1, 2020 - December 31, 2030, and 2050
3. Contribution	Kyrgyz Republic will reduce GHG emissions in the range of 11.49 - 13.75% below BAU in 2030. Additionally, under the international support Kyrgyz Republic could implement the mitigation measures to achieve total reduction in the range of 29.00 - 30.89% below BAU in 2030.  Kyrgyz Republic will reduce GHG emissions in the range of 12.67 - 15.69% below BAU in 2050. Additionally, under the international support Kyrgyz Republic could implement the mitigation measures to achieve total reduction in the range of 35.06 - 36.75% below BAU in 2050.
4. Base year	Not used to determine the targets as they are indicated in per capita GHG emission. 2010 is taken for the emissions modeling.
5. Scope	<ul style="list-style-type: none"> <li>• Energy</li> <li>• Industrial processes, solvents and other product use</li> <li>• Agriculture</li> <li>• Land use, land use change and forestry</li> <li>• Waste</li> </ul>
6. Greenhouse gases	Carbon dioxide (CO <sub>2</sub> ) Methane (CH <sub>4</sub> ) Nitrous oxide (N <sub>2</sub> O) Hydrofluorocarbons (HFCs) Perfluorocarbons (PFCs) Sulfur hexafluoride (SF <sub>6</sub> ) Nitrogen trifluoride (NF <sub>3</sub> )
7. Methodological approaches for accounting of anthropogenic GHG emissions and removals	Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories
8. Metric (GWP values)	Carbon dioxide - 1 Methane - 21 Nitrous oxide - 310 HFC-134a - 1300 Other GHGs emissions not relevant.

9. Methodology and assumptions for modeling emission scenarios (baseline and mitigation measures)

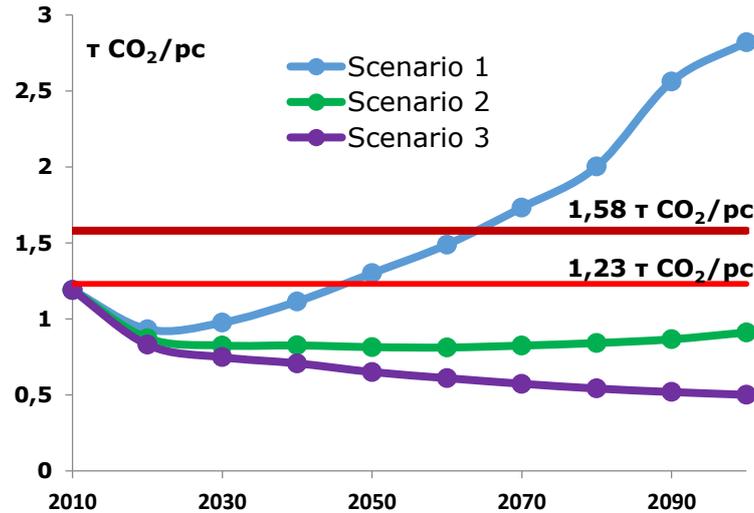
Model - SHAKYR (development of the Climate Change Centre of the Kyrgyz Republic).

To assess the potential mitigation actions to achieve the long term GHG emissions target, the following scenarios were developed:

- Scenario 1: Low population growth - high economic growth;
- Scenario 2: Average population growth - average economic growth;
- Scenario 3: High population growth - low economic growth.

The following estimates of population for 2050 (in thousands): Scenario 1 - 6872; Scenario 2 - 7975; Scenario 3 - 9170.

Figure below provides a graphical illustration of per capita emissions for the three scenarios.



10. Expected GHG emissions reduction and resources required for mitigation to 2100, mln. \$2005

	Total		Domestic efforts		International Support	
	Resources cumulative (\$2005, in millions)	GHG reduction annual (CO <sub>2</sub> Gg)	Resources cumulative (\$2005, in millions)	GHG reduction annual (CO <sub>2</sub> Gg)	Resources cumulative (\$2005, in millions)	GHG reduction annual (CO <sub>2</sub> Gg)
Scenario 1	1960	7403	733	2865	1227	4548
Scenario 2	1630	5635	568	2070	1062	3575
Scenario 3	1867	4463	686	2247	1181	2226

11. GHG emissions reduction as % below BAU scenario

		2020	2030	2050	2100
Scenario 1	Domestic efforts	12,22	13,75	15,69	15,06
	International support	13,14	17,04	21,06	23,91
	<b>Total</b>	<b>25,36</b>	<b>30,89</b>	<b>36,75</b>	<b>38,92</b>
Scenario 2	Domestic efforts	11,58	13,29	13,98	16,28
	International support	12,70	16,66	22,53	28,12
	<b>Total</b>	<b>24,27</b>	<b>29,96</b>	<b>36,51</b>	<b>44,31</b>
Scenario 3	Domestic efforts	11,09	11,49	12,67	20,98
	International support	12,76	17,51	21,98	20,78
	<b>Total</b>	<b>23,86</b>	<b>29,00</b>	<b>35,06</b>	<b>41,66</b>

12. GHG emissions reduction	
<p>12.1. GHG emissions reduction through domestic efforts and international support for Scenario 1</p>	<p>Gg CO<sub>2</sub>-e</p> <p>GHG emission reduction from domestic resources</p> <p>GHG reduction from international resources</p>
<p>12.2. GHG emissions reduction through domestic efforts and international support for Scenario 2</p>	<p>Gg CO<sub>2</sub>-e</p> <p>GHG emission reduction from domestic resources</p> <p>GHG reduction from international resources</p>
<p>12.3. GHG emissions reduction through domestic efforts and international support for Scenario 3</p>	<p>Gg CO<sub>2</sub>-e</p> <p>GHG emission reduction from domestic resources</p> <p>GHG reduction from international resources</p>
<p>13. Monitoring and reporting</p>	<p>Monitoring over implementation of the mitigation contribution will be combined with a process of regular updating of the national mitigation priorities, programs and action plans. Preparation of the updated programs and plans will be based on assessments of the earlier mitigation measures' implementation.</p> <p>The domestic MRV system will be developed and established as a basis for monitoring and reporting of the mitigation actions.</p> <p>Reporting will also be carried out in the frames of the national communications on climate change and biennial update reports.</p>

<p>14. Fairness and ambition</p>	<p>GHG emissions of the Kyrgyz Republic are small. In 2010, the share of the Republic in global GHG emissions from fossil fuel combustion was 0.023%. Per capita GHG emissions of the Kyrgyz Republic are less than one-third of the world average.</p> <p>The low emissions of Kyrgyz Republic are largely because 90% of the total electricity generation is supplied by the hydroelectric power plants. However, the expected climate change impacts will decrease the water flow after the 30s and, consequently, reduce the hydropower resources potential. As a result, even with an annual GDP growth of 4%, the electricity demand for Kyrgyzstan's economy would be much more that can be met through the hydropower capacities.</p> <p>The Kyrgyz Republic is a lower middle income country with 637.3 pc income, compared to global average per capita income of 8054.6 (2014, \$2005). To meet its development needs the economy is expected to grow and so will do the GHG emissions. The increase in GHG emissions is expected to be much faster than in the developed countries.</p> <p>Despite this, the long term vision of the Kyrgyz Republic is to limit the per capita GHG emissions to a very low level of 1.58 t CO<sub>2</sub> in line with 2<sup>0</sup>C objective. Hence, the ambition and fairness of the national efforts, submitted in the INDC, is evident and equitable in the face of a sharp growth of the country's economic level.</p>
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**Lao People's Democratic Republic**  
Peace Independence Democracy Unity and Prosperity

# **Intended Nationally Determined Contribution**

**30 September 2015**

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## 1 National Context

Lao PDR has a long term goal for national development which is set out in the 8<sup>th</sup> Five Year National Socio-economic Plan (2016-2020), with a Vision to 2030. According to this vision, the goal is for Lao PDR to make the transition from a Least Developed Country (LDC) to a middle income country by 2030 supported by inclusive, stable and sustainable economic growth whilst alleviating poverty. Lao PDR recognises the strong link between economic development, sustainability and the need to mainstream environmental considerations, including action on climate change into its development plans.

The Climate Change and Disaster Law is being developed and the overarching legal framework for climate change and disaster management is provided in the law. The law is expected to be approved in 2017.

The National Strategy on Climate Change (NSCC) of Lao PDR was approved in early 2010, and states a vision on how to address climate change<sup>1</sup>:

“To secure a future where Lao PDR is capable of mitigating and adapting to changing climatic conditions in a way that promotes sustainable economic development, reduces poverty, protects public health and safety, enhances the quality of Lao PDR’s natural environment, and advances the quality of life for all Lao People”

In addition to the overarching strategy set out in the NCCS, climate change action plans for the period 2013-2020 define mitigation and adaptation actions in the sectors of agriculture, forestry, land use change, water resources, energy, transportation, industry and public health.

Lao PDR is highly climate-vulnerable, and the country’s greenhouse (GHG) emissions were only 51,000 Gg<sup>2</sup> in the year 2000, which is negligible compared to total global emissions. Despite this, Lao PDR has ambitious plans to reduce its GHG emissions while at the same time increasing its resilience to the negative impacts of climate change. Examples of such plans include the following:

- An ambitious target is set out in the National Forestry Strategy to the Year 2020 for increasing forest cover to a total of 70% of land area by 2020, and maintaining it at that level going forward. This will reduce the risk of floods and prevent land degradation, yet at the same time the greenhouse gas mitigation potential of such a target is substantial and long lasting.
- In terms of Lao PDR’s large scale electricity generation, the electricity grid draws on renewable resources for almost 100% of its output. Lao PDR also aims at utilising unexploited hydropower resources to export clean electricity to its neighbours. By supplying neighbouring countries such as Cambodia, Viet Nam, Thailand and Singapore with hydroelectricity, Lao PDR is enabling other countries in South East Asia to develop and industrialise in a sustainable manner.
- The Government of Lao PDR has also laid the foundations for the implementation a renewable energy strategy that aims to increase the share of small scale renewable energy to 30% of total energy consumption by 2030.

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<sup>1</sup> National Strategy on Climate Change (NSCC) (2010). Available at:

[http://www.undp.org/content/lao\\_pdr/en/home/library/environment\\_energy/climate\\_change\\_strategy.html](http://www.undp.org/content/lao_pdr/en/home/library/environment_energy/climate_change_strategy.html)

<sup>2</sup> The latest GHG inventory in Laos presented in the Second National Communication on Climate Change of Lao PDR (2013) used data of the year 2000.

Climate change is already causing economic loss and affecting the livelihoods, food security, water supply and health of much of the country’s population. The frequency and intensity of climate related hazards such as droughts and floods are expected to increase in future, so Lao PDR must also urgently take steps to build its resilience by enhancing its adaptation efforts across all sectors. A more detailed summary of the vulnerabilities to climate change and the adaptation actions proposed to address them are discussed further in Section 3 of this INDC.

Lao PDR is committed to the implementation of its NCCS and its sectoral climate change action plans, for the national, regional and global benefit. However, it will require technical and financial support to deliver the mitigation and adaptation actions identified herein. With such support, the NCCS will be most efficiently implemented, the potential GHG reductions identified will be optimised, and Lao PDR can most effectively adapt to the negative and immediate effects of climate change.

## 2 Mitigation

### 2.1 Mitigation Contribution

Lao PDR has identified a number of actions which it intends to undertake in order reduce its future GHG emissions, subject to the provision of international support. These are outlined in Table 1 together with preliminary estimates of the projected emissions reductions which will occur as a result. These estimates have been drawn from a variety of sources and need to be reviewed and updated to address consistency and accuracy in analytical methods once more reliable data and information are available. Details of the mitigation actions, implementation plans and support needs are outlined in Section 4 and Annex 1 respectively.

Table 1: Intended Mitigation Activities to be implemented by Lao PDR in 2015-2030

No	Name of activity	Objectives of the activity	Estimated CO <sub>2eq</sub> reductions
1	<b>Implementation of “Forestry Strategy to the year 2020” of the Lao PDR</b>	To increase forest cover to 70% of land area (i.e. to 16.58 million hectares) by 2020. Once the target is achieved, emission reductions will carry on beyond 2020.	60,000 to 69,000 ktCO <sub>2e</sub> (once the target has been met, by 2020 onwards)
2	<b>Implementation of Renewable Energy Development Strategy</b>	To increase the share of renewable energy to 30% of energy consumption by 2025. (Note that large scale technologies with installed capacity equal to or greater than 15MW are not included in this policy’s target.)  For transport fuels the objective is to increase the share of biofuels to meet 10% of the demand for transport fuels by 2025.	1,468,000 ktCO <sub>2e</sub> (by 2025).
3	<b>Implementation of Rural Electrification Programme</b>	To make electricity available to 90% of households in rural area by the year 2020. This will offset the combustion of fossil fuels to produce power where there is no access to the electricity grid.	63 ktCO <sub>2</sub> /pa (once the target has been met in 2020)
4	<b>Implementation of transport focused NAMAs</b>	In one NAMA feasibility study, road network development is identified as a first objective which will reduce the number of kilometres	Road network development is 33 ktCO <sub>2</sub> /pa,

No	Name of activity	Objectives of the activity	Estimated CO <sub>2</sub> eq reductions
		<p>travelled by all vehicles. The second objective is to increase the use of public transport compared to the business as usual (BAU).</p> <p>In addition to a reduction in GHG emissions the activity will lead to a reduction in NO<sub>x</sub> and SO<sub>x</sub> emissions which will have significant co-benefits such as improvement in air quality which in turn will have positive impacts on human health.</p>	and 158 ktCO <sub>2</sub> /pa for public transport development
5	<b>Expansion of the use of large scale hydroelectricity</b>	The objective of this activity is to build large-scale (>15 MW) hydropower plants to provide clean electricity to neighbouring countries. Approximately total installed capacity of the hydropower plants will be 5,500 MW by 2020. In addition, 20,000 MW of additional hydroelectric capacity is planned for construction after 2020.	16,284 ktCO <sub>2</sub> per annum (2020-30)
6	<b>Implementation of climate change action plans</b>	<p>To build capacity to monitor and evaluate policy implementation success, with a view to producing new policy, guidance and data.</p> <p>The objective is to develop and implement effective, efficient and economically viable climate change mitigation and adaptation measures.</p>	To be estimated as part of the implementation plan

## 2.2 Ambitious and Fair

Lao PDR's GHG emissions are very low in the global context, and its historic contribution to climate change has been minimal. Despite this and its status as a Least Developed Country (LDC), the Government of Lao PDR intends to implement policies that support the long term goal of limiting global GHG emissions in line with the objectives of the UNFCCC and the findings of the IPCC's 5th Assessment Report. These represent the first time that Lao PDR has made an international undertaking to take action on mitigation and therefore fulfils the requirements of the Lima Call for Climate Action to go beyond existing efforts.

In order to maximise the ambition of its mitigation contribution while taking into account the need for economic development, Lao PDR has prioritised mitigation actions that both address the main causes of future increases in emissions and also have significant development co-benefits. This is considered to be a fair approach to the nation's first INDC. Forestry based actions will not only increase the amount of GHG sinks in Lao PDR, but will also provide adaptation co-benefits contributing to prevention of flooding, soil erosion and landslides, protection of biodiversity and ecosystem services. Improving public transport will not only result in less GHG emissions as a result of travel, but will also improve air quality and support more sustainable economic growth. The rural electrification programme will reduce GHG emissions, promote rural development and reduce poverty. Finally, the export of hydropower to other countries in the region will allow their economies to grow in a more sustainable manner, by replacing consumption of fossil fuels.

This INDC includes a mix of plans which are being undertaken by the Government of Lao PDR including those supported by overseas development assistance. Lao PDR is also implementing other relevant national and local plans such as the allocation of approximately USD 12 million annually for disaster emergency response plans. This demonstrates that Lao PDR is not content to wait for international support to take action on climate change. However, reforestation and maintenance of forests for example is a major challenge for a country such as Lao PDR, so there is strong desire to achieve success with international programmes and assistance such as REDD+ and FLEGT.

Overall, in order to achieve maximum mitigation potential, further international support is required by Lao PDR. The main support needs are as set out in the Section 4 and Annex 1 of this INDC.

### 3 Adaptation

As set out in the vision for the NSCC referred to in Section 1, Lao PDR intends to balance its need for development without compromising its environment. For climate change adaptation this translates into the following goals which are articulated in the NSCC:

- Increase resilience of key economic sectors and natural resources to climate change and its impacts
- Enhance cooperation, strong alliances and partnerships with national stakeholders and international partners to achieve national development goals
- Improve public awareness and understanding of various stakeholders about climate change, vulnerabilities and impacts in order to increase stakeholder willingness to take actions.

Lao PDR's economy is already experiencing the impacts of climate change, and the majority of population remains highly vulnerable to climate hazards in particular floods and droughts. This is because Lao PDR's economy and over 70% of population depends on natural resources for their livelihoods and to ensure food security. The agriculture sector is responsible for 29.9 % of GDP and approximately 70% of the population are dependent on the sector for their livelihoods. Increasing climate resilience with respect to agriculture is therefore a high priority especially food security. Another high priority is the provision and management of water resources as this contributes to social wellbeing, economic productivity and water supply for agriculture, industrial processes and energy production.

Flooding is a major climate risk in the country, threatening livelihoods almost every year. 14 out of 17 provinces as well as the Vientiane capital have experienced floods since 1995. The country's annual rainfall is expected to increase its variability which, accompanied with increase in temperature could have significant impact on water resources, ecosystems and agricultural production. In addition floods have an adverse impact housing, health and education, industrial activities, and infrastructure (transportation, water and sanitation). As an example the flooding in 2005 caused widespread disruption and the estimated economic costs were USD 29 million<sup>3</sup>.

Lao PDR is also experiencing increasingly frequent episodes of drought. Severe drought occurred in 1996, 1998 and 2003. It is estimated that 6 out of 17 provinces are already at high risk of droughts. Droughts adversely affect water resources, hydroelectricity generation and agricultural production resulting in widespread economic losses.

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<sup>3</sup> Lao PDR Second National Communication (2013)

The National Adaptation Programme of Action (2009) maps out a country-driven programme to address immediate and projected climate change adaptation requirements in the agriculture, forestry, water resources and public health sectors. The adaptation programme was further developed in the NSCC to cover the main sectors of the economy which are identified as the agriculture and food security, forestry and land use change, water, energy and transport, urban development, industry and public health sectors, which are intended for implementation by 2020.

One of the guiding principles of the NSCC is to develop and implement integrated adaptation and mitigation solutions, i.e. that are low-cost, improve energy efficiency, promote cleaner production, and provide adaptation/mitigation synergies as well as economic, environmental and socioeconomic benefits. Hydroelectricity has great potential in Lao PDR providing clean energy, an opportunity to reduce GHG emissions and also meet other objectives such as flood, irrigation and water supply management. The forestry sector contributes to both national economy and also livelihoods of many Laotians for example. Sustainable forest management therefore improves the resilience of communities and ecosystems and at the same time reduces GHG emissions by absorbing carbon dioxide.

In order to work towards achieving the NSCC’s vision and goals and effectively implement the climate change action plans for all sectors, development of an M&E system is an immediate need for Lao PDR. Table 2 and Annex 2 reflect the nation’s adaptation priorities given the current understanding of expected climate impacts. These actions will be continuously assessed and improved when monitoring and evaluation (M&E) data and new information about climate change and impacts become available.

Table 2: Focus of Adaptation Projects in Key Sectors

No	Sector	Focus of Projects and Programmes
1	<b>Agriculture</b>	<ul style="list-style-type: none"> <li>Promote Climate Resilience in Farming Systems and Agriculture Infrastructure</li> <li>Promote Appropriate Technologies for Climate Change Adaptation</li> </ul>
2	<b>Forestry and Land Use Change</b>	<ul style="list-style-type: none"> <li>Promote Climate Resilience in Forestry Production and Forest Ecosystems</li> <li>Promote Technical Capacity in the Forestry Sector for Managing Forest for Climate Change Adaptation</li> </ul>
3	<b>Water Resources</b>	<ul style="list-style-type: none"> <li>Strengthening Water Resource Information Systems for Climate Change Adaption</li> <li>Managing Watersheds and Wetlands for Climate Change Resilience</li> <li>Increasing Water Resource Infrastructure Resilience to Climate Change</li> <li>Promotion of Climate Change Capacity in the Water Resource Sector</li> </ul>
4	<b>Transport and Urban Development</b>	<ul style="list-style-type: none"> <li>Increasing the Resilience of Urban Development and Infrastructure to Climate Change</li> </ul>
5	<b>Public Health</b>	<ul style="list-style-type: none"> <li>Increasing the Resilience of Public Health Infrastructure and Water Supply System to Climate Change</li> <li>Improving Public Health Services for Climate Change Adaptation and Coping with Climate Change Induced Impacts.</li> </ul>

## 4 INDC Development Process and Implementation Plan

This INDC has been prepared through an inclusive stakeholder consultation process including line ministries, research institutions, civil organizations, provincial governments, private sector and international development partners. The main sources of information to prepare this document were the 7<sup>th</sup> and 8<sup>th</sup> five year National Socio-Economic Development Plan 2011-2015 and 2016-2020, with a Vision to 2030 (2011 and 2015), National Climate Change Strategy (2010), Forestry Strategy to the Year 2020 of the Lao PDR (2005), Renewable Energy Development Strategy (2011), Sustainable Transport Development Strategy (2010), Climate Change Action Plan of Lao PDR for 2013-2020 (2013), National Adaptation Programme of Action (2009) and the Second National Communication to the UNFCCC (2013) and Investment and Financial Flows to address climate change in Energy, Agriculture and Water Sector (2015).

The cross-ministerial National Disaster Management Committee (NDMC) will oversee the overall implementation of the INDC. Using the NDMC's existing structure, the Ministry of Natural Resources and Environment (MoNRE) will act as secretariate. This will involve coordination with relevant ministries and cooperation with international stakeholders to access finance and capacity building for the implementation of the INDC including the establishment and implementation of MRV.

MoNRE will disseminate the INDC and later the results of the COP 21 to relevant ministries in the central and line agencies in the local levels. The INDC will also be incorporated in the 8<sup>th</sup> National Socio-Economic Development Plan to ensure the continued mainstreaming of climate related policy in overall national plans.

The INDC will be implemented in a coordinated manner with the NCCS, climate change action plans and the sectoral plans. The current climate change action plans run until 2020 and Lao PDR will start devising the next set of action plans to continue to implement the NCCS before the end of the year 2020. Details of the implementation of the mitigation and adaptation actions identified in Sections 2 and 3 of this INDC are set out in Annexes 1 and 2 respectively.

To facilitate the implementation of the INDC and ensure climate change action plans are executed in the most effective, efficient and economic manner, MoNRE will carry out four elements as follows:

1. **Overall strategy, coordination of INDC implementation and regulatory framework:** will be established by MoNRE. Effective arrangements for liaison with line ministries responsible for aspects of the INDC, international stakeholders and development partners, at national and local levels to facilitate implementation of the INDC will be put in place. This will also include strengthening the policy and regulatory framework especially continue development and promulgation of the Climate Change and Disaster Law, which is expected to be in 2017. This law will be a continuum for earlier achievements on climate change policies and plans such as the Environmental Protection Law, Revised Urban Planning Law, Strategic Plan on Disaster Management 2020 (2003) and the National Strategy on Climate Change (2010).
2. **Capacity building:** one of the biggest requirements above all is to instigate the development of technical capacity – not just across sectors, but at all levels of engagement from central government decision-makers through to local levels and technical staff. In mitigation capacity building is needed for example in feasibility studies, mitigation analysis and policy development.

Regarding adaptation capacity building is needed in understanding the climate change impacts, adaptation measures including technical requirements of the adaptation measures such as drought- and flood-resistant varieties of crops, research into new crops and climate resilient technologies as well as on how the adaptation measures will impact on communities and environments.

3. **Finance:** in summary, there are broadly eight main steps that will need to be followed in order to ensure that domestic and international finance is successfully acquired, utilised and accounted for<sup>4</sup>:
  - a. Assess needs, define priorities, and identify barriers to investment
  - b. Identify policy mix and sources of financing
  - c. Identify access routes to multilateral finance
  - d. Blend and combine resources
  - e. Formulate projects, programmes and sector-wide approaches to access finance
  - f. Implementation and execution of planned action
  - g. Implementation and management of project coordination systems
  - h. MRV / M&E of climate finance

With respect to domestic resources for climate action, Lao PDR has apportioned USD12.5 million for climate change which represented approximately 0.14% of GDP in 2012. In order to implement the mitigation actions and address adaptation needs international support in the form of financial, technology transfer and capacity building is needed. An initial estimate of the financial needs for implementing identified mitigation and adaptation policies and actions is US\$ 1.4 billion<sup>5</sup> and US\$ 0.97 billion<sup>6</sup>, and details are provided in Annex 1 (mitigation) and Annex 2 (adaptation) respectively.

4. **Monitoring, Reporting and Verification (MRV):** an MRV system is the cornerstone of effective national implementation as it allows progress against implementation plans to be demonstrated and provides data for learning for future project development. Lao PDR recognises that its capacity with respect to MRV requires development if the climate change goals set out in this INDC are to be realised. Specifically, a GHG inventory system, NAMA MRV framework, adaptation evaluation indicators and tracking systems for climate finance need to be developed. In the immediate term, in order to develop MRV system, Lao PDR intends to carry out the following:

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<sup>4</sup> [http://www.tr.undp.org/content/dam/turkey/docs/Publications/EnvSust/UNDP-Readiness\\_for\\_Climate\\_Finance.pdf](http://www.tr.undp.org/content/dam/turkey/docs/Publications/EnvSust/UNDP-Readiness_for_Climate_Finance.pdf)

<sup>5</sup> The cost was calculated based on the cost estimated in the Investments and Financial Flows to Address Climate Change in Energy, Agriculture and Water Sectors; the Forestry Strategy to the year 2020 of the Lao PDR, Renewable Development Strategy in Lao PDR; Country Partnership Strategy between ADB-Lao PDR, 2012-2020; Mitigation Cost in Different Sectors presented in the IPCC Fourth Assessment Report; Resources Requirements for Aichi Targets 11-Protected Areas; Global Review of the Protected Area Budget and Staff and expert judgements.

<sup>6</sup> The cost was calculated based on the cost estimated in the Investments and Financial Flows to Address Climate Change in Energy, Agriculture and Water Sectors, NAPA and expert judgements.

- **Readiness assessments:** these will identify the current state and barriers on data, organisational arrangements, personnel capacity, national policies, and any existing domestic MRV systems.
- **Capacity building:** once the readiness assessment is complete, a capacity development plan will be produced and implemented, and tools will be provided in order to carry out MRV inclusively.

## Annex 1: Mitigation Measures

Please note that investment estimates will need to be investigated further as one of the first steps of implementing the INDC. Figures presented in these Annexes are indicative estimates.

Forestry Strategy to the Year 2020 of the Lao PDR	
<b>Description</b>	Trees and forests are GHG sinks, i.e. they absorb carbon dioxide. They also preserve land quality which mitigates the risk of flooding and landslides. Increasing and maintaining total forest cover therefore has significant mitigation impacts and development co-benefits.
<b>Objectives</b>	The objective of this activity includes increasing total forest cover to 70% of land area (i.e. to 16.58 million hectares). Once the target is achieved, emission reductions will carry on beyond 2030 as forest cover is maintained.
<b>Base year</b>	2000
<b>Methodology for assessing base year and anticipated future emissions</b>	Please refer to the calculations presented in Lao PDR's Second National Communication to the UNFCCC, chapter 4, sections 4.4.2 and 4.4.5 and the Technology Needs Assessment (2013). The base year of 2000 is selected as this is the latest emissions inventory calculated, which was part of the process of compiling the Second National Communication.
<b>Anticipated emission reductions</b>	If these measures are implemented effectively, the country successfully increases its natural forest coverage to 70 percent (about 16.58 million ha) with additional 500,000 ha of plantation, logging and conversion forest under control until 2020. In this scenario, the forests in the Lao PDR would be able to sequester about 60,000-69,000 ktCO <sub>2e</sub> by 2020.
<b>Plan to Achieve the Goal</b>	<ul style="list-style-type: none"> <li>• Implementation of the plans set out in the Forestry Strategy to the Year 2020 of the Lao PDR. As the strategy runs until 2020, Lao PDR will start revising the next set of action plans to maintain forest cover at 70% after the target date of 2020. Work on developing the new strategy will begin in 2018.</li> <li>• Implementation of REDD+ programme which has provided a framework for the development of the forestry sector in Lao PDR since around 2007. As early as 2009, a number of REDD+ pilot activities and projects supported through development partners were initiated, and in 2010, Lao PDR became one of the first pilot countries under the Forest Investment Program (FIP) too which is a multilateral programme under the Climate Investment Funds (CIFs).</li> <li>• Implementation of the voluntary partnership agreement (VPA) which is bilateral trade agreement between the EU and a timber-exporting country outside the EU, that the Government of Lao PDR announced its interest in negotiating a VPA in February 2012.</li> <li>• Continue to carry out the Forest Law Enforcement, Governance and Trade (FLEGT) which has begun since October 2013, with support from Germany's agency for international cooperation (GIZ).</li> </ul>
<b>Main barriers for implementation</b>	<ul style="list-style-type: none"> <li>• Ineffectiveness of existing forest management systems including law enforcement especially on forest harvesting, conversion as a result of development projects, collection and management of forest fund</li> <li>• Forest inspection system is not systemized and effectively enforced</li> <li>• Resources and capacity for forest inventory, planning and restoration is limited</li> <li>• Poverty and limited livelihood options, leading to forest encroachment</li> <li>• Unclear or lack of policies and guidelines to promote forest restoration, and reforestation.</li> </ul>
<b>Support required</b>	Capacity building, technology transfer and financial support on: <ul style="list-style-type: none"> <li>- Law enforcement,</li> <li>- Forest monitoring and inspection system,</li> </ul>

## Forestry Strategy to the Year 2020 of the Lao PDR

	<ul style="list-style-type: none"> <li>- Forest restoration and rehabilitation,</li> <li>- Sustainable community forest management and agro-forestry for mitigation and poverty reduction,</li> <li>- Policy for investment on forest restoration,</li> <li>- Forest inventory and planning system,</li> <li>- Research on forest ecosystem, economic and best practices in relation to climate change mitigation.</li> </ul>
Estimated cost	USD180 million <sup>7</sup> This is assuming that the cost for forest management is approximately 10.84 US\$/ha <sup>8, 9,10</sup> . Note that this does not include costs related to plantations and therefore it provides a lower bound of the total cost related to this measure.

## Implementation of Renewable Energy Development Strategy

Description	The Renewable Energy Strategy (2011) outlines actions and plans to increase the use of small scale hydropower, solar energy, biomass, biogas, municipal solid waste to energy and wind technologies, as well as transport fuels (bioethanol and biodiesel) to provide clean energy to consumers.
Objective	<ul style="list-style-type: none"> <li>• To increase the share of renewable energy to meet 30% of energy consumption by 2025.</li> <li>• To increase the share of biofuels to meet 10% of the demand for transport fuels by 2025.</li> </ul>
Base year	2011
Methodology for assessing base year and anticipated future emissions	For further information please see the Renewable Energy Development Strategy (2011) of Lao PDR. Note: these are preliminary estimates and will be reviewed and updated once technical capacity has been built and more reliable data is made available.
Anticipated emission reductions	1,468,000 ktCO <sub>2e</sub> (by 2025).
Plan to Achieve the Goal	<p>The Renewable Energy Strategy was approved at the national level in 2011. The Ministry of Energy and Mines is the main agency responsible for renewable energy coordination and its main functions include the following:</p> <ul style="list-style-type: none"> <li>• Develop an overall renewable energy policy and support the achievement of sustainable development goals</li> <li>• Set-up objectives and goals based on resource potentials and develop renewable energy database</li> <li>• Carry out studies and demonstration projects utilising renewable energy technologies.</li> </ul> <p>In addition, other ministries have responsibilities under the Renewable Energy Strategy:</p>

<sup>7</sup> The Forest Strategy to the year 2020

<sup>8</sup> Current cost of forest management especially protected area management in Laos is estimated to be few US\$ per ha

<sup>9</sup> The global mean budget for protected areas is \$893 per km<sup>2</sup> in 1996 US\$. The developed countries mean is \$2,058 per km<sup>2</sup> while the developing countries mean is \$157 per km<sup>2</sup> (WCPA, 1999).

<sup>10</sup> Estimated costs to develop and manage protected area effectively are: a) a low scenario of US\$8,000/km<sup>2</sup>; b) a medium scenario of US\$16,000/km<sup>2</sup>; and c) a high scenario of US\$24,000/km<sup>2</sup> (Ervin and Gidda, 2012).

## Implementation of Renewable Energy Development Strategy

- The Ministry of Agriculture and Forestry, in collaboration with Ministry of Natural Resource and Environment and provincial authorities, will determine and develop policies related to the most effective use of lands for plantation of crops for fuel and industrial uses, carry out participatory land use planning and local land use zoning, and monitor and enforce the implementation of the policy
- The Ministry of Natural Resources and Environment is responsible for undertaking research on the use of water resources and will collaborate with the Ministry of Energy and Mines on studies concerning production of hydrogen fuels. Further, they are responsible for developing and enforcing requirements and guidelines and to minimise the environmental and social impacts of renewable energy development through oversight of Initial Environmental Examinations and carrying out environmental impact assessments
- The Ministry of Science and Technology has the role of conducting research and pilot tests on science and technologies developed from different countries, for renewable energy applications
- The Ministry of Industry and Commerce facilitates the importation of equipment and machinery, seeds and vehicles related to the development of renewable energies, as well as supporting the construction of gas stations for biofuel distribution
- The Ministry of Public Works and Transportation will be responsible for the introduction of policies that promote the use of alternative fuels in individual vehicles, public transportation systems, freight and air transport
- The Ministry of Finance determines appropriate tax and duties policies for land use, vehicles and equipment to be used for renewable energy projects while at the same time assisting in raising funds for renewable energy development
- The Central Bank of Lao PDR will consider carbon credits and low interest loans as sources of financing for renewable energy projects and activities, agricultural promotion and fuel crops plantation development and projects carried out by small and medium enterprises.

Regarding implementation, the first step would be an assessment and update of the Renewable Energy Strategy including analysis of:

- i. Resources available, identifying gaps and opportunities for improvements in technology selection and sources. Specifically, the gaps that require analysis in Lao PDR include:
  - i. Political, legal, regulatory and institutional gaps
  - ii. Economic, financial and market gaps
  - iii. Technology, human capacity and infrastructure gaps
- j. Current levels of deployment and their management
- k. Current targets for supply and how they are aligned with demand forecasts
- l. Support policies such as feed-in tariffs, tax incentives and import duties
- m. Market readiness to encourage investment by the private sector.

As a result, Lao PDR's energy focal points and related organisations will be able to comply with all related international agreements with respect to energy supply and trading. Its regulatory system would be strengthened, giving Lao PDR a more organised and authoritative voice when negotiating with potential partners.

### Implementation of Renewable Energy Development Strategy

<b>Main barriers for implementation</b>	<ul style="list-style-type: none"> <li>• Lack of reliable data on renewable energy including its sub-sectors: e.g. actual potential and feasibility of each renewable energy source and optimal locations,</li> <li>• Knowledge and capacity on renewable technologies are limited,</li> <li>• Promotion and investment is limited,</li> <li>• Lack of policy to promote renewable energy technology development, import-export and subsidy mechanism.</li> </ul>
<b>Support required</b>	<ul style="list-style-type: none"> <li>• Strengthen capacity for research on the potential and feasibility of each renewable energy source and location</li> <li>• Strengthen financial mechanism, policy on promotion and development of renewable energy, technologies including its supply chain.</li> </ul>
<b>Estimated cost</b>	USD 658.75 million <sup>11</sup> (2007-2030) including investment costs, operation and management costs and financial costs.

### Expansion in the use of large-scale hydroelectricity

<b>Description</b>	Lao PDR has great potential for hydroelectricity generation and is often referred to as “the battery of South-East Asia”. Exporting of clean energy powers green growth in neighbouring countries and provides foreign exchange earnings and employment in Lao PDR.
<b>Objective</b>	The objective of this activity is to build large-scale hydropower plants to provide clean electricity to neighbouring countries. 2.3GW will be added by 2020 and increase total hydropower electricity production to approximately 5.5GW by 2020. In addition, Lao PDR has over 20GW of additional hydroelectricity capacity to be constructed after 2020.
<b>Base year</b>	2015
<b>Methodology for assessing base year and anticipated future emissions</b>	The estimate is based on the following assumptions: 85% of the hydropower electricity is exported to Thailand and Viet Nam. 1 MW generates 3.5 GWh and 1 GWh produces 3.6 TJ and the default emission factors is 0.67 tonnes of CO <sub>2</sub> per MWh . Note that this is a preliminary estimate and need to be reviewed and updated to address consistency and accuracy in analytical methods once more reliable data and information are available
<b>Anticipated emission reductions</b>	16,284 ktCO <sub>2</sub> per annum, once the target is reached in 2020.
<b>Plan to Achieve the Goal</b>	Implementation of the electricity export agreement along with development of a NAMA, and preparedness for future carbon market mechanism.
<b>Main barrier for implementation</b>	Limited budget and access to finance.
<b>Support required</b>	Capacity building and financial support for strengthening environmental safeguard systems, resettlements, dam safety, climate resilience and development of multi-purpose financial mechanisms.
<b>Estimated cost</b>	USD 320 million

<sup>11</sup> MoNRE, NDF and ADB, 2015. [Investments and Financial Flows to Address Climate Change in Energy, Agriculture and Water Sectors](#)

<b>Rural electrification program</b>	
<b>Description</b>	<p>Rural communities require a clean and secure source of energy, particularly when there is no access to the electricity grid.</p> <p>By increasing the level of rural electrification, reliance on woodfuel and fossil fuels will be reduced.</p>
<b>Objective</b>	Lao PDR has set a target of making electricity available to 90% of the households by the year 2020. Electrification has already improved from a low of 15% in 1995 to 73% in 2010.
<b>Base year</b>	2010
<b>Methodology for assessing base year and anticipated future emissions</b>	<p>Nationally Appropriate Mitigation Action (NAMA) on Rural Electrification in Lao PDR, produced with support by the UNDP lays out the plans for the implementation of the NAMA which will assist Laos to meet its goal of 90% electrification by 2020.</p> <p>The estimate of the emissions based on following assumption:  90% or 1,108,609 households will be electrified by 2020. 60% of the household lives rural area and consumes on average 30 litres of kerosene and diesel per year. Therefore the achievement of the rural electrification goal would reduce the use of kerosene and diesel about 19.95 million litres. With the use of default value for net calorific value and emission factors, electrification in Lao PDR would reduce CO2 emissions of about 63 ktCO2 per year.</p> <p>Note that this is a preliminary estimate and need to be reviewed and updated to address consistency and accuracy in analytical methods once more reliable data and information are available</p>
<b>Anticipated emission reductions</b>	63 ktCO2 per year
<b>Plan to Achieve the Goal</b>	<p>Implementation of nationally appropriate mitigation action (NAMA), with the support from the United Nations Development Programme (UNDP) and measures on rural electrification particularly following five underlying concepts:</p> <ul style="list-style-type: none"> <li>• Maintenance and expansion of power supply based on economic efficiency, reliability, and sustainability, in order to promote economic and social development</li> <li>• Promotion of electric power development and expansion of electricity exports, in order to secure finances targeted by the government</li> <li>• Development and strengthening of laws and regulations, in order to effectively develop the electricity sector through the government, the private sector, or partnerships between public and private sectors</li> <li>• Increasing the nation's capabilities, while developing international-standard techniques, expertise, and experience</li> <li>• Achieving sustainable development by identifying impacts and responsibilities related to society and environment.</li> </ul>
<b>Main barriers for implementation</b>	<ul style="list-style-type: none"> <li>• Limited access, scattering resettlement and inexistence of integrated rural infrastructure development plan</li> <li>• Existing transmission networks are limited</li> <li>• Limited finance for development of rural electricity systems</li> <li>• Lack of comprehensive policy and facilitation to access to finance and private sector investment.</li> </ul>
<b>Support required</b>	<ul style="list-style-type: none"> <li>• Capacity building and financial mechanism for access to finance and resource mobilization</li> <li>• Financial support and investment in electricity grid expansion, system and facilities.</li> </ul>
<b>Estimated cost</b>	USD160 million <sup>12</sup> (for transmission lines only) for the next five years.

<sup>12</sup> Asian Development Bank Country Partnership Strategy (2012-2016) for Lao PDR.

Implementation of transport focused NAMAs	
<b>Description</b>	Systematic development of a road network and provision of buses to meet increasing demand for travel will mitigate GHG emissions while promoting economic development.
<b>Objective</b>	The objective of road network development is to provide better networks so that vehicle kilometres travelled will be reduced against the business as usual (BAU) scenario. In addition to reduction in GHG emissions, the activity will lead to a reduction in NO <sub>x</sub> and SO <sub>x</sub> emissions which will have significant co-benefits such as improvement in air quality which in turn has positive implications for human health.
<b>Base year</b>	2007
<b>Methodology for assessing base year and anticipated future emissions</b>	<p>The reference scenario is determined as BAU which is the scenario reflecting traffic volume trends between 2007 and project start. The scenario is pre-determined and based on transport demand forecast surveys conducted prior to the project's implementation.</p> <p>The Japan International Cooperation Agency (JICA)-supported NAMA document from which projections are taken employs the ASIF (activity-structure-intensity-fuel) approach to calculate emission reductions <i>ex-ante</i>.</p>
<b>Anticipated emission reductions</b>	A feasibility study for a JICA proposed NAMA estimates that emission reductions due to road network development is approximately 33 kt CO <sub>2e</sub> /pa, and emission reductions due to public transport development 158 kt CO <sub>2e</sub> /pa by against BAU by 2025, using 2007 as a base year for comparison.
<b>Plan to Achieve the Goal</b>	The actions are to be completed as part of a NAMA. Projects in road network development, public transport development and transport management sectors are planned to be implemented in three phases; short, medium and long term.
<b>Main barriers for implementation</b>	<ul style="list-style-type: none"> <li>• Uncertain or unclear carbon market and mitigation incentives;</li> <li>• Limited budget for road network and transport system improvement;</li> <li>• Existing road network is rather complicated and it has not been integrated sustainable urban planning. Improving existing one might take time and costly.</li> </ul>
<b>Support required</b>	<ul style="list-style-type: none"> <li>• Capacity building on: <ul style="list-style-type: none"> <li>- Sustainable and integrated urban planning</li> <li>- Law enforcement</li> <li>- Financial models for road planning</li> <li>- Traffic controls</li> <li>- Sustainable and climate resilient transport / technologies.</li> </ul> </li> <li>• Access to favourable terms for infrastructure funding.</li> </ul>
<b>Estimated cost</b>	USD 105 million (until 2020)

## Annex 2: Adaptation Measures

Agriculture	
<b>Objective 1 and related activities</b>	<b>Promote Climate Resilience in Farming Systems and Agriculture Infrastructure</b> <ul style="list-style-type: none"> <li>• Improve appropriate resilient agricultural farming system practices and technologies to address climate change impacts</li> <li>• Develop and improve crops and animal diversification and resilience especially in the risk, flood and drought areas.</li> </ul>
<b>Objective 2 and related activities</b>	<b>Promote Appropriate Technologies for Climate Change Adaptation</b> <ul style="list-style-type: none"> <li>• Promote and enhance development of appropriate technologies to cope with climate change. This may include the conservation of agricultural soil, animal health and disease outbreak monitoring and control, long term feed storage improvement, climate resilience crops, efficient water use cropping systems, short rotation cropping and maximising the use of indigenous climate resilient knowledge.</li> <li>• Upgrade agricultural research and extension services to define and promote existing agricultural practices to reduce the negative effects of climate change</li> <li>• Promote two seasons rice cultivation in flood area by adaptive and short rotation rice varieties</li> <li>• Promote appropriate techniques for crop and animal productions and meteorological-agricultural technologies in natural disaster risk areas.</li> </ul>
<b>Main barriers for implementation</b>	<ul style="list-style-type: none"> <li>• Limited knowledge, capacity and technology on appropriate conservation farming systems, integrated and sustainable agriculture, agro-forestry, soil degradation and quality restoration, pest outbreak management and tolerant crops and different animal varieties</li> <li>• Limited information, knowledge and capacity on the vulnerability assessment of the conservation farming systems, integrated and sustainable agriculture on mitigation and adaptation</li> <li>• Ineffective law enforcement especially land concession, conversion, chemicals and environmentally friendly agriculture</li> <li>• Lack of comprehensive land development policy including effectiveness</li> <li>• Limited budget on promotion and investment on climate resilient agriculture</li> </ul>
<b>Support required</b>	<ul style="list-style-type: none"> <li>• Capacity building including research on appropriate conservation farming systems, integrated and sustainable agriculture, agro-forestry, soil degradation and quality restoration, pest outbreak management and tolerant crops and different animal varieties.</li> <li>• Financial support to pilot and promote appropriate conservation farming systems, integrated and sustainable agriculture, agro-forestry, soil degradation and quality restoration, pest outbreak management and tolerant crops and different animal varieties</li> </ul>
<b>Estimated cost</b>	USD709 million <sup>13</sup> (2007-2030).

Forestry and Land Use Change	
<b>Objective 1 and related activities</b>	<b>Promote Climate Resilience in Forestry Production and Forest Ecosystems</b> <ul style="list-style-type: none"> <li>• Develop and enforce appropriate laws, regulations and implement guidelines for sustainable forest management</li> <li>• Strengthen capacity in integrated land use planning, watershed forest management, reduction of slash and burn practices to increase the resilience of forests to cope with climate change</li> <li>• Promote integrated actions on watersheds, reservoir management, water storage for agro-forestry, wildlife management, fisheries and tree varieties, prevention of drought</li> </ul>

<sup>13</sup> MoNRE, NDF and ADB, 2015. [Investments and Financial Flows to Address Climate Change in Energy, Agriculture and Water Sectors.](#)

**Forestry and Land Use Change**

	<ul style="list-style-type: none"> <li>• Forest surveys and allocation for sustainable management and rural development</li> <li>• Strengthen the capacity of technical staff and village forest volunteers to enable optimal planting, managing and utilising community forests in response to climate change</li> <li>• Promote forest seed and seedling production for reforestation and forest restoration</li> <li>• Research and select forest species which are resilient to pests, diseases, drought, and soil erosion.</li> </ul>
<b>Objective 2 and related activities</b>	<p><b>Promote Technical Capacity in the Forestry Sector for Managing Forests for Climate Change Adaptation</b></p> <ul style="list-style-type: none"> <li>• Increase awareness and technical capacity of village forest volunteers on climate resilient natural forest management, agro-forestry and plantation technologies</li> <li>• Assess capacity limitations and needs in the management of the forestry sector in relation to climate change adaptation</li> </ul>
<b>Main barriers for implementation</b>	<ul style="list-style-type: none"> <li>• Limited knowledge and capacity on climate change impact on the forest sector, on adaptation technologies such as ecosystem-based approaches, on climate resilient flora and fauna species and sustainable forest management for addressing climate change impacts and wood demand management             <ul style="list-style-type: none"> <li>• Capacity on sustainable production forest and ecosystem management is limited</li> <li>• Sustainable production forest law enforcement and management is ineffective</li> </ul> </li> <li>• Lack of financial support and investment</li> </ul>
<b>Support required</b>	<ul style="list-style-type: none"> <li>• Strengthening capacity building on planning and establishment of information management systems, development of an action plan for different types of forests and technologies; climate change adaptation technologies e.g. ecosystem-based approaches, resilient species and forest systems; sustainable production forests and ecosystem-based forest management techniques; access to international finance and systematic sector investment planning</li> <li>• Strengthening capacity building for access to international finance and systematic sector investment planning</li> <li>• Financial support and investment in commercial forest carbon projects including financial mechanism, market, technology, calculation and monitoring.</li> </ul>
<b>Estimated cost</b>	USD40.5 million <sup>14</sup> (until 2020)

**Water resources**

<b>Objective 1 and related activities</b>	<p><b>Strengthening Water Resource Information Systems for Climate Change Adaptation</b></p> <ul style="list-style-type: none"> <li>• Strengthen information gathering, modelling and vulnerability assessment for climate change in priority river basins in Lao PDR;</li> <li>• Develop and implement reliable early warning flood systems, reporting and information disseminating services.</li> </ul>
<b>Objective 2 and related activities</b>	<p><b>Managing Watersheds and Wetlands for Climate Change Resilience</b></p> <ul style="list-style-type: none"> <li>• Strengthen the protection of watersheds to safeguards and moderate downstream flow during periods of high and low flow;</li> <li>• Study and promote the conservation of wetlands as part of a climate resilient ecosystem-based approach.</li> </ul>
<b>Objective 3 and related activities</b>	<p><b>Increasing Water Resource Infrastructure Resilience to Climate Change</b></p> <ul style="list-style-type: none"> <li>• Develop and strengthen standards and procedures to ensure the safety of dams and other water resource related infrastructure; preparation of investment plans for upgrading and safeguarding infrastructure for water resource management</li> </ul>

<sup>14</sup> National Adaptation Programme of Action, NAPA, 2009

Water resources	
	<ul style="list-style-type: none"> <li>• Design and build multi-purposes dam and reservoirs to ensure sufficient water supply in drought prone areas and seasons;</li> <li>• Construct / rehabilitate dykes and enhance river bank protection and irrigation systems to increase climate resilience.</li> </ul>
Objective 4 and related activities	<p><b>Promotion of Climate Change Capacity in the Water Resource Sector</b></p> <ul style="list-style-type: none"> <li>• Increase awareness and technical capacity of staff regarding climate change impact on water resources and appropriate technologies, and wetland management;</li> <li>• Increase capacity on water resource management for climate change adaptation;</li> <li>• Study water treatment which has ground water impacts, ground water and ecosystem</li> </ul>
Main barriers for implementation	<ul style="list-style-type: none"> <li>• Knowledge and capacity on climate change impacts on water resources, early warning systems, wetland management, climate resilient technologies and financial assessments are limited and inadequate</li> <li>• Early warning system and flood risk management is limited and adequate</li> <li>• Integrated watershed management is not effectively promoted Lack of comprehensive water storage and water quality plan</li> <li>• Lack of financial mechanism to access to finance, resources mobilization and investment.</li> </ul>
Support required	<p>Capacity and financial support for:</p> <ul style="list-style-type: none"> <li>• Flood/drought management and early warning systems</li> <li>• Development of a policy for dam safety and multi-purpose for water supply</li> <li>• Climate resilient water resources infrastructure</li> <li>• Law enforcement</li> </ul>
Investment for adaptation	USD 44 million (until 2030) <sup>15</sup>

Transport and Urban Development	
Objective 1 and related activities	<p><b>Increasing the Resilience of Urban Development and Infrastructure to Climate Change</b></p> <ul style="list-style-type: none"> <li>• Conduct climate risk audits for key infrastructure services;</li> <li>• Ensure flood protection and drainage design for urban infrastructure (roads, drains, flood protection works, water and wastewater facilities, landfills, hospitals, other public buildings) are adequate for climate change conditions;</li> <li>• Ensure that urban water supply systems have adequate design and operational standards for climate change impacts, including access to low flows in water sources, water treatment capability and flood protection;</li> <li>• Build storm surge / flood protection works for urban infrastructure</li> </ul>
Main barrier for implementation	<ul style="list-style-type: none"> <li>• Research, information and capacity on sustainable and climate resilient urban planning and development technologies</li> <li>• Limited knowledge and capacity on sustainable and climate resilient urban planning and development, and technologies,</li> <li>• Lack of financial mechanism, access and resources mobilization</li> </ul>
Support required	<ul style="list-style-type: none"> <li>• Strengthen human resources capacity and financial capacity on: <ul style="list-style-type: none"> <li>- Development of financial and investment plan for implementation of climate resilient urban planning and development and technologies deployment</li> <li>- Mainstream appropriate climate resilient technologies in the environmental impact assessment</li> </ul> </li> </ul>

<sup>15</sup> MoNRE, NDF and ADB, 2015. [Investments and Financial Flows to Address Climate Change in Energy, Agriculture and Water Sectors](#)

## Transport and Urban Development

	Strengthen cooperation and partnership, financial mechanism, access to finance and resource mobilization
Investment for adaptation	USD190 million (until 2020)

## Public Health

Objective 1 and related activities	<p><b>Increasing the Resilience of Public Health Infrastructure and Water Supply System to Climate Change</b></p> <ul style="list-style-type: none"> <li>• Development of climate resilient health related infrastructure and facilities such as health care centres, laboratories, rural water supply and sanitation systems</li> <li>• Increase capacity on climate change impact assessments, estimating financial needs, and implementing resilience plans in the health sector</li> </ul>
Objective 2 and related activities	<p><b>Improving Public Health Services for Climate Change Adaptation and Coping with Climate Change Induced Impacts</b></p> <ul style="list-style-type: none"> <li>• Improve education, research on climate change induced disease and health impacts, its treatments (by both modern and traditional methods), monitoring and reporting</li> <li>• Improve access to human resources and increase service coverage in vulnerable communities</li> <li>• Improve medical and food supplies, nutritional surveillance, drinking water improvement by better management of its supply network</li> <li>• Increase public and vulnerable community awareness on climate change induced health risks and provide advisory and warnings, enhance first aid and promote self-help and access to health care service of communities</li> <li>• Develop policies to increase the ability of vulnerable groups and the poor to access health services.</li> </ul>
Main barrier for implementation	<ul style="list-style-type: none"> <li>• Inadequate capacity to conduct climate change vulnerability and impact assessment, Inadequate capacity and human resources</li> <li>• Limited budget, quality and quantity of human resources.</li> </ul>
Support required	<ul style="list-style-type: none"> <li>• Capacity building on disease outbreak monitoring, response plans and human resource development planning</li> <li>• Technical and financial support on awareness raising on climate change impacts and health risks</li> <li>• Capacity and financial support to develop monitoring centres, laboratories, mobile teams and stations, treatment centres.</li> </ul>
Investment for adaptation	USD5 million <sup>16</sup> (until 2020)

<sup>16</sup> National Adaptation Programme of Action, NAPA, 2009.



## **Republic of Lebanon**

**Lebanon's Intended Nationally Determined Contribution  
under the  
United Nations Framework Convention on Climate Change**

**September 2015**

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## 1. Introduction

Lebanon presents its INDC in a situation of development challenges, including, amongst other issues, a lack of security due to regional turmoil and a high level of poverty. Adaptation is a priority for Lebanon. Being a developing country with scarce water resources and high population density in the coastal areas, Lebanon is already facing and will continue to face, significant challenges as a result of climate change. The government of Lebanon recognizes that the more sustainable its development path is, the easier it will be to build resilience to climate change impacts.

National as well as sectoral planning has addressed these challenges through the development of a number of low-carbon and adaptation strategies. These strategies take a long-term view, considering for example a full restructuring of the power sector between 2011 and 2030. Lebanon's INDC builds on these strategies. The country is, however, not able to provide the resources necessary to implement these strategies completely on its own. International support is required to fully implement and track the existing adaptation and mitigation strategies and to further mainstream adaptation and mitigation throughout the economy. With regard to mitigation, the INDC has two targets: the first representing the country's own contribution ("unconditional target"), the second offering a wider mitigation target conditional on receiving international support ("conditional target"). With this INDC, the government of Lebanon strives to both build resilience and improve adaptation as it lowers emissions, and therefore take advantage of the synergies between adaptation and mitigation.

Lebanon's INDC was developed based on extensive stakeholder involvement. Mitigation and adaptation actions considered in the development of the INDC targets were selected using a bottom-up approach, employing existing sectoral plans and strategies as a basis. This approach allowed the inclusion of the most appropriate mitigation and adaptation actions for each sector and ensures full support from sectoral stakeholders who see their own planning reflected in the targets set by the INDC.

## 2. National Circumstances

Lebanon has made various strides towards improving its development status and is in fact designated as an upper middle income country<sup>1</sup>. Nevertheless, despite its many accomplishments, the country still suffers from a myriad of development challenges, mainly related to lack of security due to regional turmoil, political instability as well as massive inequality and a high level of poverty. Lebanon's poverty rate is estimated to be 28% with 8% considered extremely poor<sup>2</sup>. In addition, Lebanon estimates that the total cost in 2020 from climate change would be equivalent to about USD 4,000 per household. This is around a third of the average household annual earnings, which currently is about USD 12,000, as a result, many households would become impoverished<sup>3</sup>. A poverty reduction program that boosts the country's resilience to security and natural shocks is therefore a high priority for Lebanon.

To exacerbate matters, the Syrian crisis has led to the arrival of around 1.13 million registered refugees<sup>4</sup> to the country, increasing Lebanon's population by 30% in just over 2

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<sup>1</sup> World Bank Website, Lebanon Profile (<http://data.worldbank.org/country/lebanon>)

<sup>2</sup> UNDP (2008), Poverty, Growth and Income Distribution in Lebanon

<sup>3</sup> MoE/ UNDP/GEF (2015), Lebanon's Third National Communication to the United Nations Framework Convention on Climate Change. Unpublished

<sup>4</sup> UNHCR Syrian Regional Refugee Response Portal (<http://data.unhcr.org/syrianrefugees/country.php?id=122>), as of Data provided by UNHCR, as of 25.08.2015.

years<sup>5</sup> and adding stress to the already-stretched economy and natural resources. This surge in population has led to an estimated 5% increase in road traffic and therefore in greenhouse gas emissions and air pollution. It has also led to an increase in domestic water demand for refugees of around 70 million m<sup>3</sup> by the end of 2014, which is equivalent to a 12% increase in the national water demand. It has also added 251 MW to the country's power needs, an increase of over 10%, noting that the electricity purchasing from Syria dropped by around 88% during the same period. This demand can currently only be met through private generators, leading to additional carbon emissions and air pollutants. Other impacts include felling of forest trees to obtain firewood<sup>5</sup>. This additional pressure poses a risk factor for Lebanon in its strive to achieve economic growth, and build a climate resilient low carbon economy. In fact, this has had a devastating impact on development, economic activity, social progress and the environment, overstressing the capacity of national institutions in health care, education, energy, water, sanitation and security. It has set back development or even threatened to reverse it, and has weighed dramatically on the national economy, generating a cumulative and compounded cost of about one-third of the national GDP since the start of the crisis.

Furthermore, Lebanon continues to face a difficult economic situation. According to the International Monetary Fund, the Lebanese Gross Public Debt stood at 134% of GDP by the end of 2014 (fourth-highest among 188 countries). The fiscal deficit amounted to 7.1 percent of GDP during 2014. The lack of fiscal space has translated into limited capital expenditure. Lebanon has nevertheless taken several steps towards addressing these challenges through developing and implementing government strategies and initiatives, at the national and local levels, to promote a cleaner economy. Lebanon, following the preparation of the National Energy Efficiency Action Plan 2011-2015, has updated the National Energy Efficiency Action Plan for 2016-2020 and prepared the National Renewable Energy Action Plan 2016-2020, to meet the target of 12% renewable energy by 2020 that has already been committed through the 2010 Policy Paper for the Electricity Sector. Lebanon is also preparing for the exploration of potential for the production of natural gas offshore. This would allow for considerable reduction in emissions in the power sector by replacing dependence on heavy fuel oil and diesel in power generation, and, in the long term, throughout the economy. In addition, the government of Lebanon is currently preparing a Sustainable Development Strategy that covers all sectors of the economy where climate change mitigation and adaptation issues are mainstreamed throughout. Lebanon's response to climate change will therefore require national measures aligned with other sectoral action plans and ensure that sustainable development is also climate friendly.

In December 1994, Lebanon ratified the United Nations Framework Convention on Climate Change (UNFCCC) and has since been involved in various activities aimed at spreading climate change awareness in the country, reducing national greenhouse gas (GHG) emissions, developing measures to reduce adverse impacts on environmental, economic and social systems, building institutional capacity and mainstreaming climate change into the different policies. These activities were undertaken and monitored through a platform, the Climate Change Coordinating Committee (CCCC), led by the Ministry of Environment and in cooperation with its various focal points located at the line ministries, government agencies, private sector and academic institutions.

It is under these circumstances and commitment to a cleaner and more resilient economy and in accordance with the COP decisions 1/CP.19 and 1/CP. 20 that Lebanon presents its

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<sup>5</sup> MoE (2014), Lebanon Environmental Assessment of the Syrian Conflict and Priority Interventions

INDC which can only succeed through the cooperation of all national stakeholders and the invaluable support of the international community.

### 3. Adaptation

Climate change adaptation is a priority for Lebanon. Being a developing country with scarce water resources and high population density in the coastal areas, Lebanon is already facing and will continue to face several challenges as a result of climate change (Second National Communication, SNC, 2011). According to the climate models, temperatures are expected to increase by around 1°C on the coast and 2°C in the mainland by 2040, and by 2090 they will be 3.5°C and 5°C higher, respectively. At the same time rainfall is projected to decrease by 10-20% by 2040 and 25-45% by the year 2090. This will lead to substantial detrimental effects in a number of areas. Lebanon has a diverse natural environment including coastal, agricultural, forest and mountainous areas many of which have unique biodiversity and ecosystems that are sensitive to climate change.

Lebanon's electricity infrastructure needs to cope with increased demand for cooling. Temperature increases are expected to cause approximately 2,400-5,200 additional deaths annually by 2030, which need to be acted on in the public health sector (SNC, 2011). Tourism needs to adjust to rising sea levels, warmer temperatures and shrinking snow cover in the mountains resulting from an increase in temperature.

Lebanon's arid / semi-arid climate makes it poor in water resources availability and vulnerable to the impacts of climate change; the projected changes in rainfall will put tremendous pressure on national water security and produce knock-on effects in sectors such as agriculture, where around 70% of the available water is being used for irrigation. Given the projected decrease in precipitation, there is an immediate need to increase water resources through the designing and commissioning of dams and hill lakes as well as artificially re-charging the groundwater. In addition, there is a need to optimize the use of current water resources through the rehabilitation of the existing network and the installation of water meters. Lebanon is already undertaking major initiatives to ensure the availability of affordable water for domestic, industrial and agricultural use, in line with the National Water Sector Strategy (2012). However, more technical, financial and capacity building support and technology transfer is needed to optimize water storage, water use efficiency, improve irrigation systems and demonstrate reuse of wastewater.

To reduce these adverse impacts on environmental, economic and social systems, Lebanon will promote climate change adaptation through mainstreaming and building institutional capacity. The National Sustainable Development Strategy, which is currently under preparation in cooperation with the Council of Ministers, clearly highlights the importance of adaptation and points out necessary action in nearly all of its sectoral chapters. The objective is to provide security and well-being for the Lebanese people whilst increasing the resilience to climate change. Yet climate change is one of many challenges to national development in Lebanon: population growth, rapid urbanization and geopolitical location provide additional challenges, and addressing these should be pursued simultaneously to avoid working in silos through collaboration between multiple government ministries and agencies, the private sector and other relevant stakeholders.

Lebanon has already made progress in mainstreaming climate change adaptation into the biodiversity (draft National Biodiversity Strategy and Action Plan, NBSAP, 2015), water (National Water Sector Strategy, 2012), forestry and agriculture (National Forest Plan, NFP, 2015 and Ministry of Agriculture Strategy, 2015) sectors. The key actions included in these strategies are listed in Table 1 below. The actions reflect Lebanon's priorities given the

current understanding of expected climate impacts. Sectoral strategies will be assessed regularly as part of the national development process and/or when new information about climate change and impacts become available.

Furthermore Lebanon aims to reach land degradation neutrality by 2030, in line with the recommendations by the UNCCD framework. This has recently been agreed by the Committee on Land Degradation and Desertification, led by the Ministry of Agriculture. Detailed adaptation measures to suit this aim are yet to be developed.

Lebanon also continues promoting climate change adaptation in other vulnerable sectors by seeking to mainstream climate change adaptation into electricity infrastructure, tourism, human settlements and infrastructure, and public health sectors. The Climate Change Coordination Committee will thrive to continue to examine sectoral vulnerabilities, assess priorities and design/guide actions in cooperation with concerned ministries to increase resilience and minimize impacts of adverse climate change effects. The work will build on the sectoral vulnerability assessments completed for the Third National Communication as well as on other relevant studies.

Table 1: Key adaptation measures in the biodiversity, forestry and agriculture, and water sectors

Sector	Examples of adaptation measures
<b>Biodiversity</b>	<p><b>Overarching objective:</b> By 2030, adaptation plans for ecosystems vulnerable to climate change have been developed and implemented. This will be achieved by:</p> <ul style="list-style-type: none"> <li>• Conducting needs assessment and defining pilot national monitoring sites and species. Coastal zones are considered a priority.</li> <li>• Designing and implementing pilot action plans.</li> </ul>
<b>Forestry and agriculture</b>	<p><b>Overarching objective:</b> Towards sustainably managed forest resources, safeguarded ecological integrity, and economic and social development for the benefit of present and future generations. This will be achieved through the implementation of the National Forest Programme including, among others:</p> <ul style="list-style-type: none"> <li>• Raising tree nurseries' productivity.</li> <li>• Planting of trees.</li> <li>• Implementing the forest fire fighting strategy.</li> <li>• Rehabilitating irrigation canals.</li> <li>• Promoting Good Agricultural Practices through the support of organic farming and obtaining quality certificates.</li> <li>• Applying forest integrated pest management.</li> <li>• Developing an early warning system for agricultural pests and climatic conditions.</li> </ul>
<b>Water</b>	<p><b>Overarching objective:</b> Increase water availability and improve water usage to decrease the sector's vulnerability to climate change impacts by:</p> <ul style="list-style-type: none"> <li>• Improving water security such as through increasing artificial recharge of groundwater aquifers and increasing surface storage dams and hill lakes.</li> <li>• Optimizing the use of the current water resources through the rehabilitation of the existing network and the installation of water meters.</li> <li>• Increasing wastewater collection and treatment.</li> <li>• Increasing water reuse, especially after wastewater treatment.</li> <li>• Improving water efficiency and decrease water loss in irrigation.</li> </ul>

Climate change mitigation and adaptation policies provide many synergies and therefore call for a coordinated approach. A number of mitigation actions which Lebanon proposes to implement in this INDC, like planting of trees and wastewater treatment, can contribute to increasing the resilience to climate change. The forestry sector supports livelihoods in the rural areas for example by providing charcoal, fuelwood, medicinal and aromatic plants and is also important for the tourism sector. Therefore planting of trees also promotes resilience to climate change through protecting rural livelihoods and ecosystem services. In addition, better treatment of wastewater can reduce greenhouse gas emissions whilst protecting national water resources.

## 4. Mitigation

### Unconditional Target<sup>6</sup>

- A GHG emission reduction of 15% compared to the Business-As-Usual (BAU) scenario in 2030.
- 15% of the power and heat demand in 2030 is generated by renewable energy sources.
- A 3% reduction in power demand through energy-efficiency measures in 2030 compared to the demand under the Business-As-Usual scenario.

The unconditional mitigation scenario includes the impacts of mitigation actions which Lebanon is able to implement without additional international support.

### Conditional Target

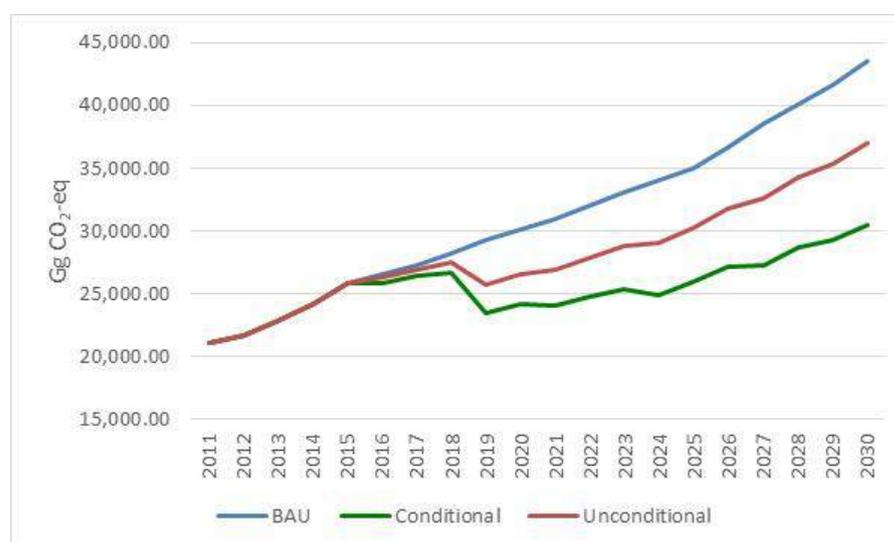
- A GHG emission reduction of 30% compared to the BAU scenario in 2030.
- 20% of the power and heat demand in 2030 is generated by renewable energy sources.
- A 10% reduction in power demand through energy-efficiency in 2030 compared to the demand under the BAU scenario.

The conditional mitigation scenario covers the mitigation actions under the unconditional scenario, as well as further mitigation actions which can be implemented upon the provision of additional international support.

### Emission trajectories

Figure 1 shows GHG emissions trajectories; the Business as Usual emissions as well as the unconditional mitigation scenario and the conditional mitigation scenario.

Figure 1: Greenhouse gas developments at the national level



Implementation Period 2020-2030

<sup>6</sup> Lebanon considers that its unconditional target presumes:

- 1- The reinstatement, as soon as possible, of the prevailing national circumstances prior to the latest regional crisis, a matter considered as Lebanon's legitimate right.
- 2- The absence of the emergence of any new crisis which could adversely affect Lebanon's national circumstances.

Sectoral coverage	The INDC covers the following IPCC sectors: Energy, industrial processes and other product use, agriculture, land-use, land-use change and forestry, and waste.
Coverage of greenhouse gases	The following gases are covered: CO <sub>2</sub> , CH <sub>4</sub> , and N <sub>2</sub> O. Fluorinated greenhouse gases (HFCs, PFCs and SF <sub>6</sub> ) play a limited role in Lebanon's overall GHG emissions. Furthermore, they have not been assessed at the level of detail required to estimate their emissions with the necessary accuracy needed to include them in the GHG inventory. Such assessments are currently being undertaken. Lebanon plans to include emissions from fluorinated GHGs in an updated version of its INDC.
Methodological Approaches	<p>The BAU scenario was developed using the 2011 GHG inventory as a basis. The 2011 GHG inventory data was compiled according to the following standards:</p> <ul style="list-style-type: none"> <li>- Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories,</li> <li>- Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories,</li> <li>- Good Practice Guidance for Land Use, Land-Use Change and Forestry.</li> </ul> <p>The BAU and mitigation scenarios were developed for all sectors using the "Long range Energy Alternatives Planning System" (LEAP) software.</p>
Key assumptions	Key assumptions for developments of the Business-As-Usual scenario were taken from Lebanon's 3 <sup>rd</sup> National Communication, which is currently under preparation and will be published in 2016. For the energy sector in particular, it was assumed that national demand will grow at an average rate of 3.5% annually and that power demand which cannot be satisfied by the installed generation capacity, continues to be largely satisfied through private diesel generators. The BAU scenario does not take into account mitigation actions implemented after 2011.
Use of international market mechanisms	International market mechanisms other than the Clean Development Mechanism (CDM) are still to be developed to a stage which allows Lebanon to make an informed decision on their use in achieving its INDC target. While at present, their use is not envisaged, Lebanon does not exclude the possibility of making use of international market mechanisms to achieve its INDC targets.

## 5. Fair and Ambitious

Lebanon aims to embark on a long-term low-emission and climate resilient development trajectory to ensure a sustainable future for its population, despite its current challenging national circumstances. This INDC, as the first economy-wide climate change contribution Lebanon takes on, demonstrates movement beyond Lebanon's existing commitments and reflects the strategies Lebanon has developed with this long term aim in mind. In the energy sector, the long-term transformational changes include, among others, a complete restructuring of the power sector, with refurbishment, replacement and extension of power generation capacities, a fuel switch to natural gas as main fuel for conventional power

generation as well as covering a relevant share of power and heat demand from renewable energy sources. In the transport sector, restructuring is planned through a number of large infrastructure initiatives aiming to revive the role of public transport and achieving a relevant share of fuel efficient vehicles. Under both the conditional and unconditional mitigation scenarios, Lebanon will achieve sizeable emission reductions. With regards to adaptation, Lebanon has planned comprehensive sectoral actions related to water, agriculture/forestry and biodiversity, for example related to irrigation, forest management, etc. It also continues developing adaptation strategies in the remaining sectors.

The contribution put forward has to be considered against the background of Lebanon's difficult national circumstances and its regional context, as well as its low share in global emissions (0.07%). Lebanon therefore considers the targets put forward as fair and ambitious as well as contributing to achieving the objective of the Convention as set out in its Article 2.

## 6. Means of Implementation

The implementation of Lebanon's INDC presumes the reinstatement, as soon as possible, of the prevailing national circumstances prior to the latest regional crisis, a matter considered as Lebanon's legitimate right as well as the absence of the emergence of any new crisis which could adversely affect Lebanon's national circumstances.

Lebanon's INDC requires a strong coordination role, which includes supporting the sectors with the planning and implementation of mitigation and adaptation actions, the assessment and communication of support needs (nationally and internationally) and the monitoring, reporting and verification (MRV) related to the INDC implementation. Tasks will also have to include further mainstreaming of mitigation and adaptation, promoting mitigation and adaptation actions, improving the cooperation among ministries as well as mobilizing support for mitigation and adaptation actions. While the institutional structures for the coordination remain to be agreed, Lebanon currently envisages a dedicated coordination unit located in the Ministry of Environment, aligned with the governance arrangements for the implementation of the National Sustainable Development Strategy currently under preparation. Line ministries would remain accountable for the implementation of sectoral strategies and action plans, both at the national and local levels. The measures described above require the support of the international community in order to successfully continue the efforts put in place.

The MRV of the INDC implementation, which also requires support from the international community, will include planning and implementation of activities, assessment of impacts (GHG and non-GHG) as well as tracking of support (both national and international) needs and flows. Most of these activities are in some form already addressed by Lebanon's response to UNFCCC reporting requirements for National Communications and Biennial Update Reports. Lebanon aims to integrate the necessary MRV activities into the existing processes and structures for the international reporting to ensure an efficient and consistent approach.

Lebanon will require international support to achieve its conditional mitigation target as well as to implement its adaptation actions. This will include capacity building, technology transfer and financial support. For example, in the water sector financial and capacity building support as well as technology transfer and awareness raising are needed to optimize water storage, water use efficiency, improve irrigation systems and solid waste and wastewater treatment, and reuse of wastewater. In addition, further capacity building and financial support is required to complete an integrated monitoring and evaluation system allowing effective planning and implementation of adaptation policies.



# Lesotho's Intended Nationally Determined Contributions (INDC)



**MINISTRY OF ENERGY AND METEOROLOGY**

**SEPTEMBER 2015**

The Lima Call for Climate Action (Decision 1/CP.20)<sup>1</sup> reiterated the invitation to all Parties to develop and communicate Intended Nationally Determined Contributions (INDC) as their ‘contributions’ toward achieving the ultimate objective of Article 2 of the United Nations Convention on Climate Change (UNFCCC): “*to achieve... stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system.*” Recognizing concerns about the legal nature of INDCs, the decision also noted that arrangements for INDC preparation and submission were “*without prejudice to the legal nature and content of the intended nationally determined contributions of Parties or to the content of the protocol, another legal instrument or agreed outcome with legal force under the Convention applicable to all Parties*”. Further, the Twentieth Conference of the Parties (COP) in Lima agreed that special provisions would apply to Least Developed Countries (LDCs) and Small Islands Developing States (SIDS), i.e. that their INDCs “*may communicate information on strategies, plans and actions for low greenhouse gas emission development reflecting their special circumstances*”. This means that while the INDCs of developed countries are expected to include absolute or economy-wide emission reduction commitments, LDCs can draw on specific strategies, plans or projects to formulate their contributions, and specify the component of the contribution that would be conditional upon receiving international finance or other support.

It is against this backdrop of the foregoing that the Kingdom of Lesotho is herein submitting her Intended Nationally Developed Contributions. This report followed a series of intensive national consultations, on the nature of our development trajectory between 2020 and 2030 and the potential greenhouse gas emissions reductions. However, cognizant to the fact that Lesotho is highly vulnerable to the impacts of climate change, it has thus also reported on adaptation in line with the collective position of the Africa Group.

Thus, this report is a summary of our national mitigation and adaptation contributions.

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<sup>1</sup> The Lima Call to Action – The UNFCCC’s 20<sup>th</sup> Conference of the Parties. December 2014.

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## 2 Acronyms

BAU	Business As Usual
CAREI	China Association of Rural Energy Industry
CBO	Community Based Organisations
CDM	Clean Development Mechanism
CFLs	Compact fluorescent Lamps
COP	Conference of the Parties
CSES	Centre of Sustainable Environmental Sanitation
DFID	Department for International Development
EE	Energy Efficiency
EEP	The Energy and Environment Partnership
FILLI	Forestry Initiative for Landscape and Livelihoods Improvement
GDP	Gross Domestic Product
GEF-SGP	Global Environment Facility - Small Grants Programme
GHG	Greenhouse Gases
GWh	Gigawatt Hour
INDC	Intended Nationally Determined Contributions
IPCC	Intergovernmental Panel on Climate Change
LDCs	Least Developed Countries
LHDA	Lesotho Highlands
LMS	Lesotho Meteorological Services
LPG	Liquid Petroleum Gas
MDGs	Millennium Development Goals
MRV	Measurement, Reporting and Verification
NAPA	National Adaptation Programme of Action
NCCC	National Climate Change Committee
NGOs	Non-Governmental Organizations
NSDP	National Strategic Development Plan
PRS	Poverty Reduction Strategy
RE	Renewable Energy
REDD	Reducing Emissions from Deforestation and Forest Degradation
SADC	Southern African Development Community
SAPP	Southern African Power Pool
SIDS	Small Islands Developing States
SNC	Second National Communication
TED	Technologies for Economic Development
UNFCCC	United Nations Framework Convention on Climate Change
USTB	The University of Science and Technology Beijing

### **3 National Development Goals and Priorities, Climate Change Context**

In the year 2000, Lesotho adopted a Vision 2020 statement to guide all development goals, objectives and aspirations in the medium and long term. The vision statement overlapped with Lesotho accession into the Millennium Development Goals (MDGs). Two key strategies were in particular aimed at fulfilling the Vision 2020 pronouncements. The first of these was the Poverty Reduction Strategy (PRS) 2005-2007 which sought to reduce poverty from 56.6% in the base year of 2003 to 29% at the end of the plan period. The second was the National Strategic Development Plan (NSDP):2012-2017 which embraced the key poverty targets of the PRS while seeking to, hence forth, consolidate all development goals with an associated Public Sector Investment Programme for the plan period.

In addition, a number of sector specific policies were adopted pursuant to the aspirations of the NSDP. The Lesotho Energy Policy 2015 envisions that energy shall be universally accessible and affordable in a sustainable manner, with minimal negative impact on the environment and sets goals to reduce in particular fuelwood usage in the national energy consumption including other fossil fuels. The policy further provides for mitigation of climate change, through energy efficiency and promotion of renewable energy. The Draft Strategic Plan for the Ministry of Energy and Meteorology (2015/16 to 2020/21) projects key strategic intentions in both climate change mitigation and adaptation including national energy initiatives. National Rangelands Management Policy 2013 seeks to guide range and natural resources management in the Kingdom. Lesotho has formally committed with support from the European Union, to a process of developing a new National Climate Change Policy and Sustainable Energy Policy.

## **4 Adaptation Contribution**

### **4.1 Rationale and Process for Developing INDCs on Adaptation**

Climate change is already impacting on Lesotho hence robust integrated policies and strategies are required to improve the adaptive capacity of Kingdom. Lesotho has a high exposure to climate variability and extremes which are expected to increase in frequency and intensity in the future. A sectoral vulnerability assessment to climate change was carried out on key sectors: agriculture, water resources, forestry, rangelands, and health. Subsequently a National Adaptation Programme of Action (NAPA) was developed in 2007 outlining future adaptation needs to address projected climatic changes.

### **4.2 Summary of Climate Change Trends**

The trend analysis of temperature over most areas in Lesotho (Fig. 1) show increases in both annual maximum and minimum temperatures between 1968 and 2006 with minimum temperatures warming more than the maximum temperatures with the most rapid warming in the early 1980s.

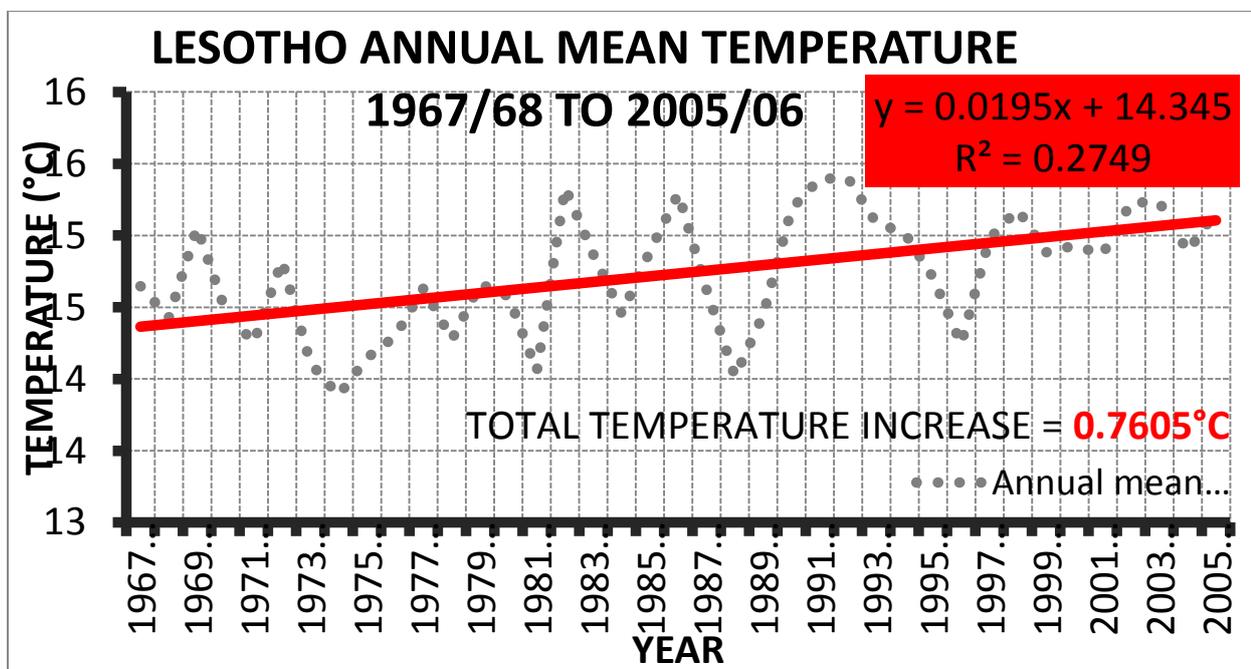


Fig.1. Mean annual temperature in Lesotho: 1967 – 2004.

In the 1997/98, GCM simulations of future (2030, 2050 and 2075 relative to 1961-1990) climate change scenarios were generated using an ensemble of six GCMs. More recent climate change simulations show temperatures increasing by about 1 °C by 2030, 1.5-2.0 °C by 2050, and by about 2.5-3.5 °C by the 2080s while winter rainfall shows strong decreases, with no change in summer and autumn rainfall, and gradually increasing spring rainfall (Dejene et al., 2011)<sup>2</sup>. In summary the following climate change projections appear likely for Lesotho: an increase in annual mean temperature of approximately 1.0 °C (2030), 2.0 °C (2050) and 3.5 °C (2080) is likely; a moderate drying in late autumn/winter is expected and moderate increases in spring/summer rainfall, with stronger spring/summer wetting towards the end of the century.

### 4.3 Reporting on Long - and Near- Term Adaptation Visions, Goals and Targets

Climate change could well undermine national efforts to attain all goals encapsulated in the National Vision 2020 statement and erode achievements that have already been attained over the last few decades, and undermine poverty reduction efforts. Lesotho does not have an officially expressed medium to long term national adaptation plan to climate change. However, our aspirations are expressed explicitly or implicitly in all policy documents, and NSDP. The apparent national adaptation goal (s) towards 2030 embraces all tenets of the MDGs which seek to reduce and /or facilitate national resiliency against climate change shocks especially production decline leading to food insecurity; gender vulnerabilities to climate-change-related impacts especially natural resources e.g. declining quantity and quality of drinking water; environmental degradation; erosion of basic support systems for majority of livelihoods. These are implicit aspects of a long term national adaptation vision to be refined in the national adaptation plan in the pipeline.

The government of Lesotho has over the last 20 years invested heavily in tree planting and small woodlot reserves. Pursuant to this policy, the Forestry Act of 1998 was promulgated and a new National Forest Policy was launched in 2008 to pursue sustainable forest management; poverty reduction strategy through

<sup>2</sup> Dejene A., S. Midgley, M.V. Marake and S. Ramasamy. 2011. Strengthening Capacity for Climate Change Adaptation in Agriculture: Experience and Lessons from Lesotho. Food and Agriculture Organization of the United Nations. Blue Book Series.

social and economic dimensions of forestry development and enhancing people's participation in the on-going Land Rehabilitation Program of the Government of Lesotho.

#### 4.4 Reporting on Current and Planned Adaptation Undertakings and Support

In the absence of an official national adaptation plan, the NAPA options remain the best indication of the nation intentions for adaptation (Table 1).

Priority Program areas	Estimated Cost
Improve Resilience of Livestock Production Systems Under Extreme Climatic Conditions in Various Livelihood Zones in Lesotho	3,980,000
Promoting Sustainable Crop Based Livelihood Systems in Foothills, Lowlands and Senqu River Valley	5,235,000
Capacity Building and Policy Reform to Integrate Climate Change in Sectoral Development	2,260,000
Improvement of Early Warning System Against Climate Induced Disasters and Hazards	1,920,000
Securing Village Water Supply for Communities in the Southern Lowlands	2,170,000
Management and Reclamation of Degraded and Eroded Land in the Flood Prone Areas	1,966,000
Conservation and Rehabilitation of Degraded Wetlands in the Mountain Areas of Lesotho	1,690,000
Improvement of Community Food Security Through the Promotion of Food Processing and Preservation Technologies	1,620,000

Since 2007, a number of efforts were undertaken by various roles players in the climate change adaptation field in Lesotho with support from government of Lesotho, development partners and NGOs /community based organizations currently at different implementations stages. These can be grouped into a few categories.

##### 4.4.1 Crop Production and Cropping Systems

Project name	Implementation State	
	Complete / On-going	Planned
Developing capacity for climate change adaptation capacity in the agricultural sector	2009 – 2011	
Conservation agriculture: advocacy, extension / training, research integration into formal curricula	2005 to date	
Sorghum breeding for high yield and drought tolerance	1996 to date	
High efficiency irrigation systems: Gravity & Drip	1995 to date	
Lesotho Block Farming Initiatives	2005 to date	
Smallholder Agriculture Development Project – Cropping Systems	2011-2017	
Develop National Adaptation Plans		2015-2020
Develop Climate Change Policy and Strategy		
Integrate Climate Change into sectoral policy and strategies		
Develop mechanisms to improve access to climate change adaptation technologies		

##### 4.4.2 Livestock production and Livestock Systems

Project name	Implementation State	
	Complete / On-going	Planned
Lesotho wool & mohair improvement project		2015 - 2022
Smallholder Agriculture Development Project – Livestock	2011-2017	

#### 4.4.3 Forest and Land Rehabilitation Program

Land Rehabilitation Program		
Mechanism to Implement the Forestry Initiative for Landscape and Livelihood Improvement Program	2015-2016	
Forestry Initiative for Landscape and Livelihoods Improvement (FILLI) Program		✓

#### 4.4.4 Wetlands and Watershed Management

Wetlands restoration and rehabilitation project	2010 -2014	
Lesotho Water Development Program	Lesotho Highland Water Development Project II	Planned
	Lesotho Lowlands Water Scheme I	2001 - 2003
	Lesotho Lowlands Water Scheme II	✓

#### 4.4.5 Climate Change Adaptation Projects

Africa Adaptation Project	2009-2012	
Improvement of Early Warning System to Reduce Impacts of Climate Change and Capacity Building to Integrate Climate Change into Development Plans – Vulnerability Mapping	2013-2015	
Improvement of Early Warning System to Reduce Impacts of Climate Change – Phase II		2016 - 2020
Improvement of Capabilities to Cope with Natural Disasters caused by Climate Change	2011 - 2014	
Eco-system based climate change adaptation in southern Lesotho	2015-2021	
Increasing Capacity for Climate Change Adaptation in the Agriculture Sector – I	2008-2011	
Increasing Capacity for Climate Change Adaptation in the Agriculture Sector – II	2015-2019	
Climate Change Policy Project		2016-2017
Lesotho Climate Change Adaptation of Small-Scale Agricultural Production		✓
Develop National Adaptation Plans		2015-2020
<b>Develop Climate Change Policy and Strategy</b>		
Integrate Climate Change into sectoral policy and strategies		
Develop mechanisms to improve access to climate change adaptation technologies		

Most of the climate change adaptation activities are implemented through capital projects with a larger portion of the budget sourced from development partners but the distribution shows that government of Lesotho pays its equitable share of adaptation costs (Table 2). The government co-financing of donor funded projects is mainly through in-kind contribution.

**Table 2. Climate Change Adaptation projects implemented in Lesotho since 2012/13 – 2016/17**

Name of Project	Government Contribution (\$US x 10 <sup>6</sup> )	Development Partner Contribution (\$US '000)	Development Partner (s)
Agriculture and Food security	28.76	N/A	
Watershed Management	68 800	N/A	
Framework for strengthening capacity for climate change adaptation in Agriculture	3 600	N/A	

Climate change investment program (MDP)		N/A	
Public sector investment program (MDP)		N/A	
Forestry Poverty Alleviation Programme	49	N/A	
Source: PSIP 2012-2017			
<b>Projects with External Support</b>			
Name of Project	Government Contribution (\$US x 10 <sup>3</sup> )	Development Partner Contribution (\$US x 10 <sup>3</sup> )	Development Partner (s)
Development of climate change policy and strategy	N/A	848	EU
Improvement of Early Warning System to Reduce Impacts of climate change and hazards	318	1,735	GEF
Small Holder Agricultural Development	973	7,773	GEF
Reducing Vulnerability from climate change in the Foothills, Lowlands and the Lower Senqu River Basin	26,000	8,400	GEF
Improvement of Early Warning System to Reduce Impacts of Climate Change and Capacity Building to Integrate Climate Change into Development Plans	1,600	1,800	GEF
Strengthening Capacity for climate change adaptation through support to integrated watershed management programme in Lesotho	7,800	3,600	GEF
Adaptation of Small-scale Agriculture Production	13,000	4,300	GEF
Wool and Mohair Promotion Project	7,000	29,000	IFAD,OPEC, ASAP
Smallholder Agricultural Development	999.7	6557	IFAD
<i>Source: Ministry of Energy and Meteorology, August 2015</i>			

In addition, a number of adaptation projects are undertaken at household and community levels by NGOs and CBOs (Table 3).

<b>Table 3. Number of GEF-SGP in Lesotho accessed by non-governmental organizations (NGO), community based organizations (CBO) and the private sector for climate change adaptation.</b>				
Grantee Types	Number of GEF-SGP Projects	Grant Amount	Co-financing (Cash)	Co-financing(in- Kind)
		Funding Amounts (in '000 USD)		
NGO	29	965	216 865	959
CBO	18	560	157	467
Other	1	50	0	126
<i>Source: Ministry of Energy and Meteorology, August 2015</i>				

## 4.5 Gaps and Barriers

To achieve national resiliency to climate change, the NSDP has outlined the following strategies: i) Integrating of climate change into sectoral plans and programmes; ii) Climate proofing investments by upgrading standards for infrastructure development; iii) Improving access to climate change adaptation

technology and use; iv) Improving environmental and climate change governance through undertaking vulnerability assessments and utilising them for medium to long-term forecasting, policy and planning. Despite these noble aspirations, the country currently does not have a long term national adaptation plan. Thus there is an urgent need for financial support to complement the on-going processes of policy development by taking the process further to the development of an adaptation plan and research.

Specific barriers to adaptation in Lesotho are:

- Technological: Lack of tools and techniques may hinder adaptation to climate change. National research capacity to build basic dataset and technical analysis /publication is a critical component of the technology /capacity barriers in Lesotho;
- Economic and financial: The urgency of adaptation is felt by rural low income subsistence farming households and communities. In Lesotho, this is expressed by lack of financial capital to finance adaptation technologies such as improved crop varieties and diversification of livelihoods.
- Institutional: In Lesotho, commons institutions restrict the choice of livelihood strategies by favouring some groups over others such as those who own livestock and those who do not.

#### **4.6 Summary of Needs**

For Lesotho to adaptation there is urgent need for provision of finance, capacity building and technology. These also underscore the need for research support in climate change adaptation. Sectorally, there is an inadequate adaptation capabilities in the sectors such as Energy, Agriculture, Land Use, Land Use Changes and Forestry, Health, Water and in the aspects of data collection, processing and provision by the sectors. Consequently, there is need to:

- build capacity of experts and stakeholders in the preparation, data collection to enhance information management, ownership, information exchange, dissemination and information sharing within and across sectors;
- create systemic enabling working environment for the implementation of climate change activities in relation to institutional arrangements, performance management and reporting to ascertain roles and responsibilities, political will, ownership and empowerment, decision making and service delivery;
- Develop a database for reporting raw data which will take into consideration IPCC requirements by carrying out new studies to upgrade the datasets and then make use of remotely sensed data and training on GIS.
- Obtain data from satellite/remote sensing e.g. land cover data and then design consistent reporting formats of the reports.
- coordinate data pools to establish data archiving and sharing protocols;
- Support research in climate change.

#### **4.7 Monitoring and Evaluation**

Lesotho's climate change adaptation process will be monitored using the following indicators: Change in the level of vulnerability; Number of people benefiting from adaptation activities; Degree of integration of climate change adaptation into sectoral policies and plans; Resources spent on adaptation to reveal the climate relevant share of the total public expenditure over time. However, proper implementation of the monitoring and evaluation commitment is conditional on enabling finance.

## 4.8 Gender Imperatives of Climate Change Adaptation<sup>3</sup>

Women have a unique relationship with natural resources which render them more vulnerable to climate change. They are responsible for food security of families through food collection, crop production, meal preparation, and often through cultivation techniques. One of Lesotho's unique features is women's dominance in piggery and poultry farming, and this role creates an added vulnerability to climate change, due to their economic dependence on these industries. With responsibilities within the household, such as child-rearing, domestic management and meal preparation, women often work longer hours and any added challenges such as those imposed by climate change, will increase their vulnerability and workload. Therefore, climate change adaptation interventions need to include measures to reduce women's workload.

In Lesotho the formative years of the boy child are occupied by herding of livestock to the detriment of their education. Climate change will particularly affect them negatively as good grazing land is gradually pushed further away from the village by its compounding negative effects on natural resources. In addition, extreme weather events like heavy snow will increase their risk of life in the remote cattle posts more than any other group in society.

## 5 Mitigation Contribution

### 5.1 Timeframe

The timeframe for mitigation contribution goal is 2030.

### 5.2 Type of Contribution by Sector

Lesotho's GHG emissions are minimal due to its predominant dependence on hydropower with a grid emission factor is 0.0038 tCO<sub>2</sub>/GWh. The proportional contribution of three key sectors is agriculture (63%), energy (31%) and waste management (6%). This reflect a picture of Lesotho's socio-economic circumstances: an economy dependent on natural resources, a low but growing energy sector and industrial sector that is still in its infancy.

#### 5.2.1 The Energy Sector

Emissions from energy sector make a total of 1,079.43 Gg CO<sub>2</sub>eq mostly from residential fuel combustion (51%) followed by combustion of liquid fossil fuels in the transport subsector (29%). Residential emissions emanate from the use of biomass, coal, Liquid Petroleum Gas (LPG) and paraffin. CO<sub>2</sub> is the major contributor, making about 75% of total sectoral emissions. Energy sector emissions showed a consistently increasing trend reaching 30% between 1994 and 2000.

#### 5.2.2 The Agriculture Sector

Emissions from the agriculture sector make a total of 2,230.43Gg CO<sub>2</sub>e (Fig. 3). Nitrous Oxide (N<sub>2</sub>O) emissions are the largest GHG (61.6%) of the total emissions. Other emissions are Methane (CH<sub>4</sub>) from enteric fermentation of domestic livestock and manure management from domestic livestock (37%). Crop production is expected to increase between 2014 (114, 804 Mg) and 2030 (250,000 Mg) primarily due increased intensive crop production systems and increased use of inorganic fertilizers. In 2012, Lesotho

<sup>3</sup> Excerpts from Talafre J., M.V. Marake, \*\*\*\*\* and S. Tomlow. 2013. Lesotho Adaptation of Small Scale Agricultural Production. IFAD-Ministry of Agriculture and Food Security. Project Design Report. Maseru. Lesotho.

imported more than 9,000 Mg of nitrogen-based chemical fertilizers, and used an estimated 9,807 Mg of organic fertilizers (96% Kraal manure).

### 5.2.3 The Waste Sector

The waste sector in Lesotho is divided into two distinct sectors; the solid waste management (CH<sub>4</sub> emissions) and waste water handling (CH<sub>4</sub> and N<sub>2</sub>O emissions). The sector was assessed for emissions from domestic, commercial and industrial waste. The total emissions from this sector are 199.63 Gg CO<sub>2</sub>eq over 80% of the CO<sub>2</sub>eq emissions is methane. The bulk of these emissions are from industrial waste water handling. Overall, GHG emissions in this sector have doubled since 1994. The sector emissions are driven by the increasing per capita solid waste generation among population especially in the urban areas. Deposal of solid waste to land with relatively deeper and sanitary landfill sites is becoming common practice in urban waste management.

## 5.3 Mitigation Policy /Programs and Targets

### 5.3.1 Energy Sector Mitigation Potentials

The major assumption under the mitigation scenario in the energy sector is the implementation of Lesotho Energy Policy 2015 and Draft Lesotho Renewable Energy Policy 2013 which seek to increase energy efficiency significantly and shift the energy supply to more climate friendly technologies. The energy sector will require additional investment of about USD 15 million in 2020 and USD 20 million in 2030. These investments will be needed in energy-efficient equipment, grid extension; rural electrification projects (off-grids and mini-grids) that are ultimately expected to reduce emissions significantly. However, Lesotho cannot afford these levels of investment without financial support.

Energy Sector Mitigation Policy /Program and Targets	
Mitigation Policy /Programs	Targets & Assumptions
<ul style="list-style-type: none"> <li>➤ Continued development of hydropower resources, particularly in terms of advancing technical design and sourcing funding for development of identified sites</li> </ul>	<ul style="list-style-type: none"> <li>➤ Improving energy efficiency by 20% by 2020,</li> <li>➤ Increasing electricity coverage /access to 35% of households in 2015, 50% in 2020 and 80% by 2030;</li> <li>➤ With increase in rural electrification, paraffin consumption is expected to come down from 30, 434 kilolitres (2014) to 25,000 kilolitres in 2020, with a GHG saving of 12 Gg CO<sub>2</sub>e and 20,000 kilolitres in 2030 with a GHG saving 24 Gg CO<sub>2</sub>e in the BAU.</li> <li>➤ Potential reduction of transmission and distribution losses from 2015 until 2030 by 0.5% per annum (total of 7.5.0%)</li> <li>➤ Increase renewable energy sources by 200 MW by 2020: 40MW from Solar (2017/2018); 35 MW from wind (2017); 125 MW from hydropower (2025).</li> </ul>
<ul style="list-style-type: none"> <li>➤ Design and implementation of demand-side management techniques to encourage better use of existing distribution infrastructure, and Reduce peak demand.</li> </ul>	
<ul style="list-style-type: none"> <li>➤ Promotion of renewable energy</li> </ul>	
<ul style="list-style-type: none"> <li>➤ Improving distribution efficiency of the power system through measures to reduce transmission and distribution losses</li> </ul>	
<ul style="list-style-type: none"> <li>➤ Continuing to develop and promote uptake of renewable sources of energy, particularly wind and solar (where feasible).</li> </ul>	
<ul style="list-style-type: none"> <li>➤ Develop low energy investment plan</li> </ul>	

Furthermore energy efficiency has large mitigation potential in the residential sector. Households commonly use incandescent electric bulbs for lighting. Replacement of these bulbs with Compact Fluorescent Lamps (CFLs) can save as much as 80% of electricity used for lighting. If 40,000 households are using electricity for lighting, and each installs two (2) CFLs replacing incandescent bulbs, the reduction potential in a CFL programme would be about 3,700 tCO<sub>2</sub>e per year based on an average saving of 50 kWh per bulb per year (using the SAPP grid emission factor of 0.92). However, all this efforts are conditional to financial support.

Buildings (Residential, Commercial and Institutional) Sector Mitigation Options & Targets	
Mitigation Policy /Program	Targets & Assumptions

➤ Promoting energy efficiency in buildings through targeted awareness-raising programs that seek to reduce demand in industrial, business, government and residential buildings	➤ To disseminate efficient stoves to reach a penetration rate of 30% in 2030;
➤ Phasing out of incandescent light bulbs	➤ To reduce progressively the use of wood for heating in order to reach 10% by 2030;
➤ Installation of motion-sensor lights	➤ Replacement of fuel-wood with LPG at the rate of 10% a year from 2020 to 2030
➤ Introduction of more energy-efficient stoves within households	➤ Potential reduction of electricity demand in industrial sector from the year 2020 until 2030 by 0.8% per annum ( <i>total of 8.0%</i> );
➤ Implementing incentives for retro-fitting of existing buildings with more energy-efficient appliances	➤ Potential reduction of final energy demand (electricity + petroleum products) in industrial sector by 1.0% per annum from 2020 until 2030 ( <i>total of 10.0%</i> )
➤ Designing and implementing guidelines and/or standards and regulations for design of new buildings	➤ Potential reduction of electricity demand in commercial sector from the year 2020 until 2030 by 0.8 % per annum ( <i>total of 8.0%</i> )
➤ Use of passive design and low carbon materials in building construction	

We also have significant albeit conditional emission reduction potential in the road transport sector. Road transport emissions increased by approximately 2.5% per year between 2000 and 2009. Consumption of petrol and diesel by road transport produced a total of 0.28 MtCO<sub>2</sub>eq in 2009. The main contributors were freight transport at 0.18 MtCO<sub>2</sub>eq (64%) and passengers transport at 0.10MtCO<sub>2</sub>eq (36%). In 2000 road transport contributed 29% to total energy emissions and 8.99% of the total GHG emissions. In 2014, Lesotho imported 225.3 million litres of refined oil products (diesel, petrol and paraffin). Emissions from combustion of 225 million litres of diesel (or petrol) are about 90,000 tCO<sub>2</sub>e/year.

The most promising transport mitigation options are vehicle efficiency, modal shift from private to public transportation, investments in fuel-efficient vehicles. These measures will need to be driven by policies and must be enforced. In this scenario, the subsector will require additional investment to the tune of USD 1.5 million in 2020 and USD 2.0 million in 2030. Limited transport planning and management has resulted in inadequate investment in infrastructure for non-motorized transport and pedestrian traffic.

### 5.3.2 Waste Management Sector Mitigation Potentials

The national dependence on agricultural wastes for energy is cause for concern significant health and GHG emissions. There are approximately 310,000 households in Lesotho dependent on small-scale farming. If 20% of these rural households (*approximately 60,000 households*) had the sufficient number of livestock (*3-5 cattle*) for installing a domestic biogas digester to generate gas for cooking, the traditional use of firewood could be reduced (*the dung from two cows typically suffices to meet the cooking requirements of a household*, Bajgain & Shakya (2005)). By using the suppressed demand method for this potential emissions reduction calculation, and assuming a daily use of 0.5 litres of paraffin for cooking, the potential reduction would be 60,000 households \* 0.5 litres\* 2.6 kgCO<sub>2</sub>/litre\* 365 days/1000 = 29,200 tCO<sub>2</sub>/year. Construction of a 6 m<sup>3</sup> bio-digester cost USD 1.800. Construction of 60,000 bio-digesters will cost USD 108 million.

Waste Sector Mitigation Options and Targets	
Mitigation Policy/ Program	Targets & Assumptions
Developing targeted programs to raise awareness of importance of, and opportunities for, reducing waste at source and recycling	➤ Introducing targets for waste reduction (e.g. % of waste sent to landfill) and recycling
Promoting commercial and household waste recycling through:  Development of infrastructure (e.g. collection systems, depots, and processing plants, etc.) to support recycling activities Design of incentives to promote recycling activities	
Construction of proper landfill sites in all 10 districts of Lesotho with methane recovery facilities	

<ul style="list-style-type: none"> <li>➤ Development of a national Waste Management Programme including e-Waste</li> <li>➤ Development of a well-integrated country Waste Management Plan</li> </ul>	
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### 5.3.3 Forestry Sector Mitigation Potentials

Tree planting in degraded forest lands present a significant potential for climate change mitigation in Lesotho. According to the latest mapping inventory from 2012, the forested area of Lesotho is estimated to be 49,485 ha, which translates to approximately 1.6% of the country's area. Lesotho's forests contain 2 million metric tons of carbon in living forest biomass. One of the key objectives of the National Forestry Policy (2008) is to increase tree cover from around 1% to at least 5% (152,000 ha) by the year 2020. However, deforestation rate of 0.50% per year lead to loss of 200 ha between 1990 and 2010. If this trend is reversed, it could potentially produce nearly 38,902 tCO<sub>2</sub> of emission reductions for each area of 200 ha of tree cover. These calculations are based on an estimation of the amount of carbon stored in the country's forests per year to 5tC/ha, and a conversion factor of 1 ton of biomass carbon to an equivalent of 3.67tCO<sub>2</sub>.

Given, that biomass consumption remains the main source of domestic energy, and energy in small-scale commercial sectors, it will take a radical substitution of household fuel supply. Such a fit would also require significant financial support to Lesotho towards to subsidize fuel-efficient cook stoves, and alternative fuels and techniques for cooking, which altogether might have a significant impact on GHG emissions. The cost of reforestation option would amount to USD 24 million between 2015 and 2030 for the 120,000 ha of land to be reforested with an initial establishment cost of USD 200/ha. Therefore, the mitigation scenarios advanced for the forestry sector are conditional on financial support.

## 5.4 Target Level

The main opportunities for mitigation consist of energy efficiency and demand management, coupled with increasing investment in a renewable energy programme in the electricity, Buildings (Residential, Commercial and Institutional) and Waste sectors. Lesotho is committed to reduce unconditionally 10% of its GHG emissions by 2030 compared to a Business-as-usual (BAU) scenario. The conditional target is 35% by 2030.

## 5.5 Means of Implementation

### 5.5.1 Domestically Financed Contributions

In the period 2015-2030, additional investments (relative to BAU scenario) needed for realization of the mitigation scenario are estimated at USD 1.2 billion, while for realization of the higher ambition mitigation scenario are estimated at USD1.8 billion.

Project Title	Estimated Cost (US\$)
Rehabilitation of 2 MW Mantšonyane Hydropower plant	1 million
Implementing energy efficiency measures, including the removal of institutional barriers to energy efficiency improvements;	10 million
Promotion of new and renewable energy technologies in mitigating climate change	351.46 million
Rehabilitation, modernization, re-equipment of Semonkong mini-hydro power plant and enhancing generation capacity up to 1 MW	2 million
<b>Enhanced forest sinks:</b> Planting of 120,000 ha of forests to meet the public demand for fuel wood used for heating and cooking	10 million
Capacity building in sustainable forest management	500,000
Rural electrification using stand-alone systems and mini-grids	10 million
Dissemination of efficient biomass cook-stoves and efficient biomass space heating stoves	2 million

### 5.5.2 Internationally Supported Contributions

Lesotho has already undertaken several actions to support a low carbon development trajectory including extensive investigation into its hydro and wind power potential, embarking on rural electrification and afforestation projects. However, Lesotho’s potential to contribute to global mitigation efforts will not be realized without greater support from the international community. This includes not only financial support, but also technology transfer and help with capacity-building initiatives. The table below summarizes the key mitigation initiatives that would greatly enhance Lesotho’s capacity in this regard.

Project Title	Estimated cost (US\$)
<b>Expansion of Renewable Energy Capacity:</b> Promote electricity generation from renewable energy sources to increase the share of renewables to 10–20 per cent by 2030;	351.46 million
Establishment of a specialized national institution responsible for measurement, reporting and verification (MRV), and the development of a national MRV system to: document greenhouse gas (GHG) emissions from agriculture	350 million
Development and construction of an estimated 1200 MW Pumped Storage Power Plant at either Kobong or Monontša under the auspices of LHDP Phase II.	1.8 billion
Development of Small Hydropower (SHP): A potential of up to 40 MW for SHP exists in perennial rivers (Hydropower generation master plan)	600 million
Capacity-building for the use of tools to enable accurate and full GHG accounting;	4050 million
Construction of wind farms on potentially productive territories: Letšeng-la-Terai approximately 35 kw, Quthing etc.	4 million
Enhancing power generation capacity of <i>Muela Hydropower Station</i> up to 125 MW	2 million
Construction of municipal solid waste incineration plants in urban areas	1 million
Landfill gas recovery and flaring clean development mechanism (CDM) Project	500,000
Determining local emission factors and minimum data sets for model verification in the Agriculture, Water Resources, Energy, Forestry and Other Land-Use, Industrial Processes and Waste Management Sectors	5 million
Development of appropriate agricultural technologies for mitigating and adapting to climate change in different agro-ecological zones of Lesotho:	1 million

Finally, international support is critical to enable Lesotho to implement the actions enshrined in its National Energy Policy, Second National Communication (SNC), National Strategic Development Plan and other sectoral policies and plans.

### 5.5.3 Non-governmental Organizations

Some NGOs are also investing in GHG mitigation projects. These include: i) Initiatives on carbon trading promoted by SMARDT; ii) Save80 Stove funded by Atmosfair and DHL in the private sector; iii) The Energy and Environment Partnership (EEP) funded project – Piloting Implementation of Prefabricated Biogas Plants in Rural Areas in Lesotho under Technologies for Economic Development (TED) Lesotho; iv) Energy Efficient ISILIE project by TED under GEF-SGP funded projects – The goal is to develop adaptation interventions to address the impacts of climate change and enhance the resilience of livelihoods and ecosystems in the highlands of Lesotho.

EEP promotes renewable energy (RE), energy efficiency (EE), and clean technology investments. Jointly funded with €207, 900.00 by the Governments of Finland, Austria and by the UK's Department for International Development (DFID), EEP projects aim to provide sustainable energy services to the poor and combat climate change, demonstrate high innovation in delivering energy services, facilitating technology transfer, and encouraging cooperation and local stakeholders’ participation.

Technology for Economic Development (TED) takes the institutional project lead with international, national and local contacts and skills, supported by the Department of Energy (Ministry of Energy, Meteorology and Water Affairs), and the Department of Environmental Health (Ministry of Health).

The University of Science and Technology Beijing (USTB), China, through the Centre of Sustainable Environmental Sanitation (CSES) contributes with a broad knowledge on biogas technology, prefabricated biogas systems, training and energetic and environmental impact analysis. USTB-CSES is further cooperating with the Biogas committee of the China Association of Rural Energy Industry (CAREI), which develop standards for the Chinese rural energy market and certifies products being sold in the market.

## 5.6 Sectors

The SNC shows that three major sectors account for the emissions burden of the country. These are Energy (including transportation), Agriculture and Waste sector. However, in the SNC, emissions from forestry and other land uses, as well as in industrial processes have not been analysed since they have a relatively insignificant share in total GHG emissions. However, in the future these will be monitored and analysed to establish the emerging trends with time.

## 5.7 Gases

Nitrous Oxide (N<sub>2</sub>O) is the major contributor accounting for 41%, followed by methane with 36% of the total CO<sub>2</sub>eq emissions. Carbon Dioxide accounts for the least emissions with 23% of the total emissions. Emissions of GHGs not listed are negligible but will still be monitored and reported. Fluorinated gases are not covered since they are rarely used and their emissions are marginal.

## 5.8 Accounting Methodologies

GHG inventories based on IPCC guidelines and methodologies will remain the foundation of emissions accounting in the context of the UNFCCC. They are currently reported and included in the national communications. In future they will be reported and included in the biannual update reports. Lesotho considers the establishment of an international market mechanism vital to reduce the total costs to achieve the target of limiting the temperature increase to 2°C. Thus the country remains open to the possibility of using of international market-based mechanisms in line with agreed accounting rules to achieve its conditional and/or unconditional targets. Reporting of GHG inventories and updates on mitigation actions and goals via national communications, as well as verification of this information via in-depth reviews, international assessment and review and international consultations Biennial updates to GHG inventory and reporting on mitigation actions will also be developed as part of the Climate Change Policy and Response Strategy.

Emissions from the Forestry sector will be tackled via (Reducing Emissions from Deforestation and Forest Degradation (REDD) initiatives. Lesotho intends to adopt the SADC REDD Strategy (2012 – 2015).

## 5.9 Institutional Arrangements for Implementation

The Lesotho Meteorological Services (LMS) under the Ministry of Energy and Meteorology the coordinating agency charged with the responsibility of monitoring and reporting on weather, climate and climate change issues. In addition, LMS is the focal point in the planning and co-ordination of activities for Lesotho's commitments under the UNFCCC. A National Climate Change Committee (NCCC) was formally established in 2013 to effectively coordinate climate change issues in the country. The committee serves as an advisory body to the LMS.

The INDC report was informed by a broad representation of experts and stakeholder institutions in a national launching workshop. Subsequently, the respective experts consulted broadly across governmental and non-governmental stakeholder institutions and expert informants. The draft mitigation and adaptation

reports were subjected to a one day validation workshop prior to consolidation by the Lead Expert. The final summary report to the UNFCCC was endorsed by national stakeholders in a validation workshop and reviewed by an appointed international institution. Subsequently the report was presented for endorsement by a relevant sub-committee of the National Assembly.

### **5.10 Equity and Fairness**

Lesotho's INDC is an ambitious, fair and responsible contribution to global efforts toward meeting the objective of the UNFCCC with the goal of limiting global average temperature rise to below 2°C. Lesotho's proposed targets are ambitious, despite its status as a very vulnerable, small, landlocked least developed country with a fragile mountainous ecosystem and numerous pressing social and economic development needs and priorities. We submit that these nationally intended contributions are fair and equitable commensurate to the national circumstances especially its low GDP per capita ( $\approx$  US\$1,126) and the level of dependence on external support. Though Lesotho's GHG emissions represent only 0.005% of global emissions and net per capita emissions, inclusive of all sectors, are 1.1 tCO<sub>2e</sub>, it is highly vulnerable to climate change, particularly in the agriculture, energy and water sectors and has already experienced extreme weather shifts. Nevertheless, Lesotho is a responsible party committed to tackling global climate change by transforming its development route to a low emissions pathway, which requires progressive decoupling of carbon emissions from economic growth.

# REPUBLIC OF LIBERIA



## INTENDED NATIONALLY DETERMINED CONTRIBUTIONS (INDC)

<p><b>Preamble</b></p>	<p>Liberia’s INDC presents a context for the global effort to create a new international climate agreement by the end of the Paris Climate Summit in December 2015, in order to limit temperature increase to 2°C. Liberia recognizes the current and future threats of climate change and has been taking initiatives toward addressing these threats. Liberia ratified the United Nations Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol in 2002, and has implemented a number of climate change related programs. Liberia developed its National Adaptation Programme of Action in 2008 followed by its Initial National Communication to the UNFCCC in 2012. A National Adaptation Plan (NAP) is currently being developed as a means of identifying Liberia’s medium and long-term adaptation needs. A National Climate Change Policy is also being developed to ensure that a qualitative, effective and coherent climate change adaptation process takes place, and to serve as the pillar for comprehensive sectoral strategies and action plans. Additionally, Liberia is currently implementing Reducing Emissions from Deforestation and Forest Degradation (REDD+) readiness activities.</p> <p>Liberia’s INDC includes one component on mitigation and one on adaptation. The extent of implementation of the intended contributions on mitigation and adaptation stated here are conditioned upon the provision of adequate means of implementation by the international community (financial resources, capacity building and the transfer of technologies). It does not constitute an international obligation to Liberia. For Liberia, the INDC presents a platform to integrate its Low Carbon Development Strategy into the country’s long-term sustainable development Vision by 2030 (Agenda for Transformation).</p>
<p><b>National Situation and Policy Context</b></p>	<p>Liberia covers an area of 111,369 square km (11,137,000 ha), with 13.5% covered by water and the remaining 86.5% consisting of land. The coastline of Liberia is, an estimated 565-km in length. Despite substantial forest loss over the years, Liberia is a net carbon sink and still has significant forest, estimated around 30% of total land in 2009 by FAO. Additionally, Liberia holds around 40% of the remaining West African moist forest (Upper Guinean Forest).</p> <p>Liberia’s population was put at 3.5 million in 2008 and it is projected to increase to 10.3 million by 2058, with more than 70% of the population living in coastal cities including Monrovia, the country’s capital. Amidst immense recovery efforts since 2005, Liberia remains one of the least developed countries. More than half of the country’s population lacks access to basic social services and high levels of unemployment. Majority of Liberians use biomass as the primary source of energy. In 2004, it was estimated that over 95% of the population relied on firewood and charcoal for cooking and heating needs and palm oil for lighting. In 2009 it was estimated</p>

that 70% of the urban population use charcoal for cooking as compared to 5% of the rural population; 91% of the rural population use firewood for cooking as compared to 21% of the urban population.

In 2012, Liberia took a significant step towards transforming the country into a middle income nation by adopting the Vision 2030. To achieve the Vision 2030, the Agenda for Transformation (AfT) was also adopted as a framework for meeting the country's expectation for social development, sustained and accelerated growth, reflected in 5 pillars (Peace, Justice, Security and Rule of Law; Economic Transformation; Human Development; Governance and Public Institutions; Cross-Cutting Issues including environment and gender). Attaining the middle income country status by 2030, the economy was projected to maintain the GDP growth rate of 8.3% for two decades considering 2012 as the base year. However, the more recent assessment of the economy revealed that the real GDP growth for 2014 declined from 2.5% to 0.7% as a result of the slow pace of economic activities in the traditional sectors, exacerbated by the outbreak of the Ebola Virus Disease (EVD). With the gradual resumption of economic activities, the estimated GDP growth rate for 2015 is 4.5%. Liberia's economic growth to a large extent relies on its natural resources, particularly agriculture, minerals and timber.

In 2013, Liberia submitted its Initial National Communication (INC) on climate change to the United Nations Framework Convention on Climate Change (UNFCCC). The INC contains a national inventory of anthropogenic emissions by sources and removals by sinks of GHG, as well as a description of steps to be taken by the country to contribute in achieving the objective of the Convention. The table below shows that in the absence of Land Use, Land-Use Change and Forestry (LULUCF), Liberia's total national GHG emissions for the year 2000 is estimated to be 8,022 Gg of equivalent CO<sub>2</sub>. Of the four non-LULUCF sectors responsible for the country's sources of GHGs, the Energy sector is the most significant, accounting for about 67.5% of the national total. This is trailed closely by the agriculture sector's contribution of about 31.9%. The waste sector accounts for 0.6%.

<b>GHG Emissions by Sector (without LULUCF), 2000</b>		
<b>GHG Source and Sink Categories</b>	<b>Total Gg CO<sub>2</sub> Equiv.</b>	<b>Sector Share (%) (without LULUCF)</b>
Energy	5,414	67.5
Industrial processes	NO	NO
Solvent and other product use	NE	NE
Agriculture	2,562	31.9
LULUCF	-96,811	
Waste	46	0.6
Other (please specify)	NO	NO
Total without (LULUCF)	8,022	100
Total (with LULUCF)	-88,789	

Note: LULUCF – Land Use Change and Forestry

The GHGs of concern in Liberia from the three mentioned sectors are mainly Methane (CH<sub>4</sub>), contributing 51.6%; Carbon dioxide (CO<sub>2</sub>), contributing 44.5%; Nitrous oxide (N<sub>2</sub>O) contributing 3.9%. Other important gases for consideration include Hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF<sub>6</sub>).

However, Liberia has started to implement some mitigation strategies in the energy and transport sectors to further limit its greenhouse gas emissions. In a separate study on the costs

	and benefits of land placed under different uses in Liberia, it was projected that the implementation of a low-carbon development strategy in Liberia will save an estimated 11.7 million tons of CO <sub>2</sub> per year, while generating \$58.7 million in revenues annually. The study also estimated the total costs to around \$22.0 million per year, resulting in an estimated net benefit of \$36.7 million per year to Liberia.
<b>Planning Process</b>	In the preparation of Liberia's INDC, several national laws, policies, programs, plans and strategies were given consideration, including National Energy Policy and the National Low-Carbon Economic Analysis paper. Most importantly, the planning process of Liberia's INDC draws largely on Liberia's Agenda for Transformation. Liberia has ensured that key relevant stakeholders (Government agencies and ministries, civil society, local leaders, private sector, women groups, youth and student representatives, non-government organization) were included and fully participated in its INDC preparation process.
<b>Fairness and Ambition</b>	Liberia's contributions to global greenhouse gas (GHG) emissions stand at 1.89 Mt CO <sub>2</sub> eq, representing 0% of the global total. It is equally important to note that Liberia is categorized as a GHG sink if the LULUCF sector is considered. However, Liberia is committed to do more to further cut down on its GHG emissions provided the international community supports Liberia with the appropriate means of implementation. On the other hand, projections show that Liberia's future climate will change in line with global changes. The changes will greatly affect the country due to its high vulnerability owing to its low economic base, dependence on rain-fed agriculture, increasing coastal erosion, exposure to epidemics and huge reliance on biomass energy, plus the low capacity to adapt at the community and national levels.
<b>Timeframe for Implementation</b>	The timeframe for implementation of the INDC mitigation and adaptation actions is up to 2030 in line with Liberia's Agenda for Transformation (AfT).
<b>Means of Implementation</b>	<p>To fully implement Liberia's INDC mitigation and adaptation interventions, there is a need for adequate, predictable, and sustainable financial, technological, and capacity support and mechanisms provided by various sources. Further studies will be conducted in the future to determine an estimated cost of implementing Liberia's INDC. Liberia intends to mobilize funds from the private sector, bilateral and multilateral sources and all other sources, mechanisms and instruments. Liberia also plans to develop a tracking system to analyse the support (finance, technology transfer and capacity building) for implementation.</p> <p>Liberia does not rule out the inclusion of international carbon market mechanisms such as the Clean Development Mechanism (CDM) in a post 2020 climate agreement. We propose that such an economic instrument, supported by an appropriate accounting system (MRV), can be used to help finance certain low-carbon and climate-resilient infrastructure investments. Liberia considers that some low carbon development options in the INDCs, or additional actions, could be financed in full or in part, through the transfer of international carbon credits/assets (results-based financing), taking into account environmental integrity and transparency.</p> <p>Liberia recognizes the system of Monitoring, Reporting and Verification (MRV) as a fundamental pillar of its INDC for the purpose of transparency and accountability. The MRV system for the INDC will build upon existing structures for monitoring and evaluation (M&amp;E) and intersectoral coordination. In this regard, the country will require further support to ensure that its MRV system is strengthened (institutional arrangement and responsibilities, indicators, methodologies) in order to track progress toward the implementation of INDCs including non-GHG co-benefits.</p>

# I. MITIGATION

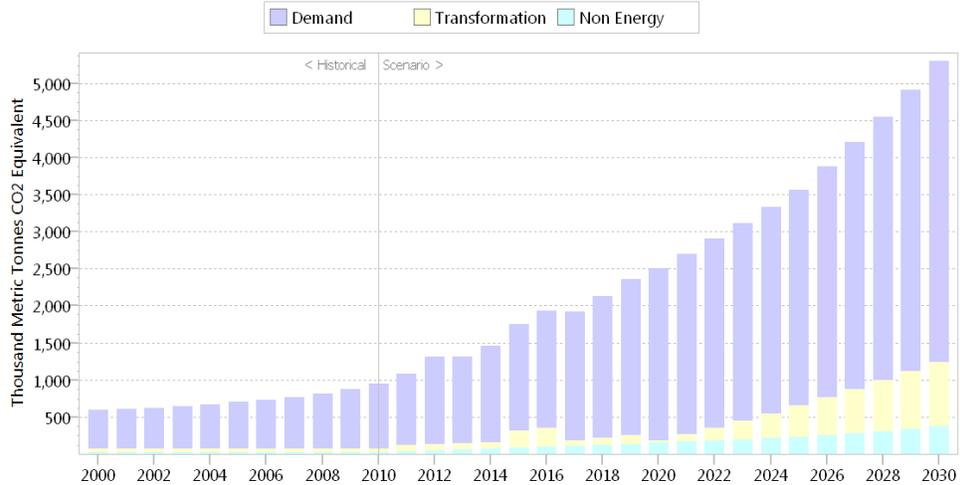
<b>Mitigation and Emission Reduction</b>	<b>Mitigation Targets</b> <p>The energy sector is the highest contributor of GHG in Liberia emanating mainly from the use of traditional fuels such as firewood, charcoal and palm oil and the use of fossil fuels, especially petroleum products. To reduce the reliance on traditional fuel and increase the use of modern and renewable energy sources, the National Energy Policy (2009) was developed with a set of goals targeted at maximizing efficiency, minimizing costs and adverse environmental impacts as principle of extending energy access to all Liberians. Most recently, Liberia’s Initial National Communication (2013) reinforces the National Energy Policy with additional long-term targets and related activities, which includes:</p> <ul style="list-style-type: none"><li>• Reducing GHGs by at least 10% by 2030</li><li>• Improving energy efficiency by at least 20% by 2030</li><li>• Raising share of renewable energy to at least 30% of electricity production and 10% of overall energy consumption by 2030</li><li>• Replacing cooking stoves with low thermal efficiency (5-10%) with the higher-efficiency (40%) stoves.</li></ul> <p>The long-term strategy of Liberia is to achieve carbon neutrality by 2050. The strategic options for mitigation considered under the INDC are the energy sector (electricity, transport) and the waste sector. The Waste Sector focuses on solid waste disposal on land. In 2000, the waste sector accounted for about 0.60% of Liberia’s national total CO<sub>2</sub> eq emissions. A significant subcategory is CH<sub>4</sub> emissions from solid waste disposal sites (SWDS) on land, which contributed 91.7%. CH<sub>4</sub> mitigation targets will include landfill recovery, waste incineration with energy recovery, composting of organic waste, controlled wastewater treatment, and recycling and waste minimization.</p>
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## Business-As-Usual Scenario Assumptions

### I. Business-As-Usual High Growth Scenario

Environment: One Hundred Year Global Warming Potential

Scenario: BAU (High Growth and Transformation to 2015), Fuel: All Fuels, GHG: Selected GHGs...



### Mitigation Scenario 1: 30% Renewable Generation

#### Under BAU Scenario

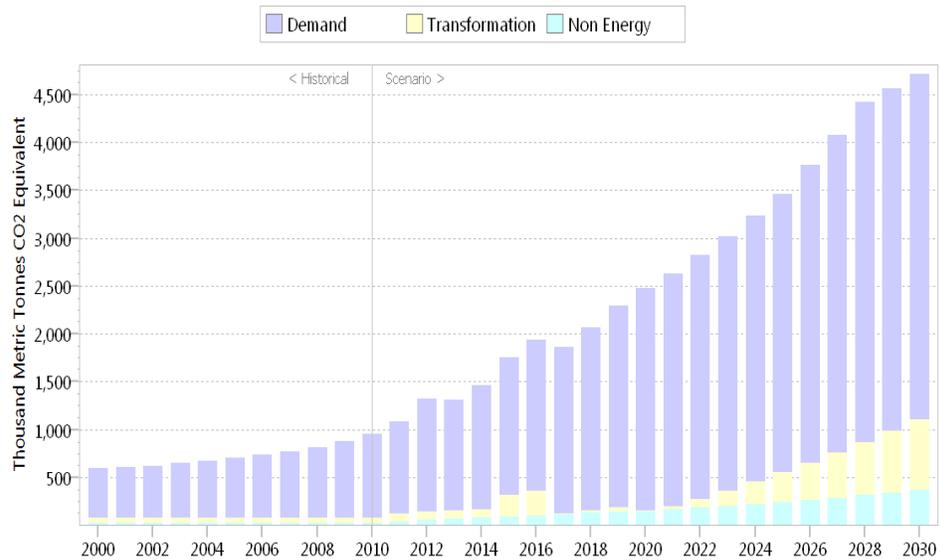
- Total Generation (2030 Projected)
- WAPP Imports: 378,000 MWh
- Diesel: 171,000 MWh
- HFO: 824,000 MWh
- Hydro: 402,000 MWh
- Total Generation: 1,775,000 MWh
- Total Generated after 20% T&D losses: 1420 MWh
- Renewable Energy is 22.6% of generation in this scenario

#### Under 30% Renewable Scenario

- Total Generation (2030 Projected)
- WAPP Imports: 378,000 MWh
- Diesel: 143,000 MWh
- HFO: 689,000 MWh
- Hydro: 367,000 MWh
- Biomass: 198,000 MWh
- Total Generation: 1,775,000 MWh
- Total Generated (after losses): 1420 MWh
- Renewable Energy is 31.8% of generation in this scenario with Hydro and Biomass

**The main difference:** In the 30% renewable scenario, we assume a 30 MW biomass project comes online. Additionally, if Transmission & Distribution (T&D) losses are higher than 20%, more renewable generation will be needed to meet the 30% goal.

Environment: OneHundred Year Global Warming Potential  
 Scenario: Upper Bound of supply Alternatives, Fuel: All Fuels, GHG: Selected GHGs...



**Mitigation Scenario 2: 20% Energy Efficiency (EE)**

The total consumption of firewood and charcoal equates to about 67.5 million Gigajoules in 2010

- 91% of this consumption is from firewood and this percentage is projected to remain constant until 2030.

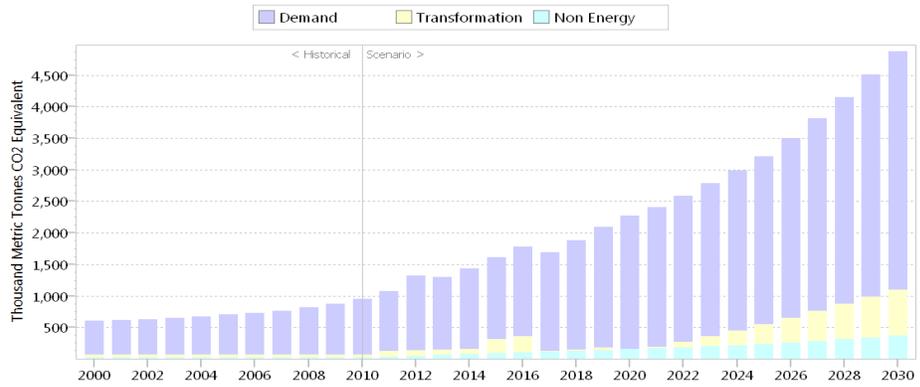
We ran two scenarios, the first that reduced firewood use by 20% and the second that reduced both firewood and charcoal each by 20%

- Scenario A:** 2030 Projected Firewood Consumption: 9,379,790 cubic meters or 103.2 million Gigajoules since this will have the greatest impact
- Scenario B:** 2030 Projected Firewood Consumption: 9,379,790 cubic meters or 103.2 million Gigajoules AND 2030 Projected Charcoal Consumption: 342,629 metric tons or 9.9 million Gigajoules

While there are two scenarios presented, all of the other follow-on mitigation scenarios (3 and 4) use the results from Scenario 2A.

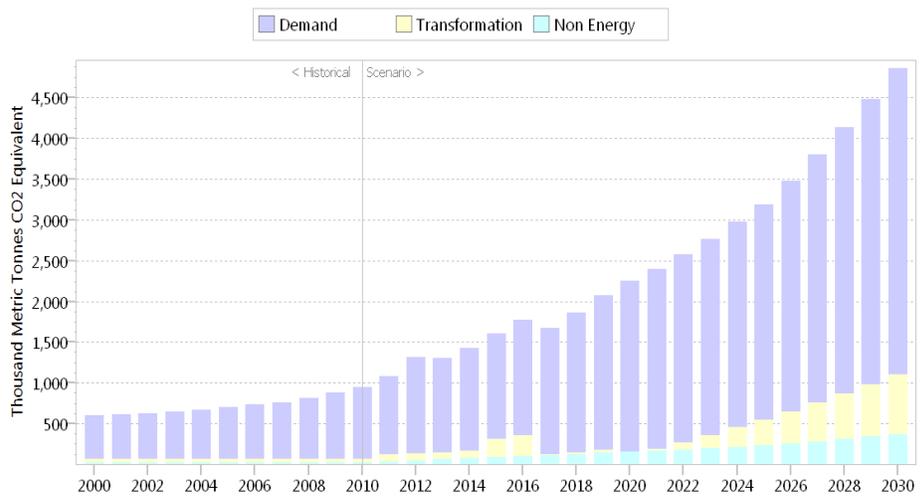
### Mitigation Scenario 2A: 20% Energy Efficiency (EE) – Firewood Only

Environment: OneHundred Year Global Warming Potential  
 Scenario: Cook Stove Distribution - Firewood Only, Fuel: All Fuels, GHG: Selected GHGs...



### Mitigation Scenario 2B: 20% Energy Efficiency (EE) – Firewood and Charcoal

Environment: OneHundred Year Global Warming Potential  
 Scenario: Cook Stove Distribution - Charcoal and Firewood, Fuel: All Fuels, GHG: Selected GHGs...



### **Mitigation Scenario 3: 5% Biofuel Use in Transport**

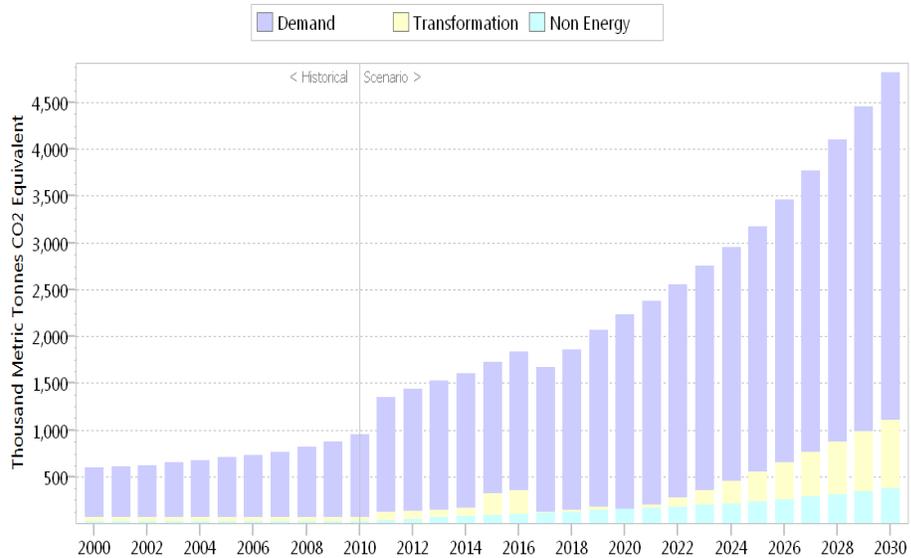
For the purposes of this analysis, it was assumed that 5% palm oil biodiesel will be used with both gasoline and diesel

- This assumes that oil palm trees used will be wild or grown by large farms or through subsistence farming
- Further analysis is needed to determine the total emissions resulting from the cultivation of oil palm, milling and refining processes, and transport and esterification (conversion from palm oil to biodiesel) in Liberia.
- For this analysis we will assume everything is produced sustainably

According to several studies, if the production process is managed appropriately, there could be significant reduction in GHG emissions from palm oil biodiesel, mostly in CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O emissions. For the purposes of this analysis, we have assumed a 40% reduction in GHG emissions resulting from palm biodiesel use (over fossil fuel).

Environment: OneHundred Year Global Warming Potential

Scenario: Biofuel Use 5%, Fuel: All Fuels, GHG: Selected GHGs..



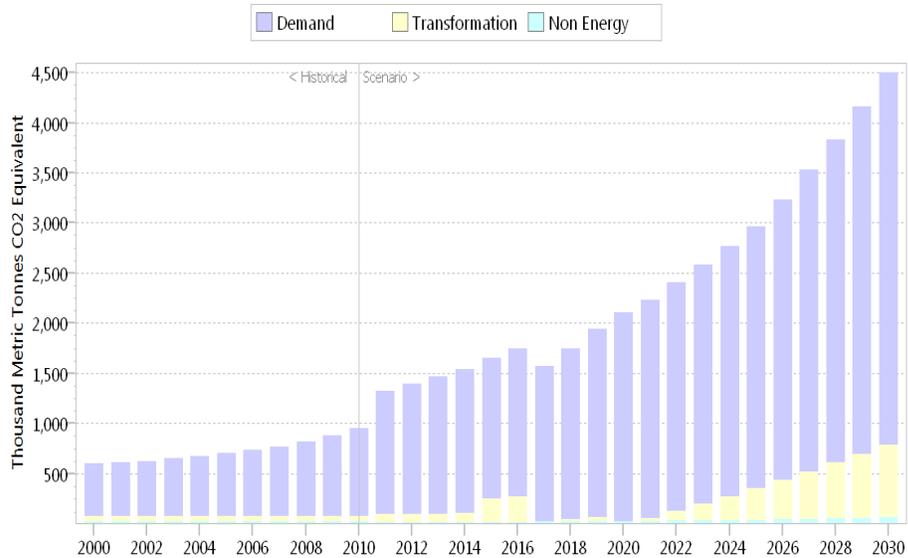
**Mitigation Scenario 4: Waste Sector (Landfill Gas)**

Calculated methane emissions generated by landfill based on total waste generation in Monrovia (table 3.15 of INC) and waste profile of landfill (table 3.16 of INC)

Based on these calculations, assumed that most of this methane gas can be captured and either used to fuel vehicles on biogas or can be piped in for use in a power generation facility. Doing either can reduce emissions by roughly 90%.

Environment: OneHundred Year Global Warming Potential

Scenario: Monrovia AD Plant, Fuel: All Fuels, GHG: Selected GHGs...



**Mitigation Summary**

Total GHG emissions can be reduced using all of the above strategies from the BAU Trajectory by 15% (797 000 tCO2e) in 2030. The following are the 2030 projections--

- BAU Emissions: 5,302,000 tCO2e
- With Mitigation Scenario 1: 30% RE Goal: 5,161,000 tCO2e
- With Mitigation Scenario 2A: Firewood Cookstove Distribution: 4,879,000 tCO2e
- With Mitigation Scenario 3: 5% Biofuel Use: 4,821,000 tCO2e
- With Mitigation Scenario 4: Monrovia Landfill Gas Plant: 4,505,000 tCO2e

Under BAU emissions will be 5,302,000 tCO2e by 2030 and if all four scenarios were implemented, emissions would be 4,505,000 tCO2e with a total potential of reducing 797 000 tCO2e by 2030 (see figure below).

	<p style="text-align: center;"><b>Impact of Mitigation Scenario on Emissions</b></p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Scenario</th> <th>Emissions (Thousand tCO<sub>2</sub>e)</th> </tr> </thead> <tbody> <tr> <td>BAU Emissions</td> <td>5 302</td> </tr> <tr> <td>Mitigation Scenario 1: 30% RE Goal</td> <td>5 161</td> </tr> <tr> <td>Mitigation Scenario 2A: Firewood Cookstove Distribution</td> <td>4 879</td> </tr> <tr> <td>Mitigation Scenario 3: 5% Biofuel Use</td> <td>4 821</td> </tr> <tr> <td>Mitigation Scenario 4: Monrovia Landfill Gas</td> <td>4 505</td> </tr> </tbody> </table>	Scenario	Emissions (Thousand tCO <sub>2</sub> e)	BAU Emissions	5 302	Mitigation Scenario 1: 30% RE Goal	5 161	Mitigation Scenario 2A: Firewood Cookstove Distribution	4 879	Mitigation Scenario 3: 5% Biofuel Use	4 821	Mitigation Scenario 4: Monrovia Landfill Gas	4 505
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<b>Scope and Coverage</b>	The GHGs of concern are mainly Methane (CH <sub>4</sub> ), Carbon dioxide (CO <sub>2</sub> ) and Nitrous oxide (N <sub>2</sub> O). The sectors covered are energy, transport and waste												
<b>Assumptions and Methodological Approaches</b>	<p>The implementation of the mitigation interventions will require availability of financial resources, technology development and transfer, and capacity building from the international community. The outcome of the Paris new agreement under the Convention is expected to be in full conformity with equity and common but differentiated responsibilities; and the contributions forthcoming from developed country Parties will be in a balanced manner in the context of a global and comprehensive agreement for the period beyond 2020.</p> <p>With regard to the methodological approach, the Revised 1996 IPCC Guidelines and the guidelines in IPCC Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories, 2000 (IPCC GPG ) were used to calculate the GHG emissions and removals as described in the Initial National Communication. The basic assumptions are as follows:</p> <ul style="list-style-type: none"> <li>• 2011 – First Scenario Year</li> <li>• 2030 – Target Year</li> <li>• GHGs – CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O</li> <li>• Historical emissions (up to Year 2010) came from the Options for Development of Liberia’s Energy Sector Report and the Initial National Communications (INC)</li> <li>• Each subsequent mitigation scenario is built on the one before it.</li> <li>• For example, the 30% renewable generation scenario leads to a certain reduction in GHG emissions, and the next scenario – 20% energy efficiency scenario on cook stove distribution – layers additional GHG reductions on top of the 30% renewable scenario.</li> </ul>												
<b>Planned Mitigation Actions</b>	Below are proposed mechanisms in key sectors aiming to facilitate Liberia’s INDC. It is prudent to note that these were developed with the view to implement upon the provision of means of implementation by the international community. For Mitigation, Liberia will focus on the following sectors orientation and specific actions:												

**Energy:**

1. Strengthen implementation and coordination mechanisms to improve climate change mitigation actions.
2. Implement quantitative and qualitative research and improve systematic priority sequencing between National Energy Policy, Low Carbon Economy, and National Vision 2030 developmental goals.
3. Strengthen institutional and individual capacity in renewable energy technology and management.
4. Implement and strengthen policy that promotes private investment in renewable energy (hydro, biomass and solar etc).
5. Rehabilitate existing hydro-power plants and build new hydro-power plants to increase hydro-power production capacity.
6. Produce and distribute 280,543 energy saving cook stoves that use fuel wood and 308,004 energy saving cook stoves that use charcoal by 2030.
7. Implement large scale biomass projects to generate about 30 MW by 2030.

**Waste:**

1. Strengthen institutional and individual capacity for waste management.
2. Develop waste management infrastructure.
3. Implement and strengthen policy that promotes private investment in waste management.
4. Capture methane gas emitted from landfills and used for fuelling vehicles, cooking at home or generation of power.

**Transport:**

1. Mainstream climate change into existing transport management plan to strengthen emission control.
2. Strengthen institutional capacity for developing strategies for integrated transport services; developing technical and safety standards and the enforcement of policies including emission control.
3. Improve the quality and reliability of transport infrastructure and services.
4. Develop emission reduction and tracking system of pollutants from vehicles.
5. Blend up to 5% of palm oil biodiesel with both gasoline and diesel by 2030 for vehicles.

## II. ADAPTATION

<p><b>Impacts and Vulnerability</b></p>	<p>Vulnerability and adaptation assessments conducted have revealed that Liberia is faced with climate change and variability leading to extreme events, which have negative impact on agriculture, forestry, health, energy and other sectors. Climate change impacts are marked by irregular patterns of rainfall, flooding, high temperature, and coastal erosion. These factors result to crops and livestock losses that intensify food insecurity and loss of income. For the most part, women and children are particularly vulnerable to the impacts of climate change. However, their unique knowledge and perspectives also provide opportunities for inclusive, equitable and efficient adaptation responses and coping strategies. The limited supporting infrastructures increase the vulnerability of the population. Coastal areas in Liberia are the most populated and economically vibrant areas. Sea erosion continues to pose increasing threats to the shorelines of coastal cities including major infrastructures and investments. It can also lead to displacement, loss of lives and properties and can severely undermine national security.</p>
<p><b>Area/sector for Adaptation Actions</b></p>	<p>The three priority areas for adaptation based on Liberia’s NAPA are:</p> <ul style="list-style-type: none"> <li>a) Agriculture- Enhancing resilience to increasing rainfall variability through the diversification of crop cultivation and small ruminants rearing;</li> <li>b) Building of a national hydro-meteorological monitoring system and improved networking for the measurement of climatic parameters; and</li> <li>c) Building of coastal defence walls to reduce the vulnerability of urban coastal areas.</li> </ul> <p>The long-term adaptation initiatives will include fishery, health, and transport, all with an integrated gender-responsive approach to ensure progress toward efficient and effective adaptive capacity and resilience.</p>
<p><b>Planned Actions</b></p>	<p>The Agenda for Transformation (AfT), the country’s national development document, recognizes climate change adaptation and mitigation under Pillar V as a cross cutting issue. However, there are challenges linked to the adequate means of implementation.</p> <p>As for sectoral development documents, climate change is integrated in the Food and Agriculture Policy and Strategy (2008) of the Ministry of Agriculture where there is a focus on food security, sustainable agriculture and climate change resilience. A Climate Change Gender Action Plan (CCGAP) was developed by the Government of Liberia in 2012. It provides a framework for enhancing gender equality in both climate adaptation and mitigation activities including decision-making processes, capacity building, implementation of policies and measures to ensure that climate change vulnerabilities are addressed with gender equity and youth development. As for other sectors, integration of climate change in the development planning and implementation processes will be undertaken when the capacities of the sectoral ministries are upgraded.</p> <p>In the short, medium and long terms, Liberia plans to implement adaption actions under different sectors as follows:</p>

### **Agriculture**

- Develop and promote drought-resistant, flood- tolerant and early maturing crop species.
- Intercropping, irrigation and the optimization of lowland/swamp farming.
- Pest control including fencing of farms against rodents, birds scarescrows, regular weeding, and the use of high echoing bells.
- Develop climate resilient crop/agroforestry diversification and livestock production systems.
- Create a platform for knowledge and experience sharing on best adaptation practices.
- Develop and implement agriculture and hydrological technology models and scenarios for planning.
- Establishment of a gene bank of climate resilient varieties of indigenous food crops.

### **Energy**

- Protection of water catchments around hydro-power sources such as the St. Paul River Basin.
- Strengthening of transmission and distribution infrastructure for public utilities to ensure climate resilience (i.e. flooding).

### **Health**

- Strengthen integrated disease surveillance response systems and emergency preparedness to prevent, mitigate, and respond to epidemics.
- Strengthen preventive measures to restrict preventable disease transmission.
- Develop early warning systems for climate- driven infectious diseases.
- Integrate climate change considerations into existing health policies and strategies, taking into account gender-differentiated impacts and responses.
- Conduct research on health vulnerability and impact, and develop scenarios to facilitate adequate planning.

### **Forestry**

- Increase awareness and strengthen participation of local dwellers in forest conservation.
- Protection of forest and biodiversity rich forest zones.
- Increase the amount of forested land through reforestation of degraded lands.

### **Coastal Zone**

- Develop and implement Coastal Zone policy, strategy and management plan.
- Construct hard structures such as sea walls or revetment.
- Manage and conserve coastal mangrove ecosystem.
- Facilitate technology transfer and training of institutional and local experts in coastal zone management and monitoring.

	<p><b><u>Fishery</u></b></p> <ul style="list-style-type: none"> <li>• Strengthen institutional and local capacity and monitoring systems for fishery management.</li> <li>• Develop and implement climate smart fishery systems to enhance the adaptive capacity and resilience of fisher communities.</li> <li>• Identification and conservation of endangered fish species.</li> </ul> <p><b><u>Transport/Infrastructure</u></b></p> <ul style="list-style-type: none"> <li>• Implement and reinforce design standards and planning codes for roads and other infrastructure to cope with flooding, sea level rise and windstorm.</li> <li>• Strengthen early warning systems and evacuation planning for intense rainfall events and floods.</li> <li>• Install signs high above the ground that can alert pedestrians and motorists of unsafe zones, such as low-lying areas.</li> <li>• Maintain and upgrade roads with appropriate drainage systems to cope with flooding.</li> <li>• Improve and enhance public transport services.</li> </ul>
<p><b>Implementation of Adaptation Actions</b></p>	<p>In Liberia, many sectoral policies have not mainstreamed the impacts of climate change. These include energy, hydrology/meteorology, health, transport and disaster. An overarching climate change policy is currently being developed which will serve as the pillar for comprehensive sectoral strategies and action plans. This policy will enable better coordination of climate change work in the country and provide opportunities for cooperation and collaboration between the government and people of Liberia; as well as with development partners, international and regional institutions, intergovernmental organizations and experts.</p> <p>The current National Adaptation Programme of Action (NAPA) pilot projects implementation framework started in 2010: The coastal pilot project in Grand Bassa Buchanan, with a length of 600meters had a budget of 3.3million USD; the agriculture adaptation pilot project had a budget of 2.6million (begun in 2012). The third pilot project ( monitoring climate information and services to enhance adaptation in climate change) started in 2014 with a budget of 7million USD. All of these projects were due to be implemented in four years from the starting date, with a grant from GEF/ Least develop fund budget of 13million USD. The completion of these projects will depend on the availability of funding. The NAP will detail the medium and long term adaptation program of the country as well as the projected timeframe for implementation. However, the time frame for the implementation of the proposed adaptation actions in this INDC will be up to 2030.</p>

# Liechtenstein's Intended Nationally Determined Contribution (INDC)

## Submission of 22 April 2015 under the United Nations Framework Convention on Climate Change, UNFCCC

The content of Liechtenstein's INDC follows the guidelines established by the 20<sup>th</sup> Conference of the Parties to the UNFCCC in December 2014 in Lima, Peru. Reference is made in particular to paragraphs 13 and 14 of 1/CP.20<sup>1</sup>.

### 1. Summary

The **assumptions** underlying Liechtenstein's INDC are based on the possibility to achieve emission reductions abroad which may be accounted towards Liechtenstein's reduction target in 2030.<sup>2</sup> However, primary focus will be given on domestic emission reductions. Liechtenstein aims at a reduction of greenhouse gases by 40 % compared to 1990 by 2030. The reduction target will be subject to the approval of the Liechtenstein Parliament.

Reduction Target	Base Year	Timeframe
40 %	1990	2021 - 2030

### 2. National Circumstances

With a population of 37'100 inhabitants and a total area of only 160 km<sup>2</sup>, Liechtenstein is one of the smallest countries in the world. Within 50 years Liechtenstein developed from a mainly agricultural state to one of the most highly industrialized countries in the world. The high value-added development until today is particularly due to the strong industrial sector and financial services, while the public sector of the national economy is

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<sup>1</sup> <http://unfccc.int/resource/docs/2014/cop20/eng/10a01.pdf>

<sup>2</sup> To this regard Liechtenstein reserves the right to revisit its overall commitment if no internationally agreed rules are given.

comparatively small. From 1990 until 2012 the country's GDP experienced a growth of about 140 %, with an increase of population of around 25 %. At the same time Liechtenstein managed to decouple its economic growth from its greenhouse gas emissions. Despite the growth of its economy, the increase in population and commuters Liechtenstein's emissions are today below the levels of 1990.

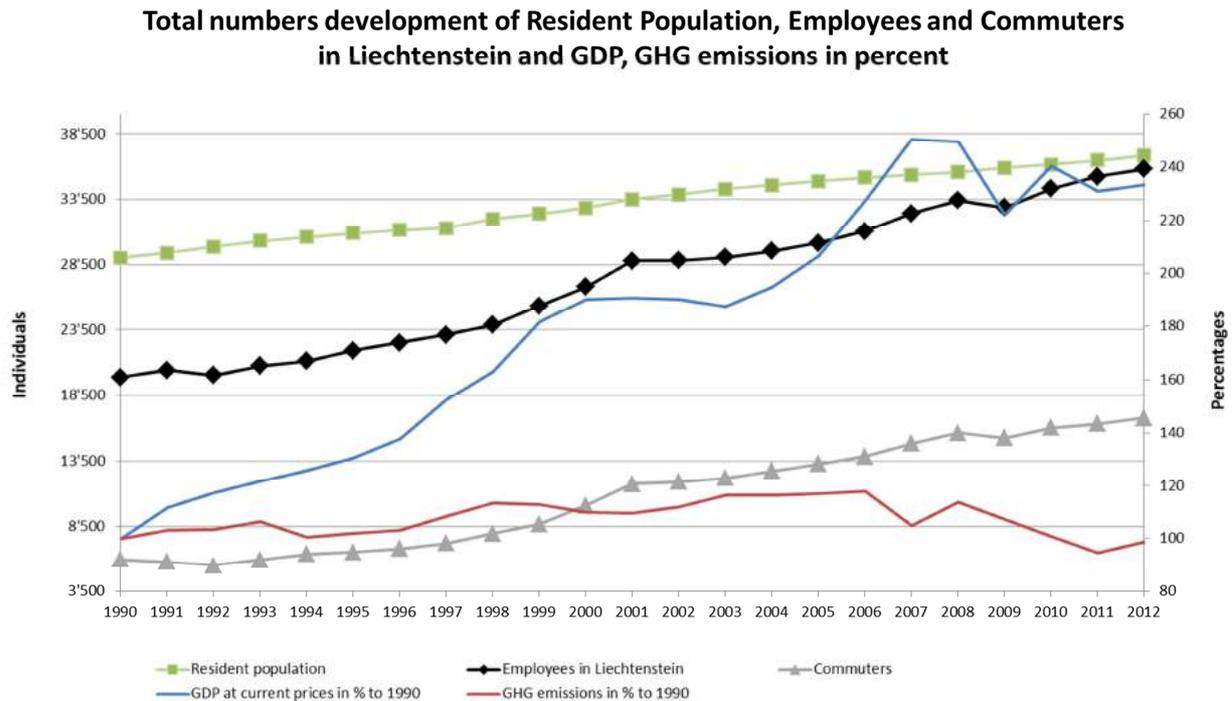


Figure 1: Trend from 1990-2012 of resident population, employed persons and commuters in Liechtenstein as well GDP and greenhouse gas emissions in percent to 1990.<sup>3</sup>

The decoupling of greenhouse gas emissions and economic growth is the consequence of the establishment of rigorous environmental standards and a comprehensive set of climate related policy measures such as the participation in the European Emissions Trading regime, levying of CO<sub>2</sub> emissions from the combustion of fossil fuels or the obligation to compensate emissions caused by motor fuel consumption.

<sup>3</sup> Source: Gross domestic product (GDP) 1990 - 1997: Office of Statistics (OS), Statistical yearbook. GDP 1998 - 2012: OS, National accounts. Resident population: OS, Population Statistics. Greenhouse gas emissions: OS, Environment statistics. Please note gross domestic product (GDP) at current prices, source data in billion CHF. Number of employees and commuters origin from Table 3\_1\_01 and T\_3.1\_02 of the statistical year book. Please note that the number of commuters is corrected for out-bound commuters.

### **3. Ex ante information according to paragraph 14 of 1/CP.20**

#### **3.1 Quantifiable information on the reference point**

For its reduction target Liechtenstein will apply 1990 as base year. The quantified amount of emissions in 1990 is currently considered to be 228.7 Kt CO<sub>2</sub> eq<sup>4</sup>. This figure is however provisional since the 1990 value will be fixed once the respective initial report is defined.

#### **3.2 Time frame for implementation and scope and coverage**

Liechtenstein's INDCs encompass a reduction target within a time frame from 2021 until 2030. The scope of Liechtenstein INDCs covers all sectors relevant to the state's greenhouse gas emissions. The respective sectors and subsectors are based on the most recent IPCC Guidelines for National Greenhouse Gas Inventories: Energy, Industrial Processes, Solvent Use, Agriculture, LULUCF and Waste.

Liechtenstein's INDCs cover seven greenhouse gases (as foreseen under the UNFCCC and the Kyoto Protocol) and generally apply the base year 1990<sup>5</sup>: carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), nitrous oxide (N<sub>2</sub>O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulfur hexafluoride (SF<sub>6</sub>), and nitrogen trifluoride (NF<sub>3</sub>).

#### **3.3 Planning Processes**

The planning processes for Liechtenstein encompass the sectors mentioned above under 3.2. These sectors are addressed by individual sectorial policies which are guided by Liechtenstein's climate strategy which will be revised in the course of 2015/2016. The strategy requires an interdisciplinary coordination of the focussed areas.

The focus will be on the coordination of climate relevant measures within Liechtenstein's energy policy, transport policy, environmental policy, agricultural and forestry policy.

In addition to that the relevant CO<sub>2</sub>-Act will be revised in the course of 2016 / 2017 to reflect the targets for 2030. The EU energy and climate policies will also contribute to reach Liechtenstein's goal within the energy sector on the long run. Within these policy areas Liechtenstein's influence is very limited.

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<sup>4</sup> NIR 2014 (1990-2012) Resubmission

<sup>5</sup> not relevant where reference level apply (e.g. forests)

## 4. Assumptions and methodological approaches

The **assumptions** underlying Liechtenstein's INDC are based on the possibility to achieve emission reductions abroad which may be accounted towards Liechtenstein's reduction target in 2030.<sup>6</sup> However, primary focus will be given on domestic emission reductions.

The **methodological** approaches for estimating and accounting for anthropogenic greenhouse gas emissions and removals use standard methods. The emissions in Liechtenstein are calculated based on the standard methods and procedures of the Revised 1996 Intergovernmental Panel on Climate Change (IPCC) Guidelines for National Greenhouse Gas Inventories (IPCC 1997a, 1997b, 1997c) and IPCC Good Practice Guidance (IPCC 2000, IPCC 2003) as adopted by the UNFCCC.

## 5. Fairness and ambition

Liechtenstein understands fairness of its INDC within the context of national circumstances. As Liechtenstein is one of the smallest countries in the world its total emissions count up to 0.0073 % of the global total emissions. Liechtenstein's responsibility in terms of greenhouse gas emissions is insignificantly low. Nevertheless per capita emissions of 6.1 tonnes in Liechtenstein lie within the European average. The overall reduction target of 40 % compared to 1990 corresponds to per capita emissions of 3.6 CO<sub>2</sub>eq. The reduction path is considered to be very ambitious taking into account the already existing very high technical environmental standards applied in Liechtenstein. Moreover the reduction path is well in line with the respective recommendations made by the IPCC in 2014.

Liechtenstein stays committed to deliver its fair share within the international efforts to combat climate change.

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<sup>6</sup> To this regard Liechtenstein reserves the right to revisit its overall commitment if no internationally agreed rules are given.

## **6. Contribution to the objective described in Art. 2 of the UNFCCC**

Liechtenstein's main focus for its contribution, towards achieving the objective of the Convention as set out in its Article 2, is to reduce domestic emissions as much as possible. Albeit Liechtenstein is already highly efficient in its energy use some costs for further reductions within the country would be unreasonably high. Therefore Liechtenstein aims at the supplemental realization of emission reductions abroad. To that respect Liechtenstein emphasizes to invest in emission reduction projects of high quality standards which besides the mitigation of greenhouse gases also lead to social, health and environmental benefits. Liechtenstein is of the view that encompassing domestic emission reductions as well as emission reductions achieved abroad by its INDC states the most effective contribution to the objective described in Art. 2 of the UNFCCC.



## MADAGASCAR'S INTENDED NATIONALLY DETERMINED CONTRIBUTION

### NATIONAL CONTEXT AND PRIORITIES

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Madagascar is among the top-ten countries of the world having important and extensive coastal zones. Due to its geographical position, the island frequently experiences extreme weather events that significantly affect its national economy, as well as the population's livelihood. Climate change impacts, particularly severe during the last two decades, are: (1) extended drought periods; (2) increased variability of the rainfall regime; (3) intensification of cyclones; (4) floods associated with cyclone disturbances.

Madagascar is equally committed to contribute to mitigate climate change, as well as to reduce climate change vulnerability and promote adaptation measures, although the importance of the two complementary strategies is different. Moreover, the choice of the identified adaptation sectors (agriculture, coastal zone management, human health), as well as ecosystem based adaptation approach (forests, mangroves, biodiversity, water resources) can have significant benefits on the mitigation. In fact, these actions may contribute to the strengthening of carbon stocks. Forests and mangroves sustainable management, in addition to greenhouse gas (GHG) emission reduction associated with deforestation limitation, can specifically illustrate this link.

Madagascar is a least developed country with non-significant greenhouse gases emissions. Primary sectors, particularly agriculture and fisheries, are prominent in the national economy. Furthermore, the country has an exceptional biodiversity that need to be preserved. In this context, approximately 7 million hectares, representing 11.9% of national territory is declared protected areas, as of May 2015. Electrification level is extremely low, with about 20% of households benefiting from electric lighting. This explains its dependence on fuelwood, which will persist in the medium term.

The INDC of the Republic of Madagascar was developed taking into account the national development objectives and priorities stated in main national strategic documents including the *Politique Générale de l'Etat*, the *Plan National de Développement 2025-2019*, and the *Politique Nationale de lutte contre le Changement Climatique*.

### SECTION 1: MITIGATION

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#### 1. National Contribution

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The national contribution of the Republic of Madagascar is the result of mitigation measures targeted to relevant sectors, compared to the national reference scenario BAU (business as usual; see Figure 1). In 2030, Madagascar aims to reduce approximately 30 MtCO<sub>2</sub> of its emissions of GHG, representing 14% of national emissions, compared to the BAU scenario, with projections based of GHG inventory from year 2000 to 2010. This reduction is additive to the

absorptions increase of the LULUCF sector, which estimated at 61 MtCO<sub>2</sub> in 2030. Total increase in GHG absorption is expected at 32%, compared to the BAU scenario.

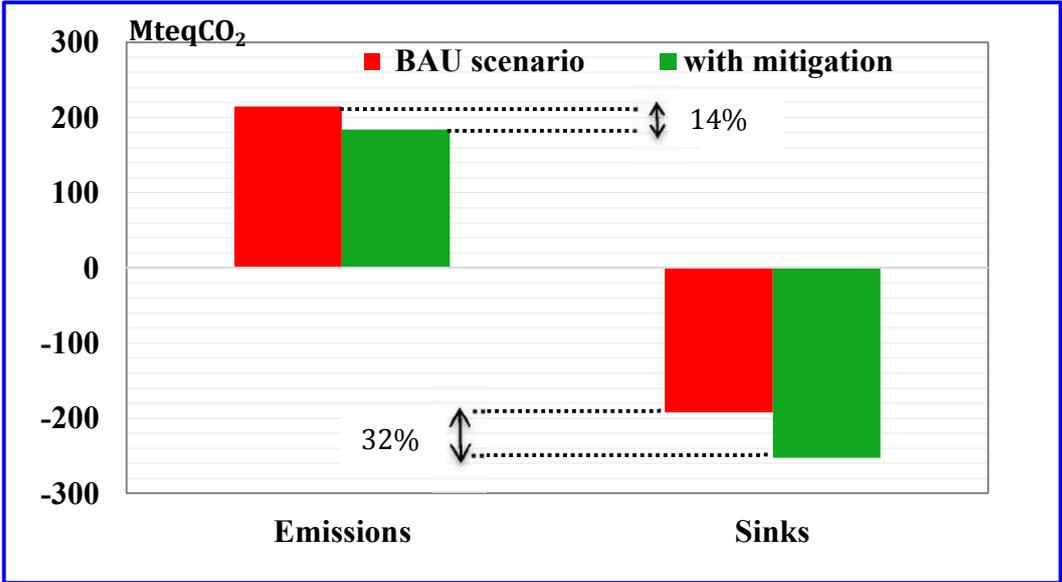
However, these objectives remain conditioned by financial support, which will be received from global partners (conditional contributions). Madagascar relies on the international community support to reach this objective through the United Nations Framework Convention on Climate Change (UNFCCC) and other existing or future financial mechanisms. The estimate costs of the mitigation actions will be above 6 billion US dollars (see Table 2).

If nothing is done, Madagascar’s total emissions will increase from *ca.* 87 MtCO<sub>2</sub> in the year 2000 to reach 214 MtCO<sub>2</sub> in 2030. Total absorptions will decrease from 290 MtCO<sub>2</sub> in 2000 to 92 MtCO<sub>2</sub> in 2030, which will change the country’s status of carbon sink of 203 MtCO<sub>2</sub> in year 2000 to an emitting source of 22 MtCO<sub>2</sub> in 2030. Emissions and absorptions profiles are shown in Table 1.

**Table 1: Profile of emissions and absorptions during the period 2000 to 2030 (in MtCO<sub>2</sub>eq).**

<i>Year</i>	<i>2000</i>	<i>2010</i>	<i>2020</i>	<i>2030</i>
<i>Emissions</i>	87,152	156,973	192,281	214,206
<i>Absorptions</i>	-290,017	-220,094	-215,890	-192,111
<i>Net Emissions/Absorptions</i>	-202,865	-63,121	-23,609	22,095

For the LULUCF sector, Madagascar is currently developing a diversified reforestation program. This document proposes increasing the total areas under forest cover, with an indigenous species reforestation program of 270,000 ha. Such efforts will perfectly fit with the projected economic growth, by including renewable energy initiatives, as well as the updated rural electrification technologies.



**Figure 1: Potential of GHG reduction and absorption as of year 2030, in comparison with business as usual scenario.**

## 2. Major mitigation actions

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The Republic of Madagascar has identified the following actions to contribute to the reduction of GHG emissions:

### Energy

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- Facilitate access to energy by strengthening existing systems and by promoting renewable and alternative energies;
- Rehabilitate energy producing network and plant stations;
- Reinforce renewable energy (hydraulic and solar) from the current level of 35% to 79%);
- Improve energy efficiency;
- Rural electrification;
- Disseminate improved stoves (by 2030: 50% of households adopting improved stoves).

### Agriculture

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- Large scale dissemination of intensive/improved rice farming techniques (SRI/SRA);
- Large scale implementation of conservation agriculture and climate-smart agriculture;
- Dissemination of arboriculture (from 2018: 5,000 ha per year).

### LULUCF

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- Large scale reforestation for sustainable timber production and indigenous species for conservation;
- Reduction of forest timber extraction;
- Promotion of REDD-plus;
- Large scale adoption of agroforestry;
- Forest and grassland forests enhanced monitoring.

### Waste

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- Biogas production from waste water;
- Sustainable management (compost) of organic household waste (50% of waste treated in urban agglomerations).

## 3. Information for clarity and transparency

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### Category source and scope

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Category sources include all sectors of the national economy. The geographical scope is 100% of the territory.

Figures 2, 3, 4, 5, 6, 7, and 8, shown in the Annex, correspond to the national and sectorial emissions and absorptions.

### Reference Scenario on the period of 2000 and 2030

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The reference scenario approach was adopted, given that Madagascar currently has no obligation to reduce its emissions regarding a reference year, under the UNFCCC. This approach is considered the best-fitting methodology as far as concern national objectives, and it is more transparent. While being realistic, it is part of the strategic policy of the country's development. It also joins the global needs of overall emission reduction, as well as national contributions, in

order to achieving the ultimate objective of the UNFCCC, which is the stabilization of GHG concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system.

## Period

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- Application period: 2021-2030.
- Reference scenario projection: 2030.

## Greenhouse Gases

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- Carbon Dioxide (CO<sub>2</sub>);
- Methane (CH<sub>4</sub>);
- Nitrous Oxide (N<sub>2</sub>O).

Sectors and GHG emissions reported within this document cover 99.9% of national emissions. Fluorinated gases were not taken into account, considering that their use and associated emissions are extremely low.

## Sectors

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- Energy;
- Agriculture;
- LULUCF;
- Waste.

By 2030, the Republic of Madagascar has set up an emission reduction **contribution** of at least 14% of its GHG, compared to the BAU scenario, and an increase of GHG absorption of at least 32% compared to the BAU scenario. These objectives continue to be conditioned by international supports (financial, technology, capacity building), which will be received from the international community (conditional contributions).

Figures 2, 3, and 4 of the Annex display national emissions and absorptions.

## Inventory Methods and Applied Parameters

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Methodological approach for GHG inventories, projections, and absorptions is based on the IPCC Revised Guidelines (1996), which was supported by the 2000 and 2003 IPCC's *Good Practice Guidance* series.

Data from *Institut National des Statistiques*, verified with data from sectorial departments in charge of the category sources, were used for the BAU emission scenario, and the projected mitigation scenario were extracted from the national database. For projection, these data were completed by demographic, economic, and social analyses.

The avoided or absorbed GHG emissions, according to the prioritised mitigation actions, were then aggregated to provide the national mitigation potential. For the LULUCF sector, land use change monitoring through remote sensing techniques was supported by traditional mapping to evaluate changes regarding emissions and absorptions.

For the considered GHG, value of Global Warming Potentials over a hundred years, drawn from the IPCC second assessment report, are as follow:

- CO<sub>2</sub>: 1;
- CH<sub>4</sub>: 21;
- N<sub>2</sub>O: 310.

## Planning

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The INDC was developed using multiple stakeholders, iterative consultation process. This process has involved several bilateral meetings and a series of two national consultations. It was built and is highlighting synergies with existing national framework documents (*Politique Générale de l'Etat; Plan National de Développement 2015-2019; Politique Nationale de Lutte contre le Changement Climatique*). INDC concepts continue and/or support other related UNFCCC processes, including the Third National Communication (TNC), Biennial Update Reports, National Action Program of Adaptation to Climate Change (NAPA), National Appropriated Mitigation Actions (NAMA), and the National Technological Assessment (TNA). The INDC process was coordinated by the *Bureau National de Coordination des Changements Climatiques* (BNCCC).

Overall implementation, as well as monitoring and evaluation of the INDC will be articulated around existing or future strategic documents (among which the National Adaptation Plan). They will particularly emphasise participatory and inclusive process of all stakeholders, with a strong leadership from the Ministry of Environment, Ecology, the Sea and Forests, which is lead coordinating entity of all actions to combat climate change. The integrated approach will be used to highlight the complementarities of actions and means, in order to achieve better results.

## Fair and ambitious

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This INDC will constitute the national reference for the Republic of Madagascar's involvement to fight climate change. It contains actions reflecting contributions to the GHG emissions reduction and absorption. The document decrypt the country's overall climate policy, and demonstrates clearly the national ambitions to contribute for a successful, legally binding, fair, and equitable agreement that should be adopted during the 21<sup>st</sup> UNFCCC Conference of Parties to be held in Paris by the end of 2015.

Madagascar is a least developed country with 440 USD per capita GPD, well below the average of the Sub-Saharan poor countries. More than 91% of households are categorised as poor, living with less than 2 dollars per day, with a poverty index of 36.1. National GHG emissions represent 0.2% of global emissions, therefore being a net carbon sinks of 13 MtCO<sub>2</sub> per capita in 2000, which is 3 MtCO<sub>2</sub> per capita as in 2010.

Despite this very low responsibility in terms of GHG emissions, Madagascar has an ambition (1) to reduce its emissions to 30 MtCO<sub>2</sub> in 2030, compared to the reference scenario BAU; and (2) to increase the absorptions in the LULUCF sector at approx. 61 MtCO<sub>2</sub>. The combined contributions give an avoided total GHG emission of 91 MtCO<sub>2</sub>. In this context, the Republic of Madagascar's contribution is considered as fair and ambitious.

## Carbon credits

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No reduction based on of carbon credits purchased outside of Madagascar.

## SECTION 2: ADAPTATION

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The general approach adopted to identify adaptation measures was concentrated on the sectors or areas regarded as most vulnerable to climate change. Although sectorial, these actions and their impacts are of national scope. They deal particularly on the impacts of climatic hazards that mostly affect the country, i.e. cyclones, floods, drought, sea-level rise, whose intensities are exacerbated by climate warming observed both at national and global levels. Adaptation measures were frameworked by the *Politique Nationale de Lutte contre le Changement Climatique* that has been developed in 2010. This national policy has as first strategic target to “Strengthen adaptation to climate change, considering Madagascar’s realistic needs”.

### 1. Overview of climate scenarios

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Climate modelling conducted in 2008 indicates that the trend of temperature rise, which has been observed since the year 1950s from the South, gradually shifting to the Northern part of the island since the year 1970s, tends to endure. Temperature projections by 2055, including therefore the period covered by this INDC, maintain this upward trend, even if it is done in a non-uniform manner. In fact, temperature rise is expected to be higher in the South, and relatively lower in coastal zones.

As far as concern rainfall patterns for the same period, most parts of the country will experience an increasing rainfall whereas in the East; and in the South-east, decreasing trends would be observed, according to the season. Concerning cyclones, their frequency would remain unchanging during the next decades; but the number of intense cyclones would increase. On the other hand, the trajectory of the majority of cyclones passing through the island would move northward.

The current and projected climate trends are as follow:

- Increasing average temperature of 0.5 °C in 20 years, and up to roughly 0.1 °C per year for the coming years;
- Intensification of cyclones and evolution of their trajectories;
- Increased floods;
- In places, reduced rainfall in 2025 and 2050, but much more intensity in wet season.

It is worth noting that uncertainties remain regarding climate change setting and parameters in Madagascar. These uncertainties concern mainly changing rainfall patterns. Further research and monitoring are needed to project more reliable climate change scenarios.

### 2. Examples of impacts already observed regarding current climate trends

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- Average sea level rise of 7 to 8 mm per year, leading to coastal erosion and the progression of receding shorelines;
- Increasing mortality rate caused by fish consumption that have accumulated dinoflagellate algae, which flourishing is increasing with sea-surface temperature rise;
- Medium to high index of direct fatalities associated with cyclone events (index value: 6);
- Social infrastructures (schools, health centres, nurseries) destruction due to cyclone events;
- Mangroves forest destruction due to floods, destruction of coral reefs, habitats, and associated species (fishes, arthropods, sea grass, etc.);
- Destruction of agriculture crops and fields due to heavy rains, floods, and stormy winds;
- Destruction of administrative buildings, roads, tracks, etc. due to heavy rains, floods, and stormy winds;
- Decreasing yields and soil fertility loss;
- Water stress (irregular rainfall patterns, drought and deficit in some areas);
- 30-60% of the population of Southern Madagascar suffering from food insecurity due to drought periods;

- Outbreaks (particularly towards the Highlands) of vector-borne diseases, particularly malaria.

#### Potential Impacts, if no action is implemented

- Highly significant decrease in agricultural yields, poor fisheries and aquaculture productions, therefore aggravation of household poverty;
- Inadequate infrastructures that are repeatedly destroyed by extreme weather events;
- Highly increasing prevalence rate of acute respiratory infections, and widespread distributions of vector-borne diseases;
- Distribution shift in geographical range of some species, increasing risks of species extirpation;
- Food insecurity and social conflicts associated with water-related conflicts.

### **3. Priority Actions before 2020**

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- Finalisation and implementation of the National Adaptation Plan;
- Strengthen climate change adaptation mainstreaming in all strategic/framework documents;
- Multi-hazard early warning systems primarily that mainly consider cyclones, floods, drought and the public health surveillance;
- Effective application of existing or newly established sectorial policies: flood and cyclone-resistant hydro-agricultural infrastructures standards, cyclone resistant buildings standards, flood-resistant terrestrial transport infrastructure standards, local for climate hazard community guideline for Water-Sanitation-Hygiene ;
- Intensive awareness raising campaigns concerning the adverse effects of climate change and environmental degradation;
- Development of Resilient Agriculture Integrated Model pilot projects/programmes (combination of watershed management, selected/adapted varieties, locally-produced compost, rehabilitation of hydro-agricultural infrastructures, input access facilitation system, conservation agriculture, and agroforestry) or "climate-smart agriculture";
- Promotion of intensive/improved rice farming system and rain-fed rice farming technique;
- Formulation and implementation of the national policy of the maritime territory of Malagasy, considering climate change;
- Formulation and implementation of the National Strategy for Integrated Water Resources Management;
- Evaluation of links for the climate change and migration of vector-borne diseases, malaria, and others emerging diseases as well as the evolution of acute respiratory infections, in order to identify remedial and/or corrective measures;
- Restoration of natural forests and reinforcement of habitat connectivity;
- Identification and sustainable management of climate refuge areas inside and outside protected areas;
- Contribution to the finalisation of the "National framework for meteorological services" for which Madagascar has committed to the World Meteorological Organisation.

#### • Expected Impacts of actions before 2020

- Cyclone-induced human loss of life Index reduced to 4;
- Strengthened food security and increasing number of people unaffected by hunger;
- Slowing of the receding shorelines process;
- Restoration of 35,000 hectares of primary forest areas and mangroves.

### **4. Actions to be undertaken between 2020 and 2030**

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- Real-time monitoring of climate information;

- Effective implementation of multi-hazard early warning systems, including cyclones, floods, food security, drought, hunger, health and phytosanitary monitoring;
- Widespread application of Resilient Agriculture Integrated Models in major agricultural centre, cash crop zones, extensive livestock farming areas, priority areas for fisheries, mangroves, as well as drought hotspots;
- Sustainable and integrated water resources management, particularly in sub-arid areas and those vulnerable to drought periods;
- Reinforcement of natural protection and reduction of the vulnerability of coastal, inshore and marine areas affected by coastal erosion and receding shorelines progress (Menabe, Boeny, South-west and East)
- Strengthen and upgrade casualty multi-hazard early warning systems including the aspects of phytosanitary, agricultural, drought and food security monitoring;
- Sustainable and integrated water resources management, especially in sub-arid areas and those vulnerable to drought periods;
- Implementation of ecosystem-based adaptation to cope with sand-hill progression (multiple causes but phenomena aggravated by climate change) by leveraging research findings and best practices;
- Restoration of natural habitats (forests and mangroves: 45,000 ha; lakes, streams, etc.).

#### Expected impacts, until year 2025

- Stabilisation of the case of human casualties due to cyclones;
- Reduction of the occurrence of hunger and food insecurity events associated with drought periods, particularly in the South;
- National Food Security assured through a large scale implementation of Resilient Agriculture Integrated Models (climate-smart agriculture) in major agricultural centres;
- 45,000 ha of forest area restored.

#### Expected impacts, until year 2030

- Cyclone-induced human loss of life Index reduced to 3;
- Significant decrease in the proportion of people, particularly in Southern Madagascar, suffering from starvation;
- Paddy production maintained at 4 tons per hectare in agricultural centres that apply the Resilient Agriculture Integrated Models (climate-smart agriculture);
- Environmental amenities and ecosystem services associated with the restoration of 55,000 ha of forests and mangroves;
- Downturn up to trend 0 of the receding shorelines progression in the most affected coastal zones.

The estimated amount of the adaptation cost is 28.713 billion US dollars (see Table 2).

### **SECTION 3: MEANS OF IMPLEMENTATION**

Madagascar is committed to evolve in the pathways leading to the sustainable economic and social development, whilst being environmentally aware and resilient to various hazards. In that sense, the Government is being implementing ambitious and liable development programs in order to boost the national economy through the *Politique Générale de l'Etat*, the *Plan National de Développement 2015-2019* and its implementation plan. Climate actions are among the top priorities in these programs in the coming years.

The country's willingness to struggle with climate change has led to the existence of many policy framework documents and legal instruments conducive to the implementation of actions to cope with climate change. It is noteworthy that Madagascar will undertake efforts for both the

effective implementation of existing regulatory instruments, as well as to elaborate new policies in order to support the implementation of actions linked to the national contributions.

According to the Decree No. 2015-092 of March 5th 2015, the Ministry of the Environment, of Ecology, the Sea and Forest (MEEMF) is responsible for the implementation and coordination of actions, as well as the mainstreaming of climate change issues in various social and economic sectors. In fact, the National Bureau of Climate Change Coordination (BNCCC) of MEEMF ensures the role of coordinating, facilitating, supervising and monitoring of the effective implementation of all the measures/actions provided within this INDC. The BNCCC works closely with sectorial ministries, the National Climate Change Committee, sectorial and regional environmental offices, and others non-governmental actors operating in the fight against climate change.

**1. Gaps and obstacles**

Madagascar spends a substantial part of its annual budget in social services and infrastructures in response to the adverse effects of climate change. During the last five years, losses and damages associated with floods and cyclone events are estimated at about 470-940 million of US dollars per year. It is however worth noting that studies related to adaptation costs do not yet exist yet for Madagascar.

Given the precarious economic situation of Madagascar, the implementation of the INDC is conditioned by the availability of external financial support, especially through the financial mechanisms under the UNFCCC but also through other multilateral and bilateral sources. The effective implementation of Madagascar’s contributions requires the reinforcement of the national capacities (technical, institutional, mobilisation and absorption of funding) and transfer of technology and research from developed countries, as well as the contributions of countries and other stakeholders that are actively involved in the fight against climate change.

**2. Cost estimates**

Costs associated with the implementation of the actions of this INDC are estimated at USD 42.099 billion (see Table 2). Madagascar, on the basis of these external contributions and national contributions, has setting up a national mechanism sustainability of actions against the climate change operational before the end of 2020. In order to demonstrate its commitment against climate change, the Republic of Madagascar with internal resources will contribute to the implementation of the actions of SCOND up 4% of the cost amounts.

Costs associated with the implementation of this INDC are estimated at 42.099 billion US dollars (see Table 2). Madagascar, based on the external contributions and domestic resources, has the intention to create a sustainable national financial mechanism that will deal in particular with climate change. This mechanism should be operational by the end of 2020. In order to demonstrate its commitment to fight climate change, the Republic of Madagascar will contribute, through the mobilisation of domestic resources, up to 4% of the INDC implementation costs.

**Table 2: Costs Estimates of climate actions in the framework of the INDC of Madagascar (period 2015-2030).**

<i>Component</i>	<i>Cost (milliards USD)</i>
<i>Adaptation</i>	28.713
<i>Mitigation</i>	6.370
<i>Capacities building</i>	1.754
<i>Technology development and transfer, and research</i>	5.262
<b>TOTAL</b>	<b>42.099</b>

# ANNEXE

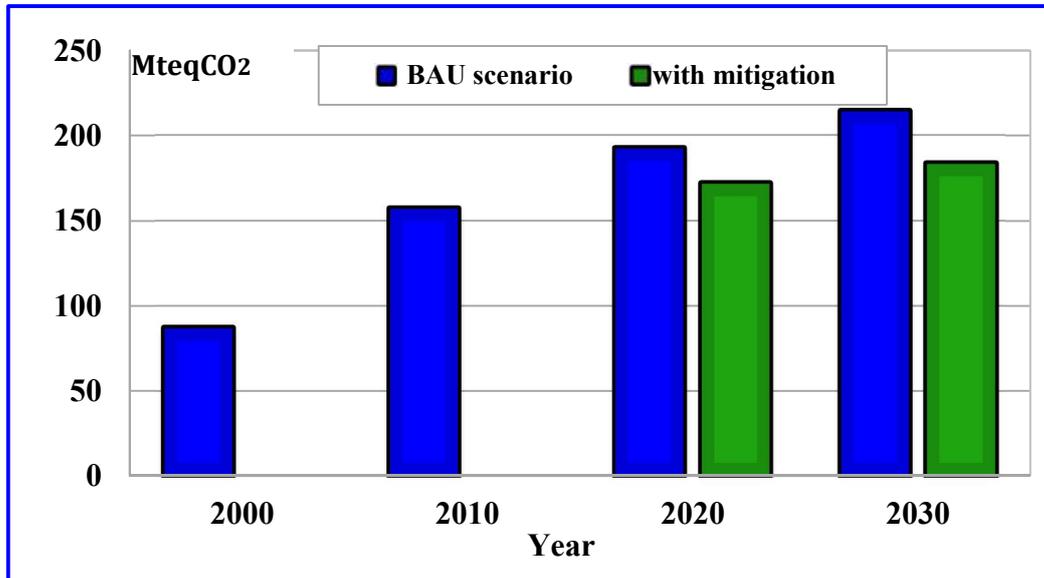


Figure 2: National Emissions, all sectors.

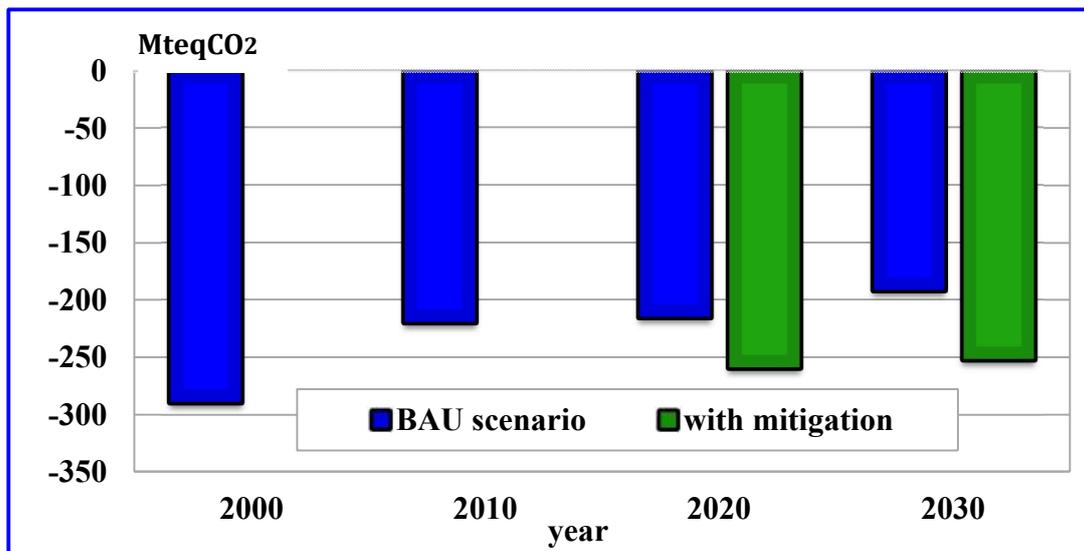
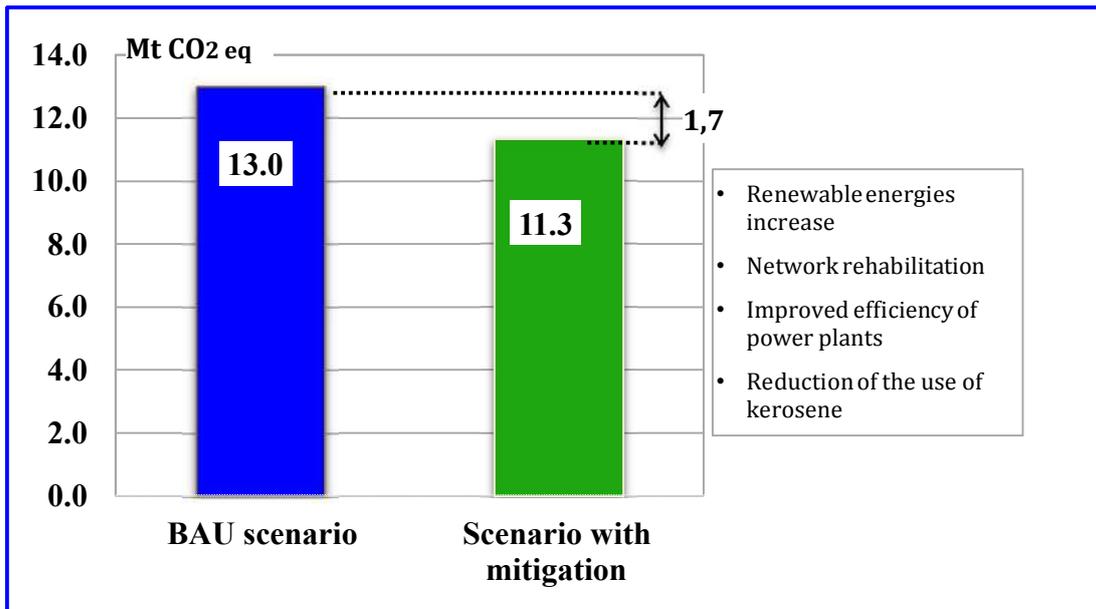
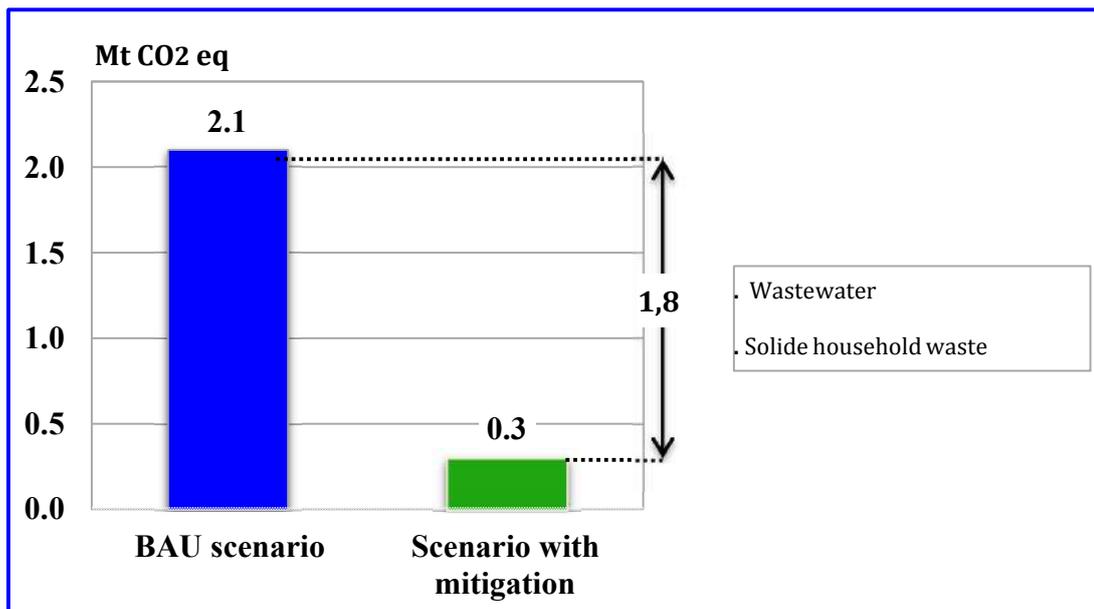


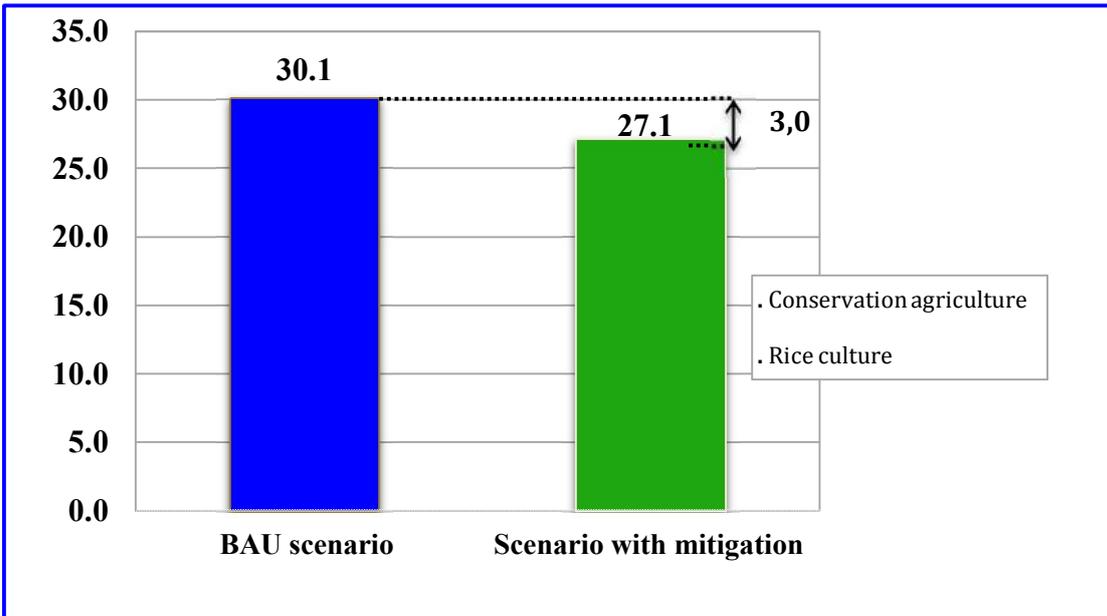
Figure 3: National Absorptions in the Land Use, Land Use Change & Forestry (LULUCF) sector.



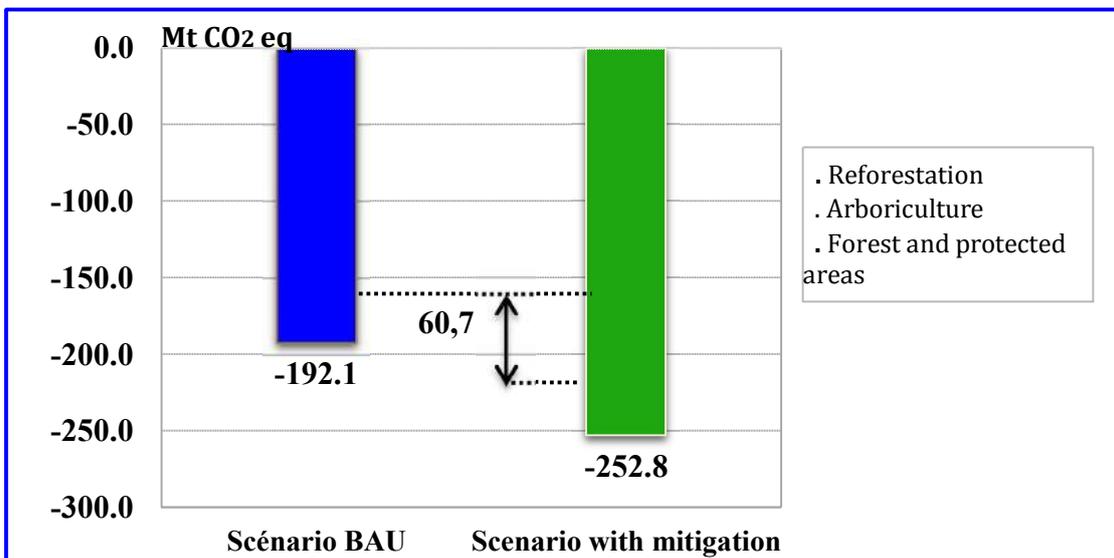
**Figure 4: Comparison of the BAU emission scenario and the mitigation scenario in 2030 for the Energy sector.**  
 Shown as legend: sub sectors that are most concerned by the mitigation actions.



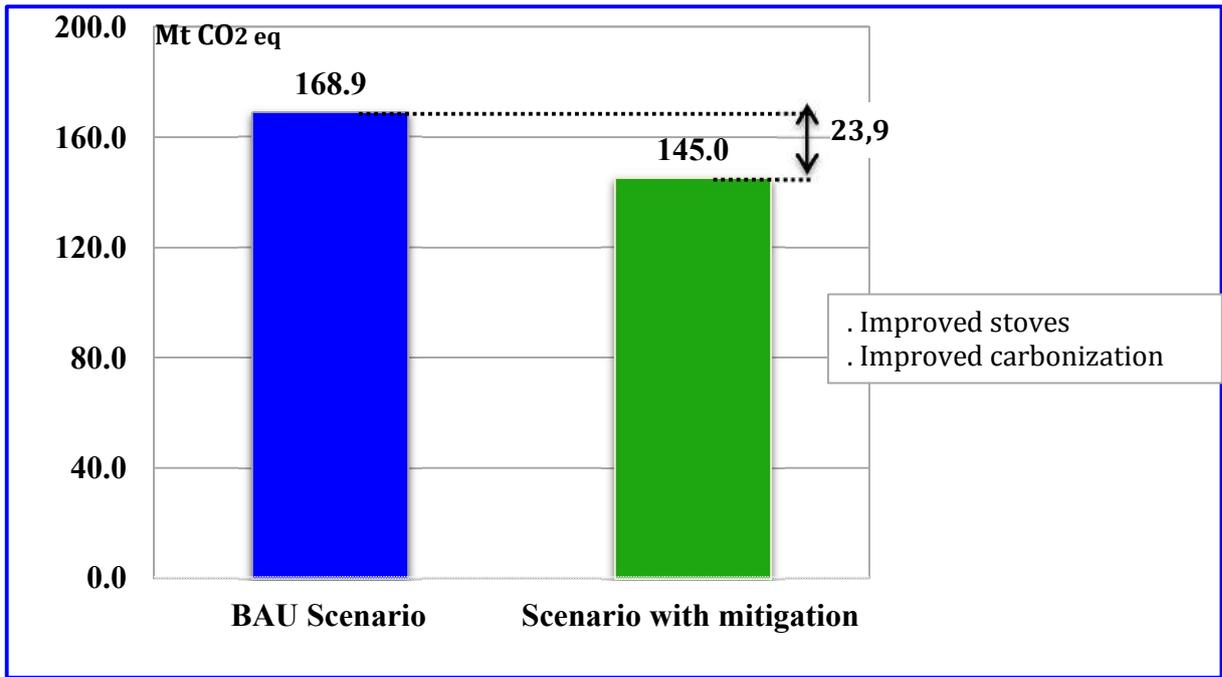
**Figure 5: Comparison of the BAU emission scenario and the mitigation scenario in 2030 for the Waste sector.**  
 Shown as legend: sub sectors that are most concerned by the mitigation actions.



**Figure 6: Comparison of the BAU emission scenario and the mitigation scenario in 2030 for the Agriculture sector.**  
Shown as legend: sub sectors that are most concerned by the mitigation actions.



**Figure 7: Comparison of the BAU emission scenario and the mitigation scenario in 2030 for the LULUCF sector.**  
Shown as legend: sub sectors that are most concerned by the mitigation actions.



**Figure 8: Comparison of the BAU emission scenario and the mitigation scenario in 2030 for the Energy sector.**  
 Shown as legend: sub sectors that are most concerned by the mitigation actions.



## REPUBLIC OF MALAWI

### INTENDED NATIONALLY DETERMINED CONTRIBUTION

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## 1 Introduction

### *1.1 National Circumstances*

Malawi is a land-locked and densely populated country located in sub-Saharan Africa. The country lies at the southern end of the Great East African Rift Valley system. It is bordered by Tanzania to the north, Zambia to the west and Mozambique to the east, south and south-west. The country's total area is 118,484 km<sup>2</sup>, with an estimated population of 17 million<sup>1</sup>, growing at a rate of 2.8% per annum. Malawi's current per capita gross domestic product (GDP) is \$272.

The United Nations Development Programme (UNDP) Human Development Report (HDR) of 2007 rated Malawi as one of the most vulnerable countries in sub-Saharan Africa to the deleterious impacts of climate change. Furthermore, Malawi's NAPA of 2006 showed that thematic areas such as agriculture, energy, water, forestry, fisheries, gender, wildlife and human health are vulnerable to the impacts of climate change, climate variability and extreme climate events. Major climate related hazards that wreak havoc in the country are floods and droughts. For example, in 2015, floods affected 15 out of 28 districts in Malawi. About 1.1 million people were affected, 230,000 were displaced, 176 were killed and 172 were reported missing. The total cost of loss and damage that the Government of Malawi incurred during these severe floods was estimated to be US\$335 million, and the recovery and reconstruction costs stood at US\$494 million.

Because of the country's vulnerability to climate change, there is urgent need to undertake interventions to enhance the resilience of productive sectors to the associated negative impacts. For instance, climate-sensitive rain-fed agriculture is the mainstay of Malawi's agro-based economy. It accounts for 30 to 40% of the GDP, employs 85% of the country's workforce and supplies 60 to 70% of raw materials to the manufacturing sector.

Notwithstanding its very low emissions of around 1.4 t CO<sub>2</sub>e per capita in 2015, Malawi as a Party to the United Nations Framework Convention on Climate Change (UNFCCC) has made firm decisions and plans to move the country's development pathways towards a green economy based on national circumstances and capabilities. It is in light of the above that the country's Intended Nationally Determined Contribution (INDC) has been developed in direct response to decisions adopted at the 19th and 20th Sessions of the Conference of the Parties (CoP) to the

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<sup>1</sup> 2008 Population Census by National Statistical Office - Population Projections sourced from <http://www.nsomalawi.mw/publications/134-population-projections-for-malawi.html>

UNFCCC. The INDC aims at achieving the objective of the UNFCCC as set out in Article 2 of the Convention and also contribute to sustainable development.

### ***1.2 National Climate Change Management Policy***

Government of Malawi has developed the National Climate Change Management Policy, currently pending Cabinet approval and endorsement, to spur climate change activities in Malawi. The overall goal of the Policy is ***to promote climate change adaptation and mitigation for sustainable livelihoods through measures that increase levels of knowledge and understanding and improve human well-being and social equity, while pursuing economic development that significantly reduces environmental risks and ecological scarcities.*** In addition, Malawi has sector-specific policies which have mainstreamed adaptation and mitigation activities, as well as implementation frameworks that foster development and transfer of technology and capacity building.

The selection of sectors prioritized in the INDC was premised not only on the sectors that could make the greatest contribution to GHG abatement and resilience building, but other emerging issues were also considered to reflect changes overtime in other key sectors. For instance, the energy and industrial sector landscapes are bound to change in line with developmental plans of the country. Furthermore, the INDC has included issues of adaptation and community resilience, paying particular attention to the vulnerable groups and sectors. Above all, the INDC has provided an opportunity to enhance the implementation of Malawi's sustainable development goals as articulated in its national developmental agenda.

## 2 Mitigation Contributions

### 2.1 Malawi's current greenhouse gases profile

As per 2006 IPCC Guidelines for the preparation of National GHG Inventories, the main sectors contributing to GHG emissions in Malawi are energy, industrial processes and product use (IPPU), agriculture, forestry and other land use (AFOLU), and waste.

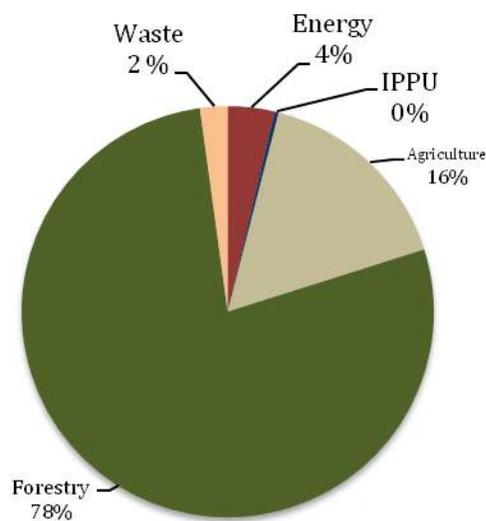


Figure 1: Sectoral emissions in 2015

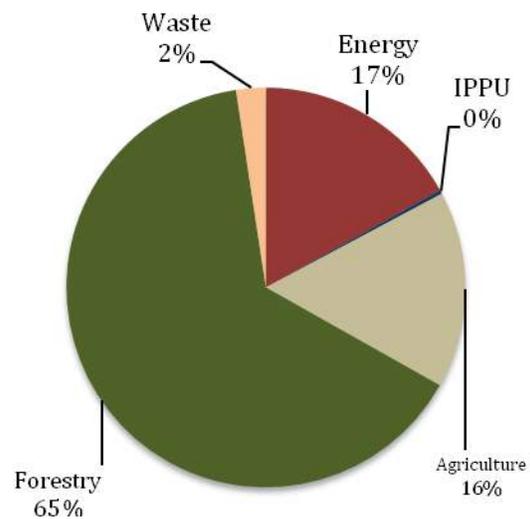


Figure 2: Sectoral emissions in 2040

Between 2015 and 2040, total annual GHG emissions are expected to increase from the current level of approximately 29,000 Gg CO<sub>2</sub> equivalents to in the range of 42,000 Gg CO<sub>2</sub> equivalents, an approximately 38% rise. However, there is at present significant uncertainty about future emissions, particularly beyond the year 2020. While some of these uncertainties pertain mainly to endogenous economic and political factors, as a least-developed country the pace and scope of future emissions growth and the nation's overall pursuit of low-emissions development will also hinge on the provision of international capacity building, technology transfer and financial assistance. The Government of Malawi is working with development partners to improve climate change related data management systems. Estimates suggest that between 14,000 and 16,000 Gg of CO<sub>2</sub> equivalent will be saved per year by 2030 if a robust low emission development path is adopted.

At sectoral level, the largest emitters of greenhouse gases are forestry and land-use, agriculture and energy respectively (Figures 1 and 2). The largest sectoral increase will likely take place in the energy sector as new coal-based generation capacity by independent power producers (IPPs) comes on line to meet immediate energy deficits currently being experienced in Malawi. Due to unsustainable use of fuelwood and charcoal (97% of Malawians rely on biomass energy for cooking fuel), and poor agricultural practices, resulting in a high rate of deforestation and forest

degradation, Malawi is a net emitter of GHGs. Therefore, reliance on biomass energy for the majority of Malawians households continues to put pressure on existing forests, thereby reducing Malawi's sink capacity further. Investments in new and alternative renewable energy sources and the promotion of sustainable forest management practices will be an absolute necessity if deforestation and forest degradation are going to be halted. For the agricultural sector, enteric fermentation, manure management and the use of chemical fertilisers are major sources of emissions, resulting from farming activities as the nation strives to ensure household food security. Emissions in Industrial Process and Other Products Units (IPPU) reflect the growth in the cement industry as new entrants or expansion of existing manufacturing capacity takes place. Management of municipal solid wastes (MSW) is a big challenge to existing and new urban establishments, resulting in the emission of GHGs.

## ***2.2 Scope of gases covered***

As it was the case during the implementation of the Initial and Second National Communication, the following gases will be covered in this INDC: carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>) and nitrous oxide (N<sub>2</sub>O).

## ***2.3 Targets***

Malawi's targets reflect a consolidation and expansion of various climate change related initiatives that have been derived from policies, programmes, and projects. Table 1 shows policy mitigation actions in various sectors of the economy, which can be implemented using local resources (i.e., Unconditional). The table also shows mitigation actions, which the Government would undertake on condition that external support in terms of capacity building, technology development and transfer, and financial resources (i.e., Conditional) are provided thereby contributing meaningfully to the reduction of global emissions.

## ***2.4 Equity, fairness and ambition***

Levels of GHG emissions in Malawi are very low, amounting to 0.04% of the total global emissions in 2015. Despite this observation, Malawi Government, through this INDC, has expressed its intentions to contribute towards global efforts to reduce GHG emissions. Emission reduction efforts will concentrate in key sectors of forestry, agriculture and energy. Implementing all unconditional and conditional mitigation activities is expected to reduce the per capita emissions of Malawi from 1.4 t CO<sub>2</sub>e per capita in 2010 to around 0.7 to 0.8 t CO<sub>2</sub>e per capita in 2030 compared to expected business as usual emissions of around 1.5 t CO<sub>2</sub>e per capita in 2030. Potential reductions from the energy sector will be additional to the expected overall per capita GHG emissions reduction. Malawi is currently preparing the Third National Communication to the UNFCCC, which will provide an updated national GHG inventory. Since the results of the new GHG inventory are not available as of yet, Malawi intends to contribute to climate change abatement by implementing mitigation activities, which only provide estimates of GHG reductions through this INDC. Malawi seeks support to improve the national GHG inventory system with a view to provide accurate baseline emissions in the future.

## **2.5 Sectoral emissions**

Table 1 shows the detailed mitigation policy actions for the following sectors: energy; industrial processes and product unit (IPPU); agriculture forest and other land use (AFOLU); and waste.

### **2.6 Energy Sector**

Malawi's current electricity generation capacity is only 351MW against an estimated suppressed demand of 400MW. The hydroelectric power plants are mostly located on the Shire River. Biomass accounts for about 90% of energy supply. Access to grid electricity is at 10%, one of the lowest in the world. Malawi's electricity generation deficit is not only a hindrance to new investments in manufacturing, industry, mining and tourism but also detrimental to the social and economic well-being of its people. Thus, investments that would enhance the generation, transmission, distribution and utilization of alternative and renewable energy sources are key to the development of Malawi.

The Malawi Energy Policy (2003) envisaged a steady increase in hydroelectric power generation, reduction in biomass use, and steady growth in other renewable sources - especially solar, wind and micro hydro power plants. Most of the set targets were not achieved. Recent electricity projections show that Malawi has to rapidly increase its generation capacity to between 1,200MW and 1,500MW by 2020 in order to meet demand. There is a need to accelerate feasibility studies of potential HEP sites so that corresponding electricity generation growth exceeds that of fossil fuel based electric power plants. With external support, Government of Malawi will be able to make significant investments in energy generation from cleaner sources

### **2.6 Industrial Process and Other Product Units**

There is currently a shortage of decent houses both in urban and rural areas of Malawi. In order to meet the demand, the government needs to build an average of 21000 houses per annum. Thus demand for cement, cement products and burnt clay bricks will continue to grow. The two main areas of mitigation in the Industrial Processes and Product Use (IPPU) sector are the reduction in cement consumption through cement blend (using rice husks ash or coal ash) and use of soil stabilized building blocks in place of burnt clay bricks. External support in form of finance, capacity building and technology transfer would contribute towards reduction in GHG emission from IPPU sector.

### **2.7 Agriculture**

Even though the agricultural thematic area is responsible for a significant share of Malawi's GHG emissions, the overall mitigation potential is comparably small. The mitigation options for agriculture are: the promotion of sustainable intensification pathways for the livestock sector, including improved feeding, breeding and veterinary services as well as improved manure management; promoting agroforestry systems in targeted locations as source of biomass and soil carbon sequestration; optimizing fertilizer application with regards to product, rate, timing and placement and encouraging the application of organic amendments such as manure and crop

residues that contain the potential to contribute to soil carbon levels; the planting of nitrogen fixing plants to reduce fertilizer usage; as well as potentially reduced and zero tillage.

The mitigation measures suggested in the agricultural sector will unconditionally contribute 100 Gg CO<sub>2</sub> equivalent mainly from reduced synthetic fertilizer application, and around 400 Gg CO<sub>2</sub> equivalent per annum from implementing climate smart agriculture extensively by 2040, conditional upon support.

## **2.8 Forestry and other land-use**

The main activities responsible for greenhouse gas emissions and removals in the forestry sector include deforestation, forest degradation, and afforestation (which includes natural and assisted regeneration). On an annual basis, Malawi emits approximately 0.8 million tCO<sub>2</sub>e from deforestation, and approximately 10 million tCO<sub>2</sub>e from forest degradation. The current level of tree planting and natural or assisted regeneration sequesters approximately 0.9 million tCO<sub>2</sub>e annually. The result is an approximate net annual emission from the forestry sector of 9.9 million tCO<sub>2</sub>e annually.

Two main mitigation options have been proposed for the forestry sector which are in accordance with the recently approved Government of Malawi REDD+ Programme Action Plan: protection and conservation (of existing forests); and, afforestation (covering tree planting, as well as natural and assisted regeneration). Malawi is committed to pursuing policies and measures that slow and eventually reverse GHG emissions from deforestation and forest degradation, and increase removals through afforestation. Given limited resources, however, our ability to implement many of these measures, and to accurately capture resultant emission reductions, will depend to a large extent on adequate provision of international technical and financial assistance.

The proposed mitigation actions designed to enhance protection and conservation of protected areas (forest reserves and wildlife reserves) are projected to result in an unconditional emission reduction of approximately 4.8 million tCO<sub>2</sub>e. Conditional on external support, which would enable the Government of Malawi to expand protection and conservation efforts beyond the nine reserves prioritize by the Department of Forestry in 2015, the emission reduction from protection and conservation could be increased.

The mitigation actions that enhance afforestation and natural/assisted regeneration are projected to result in the unconditional sequestration of approximately 1 million tCO<sub>2</sub>e annually (through planned afforestation in plantations and on customary land, projected based on recent afforestation rates, and discounted to reflect realistic survival rates). Conditional on external support the contribution of afforestation could be increased. Specifically, for the Government of Malawi's to achieve its target of 2% increase in forest cover nationally, the area being afforested on an annual basis would need to increase four times. If conditional funding were available to achieve this target the mitigation benefit is projected to sequester approximately 2.6 million tCO<sub>2</sub>e.

## **2.9 Waste**

Population is the main driver of waste generation. Malawi's population is rural based, with 85% of its population living in the rural areas. However, the rate of urbanization in cities and town centres, estimated at 5.2%, is among the world's fastest growing. The high urbanisation rate and lack of designated plots have resulted in the expansion of informal settlements in its towns and cities, which are characterised by lack of access to basic services, including waste collection and disposal. The per capita waste generation ranges from 0.37 to 0.9, with organic content of 81%.

Mitigation interventions recommended are reduction of waste generation, recovery and use of landfill bio-gas, controlled waste incineration, and composting for organic manure as technological approaches to mitigate GHG emissions in the waste sector.

Conservative estimates, indicate that the mitigation potential could be as high as 400 Gg CO<sub>2</sub> equivalent by 2025, if additional measures (i.e. waste incineration, biogas recovery, processing MSW into fertilizers) will be implemented with external support.

Table 1: Malawi's policy-based mitigation actions.

Key: Unconditional (UC) Capacity requirements (CR), technology requirements (TR) and finance requirements (FR)

Sectors	Intended policy based action	Provision of implementation means			
		UC	CR	TR	FR
<b>Energy Supply</b>	Produce 2000 solar water heaters (SWH)	✓			
	Increase SWH from 2,000 to 20,000 by 2030		✓	✓	✓
	Install 20,000 solar PV systems	✓			
	Increase Solar PV from 20,000 to 50,000 by 2030		✓	✓	✓
	Produce 2 million litres of bio-diesel/year	✓			
	Increase biodiesel from 2 to 20 million/ year		✓	✓	✓
	Produce 18 million litres of ethanol/ year	✓			
	Increase ethanol production from 18 to 40 million litres per year		✓	✓	✓
	Increase number of passengers using mass transport by 1%	✓			
	Increase number of passengers using mass transport by 30%		✓	✓	✓
	Producing 351 MW of hydro electricity	✓			
	Increase generation of HEP by 800MW by 2025		✓	✓	✓
<b>Energy utilization</b>	Distribute energy saving cook stoves to 400 000 households	✓			
	Increase the number of households adopting energy saving stoves to 2,000,000 by 2030		✓	✓	✓
<b>Industrial Processes</b>	Increase use of soil-cement stabilized block and rice husk ash blended cement to around 10% of current cement production		✓	✓	✓
	Support research and use of alternative cement materials	✓			
	Develop national standards for alternative building materials and technologies		✓	✓	✓
	Support industries engaged in carbon capture and storage		✓	✓	✓
<b>Agriculture</b>	Support development of market based policies and legal instruments to shift decisions from financial to environmental decisions		✓	✓	✓
	Develop appropriate extension and training materials for climate resilient agronomic practices	✓			
	Upscale the dissemination of climate resilient agronomic practices to above 10% of current cropland		✓	✓	✓
	Build capacity to implement and monitor the agriculture NAMA		✓	✓	✓
<b>Forestry and land-use</b>	Afforestation, reforestation and forest conservation and protection of catchments	✓			
	Upscale afforestation, reforestation and forest conservation and protection of catchments		✓	✓	✓
	Implementation of payment for ecosystem service for hydroelectric dams		✓	✓	✓
	Promotion of non-extractive livelihoods from forest	✓			
	Upscale the non-extractive livelihoods from forest		✓	✓	✓
	Promote sustainable production of fuel wood by establishing woodlots plantations and forest management	✓			
	Upscale sustainable production of fuel wood by establishing woodlots plantations and forest management		✓	✓	✓
<b>Wastes</b>	Construct controlled landfill for biogas recovery to generate up to 240 GWh of primary energy (95 GWh of electricity) per year		✓	✓	✓
	Promote solid and water waste reduction practices at household, institutional and industry level to reduce waste generation	✓			
	Process municipal solid wastes into fertilisers		✓	✓	✓
	Install waste to energy incinerators to generate up to 250 GWh of electricity per year		✓	✓	✓

### 3 Adaptation measures

The priority sectors and thematic areas identified based on national development priorities are: agriculture (crops, livestock, fisheries), water resources, health, infrastructure, land-use planning, transport, population and human settlements, disaster risk management, forestry; wildlife, energy and gender. For all these sectors, there will be need for multi-sectoral collaboration in the implementation of various projects and programmes. Also, there will be need for capacity building, research, and consideration for disaster risk management as well as the need to harmonise policies. Table 2 shows the summary of adaptation measures.

#### *3.1 Agriculture*

The biggest adaptation challenge is Malawi's heavy reliance on rain-fed agriculture. The majority of smallholder farmers cannot afford irrigation technologies despite the fact that Malawi is endowed with abundant water resources. Climate change also requires farmers to adapt to new agronomic practices such as conservation agriculture, growing of drought tolerant crops, precision agriculture (which in turn also requires a better access to input for seeds and fertilizers) and agro-forestry amongst others in order to improve productivity. The Greenbelt Initiative by the Government to increase the level of irrigation farming is a key national adaptation measure to address this challenge.

#### *3.2 Water*

Potential adaptation measures in the water sector reflect the need to enhance and harmonise policies and strategies for catchment area protection, water conservation and sustainable utilization. The adaptation actions that Malawi is implementing in this sector include: the construction of multipurpose dams, implementation of water harvesting technologies, capacity building in integrated water resources management (IWRM), catchment management, promotion of irrigated agriculture (including the Greenbelt Initiative), fish farming, and water supply development for domestic and livestock use. Upscaling of the above listed activities will require external support.

#### *3.3 Human health*

Various studies have shown that under climate change scenario, the spread of climate-sensitive diseases such as malaria and diarrhoea would increase, and food production would decline resulting in malnutrition. Years of below-normal rainfall (e.g., 1991/92) have correspondingly led to higher incidents of malnutrition. These issues are highlighted in the NAPA.

Adaptation measures suggested in this INDC aim at enhancing institutional and human resource capacities so as to provide sustainable support to vulnerable groups in terms of disease monitoring, prevention and control.

#### *3.4 Wild life*

Droughts pose a major threat to wildlife in terms of availability of forage and water. Adaptation interventions are meant to prevent the extinction of the animal species while ensuring optimal population sizes are retained based on carrying capacity of the reserve. Efforts will be taken towards enhancing capacity to construct watering points, and control of animal population by culling or translocation amongst other approaches.

Table 2: Adaptation actions

Key: Unconditional (UC) Capacity Requirements (CR), Technology Requirements (TR) and Finance Requirements (FR)

Sectors	Intended policy based action	Provision of implementation means			
		UC	CR	TR	FR
<b>Agriculture</b>	Increase irrigation at smallholder level	✓			
	Increase land under irrigation through Greenbelt initiative from 20000 to 40000 ha	✓			
	Expanded programmes of Greenbelt initiative from 40000 ha to 10000 ha by 2030		✓	✓	✓
	Build adaptation capacity in climate resilient agronomic practices for smallholder farmers	✓			
	Promote on-farm water conservation technologies	✓			
	Support an expanded programme of constructing multipurpose dams for irrigation and aquaculture		✓	✓	✓
	Develop financial mechanisms to support crop insurance targeting smallholder farmers		✓	✓	✓
	Promote the growing of drought torelant crop varieties	✓			
	Implement conservation agriculture and agroforestry practices		✓	✓	✓
	Promote improved land use practices	✓			
<b>Water</b>	Implement integrated catchment conservation and management programme		✓	✓	✓
	Promote water harvesting technologies at all levels	✓			
	Support an expanded programme of constructing multipurpose dams to enhance water storage		✓	✓	✓
	Support the revision of water related policies and strategies (inc. water-SWAP)		✓	✓	✓
	Develop and enhance climate information and early warning systems		✓	✓	✓
<b>Human Health</b>	Build capacity to diagnose, prevent and control climate-sensitive diseases such as malaria, darrhoal diseases and malnutrition	✓			
	Enhance public awareness about water, sanitation and hygiene practices; and enhance health surveillance	✓			
	Support expanded programme for preventing and controlling climate-sensitive diseases		✓	✓	✓
	Construct more health centres in order to improve access to health facilities within a walking distance of 8 km		✓	✓	✓
<b>Energy</b>	Support the establishment of centre of excellence for research and disease control targetting climate-sensitive diseases		✓	✓	✓
	Promote use of biomass briquettes as substitute for firewood and charcoal	✓			
	Promote an energy mix that moves people away from use of biomass	✓			
	Support an expanded programme of briquette production and use		✓	✓	✓
	Construct storage dams for hydropower generation		✓	✓	✓
	Promote solar PV and use of energy efficient bulbs	✓			
<b>Forestry</b>	Promote use of bio-fuels for lighting and cooking replacing fossil based fuel	✓			
	Support research in drought tolerant and fast growing tree species	✓			
	Expand afforestation and forest regeneration programmes		✓	✓	✓
	Promote growing of drought tolerant and fast frowing tree species	✓			
<b>Wildlife</b>	Provide watering points at strategic locations of national park/ game reserve		✓	✓	✓
	Implement diseases control programmes		✓	✓	✓
	Support capacity building in wildlife institution to lead in adaptation initiatives e.g. translocation and culling.		✓	✓	✓
<b>Fisheries</b>	Capacity building in aquaculture and cage culture fish farming practices	✓			
	Adopt eco-system services approach in the management of fisheries resources	✓			
	Promote aquaculture and cage culture fish farming practices		✓	✓	✓
	Protect of fish spawning/breeding sites	✓			
	Maintain fingerings for stocking lakes and rivers after severe droughts episodes	✓			
<b>Gender (and vulnerable groups)</b>	Promote gender mainstreaming in policies, programmes and projects	✓			
	Support capacity building programmes for vulnerable groups		✓	✓	✓
<b>Infrastructure</b>	Construct infrastructure for flood control, transport, etc		✓	✓	✓
	Develop and implement dimate related building codes/standards		✓	✓	✓
	Revise existing building standards in line with dimate change	✓			
<b>Industry</b>	Promote reserch in industrial technologies		✓	✓	✓

### *3.5 Energy*

Most of the energy sector interventions that have been put forward as mitigation activities have adaptation co-benefits. The vulnerability of energy production is related to the sources being affected by floods and droughts in terms of damage to machinery, loss of biomass productivity and availability of appropriate alternative technologies. For instance, solar PV is an alternative energy source for lighting when there is load shedding resulting in generation outage, but the technology is currently unaffordable without international support. Biomass briquettes and bio-fuels provide alternative energy sources in place of charcoal and firewood as the national forest stand is simultaneously under pressure from unsustainable wood extraction and climate change effects.

### *3.6 Forestry*

Forest productivity will be greatly affected by erratic rainfall and extended droughts. Overtime, communities may adapt by planting tree species that are drought tolerant and fast growing such as bamboos. This would reduce pressure on standing forests since communities would be harvesting wood for fuel from their own woodlots. Some mitigation interventions in the forestry sector also have adaptation co-benefits elements. For example, forest regeneration could spur bee-keeping and indigenous mushroom harvesting thereby taking people-off from forest extractive activities.

### *3.7 Fisheries*

Fish provides about 60% of animal protein intake in Malawi and is a source of employment for many Malawians. Unfortunately, fish population is declining rapidly due to climate change as well as non-climate factors such as rapid population growth resulting in unsustainable levels of fish harvesting. Fish farming using ponds and cages provides an opportunity to enhance the quality of life of vulnerable groups through improved access to fish resources. This development could be directly linked to the construction of multipurpose dams. Improved co-management of capture fisheries also has strong potential to buffer food security and improve the climate resiliency of fishing-dependent communities.

### *3.8 Gender*

It is worth noting that gender is a cross-cutting issue. Hence, it needs to be mainstreamed in all the sectors. Vulnerable and disadvantaged groups carry the burden of the impacts of climate change. Women and girls are particularly impacted, as they have to walk further in search of basic commodities for the family such as firewood and water. Yet, women may not have the authority to decide on alternative and climate-resilient solutions for the household. The adaptation interventions proposed in this INDC are meant to enhance gender inclusiveness in the adaptation programmes and projects.

### *3.9 Infrastructure*

Adaptation measures under this subsector are meant to provide physical barriers for flood prevention and control and facilitate the revision of construction and building standards in line with the changes in climate-based design parameters. The interventions are also meant to contribute to green and climate-resilient buildings.

## 4 Time frames and period for implementation

The timeframe for implementation of the Malawi INDC is 2015 to 2040. This timeframe will allow development of a detailed INDC plan and feed into the medium term plan of the successor MGDS III which will become effective in 2016, and also be aligned with the new long term vision when the current expires in 2020.

## 5 The INDC Development Process

The preparation of Malawi's INDC was conducted with government's full commitment and all inclusive process: It passed through the establishment of national INDC taskforce and the launching of the process at national level. The draft was prepared by the national taskforce assisted by national and international experts. The review of national policies and strategy documents as well as a series of consultations of key stakeholders, including a national workshop for the final validation of the INDC were conducted. Finally the document was approved by government.

## 6 Other implementation considerations

### 6.1 Assumptions

The implementation of mitigation and adaptation actions indicated as "with *requirements*" will require availability of financial resources, technology development and transfer, and capacity building from the international community. The Government of Malawi is willing to implement some of the adaptation and mitigation actions indicated as 'unconditional' by pulling resources from domestic sources. Development partners and other stakeholders at the national level are invited and requested to provide the required support to ensure that the recommended projects are implemented. For this to happen, the outcome of the United Nations Climate Change Conference in December 2015 in Paris, France is expected to be in full conformity with equity and common but differentiated responsibilities; and the contributions forthcoming from developed country Parties relating to mitigation and adaptation will be in a balanced manner, in the context of a global and comprehensive agreement for the period beyond 2020. The economic development landscape in the country will also be key in determining the implementation of the mitigation and adaptation actions proposed.

### 6.2 Human rights and Gender

Vulnerability and adaptation assessments have shown that most of Malawi's social economic sectors are prone to negative impacts of climate change. Through this INDC, Malawi has expressed the need for external support in the implementation of adaptation policy actions that will reduce the vulnerability of the sectors and enhance people's resilience to the negative impacts of climate change.

Human rights and gender issues are enshrined in the Malawi Constitution, and Government of Malawi is committed to its Gender Policy, promoting the mainstreaming of gender in all government sectors, programmes and projects. Consideration of these cross-cutting issues is critical in the design and implementation of mitigation and adaptation actions.

### *6.3 Policy framework to support implementation*

Malawi launched its Vision 2020 in the year 2000 to provide a roadmap for sustainable development in the country. This provided the basis for developing medium term developmental plans such as the Malawi Poverty Reduction Strategy Programme (MPRSP), Malawi Economic Growth Strategy (MEGS) and Malawi Growth and Development Strategy I & II (MGDS I & II). MGDS II spans over the period 2011 to 2016. At the sectoral level, the National Environmental Action Plan (NEAP) (1994) and National Environmental Policy (NEP) (revised 2004) provided policy guidance and direction to manage the environment, natural resources and climate change. There have been other strategic documents that have provided policy direction such as the National Communications of 2002 and 2011 submitted to COP, NAPA (2006), National Environment and Climate Change Communication Strategy (2012), Malawi's Climate Change Learning Strategy (2012) and National Climate Change Investment Plan (2014). MGDSII recognises climate change as a key priority area.

## **7 Monitoring and Evaluation System for Adaptation**

For all government programmes and projects implemented in the country, a monitoring and evaluation framework is in place. The M&E activities are undertaken by the Ministry of Finance, Economic Planning and Development in collaboration with sectoral ministries. The INDC M&E will be done by the MFEPD, Ministry of Natural Resources, Energy and Mining and other sectoral ministries. Government of Malawi will require external technical and financial support to put in place a tailor-made INDC tracking system to monitor short, medium and long term implementation.

## INTENDED NATIONALLY DETERMINED CONTRIBUTION OF THE GOVERNMENT OF MALAYSIA

In accordance with decisions 1/CP.19 and 1/CP.20 of the UNFCCC, the Government of Malaysia is pleased to communicate its Intended Nationally Determined Contribution (INDC), together with relevant clarifying information.

### MALAYSIA'S INTENDED NATIONALLY DETERMINED CONTRIBUTION

Malaysia intends to reduce its greenhouse gas (GHG) emissions intensity of GDP by 45% by 2030 relative to the emissions intensity of GDP in 2005. This consist of 35% on an unconditional basis and a further 10% is condition upon receipt of climate finance, technology transfer and capacity building from developed countries.

<b>Quantifiable information on the reference point</b>	Base year: 2005 <ul style="list-style-type: none"> <li>• Emissions in the base year: 288,663 Gg CO<sub>2</sub>eq*</li> <li>* Emissions in the base year includes emissions from land use, land use change and forestry (LULUCF) which have been estimated at 25,667Gg CO<sub>2</sub>eq respectively,</li> <li>• GDP in the base year (constant price at 2005): RM 543.578 billion</li> <li>• Emissions intensity of GDP in the base year: 0.531 tons CO<sub>2</sub>eq per thousand RM</li> </ul>
<b>Time frame for implementation:</b>	<b>10 years – 2021 to 2030</b>
<b>Scope and coverage</b>	<i>Gases covered:</i> Carbon dioxide (CO <sub>2</sub> ) Methane (CH <sub>4</sub> ) Nitrous Oxide (N <sub>2</sub> O)  <i>Coverage:</i> Economy-wide emissions intensity of GDP  <i>Sectors:</i> Energy Industrial Processes Waste Agriculture Land Use, Land Use Change and Forestry (LULUCF)
<b>Planning processes</b>	The INDC was developed through participatory process through an inter-ministerial/agencies working group. Stakeholder consultations were conducted to obtain

	<p>inputs on possible measures to reduce greenhouse gas emissions. The projected outcomes from the 11<sup>th</sup> Malaysian Development Plan and the following policies and plans form the basis for the development of this INDC:</p> <ol style="list-style-type: none"> <li>a. National Petroleum Policy (1975)</li> <li>b. National Energy Policy (1979)</li> <li>c. National Depletion Policy (1980)</li> <li>d. Four-Fuel Diversification Policy (1981)</li> <li>e. National Forestry Policy (1978, Revised 1992)</li> <li>f. National Policy on Biological Diversity (1998)</li> <li>g. Five-Fuel Policy (2001)</li> <li>h. National Policy on the Environment (2002)</li> <li>i. National Strategic Plan for Solid Waste Management (2005)</li> <li>j. National Biofuel Policy (2006)</li> <li>k. National Energy Policy (2008)</li> <li>l. National Green Technology Policy (2009)</li> <li>m. National Policy on Climate Change (2009)</li> <li>n. New Economic Model, Government Transformation Programme and Economic Transformation Programme (2010)</li> <li>o. Renewable Energy Policy and Action Plan (2010)</li> <li>p. Second National Physical Plan (2010)</li> <li>q. Low Carbon Cities Framework (2011)</li> <li>r. National Agro-food Policy (2011)</li> <li>s. National Water Resources Policy (2012)</li> <li>t. National Automotive Policy (2014)</li> </ol>
<p><b>Assumptions and methodological processes</b></p>	<p><i>GHG Inventory Method</i>  Malaysia used the Revised 1996 IPCC Guidelines, Good Practice Guidance, 2000 and Good Practice Guidance for LULUCF, 2003 for current reporting. From 2017 onwards, the 2006 IPCC Guidelines will be used.</p> <p><i>Global Warming Potential Used</i>  Global warming potential values on a 100 year timescale in accordance with IPCC's 2<sup>nd</sup> Assessment Report</p> <p><i>International market mechanism</i>  Malaysia has no intentions to use international market mechanism to achieve INDC contributions.</p> <p><i>LULUCF</i>  The inclusion of non-forest land (cropland, grassland, wetlands and settlement) will be determined later.</p>

### **Fairness and Ambition Considerations:**

Malaysia's total GHG emissions represent about 0.6% of global emissions in 2011. The emission intensity per GDP was 0.41 tCO<sub>2</sub>eq/RM1000 for that year. This represents a reduction of about 23 % from 2005 values. The total GHG emissions including removals by LULUCF sinks is about 0.05% of global emissions.

The country continues to allocate financial resources for the implementation of climate change mitigation programmes through both public and private sector initiatives. The climate-related policies are implemented along with national priorities such as poverty eradication, improving quality of life and development. In addition, financial resources are also frequently reallocated to address losses due to increased incidences of natural disasters.

#### **➤ Malaysia has taken early action**

Since the Ninth Malaysia Plan (2006-2010), Malaysia has started initiatives to increase the share of use of non-fossil fuel energy. The National Biofuel Policy 2006 already laid the groundwork for the development and use of biofuels. The National Biofuel Industry Act 2007 was put in place to regulate the biofuel industry and to promote the mandatory use of the B5 domestic blend of 5% palm biodiesel and 95% fossil fuel diesel. At the end of 2014, Malaysia had also introduced the bio-diesel B7 Programme.

The Tenth Malaysia Plan (2011-2015) focussed on sustainable growth and introducing mitigation strategies to reduce emissions of GHG. Three significant financial tools were introduced to promote sustainability measures. These consist of the introduction of a feed-in-tariff (FiT) mechanism in conjunction with the Renewable Energy Policy and Action Plan (2010) to help finance renewable energy investment, providing fiscal incentives and funding for green technology investments and promoting projects eligible for carbon credits. In the forestry sector, two major initiatives were launched, the Central Forest Spine (CFS) and Heart of Borneo (HOB) to ensure sustainable forest management and use of natural resources.

The government will continue to pursue the green growth goal under the Eleventh Malaysia Plan (2016-2020) will further focus on pursuing green growth for sustainability and resilience. These include strengthening enabling environment for green growth, adoption of sustainable consumption and production, conserving natural resources and strengthening resilience against climate change and natural disasters. These actions will further reduce Malaysia's carbon footprint.

#### **➤ Major barriers for implementation include high costs and capacity constraints**

Malaysia developed *A Roadmap of Emissions Intensity Reduction in Malaysia* in 2014. The study indicated that Malaysia has opportunities across various sectors to meet the reduction target of 40% emissions intensity reduction of GDP. However, while these opportunities exist, considerable efforts would be required to realise these emissions reductions in light of the challenges and barriers described below.

### *TECHNOLOGY COST*

Many mitigation actions are limited by the cost and suitability of appropriate technologies. Generation cost of renewable energy is still higher than conventional energies while rail based mass transport systems have high capital cost. Benefit relating to electrification of transportation systems are also limited by the current fuel mix used for electricity generation which consist mainly of fossil fuels.

### *INSTITUTIONAL FRAMEWORK and CAPACITY*

Climate change is a cross cutting issue and currently the institutional framework to address the issue is fragmented. It is often a consequential co-benefit outcome of agencies' core responsibilities. Creating long-term commitment from all stakeholders, businesses, civil society, and people, is critical as this transition and associated results will take time. In addition, new competencies and skills need to be developed.

### *LULUCF LEGACY ISSUES*

Malaysia has a long forest management history. However, there are some areas of forest that have been degraded due to past management effects. Restoration and rehabilitation of these forests incurs high cost and nurturing. Furthermore, the advent of climate change has also highlighted another legacy in forest management, that is, the drained peatlands. In the 1960s and 70s, peatlands were considered a wasteland and draining was considered an effective rehabilitation to improve the productivity. Some of these drained peatlands are now unmanaged and are susceptible to wildfires during the dry seasons. It is also expensive to "re-wet" these areas.

### **Adaptation**

Over the past five decades, positive trends in temperature increase have been observed in Malaysia. The surface mean temperature increase is around 0.14°C to 0.25°C per decade. The surface maximum temperature increase is around 0.17°C to 0.22°C per decade, and the surface minimum temperature increase is around 0.20°C to 0.32°C per decade. Realising adaptation to climate change is required to build resilience, Malaysia has taken early actions to mainstream adaptation to climate change into development. During the Tenth Malaysia Plan, Malaysia spent RM51 billion to enhance resilience against climate change. A national adaptation plan would be developed to provide greater coordinated implementation.

### *Addressing Flood Risks*

Malaysia is prone to seasonal monsoon floods. Average annual direct loss from these floods amounts to RM915 million. In the recent decade, rainfall intensity has increased leading to more severe monsoonal floods. Urban areas are also becoming more prone to flash floods due to the higher rainfall intensity. In the extreme floods in 2014, damage to public infrastructure amounted to RM2.9 billion. However, Malaysia has been implicitly building adaptation resilience through its development Plans. From 2004 to 2014, Malaysia has invested over RM 9.3 billion on flood mitigation. Flood mitigation programmes and

strengthening of disaster risk management and resilience of infrastructure would be further enhanced in the Eleventh Malaysia Plan and beyond.

#### *Water Security*

Over 97% of the water supply is derived from surface water in rivers and reservoirs, hence management of these vital water catchment areas is crucial to ensure a reliable source of water supply. As part of forward planning on water supply requirements, a Review of the National Water Resources Study (2000-2050) was completed in 2011 and a National Water Resources Policy was formulated in 2012. To ensure adequate and safe water supplies, inter-basin water transfer projects are being implemented to supply water to areas that are experiencing water-stress due to high economic and population growth and spatial and temporal shifts in rainfall distribution. Although expensive, these infrastructure investments are necessary to address water resource needs under a future climate regime. During the Tenth Malaysia Plan, over RM 12 billion were spent on improving the water sector infrastructure, with over RM 5.6 billion being used for developing the water supply for the rural areas. Moving forward, the Eleventh Malaysia Plan among others aims to strengthen the regulatory framework of the water services industry, expand the water supply network and treatment capacity infrastructure and increase the efficiency of water supply services.

#### *Food Security*

The development of the agriculture sector in Malaysia is guided by the National Agro-food Policy (2011-2020) and the National Commodity Policy (2011-2020), which aim to increase food production and exports of industrial commodities. In the Tenth Malaysia Plan, RM 5.1 billion was allocated to improve the agriculture and agro-based industries in Malaysia. The Eleventh Malaysia Plan would further expand implementation of good agricultural practices and intensifying research and development for improving agriculture production. New granary areas and adequate and efficient irrigation and drainage infrastructure will be developed to increase the production of rice.

#### *Protecting Coastlines*

Malaysia has about 5267km of coastline and 29% of these faces erosion problems. As part of the solution towards coastal erosion, both hard and soft engineering approaches had been implemented. For the longer term, Integrate Shoreline Management Plans (ISMPs) have been developed and implemented for specific areas. In addition, a National Coastal Vulnerability Index to sea-level rise is being developed. Detailed sea level rise studies had also been conducted at some of the vulnerable coastal areas to project future vulnerabilities in a 20-year sequence from 2020 to 2100.

#### *Health*

During the Tenth Malaysia Plan, Malaysia spent over RM 9 billion on the health sector, with over RM 1.5 billion being for adaptation of the health sector to climate change. In particular, vector-borne diseases such as dengue and malaria are expected to be further exacerbated by rising temperatures and high rainfall. The dengue menace in urban centres has been a

constant public health challenge affecting a wide population of all age groups in Malaysia and this is expected to worsen with the impacts of climate change. The control and prevention of dengue transmission using early test kits and community behavioural intervention as well as exploratory research on alternative medicines are among the efforts being undertaken.

In addition, climate-related disasters are already posing huge challenges to the public disaster management systems. Ensuring clean water supply and optimal sewerage services are particularly difficult during disasters such as flooding, as experienced during the recent year-end massive flooding that affected several states, giving rise to food and water-borne diseases.

# **MALDIVES' INTENDED NATIONALLY DETERMINED CONTRIBUTION (INDC)**



## Vision

To recognize the status of Maldives as a nation suffering from the adverse impacts of climate change and to build its capacity to ensure a safe, sustainable and resilient and prosperous future

## National Circumstances and Challenges

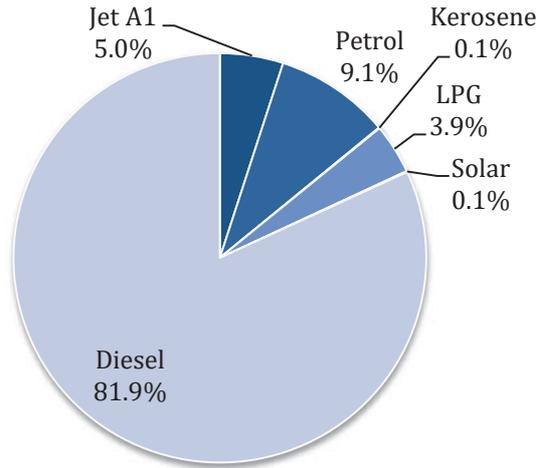
The Maldives is a low lying island nation in the Indian Ocean with a population of 341,256 (2014). The country consists of about 1190 islands and the population is distributed over approximately 197 inhabited islands. The country's main economic sectors are tourism and fisheries, both of which are extremely climate-sensitive.

The challenges Maldives faces in the context of climate change and development are similar to other small island nations. These challenges include, but are not limited to, the low lying nature of the islands, high population density, high levels of poverty, and a dispersed geography. Because Maldives is a small low lying island nation, its vulnerability to climate change impacts and associated extreme weather events and disasters are significantly greater due to limited ecological, socio-economic, and technological capacities. Maldives' geography also makes communication difficult and transport expensive. Maldives' small, physically isolated economy is highly susceptible to global influences and shocks.

Continuous efforts are being undertaken to increase adaptation actions and opportunities, and to undertake low emission development. However, limited financial resources, capacity and technology remain as major challenges in addressing the impacts of climate change.

Maldives' high level of fuel imports poses a number of challenges. The country's energy demand is completely met by imported fossil fuel. Therefore it is imperative that the Maldives explore, develop and deploy indigenous, clean and renewable sources to meet energy demand and ensure energy security.

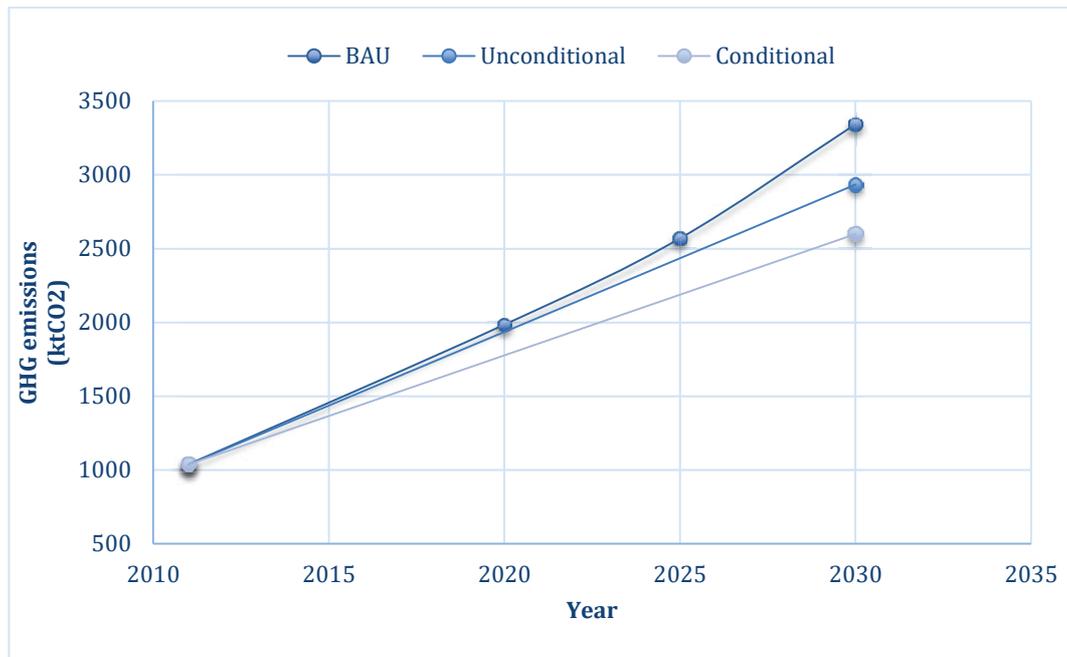
Maldives' 2011 energy balance shows that there was approximately 313 kilo tonnes of oil equivalent (ktoe) of energy consumed in the Maldives of which over 80% was from imported diesel oil as shown in Figure 1. Energy consumption contributes to about 1.04 million tonnes of CO<sub>2</sub> emissions in 2011 which is about 0.003% of global emissions. Energy consumption in various sectors constitutes a major share of the country's GHG emissions. Although there has been some solar photovoltaic (PV) penetration, this amount is insignificant compared to the country's energy demand.



**Figure 1. Energy consumption by source in the Maldives for 2011**

Considering the growth rate of the imported fossil fuel usage in the country, it is estimated that under the BAU scenario will generate about 3.3 million tonnes CO<sub>2</sub> equivalent by year 2030. Maldives intends to take actions and undertakings to reduce unconditionally 10% of its GHG emissions (under a BAU) by the year 2030. These actions and undertakings could be scaled-up to 24% in a conditional manner, in the context of sustainable development, supported and enabled by availability of financial resources, technology transfer and capacity building.

These scenarios are depicted in the Figure 3 below.



**Figure 3. Projected GHG emissions from energy consumption for the Maldives 2011-2030**

## Mitigation Contribution

Maldives aims to achieve a low emission development future and ensure energy security.

<p><b>Unconditional Reduction</b></p> <p>“In accordance with Decisions 1/CP.19 and 1/CP.20, Maldives communicates that it intends to reduce unconditionally 10% of its Greenhouse Gases (below BAU) for the year 2030”</p> <p><b>Conditional Reduction</b></p> <p>“The 10% reduction expressed above could be increased up to 24% in a conditional manner, in the context of sustainable development, supported and enabled by availability of financial resources, technology transfer and capacity building.</p>	
<b>Timeframe</b>	2021 – 2030
<b>Type of Contribution</b>	Maldives is focusing its efforts, actions and undertakings in reducing its GHG emissions in the energy sector. These actions and undertakings will be based on strategies and sectoral action plans designed, amongst others, for the following areas of intervention: energy, tourism, waste, water, and building sectors.
<b>Sectors</b>	<ul style="list-style-type: none"> <li>• Energy <ul style="list-style-type: none"> <li><i>Electricity generation</i></li> <li><i>Energy Efficiency – domestic consumption</i></li> <li><i>Energy Efficiency – processes and product use</i></li> </ul> </li> <li>• Transportation</li> <li>• Waste</li> </ul>
<b>Gases</b>	CO <sub>2</sub> , CH <sub>4</sub> Contribution of other GHGs like Sulphur hexafluorides (SF <sub>6</sub> ) and Nitrous oxides (N <sub>2</sub> O) are significantly low and hence not considered
<b>Accounting Methodologies</b>	For the purpose of this INDC GHG emissions have been derived using the 1996 Intergovernmental Panel on Climate Change (IPCC) Guidelines for National Greenhouse Gas Inventories based on the Sectoral approach. Further, the following methodology was adopted for the GHG abatement costs analysis. <ol style="list-style-type: none"> <li>a. Establishing an energy balance as disaggregated as possible, based on the latest available data which was derived from 2011.</li> </ol>

	<p>The energy balance was converted to GHG-emissions for 2011 by use of IPCC conversion factors.</p> <p>b. Energy balance of 2011 was projected to 2030 under a BAU. As the 2030 projection describes the business as usual (BAU) scenario, energy services by 2030 were assumed to be produced and consumed with the same technologies and efficiencies as were assumed for the 2011-energy balance. The growth assumptions used for Maldives national planning were taken into account in developing the 2030-projection.</p> <p>c. Based on inter alia existing studies mitigation options in various sectors of the economy were identified and further analysis was undertaken by the “Greenhouse Gas Costing Model” (GACMO).</p>
<p><b>Fairness and Ambition</b></p>	<p>Despite the Maldives' dependence on fossil fuels, its global GHG contribution is only 0.003%. However, Maldives is taking actions and undertakings in accordance with common but differentiated responsibilities and respective capabilities to achieve the ultimate objective of United Nations Convention Framework on Climate Change.</p> <p>The main area of focus for mitigation is fuel switching to alternative energy options, which is severely constrained by the limited land area, geographic isolation of islands and geographic dispersion of populations. Solar irradiance is available in the country throughout the year, however due to lack of technical capacity, limited land area, already established diesel based power generation systems and high investment costs pose a major challenge to the introduction of solar PV systems in the country. Although ocean currents and the waves surrounding each island might be the perfect renewable energy resource for the Maldives and other SIDS, the technologies to harness them are still at pilot stages around the world and commercially not available. Wind resources are low due to the low lying and flat nature of the country, but efforts are ongoing to incorporate it into the energy mix.</p> <p>These unfavorable conditions and barriers severely</p>

	<p>limit the use of alternative energy sources in the Maldives and have resulted in Maldives being heavily dependent on imported fossil fuels.</p> <p>As Maldives is already facing the consequences of extreme and slow onset events, there is a need for urgent and immediate adaptation actions. Maldives is undertaking a number of adaptation actions through the use of domestic and international resources most of which addresses immediate needs of the country.</p> <p>Considering these constraints, challenges and the increasing vulnerabilities to the adverse impacts of climate change and the insignificant share of global GHG emissions, the Maldives' INDC is highly equitable and ambitious.</p>
<p><b>Institutional Arrangement</b></p>	<p>The Maldives' Intended Nationally Determined Contributions (INDC) was developed through extensive consultations with representatives of the general public, government institutions, the private sector, non-governmental organizations and other relevant stakeholders.</p> <p>The Ministry of Environment and Energy is the main executing agency of the INDC process in close collaboration with other ministries and stakeholders.</p> <p>The executing agency will undertake monitoring, reporting and verification (MRV).</p> <p>Public awareness, capacity building, development of strategies, supportive mechanisms, and monitoring of financial flow for implementation will be undertaken by the executing agency.</p>
<p><b>Means of implementation</b></p>	<p>Actions and undertakings in this INDC will be carried out through synergizing international and domestic support.</p> <p>The successful implementation of both adaptation and mitigation actions and undertakings of the Maldives require provisions of adequate and predictable financial resources, transfer of environmentally sound technologies and capacity building support.</p>

## Adaptation Contribution

Maldives aims to undertake adaptation actions and opportunities and build climate resilient infrastructure to address the current and future impacts of climate change.

As a minimal contributor to global GHG emissions, Maldives places a significant priority on adapting to the adverse impacts of climate change.

Adaptation Contribution	
<b>Enhancing Food Security</b>	<p>Agriculture and food production is very limited in the Maldives due to land scarcity, poor soil conditions and limited water resources.</p> <p>The Maldives, is a highly import oriented economy with respect to its staple food requirements. Moreover, the extensively scattered and irregular geography results in tremendous barriers and added risks towards adequate storage and distribution facilities especially in order to handle unexpected market irregularities.</p> <ul style="list-style-type: none"> <li>• <i>Strengthen existing climate risk insurance mechanism to protect the farmers and reduce the income losses from extreme weather events.</i></li> <li>• <i>Establishment of strategic food storage facilities and distribution centres across the country as an adaptive measure to increase accessibility and reduce the risk of food shortages during extreme events.</i></li> <li>• <i>Promotion and introduction of alternative technologies to make local agriculture more resilient.</i></li> <li>• <i>Establish mechanisms to ensure food security to citizens in case of extreme events and market irregularities.</i></li> </ul>
<b>Infrastructure Resilience</b>	<p>Considering the highly vulnerable nature of the Maldives the critical infrastructure in the country require additional protection from the potential adverse impacts of climate change. The Ibrahim Nasir International Airport, and other international and domestic airports and sea-ports are crucial infrastructure in the Maldives. Increasing resilience of island communities is a critical challenge, which needs to be addressed to meet the adverse impacts of climate change.</p> <ul style="list-style-type: none"> <li>• <i>The Ibrahim Nasir International Airport is planned for</i></li> </ul>

	<p><i>expansion to handle additional passenger capacity along with an additional runway. Moreover, coastal protection measure would be carried out to protect the shoreline of Hulhule (the Airport Island) as well as for other air and sea ports.</i></p> <ul style="list-style-type: none"> <li>• <i>Malé Commercial Port that handles more than 90 percent of the imported cargo. To increase the capacity and reduce the impacts of high winds and seas to the operation of the port, the commercial port would be relocated to a different island called Thilafushi.</i></li> <li>• <i>Increase resilience and climate proofing of all critical infrastructures across the country including utility services, health care facilities, and telecommunications.</i></li> <li>• <i>A National Building Code will be established to provide guidance to the planners, architects and engineers to integrate climate and weather related factors into the designs of buildings and facilities. The building code will help to increase resilience and climate proofing.</i></li> <li>• <i>Establishment of National Development Act to facilitate integration of climate change into development planning, considering the economies of scale for public services, land use planning and population consolidation.</i></li> </ul>
<p><b>Public Health</b></p>	<p>Mortalities due to vector borne diseases have been identified as an emerging health challenge while water borne disease incidences are high during extreme weather events as a result of inadequate access to safe water and sanitation. However, with present data management methods, it is difficult to use existing health records to research the effects of climate change on human health. There is an urgent need to study the effects of climate change on the prevalence of vector borne diseases in the Maldives.</p> <ul style="list-style-type: none"> <li>• <i>Vector surveillance program covering all the islands to address the emergence and re-emergence of vector borne diseases will be formulated and implemented.</i></li> <li>• <i>Nationwide vector control programs will be developed and implemented.</i></li> <li>• <i>Food safety increased through appropriate policies and monitoring mechanisms.</i></li> </ul>

<p><b>Enhancing Water Security</b></p>	<p>The Maldives has very limited freshwater resources. The country's freshwater resources exist as groundwater in the form of a thin fresh water lenses. In most of the islands, the groundwater is not suitable for potable use due to saltwater intrusion and poor water quality. Climate change is expected to pose further risks to availability, accessibility and quality of water sources.</p> <p>Rainwater is the main source of drinking water in more than 90% of the outer islands. Groundwater is used for other domestic purposes and agriculture. Changes in average annual and temporal patterns of the rainfall have led to localised water stress in a large number of islands requiring augmentation by desalination alternatives and transportation of water resources to water stressed locations.</p> <ul style="list-style-type: none"> <li>• <i>Desalinisation has been widely used in the Maldives as an adaptation technology to supplement the existing water resources. Cost effective desalination techniques will be explored in the future.</i></li> <li>• <i>Provision of Integrated Water Resource Management Schemes which includes rainwater harvesting, groundwater recharging and desalination.</i></li> <li>• <i>Develop appropriate policies and implement programs to address water security and water shortages facing the islands during the dry periods.</i></li> </ul>
<p><b>Coastal Protection</b></p>	<p>The islands of the Maldives are low lying and beach erosion is widespread causing significant loss of land and costal infrastructure. Priority is given to protect the human settlements and infrastructure of inhabited and resort islands.</p> <ul style="list-style-type: none"> <li>• <i>Facilitate and continue to invest in coastal protection of inhabited islands and resorts.</i></li> <li>• <i>Include land elevation, shore protection and reclamation as an adaptation measures to increase resilience of vulnerable islands.</i></li> </ul>
<p><b>Safeguarding coral reef and its biodiversity</b></p>	<p>Coral reefs are an important contributor the economy supporting tourism and fisheries. The reefs support rich biodiversity providing food and livelihoods to island communities. This vital ecosystem is highly sensitive to changing sea surface temperature and other climatic factors. The evidence from the reefs of the Maldives</p>

	<p>supports that warming of the ocean surface leads to significant coral bleaching. In some instances, coral reefs surrounding the islands are stressed due to land based sources of pollution.</p> <ul style="list-style-type: none"> <li>• <i>Coral reefs conservation through ecosystem approach as an adaptation measure to increase the resilience of the coral reef ecosystem.</i></li> <li>• <i>Reduction of sources of pollution through appropriate policies, development of appropriate sewage treatment systems on the islands, management and safe disposal of solid waste are considered as an adaption measures to protect the coral reefs.</i></li> </ul>
<b>Tourism</b>	<p>Climate change would have implications on the tourism industry developed around the clear water surrounding the islands, white sandy beaches and vibrant coral reefs.</p> <p>Protection of resort island's beach and its coastal infrastructure is important to safeguard the tourist product and tourist facilities, which represent massive capital investments.</p> <ul style="list-style-type: none"> <li>• <i>Establish an insurance mechanism to reduce the impacts on the tourism sector through risk sharing and risk management.</i></li> <li>• <i>Establish a Green Tax on tourism to finance for environmental management including adaptation.</i></li> </ul>
<b>Fisheries</b>	<p>Tuna fisheries are an important economic sector in the Maldives. Live bait is a prerequisite for the unique pole and line fishery which is sensitive to the monsoonal changes and climate variability. Tuna is expected to move deeper waters due to impacts of climate change.</p> <ul style="list-style-type: none"> <li>• <i>Facilitate fisheries industry to adapt tuna catch from shallow water to deep water.</i></li> <li>• <i>Diversification of the fisheries sector to sustainable use of available marine resources.</i></li> <li>• <i>Facilitation and increase access to finance to develop mariculture.</i></li> <li>• <i>Strengthen fisherman insurance mechanism to ensure</i></li> </ul>

	<p><i>minimum monthly income from fishing activities for lost fishing due extreme events.</i></p>
<p><b>Early warning and Systematic Observation</b></p>	<p>Climatological measurements are limited due to capacity constraints and inadequate resources. Improvement of climate data collection, management and forecasting remains a critical gap area.</p> <ul style="list-style-type: none"> <li>• <i>Expand and strengthen the meteorological network and weather related early warning system to cover all the communities of the Maldives.</i></li> <li>• <i>Improve climate forecasting using climate modeling to provide information to support decision making sectors affected by weather and climate variability.</i></li> <li>• <i>Develop appropriate early warning systems and risk management tools.</i></li> </ul>
<p><b>Cross Cutting Issues</b></p>	<p><b>Finance</b></p> <p>Sustainable finance remains a major challenge in addressing climate. Domestic budgetary spending on addressing climate change remains an additional burden towards the achievement of sustainable development. Nevertheless public finance is being allocated to meet urgent and immediate adaptation actions. However International support is necessary to address the adverse impacts of climate change facing the islands of the Maldives.</p> <ul style="list-style-type: none"> <li>• <i>Creating sustainable financing mechanisms for programmes related to climate change activities.</i></li> <li>• <i>Establishment of a Maldives Climate Resilient Fund to finance climate change adaptation and mitigation programs.</i></li> </ul> <p><b>Climate governance and capacity building</b></p> <p>Addressing the adverse impacts of climate change requires good governance and adequate capacity. Education, training and public awareness remain a key priority. Climate change research and technology transfer remains an area, which needs to be strengthened.</p> <ul style="list-style-type: none"> <li>• <i>Develop National Adaptation Plans to address immediate, medium and long term adaptation</i></li> </ul>

	<p><i>programmes with support from international community.</i></p> <ul style="list-style-type: none"><li>• <i>Develop Climate Change Act for addressing climate change.</i></li><li>• <i>Continue to build national capacity with support from international community</i></li><li>• <i>Develop and promote appropriate technologies to address climate change impacts with support from international community.</i></li><li>• <i>Implement appropriate policies and strategies to address the impacts of climate change on vulnerable groups.</i></li></ul>
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**REPUBLIQUE DU MALI**  
Un Peuple – Un But – Une Foi

**Convention Cadre des Nations Unies sur les  
Changements Climatiques**

**21<sup>ème</sup> Conférence des Parties**

**CONTRIBUTION PREVUE DETERMINEE AU NIVEAU NATIONAL  
C P D N**



**Septembre 2015**

## RESUME EXECUTIF

L'économie du Mali repose essentiellement sur l'exploitation des ressources naturelles. La croissance démographique (3,6 %/an) et les contraintes climatiques ont entraîné une surexploitation et une dégradation de ces ressources. Les deux tiers du pays sont arides et semi arides dominés par les problèmes de désertification. Les risques naturels se sont accrus avec l'intensification des changements climatiques : sécheresses à répétition, inondations, vents forts, feux de brousse, déstabilisation du régime des pluies. L'agriculture qui est la plus touchée représente 45% du PNB et occupe environ 80% de la population active.

Cette situation est d'autant plus grave que les scénarios climatiques à l'horizon 2100 prévoient en moyenne une augmentation des températures de 3°C et une diminution des pluies de 22% sur l'ensemble du pays.

Au plan macro-économique le pays intègre les changements climatiques dans les processus de planification, notamment dans la mise en œuvre du Cadre Stratégique pour la Croissance et la Réduction de la Pauvreté (CSCR), dans la Politique Nationale de Protection de l'Environnement et, depuis 2011, dans la Politique Nationale sur les Changements Climatiques

C'est sur ces bases et en s'appuyant sur les services techniques nationaux qu'a été élaborée la CPDN du Mali.

Les prévisions des données techniques pour le calcul des gaz à effet de serre (GES) entre 2015 et 2030 se sont faites au cours de réunions de concertation au niveau sectoriel pour les trois secteurs principaux d'émissions de gaz à effet de serre (agriculture, foresterie et changement d'utilisation des terres, énergie) et au niveau multisectoriel.

La nature des engagements du Mali en matière **d'atténuation** est celle d'un scénario d'atténuation (dont un sous-scénario inconditionnel au cas où le pays serait le seul investisseur) basé sur la réduction des émissions de GES par rapport à un scénario de base (BAU). Les gaz considérés sont le CO<sub>2</sub>, le CH<sub>4</sub> et le N<sub>2</sub>O.

La période du scénario de base est 2015-2030 et celle du scénario d'atténuation 2020-2030.

Le Mali reste un puits de gaz à effet de serre pour tous les scénarios, la forêt jouant un rôle majeur pour le niveau de séquestration. Les niveaux des ambitions de réduction des GES du scénario d'atténuation par rapport au scénario de base sont de **29% pour l'agriculture, 31% pour l'énergie et 21% pour les forêts et le changement d'utilisation des terres**. Le coût global du scénario d'atténuation conditionnel s'élève à 34,68 milliards \$US (1,16 pour l'énergie, 20,6 pour l'agriculture, et 12,92 pour les forêts)

En matière d'**adaptation**, la vision du Mali est de faire de l'économie verte et résiliente aux changements climatiques une priorité.

**Pour la période 2015-2020**, le coût des besoins s'élève à **1,062 Milliards de \$US**. Il correspond au financement des cinq grands programmes qui ont été exposés au sommet mondial sur le climat en septembre 2014 à New York. Ces programmes portent notamment sur la foresterie, l'agriculture intelligente et les énergies renouvelables.

**Au cours de la même période**, les besoins sont basés sur des objectifs de développement durable axés sur la poursuite et l'intensification des programmes ci-dessus complétés notamment par :

- la mise en œuvre d'un plan d'action technologique pour l'adaptation et l'atténuation ;
- la lutte contre la désertification et contre l'ensablement;
- le développement de la recherche sur l'adaptation aux changements climatiques ;
- la mobilisation des collectivités locales, des communautés vulnérables et des groupes de femmes pour améliorer leur résilience aux changements climatiques.

Une **stratégie de financement** durable de l'environnement et des changements climatiques est en cours d'élaboration.

La mobilisation des ressources pour la mise en œuvre des programmes identifiés dans la CPDN, constitue une conditionnalité pour que le Mali puisse d'une part atteindre ses objectifs en matière de réduction des GES et, d'autre part, adapter ses systèmes de production, ses systèmes écologiques et ses systèmes sociaux aux changements climatiques. C'est dans ce contexte que le Mali amorcera une trajectoire de développement économique sobre en carbone et résilient aux changements climatiques, contribuant de plus aux efforts mondiaux de stabilisation des gaz à effet de serre, au titre de la responsabilité commune mais différenciée.

## CONTRIBUTION

Nature des engagements	Scénario d'atténuation basé sur la réduction des émissions de GES par rapport à un scénario de base reflétant la tendance normale des affaires (scenario Business-As-Usual BAU)
Champ d'application	- Ensemble des émissions de GES et des séquestrations de carbone sur le territoire national - Adaptation pour l'ensemble du territoire national
Gaz considérés	Dioxyde de carbone CO <sub>2</sub> Méthane CH <sub>4</sub> Oxyde nitreux N <sub>2</sub> O
Présentation des émissions	Kilo tonne (kT) pour le CO <sub>2</sub> , ou Kilo tonne équivalent de CO <sub>2</sub> (kTeq CO <sub>2</sub> ) pour tous les gaz
Période de référence	2007-2014
Période de mise en œuvre	2015-2030 pour le scénario de base 2020-2030 pour le scénario d'atténuation
Méthodologie pour l'estimation des émissions	Les inventaires des émissions de GES ont été réalisés suivant les lignes directrices révisées du GIEC de 2006
Secteurs couverts	Energie – Agriculture – Forêts et changements d'utilisation des terres

### Ambition de la contribution du Mali :

Le Mali est un puits de carbone et le restera au-delà de 2030. Mais le Mali considère qu'il doit contribuer au maximum de ses possibilités à l'ambition collective de limiter d'ici à la fin du siècle l'augmentation de la température globale sous 2°C par rapport à l'ère industrielle afin de limiter dans le pays, les impacts négatifs des changements climatiques sur l'agriculture et sur l'occurrence des risques de catastrophes naturelles (sécheresses, inondations, feux de brousse).

Le niveau des ambitions de réduction des GES du scénario d'atténuation par rapport au scénario de base (29% pour l'agriculture, 31% pour l'énergie et 21% pour les forêts) implique des actions ambitieuses favorables au développement du pays et à l'amélioration des systèmes de production à savoir entre autres : accélération de la prise en compte des énergies renouvelables dans le mix énergétique, amélioration des performances des processus de production agricole, réduction de la déforestation et reboisement intensif.

## PREMIERE PARTIE : SITUATION DU MALI FACE AUX CHANGEMENTS CLIMATIQUES

### 1.1. Indicateurs

<b>Population</b>	<b>14,5 millions</b>
<b>Croissance démographique</b>	3,6 %
<b>Taux d'urbanisation</b>	26,8 %
<b>Population rurale</b>	73 %
<b>Taux de croissance du PIB</b>	7,2 %
<b>Taux national de pauvreté</b>	46,9%
<b>Taux national d'accès à l'électricité (2014)</b>	34,89 %
<b>Consommation d'énergie par habitant en 2010</b>	0,20 tep/habitant
<b>Consommation électrique annuelle en 2009</b>	59,36 Kwh/habitant
<b>Puissance totale installée en MW en 2010</b>	402 MW
<b>Estimation de la demande annuelle en électricité (en 2010)</b>	182,4 MW
<b>Part des EnR dans la production nationale d'électricité en 2010</b>	3%
<b>Part du Mali à l'émission mondiale des GES</b>	0,06%

L'économie du Mali repose essentiellement sur l'exploitation des ressources naturelles. La croissance démographique et les contraintes climatiques ont entraîné une surexploitation et une dégradation de ces ressources. Le Mali considère que le maintien de l'intégrité des milieux naturels est un acte écologique mais aussi un acte éminemment économique.

Les deux tiers du pays sont arides et semi arides dominés par les problèmes de désertification qui se sont accentués à partir de la deuxième moitié du 20ème siècle avec la montée en charge des changements climatiques.

Les risques naturels se sont accrus avec l'intensification des changements climatiques : sécheresses à répétition, inondations, vents forts, feux de brousse, déstabilisation du régime des pluies entraînant une incertitude sur les calendriers agricoles. L'agriculture qui est la plus touchée représente 45% du PNB et occupe environ 80% de la population active ; elle demeure très sensible aux changements climatiques.

### 1.2. Engagements du Mali au regard des changements climatiques

Le Mali, s'est engagé à combattre les changements climatiques en signant la convention cadre des Nations Unies sur les changements climatiques (28 décembre 1994) et le Protocole de Kyoto (27 janvier 1999).

Le pays a élaboré son Programme d'Action National d'Adaptation (PANA) aux effets néfastes des changements climatiques en 2007. Il a présenté à la convention sa première et sa deuxième communication nationale ; la troisième communication est en cours d'élaboration.

Le Mali a élaboré sa Politique Nationale sur les Changements Climatiques en 2011, assortie d'une stratégie et d'un plan d'actions.

Au plan macro-économique le pays intègre la dimension environnementale en général et des changements climatiques en particulier dans les processus de planification, notamment dans la mise en œuvre du Cadre Stratégique pour la Croissance et la Réduction de la Pauvreté (CSCR), qui constitue le cadre unique de référence de l'ensemble des politiques de développement du pays pour la période 2012-2017.

Il a également élaboré un Cadre Stratégique pour la Réalisation d'un Mali Résilient et Vert qui permettra la réalisation effective d'une économie résiliente et peu génératrice de carbone tout en donnant une impulsion nouvelle à ses objectifs de croissance économique et de réduction de la pauvreté.

Des initiatives nationales concernent également le marché carbone. Elles sont orientées vers des technologies « propres » ou à faible émission de carbone, essentiellement des énergies renouvelables.

**Sur le plan institutionnel**, le Ministère de l'Environnement, de l'Assainissement et du Développement Durable a en charge la prise en compte des changements climatiques. Il a confié à l'Agence de l'Environnement et du Développement Durable (AEDD), créée en 2010, la mission de gérer les différents aspects des changements climatiques.

Le Mali a également mis en place un Comité National des Changements Climatiques (CNCC) qui est l'instance de concertation, d'orientation et de mobilisation des forces vives du pays. Ce comité est consulté régulièrement pour accompagner les équipes de préparation de la contribution nationale, notamment à travers ses groupes thématiques.

### 1.3. Aperçu du profil des émissions de GES du Mali en 2010

Globalement, les dernières estimations montrent que l'Afrique est responsable d'environ 3% des émissions mondiales de GES et le Mali environ 0.06%. Même si les émissions sont amenées à augmenter au fur à mesure que le pays se développe, le Mali reste encore aujourd'hui un puits de gaz à effet de serre.

Le profil des émissions des trois principaux gaz calculées lors de l'élaboration de la Troisième Communication Nationale (TCN) du Mali en 2010 est reporté dans le tableau 1.

**Tableau 1** : Emissions et Séquestration des trois principaux GES (2010) au Mali

		Dioxyde de carbone CO <sub>2</sub>	Méthane CH <sub>4</sub>	Oxyde azoteux N <sub>2</sub> O
<b>Energie</b>	(kT)	2676	63,81	0,75
	Total Energie (kTéq CO <sub>2</sub> )		<b>4 289</b>	
<b>Agriculture</b>	(kT)		627	114
	Total Agriculture (kTéq CO <sub>2</sub> )		<b>48 507</b>	
<b>Forêts et Changements d'affectation des terres</b>	(kT)	-245 177		
	Total Forêts et changement d'affectation des terres(kTéq CO <sub>2</sub> )		<b>-244 799</b>	
<b>Total général des émissions</b>	(kTéq CO <sub>2</sub> )		<b>-192 003</b>	

*Les valeurs positives traduisent les émissions et les valeurs négatives la séquestration des GES.*

L'analyse de l'inventaire des émissions de GES du Mali met en relief l'existence d'un important potentiel d'atténuation des émissions de GES, d'une part par la réduction des émissions de GES dans les principaux secteurs émetteurs, à savoir l'agriculture et l'utilisation agricole des terres ainsi que l'énergie, et d'autre part par le renforcement des capacités d'absorption de GES par les forêts. Ce sont ces mesures qui constitueront les principaux éléments de la CPDN-MALI.

#### 1.4. Scénarios climatiques du Mali à l'horizon 2100

La méthodologie utilisée pour ces scénarios exploite les outils MAGICC et SCENGEN du GIEC.

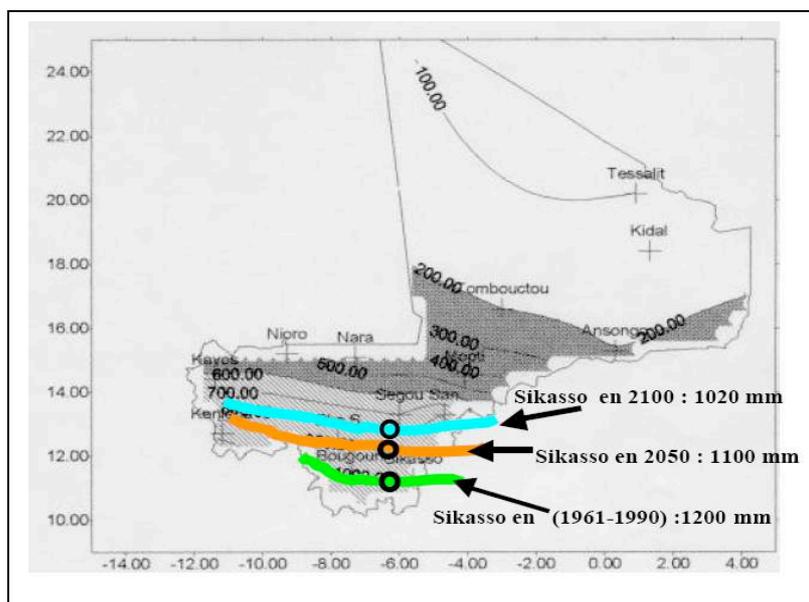
Les résultats obtenus sont les valeurs escomptées, sur l'ensemble du pays des paramètres climatiques aux horizons temporels compris entre 2015 et 2100 pour la pluviométrie et la température.

Pour toutes les localités du Mali, le scénario climatique le plus plausible prévoit une diminution de la pluviométrie dont les taux de pertes par rapport à la normale sont reportés dans le tableau 2.

**Tableau 2 : Diminution de la pluviométrie**

Année	2020	2025	2030	2050	2100
Perte en %	1 à 5	2 à 6	5 à 8	5 à 10	22

Les résultats de cette étude ont montré que pour toutes les localités on assisterait à une diminution de la pluviométrie qui se traduirait par un déplacement des isohyètes vers le sud (Figure 1).



**Figure 1 : Diminution de la pluviométrie et déplacement des isohyètes vers le Sud dans la localité de Sikasso entre 1960 et 2100**

Les températures seraient par contre en hausse dans toutes les localités du Mali avec un taux moyen donné dans le tableau 3.

**Tableau 3 : Hausse des températures**

Année	2020	2025	2030	2050	2100
Augmentation température	0,5°C	1°C	1,5°C	1,7°C	3°C

Selon l'analyse des évènements extrêmes durant la période très humide du mois de juillet au Mali, la température maximale qui était de 30,5°C pour la période 1961-1990 serait pour le même mois de :  
(i) 32,5°C en 2050 et l'occurrence des températures supérieures à cette valeur serait de 40%

(ii) 34,5°C en 2100 et l'occurrence des températures supérieures à cette valeur serait de 36%.  
L'analyse effectuée a montré une augmentation de cette probabilité entre 2025 et 2100.

Dans le cas d'une diminution de 20% de la pluviométrie (comme le prévoit le scénario plausible construit à partir des années 2075), on obtiendra une pluviométrie semblable à celle de la période sèche dans les mêmes zones climatiques.

Des situations de sécheresse seraient constatées sur la première moitié de l'hivernage (mois de mai, juin et juillet) à partir de l'horizon 2025 sur toutes les stations du pays pour une sensibilité climatique moyenne. Les mêmes situations pourraient s'installer dès l'horizon 2020 si la réaction du climat aux perturbations devenait plus rapide.

Suite à ces déficits pluviométriques, les sources d'approvisionnement naturelles en eau des communautés constituées par les eaux de surface et les eaux souterraines superficielles seront affaiblies dans une certaine proportion.

## DEUXIEME PARTIE : METHODOLOGIE ET LIGNES DIRECTRICES DE L'ELABORATION DES SCENARIOS

L'estimation des émissions de GES a été faite sur la base de la méthodologie révisée de 2006 et les bonnes pratiques de GIEC. A cet effet l'outil informatique a été utilisé à travers les feuilles de calcul au format Excel développées par le GIEC pour chacun des secteurs concernés.

L'élaboration des prévisions et du choix des données se sont faites au cours de réunions de concertation. Elles ont lieu au niveau sectoriel pour les trois secteurs principaux d'émissions de gaz à effet de serre (agriculture, foresterie et changement d'utilisation des terres, énergie) et au niveau multisectoriel.

Ces réunions ont permis :

- d'identifier et d'exploiter les programmations nationales et les orientations prospectives du Mali qui ont servi de base à l'élaboration de la CPDN MALI ;
- de valider les données techniques recueillies par l'équipe de la Troisième Communication Nationale pour la période 2007 – 2014 ;
- de déterminer les valeurs des données de base pour les années 2015-2030 dans les différents secteurs pour le scénario de base et pour le scénario d'atténuation.

Dans une perspective de moyen terme pour assurer le développement durable du pays, bien qu'ils n'émettent que très peu de GES, deux autres secteurs ont été considérés : la gestion des déchets et l'industrie. Ils ne sont pas intégrés dans la CPDN mais feront l'objet de traitements ultérieurs.

Les calculs de GES dans la CPDN sont effectués par secteur puis agrégés sur trois périodes.

- La première période est celle des années 2007–2014 pour laquelle les valeurs des émissions de GES sont issues de calculs effectués lors de l'élaboration de la Troisième Communication Nationale du Mali (TCN), à partir de données réelles fournies par les services techniques.
- La seconde période concerne 2015–2030 et résulte de prévisions reflétant la tendance normale du développement du Mali (scénario Business-As-Usual). Ce scénario a été élaboré en fonction des politiques nationales et des concertations sectorielles. C'est le **scénario de base**.
- Afin de participer à l'ambition collective d'atteindre l'objectif ultime de la Convention (moins de 2°C), le Mali a élaboré un scénario plus ambitieux et volontariste afin de réduire les émissions de GES au cours de la période 2020–2030. C'est le **scénario d'atténuation**.

La réalisation du scénario d'atténuation est conditionnée par la mise en œuvre de moyens humains, matériels et financiers du Mali et de ses partenaires bilatéraux et multilatéraux ; c'est donc un scénario conditionnel d'atténuation. Le sous-scénario qui serait réalisé si le Mali était le seul investisseur est le scénario inconditionnel d'atténuation.

## TROISIEME PARTIE : PREVISIONS DES EMISSIONS DE GES DU MALI

### 3.1. Bilan des émissions de la période 2007-2014

#### 3.1.1. Emissions dans le secteur de l'Énergie

Le Mali dispose de potentiels d'énergies renouvelables significatifs dont :

- l'énergie solaire : 6 kWh/m<sup>2</sup> (7 à 10 h) ;
- la biomasse : 2000 ha de plantations de jatropha, 1.400.000 L d'alcool à partir de la canne à sucre ;
- l'hydraulique : 1150 MW (seulement 22% exploités) ;
- l'éolien : 3 à 7 m/s.

Malgré ce potentiel, le secteur énergétique est très peu performant au regard de ses principaux indicateurs notamment :

- un bilan énergétique dominé par le bois énergie (bois de feu et charbon de bois), se traduisant par une forte pression de la consommation sur le massif forestier national ;
- un taux de dépendance à l'importation des produits pétroliers de 100% ;
- une faible consommation d'énergie finale : 0,18 tep/hbt (0,45 pour la zone CEDEAO, 0,5 pour l'Afrique) ;
- une faible consommation électrique : 59,36 kWh/hbt ;
- un taux d'électrification bas : 27,08% national (55,27% urbain, 14,89% rural) en 2010 ;
- une croissance de demande d'électricité : 10% annuel ;
- une faible intégration des énergies renouvelables dans la production d'électricité : 3% ;

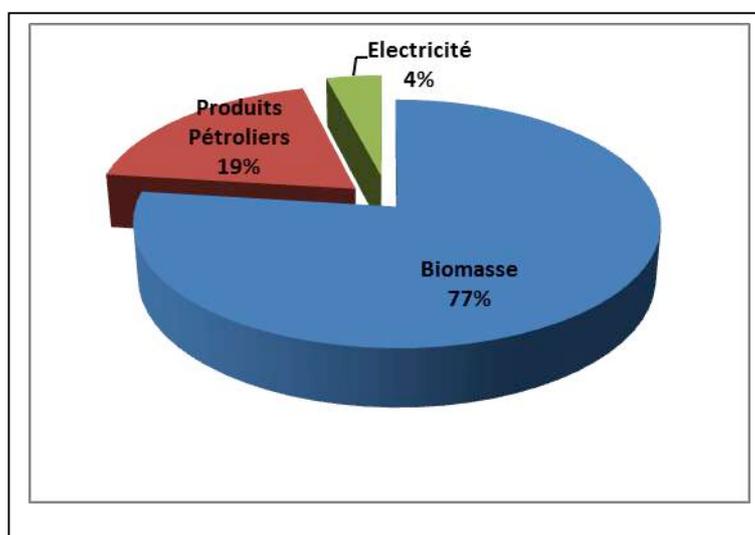
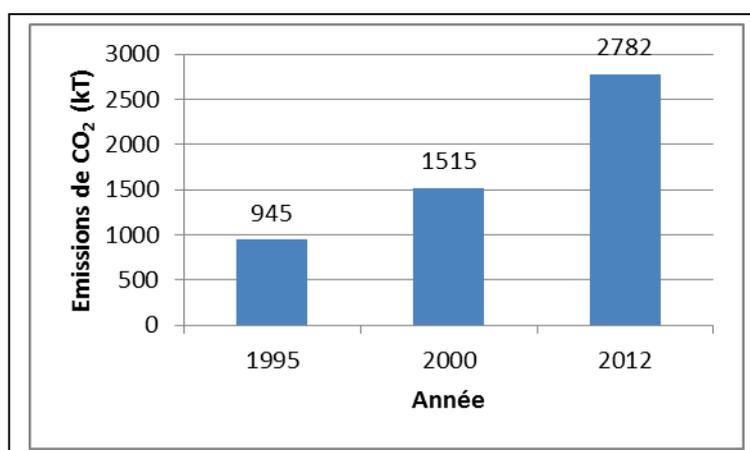


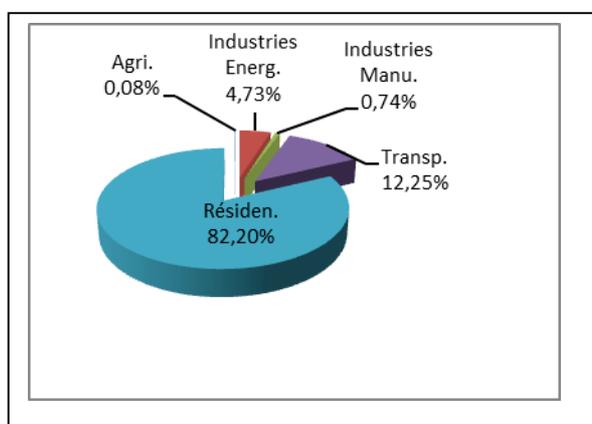
Figure 2 : Structure de la consommation finale d'énergie au Mali en 2010

Les trois communications nationales du Mali (1<sup>ère</sup> en 1995, 2<sup>ème</sup> en 2000, 3<sup>ème</sup> en cours d'élaboration) ont toutes établi que parmi les trois secteurs les plus émetteurs de gaz à effet de serre (GES), figure celui de l'énergie. L'émission de GES due à ce secteur est en constante progression (Figure 3). Entre 1995 et 2000, l'accroissement a été de 60,32%, tandis qu'il a atteint 83,63% entre 2000 et 2012. Dans la période 1995-2012, les émissions de CO<sub>2</sub> sont passées de 945 kT à 2782 kT, soit un accroissement de plus de 190% sur les 17 années.

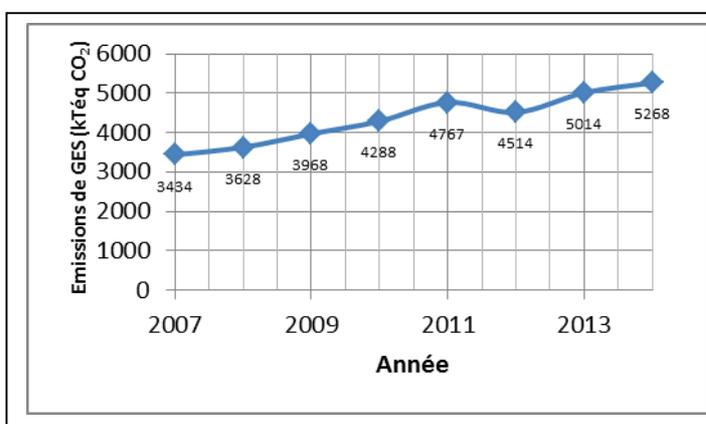


**Figure 3** : Evolution des émissions de GES dans le secteur de l'énergie

La répartition des émissions par rapport aux sous-secteurs de l'énergie est montrée sur la figure 4. L'analyse de cette répartition montre que le sous-secteur **résidentiel** occupe la première place avec la **consommation accrue de biomasse**, notamment le **bois énergie** comprenant le **bois de feu et le charbon de bois** (82,20% des émissions significatives du secteur en 2012). Le sous-secteur des **transports** vient en seconde position (12,25% des émissions significatives du secteur en 2012) avec la consommation de combustible fossile (essence et gasoil). Le sous-secteur de la transformation occupe la troisième, particulièrement pour la consommation de combustible dans la production de l'électricité (4,73% des émissions du secteur en 2012). La figure 5 représente l'évolution des GES dans le secteur de l'Energie entre 2007 et 2014.



**Figure 4** : Répartition des émissions de CO<sub>2</sub> par sous-secteur de l'Energie en 2012.



**Figure 5** : Evolution des GES dans le secteur de l'Energie entre 2007 et 2014

Entre 2007 et 2014 les émissions de GES dues à la production et à la consommation d'énergie ont évolué de 3434 kTéq CO<sub>2</sub> à 5268 kTéq CO<sub>2</sub>, soit un accroissement moyen annuel de 6,44 %.

Au regard de ce qui précède, les politiques d'atténuation d'émissions de GES dans le secteur de l'énergie, doivent beaucoup s'orienter vers le **résidentiel, les transports et les industries énergétiques**.

L'application de l'efficacité énergétique associant l'utilisation rationnelle de l'énergie, l'économie d'énergie et la maîtrise de l'énergie devrait permettre une décroissance significative des émissions de GES à l'horizon 2030. L'association de l'ensemble de ces mesures permet de construire les scénarios de base et d'atténuation.

### 3.1.2. Emissions dans le secteur de l'Agriculture

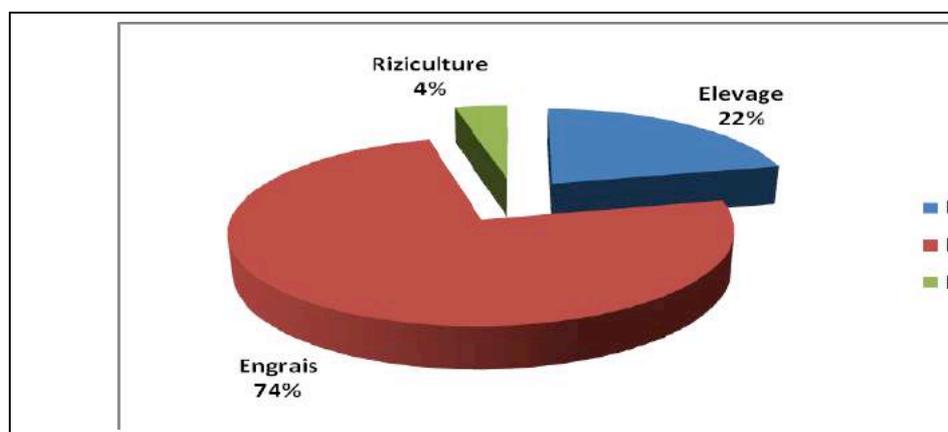
Selon la méthodologie du GIEC utilisée pour le calcul des émissions de GES, le secteur de l'Agriculture regroupe les sous-secteurs suivants :

- l'Elevage où la production du méthane (CH<sub>4</sub>) se produit par : (i) la fermentation entérique résultant du processus digestif des animaux ; (ii) le mode de gestion du fumier pouvant provoquer sa décomposition dans des conditions anaérobies ;
- la Riziculture : la décomposition anaérobie des matières organiques dans les rizières inondées produit du CH<sub>4</sub> qui est rejeté dans l'atmosphère principalement par l'intermédiaire des pieds de riz pendant la saison de croissance ;
- le brûlage des savanes et des résidus agricoles sur place : le brûlage dans ce secteur produit principalement du monoxyde de carbone; dans l'ensemble de ce sous-secteur, il y a des émissions instantanées de dioxyde de carbone (CO<sub>2</sub>) dont le bilan est nul car le CO<sub>2</sub> émis est rejeté dans l'atmosphère et réabsorbé au cours de chaque nouvelle période de végétation.
- les sols agricoles et la gestion des engrais : ce sous-secteur produit du N<sub>2</sub>O dont: (i) les émissions directes par les sols cultivés (incluant les systèmes de culture et les effets des animaux en pâturage) et par le sol issues de la production animale ; (ii) les émissions indirectes issues de l'azote utilisée en agriculture.

Les émissions de GES en TE-CO<sub>2</sub> du secteur de l'Agriculture pour la période 2007-2014 sont rapportées dans le tableau et les figures ci-dessous. Le sous-secteur du brûlage des savanes et des résidus agricoles émet uniquement du CO dont le pouvoir de réchauffement par rapport au CO<sub>2</sub> n'est pas défini. De ce fait, il n'est pas pris en compte dans ce tableau.

**Tableau 4 : Synthèse des émissions en TE CO<sub>2</sub>**

Années	Elevage	Engrais	Riziculture	TOTAL
2007	8 904 000	29 450 000	1 554 000	39 908 000
2010	10 206 000	34 720 000	2 016 000	46 942 000
2014	11 718 000	42 160 000	2 163 000	56 041 000
Moyenne	10 276 000	35 443 333	1 911 000	47 630 333



**Figure 7 : Répartition sous sectorielle des émissions**

La synthèse des émissions du secteur montre que les principaux sous secteurs d'émission de GES de l'agriculture sont ceux des engrais chimiques (74%), de l'élevage (22%) et de la riziculture irriguée (4%). Les mesures d'atténuation des émissions de GES dans le secteur de l'Agriculture porteront sur ces sous secteurs.

### 3.1.3 Emissions dans le secteur de la Foresterie et des Changements d'Affectation des Terres

La zone forestière prise en compte par le secteur comprend les espaces boisés et les savanes.

Les principales données utilisées pour l'évaluation des gaz sont la superficie des zones forestières, la superficie des plantations forestières, la quantité de bois exploitée, et la superficie des sols minéraux.

La plantation forestière est une activité importante au Mali marquée par une forte progression des superficies reboisées. Entre 2007 et 2014, les superficies plantées ont passé de 9 079 hectares à 80 387 hectares, soit une multiplication par 9.

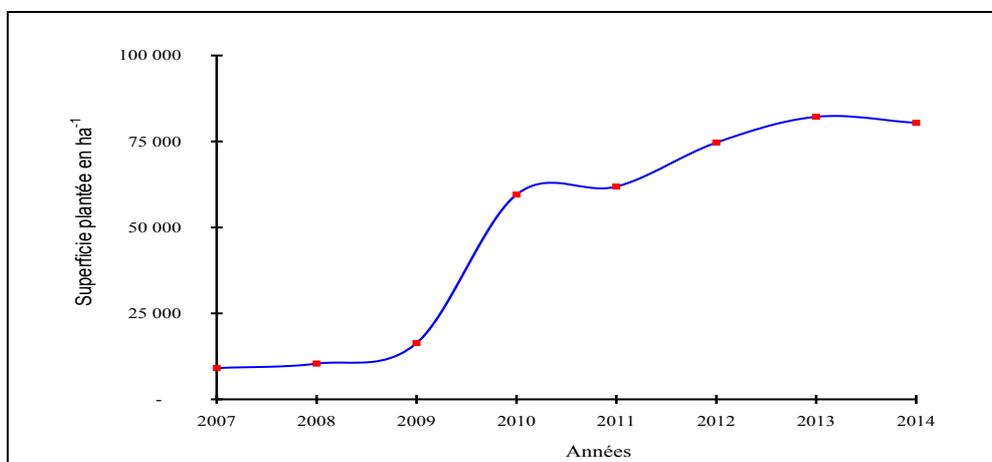
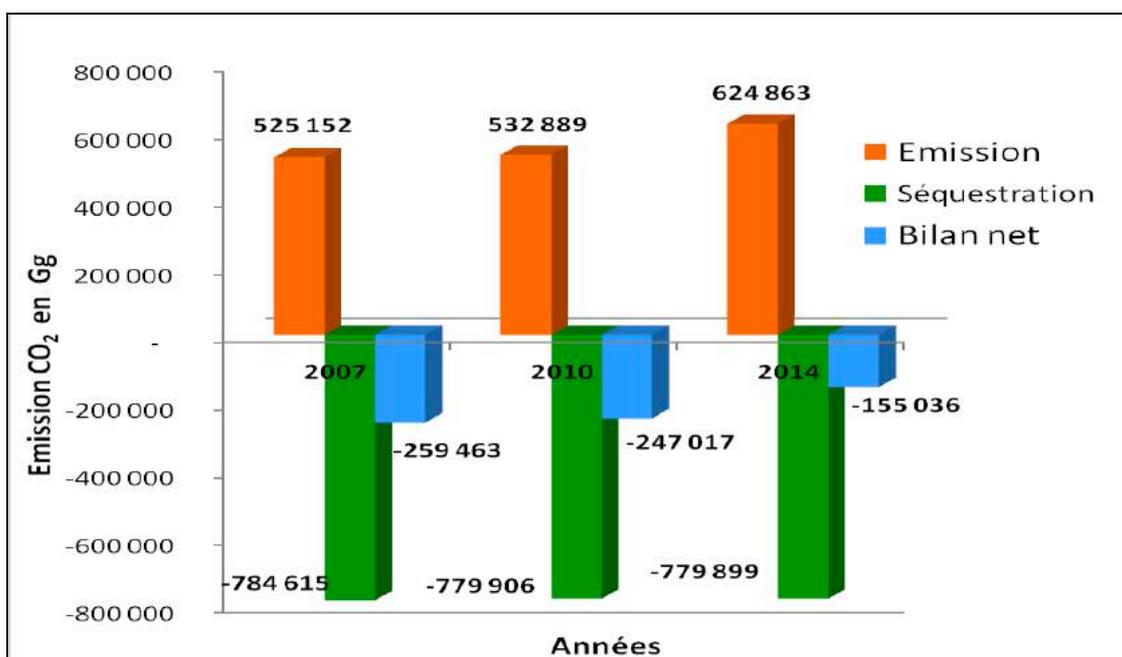


Figure 7 : Evolution de la superficie des plantations forestières réalisée au Mali entre 2007 et 2014.

Dans le secteur de la Foresterie et des Changements d'Affectation des Terres la séquestration de GES, d'une valeur moyenne de 781 473 Kilo Tonnes de CO<sub>2</sub> par an, est assurée uniquement par la zone forestière. En revanche les émissions, d'une valeur moyenne de 560 976 Kilo Tonnes de CO<sub>2</sub> par an, proviennent des sols minéraux, affectés aux systèmes d'agriculture et du sylvopastoralime, et des terres converties (prairies et surfaces défrichées).

Tableau 5 : Synthèse des émissions de GES du secteur en KT CO<sub>2</sub>

Années	Emission	Séquestration	Bilan net
2007	525 152	- 784 615	- 259 463
2010	532 889	- 779 906	- 247 017
2014	624 863	-779 899	- 155 036



**Figure 8 :** Bilan des émissions du secteur Forêts –changements d’affectation des terres en KT CO2 (Gg CO2)

Le bilan net du secteur foresterie et des changements d’affectation des terres est un bilan de séquestration des GES, d’une valeur moyenne de 220 505 Kilo Tonnes de CO2 par an, qui permet au Mali d’être un puits de carbone.

## 3.2. Prévisions des émissions pour la période 2015-2030

### 3.2.1. Emissions de GES dans le secteur de l’Energie

#### ❖ *Politiques, plans et programmes sur lesquels s’appuie la prospective*

La faible performance du bilan énergétique et les potentialités significatives énergétiques du Mali ont motivé l’élaboration et la mise en œuvre à court et moyen termes de politique, de programmes et de plans dans le sens d’une efficacité énergétique associant l’utilisation rationnelle de l’énergie, l’économie d’énergie et la maîtrise de l’énergie. Ces actions concernent tous les aspects du secteur de l’Energie, de la production à la consommation.

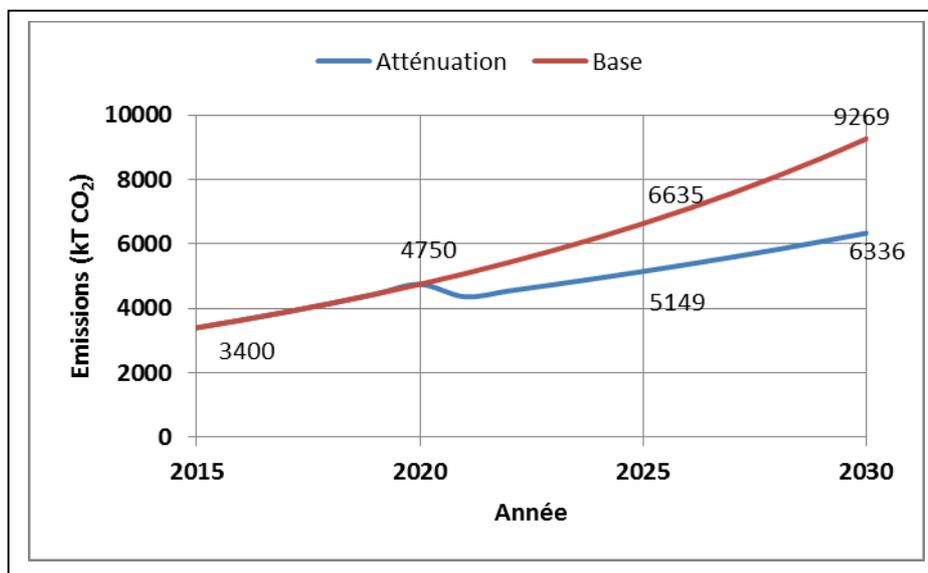
Les scénarios des émissions de GES dans le secteur de l’Energie ont été développés sur la base de la Politique nationale de l’énergie et des stratégies afférentes ainsi que des actions qui en découlent.

Les principales actions concernées sont :

- le programme de valorisation à grande échelle des énergies renouvelables (SREP) pour 258 millions de \$US ;
- Le projet Manantali II qui sera réalisé entre 2016 et 2021 et coûtera 150 millions de dollars US ;
- Le projet d’électrification villageoise par système d’énergies renouvelables qui sera réalisé entre 2015 et 2020 et coûtera 7,2 millions de \$US ;
- Le projet de la centrale hydroélectrique de Kénié qui sera réalisé entre 2015 et 2020 et coûtera 165 millions de \$US.

### ❖ *Prévision des émissions de GES*

Les programmes et projets ci-dessus permettent d'obtenir les réductions de GES synthétisées dans la figure suivante :



**Figure 9** : Evolution des émissions dans les situations de base et d'atténuation de 2015 à 2030

Le scénario de base montre que les émissions de GES vont croître de 3 400 kTéq CO<sub>2</sub> en 2015 à 4 750 kTéq CO<sub>2</sub> en 2020 pour atteindre 9269 kTéq CO<sub>2</sub> en 2030. Cela donne un accroissement moyen annuel de 6,91% entre 2015 et 2030.

Les conséquences des mesures d'atténuation entre 2020 et 2030 permettront de rabaisser le niveau des émissions de 4750 kTéq CO<sub>2</sub> en 2020 à 6336 kTéq CO<sub>2</sub> en 2030. Ainsi, par rapport au scénario de base, les émissions atteindront une baisse, par la scénario d'atténuation, de **31,6%** en 2030.

### ❖ *Coût des mesures d'atténuation*

Les ambitions de réduction des émissions du scénario d'atténuation sont de 1486 kTéq CO<sub>2</sub> en 2025, soit une réduction de 22,4%, et 2933 kTéq CO<sub>2</sub> en 2030, soit une réduction de 31,6%. Le coût correspondant est de 580 millions de \$US sur cinq ans, soit 1,16 milliard de \$ US sur les dix ans

## 3.2.2 Emissions de GES dans le secteur de l'Agriculture

### ❖ *Politiques, plans et programmes sur lesquels s'appuie la prospective*

Les politiques, plans et programmes sur lesquels s'appuie cette prospective sont :

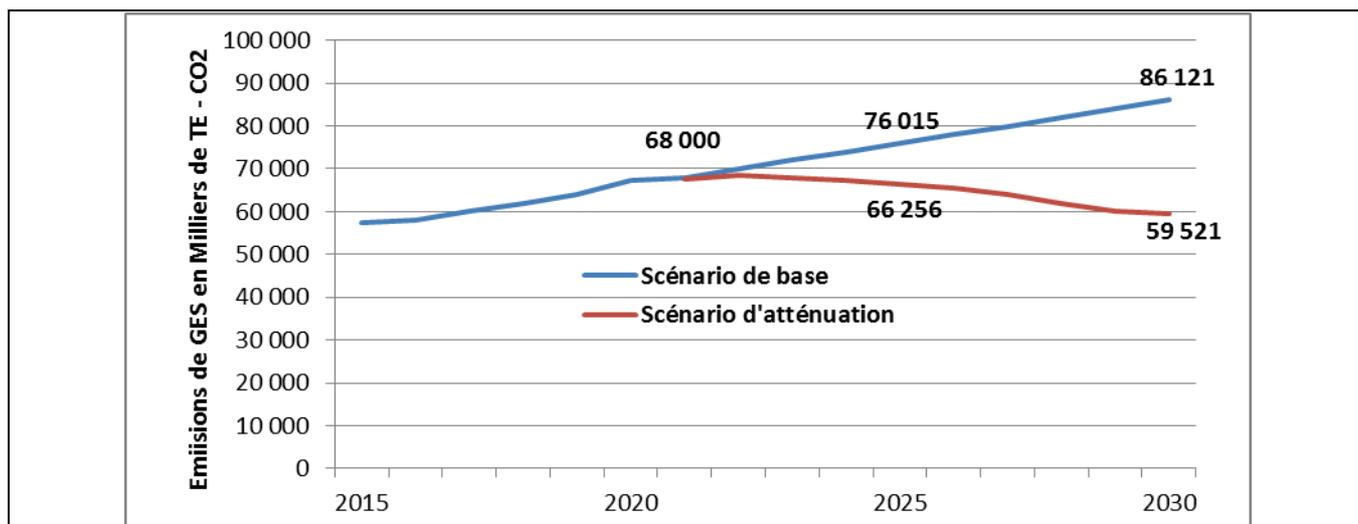
- La Politique Nationale de l'Agriculture ;
- Le Cadre stratégique d'investissement pour la gestion durable des terres ;
- Le Programme pilote de développement d'une agriculture intelligente et résiliente aux changements climatiques ;
- Le Programme national d'aménagement pastoral résilient aux Changements Climatiques
- Le Programme de captage et stockage des eaux de pluie ;

Les principales actions concernées qui en découlent sont :

- le système de riziculture intensive (SRI) ;
- la micro-dose ;
- La production de la fumure organique ;

#### ❖ *Prévision des émissions de GES*

Les programmes et projets ci-dessus permettent d'obtenir les réductions de GES synthétisées dans la figure suivante :



**Figure 10** : Evolution des émissions dans les scénarios de base et d'atténuation de 2015 à 2030

#### ❖ *Coût des mesures d'atténuation*

Les ambitions de réduction des émissions sont de 9 759 kTéq CO2 en 2025 et 25 400 kTCO2 en 2030. Le coût de ce scénario d'atténuation conditionnel s'élève à 20,6 milliards de \$US.

Dans le secteur de l'agriculture, les mesures d'atténuation des émissions de GES, les plus appropriées concernent trois sous-secteurs qui sont : la riziculture irriguée, l'élevage et la gestion des engrais.

Pour le sous secteur de la riziculture irriguée, l'atténuation sera focalisée la gestion de l'eau par l'irrigation intermittente afin d'éviter l'inondation permanente des terres rizicoles, source d'émission par fermentation.

Pour les sous secteurs de l'élevage et des engrais chimiques, la mesure d'atténuation sera axée sur la substitution de l'urée à forte teneur en azote par la fumure organique dont la production permettra de réduire les émissions des fumures liées à la décomposition anaérobie.

Le coût lié à ces émissions de GES dans le secteur de l'agriculture s'élève à 20,6 milliards de \$US pour le scénario d'atténuation.

### 3.2.3. Emissions de GES dans le secteur de la Foresterie et des Changements d’Affectation des Terres

#### ❖ *Politiques, plans et programmes sur lesquels s’appuie la prospective*

Les politiques, plans et programmes sur lesquels s’appuie cette prospective sont :

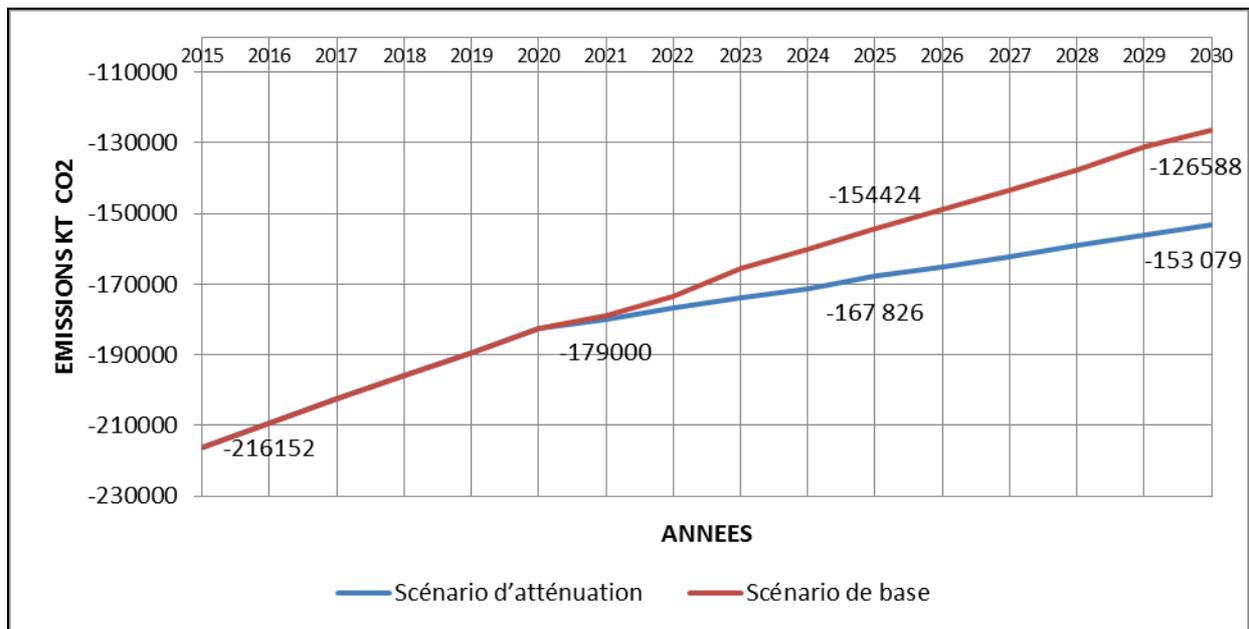
- la Politique Nationale de Protection de l’Environnement ;
- la Politique Nationale Forestière ;
- la Politique Nationale des Changements Climatiques, sa stratégie et son plan d’action ;
- Les Plans quinquennaux de reboisement .
- La Stratégie Nationale de la diversité biologique ;
- La Stratégie Nationale de gestion des aires protégées ;
- la Grande Muraille Verte ;
- le Mécanisme de Développement Propre.

Ces politiques et stratégies sont mises en œuvre par des projets dont ceux présentés ci-dessous :

<b>Projet</b>	<b>Actions</b>
Projet Alliance Globale sur le Changement Climatique	Inventaires forestiers régionaux Système informatique de gestion des données forestières Reboisement et régénération des forêts
Programme Gestion Décentralisée des Forêts	Plans d’aménagement et de gestion de massifs forestiers Exploitation rationnelle du bois énergie dans ces massifs
Programme de Développement Durable dans le Delta du Niger	Plans d’aménagement et de gestion des Forêts Classées Plantations de Bosquets villageois et d’arbres fruitiers
Projet de Lutte Contre l’Enseblement du Fleuve Niger	Fixation de dunes Plantations forestières de bois de service
Projet d’Extension et de Renforcement du Système des Aires Protégées	Gestion d’aires protégées Création de couloirs de migration de la faune Formation de villageois
Foyers améliorés (MDP)	Vulgarisation de foyers économes en bois de chauffe
Valorisation énergie (MDP)	Production de briquettes à travers les sous-produits agricoles.
Reboisement et production de biocarburant (MDP)	Plantation de Pourghère pour l’électrification rurale Plantation de Jatropha dans les systèmes agraires
Boisement (MDP)	Plantation d’Acacia Sénégal

#### ❖ *Prévision des émissions de GES*

Les programmes et projets ci-dessus permettent d’obtenir les réductions de GES synthétisées dans la figure suivante :



**Figure 11 :** Courbes des bilans nets (séquestration) des scénarios de base et d'atténuation pour la période 2015-2030

#### ❖ *Coût des mesures d'atténuation*

Le scénario de base est mis en œuvre par des plantations forestières pour un coût total entre 2015 et 2030 de 1 229 millions \$US

Le scénario d'atténuation conditionnel est mis en œuvre par les mesures suivantes :

- Plantations forestières pour un coût de 10 719 millions \$US
- Régénération naturelle assistée pour un coût de 1 531 millions \$US
- Gestion des forêts classées et des aires protégées pour un coût de 670 millions \$US

Le coût total du scénario d'atténuation conditionnel est de 12 920 millions \$US

- Le secteur Foresterie et changement d'affectation des terres le Mali demeure un puits de carbone qui séquestrera en 2030 : 126 588 KT équivalent CO2 selon le scénario de base et 153 079 KT- équivalent CO2 selon le scénario d'atténuation conditionnel
- En 2030 le scénario d'atténuation séquestre 21 % plus de CO2 que le scénario de base
- Le gain cumulé pendant la période 2020-2030 entre le scénario de base et le scénario d'atténuation est de 132 455 KT équivalent CO2
- Le coût total du scénario d'atténuation conditionnel est de 12,92 milliards de dollars US

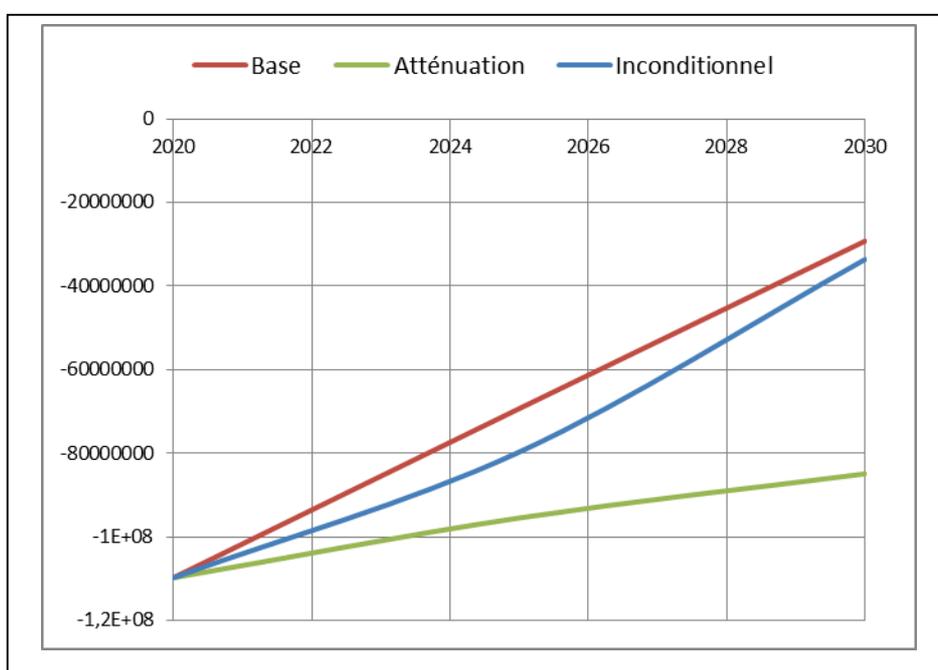
#### **3.2.4. Synthèse des émissions de la période 2015-2030 pour l'ensemble des secteurs**

Les secteurs de l'énergie, de l'agriculture, de la foresterie et du changement d'affectation des terres sont des secteurs émetteurs en GES. Le secteur de la foresterie et du changement d'affectation des terres émet et séquestre mais son bilan net est en séquestration.

La synthèse des émissions de GES des trois secteurs énergie, agriculture et foresterie et changements d'affectation des terres est donnée dans le tableau 6 ci-dessous pour le scénario de base et pour le scénario d'atténuation (versions conditionnelle et inconditionnelle).

**Tableau 6** : Bilan net des prévisions d'émissions et séquestration en KT Eq CO2 :

Années	Scénario de base	Scénario d'atténuation conditionnelle	Scénario inconditionnel
2015	-155 552 814		
2020	-109 788 619	-109 788 619	-109 788 619
2025	-69 327 889	-95 494 305	-79 727 072
2030	-29 242 410	-84 937 087	-33 628 772



**Figure 12** : Evolution des émissions du scénario de base, du scénario d'atténuation conditionnel et du scénario d'atténuation inconditionnel pour l'ensemble des secteurs de 2015 à 2030.

Le Mali reste un puits de gaz à effet de serre jusqu'en 2030 pour tous les scénarios.

Il ressort du scénario de base que le bilan net de séquestration de l'ensemble des secteurs diminue de façon significative au fil des années.

Les gains en termes d'atténuation de GES du scénario d'atténuation conditionnel par rapport au scénario de base permettent d'améliorer cette situation entre 2020 et 2030. Ces gains sont de 31% pour le secteur de l'énergie, 29% pour le secteur l'agriculture et de 21% pour le secteur de la foresterie et des changements d'affectation des terres, soit une moyenne de 27% pour l'ensemble des secteurs.

Le coût global du scénario d'atténuation conditionnel s'élève à 34 680 000 000 \$US, et le coût du scénario d'atténuation inconditionnel à 5 202 000 000 \$US.

## QUATRIEME PARTIE : ADAPTATION AUX CHANGEMENTS CLIMATIQUES

### ❖ *Politiques et stratégies nationales – Processus de planification*

Le climat du Mali, de type sahélien, est caractérisé par une variabilité inter et intra annuelle des paramètres climatiques et par l'intensification des sécheresses depuis 1970 . Cette situation est exacerbée par la fragilité des écosystèmes et des systèmes de production (agriculture, élevage, pêche, foresterie ...), par les besoins de la croissance démographique et par les contraintes socio-économiques, rendant ainsi le pays très vulnérable et affaiblissant ses capacités d'adaptation.

Afin d'assurer un développement durable, des mesures d'adaptation aux changements climatiques s'imposent dans tous les secteurs du développement.

C'est dans ce contexte que le Mali a développé plusieurs politiques, stratégies et plans d'action (tableau ci-dessous) intégrant les orientations nationales en matière d'adaptation en référence au Cadre Stratégique pour la Croissance et la Réduction de la Pauvreté (CSCR).

Ces programmes sont en cours de révision afin de développer le Plan National d'Adaptation (PNA) du Mali aux changements climatiques à l'horizon 2030 pour mieux orienter et coordonner les actions.

<b>Politique ou Stratégie</b>	<b>Objectif</b>
Politique Nationale de Protection de l'Environnement	Assurer un environnement sain et un développement durable, combattre la désertification, assurer la sécurité alimentaire, prévenir et combattre la pollution et réduire la pauvreté.
Politique Nationale des changements climatiques, complétée par sa stratégie et son plan d'action	Cadre de référence et de pilotage pour tous les projets et programmes mis en œuvre au Mali relatifs à la lutte contre les changements climatiques.
Politique Nationale Forestière	Assurer une gestion intégrée et durable des ressources naturelles renouvelables : les forêts, la faune terrestre et aquatique, les ressources en terres et la biodiversité
Politique Nationale de l'Energie	Contribuer au développement durable du pays, à travers la fourniture des services énergétiques accessibles au plus grand nombre de la population au moindre coût et favorisant la promotion des activités socioéconomiques
Politique Nationale d'Agriculture	Promouvoir une agriculture durable, moderne et compétitive reposant prioritairement sur les exploitations familiales
Politique Nationale de l'Eau	Contribuer à la lutte contre la pauvreté et au développement durable en apportant des solutions appropriées aux problèmes liés à l'eau
Politique Nationale d'Assainissement	Structurer l'ensemble du secteur de l'assainissement autour d'un projet de développement réaliste.
Politique Nationale d'Aménagement du territoire	Conférer à la planification du développement économique une dimension territoriale, dans le cadre d'une organisation de l'espace prenant en compte la décentralisation.
Politique Nationale de la Décentralisation	Renforcer le processus de démocratisation de la société et

	adapter les missions et l'organisation de l'Etat à l'exigence de promotion des initiatives locales
Cadre stratégique d'investissement pour la Gestion Durable des Terres	Inverser les tendances à la dégradation des terres pour assurer la sécurité alimentaire, réduire la pauvreté et la vulnérabilité
Stratégie nationale d'adaptation du secteur de la foresterie du Mali aux impacts des changements climatiques	Anticiper les impacts potentiels des changements climatiques sur le secteur de la foresterie au Mali et analyser les vulnérabilités
Stratégie de Développement des Energies renouvelables	Promouvoir une large utilisation des technologies et équipements d'Énergie Renouvelable
Stratégie nationale pour le développement des biocarburants	Accroître la production locale d'énergie à moindre coût. par le développement des biocarburants.
Politique Nationale de la population	Maitriser et gérer l'évolution de la population du Mali
Politique Nationale du Genre	Amélioration de l'implication des femmes dans le processus de gestion du pays
Politique nationale des transports	Améliorer des systèmes de transport au Mali pour assurer un désenclavement adéquat du pays

#### ❖ *Prévisions et besoins en adaptation pour la période 2015-2020*

La vision du Mali est de faire de l'économie verte et résiliente aux changements climatiques une priorité mais aussi une réalité. Les actions d'adaptation restent très importantes et cruciales pour les années à venir dans la lutte contre les changements climatiques.

La mise en œuvre des politiques, stratégies, plans et programmes en matière d'adaptation au Mali s'effectue à travers de programmes et projets suivants :

- **Les programmes prioritaires contenus dans les annonces du Mali au Sommet mondial sur le climat en septembre 2014 à New York. Il s'agit :**
  - ✓ de l'aménagement forestier pour la restauration des écosystèmes dégradés visant à reboiser 325.000 hectares, promouvoir la régénération naturelle assistée et la lutte contre l'ensablement et renforcer la protection des aires protégées sur 9 millions d'hectares.
  - ✓ du développement d'une agriculture intelligente et résiliente aux changements climatiques, pour l'aménagement hydro-agricole de 92,000 ha dans le contexte d'une gestion durable des terres avec l'engagement de l'Etat à consacrer 15% du Budget national à l'agriculture ;
  - ✓ de l'aménagement pastoral résilient aux changements climatiques visant la matérialisation de 3,300 km d'axes de transhumance afin de réduire les conflits entre agriculteurs et éleveurs, la réalisation de 21 périmètres et aires pastorales d'une superficie totale de 400.000 ha ;
  - ✓ du captage et du stockage des eaux de pluie afin de contribuer à l'accès universel à l'eau potable et à l'accès à l'eau pour les autres usages, par la création de 20 systèmes d'adduction d'eau potable et 200 ouvrages de captage d'eau de surface et de plans d'eau de surface au profit de 75,000 ménages ruraux (homme et femmes),
  - ✓ du développement des énergies renouvelables et de l'Efficacité Energétique, visant à installer plus de 100 MW d'énergie renouvelables (objectif atteindre la cible de 10% du mix énergétique à l'horizon 2020, en développant l'énergie photovoltaïque, éolienne, la petite hydro-électricité et la biomasse énergie).

- **Les projets relevant du Programme d'Action National d'Adaptation aux changements climatiques (PANA) :**
  - ✓ le développement et la vulgarisation des variétés des cultures ; de types d'animaux et des cultures fourragères améliorées et adaptées ;
  - ✓ la promotion des banques de céréales ;
  - ✓ les Activités Génératrices de Revenus (AGR) ;
  - ✓ les aménagements agricoles à petite échelle et la conservation des terres ;
  - ✓ l'utilisation des produits et informations météorologiques et le renforcement des capacités.
  
- **Les autres programmes et projets** en cours d'ici 2020 avec l'appui des partenaires techniques et financiers et des Fonds relatifs au climat (au niveau national et international) pour un montant de 67 millions de \$ US et concernant principalement :
  - ✓ l'appui à l'adaptation aux changements climatiques dans des communes vulnérables ;
  - ✓ l'intensification de la résilience aux changements climatiques par une gestion agricole et pastorale ;
  - ✓ l'alimentation en eau potable par énergie solaire des communautés agro-pastorales ;
  - ✓ le renforcement de la résilience des groupes de femmes productrices et des communautés vulnérables aux changements climatiques ;
  - ✓ la Recherche-Développement sur l'adaptation de l'agriculture et de l'élevage aux changements climatiques ;
  - ✓ la gestion des ressources naturelles dans un contexte de changements climatiques.

Le coût des besoins d'adaptation à rechercher pour la période 2015-2020 sont ceux relatifs au sommet mondial sur le climat de 2014. Il s'élève à **1,062 Milliards de \$US**.

#### **❖ *Prévisions et besoins en adaptation pour la période 2015-2020***

Ces besoins sont basés sur les objectifs de développement à travers la mise en place d'un Plan National de Développement Durable et des objectifs de développement durable comprenant les actions suivantes :

- ✓ mise en œuvre du Plan d'action technologique pour l'adaptation et l'atténuation;
- ✓ intensification des 5 programmes annoncés au Sommet mondial sur le climat en septembre 2014 à New York ;
- ✓ lutte contre l'ensablement des cours d'eau afin de développer les systèmes de production agricoles, aquacoles et le transport fluvial ;
- ✓ épuration des eaux usées et leur réutilisation pour des besoins d'irrigation;
- ✓ reboisement et plantations d'arbres fruitiers afin de reconstituer le couvert végétal et protéger les espaces agricoles de l'érosion hydrique et éolienne;
- ✓ aménagement des bassins versants pour une gestion rationnelle de l'eau ;
- ✓ renforcement des capacités face aux changements climatiques de tous les acteurs du secteur public et privé, y compris le genre et les jeunes.

## CINQUIEME PARTIE : MOYENS DE SOUTIEN ET DE RENFORCEMENT DES CAPACITES

### ➤ *Transfert de technologies*

Le Mali dispose d'un Plan National de transfert de technologies d'adaptation et d'atténuation. Pour l'adaptation les technologies concernent la pratique des cultures fourragères, l'aménagement des terres de culture, les techniques agro-météorologiques, les variétés des cultures améliorées et adaptées aux changements climatiques. Pour l'atténuation, elles concernent les forages, les petits barrages de retenue d'eau, le surcreusement des mares et les puits modernes (puits à grand diamètre).

Le Mali dispose également d'un portefeuille de plus de 40 projets pour le Mécanisme de Développement Propre (MDP) permettant une réduction potentielle des émissions d'au moins 15 millions de tonnes de CO<sub>2</sub>eq par an et un calendrier d'élimination totale des hydro-chloro-fluoro-carbone (HCFC) à l'horizon 2030, soit une réduction d'environ 17, 279 tonnes de CO<sub>2</sub>eq.

### ➤ *Renforcement des capacités*

Afin de limiter les impacts des changements climatiques, et de renforcer la résilience des communautés vulnérables et des moyens de subsistance, il s'avère nécessaire de renforcer les capacités à tous les niveaux.

- Au niveau institutionnel et légal : les insuffisances se situent au niveau des conflits de compétence, du cloisonnement des différentes institutions et à la mauvaise et/ou non application des textes législatifs et réglementaires ;
- Au niveau des décideurs politiques, administratifs et coutumiers : les insuffisances sont surtout liées au manque et/ou la faiblesse d'information sur les enjeux des questions de changements climatiques ;
- Aux niveaux scientifique et technique, il faut noter l'insuffisance de l'expertise liée à la faiblesse en ressources humaines qualifiées, de laboratoires de recherches spécialisés dans le domaine des changements climatiques, de système national d'acquisition, de traitement et d'archivages de données suffisantes et fiables ;
- Au niveau de la formation académique il faut noter l'insuffisance de structures nationales de formation et de laboratoires de recherche appropriés dans le domaine des changements climatiques.
- Au niveau des communautés et des collectivités territoriales le manque d'information sur les impacts et les mesures à prendre en vue de renforcer leur résilience aux changements climatiques ainsi que le manque de formation et d'équipements adaptés pour la mise en œuvre de ces mesures sont réels ;
- Au niveau du grand public on note une insuffisance d'information et de sensibilisation ;
- L'insuffisance d'information et d'expertise des médias et leur faible implication pour la communication en matière de changements climatiques est aussi une réalité.

### ➤ **Financement**

Le financement des actions de lutte contre les changements climatiques reste aujourd'hui l'élément central des négociations sur le climat.

Plusieurs Fonds ont été mis en place, notamment le Fonds Vert Climat qui devrait être alimenté par 100 Milliards de \$US à partir de 2020. Un Accord à Paris sur les sources de financement, sur l'augmentation des ambitions et sur le respect des promesses pourrait davantage accélérer l'atténuation des émissions et l'adaptation aux effets néfastes des changements climatiques.

Le Mali est en train de concevoir et de mettre en œuvre une stratégie de financement durable de l'environnement et des changements climatiques qui devrait concilier l'unicité des procédures, la transparence des informations, la souplesse de gestion et la pérennité des financements dans les opérations clés.

Cette stratégie jouera un rôle important pour la mobilisation des Fonds prévues par le Mali pour les changements climatiques et l'économie verte, notamment ceux pour la mise en œuvre des actions d'atténuation, d'adaptation et de transferts de technologie présentés dans la CPDN.

En ce qui concerne les changements climatiques cette stratégie s'appuiera notamment sur:

- le Fonds Climat Mali (Fonds national et multipartenaires) ;
- le Fonds vert climat ;
- le Fonds d'adaptation ;
- d'autres fonds intervenant en matière de changements climatiques

## CONCLUSION

Face aux défis climatiques, le Gouvernement du Mali est résolu à assumer ses responsabilités par une démarche participative, de manière ambitieuse, en construisant un nouveau paradigme intégrant pleinement la dimension humaine en complément des dimensions économiques et écologiques.

Le Mali attend de ses partenaires qu'ils assument également leurs propres responsabilités dans le cadre de la Convention Cadre des Nations-Unies sur les Changements Climatiques. Un signal fort serait certainement une contribution significative et ambitieuse au Fonds Vert Climat.

La mise en œuvre des projets/programmes prioritaires identifiés dans la CPDN, dont la mobilisation des ressources constitue une conditionnalité, sont conformes aux orientations du Cadre Stratégique pour la Croissance et la Réduction de la Pauvreté (CSCR) et à la Politique Nationale sur les Changements Climatiques (PNCC).

C'est dans ce contexte que le Mali amorce une trajectoire de développement économique sobre en carbone et résilient aux changements climatiques, contribuant de plus aux efforts mondiaux de stabilisation des gaz à effet de serre, au titre de la responsabilité commune mais différenciée.



# Republic of the Marshall Islands

## Intended Nationally Determined Contribution

Communicated to the UNFCCC on 21 July 2015

### Introduction

The Republic of the Marshall Islands (RMI) is committed to the successful conclusion of negotiations under the Ad-Hoc Working Group on the Durban Platform for Enhanced Action (ADP) in order to adopt, at COP21, a new legally-binding agreement under the UNFCCC applicable to all Parties, which will come into effect and be implemented from 2020.

In accordance with the relevant paragraphs of Decisions 1/CP.19 and 1/CP.20, RMI hereby communicates its Intended Nationally Determined Contribution (INDC) towards achieving the ultimate objective of the Convention, and provides up-front information in tabular format to facilitate the clarity, transparency and understanding of the INDC. RMI is also pleased to provide additional accompanying information, including information relating to mitigation, adaptation planning and support for implementation.

### Intended Nationally Determined Contribution (INDC)

RMI commits to a quantified economy-wide target to reduce its emissions of greenhouse gases (GHG) to **32% below 2010 levels by 2025**.

RMI communicates, as an indicative target, its intention to reduce its emissions of GHGs to **45% below 2010 levels by 2030**.

These targets progress beyond RMI's Copenhagen pledge, and are based on the more rigorous data in RMI's forthcoming Second National Communication. They put RMI on a trajectory to nearly halve GHG emissions between 2010 and 2030, with a view to achieving net zero GHG emissions by 2050, or earlier if possible. This will require a significant improvement in energy efficiency and uptake of renewables, in particular solar and biofuels, as well as transformational technology, such as Ocean Thermal Energy Conversion (OTEC).

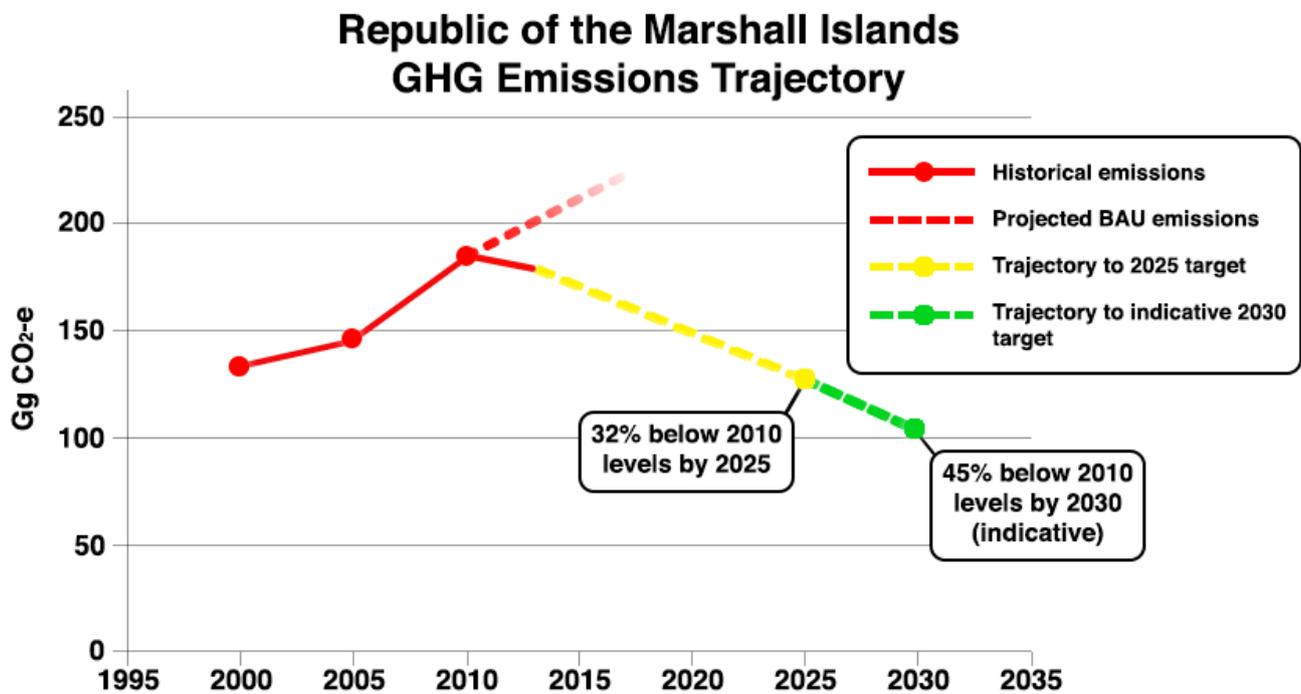
## INFORMATION TO FACILITATE CLARITY, TRANSPARENCY & UNDERSTANDING

Parameter		Information
Timeframe and/or period for implementation		Start year: 2020      End year: 2025
Type of commitment		Absolute economy-wide emission reduction target (excluding LULUCF)
Reference point or base year		2010 base year (~185 Gg CO <sub>2</sub> -e)
Estimated quantified impact on GHG emissions		Commitment to reduce GHG emissions by 32% below 2010 levels by 2025  Indicative target to reduce GHG emissions by 45% below 2010 levels by 2030
Coverage	% national emissions	~100%
	Sectors	<ul style="list-style-type: none"> <li>• Energy               <ul style="list-style-type: none"> <li>- Electricity Generation</li> <li>- Transport (land and shipping)</li> <li>- Other (cooking and lighting)</li> </ul> </li> <li>• Waste</li> </ul> [Note: emissions from sectors not listed are negligible]
	Gases	Carbon dioxide (CO <sub>2</sub> ) Methane (CH <sub>4</sub> ) Nitrous Oxide (N <sub>2</sub> O) [Note: emissions of GHGs not listed are negligible]
	Geographical boundaries	Whole of country
Intention to use market-based mechanisms to meet target		No
Land sector accounting approach		N/A
Metrics and methodology		Consistent with methodologies used in RMI's forthcoming Second National Communication (1996 IPCC Guidelines).

Parameter	Information
Planning process	<p>RMI's INDC was developed through an all-inclusive process of engaging relevant stakeholders in and outside government, including the country's first National Climate Change Dialogue and three rounds of stakeholder consultations. This process has produced genuine national ownership of the INDC and highlighted synergies with other UNFCCC-related processes, including National Communications, Biennial Update Reports, National Adaptation Planning, and Nationally Appropriate Mitigation Actions (NAMAs).</p>
Fair and ambitious	<p>RMI's emissions are negligible in the global context (&lt;0.00001% of global emissions). According to data reflected in RMI's forthcoming Second National Communication, RMI's emissions peaked around 2009 and have been trending downwards since, in line with the goals in the National Energy Plan and National Climate Change Policy, based on the 'National Climate Change Roadmap' (2008).</p> <p>Given its low GDP per capita (approx. USD3,600<sup>1</sup>), extreme vulnerability and dependence on external support, RMI's proposed targets are ambitious compared to those proposed by other countries and measured against any objective indicators. They put RMI on a trajectory to nearly halve GHG emissions between 2010 and 2030, with a view to achieving net zero GHG emissions by 2050, or earlier if possible.</p> <p>RMI's pursuit of an absolute, economy-wide emission reduction target is a far more ambitious approach than the contemplation in Decision 1/CP.20 that "LDCs and SIDS may communicate information on strategies, plans and actions for low GHG emission development..." (para. 11)</p>

<sup>1</sup> World Development Indicators (2013), World Bank.

RMI's historical GHG emissions from 2000 to 2010 (per the forthcoming Second National Communication) and the estimated emissions trajectory reflected in the new targets contained in the INDC are illustrated below:



## ACCOMPANYING INFORMATION ON RMI'S INDC

### General Information

The Republic of the Marshall Islands (RMI) is a Small Island Developing State and home to nearly 70,000 people, scattered across 24 low-lying coral atolls in the North Pacific. With an average elevation of 2 metres, RMI is uniquely vulnerable to the impacts of climate change. Though RMI's total greenhouse gas emissions are negligible on a global scale, the country takes its national motto, "Jepilpilin ke ejukaan" ("Accomplishment through joint effort"), very much to heart. RMI recognizes that it has a role to play in the global effort to combat climate change, demonstrating that even with its limited means it will undertake the most ambitious action possible.

Since its independence, RMI has been heavily reliant on external assistance, with grants averaging 60% of Gross Domestic Product (GDP). International support will remain important as RMI fulfils its National Strategic Development Plan: Vision 2018<sup>2</sup> (NSP). The NSP provides a general framework for sustainable development, and contains linkages to climate change and disaster risk management through its goal of environmental sustainability. It is a guide for development and progress in the medium term, through a three-year rolling plan, and will be updated continually for use in meeting longer-term objectives as RMI moves towards the scheduled completion of funding under "The Compact of Free Association, as Amended" in 2023<sup>3</sup>.

### Mitigation

#### *Current Status*

The estimated sectoral mix of RMI's anthropogenic GHG emissions (CO<sub>2</sub>-e), as calculated for 2010 in the forthcoming Second National Communication, is as follows: electricity generation (~54%), land and sea transport (~12%), waste (~23%), and other sectors (~11%).

Almost 90% of national energy needs are currently satisfied by imported petroleum products, although biomass remains important for cooking and crop drying on outer islands. All CO<sub>2</sub> emissions are the result of combustion of imported fossil fuels in five sectors:

- Electricity generation;
- Sea transport;
- Land transport;

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<sup>2</sup> Vision 2018, RMI Government, 2001

<sup>3</sup> RMI Decrement Management Plan, 2015-2023

- Kerosene for lighting on outer islands; and
- LPG, butane and kerosene for cooking.

Like other island nations in the Pacific, RMI suffers from high and volatile fuel prices, while lacking any known fossil fuel reserves of its own.

Following a major fuel price spike in July 2008, the RMI Government declared a state of economic emergency. This quickly drew national attention to the need to reduce the reliance on imported fossil fuels, and to scale-up renewable energy as a replacement. Prior to 2008, the emphasis had been mainly on small-scale solar for the households of the outer islands. However, since 2008, there has been a rapid expansion of solar investment to add renewable energy generation to the existing diesel-powered grids on the urban islands. This, along with the introduction of supply-side efficiency measures by the Marshalls Energy Company (MEC) and demand-side load reductions, has led to a recent decline in fuel oil usage for electricity generation.

The vision for the proposed 2014 National Energy Policy (NEP) is “an improved quality of life for the people of the Marshall Islands through clean, reliable, affordable, accessible, environmentally appropriate and sustainable energy services.” Reducing fossil fuel imports is the major goal, with the uptake of renewable energy and further energy efficiency improvements on both the demand and supply sides expected to replace more than one-third of fossil fuels for electricity and transport by 2030.

A monitoring plan has been developed as part of the National Energy Policy to tie the key strategies of the energy sub-sectors to the overall vision of the energy sector and the Vision 2018. The guiding principles for implementing this Policy are aligned with the principles adopted for national, sub-regional, regional and international initiatives, which include the Micronesian Energy Initiative, the Regional Framework for Action on Energy Security in the Pacific (FAESP), and the Sustainable Energy for All Initiative Goals.

### *Planned Actions*

In preparing its INDC, RMI considered various scenarios for the potential contribution of renewable energy and energy efficiency initiatives in the power generation and transport sectors, as well as the potential role of measures to reduce emissions from the waste, cooking and lighting sectors.

As currently estimated, progress towards achieving RMI’s targets would entail reducing emissions from: the electricity generation sector by 55% in 2025, and 66% in 2030;

transportation (including domestic shipping) by 16% in 2025 and 27% in 2030; waste by 20% by 2030; and 15% from other sectors (cooking and lighting) by 2030.

Specific areas of action contemplated to make progress towards the INDC targets include:

- Ground and roof mounted solar with associated energy storage;
- Ongoing demand-side energy efficiency improvements (e.g. prepayment meters, end user efficiency improvements);
- Supply-side energy efficiency improvements (e.g. new engines and system upgrades, heat recovery from engines)
- Small scale wind-powered electricity generation;
- Replanting and expansion of coconut oil production for use in electricity and transport sectors blended with diesel;
- Vehicle inspections and maintenance;
- Introduction of electric vehicles, and emission standards for current vehicles;
- Introduction of solar-charged electric lagoon transport;
- Reduction in methane production in landfills through pre-sorting of waste and entrapment of methane;
- Transition to electric and solar cook stoves from LPG cook stoves;
- Reduction of kerosene for lighting in outer atolls; and
- Additional GHG reductions may become possible through the use of new technologies allowing the extraction of ocean energy for power generation.

Many of these actions will depend on the availability of the necessary finance and technology support, as described in the section on “Support for Implementation.”

#### *Efforts to overachieve*

RMI will undertake the strongest possible efforts to achieve and, where possible, over-perform on the commitment in its INDC.

For example, should potential plans and specific pathways for deployment of OTEC be clarified, and should practical, island-driven application be proven, this would have the potential to allow RMI to substantially over-perform on its present commitment. Further, should additional technological developments occur, and cost barriers be reduced, further progress could be possible in all relevant sectors, including energy generation and transportation. RMI looks forward to the opportunity to consider the possible deepening of its emission reduction trajectory when it seeks to update its mitigation commitment in five years’ time.

## **Adaptation**

While RMI considers that the focus of INDCs should primarily be mitigation, we note the invitation to Parties in Decision 1/CP.20, para. 12 to “consider communicating their undertakings in adaptation planning or consider including an adaptation component in their INDCs”.

RMI’s people are among the most vulnerable in the world to the impacts of climate change. Many of these impacts are already occurring, inflicting damage and imposing substantial costs on the Marshallese government and people – costs that will only increase in the coming years.

RMI is committed to the strongest possible efforts in safeguarding security and human rights, as well as advancing development aspirations, in light of projected climate impacts and risks. RMI has no choice but to implement urgent measures to build resilience, improve disaster risk preparedness and response, and adapt to the increasingly serious adverse impacts of climate change. RMI commits to further developing and enhancing the existing adaptation framework to build upon integrated disaster risk management strategies, including through development and implement of a national adaptation plan (and further integration into strategic development planning tools), protecting traditional culture and ecosystem resources, ensuring climate-resilient public infrastructure and pursuing facilitative, stakeholder-driven methods to increase resiliency of privately-owned structures and resources. RMI seeks to consider, as appropriate, the legal and regulatory means to best support these approaches.

RMI also considers that adaptation action will have mitigation co-benefits, with efforts such as mangrove and agriculture rehabilitation programs likely to enhance carbon sinks as well as assist with protection of water resources and the health of the RMI people.

The RMI National Climate Change Policy Framework (NCCPF) sets out the Government of RMI’s commitments and responsibilities to address climate change. This policy framework is intended to guide the development of adaptation and energy security measures that respond to RMI’s needs with an “All Islands Approach”, foster an environment in which the RMI can be better prepared to manage the current and future impacts of climate change while ensuring sustainable development, and provide a blueprint for building resilience in partnership with regional and global partners.

In the NCCPF, RMI has identified a series of priority areas for urgent response. It is clear that RMI faces major impacts on its communities’ livelihoods and infrastructure from sea-level rise, sea surges, typhoons and rainfall intensity; water and food security issues from

changing rainfall patterns and ocean acidification; health issues from rising temperatures and prolonged drought periods, as well as the potential for increasing peak wind speeds and changes to ocean circulation patterns.

In addition to the NCCPF, RMI has also developed an innovative Joint National Action Plan (JNAP) for Climate Change Adaptation and Disaster Risk Management National Action Plan (DRM NAP) that sets out actions to adapt against the effects of natural disasters and climate change.

The JNAP is an important and integral supportive element towards the achievement of RMI's sustainable national development imperatives. The JNAP's strategic goals, which are a combination of those addressed in the DRM NAP and the National Climate Change Policy Framework (NCCPF), are as follows:

- Establish and support an enabling environment for improved coordination of disaster risk management /climate change adaptation in the Marshall Islands;
- Public education and awareness of effective CCA and DRM from the local to national level;
- Enhanced emergency preparedness and response at all levels;
- Improved energy security, working towards a low carbon emission future;
- Enhanced local livelihoods and community resilience for all Marshallese people; and
- Integrated approach to development planning, including consideration of climate change and disaster risks.

RMI intends on regularly updating its climate vulnerability assessments and subsequently build on its existing policies to meet its ultimate goal of minimizing impacts and harm incurred by the Marshallese people. At all steps of the way, local stakeholders will be consulted to ensure community needs are best served.

## **Support for implementation**

Climate change is a cross-cutting development issue that affects every aspect of the Marshallese way of life, and it is imperative for RMI to collectively build and strengthen its drive to a low-carbon economy and resilience to climate change impacts. RMI looks to regional and global cooperation for support in pursuit of these mitigation and adaptation-related development priorities.

While RMI considers its INDC as a full national commitment to be undertaken without pre-conditions, the country is at present heavily reliant on external assistance for capacity and

financial resources in key national sectors. As a small economy, minor perturbations can lead to substantial changes in energy needs and related emissions trajectories. If national circumstances change, RMI will to the best of its ability stay on course to achieve its emissions targets. While longer-term national projections are uncertain, and private sector growth is imperative, it is evident that external assistance will continue to be important in achieving many national development objectives.

The rapid development of energy-intensive economic activities intensified RMI's dependence on imported petroleum products, particularly in the period 2000 to 2010. The high cost of these products remains a fundamental obstacle to improving standards of living and business profitability in the country. The RMI Government is currently supported by donors and development partners to mitigate impacts of high oil prices at policy level, focused on increasing energy efficiency, minimizing the costs of imported fuels, and investing in renewable energy sources such as solar, biofuel and ocean energy.

Specifically, international support is critical to enable RMI to implement the actions enshrined in its National Energy Policy, Climate Change Policy, Joint National Action Plan, National Strategic Plan and other sectoral policies and plans. It is also important to note that RMI has made substantial progress in implementing its 2009 National Energy Plan (up to 2020), but important gaps remain, particularly in the area of private investment. RMI will need international support for its efforts to transition towards a low-emissions energy sector through greater use of renewables such as solar, biofuels and wind, and potential use of transformational technology, such as OTEC.

Finally, RMI will need substantial assistance to meet its adaptation objectives outlined in the prior section. As a highly vulnerable and low-lying island nation with no major points of elevation above 2 metres, RMI already experiences frequent and serious climate impacts, as well as natural hazard events. These impacts will continue to pose serious challenges across the full spectrum of RMI's development prospects and priorities.

# REPUBLIQUE ISLAMIQUE DE MAURITANIE

Honneur - Fraternité - Justice



Ministère de l'Environnement et du Développement Durable

## CONTRIBUTION PRÉVUE DÉTERMINÉE AU NIVEAU NATIONAL DE LA MAURITANIE A LA CONVENTION CADRE DES NATIONS UNIES SUR LES CHANGEMENTS CLIMATIQUES (CCNUCC)

21<sup>ÈME</sup> CONFÉRENCE DES PARTIES À LA CCNUCC À PARIS, FRANCE.

SEPTEMBRE 2015

### Résumé du CPDN de la Mauritanie

**Année de référence :** 2010.

**Période d'engagement :** 2020 – 2030.

**Secteurs pris en compte :** Energie, Agriculture, Foresterie et Affectation des terres, Procédés Industriels et Utilisation des Produits ainsi que les déchets.

**Gaz concernés :** CO<sub>2</sub>, CH<sub>4</sub>, N<sub>2</sub>O.

**Méthodologie d'évaluation :** GIEC 2006

**Objectif de la contribution d'atténuation:** Réduction des émissions de GES de l'année cible (2030) par rapport aux émissions projetés à la même année dans le scénario du cours normal des affaires.

**Niveau de réduction visé en 2030 :** 22.3 %.

**Réduction cumulée des émissions pour la période 2020-2030 :** 33,56 Millions de tonnes équivalent dioxyde de carbone.

**Type de contribution :** Conditionnelle 88% et non Conditionnelle 12%.

**Besoins en financement :** 17,6 milliards USD, dont

- L'atténuation: 8,2 milliards USD.
- L'adaptation: 9,4 milliards USD

## Introduction

Pays Non Annexe 1 de la Convention Cadre des Nations Unies sur les Changements Climatiques, la Mauritanie appartient à la zone du Sahel Africain la plus touchée par les sécheresses récurrentes depuis 1968. La désertification qui en a résulté est d'autant plus forte que l'effet du climat, conjuguée à l'action de l'homme, a entraîné des conséquences directes sur un milieu déjà très précaire, à savoir la dégradation des conditions socio-économiques générales du pays et de l'environnement physique. La vulnérabilité du pays au changement climatique touche par conséquent l'ensemble des secteurs vitaux de l'économie nationale.

En réponse aux catastrophes récurrentes qui résultent de cette situation, le Gouvernement de la Mauritanie consacre régulièrement une partie de son budget aux programmes spéciaux pour venir en aide aux populations vulnérables victimes des sécheresses. C'est le cas du programme Emel (Espoir), en cours d'exécution, pour une enveloppe financière initiale de 42 Milliards MRO en 2012 et un financement revolving de **12 Milliards MRO** par an, soit environ un financement cumulé de **78 Milliards MRO** pour la période 2012 – 2015, environ **300 Millions** de dollars US,. Ce programme d'urgences vient juste après le programme d'urgences Solidarité de 2011, qui a coûté neuf Milliards MRO, soit environ **35 Millions** de dollars US.

La "Contribution Prévue Déterminée au niveau National" de la République Islamique de Mauritanie s'appuie sur les programmes de développement sectoriels et sur le cadre stratégique de lutte contre la pauvreté. Ceux-ci ont pour objectif global la contribution au développement durable, sobre en carbone et résilient aux impacts du changement climatique.

Au vu de ce qui précède, la présente contribution reflète donc à la fois la volonté politique du pays à participer à la réduction mondiale des émissions de gaz à effet de serre (GES) et à répondre aux besoins du pays en matière d'adaptation, dans la mesure de ses moyens et capacités.

## 1- Approche méthodologique

Dans le cadre de la préparation de la CPDN, le Ministère de l'Environnement et du Développement Durable (MEDD) a procédé en trois étapes : une première étape de sensibilisation/ information, une deuxième d'élaboration de la Contribution et enfin une troisième étape de validation. Dans ce processus, deux volets ont été considérés, le volet politique et le volet technique:

- Pour le volet politique, le message sur les enjeux et les défis de la COP21 et la Contribution Nationale a été relayé à l'ensemble des secteurs clés par le Ministère de l'Environnement et du Développement Durable. Cette action a permis de définir les modalités pratiques de la préparation des Contributions sectorielles par des équipes, coordonnées chacune, par un point focal sectoriel. Le processus d'élaboration de la CPDN devait aussi s'achever par une validation politique marquée par l'approbation du Gouvernement.
- Pour le volet technique, le personnel technique de chacun des secteurs a procédé à la préparation de la contribution sectorielle correspondante, après échange et coordination avec l'équipe d'experts engagée par le MEDD à cet effet..

## 1.1 - Méthodologies d'évaluation de l'atténuation

Pour l'analyse de l'atténuation en Mauritanie, trois modèles ont été utilisés dans le calcul des estimations:

- Les méthodologies des Lignes Directrices 2006 du GIEC et le logiciel qui leur est attaché, pour les secteurs de 'l'énergie', des 'Procédés Industriels et l'Utilisation des Produits' (PIUP) et celui des 'Déchets';
- L'outil Ex-Ante Carbon-balance Tool (EX-ACT) de la FAO pour le secteur AFAT ;
- Le modèle «LEAP» pour l'analyse du sous-secteur de l'énergie domestique.

## 1.2 - Méthodologies d'évaluation des options d'adaptation

Sur la base des orientations (Scénarii climatiques et socioéconomiques) et de l'appui (Articulation vulnérabilité et adaptation) de l'équipe d'experts pluridisciplinaire du MEDD, les secteurs de développement ont proposé leurs portefeuilles respectifs d'adaptation au changement climatique

## 2 - Contexte national

### 2.1 - Données de base sur la Mauritanie

<b>Superficie</b>	1.030.000 Km <sup>2</sup> - 720 Kilomètres de littoral (ONS)			
<b>Climat</b>	Sud : climat sahélien, chaud et semi aride. Nord : climat Saharien chaud et aride à hyper aride (ONM)			
<b>Population</b>	3 537 368 habitants (2013) et (3 596 702 habitants en 2015), dont (57,1% des moins de 20 ans (EPCV 2014))			
<b>Population urbaine</b>	59%			
<b>PIB</b>	4,5 milliards USD en 2013 (MAED, BAD)			
<b>PIB par habitant</b>	1 272 USD (2013)			
<b>Croissance du PIB</b>	5,7% en 2013 (ONS)			
<b>Part de l'agriculture (y compris l'élevage) dans le PIB</b>	17% (MAED)			
<b>Emission en 2012</b>	7070.51 Gg Eq-CO <sub>2</sub> (RNI)			
<b>Emission par habitant</b>	2,1 tonnes Eq-CO <sub>2</sub> (RNI)			
<b>Emission par habitant hors AFAT</b>	0,7 tonnes Eq-CO <sub>2</sub> (RNI)			
<b>Accès à l'électricité</b>	38,8 % des ménages (DEME)			
<b>Mix électrique actuel</b>	En 2012 hors opérateurs miniers	<b>Hydro</b>	<b>ER</b>	<b>Thermique</b>
		18,30%	2,60%	79,10%
	En 2015 hors opérateurs miniers	13,80%	17,40%	68,80%

Sources: MAED, ONS (RGPH 2013), ONM, BAD, DEME et RNI (2014).

## 2.2 - Le changement climatique dans le contexte national

La Mauritanie a ratifié la Convention Cadre des Nations Unies sur les Changements Climatiques (CCNUCC) en 1994 et a adhéré au Protocole de Kyoto en 1997. Au plan national, la Stratégie Nationale de Développement Durable (SNDD) à l'horizon 2015, adoptée en octobre 2006 constitue le cadre de référence de la politique nationale en rapport avec les enjeux climatiques. Sur le plan opérationnel, elle est articulée avec au second Plan d'Action National pour l'Environnement et le développement durable (PANE II) qui couvre la période 2012-2016. Bien avant, la Mauritanie a élaboré son Plan d'Action National d'Adaptation au changement climatique (PANA) en 2004. En 2015, la Mauritanie a lancé les premiers jalons préparatoires de son Plan National d'Adaptation à vision moyen et long termes.

## 3 - La Composante Atténuation de la Contribution de Mauritanie

### 3.1 - Calendrier de la contribution

La période des activités d'atténuation proposées par la Contribution de la Mauritanie est 2020-2030.

### 3.2 - Type de contribution

La Mauritanie a choisi de formuler sa 'Contribution' en termes de réduction par rapport au scénario de référence. L'estimation a été faite sur la base des projets prévus pendant la période 2020-2030.

### 3.3 - Secteurs et gaz concernés

Les secteurs concernés sont tous des secteurs émetteurs des GES à savoir: (i) L'Energie ; (ii) L'AFAT; (iii) Les Procédés Industriels et (iv) Les Déchets. Les GES concernés sont le CO<sub>2</sub>, CH<sub>4</sub> et N<sub>2</sub>O.

### 3.4 - Niveau d'atténuation ciblé

La République Islamique de Mauritanie a l'intention de contribuer à l'Accord Climat de Paris par une réduction de ses émissions de GES prévue en **2030 de 22,3%**, soit **4.2 Millions de tonnes équivalent dioxyde de carbone (Mt eq CO<sub>2</sub>)**, par rapport aux émissions projetées pour la même année selon le **scénario du cours normal des affaires (Business As Usual) qui évolue de 6.6 Mt eq CO<sub>2</sub> en 2010 à 18.84 Mt eq CO<sub>2</sub>** En 2030. Ainsi, pour la période 2020-2030 le cumul des émissions évitées selon les mesures d'atténuation proposées sont d'environ **33,56Mt eq CO<sub>2</sub>**.

Secteurs	Cumul d'Atténuation 2020 – 2030 (Gg Eq CO <sub>2</sub> )
Energie	-12711.1
Procédés Industriels et Utilisation des Produits	- 30.5
Agriculture, Foresterie et Affectation des terres	- 20431.5
Déchets	-386.1
<b>Total période d'évaluation</b>	<b>- 33559.3</b>

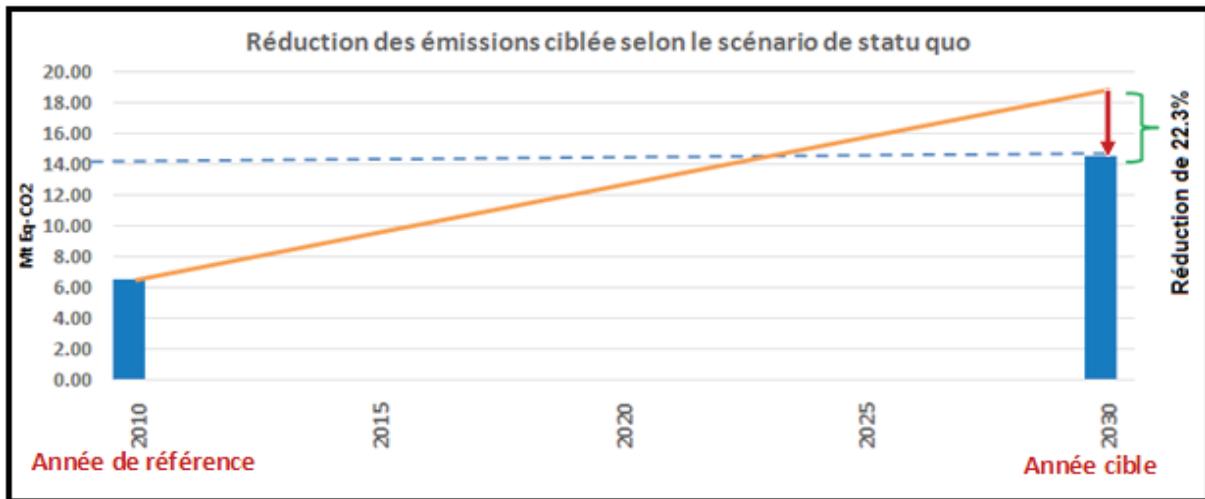
Cette contribution portera principalement sur les secteurs de l'énergie (génération électrique, transports, agriculture, pêche...), de l'Agriculture, Foresterie et Affectation des Terres (AFAT), ainsi que ceux à faibles émissions (procédés industriels et déchets).

### 3.5 - Parts de la Contribution

- **12%** de cette réduction potentielle des émissions pourront être réalisés par les moyens propres de la Mauritanie (*part inconditionnelle de la Contribution*).

La nature de cette partie inconditionnelle de la contribution porte essentiellement sur la réglementation (exemples de la mesure prise par le Gouvernement en 2015 limitant l'âge d'importation des voitures à 8 ans et celle de l'exonération de la taxe des bus sortie usine pour le transport en commun), ou sous forme d'actions prioritaires d'accès aux services de base pour réduire la pauvreté rurale (exemples: électrification rurale, équipement des points d'eau avec des pompes solaires, etc.).

- **88%** de la contribution, correspondent à la part de réduction des émissions conditionnée à l'appui international (*part conditionnelle de la Contribution*).



### 3.6 - Besoins en moyens de financement de l'atténuation

La mise en œuvre des projets d'atténuation proposés nécessite des moyens en termes de capacités, de technologies, de cadres réglementaires et institutionnels et de moyens financiers. Compte tenu de ses capacités actuelles, seule une contrepartie de ces projets peut être assurée par les moyens propres de la Mauritanie.

Pour réaliser ses ambitions d'atténuation des GES en 2030, la Mauritanie aura besoin d'une enveloppe financière globale de **9,3 Milliards de Dollars US** dont 88% (équivalents à **8,2 Milliards de Dollars US**.) devant provenir de l'appui international.

La Mauritanie souhaiterait en plus de ces appuis financiers directs, soutenir ses besoins en financement de l'atténuation à travers : (i) la plateforme NAMA, notamment pour les programmes d'efficacité énergétique et énergies renouvelables; (ii) l'inclusion des marchés internationaux du carbone, comme le MDP, dans un accord post 2020 sur le climat qui, couplé à un régime comptable approprié (MRV), pourrait servir à financer des investissements sobres en carbone.

## 4 - La Contribution de la Mauritanie en matière d'Adaptation

Selon les scénarii climatiques rapportés dans la Troisième Communication Nationale (2014), la Mauritanie, devrait connaître une forte exposition socio-économique et écologique aux impacts du changement climatique:

**Température.** Une augmentation de +2.1 °C de la température moyenne annuelle sur l'ensemble du pays à l'horizon 2050 et à +4,5° à l'horizon 2100.

**Précipitations.** Une baisse du volume annuel des précipitations de 20% selon les régions à 70% dans l'Adrar, par rapport à la situation actuelle, à l'horizon 2100.

**Phénomènes extrêmes.** Cette augmentation de la température et baisse des précipitations s'accompagnerait d'une augmentation de la fréquence et de l'intensité des phénomènes extrêmes de sécheresse et d'inondation et des perturbations de la répartition saisonnière des précipitations.

**Élévation du niveau de la mer.** Le littoral qui s'étend sur plus de 720 km de côte manifeste déjà par endroit (Nouakchott) sa sensibilité au phénomène d'élévation du niveau de la mer. La nappe affleure sur presque toute l'étendue des surfaces bâties de la Capitale et la plus petite précipitation rend l'évacuation des eaux et l'assainissement en général impossibles.

### 4.1 - Les impacts du changement climatique ressentis par les secteurs clés

**Les impacts sur les ressources en eau** seront significatifs et se traduiront par une baisse générale des ressources en eau de l'ordre de 10 à 15%, avec pour conséquences :

- L'élévation de la température moyenne de surface de l'eau de mer (SST) avec une remontée vers le nord du front thermique au-delà de sa limite géographique habituelle et l'appauvrissement des eaux en oxygène crée des OMZ de plus en plus importantes qui pourraient être à l'origine de migration des espèces pélagiques vers des zones plus riches en oxygène ;
- L'augmentation de la température des eaux et l'acidification des océans ces dernières années semblent être accompagnées d'une pullulation de méduses et d'un phénomène récurrent des eaux colorées ;
- La montée du niveau de l'océan et l'érosion côtière menaçant les infrastructures du littoral dédiées à la pêche ;
- L'accroissement de la fréquence des tempêtes qui réduit la productivité de la pêche.
- Un dérèglement du régime des oueds et une réduction de la capacité de remplissage des barrages à cause des précipitations concentrées et l'envasement accéléré des barrages par érosion hydrique dans les bassins versants fortement dénudés et,
- Un réchauffement des eaux de surface, moins aérées, à débits plus réduits et donc une réduction de leurs pouvoirs de dilution et de biodégradation de certains polluants, etc.

**Les impacts sur l'élevage** se traduiront par une aggravation de la situation actuelle, marquée par la dégradation de la productivité du cheptel. Cette évolution de la productivité du cheptel est induite par les sécheresses récurrentes, la rareté et l'éloignement des espaces pastoraux

et des points d'eau. Cette situation est le résultat de l'effet du réchauffement global et des prélèvements abusifs de la biomasse qui impactent sensiblement le niveau actuel déjà très fragile de la sécurité alimentaire. La convergence de ces différents facteurs, affecte le mode de conduite des troupeaux, avec en particulier, le développement de l'élevage périurbain et la mise en œuvre de programmes d'amélioration des races.

**Les impacts sur l'habitat, l'urbanisme et l'aménagement du territoire** concernent les risques d'intrusion d'eaux marines et d'inondation des infrastructures et villes côtières, notamment Nouakchott et Nouadhibou, respectivement capitales politique et économique. En effet, les zones côtières en Mauritanie abritent à la fois plus de 30% de la population du pays, la plupart des industries, l'essentiel des activités d'import-export, d'importantes infrastructures portuaires et aéroportuaires, les activités d'extraction des hydrocarbures, la quasi-totalité des activités de pêche, mais également les deux grands parcs nationaux du pays. Avec l'augmentation du niveau de l'océan, d'une part, et compte tenu de la topographie du littoral, d'autre part, les zones côtières sont sensiblement vulnérables aux risques d'incursions marines et d'inondations ainsi qu'aux phénomènes climatiques extrêmes. A cet effet, les catastrophes climatiques qui toucheraient la zone côtière affecteront la croissance économique de la Mauritanie, pays où le littoral représente à la fois un écosystème singulier et le principal pôle de développement économique. Sur un autre plan, les risques d'ensablement des villes et villages, cumulés aux sécheresses, induisent la concentration des populations autour des zones humides, l'atomisation des établissements humains le long des axes routiers et le développement de l'exode rural vers les grandes villes.

**Les impacts sur les ressources naturelles.** La régression du couvert végétal (ligneux et herbacé), sous l'effet conjugué des sécheresses chroniques et de la pression anthropique, a accentué la désertification et a été la cause principale de la disparition d'espèces forestières et biologiques, et de la réduction du potentiel pastoral provoquant ainsi un exode rural massif vers les grands centres urbains. Malgré l'exploitation irrationnelle des ressources forestières par les populations pour satisfaire leurs besoins en énergie domestique (bois de chauffe et charbon de bois) et en produits forestiers non ligneux (pâturages aériens, pharmacopée, produits de cueillette et cosmétique), les écosystèmes forestiers ont développé des mécanismes d'adaptation qui sont aujourd'hui déstabilisés par le changement climatique. La forme la plus visible de ces manifestations en Mauritanie est la désertification et ses corollaires.

**Les impacts sur la pêche.** Le secteur de la pêche à l'instar des autres secteurs subit les effets du changement climatique. La perception de ces effets se fait à travers le suivi des paramètres physico-chimiques des eaux de l'océan et de la biodiversité marine. Cela se traduit notamment par :

- L'élévation de la température moyenne de surface de l'eau de mer (SST) avec une remontée vers le nord du front thermique au-delà de sa limite géographique habituelle et l'appauvrissement des eaux en oxygène crée des OMZ de plus en plus importantes qui pourraient être à l'origine de migration des espèces pélagiques vers des zones plus riches en oxygène ;
- L'augmentation de la température des eaux et l'acidification des océans ces dernières années semblent être accompagnées d'une pullulation de méduses et d'un phénomène récurrent des eaux colorées ;

- La montée du niveau de l'océan et l'érosion côtière menaçant les infrastructures du littoral dédiées à la pêche ;

**L'accroissement de la fréquence des tempêtes qui réduit la productivité de la pêche.** Le sous-secteur de la pêche continentale (fleuve Sénégal) fait face à certaines contraintes d'ordre climatique et autres : (i) Baisse de la production, (ii) variation des paramètres physico-chimiques, (iii) problèmes de pollution (pesticides) du fleuve Sénégal, (iv) effets anthropiques (barrage), (v) ensablement des mares et des plans d'eau, (vi) difficultés d'accès à la ressource en raison des plantes envahissantes, (vii) irrégularité du régime du fleuve due aux barrages, (viii) conflits entre les populations autochtones et /allochtones.

**Les impacts sur la santé.** La Mauritanie est caractérisée par une situation nutritionnelle préoccupante, aggravée par un environnement hostile, ce qui engendre une augmentation de la prévalence des pathologies nutritionnelles favorisant, ainsi, l'apparition de maladies infectieuses et parasitaires, en particulier, les diarrhées et les infections respiratoires aiguës, chez les enfants de moins de 5 ans. La mortalité infantile est dominée par les infections respiratoires aiguës (21,5%), le paludisme (15%) et les maladies diarrhéiques (13,5%) selon l'enquête démographique et de santé (EDSM). Ces trois affections représentent à elles seules 50% des causes de mortalité des enfants de moins de cinq ans ; 35% des enfants de plus de cinq ans. Par ailleurs, une frange de 32% des enfants de moins de cinq ans souffre de malnutrition chronique et d'insuffisance pondérale, dont respectivement 17% et 10% sous leurs formes sévères. Ce qui met en exergue la persistance d'une situation nutritionnelle inquiétante aggravée par les épisodes de la sécheresse.

#### 4.2 - Les dépenses climatiques dans l'adaptation

**Les efforts de l'Etat.** L'Etat Mauritanien consent d'énormes moyens pour juguler les impacts des sécheresses et ce depuis les années 70. Ceux-ci ont été largement renforcés à partir de 2010 prenant la forme d'un mécanisme de financement régulier pour l'adaptation au changement climatique. . .

**Dans le domaine de la protection de la nature,** plus de 20 projets et programmes de protection et de restauration de la nature ont été mis en œuvre entre 1975 et 2008, relayés depuis 2010 par des programmes ambitieux d'adaptation au changement climatique . Il s'agit essentiellement d'initiatives de lutte contre l'ensablement, de reboisement, de gestion et protection des ressources naturelles et de conservation de la biodiversité. Le coût global cumulé est évalué à environ **100 millions de dollars US.**

**Dans le domaine agro-pastoral,** des efforts considérables pour améliorer la résilience des agriculteurs et éleveurs aux impacts du changement climatique ont été déployés sous forme d'aménagements hydro-agricoles, de soutien aux campagnes agricoles (commercialisation des produits agricoles et l'assurance climatique), amélioration des races locales, promotion de l'aviculture familiale. Ainsi, le bilan de mise en œuvre du CSLP 2006-2010 fait ressortir un investissement annuel moyen de **65 millions de dollars US.**

**Dans le domaine de la pêche,** des actions d'adaptation ont été réalisées dans le cadre de la "Stratégie de gestion Durable du Secteur des Pêches et de l'Aquaculture" (2008-2012,

prorogée à 2014). Parmi ces actions on peut citer :

- La protection des habitats de la zone euphotique (profondeur des 20m) ;
- L'élaboration des plans d'aménagement pour des principales pêcheries maritimes et du plan de développement de la pêche continentale (2010-2014) ;
- L'élaboration d'un cadre stratégique de développement de l'aquaculture (2010-2014).
- Le renforcement des moyens et capacités des institutions de contrôle en mer (Gardes Côtes de Mauritanie) et de recherche (Institution Mauritanienne de Recherche Océanographique et des Pêches)

***Dans le domaine de l'habitat, l'urbanisme et de l'aménagement du territoire***, l'Etat a procédé, depuis 2009, à des opérations de regroupement et de réinstallation de villages et hameaux atomisés, affectés par les sécheresses dans des sites viabilisés. Ce type d'intervention a également concerné des villes où la construction de logements et la restructuration des quartiers précaires ont mobilisé des montants importants. Les programmes financés au profit des couches vulnérables de la population ont concerné : (i) le regroupement de 7 localités à **4,500 Milliards MRO**; (ii) la création de deux villes modernes à **0.445 Milliards MRO**; (iii) la restructuration des quartiers précaires de Nouakchott (146.000 lots) à **5.6 Milliards MRO**; et (iv) la construction de logements sociaux et de moyen standing à **7.3 Milliards MRO**. (soit un total de **17,845 milliards de MRO**, l'équivalent de **64 Millions de Dollars US**).

### 4.3 - Les ambitions et besoins en matière d'adaptation

#### 4.3.1 - L'agenda des ambitions de la Mauritanie en matière d'adaptation à l'horizon 2030

Les initiatives proposées par les différents secteurs ont pour objectif de réduire la vulnérabilité des systèmes naturels et socio-économiques et ainsi de faire face aux changements climatiques. Pour ce faire, la Mauritanie sollicite l'appui de ses partenaires à l'échelle internationale pour l'atteinte de ses priorités d'adaptation qui comprennent :

- Un taux de couverture des besoins alimentaires de 117 % pour le riz, 80% pour le blé, 75% pour les céréales traditionnelles; 160% pour le lait, 126% pour la viande blanche;
- La réalisation des réseaux d'assainissement (eaux usées et pluviales) des villes de Nouakchott, Rosso, Kaédi, Kiffa, Nouadhibou, Néma, Aioun, Timbédra, Akjoujt, Atar;
- Un ensemencement aérien des terres dégradées (10 000 ha/an) pour favoriser la régénération du milieu naturel;
- La restauration des pâturages naturels (mises en défens et gestion des parcours dans le cadre des plans climat territoriaux);
- La réalisation de 300 sondages (dont 150 à des profondeurs supérieures à 200 m) pour l'exploration des aquifères, transformables en forages d'exploitation et/ou en piézomètres;
- La réalisation des synthèses hydrogéologiques et d'évaluation des ressources

en eau dans les zones difficiles ou vulnérables et l'extension du suivi régulier à l'ensemble des champs captant avec le système de télétransmission;

- La réalisation du projet d'adduction en eau potable (AEP) dans 4 wilayas de la zone Nord du pays
- La réalisation des projets de dessalement pour les zones côtières et autres ,
- La réalisation de 2000 petits réseaux isolés d'adduction d'eau potable (AEP) dans le milieu rural équipés en solaire
- La protection des villes de Nouakchott et de Nouadhibou contre les risques d'immersion marine et d'ensablement,
- Le renforcement de la résilience de la population vulnérable, particulièrement en milieu rural, face aux effets du changement climatique,
- Le renforcement des capacités institutionnelles et techniques des structures nationales et locales en matière de planification, de financement et de mise en œuvre des mesures d'adaptation au changement climatique,
- Le renforcement de la résilience des écosystèmes naturels face aux effets du changement climatique,
- La réhabilitation et la gestion intégrées et durables des zones humides contre les effets du changement climatique,
- L'aménagement des petits plans d'eau sur des sites pilotes,
- La promotion d'une pêche responsable sur le lac de Foum Gleita,
- Le renforcement des capacités pour le suivi et la gestion des pêches continentales,
- La promotion de la pisciculture pour améliorer la sécurité alimentaire et la réduction de la pauvreté dans les zones rurales.
- Le renforcement de la nutrition et de la santé des ménages vulnérables.

#### 4.3.2 - Les moyens de mise en œuvre des mesures d'adaptation

Outre les besoins en renforcement des capacités, transferts technologiques et institutionnels, la réalisation des projets et mesures d'adaptation nécessite un financement sur les deux périodes de: 2015 – 2020 et 2020-2030 de **9 377,4 Milliards USD**:

Secteurs	Besoins financiers (en Million de dollar US)
Agriculture	843.00
Eau et assainissement	1 500.00
Elevage	36.40
Habitat, urbanisme et aménagement du territoire	5 000.00
Environnement et développement durable (Protection de la nature)	133.00
Pêche et économie maritime	1 644.00
Santé	221.00

Sous total Adaptation

9 377.40

## 5 - Mise en œuvre et suivi de l'INDC

### 5.1 - Suivi, notification et vérification (MRV)

En Mauritanie, l'utilisation de l'approche suivi, notification et vérification (MRV) n'est pas connue et n'a jamais été appliquée auparavant aux mesures d'atténuation. Afin d'assurer une plus grande transparence, précision et comparabilité des informations concernant les mesures d'atténuation, l'Etat a déjà entamé le processus d'élaboration d'un système MRV approprié et efficace pour tous les secteurs de l'économie nationale.

La mise en place de ce système permettra de :

- Mesurer et de suivre les réductions des émissions de GES et la séquestration du carbone organique générée par la mise en œuvre des mesures d'atténuation proposées ;
- Faciliter l'identification et l'évaluation des indicateurs de suivi objectivement vérifiables afin de mesurer les progrès enregistrés par rapport aux objectifs escomptés ;
- Favoriser le rapportage et la communication des réductions d'émissions de GES et les co-bénéfices des mesures d'atténuation proposées de manière transparente ; et
- Permettre la vérification, éventuellement par une tierce partie indépendante et la fiabilité des résultats obtenus à travers la mise en œuvre des mesures d'atténuation proposées.

### 5.2 - Cadre institutionnel de mise en œuvre et de suivi –évaluation

A la demande du Ministère de l'Environnement et du Développement Durable (MEDD), chaque Ministère a désigné un "Point Focal Sectoriel" (PFS) chargé de la thématique du changement climatique pour son secteur. La Mauritanie a ainsi développé un réseau de Points Focaux Sectoriels de changement climatique au sein des départements ministériels pour améliorer la mise en œuvre des objectifs de la Convention et introduire systématiquement la préoccupation changement climatique dans toutes les activités sectorielles. De même, la Mauritanie a mis en place un système de suivi-évaluation du "plan d'action national de l'environnement" (SE-PANE), qui sera élargi à cette "Contribution" de la Mauritanie, à travers un renforcement des capacités des structures de suivi-évaluation de tous les Départements concernés.

## 6 - Equité et ambition

La Mauritanie fait partie à la fois des pays Non-Annexe I et des PMA impactés par la désertification; elle est membre des groupes de négociation Climat: "G77 et la Chine", "groupe des pays Arabes", "groupe Africain" et "groupe des pays Sahéliens". C'est pourquoi elle mutualise les préoccupations et positions de tous ces groupes, qui considèrent ***l'adaptation comme une priorité***, et travaillent pour faire de la Conférence de Paris une Conférence des Parties réussie.

Les émissions de GES de la Mauritanie sont négligeables par rapport aux émissions globales (0,00015 soit 0,015%) ;elle considère donc qu'il est ***équitable*** qu'elle puisse poursuivre son développement pour rendre son économie et ses populations résilientes aux impacts du changement climatique.

Néanmoins, la Mauritanie s'engage à participer pleinement à l'effort de la communauté internationale pour réduire ses émissions de GES de **22,3% en 2030** par rapport aux émissions projetées à la même année, selon le scénario de référence (cours normal des affaires).

Avec des émissions de l'ordre de 2 tonnes éq-CO<sub>2</sub> par habitant, **la Contribution de la Mauritanie est équitable et ambitieuse.**

La mise en œuvre de cette Contribution permettrait de réaliser une réduction des émissions cumulées de 2020 à 2030 de **33,56** Mt éq-CO<sub>2</sub>, pour un coût total estimé à **9,3 Milliards de dollars US.**

Sur cette Contribution, 88% est conditionnelle pour un cumul de réduction des émissions de 29,53 Mt éq-CO<sub>2</sub> et un coût de **8,2 Milliards de dollars US.** La Mauritanie ambitionne de renforcer son dispositif de suivi du climat pour davantage organiser l'effort d'atténuation attendu de chacun des secteurs de son développement, de poursuivre son programme de développement des énergies renouvelables, de valoriser ses réserves de gaz de pétrole liquéfié (GPL) via la génération électrique partagée avec le Mali et le Sénégal.

La Mauritanie envisage d'actualiser sa contribution pour tenir compte de l'évolution de son développement.



# **INTENDED NATIONALLY DETERMINED CONTRIBUTION FOR THE REPUBLIC OF MAURITIUS**

**28 September 2015**

## 1.0 Introduction

As a Small Island Developing State (SIDS), Mauritius is highly vulnerable to the effects of climate change and its adverse impacts on socio-economic development. We know that the global greenhouse gases (GHG) emission from major big country polluters are responsible for climate change. While SIDS contribute only 1% of the global GHG emission, they are the ones to suffer most from the adverse impacts of climate change. In fact, according to the latest World Risk Report (2014), Mauritius is ranked as the 14<sup>th</sup> country with the highest disaster risk and ranked 7<sup>th</sup> on the list of countries most exposed to natural hazard. Mauritius has a Climate Change Action Plan for addressing these threats. To date, Mauritius has invested significant resources in both adaptation and mitigation measures, despite its limited means. In addition, Mauritius is proposing to enact a Climate Change Act with a view to implementing policies, strategies and plans to further mitigate the effects of climate change and promote adaptation measures.

This document presents the Intended Nationally Determined Contribution (INDC) of the Republic of Mauritius in response to decisions adopted at the 19<sup>th</sup> and 20<sup>th</sup> sessions of the Conference of the Parties to the United Nations Framework Convention on Climate Change (UNFCCC) which invites Parties to communicate to the Secretariat their INDCs, towards achieving the objective of the UNFCCC as set out in Article 2 of the Convention. The INDC of Mauritius has been elaborated on the basis of participatory multi-stakeholder and cross-sectoral consultative processes involving all relevant partners. The INDC is in line with the vision of the Honourable Prime Minister of the Republic of Mauritius, announced in August 2015, which aims at taking Mauritius further along the pathway of sustainable development.

## 1.1 National Circumstances

The Republic of Mauritius comprises a group of islands in the South West Indian Ocean, consisting of the main island of Mauritius and the outer islands of Rodrigues, Agalega, Saint Brandon, Tromelin and the Chagos Archipelago. The total land area is 2,040 square kilometres and the country has jurisdiction over an Exclusive Economic Zone of about 2.3 million square kilometres. The country is highly vulnerable to the impacts of climate change, manifesting itself in several ways, including among others, intense cyclones, abnormal tidal surges, prolonged droughts, flash floods and increase of sea surface temperature. As most SIDS, Mauritius has limited natural resources, which are under constant pressure and strain to satisfy the increasing socio-economic development needs. There is severe competition among economic operators on land use. In the coastal zones, land is mainly utilized to cater for the tourism industry. With the reduction in sugarcane cultivation, agricultural land is being converted to other forms of small agricultural practices, such as bio-farming and to non-agricultural uses such as property development.

Approximately 25% of the total land area is under forest cover, including about 2% of native forest areas, but the planted forest area is gradually decreasing due to demographic and development pressures. Mauritius faces multi-faceted environmental challenges, such as changes in rainfall patterns both temporally and spatially. Agricultural production may decline in the medium and longer term due to increased rainfall variability. Furthermore, the ecosystem and natural habitat of fish and other marine species are being rapidly eroded due to adverse impacts of climate change, with some coral reefs under the threat of extinction, and natural assets, such as beaches, which are vital to the tourism industry may deteriorate, posing threat to some \$50 million in value from the sector by 2050.

## 1.2 Climate change trends

Meteorological observations have confirmed a change in the climate parameters of the Republic of Mauritius. Average temperature rise of 0.74 °C over mainland and 1.1 °C over Agalega have been recorded. Precipitation has also decreased by 8% between 1950 and 2008. The frequency of extreme climatic events is on the rise as well as the extent of damage to infrastructure and toll on human life. The functioning of the ecosystem is also suffering in terms of episodes of coral bleaching and accentuated beach erosion. The low-lying areas of the Republic of Mauritius, in particular Agalega, is consequently vulnerable to sea level rise and Rodrigues is more exposed to long periods of water scarcity. The intensification of cyclones in shorter periods of time has also been observed.

Climate change model projections show that large variations exist in annual rainfall patterns. The temperature trends indicate an increase of the mean annual temperature of up 3.8°C by 2100. In order to address climate change threats, the Republic of Mauritius is developing a pragmatic approach to develop its resilience.

## 2.0 Mitigation contributions

Mauritius will promote and implement the following mitigation activities:

- smart use of marine resources;
- expansion in solar, wind and biomass energy production and other renewable energy sources;
- sustainable consumption and production in all sectors of the economy;
- gradual shift towards the use of cleaner energy technologies, such as LNG, among others;
- modernisation of the national electricity grid through the use of smart technologies, which is a prerequisite to accelerate the uptake of renewable energy;
- efficient use of energy through the deployment of appropriate technologies in all sectors of the economy and awareness raising on energy conservation;
- sustainable transportation, including promotion of energy efficient mass transportation systems based on hybrid technologies and cleaner energy sources;
- climate smart agriculture including bio-farming;
- sustainable and integrated waste management, including waste to energy;
- sustained tree planting programme within the context of the cleaner, greener and safer initiative; and
- leapfrog to low global warming potential refrigerants.

The Republic of Mauritius imperatively needs international technical and financial support to enable it to abate its greenhouse gas emissions by 30%, by the year 2030, relative to the business as usual scenario of 7 million metric tonnes CO<sub>2</sub>equivalent.

### Information to facilitate clarity, transparency and understanding:

Timeframe for implementation	The timeframe for implementation of the INDC is up to 2030.
Scope of gases included in the contribution	Carbon dioxide (CO <sub>2</sub> ) and Short Lived Climate Forces (SLCF)

Sectors covered by the contribution	The contribution is from the major sectors: Energy, Transportation, Industry, Agriculture, Forestry, land use and solid waste management.
<b>Assumptions and methodological approaches</b>	
Source for GHG emissions	Projections made from historical data from Statistics Mauritius.
Global warming potentials	The carbon dioxide equivalent calculated using the locally determined emission factor and IPCC Guidelines
Approaches to land sector emissions	This includes emissions from the land use, land-use change and forestry (LULUCF) sector based on IPCC Guidelines. Mauritius is currently preparing the Third National communication that will further refine the figures for LULUCF emission values.
BAU emissions in the target year	Business-as-usual (BAU) emissions are estimated to be 7 MtCO <sub>2</sub> e by 2030.
BAU projection methodology	The BAU projection was made using the simple extrapolation method given current information constraint.

### 3.0 Adaptation Measures

The Republic of Mauritius is highly vulnerable to the impacts of climate change and climate variability which are seriously impacting on the sustainable development of the country and has, therefore, developed comprehensive action plans to adapt to these. However, the costs of such adaptation measures are so exorbitant that Mauritius can only achieve its targets if financial support in terms of grant and technical support from partners is made available to enable it to implement the plans to protect life and property and mitigate any propensity of migration of its population.

<b>Sector</b>	<b>Priority Adaptation Actions</b>
<b>Infrastructure</b>	Protection of infrastructure will be enhanced against climate change calamities
<b>Disaster Risk Reduction Strategy</b>	Objective is to understand disaster risk, implement disaster risk strategy, strengthen management of related governance and invest in resilience.
<b>Coastal Zone Management</b>	Improve awareness, enhance rehabilitation and strengthen regulatory framework for protection of beach, dunes and vegetation.
<b>Water Resources Management</b>	Improve forecasting, management, protection and quality of water resources, including upgrading and building of new treatment plants and reservoirs and reducing water losses in the distribution system.
<b>Rainwater Harvesting</b>	Procurement and installation of rainwater harvesting systems and improvement in policy, legal and regulatory water framework in mainland Mauritius, Rodrigues and other outer islands.
<b>Desalination</b>	Small desalination projects, especially for Rodrigues island.

<b>Integrated Pest and Disease Management</b>	Develop an integrated strategy and policy to foster adoption of Integrated Pest and Disease Management (IPDM) practices including the review of policy and regulatory framework to facilitate the upscaling of IPDM technology and regulate the use and disposal of pesticides.
<b>Efficient Irrigation Techniques Development</b>	Investment in water infrastructure to support irrigation projects and development of a policy framework to enhance access to, and productive use of, water in the agricultural sector.  Promote climate smart agriculture practices
<b>Climate Smart Fisheries</b>	Development and implementation of sustainable fishing management plans, strengthening of institutional capacity and adaptation of infrastructure (quay) to climate change (sea level rise).
<b>Improve Marine and Terrestrial Biodiversity Resilience</b>	Improvement of the management of marine and terrestrial protected areas and expansion of protected area network including rehabilitation of wetlands, sea-grass, mangrove plantation, increase in tree coverage areas and coral reef rehabilitation/farming.
<b>Health Sector</b>	Mainstream climate change adaptation in health sector to respond to population increase and its additional climate-related health burden.  Develop and implement a communication, education and awareness strategy with respect to climate change risks and impacts on human health. Improve surveillance of diseases associated with climate change and develop and implement a decentralized alert and rapid response mechanism.
<b>Transportation</b>	Acquisition of hybrid and electric means of mass transportation

#### 4.0 Equity in Environmental Obligations

In 2014, the total greenhouse gas (GHG) emissions for the Republic of Mauritius was approximately 5.1 million tonnes of Carbon Dioxide equivalent, up from 4.8MtCO<sub>2</sub>e in 2010. This is relatively very small, representing just 0.015% of global emissions in 2010. In terms of absolute emissions, Mauritius ranks 128<sup>th</sup> out of 216 states and territories.

The threats of climate change are in atmospheric temperature and sea level rise, rainfall patterns, tropical cyclone intensity, storm surges, droughts and floods which impact adversely on many economic sectors, and human health.

The Government of the Republic of Mauritius will adopt a responsible and environmentally sustainable policy regarding energy production, waste management and physical infrastructural development, in addition to mainstreaming climate change education for sustainable development. However, Mauritius has limited resources and is challenged by many pressing priorities such as free education, health care and eradication of poverty. A Marshall Plan on poverty alleviation is presently under preparation.

Notwithstanding the above, Mauritius is working towards mitigating its emissions and implementing adaptation actions. However, the proposed adaptation and mitigation activities can only be implemented in the medium and long term with necessary support from international funding

agencies, grants from climate funds, transfer of appropriate and affordable adaptation and mitigation technologies, technical assistance and capacity development.

## 5.0 Means of Implementation

The Ministry of Environment, Sustainable Development, and Disaster and Beach Management (MOESDDBM) is the focal point for UN Framework Convention on Climate Change. It coordinates the country's actions on climate change through its Climate Change Division (CCD) that has put in place a system to monitor and assess vulnerability and adaptation to climate change that allows for the monitoring of climate vulnerability and the results of adaptation actions, taking into account gender issues. The planning process for climate change will be reinforced with the proposed introduction of a Climate Change Bill. Coordination of the INDC plans, programmes and projects for both adaptation and mitigation actions will be under the responsibility of MOESDDBM and will involve the participation of all stakeholders (Sectoral Ministries, Private Sector, CBOs/NGOs, Women's Organisations, etc.). With a view to optimising resources and capitalising on collaboration/information-sharing, MOESDDBM will coordinate implementation of its INDC with those of other IOC countries.

The Republic of Mauritius will require international support in its efforts to transition towards a low-carbon development path through greater utilisation of renewable sources of energy (biomass, solar and wind), and to adapt to the negative impacts of climate change that affect several sectors of the economy. The implementation of the INDC of the Republic of Mauritius will require over USD 1.5 billion for mitigation measures and about USD 4 billion for adaptation measures across all the sectors up to 2030 in the form of finance, investment, technology development and transfer, and capacity-building to fully realize its intended contribution.

Mauritius has an excellent track record in managing international grant support for the implementation of development programmes. With regard to capacity development, education, awareness, research, development and implementation of adaptation and mitigation actions, these will be coordinated and reported upon by MOESDDBM in collaboration with the concerned stakeholders.



## INTENDED NATIONALLY DETERMINED CONTRIBUTION

Mexico is a country committed to address climate change, as demonstrated by the mitigation and adaptation actions undertaken over the last few years in a systematic way and supported mainly with national resources. In the international arena, Mexico has expressed its willingness to achieve a legally binding agreement with the participation of all Parties in order to keep the global average atmospheric temperature below 2°C.

Since the year 2000, Mexico has published three National Strategies on Climate Change and in 2009 adopted its first Special Program on Climate Change. In addition, Mexico has presented five National Communications with their respective greenhouse gas inventories to the United Nations Framework Convention on Climate Change.

In April 2012, the Mexican Congress unanimously approved the General Law on Climate Change (LGCC in Spanish), which entered into force in October of that year and made Mexico the first developing country to have a comprehensive law on this subject.

As a result of the implementation of this new LGCC, the country has established institutions and effective instruments to reduce greenhouse gases (GHG) and particle emissions, as well as to increase the adaptive capacity of the country.

Regarding mitigation, the LGCC sets a clear obligation to give priority to the least costly mitigation actions, that at the same time derived in health and wellbeing co-benefits to the Mexican population. For this reason, both the National Strategy on Climate Change adopted in June 2013 - which sets the vision for the next 10, 20 and 40 years - as well as the Special Program on Climate Change (PECC in Spanish) 2014-2018 incorporate greenhouse gases and particles, also known as Short Lived Climate Pollutants (SLCPs).

The INDC that Mexico is submitting encompasses for mitigation purposes both the reduction of all GHG and SLCPs.

SLCPs have an important Global Warming Potential and a shorter life span in the atmosphere than CO<sub>2</sub>. Actions to abate SLCPs simultaneously contribute to climate change mitigation in the near term and to the immediate improvement of air quality, as well as to generate positive impacts on human health and ecosystems conservation; in consistence with the recommendations contained in the 5th Assessment Report of the Intergovernmental Panel on Climate Change (IPCC), as well as with the guidelines of the Clean Air and Climate Coalition (CCAC) of which Mexico is a member.

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For Mexico, the inclusion of SLCPs constitutes an increase of its level of ambition and commitment since it is additional to what the country has committed to previously.

The INDC of Mexico has two components, one for mitigation and another one related to adaptation. In turn, the mitigation portion includes two types of measures: unconditional and conditional. The unconditional set of measures are those that Mexico will implement with its own resources, while the conditional actions are those that Mexico could develop if a new multilateral climate regime is adopted and if additional resources and transfer of technology are available through international cooperation. This is unprecedented, since it is the first time Mexico assumes an unconditional international commitment to carry out certain mitigation actions.

This INDC is consistent with Mexico's pathway to reduce 50% of emissions by the year 2050, with respect to the year 2000, as mandated by the LGCC.

In presenting its INDC, Mexico reaffirms its commitment to combat climate change, to the multilateral rules-based climate regime that requires the participation of all countries, and to sustainable development, as well as its solidarity with the most vulnerable countries.

Multiple stakeholders were consulted during the preparation of the INDC, including non-governmental organizations, academia and representatives from private industry of all economic sectors, through workshops and consultations at the national level.

In sum, the INDC of Mexico is ambitious provided that for the first time it translates previous aspirational commitments into mandatory goals. This constitutes a considerable increase in the level of ambition for a developing country with moderate levels of emissions.

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**Unconditional Reduction** Mexico is committed to reduce unconditionally 25% of its Greenhouse Gases and Short Lived Climate Pollutants emissions (below BAU) for the year 2030. This commitment implies a reduction of 22% of GHG and a reduction of 51% of Black Carbon<sup>1</sup>.

This commitment implies a net emissions peak starting from 2026, decoupling GHG emissions from economic growth: emissions intensity per unit of GDP will reduce by around 40% from 2013 to 2030.

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**Conditional Reduction** The 25% reduction commitment expressed above could increase up to a 40% in a conditional manner, subject to a global agreement addressing important topics including international carbon price, carbon border adjustments, technical cooperation, access to low-cost financial resources and technology transfer, all at a scale commensurate to the challenge of global climate change.

Within the same conditions, GHG reductions could increase up to 36%, and Black Carbon reductions to 70% in 2030.

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**Type** Emissions reduction relative to a Business As Usual baseline

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<sup>1</sup> This commitment is coherent to the mandate established in Mexico's Climate Change Law to prioritize cost-effective mitigation actions with social benefits such as the improvement of public health.

<b>Coverage</b>	Nation -wide
<b>Scope</b>	<ul style="list-style-type: none"> <li>• Carbon Dioxide (CO<sub>2</sub>)</li> <li>• Methane (CH<sub>4</sub>)</li> <li>• Nitrous Oxide (N<sub>2</sub>O)</li> <li>• Hydrofluorocarbons (HFCs)</li> <li>• Perfluorocarbons (PFCs)</li> <li>• Sulphur hexafluoride (SF<sub>6</sub>)</li> <li>• Black Carbon</li> </ul>
<b>Baseline</b>	Business As Usual scenario of emission projections based on economic growth in the absence of climate change policies, starting from 2013 (first year of applicability of Mexico's General Climate Change Law)
<b>Adaptation</b>	Mexico includes an Adaptation component with commitments by 2030 described in the Annex I of this document. The priority of these actions are: the protection of communities from adverse impacts of climate change, such as extreme hydro meteorological events related to global changes in temperature; as well as the increment in the resilience of strategic infrastructure and of the ecosystems that host national biodiversity. In order to reach those priorities Mexico will, <i>inter alia</i> , strengthen the adaptive capacity of at least by 50% the number of municipalities in the category of "most vulnerable", establish early warning systems and risk management at every level of government and reach a rate of 0% deforestation by the year 2030. Some of the adaptation actions presented foster positive synergies with mitigation actions.
<b>Planning Process</b>	<p>Mexico supports its INDC in a robust national climate change policy that includes, <i>inter alia</i>, the following instruments:</p> <ul style="list-style-type: none"> <li>• General Climate Change Law. 2012</li> <li>• National Strategy on Climate Change, 10-20-40 years. 2013</li> <li>• Carbon tax.2014</li> <li>• National Emissions and Emissions Reductions Registry. 2014</li> <li>• Energy reform (laws and regulations). 2014</li> <li>• Ongoing process for new set of standards and regulations</li> </ul> <p>The elaboration of this INDC includes a public participatory process through multiple sectorial meetings and a web based public survey.</p>
<b>Fair and ambitious</b>	<p>Mexico is a developing country, highly vulnerable to the effects of climate change. National emissions of GHG represents only 1.4% of global emissions and our net per capita emissions, inclusive of all sectors, are 5.9 tCO<sub>2</sub>e.</p> <p>Nevertheless, Mexico is a responsible party committed to tackling global climate change by transforming its development route to a low emissions pathway, which requires progressive decoupling of carbon emissions from economic growth.</p>

Existing commitments adopted by Mexico under its General Climate Change Law and presented to the UNFCCC are indicative and aspirational, subject to international support from developed countries.

The INDC submitted by Mexico is fair and ambitious because it includes for the first time an unconditional GHG mitigation commitment of 22% by 2030 that increases to 25% reduction by including Black Carbon, a well-known Short-Lived Climate Pollutant. The SLCPs reductions actions will be done with national resources, in an unconditional manner. These reductions are additional to other mitigation actions.

Further ambition is reflected in the efforts of the Government of Mexico to establish synergies between adaptation and mitigation, using national resources. These actions not only help tackle global warming and reduce social and ecosystem vulnerability, but also promote inclusive green growth in the country.

In summary, Mexico's INDC is highly ambitious as it entails unconditional and transformational investments to change our patterns of production and consumption and achieve peak net emissions within the commitment period.

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<b>Gender perspective</b>	These policies and actions include a cross-cutting human rights and gender perspective in order for the measures to be implemented to take into account women as important decision makers regarding energy consumption. They also emphasize the importance of implementing them such that they do not exacerbate the impacts of climate change that already have disproportionate adverse effects based solely on gender.
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<b>Key Assumptions on Mitigation</b>	
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<b>Metric Applied</b>	<p>GWP 100y values published in IPCC AR5 (CO<sub>2</sub>e):</p> <ul style="list-style-type: none"> <li>▪ CH<sub>4</sub> = 28</li> <li>▪ N<sub>2</sub>O = 265</li> </ul> <p>GWP 100y for Black Carbon (CO<sub>2</sub>e) described in Bond <i>et al.</i> 2013, J. Geophys. Res. Atmos., 118, no. 11, 5380-5552:</p> <ul style="list-style-type: none"> <li>▪ BC = 900</li> </ul>
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<b>Methodologies for Estimating Emissions</b>	IPCC guidelines; national statistics: sector activity and economic forecasts.
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<b>Baseline</b>	<p>2020: 906 MtCO<sub>2</sub>e (792 GHG and 114 BC / 127,177 metric tons)</p> <p>2025: 1013 MtCO<sub>2</sub>e (888 GHG and 125 BC / 138,489 metric tons)</p> <p>2030: 1110 MtCO<sub>2</sub>e (973 GHG and 137 BC / 152,332 metric tons)</p>
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**Coverage**

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**Sectors/Source Categories**

- Energy
  - Fuel Combustion
    - Energy industries
    - Manufacturing industries and construction
    - Transport
    - Other sectors
  - Fugitive emissions from fuels
    - Solid fuels
    - Oil and natural gas and other emissions from energy production
    - CO<sub>2</sub> transport and storage
- Industrial processes and product use
  - Mineral industry
  - Chemical and Iron&Steel industry
  - Non-energy products from fuels and solvent use
  - Electronic industry
  - Product uses as substitutes for ODS
  - Other product manufacture and use
  - Other
- Agriculture
  - Enteric fermentation
  - Manure management
  - Rice cultivation
  - Agricultural soils
  - Field burning of agricultural residues
  - Other
- Waste
  - Solid waste disposal
  - Biological treatment of solid waste
  - Incineration and open burning of waste
  - Wastewater treatment and discharge
  - Other
- Land Use, Land-Use Change and Forestry
  - Afforestation, reforestation
  - Deforestation
  - Forest management
  - Cropland management
  - Grazing land management
  - Or equivalent land-based accounting using UNFCCC reporting categories
  - Other categories

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**International Market Based Mechanisms**

In order to achieve rapid and cost efficient mitigation, robust global market based mechanism will be essential. Mexico's unconditional INDC commitment will be met regardless of such mechanisms, although these would assist cost-effective implementation. Achieving our conditional goal will require fully functional bilateral, regional and international market mechanisms.

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## ANNEX I – ADAPTATION

### INTRODUCTION

The government of Mexico considers adaptation to climate change as a priority to reduce the country's vulnerability. Furthermore, there are opportunities to foster mitigation measures and actions that also increase the adaptive capacity of its population as well as its natural and productive systems. This is captured in the General Law on Climate Change, the National Strategy on Climate Change and the Special Program on Climate Change 2014-2018, which describes specific actions grouped according to planning instruments; schemes and actions to protect, conserve and restore marine and terrestrial coastal ecosystems and their biodiversity; integral management of risk and sectorial vulnerability.

At the subnational level, States and Municipalities have also embarked on adaptation efforts as reflected in their own Climate Change Plans.

### MEXICO'S VULNERABILITY TO CLIMATE CHANGE

Mexico's geographic characteristics make it a highly vulnerable country to the adverse impacts of climate change. Its location between two oceans, as well as its latitude and topography significantly increase Mexico's exposure to extreme hydro meteorological events.

In the last 50 years, Mexico has experienced changes in temperature and mean precipitation. The country has become warmer, with an average temperature increase greater than 0.85°C. At the same time, Mexico has suffered an increased number of extreme weather events such as tropical cyclones, floods and droughts that have led to the loss of human lives as well as high social and economic costs.

Under various climate change scenarios for Mexico, there are projections of changes in the mean annual temperature of up to 2°C in the North of the country in the near term (2015-2039), while in most of the territory the scenarios project a range of 1°C to 1.5°C. Regarding annual precipitation reduction is projected to be in a range of 10 to 20 % across the country.

Furthermore impacts of hydrometeorological events have resulted in economic losses over an annual amount of 730 million pesos (around 48 million USD) between 1980-1999 and 21,950 million pesos (around 1.4 billion USD)<sup>2</sup> for 2000 – 2012.

In accordance to the PECC 2014–2018, in 2014 there were 319 Municipalities (13% of the total number of Municipalities in Mexico) highly vulnerable to the adverse impacts of climate change including droughts, floods and landslides.

### ADAPTATION ACTIONS IN MEXICO IN THE PERIOD 2020-2030

The adaptation component of the INDC of Mexico was elaborated taking into account a gender equality and human rights approach. As stated earlier, it prioritizes synergies between mitigation and adaptation. The INDC includes concrete actions to be undertaken from 2020 to 2030 in the following three areas:

#### 1. Adaptation to climate change for the social sector

Poverty is a determining factor of social vulnerability in Mexico. Some estimates indicate that up to 60% of the population has been affected at some point by natural disasters, coinciding with the percentage of population living in poverty and extreme poverty in the country. These groups inhabit precarious housing facilities and high-risks areas prone to climate disasters such as mountain landslides, cliffs or areas prone to flooding.

Actions to be taken in order to reduce vulnerability in this sector for the period 2020 – 2030 are the following:

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<sup>2</sup> Exchange rate 1 USD = 14.99 MXN, as of March 25, 2015.

- i. Guarantee food security and water access in light of growing climate threats through integral watershed management, biodiversity and land conservation.
- ii. Ensure capacity building and participation of the society, local communities, indigenous peoples, women, men, youth, civil organizations and private sector in national and subnational climate change planning.
- iii. Reduce the population's vulnerability and increase its adaptive capacity through early warning systems, risk management, as well as hydrometeorological monitoring, at every level of government.
- iv. Strengthen the adaptive capacity of the population through transparent and inclusive mechanisms of social participation, designed with a gender and human rights approach.
- v. Reduce vulnerability of the population through territorial planning tools and risk management such as the National Vulnerability Atlas and the National Risk Atlas.
- vi. Invert the proportion of financing currently provided to hydrometeorological disasters attention by increasing the ones invested for disasters prevention.
- vii. Prevent illnesses that are exacerbated by climate change through an early warning system with epidemiologic information.
- viii. Reduce at least by 50% the number of municipalities in the category of "most vulnerable" in the PECC 2014-2018 and avoid any other Municipality falling into this category.
- ix. Relocate irregular human settlements in zones prone to disasters through land use regulations.

## **2. Ecosystem-Based Adaptation**

In Mexico there is a large diversity of ecosystems that provide society with a vast amount of environmental services such as carbon sequestration, provision and maintenance of water, habitat conservation for the permanence of species, reduction of impacts caused by meteorological disasters, and the formation and maintenance of soils. These environmental services are seriously threatened by human activities and by the effects of climate change.

Ecosystem-based adaptation consists of the conservation of biodiversity and ecosystem services as part of an integral adaptation strategy to assist human communities to adapt to the adverse effects of climate change.

Actions to be implemented for the period 2020 – 2030 on this topic are the following:

- i. Reach a rate of 0% deforestation by the year 2030.
- ii. Reforest high, medium and low watersheds with special attention to riparian zones and taking into account native species in the area.
- iii. Conserve and restore ecosystems in order to increase ecological connectivity of all Natural Protected Areas and other conservation schemes, through biological corridors and sustainable productive activities. This approach will take into account the equitable participation of the population and will have a territorial approach.
- iv. Substantially increase the Programs of Action and Conservation of Species in order to strengthen the protection of priority species from the negative impacts of climate change.
- v. Increase carbon capture and strengthen coastal protection with the implementation of a scheme of conservation and recovery of coastal and marine ecosystems such as coral reefs, mangroves, sea grass and dunes.
- vi. Guarantee the integral management of water for its different uses (agriculture, ecological, urban, industrial and domestic).

## **3. Adaptation of strategic infrastructure and productive systems**

Climate change poses significant challenges in terms of adaptation of productive systems. The characteristics of impacts and the different ways of dealing with them will depend on the type of system: agriculture and livestock, forestry, wildlife use, aquaculture, fisheries, industrial, mining and tourism. They will also depend on the risks these productive systems are exposed to. In each production system it is necessary to take into account climate change aspects to increment their productivity and competitiveness.

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Strategic infrastructure, including communications, transport, tourism, energy, sanitation, water and waste management, is vulnerable to the effects of climate change. Therefore, it is necessary to incorporate climate change criteria as part of its design, construction and throughout its useful life span, in order to reduce its vulnerability and increment its resilience.

Actions to be implemented for the period 2020 – 2030 on this topic are the following:

- i. Execute infrastructure relocation programs currently located in high-risk zones in priority tourism destinations and implement restoration actions of vacated locations.
- ii. Incorporate adaptation criteria for public investment projects that include infrastructure construction and maintenance.
- iii. Guarantee urban and industrial waste water treatment, ensuring quantity and good quality of water in human settlements larger than 500,000 inhabitants and to monitor their performance.
- iv. Apply the norm on specifications for environmental protection and adaptation to the adverse effects of climate change in the planning, design, construction, operation and abandonment of tourism facilities in coastal ecosystems.
- v. Guarantee the security of dams and strategic hydraulic infrastructure, as well as communications and transportation strategic infrastructure.
- vi. Strengthen the diversification of sustainable agriculture by conserving germplasm and native maize species, thermal comfort for livestock, development of agro-ecosystems, through the incorporation of climate criteria in agriculture programs.

#### **CAPACITY BUILDING, TRANSFER OF TECHNOLOGY AND FINANCE FOR ADAPTATION**

The implementation of the abovementioned adaptation actions for the period 2020 – 2030 requires the continuous development and strengthening of Mexico's capacities. Therefore, it is imperative to consolidate platforms for the exchange of knowledge and information related to adaptation at the three levels of government, as well as to strengthen the networks with academic institutions and civil society.

Furthermore, it is fundamental to incorporate a gender and human rights approach into capacity building, prioritizing the most vulnerable sectors and regions in order to reduce social inequality and the gap between women and men rights.

Capacity building requires both cooperation from developed countries to developing countries as well as south-south cooperation.

Furthermore, Mexico requires international support for the development of its own technologies as well as for technology transfer and innovation to increase its adaptive capacity.

For Mexico, the increase of investment in disaster prevention is of utmost relevance, as well as the development of an insurance market against hydrometeorological and catastrophic risks, in which the private sector is invited and expected to play a relevant role.

The Mexican Government has identified a series of areas where technology transfer could be of benefit of the country for adaptation, including through:

- Access to information systems in order to monitor hydrometeorological events in real time and thus consolidate and enhance early warning systems.
- Availability of methods and tools to assess climate impacts, vulnerability and adaptation in specific sectors and regions.
- Water technologies for savings, recycling, capture, irrigation and sustainable management for agriculture purposes.
- Transportation technologies that are resilient to the adverse effects of climate change in particular for roads and massive transportation
- Technologies for the protection of coastal and river infrastructure.



## Federated States of Micronesia Intended Nationally Determined Contribution

Type of INDC	<i>The Federated States of Micronesia (FSM) commits to reduce GHGs emission in percentage terms on a base year target.</i>
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### The INDC

Unconditional	The FSM commits to unconditionally reduce by 2025 a 28% its GHGs emissions below emissions in year 2000.
Conditional	Similarly, subject to the availability of additional financial, technical and capacity building support from the international community, the FSM could do by 2025 an additional reduction up to 35% below emissions in the 2000 base year.

### Information to facilitate clarity, transparency and understanding

Type	Sectoral targets
Reference year or period	<ul style="list-style-type: none"> <li>Total GHG emissions for year 2000 in FSM were 150,000 tCO<sub>2</sub>e.</li> <li>Emission reductions expected from the unconditional INDC are expected to be 28% below emissions in year 2000, at a level of 108,000 tCO<sub>2</sub>e approximately, as it is shown in the graph below:</li> </ul> <div style="text-align: center;"> </div> <ul style="list-style-type: none"> <li>Emission reductions expected from the conditional INDC are expected to be 35% below emissions in year 2000 projections, at a level of 94,000 tCO<sub>2</sub>e approximately.</li> </ul>

<b>Target year</b>	2025
<b>Scope and coverage</b>	
Gases	Carbon dioxide (CO <sub>2</sub> ),
Sectors	Energy sector: electricity generation and transport subsectors.
Percentage of total greenhouse gas emissions covered	<p>Relative to the year 2000 inventory, electricity generation accounts for 42% of the total CO<sub>2</sub>e emissions, accounting for 64,000 tCO<sub>2</sub>e; meanwhile transport accounts for 38% of total CO<sub>2</sub>e emissions, accounting for 57,000 tCO<sub>2</sub>e, as it is shown in the figure below:</p> <p>Thus, the INDC covers 80% of FSM's GHGs emissions.</p>

## General information

### *Planning processes*

This INDC was developed through a stakeholder consultation process involving representatives of the National Government, the four FSM State Governments, Agencies and representatives from the private sector, civil society and non-government organizations. It builds upon existing renewable energy and transport targets and policies.

### *Assumptions and methodological approaches*

GWPs used	Global Warming Potential on a 100 year timescale in accordance with the IPCCs 4 <sup>th</sup> Assessment Report.
Inventory methodology	The FSM GHG inventory for year 2000 contained in the Second National Communication utilized the revised 1996 IPCC Guidelines.
Land sector emissions	N/A
International market mechanisms	FSM does not intend to use international market mechanisms.
Baseline	<p>BAU scenarios for the electricity generation and transport sub-sectors were developed using the tool 'Long-range Energy Alternative Planning System' (LEAP). The following data was used in the LEAP model:</p> <p>Current electricity rate: International Renewable Energy Agency (IRENA) Report (2011)</p> <p>Historical electricity use:</p> <ul style="list-style-type: none"> <li>• 1998 data from the 1999 National Energy Policy of FSM</li> <li>• 2011 kWh sectoral data from Pacific Power Association 2012</li> <li>• 2010-2013 kWh sectoral sales data calculated from Yap 2012 and 2013 YSPC Annual Report</li> <li>• 2009 kWh sectoral sales data calculated from the 2009 KUA Annual Report</li> </ul>
Mitigation effects	Individual assumptions were made for the mitigation scenarios. These can be found in the technical report 'Electricity Sector Analysis for Federated States of Micronesia's Intended Nationally Determined Contribution' prepared by NREL.

### ***Fairness and Ambition***

FSM's contribution to climate change has always been marginal. Decision 1/CP.20 paragraph 11 provides the flexibility to SIDS to communicate information on strategies, plans and actions for low greenhouse gas emission development reflecting their special circumstances in the context of intended nationally determined contributions. In this context, the present INDC by FSM is ambitious due to the percentage type considered.

Moreover, national efforts to implement INDC in FSM imply that resources to be allocated for development priorities will be arbitrated to take into account the requirements of the implementation of the Paris Agreement.

By presenting an ambitious INDC in the context of the Paris' agreement, FSM would like to stress that the very survival of many SIDS is at stake without ambitious global emissions reductions that will ensure the stabilisation of the

greenhouse gas emission, ensuring we are on track toward limitation of global temperature rise below 1.5 degree Celsius by 2100.

### ***Priority and needs related to adaptation***

As for all SIDS, adaptation constitutes a priority for FSM. It is therefore important that the Paris Agreement deals effectively with the adaptation needs in a post 2020 world.

FSM does not see this INDC as the vehicle to address its adaptation needs in the post 2020 context, even if these need careful consideration and assessment. Such assessments are being made in the context of the Nation Wide Integrated Disaster Risk Management and Climate Change Policy 2013 and the FSM Climate Change Act 2014, as well as the joint state action plans for disaster risk management and climate change adaptation. All necessary efforts are being made to engage the country in the formulation and implementation of transformational adaptation investment plans to protect the country against climate change, through various sources of funding including from the UNFCCC financial mechanisms, the Green Climate Fund in particular.

### ***Assumptions and conditions for implementation***

#### ***❖ Financial needs:***

Much will be needed for the implementation of FSM's INDC. An assessment of the implementation options is needed as soon as possible to ensure implementation no later than 2018. Potential sources will include the financial mechanisms of the Convention, other non-Convention financial and investments sources, as well as international, national and other financial sources. All these will be facilitated and enabled by public policy and regulatory frameworks.

#### ***❖ Technical requirements:***

There is a need to design a national inventory system and to develop a framework for domestic Monitoring Reporting and Verification (MRV) of GHG emissions. There is a further need to access expertise and develop capacities to conduct such a process at the national and state levels.

#### ***❖ Capacity building needs:***

There is a need to enhance the local capacity to plan, design, implement, manage, operate and maintain installed energy technologies. Similarly, human, technical and institutional capacity development is required in the following areas: GHG inventory, baseline scenario development, emissions projection, vulnerability

assessment, adaptation needs evaluation and prioritisation, climate finance access, mobilisation and disbursement.

❖ *Technology needs:*

Specifically to implement the INDC in the energy sector, locally appropriate technology and equipment (resilient to the elements and extreme events) needs to be assessed and procured.

***Any relevant additional information***

FSM's INDC has been developed with the joint collaboration of the National Renewable Energy Laboratory (NREL) of the United States Department of Energy and Climate Analytics as implementing agency of the INDC Global Support Project by Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH, financed by the Government of Germany Ministry for the Environment, Nature Conservation, Building and Nuclear Safety.

## **Principality of Monaco national contribution**

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### **United Nations Framework Convention on Climate Change**

- 29 July 2015 -

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*This document constitutes the “Intended Nationally Determined Contribution” of the Principality of Monaco under the United Nations Framework Convention on Climate Change in expectation of the adoption, at the end of the 21st Conference of the Parties (December 2015), of a legally binding agreement applicable to all Parties to the Convention.*

## 1. Preamble

The Principality of Monaco is a city state of 203 hectares. Its diversified economy is based primarily on services, construction, tourism and the banking sector. It is an enclave of France, located 10 kilometres from the Italian border.

The topography of the Principality comprises a mountainous cirque dropping down to the Mediterranean Sea. The country's entire territory is urbanised, and forms the centre of an economic urban area which also includes neighbouring French towns.

The resident population is 37,000, while a further 40,000 people cross the border every day to work in the Principality.

Since his accession in 2005, H.S.H. Prince Albert II has made protecting the environment a priority of his Government's policy, at both the national and international levels.

The Principality of Monaco ratified the United Nations Framework Convention on Climate Change (UNFCCC) on 20 November 1992 and the Kyoto Protocol on 27 February 2006.

Having signed up to Annex 1 of the Convention with a commitment to reduce emissions by 8% compared with 1990 during the first period of the Kyoto Protocol, the Principality has fulfilled its obligations, reducing emissions by 13.18% compared with 1990.<sup>1</sup>

Monaco continued its commitment by agreeing to the Doha Amendment on 27 December 2013. The country's target for the second period of the Kyoto Protocol is to reduce emissions by 22% on average over the period 2013–2020.

At the Climate Summit convened by the Secretary-General of the United Nations on 23 September 2014, H.S.H. Prince Albert II recalled the target that the Principality of Monaco set itself to reduce its greenhouse gas emissions by 30% by 2020 and 80% by 2050, compared with the reference year, while achieving carbon neutrality by that date.

Aware that the challenge of reducing emissions is very much a collective one, the Principality of Monaco would like to offer its full support to the joint effort. The country's hope is that through the commitment of all Parties, it will be possible to achieve the target consistent with restricting the average rise in global temperatures to less than 2°C compared with pre-industrial levels, and if possible, to less than 1.5°C.

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<sup>1</sup> Principality of Monaco National Inventory Submission, submitted on 3 September 2014:  
[http://unfccc.int/national\\_reports/annex\\_i\\_ghg\\_inventories/national\\_inventories\\_submissions/items/8108.php](http://unfccc.int/national_reports/annex_i_ghg_inventories/national_inventories_submissions/items/8108.php)

## 2. The Principality of Monaco's commitments as part of the future international climate regime

### 2.1 The Principality of Monaco's quantified commitment

With a view to the adoption of a legally binding agreement in Paris in December 2015, the Principality of Monaco wishes to contribute to the joint effort by adopting a **target to reduce its emissions by 50% by 2030, compared with the reference year of 1990.**<sup>2</sup>

The Principality of Monaco envisages that this commitment will be subject to a formal process similar to that used in the Kyoto Protocol.

The country therefore proposes that its commitment be turned into a quantitative target, which could be envisaged over ten-year period, or two successive five-year periods.

#### Option 1: 10-year commitment period

	<i>Quantified commitment to limit or reduce emissions over the period (as a percentage of reference year emissions)</i>	<i>Declaration of target to reduce greenhouse gas emissions by 2030 as a percentage of reference year emissions</i>
2021–2030	60% (or -40%)	-50%

#### Option 2: Two successive five-year periods

	<i>Quantified commitment to limit or reduce emissions over the period (as a percentage of reference year emissions)</i>	<i>Declaration of target to reduce greenhouse gas emissions by 2030 as a percentage of reference year emissions</i>
2021–2025	65% (or -35%)	-40%
2026–2030	55% (or -45%)	-50%

<sup>2</sup> The reference year is 1990 for CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O. For fluorinated gases (including NF<sub>3</sub>), the reference year is 1995.

## 2.2 Additional information and accounting assumptions

<i>Information type</i>	<i>Monaco's commitment</i>
Description of contribution	Quantified reduction commitment based on the model of the two previous Kyoto periods.
Coverage in terms of:	
a) sector	All sectors are covered (see details regarding forests).
b) greenhouse gas	All seven Kyoto gases will be covered.
c) percentage of national emissions covered by the target	100% of national inventory emissions are covered.
Reference year	The reference year is 1990 for CO <sub>2</sub> , CH <sub>4</sub> and N <sub>2</sub> O. For fluorinated gases (including NF <sub>3</sub> ), the reference year is 1995.
Accounting for forests	Given its entirely urbanised nature, the Principality will consider all of its green spaces under the category of “parks and gardens”, and will not report emissions under the forestry sector.
Inventory methodologies and GWPs <sup>3</sup> used	2006 IPCC guidelines, GWPs published in the IPCC's Fourth Assessment Report.
Use of mechanisms for international transfer of greenhouse gas reduction units.	The Principality of Monaco intends to achieve its emissions reduction target by implementing domestic measures. It does not, however, exclude the use of mechanisms for the international transfer of reduction units in the event that domestic emissions reductions prove insufficient at the end of the commitment period.

<sup>3</sup> Global Warming Potentials

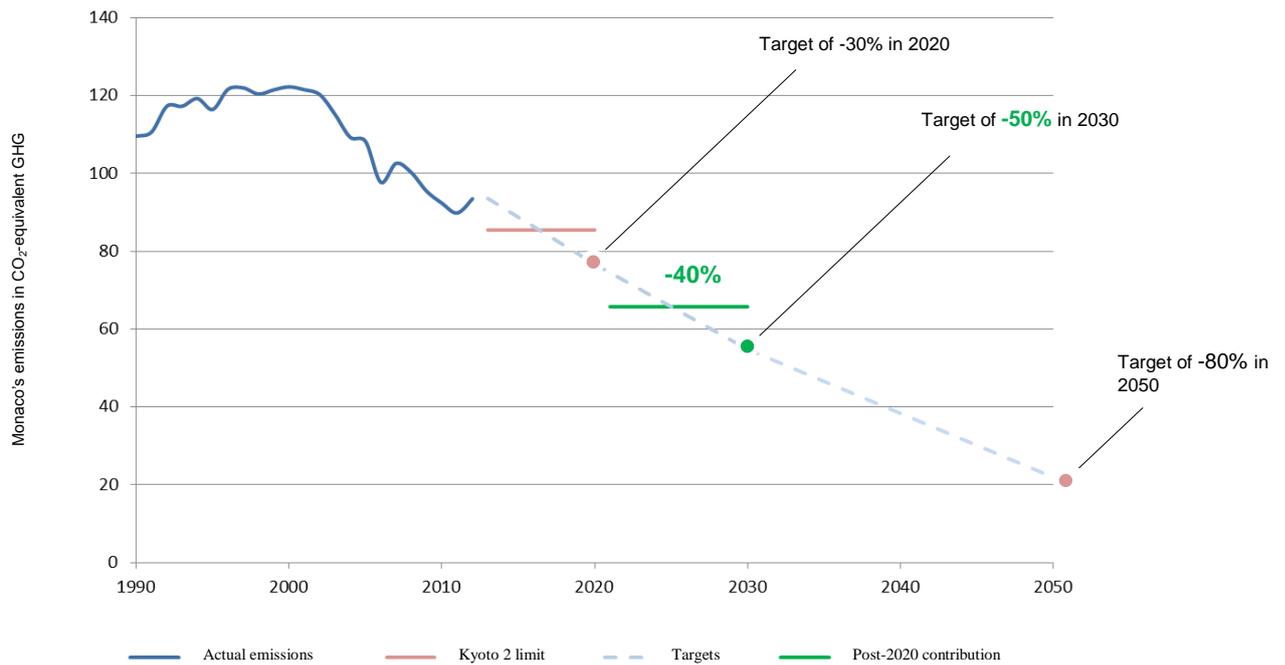


Figure 1: Graph showing the Principality of Monaco's reduction target assuming a commitment period of 10 years

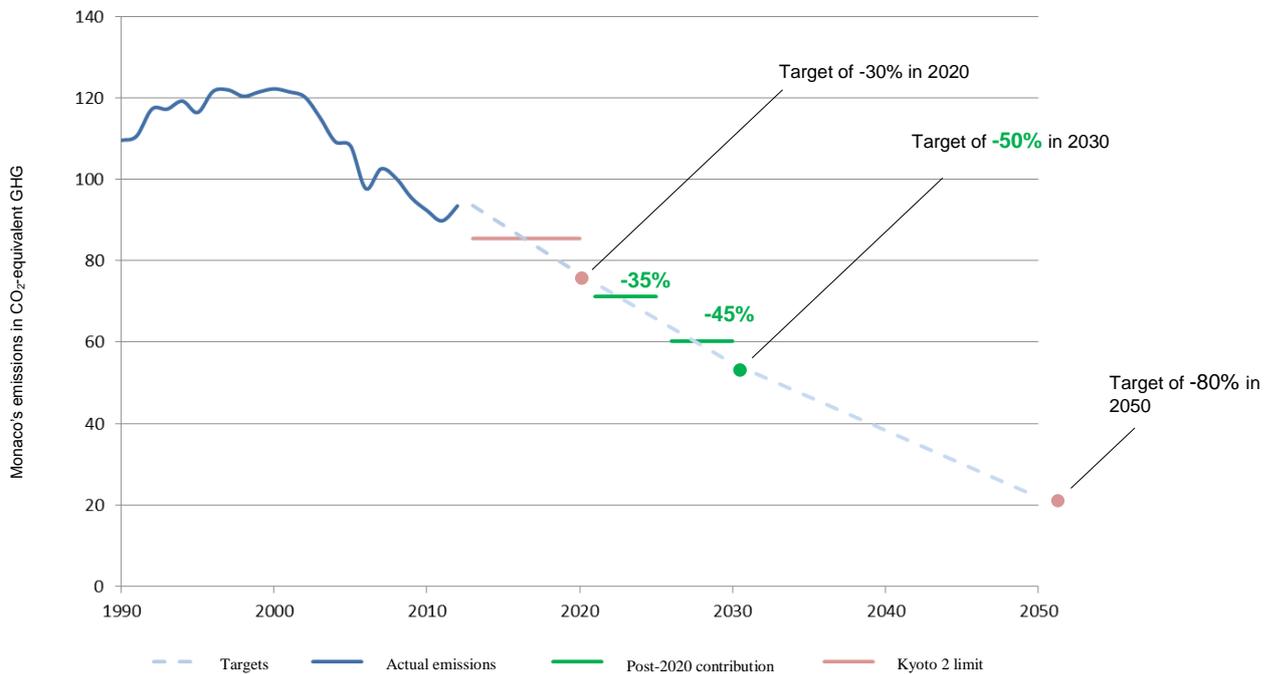


Figure 2: Graph showing the Principality of Monaco's reduction target assuming two commitment periods of five years each

### **2.3. Assumptions regarding international transfer of units**

The Principality of Monaco intends to achieve its emissions reduction target by implementing domestic measures. It does not, however, exclude the use of mechanisms for the international transfer of reduction units in the event that domestic emissions reductions prove insufficient at the end of the commitment period.

The proposed quantitative commitment therefore assumes that mechanisms for the international transfer of emissions reduction units will be available.

To this end, the Principality of Monaco supports the adoption of regulations which will guarantee the real, additional, permanent and verifiable nature of net emissions reductions or emissions avoided at the source of transferable units. The country is committed to using only units which offer this type of guarantee.

The Principality of Monaco is, in addition, in favour of limited use of international mechanisms to transfer units to achieve the Parties' targets.

### **3. Principality of Monaco action plan**

The main sources of emissions in the Principality of Monaco are road transport, waste-to-energy and heating and air conditioning in buildings. These three sources each account for nearly 30% of Monaco's emissions. The addition of emissions linked to fluorinated gases brings the figure to more than 98% of the Principality of Monaco's emissions.

The Principality of Monaco has drawn up an action plan which takes account of this emissions profile and prioritises actions relating to the most important sources.

With regard to road transport, for more than 20 years the Principality of Monaco's transport policy has been based on the following principles:

- Development of clean public transport
- Development of "soft" transport options (pedestrian footpaths, cycling)
- Development of electric vehicles

The Principality intends to strengthen its emissions reduction policy through balanced measures in each of these three areas. The pedestrian modal share for intra-urban journeys is already above 50%. The policy of developing mechanised walkways, escalators and lifts should reinforce people's instincts to travel on foot. The introduction of a dedicated public transport lane serving the length of the Principality is being studied. This should encourage journeys combining public transport and walking.

Electric and hybrid vehicles currently account for 2.57% of all cars in the Principality of Monaco. Very rapid growth in sales of hybrid and electric vehicles was recorded at the beginning of 2015. This is due to the availability of more attractive new models and the Prince's Government's incentive policy.

The implementation of this incentive policy will be continued and adapted over the coming years to ensure that road transport will play its part in achieving the national emissions reduction target in the Principality.

With regard to waste-to-energy, the Principality of Monaco has had a tri-generation plant since 1982, and this is due to be replaced soon. Reducing emissions from this source and from waste management more broadly is a priority for the Government.

The focus is on both technical treatment systems and defining a new way to manage waste. In this area, the technical choices made will have an impact on emissions for the next 30 years. The Government has launched a number of studies on this subject, some of which are currently underway.

Emissions associated with buildings are the third major source of emissions in the Principality of Monaco. Various approaches to reducing emissions in new construction and in old buildings have been deployed and strengthened in recent years.

Due to a previous acquisition, the Principality of Monaco also has a large number of seawater heat pumps, which constitute an important energy asset. Nevertheless, there is still significant potential for limiting emissions and improving energy efficiency in existing buildings.

As part of its efforts to achieve its emissions targets and communicate its post-2020 commitment, the Principality of Monaco decided to define a reduction strategy for buildings throughout the country.

This strategy will require performance and energy substitution measures. It should lead to the formulation of an energy master plan which will cover supply, energy carriers and local production, with the long-term goal of carbon neutrality.

#### **4. Adapting to climate change**

Meteorological and climate records for Monaco are available dating back to 1911. An analysis of data for the longest available consistent period has made it possible to go back to 1969 and has demonstrated a progressive upward trend in the annual temperature, amounting to 1.5° over a period of 45 years.

Much more recently, studies on the impact of climate change began in 2013 with the analysis of local climate trends (forecasts) and a study focusing specifically on the period of activity of mosquitoes (*aedes albopictus*) and on changes in heating and cooling degree days.

A vulnerability study aimed at defining an action plan for adapting to climate change in Monaco was launched in 2014. The study should be completed by the end of 2015. As part of this work, the Principality first undertook a literature review to consolidate climate forecasts for the near term (2021–2050) and the long term (2071–2100). A summary of this work was sent to the country's key stakeholders in the following areas:

- Health
- Water resources
- Biodiversity
- Urban infrastructure and services
- Planning and the built environment
- Energy and utilities
- Economic activity

The exhaustive work of analysing vulnerabilities and constructing an action plan is based on the involvement of these national stakeholders.

The adaptation strategy will be made up of an action plan accompanied by a monitoring and evaluation framework.

The climate change vulnerability study also aims to feed into risk mapping work which is being carried out by Monaco's military force and takes into account the unknown factors associated with human activities, covering both the climate and other telluric events.

## **5. Fairness and ambition of the contribution<sup>4</sup>**

As part of its participation in the first period of the Kyoto Protocol, the Principality of Monaco undertook a range of mitigation actions, prioritising those with the most promising cost-performance ratio (substituting gas for fuel oil, for example).

The target of reducing emissions by 50% by 1990 means that simple performance improvements are no longer sufficient; energy transition in the construction industry and significant changes in waste treatment are required. These steps will necessitate the deployment of carbon-neutral type technologies, which have reached varying levels of maturity. They are often little used and expensive.

Thus, the approaches envisaged by the Principality of Monaco are ambitious. They will require significant investment on the part of the Government but will also involve individuals and the private sector, which will need to adapt to new regulations.

These efforts should allow the Principality to achieve its emissions targets which are in line with the IPCC emissions scenario<sup>5</sup> enabling the temperature rise to be kept below two degrees Celsius, with reductions of between 40% and 70% by 2050, compared with 2010.

By adopting a target which goes beyond the reduction requirements stated by the IPCC at the global level and by supporting the development of the latest technologies, the Principality of Monaco wishes to demonstrate its full commitment to this collective process. Despite the fact that it represents only a small proportion of global emissions, Monaco has the capacity to become a forerunner in the deployment of innovative, non-emitting modes of transport and energy consumption, and to support innovative waste processing techniques and the development of the circular economy.

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<sup>4</sup> In accordance with the provisions of paragraph 14 of Decision 1/CP.20, this section aims to provide information on the way in which the Principality of Monaco “*considers that its intended nationally determined contribution is fair and ambitious, in light of its national circumstances, and how it contributes towards achieving the objective of the Convention.*”

<sup>5</sup> RCP 2.6 scenario



## MONGOLIA

### **Intended Nationally Determined Contribution (INDC) Submission by Mongolia to the Ad-Hoc Working Group on the Durban Platform for Enhanced Action (ADP)**

#### **Introduction**

Mongolia is fully committed to the UNFCCC negotiation process towards adopting at COP21 a legal instrument or an agreed outcome with legal force under the Convention, applicable to all Parties, in line with confining global warming below 2°C. Mongolia hereby communicates its intended nationally determined contribution to reiterate its determination to support the multilateral negotiation process and international community efforts in fulfilling the objectives of the UNFCCC.

#### **National context**

Mongolia is a landlocked country located in the centre of the Eurasian continent in a temperate climate zone. The climate is characterised by high fluctuations and extremes in temperature and precipitation. The annual mean temperature ranges from -8°C to 6°C across regions and the annual precipitation varies from 50 mm in the Gobi desert to 400 mm in the northern mountainous area. Climate change assessments undertaken in Mongolia in 2009 and 2014, demonstrated that fragile ecosystems, a reliance on pastoral animal husbandry and rain-fed agriculture, and the growing population with a tendency of urbanization, all combine to make Mongolia's socio-economic development vulnerable to climate change.

#### **Development of Mongolia's INDC**

Mongolia's INDC has its conceptual roots in the Green Development Policy of Mongolia, approved by the Parliament in 2014, to which key sectorial action plans at the national level, including energy sector, are being adjusted. Key indicators for measuring progress in the implementation of the Green Development Policy include, among others, efficient use of energy, GHG emissions and ecological footprint per unit of GDP. The National Action Programme on Climate Change (NAPCC) endorsed by the Parliament 2011 includes concrete measures in response to climate change covering all principal sectors of economy. These and other relevant national level policy documents served as a basis for the development of Mongolia's INDC, which was shaped and finalized through comprehensive consultation exercises with a broad range of stakeholders.

#### **Mitigation contribution**

In its INDC, Mongolia has outlined a series of policies and measures that the country commits to implement up to 2030, in the energy, industry, agriculture and waste sectors. The expected mitigation impact of these policies and measures will be a 14% reduction in total national GHG emissions excluding Land use, land use change and forestry (LULUCF) by 2030, compared to the projected emissions under a business as usual scenario. Those and other potentially more ambitious commitments are contingent upon gaining access to new technologies and sources of finance through internationally agreed mechanisms and instruments under the auspices of the UNFCCC (see Annex A).

#### **Adaptation component**

The melting of permafrost and glaciers, surface water shortages, and soil and pasture degradation have been identified as particular challenges faced by Mongolia as a result of climate change. Due to a high degree of vulnerability to climate change, adaptation is particularly important for Mongolia, and as such a distinct adaptation component is therefore included in the INDC. The selection of priorities for the adaptation component is based on a detailed analysis of the expected impacts, potential solutions and challenges, and of possible synergies between adaptation and mitigation activities (see Annex B).

## Annex A: Mitigation contribution

### 1. Timeframe

Up to 2030

### 2. Type of contribution

Policies and measures

### 3. Target level

#### 3a. National contribution

By 2030, Mongolia intends to contribute to global efforts to mitigate GHG emissions by implementing the policies and measures listed in Table 1, contingent upon the continuation of international support to complement domestic efforts.

**Table 1. Policies and measures for implementation up to 2030**

Sector	Measure	Policy/strategy document
Energy (power and heat)	Increase renewable electricity capacity from 7.62% in 2014 to 20% by 2020 and to 30% by 2030 as a share of total electricity generation capacity.	State policy on energy (Parliament resolution No. 63, 2015), Green development policy, 2014
	Reduce electricity transmission losses from 13.7% in 2014 to 10.8% by 2020 and to 7.8% by 2030.	
	Reduce building heat loss by 20% by 2020 and by 40% by 2030, compared to 2014 levels.	
	Reduce internal energy use of Combined Heat and Power plants (improved plant efficiency) from 14.4% in 2014 to 11.2% by 2020 and 9.14% by 2030.	
	Implement advanced technology in energy production such as super critical pressure coal combustion technology by 2030.	
Energy (Transport)	Improve national paved road network. Upgrading/Paving 8000 km by 2016, 11000 km by 2021.	National Action Programme on Climate Change (NAPCC), 2011; Urban public transport investment programme, 2015; Nationally Appropriate Mitigation Actions (NAMAs), 2010; Mid-term new development programme, 2010
	Improve Ulaanbaatar city road network to decrease all traffic by 30-40% by 2023.	
	Increase the share of private hybrid road vehicles from approximately 6.5% in 2014 to approximately 13% by 2030.	
	Shift from liquid fuel to LPG for vehicles in Ulaanbaatar and <i>aimag</i> (province) centres by improving taxation and environmental fee system.	
	Improve enforcement mechanism of standards for road vehicles and non-road based transport.	
Industrial sector	Reduce emissions in the cement industry through upgrading the processing technology from wet- to dry- processing and through the construction of a new cement plant with dry processing up to 2030.	NAMAs, 2010; NAPCC, 2011; Government resolution No. 171, 2012: Building materials programme
Agriculture	Maintain livestock population at appropriate levels according to the pasture carrying capacity.	Mongolian national livestock programme, 2010

### 3b. Additional actions

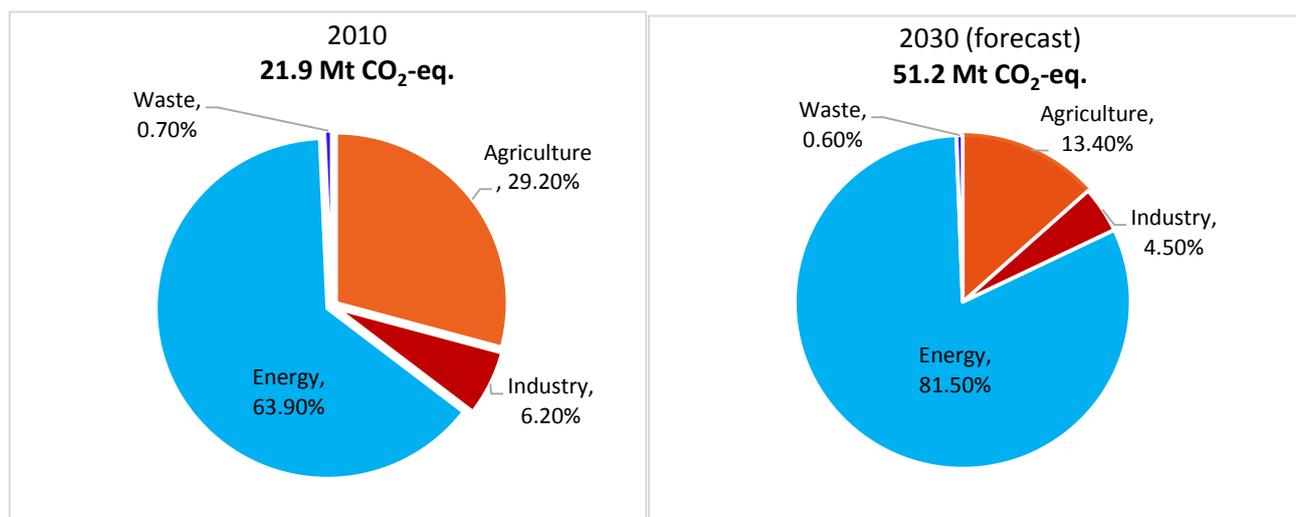
Mongolia is also interested to pursue some additional mitigation actions:

- Reduce fuel use in individual households through improving stove efficiency (with co-benefit of air pollution reduction),
- Transport (development of a Bus Rapid Transit (BRT) system and improvement of the public transport system in Ulaanbaatar),
- Agriculture (development of a comprehensive plan for emission reductions in the livestock sub-sector for implementation between 2020 and 2030),
- Waste sector (development of a waste management plan, including recycling, waste-to-energy, and best management practices),
- Industry (motor-efficiency and housekeeping improvements).

Furthermore, in the forestry sector, a programme is underway to develop a detailed inventory along with the identification of mitigation options. In future communications, Mongolia intends to include actions for mitigation in the forestry sector to reduce GHG emissions from deforestation and forest degradation by 2% by 2020 and 5% by 2030 (according to State policy on forest, 2015).

## 4. Sectors

The INDC of Mongolia includes proposed measures and additional actions for energy (including transport), industrial processes, agriculture and waste. Projected emissions by sector for 2010 and 2030 are shown in Figure 1.



**Figure 1.** GHG emissions share by sector in 2010 and 2030 [forecast, excluding LULUCF].<sup>1</sup>

GHG emissions, reported here, exclude LULUCF sector, which are currently being estimated through the preparation of a national GHG inventory, within scope of the responsibility of the Ministry of Environment, Green Development and Tourism of Mongolia (MEGDT).

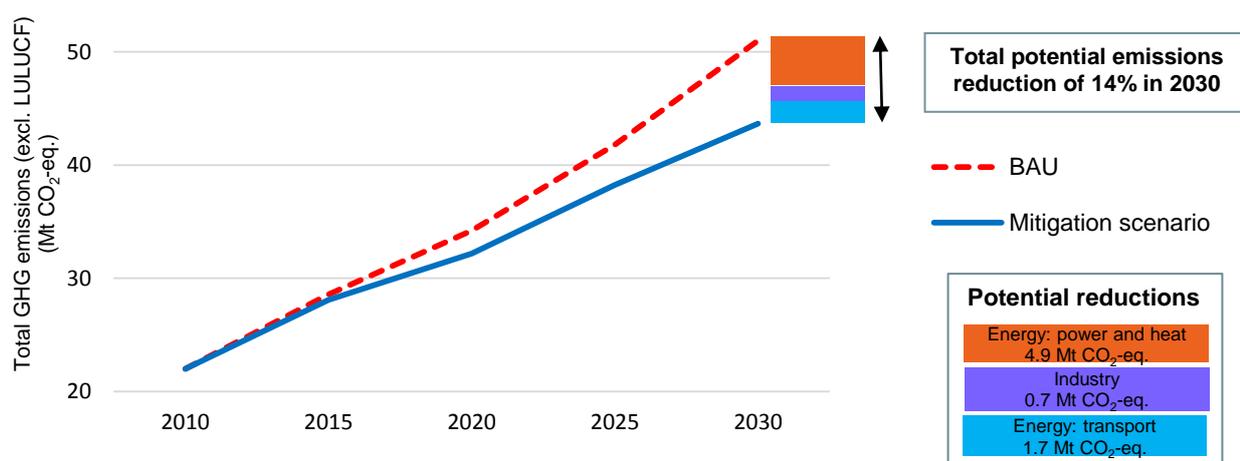
## 5. GHG emission reductions

In order to facilitate clarity, transparency and understanding, this section provides an indicative estimate of potential emission reductions for the measures targeting all major GHG gases (CO<sub>2</sub>, CH<sub>4</sub>, N<sub>2</sub>O) in the sectors mentioned.

The cumulative impact of the measures listed in Table 1 is estimated to result in approximately an annual reduction of 7.3 Mt CO<sub>2</sub>-eq. of economy-wide emissions in 2030, corresponding to a 14% reduction compared

<sup>1</sup> The Ministry of Nature, Environment and Tourism (MNET), UNEP: Mongolia Second National Communication Under the United Nations Framework Convention on Climate Change, Ulaanbaatar, 2010

to a business-as-usual (BAU) scenario, excluding LULUCF.



**Figure 2.** Indicative potential emission reductions of the measures compared to BAU emissions

## 6. Accounting methodologies

The latest official GHG emissions inventory was compiled for the year 2006 using the Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories, as described in Mongolia's Second National Communication (SNC). The projected emissions for 2010, as indicated in this document, were presented in the SNC. The BAU baseline was defined according to the methodology given in Mongolia's SNC.

Indicative emission reductions were determined using LEAP modelling (energy: power and heat; energy: transport) and Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories (industry). A description of the methodology could be found in the INDC detailed report. The potential impact of agricultural emission reduction measures could not be estimated due to lack of available background information, and are thus not included in the indicative estimate. Actual and forecast emission reductions will be recalculated annually, based on improved data availability and appropriate adjustments to the BAU baseline's assumptions.

## 7. Fairness and ambition

Mongolia has a low responsibility for climate change mitigation in terms of its historic emissions, and limited capacity due to relatively challenging environmental conditions including a long lasting heating season, a coal based electricity production system, a lack of access to cleaner fossil fuels and a highly dispersed population particularly in remote areas (lack of access to the electricity grid). This has led to a high emissions per capita ratio. Mongolia is committed to the decarbonisation of its growing economy and intends to reduce its emissions intensity by implementing the proposed measures.

The proposed targets have their origins in the Green Development Policy of Mongolia, which is an overarching and comprehensive approach to deliver low-carbon economic growth taking into account national circumstances in the context of its sustainable development. This ambitious strategy mainstreams both mitigation and adaptation in a way to reduce social and environmental vulnerability. Parliamentary approval of the most significant energy measures, and corresponding commitment to implement an important part of the mitigation actions with domestic means, demonstrates the ambition of the Mongolian Government.

## 8. Planning process and means of implementation

### Planning Processes

The Ministry of Environment, Green Development and Tourism is the key ministry to develop, update and implement climate related policies. In addition, other line ministries including the Ministry of Finance, Ministry

of Energy, Ministry of Industry, Ministry of Building and Urban Development, Ministry of Road and Transport and Ministry of Agriculture will be involved.

The elaboration of this INDC involved a multi-stakeholder process and consultations with key public bodies. It is largely based on existing legal frameworks and adopted policies of the Mongolian government, approved by the Parliament. Domestic legally-binding legislation already in place includes:

- Green development policy, 2014 (2014-2030)
- National Action Programme on Climate Change (NAPCC), 2011 (2011-2021)
- State policy on energy, 2015 (2015-2030)
- National agriculture development policy, 2010 (2010-2021)
- State policy on forest, 2015 (2016-2030)
- MDGs based comprehensive national development programme, 2008 (2008-2021)
- Law on renewable energy, 2015
- Law on energy, 2015
- State policy on Industry, 2015 (2015-2030)

Majority of the development and climate policies and programmes cover periods up to 2016 and 2020. Thus, during the period of 2016-2020, Mongolia will elaborate relevant policy documents for consultation at the national level for its development and national climate policies for the period 2021-2030. Progress towards the fulfilment of the contribution will be assessed through an annual review of the implementation progress of the proposed policies and measures.

#### Means of implementation

The measures outlined in this INDC have been presented as legislation and/or proposed in national development strategies and plans. As such, responsibility for implementation will follow existing institutional arrangements that define roles and responsibilities for the relevant sectors. In order to successfully implement the policies and measures as part of this contribution (Table 1), as well as the proposed additional measures (described in section 3b), Mongolia will seek international funding, capacity building and technology supports to complement its domestic resource allocations and efforts. Mongolia will articulate its specific needs, and communicate the potential supporting role of the international community. As a preliminary indication, some specific measures that will be important to reach the proposed targets are described in Table 2, with estimated investment needs of 3.5 billion USD. The anticipated financing modalities will be described at a later date, but a substantial private sector share is expected (leveraged by public funds) to be a part of the funding. Mongolia is interested in opportunities to access international climate funds namely the Green Climate Fund and in participation with crediting mechanisms to implement these measures.

**Table 2. Policies and measures for implementation up to 2030**

Stated contribution	Specific measures	Investment needs	Source
Increase the share of renewable electricity capacity to 30% of total electricity generation capacity by 2030, from 7.62% in 2014.	Installation of 675 MW capacity large hydro power facilities.	1,350 million USD	LEAP analysis with costs based on average of IPCC data <sup>2</sup>
	Installation of 354 MW wind power facilities.	584 million USD	
	Installation of 145 MW solar PV power facilities.	573 million USD	
Reduce building heat loss by 40% by 2030, compared to 2010 levels.	Improved insulation for existing panel apartment buildings of 18,184 households in Ulaanbaatar.	90 million USD	Technology Needs Assessment (TNA), 2013
Improved efficiency of coal fired heating plants and thermal power plants.	Improved efficiency of coal fired plants.	900 million USD	TNA, 2013

<sup>2</sup> [https://www.ipcc.ch/pdf/special-reports/srren/SRREN\\_FD\\_SPM\\_final.pdf](https://www.ipcc.ch/pdf/special-reports/srren/SRREN_FD_SPM_final.pdf)

## Annex B: Adaptation component

### 1. Rationale for Adaptation

Considering the importance of adaptation to climate change in Mongolia, this adaptation component has been included in the INDC, due to its high degree of vulnerability to climate change. It is based on a detailed analysis of the anticipated impacts of climate change and those challenges would pose to socio-economic development. Adaptation targets have been identified, along with the funding, capacity, and technologies necessary to achieve them. Implementing these actions will support sustainable development and improve Mongolia's resilience to climate change. There is a need further to use more differentiated approaches such as defining the role of passive adaptation based on traditional ways of life, active adaptation based on gained knowledge and experiences, and proactive adaptation involving modern technology and know-how.

### 2. Summary of climate change trends, impacts and vulnerabilities

The annual mean air temperature over Mongolia has increased by 2.07°C from 1940 to 2014. The ten warmest years in the last 70 years have occurred since 1997. In this period, annual precipitation has decreased slightly and the seasonal rainfall pattern has changed: winter precipitation has gradually increased and summer rain has decreased in some regions. Climate projections show intensification of these changes in the first half of the 21<sup>st</sup> century. Some of the key impacts and vulnerabilities are:

- Approximately 70% of pastoral land has degraded, while changing plant composition.
- Winter *dzud* (heavy snow, cold waves, storms etc.) risk is likely to increase leading to more losses in livestock sector.
- Non-irrigated crop production is becoming more unstable. Assessments show that wheat production might be decreased by 15% by 2030 due to climate change.
- The drying up of lakes, rivers and springs and melting of glaciers has intensified in the last decades. The recent surface water resource inventory confirmed that 12% of rivers, 21% of lakes and 15% of springs have dried up. Water temperature and evaporation are continuously increasing, leading to declining water resources.
- The intensification of dry climatic conditions cause the increase of the frequency of forest and steppe fires, the occurrence and the intensity of forest insect and pest outbreaks. As a result, the forest area is reduced by 0.46% annually, and forest resources have been degraded significantly.
- The frequency of extreme weather phenomena has doubled in the last two decades. This is expected to increase by 23-60% by the middle of the century as compared to present conditions.

Assessment of current and future impact of climate change confirms that animal husbandry, arable farming, human health, and natural resources including water, forest, pasture and soil are the most vulnerable sectors in Mongolia, and also reinforces the importance of natural disaster management.

### 3. Long and short-term adaptation visions, goals and targets

**Vision for adaptation:** Increased adaptive capacity to overcome negative impacts of climate change, and to strengthen resilience of ecosystem and socio-economic sectors.

Adaptation aims to reduce risks and vulnerabilities for the following sectors:

- **Animal husbandry** aims to maintain ecosystem balance through improving pasture management.
- **Arable farming** aspires to meet the total national need in crops by reducing bare fallow and soil moisture loss, introducing medium and long-term varieties of crops, increased irrigation with water saving technologies including snow, and rain water harvesting.

- **Water resources sector's** objectives are to expand state protected areas covering especially river headwater areas, where 70% of water resources are formed, to ensure proper use of water resources, and to strengthen integrated water resource management in river basins.
- **Forest resource** aims to reduce forest degradation, and to implement re-forestation and sustainable forest management strategies.
- **Natural disaster management** seeks to build effective disaster management to prevent environmental and socio-economic losses.

Some adaptation activities under these goals will also have mitigation co-benefits:

- Improving pasture management would increase the carbon sink of CO<sub>2</sub> equivalent to 29 million tons per year, which is equal to 1/3 of emission reduction in energy sector.
- Reducing bare fallow to 30% in rain-fed crop land, increasing variety of crops, zero-tillage and crop rotation would consequently increase a carbon sink.
- Increasing protected areas up to 25-30% of the total territory will help maintain natural ecosystems and preserve water resources with a certain synergy effects for emission reduction.
- Increasing forest area up to 9.0% by 2030 and reducing forest fire affected area by 30% would conserve ecosystems and increase carbon sink.

In general, carbon sinks of natural ecosystems will be increased with a capacity to absorb almost a half of the CO<sub>2</sub> emissions from energy sector in the country by implementing adaptation policies in agriculture, forestry, and water resource sectors.

#### 4. Current and planned adaptation undertakings

**Animal husbandry and pasture:** Every year, around 1.0 million USD is allocated from Government budget to facilitate scientific, environmentally sound measures against pasture insects and rodents. Monitoring system for pasture and soil has been created and is being strengthened.

Existing national policy documents include strategic objectives to protect pasture, which occupy about 80% of the territory. These objectives include improved pasture management, regulation of livestock numbers and herds' composition by matching with pasture carrying capacities, improved animal breeds, and regional development of intensified animal farming.

**Arable farming:** As of 2015, the total cropland has been accounted as 750 thousand ha and 450 thousand ha is re-used cropland, which was abandoned. Drip irrigation systems have been experimented since 1997 and currently used for limited area of vegetable field.

**Water resource:** As of 2015, state protected area covers 17.4% of the total national land including a certain part of river headwater areas. Integrated river basin management plans have been developed for 7 river basins out of the planned 29.

**Forestry:** Community based forest resource management has been introduced and about 20% of the forest area is currently under protection of community forestry groups, which comprise 74.8% of the total community groups on environmental protection. Multi-purpose forest resource inventory is under the process.

#### 5. Gaps and barriers

Mongolia faces some challenges in mobilization of its full potential to achieve the adaptation goals and targets. Major barriers include:

- A lack of funding, financial incentives and investments.
- Challenges to introduce advanced new technologies and equipment due to lack of domestic

production.

- Weak management of disaster risks at local level, weak and inadequate early warning systems for prevention of droughts and *dzuds*, a lack of an enabling legal environment.
- Weak coordination and integration among various sectors.
- Insufficient human resources capacity and a lack of technical training on climate change and limited engagement of academic institutions.
- Weak monitoring and evaluation system for sectors, climate events and programmes.

## 6. Summary of adaptation needs

Based on current adaptation undertakings and gaps, the needs to achieve adaptation goals and targets for 2021-2030 are given in (Table 3).

Rough estimations of adaptation measures, listed in Table 3, shows that in the future Mongolia will need around 3.4 billion USD for funding in technology and capacity building. Up to 80% of total need expected to be financed from international sources and donor institutions.

**Table 3. Adaptation needs (2021-2030)**

Sector	Adaptation goals	Adaptation Targets	Needs		
			Capacity	Technology	Financial (international, investments), million USD
Animal husbandry and pastures	-To implement sustainable pasture management	-Reduce rate of pasture degradation -Regulate headcounts and types of animals including wild animals to match with pasture carrying capacities	-To create regulations for pasture use -To set up taxation system for pasture use -To increase community participation in proper use of pastures, their monitoring and conservation	-To build an early warning system for drought and <i>dzuds</i> to prevent animal loss -To improve livestock quality and breeds -To improve livestock health (epidemic and infectious diseases) management	46.0
Arable farming	-To increase irrigated cropland, reduce soil water loss and decrease soil carbon emissions	-To reduce bare fallow to 30% -To introduce crop rotation system with 3-4 routes and 3-5 crops -To expand irrigated cropland by 2-2.5 times	-To create regulations on soil protection (soil texture, nutrient and moisture)	-To diffuse zero-tillage technology -To increase variety of crops and rotation -To introduce effective drip irrigation technology reducing water use by 2.5-5.0 times	150.0

Water resources	-To maintain availability of water resources through protection of runoff formation zones and their native ecosystems in river basins	-30 % of the territory will be state protected by 2030 and sustainable financial mechanism will be introduced	-To implement Integrated water resource management systems -To coordinate multi-stakeholder relations through improved legal policies and efficient management -To strengthen human resource capacity to deal with technical issues	-To implement ecosystem based technologies -To support ecosystem services through hydrological monitoring, construction of water diversion canals to lakes located in flood plains and re-forestation actions	5.0
	-To construct reservoirs for glacier melt water harvesting  -To regulate river streams and flows	-To create water reservoirs at rivers and at outlets of lakes, and to construct multipurpose systems of water use	- To enhance hydrological monitoring and research for river flow regulation -To construct water reservoirs and water diversion facilities to transfer water resources to dry regions	-	1800.0
	-To introduce water saving and water treatment technologies	-To find solutions (and subsequently implement) for sustainable water supply in Ulaanbaatar and for industries and mining in the Gobi region	- To conduct studies and introduce sustainable water supply with closed systems preventing evaporation loss	-To introduce new technologies for water saving, and treatment	605.0
Forest resource	-To increase efficiency of reforestation actions	-Forest area will be increased to 9% by 2030 through reforestation activities	-To build capacity of community forestry groups to conduct modern technologies for forest seedlings and tree plantations	-To introduce technology to plant seedlings	11.0
	-To reduce forest degradation rate	-To reduce forest degradation rate caused by human activities, fires, insects and diseases	-To set up fully equipped stations fighting forest fires and insects outburst and capacity building	-To use airplanes to fight against fires -To introduce biological technologies against insects	13.0

				and pests	
	-To improve effectiveness of forest management	-To make forests resilient to climate change by improving their productivity and changing their composition and structure	-To provide equipment and machineries to carry out forest cleaning activities -To train human resources for forest management practices	-To improve efficiency of forest cleaning technologies	7.0
Natural disaster management	-To enhance and improve early warning and prevention systems for natural disasters	-To strengthen early warning system for natural disasters	-To establish early detection and prediction system -To conduct disaster risk assessments at local and sub-national levels	-To improve forecast quality through increasing super computer capacity -To establish Doppler radar network covering entire territory of the country	65.4

### 7. Monitoring and reporting process

Monitoring of climate change adaptation measures will be conducted in an integrated way as per the existing national programmes.

Required funding for adaptation measures, listed in Table 3, could be provided from State budget, Government special funds, international funds and through other financial mechanisms.

Monitoring will be based on achievement of adaptation goals and targets. Baselines and targets for indicators will be assessed quantitatively and qualitatively at every phase of its implementation.

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**Government of Montenegro**

**Intended Nationally Determined Contribution (INDC) of Montenegro  
following decision 1/CP.19 and decision 1/CP.20**

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Podgorica, September 2015

This document presents Montenegro's Intended Nationally Determined Contribution following decision 1/CP.19 and decision 1/CP.20 of the United Nations Framework Convention on Climate Change (UNFCCC), which invited Parties to communicate the UNFCCC Secretariat their INDCs, with the aim to achieve the ultimate objective of the UNFCCC as set out in Article 2 of the Convention.

The region of South East Europe, including Montenegro, is highly vulnerable to the impacts of climate change thus avoiding dangerous climate change is of paramount importance for the country.

Montenegro is a non-Annex I country with a population of 621 200. According to 2013 data GDP per capita is 5 356 EUR. Size of country causes reduced flexibility in the application of policies in some emitting sectors where single source of emissions can be dominant, distorting the emission profile of the country. Also, it should be noted that tourism is one of the main drivers of the economy, having the number of tourists visiting the country annually more than twice of the number of local population.

Montenegro's contribution to the international effort to avoid dangerous climate change is expressed in **30 % emission reduction by 2030 compared to the 1990 base year**. The emission level of greenhouse gases for Montenegro from sectors covered by INDC was 5239 kilotons in 1990 and Montenegro pledges to reduce it at least by 1572 kilotons, to the level below or at 3667 kilotons. The reduction is to be achieved by general increase of energy efficiency, improvement of industrial technologies, increase of the share of renewables and modernization in the power sector.

In the following Annex additional information is provided regarding the INDC in order to ensure clarity, transparency and understanding.

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## **ANNEX**

<b>Intended Nationally Determined Contribution of Montenegro</b>	
Type	Economy-wide base year based emission reduction target
Gases covered	All greenhouse gases not controlled by the Montreal Protocol: Carbon Dioxide (CO <sub>2</sub> ), Methane (CH <sub>4</sub> ) Nitrous Oxide (N <sub>2</sub> O) Hydrofluorocarbons (HFCs) Perfluorocarbons (PFCs) Solapur hexafluoride (SF <sub>6</sub> ) Nitrogen trifluoride (NF <sub>3</sub> )
Base year	1990
Target year	2030
Reduction level	30% emission reduction by 2030 compared to the 1990
Sectors covered	Sectors included are: Energy Fuel Combustion Fugitive emissions from fuels CO <sub>2</sub> transport and storage Industrial processes Mineral industry Chemical industry Metal industry Non-energy products from fuels and solvent use Electronic industry Product uses as substitutes for ODS Other Product Manufacture and Use Other Agriculture Livestock Aggregate sources and non-CO <sub>2</sub> emissions sources on land Waste
Planning process	Planning process of the INDC included the review of available data and modelling work applicable to greenhouse gas reduction pathway as well as consultations with government stakeholders, operators of key installations as well as with the public. The scenarios for the INDC were developed in consultation with the authors of the National Climate Change Strategy of Montenegro. Within the preparation process of the INDC it became clear that significant data uncertainty exist regarding the emissions and removal in the land use, land use change and forestry sectors.
Participation in international market mechanism	Montenegro intends to sell carbon credits during the period to contribute towards achieving its emission reduction objectives as assistance to cost-effective implementation of the low emission development pathway. Montenegro foresees that for the utilization of international market mechanism is conditional on having effective accounting rules developed under the UNFCCC to ensure the environmental integrity of the mechanisms.

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<b>Fairness, equity, ambition and Means of Implementation</b>	
Fairness, equity and ambition	<p>Montenegro is a non-Annex I country, highly vulnerable to the effects of the climate change. National emissions of the greenhouse gases represent only 0,009 % of global emissions and the net per capita GHG emissions in Montenegro was 7.25 tCO<sub>2</sub>eq in 2010.</p> <p>Montenegro will take into account the ultimate objective of the UNFCCC in its future development and will be committed to decouple greenhouse gas emissions from its economic growth and embarks on a low emission development pathway.</p> <p>The INDC submitted by Montenegro is fair and ambitious because it aims to secure significant reduction of its greenhouse gas emissions while satisfies the country's need for economic development, allowing a feasible pathway for long-term decarbonisation.</p>
Means of implementation	<p>The National Climate Change Strategy will be the main planning tool along with its action plans for the implementation of Montenegro's intended nationally determined contribution until 2030. The Energy Development Strategy of Montenegro by 2030 also takes into consideration climate change as one of its six objectives and the INDC is developed in line with the trends foreseen for the energy sector development of Montenegro.</p> <p>Montenegro is in the process of accession to the European Union which involves the gradual transposition and implementation of the European Union's climate and energy legislation.</p>
<b>Key Assumptions</b>	
Metric Applied	The metric used for the GHG emissions is the Global Warming Potential on a 100 year timescale in accordance with the IPCC's 2nd Assessment Report
Inventory methodology	IPCC 2006 Guidelines are used for the inventory. Improved inventory data was used to the INDC and also for the Biennial Update Report of Montenegro compared to the 2 <sup>nd</sup> National Communication.
Approach to accounting for agriculture, forestry and other land uses	Greenhouse gas emissions and removals from agriculture, forestry and other land uses are currently not included in the accounting. Emissions and removals from these sectors can be included in the INDC at a later stage when technical conditions allow for that.

Having relatively high uncertainty regarding emissions in the LULUCF sector Montenegro reserves its right to review its INDC until 2020 upon the availability of more accurate data and improved technical conditions regarding land use, land use change and forestry and include it in its nationally determined contribution.

If the agreement or related COP decisions are amended before their entry into force in such a way that they include rules or provisions that significantly affect the assumptions under which this INDC has been developed, Montenegro reserves the right to revisit the INDC.

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Montenegro requests the UNFCCC Secretariat that this submission is published on the UNFCCC webpage and that our INDC is included in the synthesis report to be prepared by the Secretariat.

## MOROCCO

# INTENDED NATIONALLY DETERMINED CONTRIBUTION (INDC) UNDER THE UNFCCC

### Executive Summary

Morocco's Intended Nationally Determined Contribution (INDC) has its institutional roots in the National Strategy for Sustainable Development (NSSD). Morocco has developed its INDC with the conviction that global ambition to counter the effects of climate change calls for a commitment from all parties with regard to mitigation, adaptation and implementation.

In developing its INDC, Morocco undertook a broad stakeholder consultation process. This process allowed for the review of policies and programs that are being implemented by Morocco to combat global warming, and for the determination of the level of ambition to which the country wants to commit within its INDC.

This process culminated in a national conference held on June 2, 2015 in Rabat, chaired by the head of government, to officially present the draft INDC to all stakeholders and to ensure their full support for the implementation of the commitments included in the present document.

Even though Morocco is focusing its efforts in the energy sector, its greenhouse gas (GHG) emission reduction targets will be achieved through economy-wide actions based on strategies and sectoral action plans designed, amongst others, for the following areas of intervention: agriculture, water, waste, forests, energy, industry and housing.

Morocco's commitment is to reduce its GHG emissions **by 32 % by 2030** compared to "business as usual" projected emissions. This commitment is contingent upon gaining access to new sources of finance and enhanced support, compared to that received over the past years, within the context of a new legally-binding agreement under the auspices of the UNFCCC. This target translates into a cumulative reduction of **401 Mt CO<sub>2</sub>eq over the period 2020-2030**. Meeting this target will require an overall investment in the order of **USD 45 billion**, of which USD 35 billion is conditional upon international support through new climate finance mechanisms, such as the Green Climate Fund.

Concerning adaptation, Morocco has already made significant efforts. Over the period 2005-2010, Morocco devoted 64 % of all climate-related spending in the country to adaptation, which represents 9 % of overall investment expenditures.

This considerable part of the national investment budget dedicated to adaptation demonstrates the magnitude of the challenges facing Moroccan society. And this share is certain to rise over the years and decades to come. Morocco expects to dedicate at least 15% of its overall investment budgets to adaptation to climate change.

In conclusion, Morocco, driven by its convictions of common but differentiated responsibility, by its belief that humanity shares a common fate and by its commitment to the principle of equity, wishes to pave the way for a global commitment that is responsible and fair, for the well-being of the entire planet.

## **1. Morocco's national circumstances and its commitment to climate change**

Located on the southern shore of the Mediterranean, at the gates of Europe and northern Africa, Morocco has always been a crossroads of civilizations. In recent decades, Morocco has experienced economic and social development within the context of climate change. Consequently, the pressure on natural resources has increased, affecting the resilience of forest ecosystems and the agriculture sector, particularly because of water scarcity. Water availability per capita was over three times higher in 1960 than it is today.

Aware of this situation, Morocco has voluntarily and resolutely engaged in a process to combat global warming, progressively outlining its own vision while complying with decisions taken collectively at the international level. Morocco's vision to address climate change is as follows:

***Make its territory and civilization more resilient to climate change while ensuring a rapid transition to a low-carbon economy.***

This political will is today enshrined in the Framework Law on the National Charter for Environment and Sustainable Development, which asserts "the rights and duties inherent to the environment and sustainable development accorded to natural and legal persons and proclaim these principles to be respected by the state, local authorities and public institutions and businesses."<sup>1</sup> The operationalization of this policy was undertaken through the preparation of the National Strategy for Sustainable Development (NSSD) that will guide the actions of all public institutions and private actors in furthering a dynamic social and economic development.

Morocco's INDC finds its institutional roots in the NSSD and outlines a vision of Morocco in 2030. Morocco has developed its INDC with the conviction that global ambition to counter the effects of climate change calls for a commitment from all Parties with regards to mitigation, adaptation and implementation.

In this context, Morocco has set a target to limit greenhouse gas (GHG) growth that will be reached through its own means, a target that could be enhanced substantially with support from the international community. This ambition rests, to a large extent, on a major transformation of the energy sector, which requires a great political commitment and aims to reduce the country's major energy dependency and meet the growing demand for energy to support its development, particularly due to increasing water stress. The main objectives behind this transformation are:

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<sup>1</sup> This is an unofficial translation of the Framework Law for National Charter for Environment and Sustainable Development.

- Reaching over 50 % of installed electricity production capacity from renewable sources by 2025;
- Reducing energy consumption by 15 % by 2030;
- Substantially reducing fossil fuel subsidies, building on reforms already undertaken in recent years;
- Substantially increasing the use of natural gas, through infrastructure projects allowing liquefied natural gas imports.

Even though Morocco is focusing its efforts in the energy sector, its GHG emission reduction targets will be achieved through economy-wide actions based on strategies and sectoral action plans designed, amongst others, for the following areas of intervention: agriculture, water, waste, forests, energy, industry and housing.

In a near future, Morocco also intends to develop a national plan to combat short-lived climate pollutants (SLCPs), with support from the Climate and Clean Air Coalition. As part of this process, Morocco will develop SLCP emission inventories and assess the benefits of reducing SLCPs for climate, health and agricultural production.

The implementation of the INDC requires an unprecedented mobilization of Moroccan society and international financial partners. To facilitate this mobilization, Morocco has set up the Moroccan Competence Centre for Climate Change (4C Maroc), which provides a capacity-building and information-sharing platform on climate change. The platform is available to various stakeholders and has a regional and African outreach. The 4C Maroc will drive this mobilization and will be responsible for the development of a national system for monitoring GHG emissions.

In this context, and as the upcoming President of the Conference of the Parties to the UNFCCC (2016), Morocco reiterates its determination to support the multilateral negotiation process for reaching a new climate deal this year in Paris.

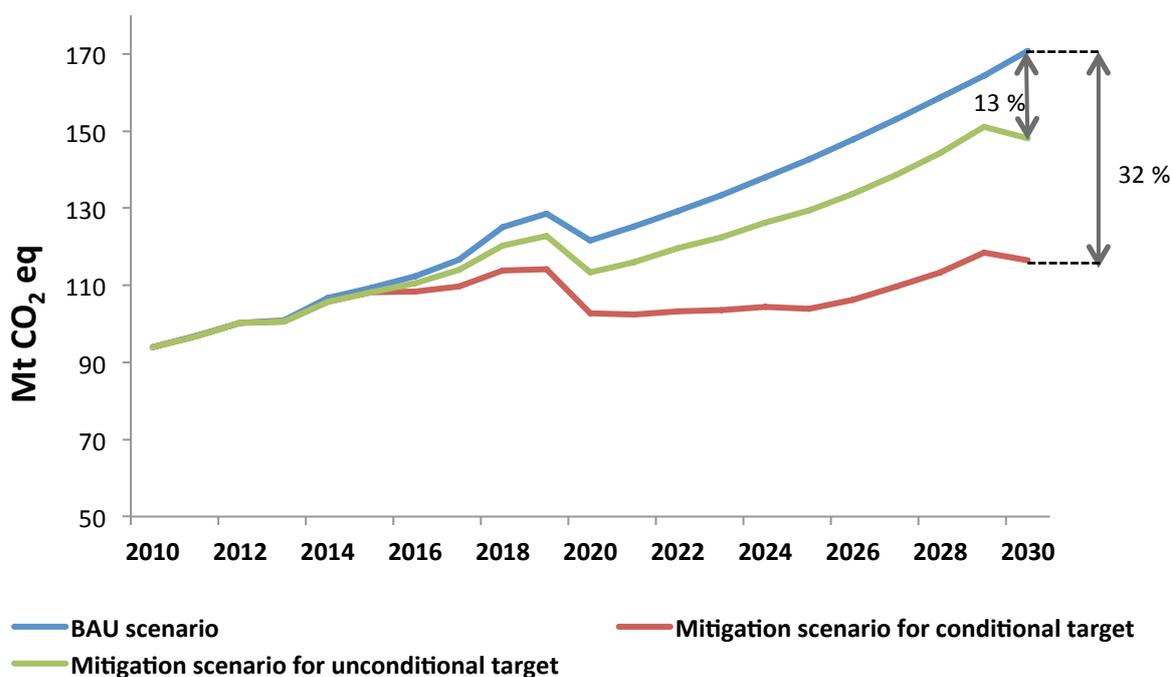
## **2. Morocco's Mitigation Contribution**

### **Mitigation Targets**

Unconditional Target	A <b>13 %</b> reduction in GHG emissions by 2030 compared to a business as usual (BAU) scenario.*
Conditional Target	An additional <b>19 %</b> reduction achievable under certain conditions, which would bring the total GHG reduction to <b>32 %</b> below BAU emission levels by 2030.*
Expected Trajectory	In achieving its unconditional and conditional targets respectively, for reference and guidance purposes only, Morocco expects its emissions trajectory to be the following: <ul style="list-style-type: none"><li>• to reach 113 Mt CO<sub>2</sub>eq in 2020 and 129 Mt CO<sub>2</sub>eq in 2025, decreasing by 7 % and 10 % compared to BAU emissions in 2020 and 2025, respectively.</li><li>• to reach 103 Mt CO<sub>2</sub>eq by 2020 and 104 Mt CO<sub>2</sub>eq by 2025, decreasing by 16 % and 27 % compared to BAU emissions in 2020 and 2025, respectively.</li></ul>
Financial Needs	Meeting the conditional target requires an overall investment estimated at USD 45 billion between 2015 and 2030, of which 35 USD billion is conditional upon: <ul style="list-style-type: none"><li>• access to new sources of finance and enhanced support, compared to that received over the past years, to be mobilised through new climate finance mechanisms, such as the Green Climate Fund;</li><li>• the conclusion of a legally-binding agreement under the auspices of the UNFCCC.</li></ul>

*\* Morocco reserves the right to revise said BAU scenario on the basis of new analysis by 2020.*

**Figure 1. BAU and Mitigation Scenarios**



### Assumptions and Methodological Approaches

Type of Targets	Emission reductions from projected emissions for the year 2030, according to a BAU scenario
Coverage	Economy-wide
Gases Covered	<ul style="list-style-type: none"> <li>• Carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>) and nitrous oxide (N<sub>2</sub>O)</li> <li>• Fluorinated gases are not covered; they are rarely used in Morocco and their emissions are marginal.</li> </ul>
Sectors covered	<ul style="list-style-type: none"> <li>• Energy                             <ul style="list-style-type: none"> <li>- Energy production</li> <li>- Energy demand (households, transport, industry, services, agriculture and fisheries)</li> </ul> </li> <li>• Industrial Processes                             <ul style="list-style-type: none"> <li>- Cement industry</li> <li>- Steel and metal manufacturing</li> <li>- Other industries</li> </ul> </li> <li>• Agriculture                             <ul style="list-style-type: none"> <li>- Enteric fermentation and manure management</li> </ul> </li> </ul>

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- Cropping systems
  - Land-use for agriculture
  - Waste
    - Solid waste
    - Waste water
  - Land-use, land-use change and forestry (LULUCF)
    - Natural forests
    - Afforestation and reforestation
    - Arboriculture
    - Firewood from forests
    - Firewood from orchards
    - Forest fires

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BAU Scenario	GHG emission projection for 2030, starting in 2010, which is the first year of implementation of the National Plan for the Fight against Global Warming. Projections do not take into account the mitigation measures and actions implemented from 2010.
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Mitigation Scenarios	GHG emission projections for 2030, starting in 2010. The unconditional mitigation scenario is based on the implementation of 10 actions, while the conditional scenario assumes the implementation 54 actions over the period 2010-2030.
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Global Warming Potential (GWP)	<p>The GWP values used are those determined by the Intergovernmental Panel on Climate Change (IPCC), according to Decision 17/CP.8 of the UNFCCC, for the preparation of national emissions inventories:</p> <ul style="list-style-type: none"> <li>- GWP CO<sub>2</sub> = 1 (by convention)</li> <li>- GWP CH<sub>4</sub> = 21</li> <li>- GWP N<sub>2</sub>O = 310</li> </ul>
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Methodology for Estimating Emissions	<p>The 2010 GHG emissions inventory was completed according to the revised 1996 IPCC Guidelines.</p> <p>The BAU and mitigation scenarios were developed for all sectors using the "Long-range Energy Alternatives Planning System" (LEAP) software. They are based on data from the National Statistics Directory, on data on sectorial activities and on economic, demographic and sectoral prospective analyses.</p>
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Methodology for Estimating Emissions from Agricultural, Forestry and other Land Use Sectors	<p>Agricultural sector: GHG emissions that are included are those related to enteric fermentation and manure management, cropping systems and agricultural land (cultivated soils). Agricultural residues are mainly used as animal feed or as fuel in rural areas.</p>
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Forestry sector and other land-use sectors: taking into account local specific conditions and type of land-use in Morocco, natural forests, reforestation, horticulture, firewood from forests and orchards, and forest fires are the main categories included in the emission assessment from the forestry and other land-use sectors.

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**Table 1. Summary of Key Mitigation Data**

	<b>2010</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>	<b>Total 2020-2030</b>
<b>Emissions – BAU (Mt CO<sub>2</sub>eq)</b>	94	122	143	171	1,585
<b>Emissions – Unconditional scenario (Mt CO<sub>2</sub>eq)</b>	94	113	129	148	1,443
<b>Emissions – Conditional scenario</b>	94	103	104	117	1,184
<b>Expected reductions – Unconditional scenario (Mt CO<sub>2</sub>eq)</b>	0	9	14	23	142
<b>Expected reductions – Conditional scenario</b>	0	19	39	54	401

### Planning for Implementation

In recent years, Morocco has thoroughly reformed its legal and institutional framework to enable the transition to a green economy. The implementation of Morocco’s INDC is based on several laws, strategies and national action plans that include clear and ambitious sectorial targets (Table 2).

The conditional mitigation scenario is based on the implementation of 54 actions covering all sectors, leading to the estimated expected GHG reductions, as shown in Figure 2.

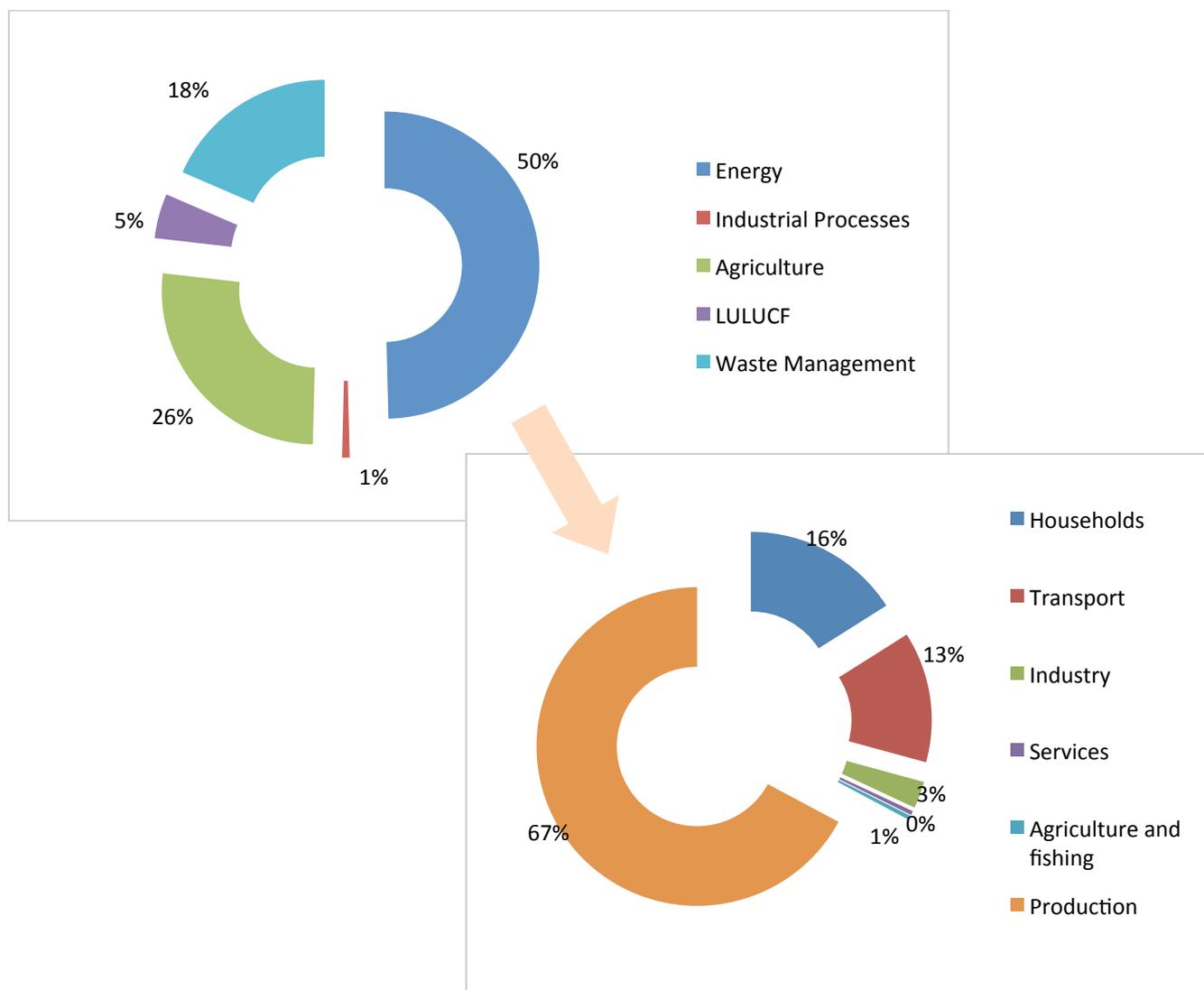
**Table 2. Key sectorial strategies and targets for the implementation of Morocco's INDC**

Strategies and action plans	Targets
National Energy Strategy	<ul style="list-style-type: none"> <li>• Provide 42 % of the installed electrical power from renewable sources, of which 14 % is from solar energy, 14 % is from wind energy and 14 % is from hydraulic energy by 2020.</li> <li>• Achieve 12 % energy savings by 2020 and 15 % by 2030, compared to current trends.</li> <li>• Reduce energy consumption in buildings, industry and transport by 12 % by 2020 and 15 % by 2030. The breakdown of expected savings per sector is 48 % for industry, 23 % for transport, 19 % for residential and 10 % for services.</li> <li>• Install by 2030 an additional capacity of 3,900 MW of combined-cycle technology running on imported natural gas.</li> <li>• Supply major industries with imported and regasified natural gas by pipelines.</li> </ul>
National Waste Recovery Program	<ul style="list-style-type: none"> <li>• Mainstream household waste management master plans and standardize them for all regions and provinces of the Kingdom.</li> <li>• Improve the collection of household waste to achieve an urban collection rate of 90 % by 2020 and 100 % by 2030.</li> <li>• Establish landfill and recycling centres for household waste for the benefit of all urban areas by 2020.</li> <li>• Rehabilitate or close all illegal landfills by 2020.</li> <li>• Make the management of the sector more professional.</li> <li>• Develop chains of “sorting-recycling-recovering” with sorting pilot projects to achieve a 20 % recycling rate by 2020.</li> <li>• Train and raise awareness of stakeholders on waste issues.</li> </ul>
National Liquid Sanitation and Wastewater Treatment Programme (NSP)	<ul style="list-style-type: none"> <li>• Reach an overall urban sewerage connection rate of 75 % by 2016, 80 % by 2020 and 100 % by 2030.</li> <li>• Reach a 50 % volume of treated wastewater by 2016, 60 % by 2020 and 100 % by 2030.</li> <li>• Expand wastewater management to services and reuse 50 % of wastewater by 2020.</li> </ul>
Morocco Green Plan	<ul style="list-style-type: none"> <li>• Modernize the agricultural sector to make it more competitive and integrated in the global market to create wealth over the entire value chain.</li> <li>• Take into account the agricultural sector in all its sociological and territorial components by incorporating human development objectives as a key requirement.</li> <li>• Improve the promotion of natural resources and their sustainable management.</li> <li>• Define the necessary policies to support sustainable growth.</li> </ul>

Preservation and Sustainable Forest Management Strategy

- Develop forestry and surrounding areas.
- Finalize land demarcation and registry of forested areas.
- Complete the suckering, renewal or afforestation of approximately 50,000 hectares per year, with a primary focus on natural species and support for high quality forest research when rehabilitating territory.
- Protect water basins against erosion and siltation of dams.
- Rehabilitate ecosystems and protect and promote natural areas as well as endangered species as resources.

**Figure 2. Distribution of the mitigation effort by sector between 2020 and 2030, to achieve the conditional target**



## Other Considerations

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Perspective on Human Rights and Gender	Respect for human rights and gender balance are two pillars of Morocco's vision for its work on climate change. Morocco's 2011 Constitution brought a new impetus to this momentum by enshrining sustainable development as a citizens' right.
Considerations relating to the other Two Rio Conventions	Morocco's INDC is part of an integrated approach, which fosters biodiversity, recovery and maintenance, whilst integrating sustainable management for both water and land resources in order to combat desertification.
Use of Market Mechanisms	Morocco considers the establishment of an international market mechanism vital to reduce the total costs to achieve the target of limiting the temperature increase to 2°C. Morocco does not exclude the possibility of using these mechanisms to achieve its conditional and/or unconditional targets.
Equity and Ambition	Morocco considers its INDC to be ambitious and fair for three main reasons: <ul style="list-style-type: none"><li>• Morocco makes, for the first time, a formal commitment to limit the growth of its GHG emissions, despite having only emitted 0.2 % of global GHG emissions in 2010.</li><li>• With the conditional target, Morocco's per capita emissions would not exceed 3.1 t CO<sub>2</sub>eq in 2029 and the GHG intensity in relation to the Gross Domestic Product (GDP) would improve by 4 % over the period 2010-2030.</li><li>• Finally, Morocco must focus primarily on minimising the risks of climate change impacts. Certain economic activities, such as agriculture, fisheries, aquaculture, forestry and tourism are significantly vulnerable, as are certain ecosystems, such as oases, the coast and mountains.</li></ul>

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### **3. Morocco's action on adaptation**

Morocco is very vulnerable to climate change, due to its geographical location, and is prone to water scarcity, declining agricultural production, desertification, floods and rising sea levels. For Morocco, adaptation to climate change is the cornerstone of any program or policy on sustainable development.

#### **Morocco's vision to address the risks of climate change impacts**

Morocco's vision is to:

*Preserve its **territory** and its **civilization** in the most appropriate manner, effectively responding to the vulnerabilities of its territory and implementing an adaptation policy that builds resilience for all of its **population** and its **economic actors** to face these vulnerabilities.*

Morocco implements a sectoral approach, adapted to its varied natural circumstances: mountain regions, the coast, oases, agricultural areas and urban areas. The ultimate objectives of Morocco in addressing climate change, which must also resonate with the international community, are:

- The protection of populations, through a risk-prevention management approach, particularly in the most vulnerable areas (coastal zones, mountainous areas, regions with a high propensity for desertification, and oases). This approach relies on an observation and research system to better understand current and future climate risks.
- The protection of natural heritage, biodiversity, forestry and fishery resources, through an ecosystem-based adaptation approach. Morocco commits to restoring ecosystems and strengthening their resilience, to combat soil erosion and prevent flooding.
- The protection of climate-sensitive production systems, such as agriculture and tourism, as well as high-risk infrastructures. Water resources being the most constraining factor to sustainable development in Morocco, the Kingdom has recently developed a National Water Strategy. The strategy aims to improve integrated and appropriate water resource management and preservation methods, protection against pollution, training, scientific research and awareness around these themes.
- The protection of the cultural heritage of the Kingdom through education and awareness actions, and efforts to preserve ancestral good practices in highly vulnerable sectors, such as water and agriculture.

## Goals to Build Resilience

Morocco's vision for adaptation involves several quantified sectorial goals for 2020 and 2030.

The goals for 2020:

- Substitution of water withdrawal (85 million m<sup>3</sup>/year) from overexploited aquifers by withdrawals from surface water;
- Increase the current area under drip irrigation from 154,000 ha at present to 555,000 ha;
- Reconstitution of forests on 200,000 ha.

The goals for 2030:

- Desalination of 285 million m<sup>3</sup>/year of drinking water supply to several cities and centres;
- Reuse 325 million m<sup>3</sup>/year of treated wastewater;
- Construction of 38 new dams and development of an inventory and the treatment of all sites vulnerable to flooding;
- Connection to the sewerage system and wastewater treatment to reach 100 % of urban areas;
- Wastewater treatment to reach 100 %;
- Savings of 2.4 billion m<sup>3</sup>/year of irrigation water;
- Improved performance of drinking and industrial water systems, with a target of 80 % as a national average, in order to save 120 million m<sup>3</sup>/year of drinking water;
- Artificial refill of aquifers with a potential of 180 million m<sup>3</sup>;
- Massive conversion of surface and sprinkler irrigation to drip irrigation over an area of 920,000 ha, resulting in water savings of 2.4 billion m<sup>3</sup>/year;
- Conversion of nearly one million hectares of grain crops to fruit plantations that are likely to protect agricultural areas from all forms of erosion, especially water erosion;
- Treatment to prevent erosion of 1.5 million ha over a period of 20 years (75,000 ha / year), in 22 priority watersheds.

To achieve these goals, much planning has already been undertaken. Resilience to climate change is included in the majority of strategies, policies, action plans and programs, including in the following, cited as examples:

- National Strategy for Sustainable Development (NSSD);
- National Strategy to Combat Global Warming (NSGW), the National Policy to Combat Global Warming (NPGW), the National Plan to Combat Global Warming (NPGW) with its local variations, and the Green Investment Plan (GIP);
- National Water Strategy (NWS), the National Water Plan (NWP);

- National Plan for Water Saving Irrigation (NPWSI);
- National Plan for the Protection Against Floods (NPF);
- National Sanitation Programme (NSP);
- National Rural Sanitation Programme (NRSP);
- Green Morocco Plan (GMP);
- National Action Programme to Combat Desertification;
- Programme for the Conversion of the Gravity-Fed System into Localized Irrigation (PCGSLI);
- National Programme for the Promotion of Household Waste (NPPW);
- National Plan for Watershed Planning (NPWD);
- National Strategy for the Planning and Development of Oases;
- National Strategy for the Planning and Development of Middle Atlas;
- Programme for the Sustainable Development of the High Atlas;
- Programme for the Sustainable Development of the Anti Atlas;
- National Strategy for Integrated Coastal Management;
- Halieutis Plan;
- Initiative for New Energy-Efficient Cities.

Moreover, Morocco is committed to developing, in the short term, a National Adaptation Plan up to 2030, to better coordinate its actions and maximize their impact.

### Morocco's Adaptation Needs

Adaptation needs will have significant budgetary implications for Morocco. Over the period 2005-2010, Morocco devoted 64 % of all climate-related spending in the country to adaptation, which represents 9 % of overall investment expenditures.<sup>2</sup>

This considerable part of the national investment budget dedicated to adaptation demonstrates the magnitude of the challenges facing Moroccan society. And this share is certain to rise over the years and decades to come. Morocco expects to dedicate at least 15% of its overall investment budgets to adaptation to climate change.

More specifically, as an example, the Green Investment Plan presents a few adaptation initiatives to be implemented over the short-term in the water, agriculture and forestry sectors, which would necessitate investments of about USD 2.5 billion.<sup>3</sup>

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<sup>2</sup> Source: World Bank (2013). *Royaume du Maroc. Revue des Dépenses Publiques et Analyse Institutionnelle de la Politique Climat*. Programme d'Appui Analytique à la Stratégie Changement Climatique du Maroc. P-ESW 113768. Note de Stratégie n. 4.1.

<sup>3</sup> Source: Government of Morocco. *Plan d'investissement vert (PIV)*, 2014. Retrieved from <http://www.maroc.ma/fr/content/plan-maroc-vert>

In this context, Morocco is seeking the support of the international community, which spent only 5 % of climate finance for adaptation.<sup>4</sup> Beyond financial support, Morocco would also benefit from technical and institutional capacity building, particularly regarding the creation of data and knowledge sharing. It would also benefit from legal, financial and engineering support pertaining to designing and implementing projects at the regional and local levels, as well as for the monitoring and evaluation of their socioeconomic impacts.

### **Monitoring and Evaluation System for Adaptation in Morocco**

Morocco has put in place a system to monitor and assess vulnerability and adaptation to climate change. It offers an institutional mechanism that allows for the monitoring of climate vulnerability and the results of adaptation actions, taking into account gender issues. This pilot project was first tested in the regions of Souss-Massa-Drâa and Marrakech Tensift Al Haouz.<sup>5</sup> The adoption of the monitoring and evaluation system by other regions is planned for the medium term, with the implementation of a national governance mechanism to oversee the monitoring and evaluation system.

By launching an advanced regionalization project, Morocco will contribute to this programme through a national vision for land planning which promotes regional potentials and resources, and encourages strategically integrated land planning that is rooted in involving territories to build their resilience to climate change.

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<sup>4</sup> Source: Climate Funds Update. « Multilateral and Bilateral Project Data. » 2015  
<http://www.climatefundsupdate.org/data>

<sup>5</sup> See: GIZ, OREDD (2014). *Guide relatif au montage du Système de Suivi-Évaluation de la Vulnérabilité et de l'Adaptation au Changement Climatique dans les Régions du Souss Massa Drâa et Marrakech Tensift Al Haouz.*



**REPÚBLICA DE MOÇAMBIQUE**  
**MINISTÉRIO DA TERRA, AMBIENTE E DESENVOLVIMENTO RURAL**

**Intended Nationally Determined Contribution (INDC)  
of Mozambique to the United Nations Framework  
Convention on Climate Change (UNFCCC)**

National development goals and priorities, climate change context

Mozambique is located in the eastern coast of Africa and has frontiers with Tanzania (north), Malawi, Zambia and Zimbabwe (west) and South Africa and Swaziland (south). The country has an area of 799 380 km<sup>2</sup>, of which 13 000 km<sup>2</sup> are coastal and 786 380 km<sup>2</sup> are terrestrial, with an eastern shoreline bathed by the Indian ocean extending to 2700 km. The Mozambican population has been increasing at a rate of 2,4% per year. According to the Demographic Census of 2007, the population was estimated at 20,6 million of inhabitants, from which 48% were men and 52% women. The demographic projection of the National Statistics Institute indicates that by 2030 the country will have about 36 million inhabitants, **implying that** the country will need to prepare the conditions for Mozambique to satisfy the needs of **this** number of inhabitants.

The geographical location and extension of the county provide for the privilege of a big diversity of natural resources, namely wide fertile areas suitable area for aquaculture, forest, wildlife and fisheries, important watersheds, mineral resources including renewable and non-renewable energy sources and a long coastline of great economic, touristic and environmental potential. However, the country is extremely vulnerable to climate change occurring through alterations in the precipitation and temperature patterns and increased intensity and frequency of the occurrence of extreme weather events like floods, droughts, wind storms, including cyclones, and a rising sea level.

Therefore, as established in the National Climate Change Adaptation and Mitigation Strategy (NCCAMS) (MICOA, 2012), the national priority is defined in its mission “to increase resilience in the communities and the national economy including the reduction of climate risks, and promote a low-carbon development and the green economy through the integration of adaptation and mitigation in sectorial and local planning”.

However, to achieve this goal, and despite the fact that the Government already has put in place a legal and institutional framework, it is still necessary to mobilize, at the national and international levels, the financial and technological resources needed and also to strengthen the national technical and institutional capacities.

Adaptation Contribution	
1. Rationale and process for developing INDC on adaptation	<p>Mozambique has elaborated its Initial and Second<sup>1</sup> National Communications and other studies<sup>2</sup>, which indicate that the country is extremely vulnerable to climate change impacts. Based on the results of those studies' and from the experience arising from actions implemented to prepare and protect people, ecosystems and infrastructures from the negative impacts occurring due to extreme weather events, the Inter-Institutional Group on Climate Change (GIIMC) conducted the participatory process to formulate the NCCAMS, which was approved by the Government in November 2012.</p> <p>The NCCAMS identifies adaptation and the reduction of the climate risk as a national priority and presents eight strategic actions aimed at creating resilience and reducing the climate risk in the communities, ecosystems and national economy. The NCCAMS identifies also a set of key cross cutting actions including (i) institutional and legal reform, (ii) research and systematic observation and (iii) capacity building and technology transfer. These are relevant to achieve a prosperous and climate change resilient Mozambique, with a green economy in all social and economic sectors.</p> <p>Mozambique has decided to include adaptation in its INDC, so as to consider this document as a means to communicate its present and future great climate vulnerability and the effort that the Government, in collaboration with its partners, has to make to create the national capacity to deal with climate change.</p> <p>The INDC formulation process started with the compilation of the strategic action proposed in the adaptation and risk reduction pillar of the NCCAMS, and other climate change studies done as well as the legal ordinances. This resulted in the preliminary version of the document that served as a basis for the consultations at the provincial level and at the central level, in the Technical Council of the National Council for Sustainable Development (CONDES), and with other different stakeholders as the civil society, private sector representatives and governmental institutions. This process ended with the realization of the Forum to debate the validation of the INDC and afterwards with its approval by the Council of Ministers and subsequent submission to the UNFCCC's Secretariat.</p>
2. Summary of climate change trends, impacts and vulnerabilities	<p>The analysis of the impacts and frequency of its occurrence in Mozambique in the period covering 1956 to 2008 demonstrates that drought and floods are the events that most affect the population, living in vulnerable areas, and that the latter are the most common occurrences</p>

<sup>1</sup> The Second National Communication is in the process of being submitted to the UNFCCC

<sup>2</sup> Studies about Climate Change elaborated by the Instituto Nacional de Gestão das Calamidades (INGC), Study on the Economy of Climate Change elaborated by the World Bank, among others

followed by tropical cyclones.

The consequences of the observed impacts of climate change in the country include the loss of human lives, destruction of socioeconomic infrastructures and property, loss of livelihoods and environmental degradation, including erosion and saltwater intrusion, with impacts in the communities and the national economy.

The economic impacts of climate change are well described in the study *Economics of Adaptation to Climate Change: Mozambique* (World Bank, 2010). This indicated that the economic cost of the disasters that occurred in Mozambique between 1980 and 2003 was 1,74 thousand million USD. However, this value underestimates the losses and impacts on the poor populations that live mostly in the coastal zones (60%) and derive their basic subsistence from fisheries and rainfed agriculture. This population, the coastal resources and infrastructures are exposed to tropical cyclones and to sea level rise.

Based in the same study, the climate scenarios indicate the reduction of the national welfare. The report projects greater losses, estimated between 2 to 7 thousand million USD (real 2003) for the period covering 2003 to 2050. This is equivalent to an annual loss that varies among 0,6 and 1,2 thousand million USD per year until 2030. The major losses are those associated with infrastructures, mainly roads due to floods, although agriculture is also severely affected by drought.

As referred above, the country is vulnerable to climate change. Assessment studies have shown that Mozambique is already suffering the negative impacts, of climate change and the climate projections recommend adoption and implementation of measures to mitigate the future climate change impacts. Some of the observed impacts include:

1. Trend in the increase of the averages of the maximum and minimum temperature (INGC, 2009) all over the country (Table 1), where the central region had the higher variation in the minimum temperature (+1,62°C)

Table 1: Variation of the average maximum and minimum temperature by region, between 1960 and 2005 in four stations (INGC, 2010)

Region	Trend	Variation TMax <sub>Ave</sub>	Variation da TMin <sub>Ave</sub>
North	Increase	0,76 – 1,16	0,80 – 0,88
Centre	Increase	0,40 – 1,11	1,12 – 1,62
South	Increase	0,50 – 0,98	0,69 – 1,35
Coast	Increase	0,74 – 1,01	0,52 – 0,65

2. Increase of the occurrence of extreme climate events such as floods, droughts, tropical cyclones and epidemics (Figure 1).

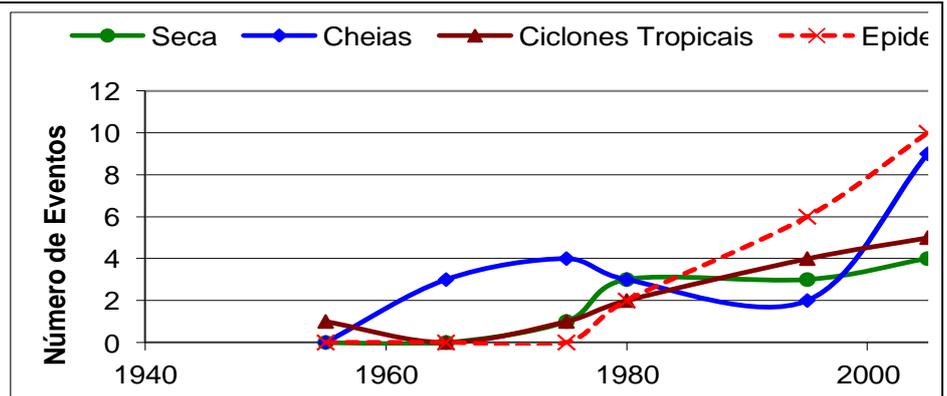


Figure 1. Number of climatic events between 1950-2010 (INGC, 2015).

- Increase of the frequency and intensity of the tropical cyclones between 1980 and 2012. As seen in Figure 2, from 1980 to 1997 five tropical cyclones hit the Mozambican coast with a wind speed of 92 to 142 km/h and from 2000 to 2012 the country has had 11 tropical cyclones and six had wind speed above 167 km/h;

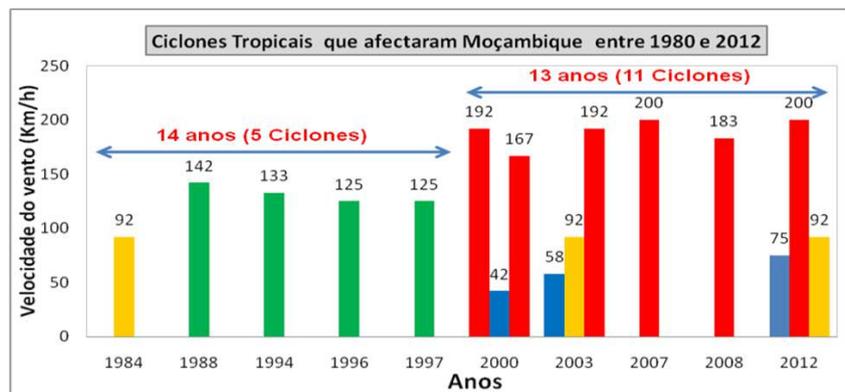


Figure 2. Number of climatic events in the period form 1984 to 2012 (INGC, 2015)

- Floods from 2000 to 2015 affected about 4 629 000 people, 1 204 deaths and caused damage in 1 176 000 houses, of which 638 700 have been destroyed. Damage also occurred in water storage and flood protection infrastructures, mainly in dyques of Licungo in Nante and Limpopo in Chókwe, Guijá and Xai-Xai, and in railways and ports. The cost of these events was estimated as 1 356,9 million USD;
- The damage in roads from 2011 to 2015 include 130 aqueducts, 119 bridges and 41 drifts destroyed or affected, 15 512 km of impassable roads, and the amount of destruction was estimated at about 13 316 443 530 MT, corresponding to 333 million USD;
- The losses in yields due to the occurrence of extremes are summarized in table 2.

Table 2: Impact of climate change on yields from 2005 to 2014.

Year	Event	Affected region	Loss of area
2005	Severe drought	South and Centre	369 ha
2005	Cyclone Fávio	Provinces of Inhambane, Sofala and Manica	75 000 ha
2007	Moderate drought	South and Centre	102 000 ha
2009	Drought and floods	South and Centre	715 696 ha
2010/11	Flood	South and Centre	21 889 ha
2011/12	Storms Dando and Funso	Entire country	41 979 ha
2012/13	Drought and floods	Entire country	216 745 ha
2013/14	Floods	South and Centre and Province of Cabo Delgado	26 085 ha

7. Nowadays the saltwater intrusion represents a problem in the Umbeluzi, Incomati, Limpopo, Save, Púngoe, Buzi and Zambeze rivers where the irrigation is developed. Table 3 (INGC, 2010) shows to which degree some rivers are affected.

Table 3: Saltwater intrusion in some rivers.

River	Distance in the interior (km)	Affected area (km <sup>2</sup> )
Zambeze	28	240
Save	16	170
Limpopo	29	83
Buzi	20	19
Maputo	11	5
Ligonha	5	6

According to climate projections these impacts will be exacerbated considering the expected increase in temperature of 1,5 to 3,0°C between 2046 and 2065 and the sea level rise of 15 cm, 30 cm and 45 cm as a consequence of thermic expansion and of 15 cm, 110 cm and 415 cm from ice melting in 2030, 2060 and 2100, respectively. Studies from the World Bank indicate a loss of 0,6 to 1,2 million USD per year until 2030.

3. Reporting on long-term and near-term adaptation visions, goals and targets

The mission is to “reduce climate change vulnerability and improve the wellbeing of Mozambicans through the implementation of concrete measures for adaptation and climate risk reduction, promoting mitigation and low-carbon development, aiming at sustainable development, with the active participation of all stakeholders in the social, environmental and economic sectors”.

To achieve that, in the short term (2015-2019), the first NCCAMM action plan is being updated. In this Plan adaptation will be included as the National Adaptation Plan (NAP). In this period, as in 2013 and 2014, the goal will continue to be the Action Plan, to increase local resilience, fighting poverty and identifying opportunities for adaptation and low-carbon development at community level through its mainstreaming in the process of district planning and budgeting. As the evaluation made shows that the goal has not been accomplished in 2014, and thereby requires delaying the term of the first phase to 2019. The subsequent medium and

	<p>long-term goals have also been adjusted to 2025 and 2030, respectively.</p> <p>In the medium (2020 to 2025) and long (2026 to 2030) terms Mozambique intends to update its NAP in which the goals will be similar to those in the shorter term, but referring to the provincial and national level, respectively. Therefore, from 2020 to 2025, the country intends to increase its resilience at the provincial level and to include adaptation in that scope of planning and from 2026 to 2030 to do the same at the national level, achieving in this way the vision of the NCCAMS – “A prosperous and climate change resilient Mozambique, with a green economy in all social and economic sectors”.</p> <p>This vision is quite ambitious, has been demonstrated during the implementation of the NCCAMS’s first action plan, and the need for financial and technical support and capacity building continues to be necessary.</p>
<p>4. Reporting on current and planned adaptation undertakings and support</p>	<p>According to the NCCAMS, the present and future planned actions (post-2020) directed at the increase of resilience and risk reduction will correspond to the update of the adaptation component of the Strategy which will correspond to the NAP of Mozambique. The country will update and implement its NAP for the following time periods: short (2015 to 2019), medium (2020 to 2024) and long (2025 to 2030) terms. The strategic actions to be included in the NAP are:</p> <ul style="list-style-type: none"> <li>• Reduce climate risks through the strengthening of the early warning system and of the capacity to prepare and respond to climate risks;</li> <li>• Improve the capacity for integrated water resources management including building climate resilient hydraulic infrastructures;</li> <li>• Increase the effectiveness of land use and spatial planning (protection of floodplains, coastal and other areas vulnerable to floods);</li> <li>• Increase the resilience of agriculture, livestock and fisheries, guaranteeing the adequate levels of food security and nutrition;</li> <li>• Increase the adaptive capacity of the most vulnerable groups;</li> <li>• Reduce people’s vulnerability to climate change related vector-borne diseases or other diseases;</li> <li>• Ensure biodiversity’s protection;</li> <li>• Reduce soil degradation and promote mechanisms for the planting of trees for local use;</li> <li>• Develop resilient climate resilience mechanisms for infrastructures,</li> </ul>

	<p>urban areas and other human settlements and tourist and coastal zones;</p> <ul style="list-style-type: none"> <li>• Align the legal and institutional framework with the NCCAMS</li> <li>• Strengthen research and systematic observation institutions for the collection of data related to vulnerability assessment and adaptation to climate change;</li> <li>• Develop and ameliorate the level of knowledge and capacity to act on climate change; and</li> <li>• Promote the transfer and adoption of clean and climate change resilient technologies.</li> </ul> <p>Mozambique is part of the group of countries which are implementing the Pilot Programme for Climate Resilience (PPCR), which encompasses support for the institutional and policies' reform, for the funding of pilot projects (roads, agriculture, early warning systems, coastal cities and irrigation) and for knowledge management. In addition to the PPCR, the World Bank is also funding actions in water resource sectors and conservation areas.</p> <p>The country is also implementing other projects supported by the Least Developed Countries Fund (LDCF), the PASA<sup>3</sup>, the African Development Bank, the JICA, the USAID and the Portuguese Carbon Fund, among others.</p>
5. Gaps and barriers	<p><i>Financial</i></p> <ul style="list-style-type: none"> <li>• Insufficient financing available to climate proof in country, associated with the complexity of the criteria and procedures for accessing the international climate financial resources;</li> <li>• Low public investment and private participation in the adaptation actions;</li> <li>• Lack of funding to maintain and upgrade data collection stations (meteorological, hydrological, hydrographical, air quality, among others); and</li> <li>• Slow payback of the investment in climate change adaptation actions.</li> </ul> <p><i>Technology and knowledge</i></p> <ul style="list-style-type: none"> <li>• Weak capacity to determine the cost of the losses and damages caused by the impacts and of the measures to adapt to climate change and few research and investigation actions addressing climate change;</li> </ul>

<sup>3</sup> Programme of Support to the Environmental Sector supported by DANIDA and the European Commission (Ireland)

	<ul style="list-style-type: none"> <li>• Unpredictability of the intensity and magnitude of the climate change impacts;</li> <li>• Weak capacity to design projects to access climate change financing and funds;</li> <li>• Unavailability of adaptation technologies;</li> <li>• Low capacity to measure, report and verify (MRV), including the effects of policies, strategies, plans and projects and of the availability and use of financial and technological resources; and</li> <li>• Difficulties and weak capacity to disclose knowledge about the climate change risks and actions, associated with a low capacity to manage and communicate the results of studies and projects.</li> </ul> <p><i>Political and institutional</i></p> <ul style="list-style-type: none"> <li>• Insufficient incentives to attract the participation of the private sector and civil society in developing initiatives to contribute to climate change adaptation; and</li> <li>• Weak coordination and charge of the sectors in the implementation of the approved policies, strategies and plans, due to a low ability to verify and enforce the laws and regulations associated to a weak capacity to cross-sectoral and integrated planning.</li> </ul>
6. Summary of needs	<p>To implement the INDC it is necessary to:</p> <ul style="list-style-type: none"> <li>• Operationalize the NCCAMM implementation mechanisms namely the Knowledge Management Centre, the National Climate Change Network and the Financial Mechanism;</li> <li>• Assess the capacity needs of the National Climate Change Network and elaborate and implement the capacity plan to conduct research and investigation in the relevant areas;</li> <li>• Strengthen the institutions to collect and manage data and information and create a data base about the existent studies and experts;</li> <li>• Elaborate and implement a strategy for climate change education, awareness raising, communication and public participation;</li> <li>• Assess the adaptation technology needs and formulate and implement the associated plan;</li> <li>• Update the sectoral policies to mainstream climate change adaptation and risk reduction;</li> <li>• Establish climate insurances; and</li> <li>• Build national technical and institutional capacity to design and manage projects to access climate financing.</li> </ul>

7. Monitoring and reporting progress	The government has approved the National System to Monitor and Evaluate Climate Change and this will be used to MRV the adaptation actions. This system is being tested and will be functioning before 2020 and onwards.
<b>Mitigation Contribution</b>	
8. Timetable	The INDC will be implemented between 2020 and 2030.
9. Type of contribution	<p>Implementation of Policies' and Programmes' actions:</p> <ol style="list-style-type: none"> <li>1. NCCAMS (2013 to 2030);</li> <li>2. Energy Strategy (being updated and to be approved by 2016);</li> <li>3. Biofuel Policy and Strategy ;</li> <li>4. New and Renewable Energy Development Strategy (2011 to 2025);</li> <li>5. Conservation and Sustainable Use of the Energy from Biomass Energy Strategy (2014 to 2025);</li> <li>6. Master Plan for Natural Gas (2014 to 2030);</li> <li>7. Renewable Energy Feed-in Tariff Regulation (REFIT);</li> <li>8. Mozambique's Integrated Urban Solid Waste Management Strategy (2013 – 2025)</li> <li>9. National REDD+ Strategy (in preparation and to be approved in 2016);</li> <li>10. Renewable Energy Atlas for Mozambique;</li> <li>11. Project to build and manage two solid waste landfills with the recovery of methane; and</li> <li>12. Project of Urban Mobility in the Municipality of Maputo.</li> </ol>
10. Target level	<p>Based on the policy actions and programmes outlined above, the country estimates, on a preliminary basis, the total reduction of about 76,5 MtCO<sub>2</sub>eq in the period from 2020 to 2030, with 23,0 MtCO<sub>2</sub>eq by 2024 and 53,4 MtCO<sub>2</sub>eq from 2025 to 2030. These reductions are estimates with a significant level of uncertainty and will be updated with the results from the BUR to be available by early 2018.</p> <p>The implementation of any proposed reduction is conditional on the provision of financial, technological and capacity building from the international community.</p>
11. GHG reductions	The implementation of the actions referred will limit the GHG emissions by sources and the removals by sinks at the same time as they contribute to the increase of the well being of the Mozambicans through the increase of the access to renewable energy sources and to basic sanitation services to promote the efficient use of the natural assets, reducing the

	<p>environmental degradation.</p> <p>Mozambique is willing to participate in the market mechanisms to be established which would allow access to clean technologies in order to mitigate the emissions arising from exploiting, managing and using the natural capital that is available.</p>
12. Means of Implementation	<p>Mozambique is participating in the Second Phase of the Technology Needs Assessment Project (TNA), covering the following sectors: (i) energy and waste, (ii) agriculture and (iii) coastal zones, including infrastructures. This process will result in a Technological Action Plan identifying the needs, including the financial and capacity building needs in those sectors. This information is relevant to identify the necessary means to implement the proposed actions. This exercise will be concluded by the end of 2017.</p> <p>Another relevant source of information is the ongoing process for making the National Climate Change Network operational which includes the assessment of the existing institutional and technical capacities and their needs for the implementation of the NCCAMS to formulate and implement the Capacity Building Plan, as included in the NCCAMS.</p>
13. Sectors	<p>The presently identified actions are related to energy (electricity production, transports and other – residential, commercial and institutional), land use, land use change and forestry (REDD+) and waste (solid waste disposal and treatment).</p> <p>Despite the above identified actions, the country still has potential actions in other sectors such as industry, agriculture including in the other energy sub-sectors.</p>
14. Gases	<p>The main gases covered in this contribution are: carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>) and nitrous oxide (N<sub>2</sub>O)</p> <p>In the future, other GHG may be included.</p>
15. Accounting Methodologies	<p>The IPCC Revised 1996 Guidelines for National Greenhouse Gas Inventories and the Good Practise Guidance and Uncertainty Management in National Greenhouse Gas Inventories were used to calculate the GHG emissions and removals as described in the Second National Communication and the LEAP software was used to develop emission scenarios for the INDC.</p> <p>The Global Warming Potential values used were those from the IPCC's Fourth Assessment Report and as stated below:</p> <p>CO<sub>2</sub> = 1 CO<sub>2</sub>eq  CH<sub>4</sub> = 21 CO<sub>2</sub>eq  N<sub>2</sub>O = 310 CO<sub>2</sub>eq.</p>
16. How it is equitable and adequate	<p>Considering Mozambique's historical GHG emissions, which are insignificant in the global total, the effort that the country is willing to</p>

	<p>make to create adaptative capacity and face the national challenges of reducing poverty, including those of the most vulnerable, this contribution is fair and adequate considering the ultimate objective of the UNFCCC.</p> <p>It is recognized that achieving a resilient and low carbon development can be a catalyser to reduce poverty and diminish the inequalities towards the most vulnerable. Therefore, the implementation of the INDC will include the most vulnerable communities, promoting an inclusive climate proofed development, with a higher degree of access to efficient technologies and cleaner energy sources, promoting environmental integrity and the creation of green jobs.</p>
<p>17. Institutional arrangements</p>	<p>The Institutional Arrangements established to implement and MRV the Mitigation component of the INDC are those established by the NCCAMS and operationalized by the National System to Monitor and Evaluate Climate Change. The relevant entities are the Climate Change Unit, the Knowledge Management Centre, hosted in the Science Academy of Mozambique, the National Climate Change Network, the GIIMC and the National Greenhouse Gases Inventory System (SNIGEE), already included in the National System to Monitor and Evaluate Climate Change.</p>

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**The Republic of the Union of Myanmar**

**Myanmar's Intended Nationally  
Determined Contribution–INDC**

**(25-8-2015)**



## Foreword

Climate Change is the most threatening global challenge faced by humanity. Myanmar is one of the most highly vulnerable countries in the world to the adverse impacts of climate change facing threats from extreme weather events, sea level rise, flooding and drought. Without action to adapt to these threats, the prospects for the economic development of our population of over 50 million will be hindered and our environment degraded.

With the largest standing forests on mainland South East Asia, Myanmar currently absorbs more greenhouse gases than it emits, thereby already making a significant contribution to global efforts to tackle climate change. However, we are currently in the process of rapid industrialisation and increasing urbanisation which will lead to an increase in our emissions of greenhouse gases. We therefore intend to implement a series of policies and actions to maintain the harmony between growth and mitigating climate change. This means planning the development of our economy so it takes place in a sustainable manner, whilst also confronting multiple challenges such as poverty alleviation and protecting our population against climate related disasters.

Ahead of the next UNFCCC Conference of the Parties in Paris (COP21) in December 2015, governments are preparing their Intended Nationally Determined Contributions (INDCs). INDCs are a key input to the negotiations of a new international climate agreement that will be finalised at COP21 and come into effect in 2020. By designing ambitious INDCs, countries have the opportunity to lay the foundation for a new climate agreement that sets the path towards maintaining temperature change below 2°C relative to pre-industrial levels. It is up to each country to determine an ambition level for their INDC that reflects national priorities, capabilities and responsibilities.

Myanmar is determined to play its role in the global effort and to crystallise this will into our INDC. Despite being a relatively low greenhouse gas (GHG) emitter and being a net GHG sink, Myanmar wishes to undertake a series of actions to demonstrate its commitment to climate change mitigation and highlight options for adaptation.

The development of the INDC is a nationally led process. Political guidance has been sought from the highest institutional level within the Government of the Republic of the Union of Myanmar. The Ministry of Environmental Conservation and Forestry (MOECAF) has acted as INDC focal point, facilitating the inputs from other line ministries. In accordance with relevant decisions of the Conference of the Parties to the Convention, Myanmar hereby presents its enhanced mitigation actions, policies, strategies and adaptive efforts on climate change, and wishes to contribute to making the Paris Conference agreement negotiation a great success.

H.E U Win Tun  
Union Minister

Ministry of Environmental Conservation and Forestry  
The Government of the Republic of the Union of Myanmar



# Myanmar's Intended Nationally Determined Contribution-INDC

## 1. National Circumstances

Since 2011, Myanmar has been engaged in an active process of institutional and political reform leading to democratisation, and is gearing towards rapid socio-economic change and development. As part of this process, the Government of Myanmar is putting in place the necessary legal, procedural and governance instruments while building the institutional, technical and human capacities needed to achieve sustainable development in all sectors of the economy.

Myanmar considers climate change as a major challenge to its socio-economic development and is therefore determined to play its part in mitigating global climate change, while actively adapting to its effects. In effect, the country is extremely vulnerable to the negative effects of climate change. In 2015, for the third consecutive year, Myanmar was ranked globally by studies<sup>i</sup> as the second most vulnerable country in the world to extreme weather events over the last 20 years<sup>i</sup>. Tropical Cyclone Nargis caused the loss of 138,000 lives in 2008 and devastated infrastructure, causing long-term adverse socio-economic impacts. The estimated total cost of loss and damage due to Nargis to the national economy is estimated to be over USD4bn<sup>ii</sup>. During mid-2015, Myanmar experienced floods of unprecedented proportions. Observed changes<sup>iii</sup> in the last decades include rain patterns variations that are causing climate-driven migration that affect, for instance, the socio-economic conditions of dry regions due to increased occurrences of drought. In addition, climate models predict further sustained impacts from climate change in future, which will further expose Myanmar to the negative impacts of climate change<sup>iv</sup>.

Myanmar is therefore actively engaged in designing and implementing the required policies, governance, financial and programming instruments to address climate change. In terms of policy development, the Government, for example, has made environment one of the seven strategic pillars of its National Comprehensive Development Plan (2011-30); it has promulgated the Environmental Conservation Law (2012); and it is resolute in mainstreaming environment into the national policy and development agenda. This will take place under the guidance of the National Environmental Conservation Committee and Myanmar Climate Change Alliance established by the Union government's cabinet in 2013. In addition to fulfilling its reporting responsibility to the UNFCCC, with both the Initial National Communication and the National Adaptation Programme of Action were submitted in 2012, Myanmar is now developing its National Climate Change Strategy and associated action plans. These will present a vision for achieving climate resilient, low-carbon, resource efficient and inclusive development as a contribution to sustainable development. To support this vision, Myanmar is also developing its Green Economy Strategic Framework again with associated action plans. With respect to adaptation, in 2016 Myanmar will start the elaboration of the National Adaptation Plan (NAP) to provide more detail to guide its on-going adaptive efforts.

The process of socio-economic development will likely lead to increased demand for services, products and infrastructure development, particularly in the energy, agriculture, industry, human settlements and environmental resources sectors, which may increase GHG emissions. Currently Myanmar's annual electricity consumption is only 180 kWh per capita per annum and access to electricity is relatively low, i.e. 27% in 2011-12 and 31% in 2015-16 per households<sup>v</sup>. Among other means to achieve its Millennium Development Goals (MDGs) of poverty alleviation, the Government of Myanmar wants to increase the electrification rate to 45% by 2020-21, 60% by 2025-26, and 80% by 2030<sup>vi</sup>. However, Myanmar is willing to limit the emissions through appropriate policies and development choices. With the largest expanse of tropical forest in mainland South East Asia, Myanmar is already a net greenhouse gas (GHG) sink<sup>vii</sup>.



Myanmar will require the cooperation and assistance of the international community to further its capacities to achieve socio-economic development, while containing emissions.

This INDC is Myanmar's opportunity to confirm its commitment to climate change mitigation, by pursuing the correct balance between socio-economic development and environmental sustainability. To this end, Myanmar has identified mitigation actions and policies in the primary areas of forestry and energy, complemented by supporting policies in other sectors. These actions have been selected as they will not only deliver reductions in GHG emissions, but also have significant development co-benefits. For example, actions in the forestry sector will not only preserve one of the world's most important GHG sinks, but will also prevent soil erosion and therefore reduce the risk to the population of floods and landslides.

Alongside identified mitigation actions, Myanmar would continue to increase its capacity to adapt to the negative effects of climate change. Adaptation actions in agriculture, forestry, water, infrastructure and bio-diversity, among others, are being currently implemented, while reducing risks of disasters remains a main programme and policy focus. Myanmar wishes to highlight to the international community that, while committed to making an evidence-based contribution to global mitigation efforts, the national priority is to adapt to the devastating effects of climate change.

In addition, Myanmar recognises a number of important emerging themes which are key to addressing both future emission reductions and adaptation to climate impacts, including the need for sustainable urban development; a more consistent inclusion of civil society perspectives; the empowerment of groups at risk of the short and long-term impacts of climate change, (such as children and other younger members of society); and the integration of gender considerations into climate change policy design. Ultimately, the effort to mitigate and adapt to climate change is seen as a contribution to alleviate suffering caused by climate change and enable sustainable and durable development of the poor, both in rural and urban areas.

However, as one of the world's least developed countries (an "LDC"), existing technological, financial and capacity gaps limit Myanmar's ability to achieve its vision for sustainable development while balancing socio-economic development with environmental sustainability. For this reason, Myanmar requires significant support from the international community for capacity building, technology development and transfer and financial resources to implement the actions proposed in this INDC. Once received Myanmar looks forward to developing its contribution further to the global effort to mitigate climate change while increasing its capacity to adapt to the negative consequences of climate change.



## 2. Mitigation Contribution

Myanmar would undertake mitigation actions (Section 2.1 – Mitigation actions) in line with its sustainable development needs, conditional on availability of international support, as its contribution to global action to reduce future emissions of greenhouse gases. The document also presents planned and existing policies and strategies (Section 2.2 - Institutional Arrangements and Planning for Implementation) which will provide the policy framework to implement identified actions and prioritise future mitigation actions.

### 2.1. Mitigation Actions

The actions presented below will result in significant reductions in greenhouse gas (GHG) emissions. The implementation of these actions will be contingent to a number of factors. This includes support for capacity-building, technology development and transfer, and financial resources from the international community, as well as the active participation of the national and international private sector.

The information required to estimate GHG emissions was collected and an estimate produced. However, given the deadline and the current available data, it was decided not to include the estimate in the INDC, as deemed not sufficiently reliable. Further analysis to quantify the GHG emission will be conducted as a result of the actions and strategies below, i.e. as part of the implementation plan described in Section 4. This will allow Myanmar to present projections of anticipated GHG impact assessments in future revisions of its INDC.

Action	Objective	Intended Implementation Plan
<b>Forestry Sector</b> National Permanent Forest Estate Target	By 2030, Myanmar's permanent forest estate (PFE) target is to increase national land area as forest land with the following percent of total land area): <ul style="list-style-type: none"> <li>• Reserved Forest (RF) and Protected Public Forest (PPF) = 30% of total national land area</li> <li>• Protected Area Systems (PAS) = 10% of total national land area</li> </ul>	The Government of Myanmar is following the implementation plan as set out in the <b>30-Year National Forestry Master Plan (2001-30)</b> . To develop its capacity to meet such ambitious targets, Myanmar has set about a number of activities under the plan at the national and regional level: <ul style="list-style-type: none"> <li>• In 2011, Myanmar joined the <b>UN-REDD Programme</b> (United Nations collaborative initiative on Reducing Emissions from Deforestation and forest Degradation in developing countries). The REDD+ Core Unit was established in the Ministry of Environmental Conservation and Forestry (MOECAAF), and has the task of coordinating and guiding REDD+ related actions at national level. Myanmar developed its REDD+ Readiness Roadmap in 2013 and prioritised the activities for the implementation. In 2015 a new proposal was submitted for UN-REDD Support for the Implementation of the Myanmar REDD+ Readiness Roadmap.</li> <li>• In 2014, Myanmar joined the <b>European Union's Forest Law Enforcement Governance Trade (FLEGT) programme</b> which provides capacity building on legal aspects related to forestry.</li> </ul>



Action	Objective	Intended Implementation Plan
<b>Energy Sector</b>	Actions described here are taken on both the supply and demand side of energy. Please see below for identified actions in different sub-sectors of the energy sector. The development of hydropower, depending on the case and scale, will require rigorous Environmental Impact Assessments and Social Safeguarding, to ensure sustainability. MOECA is in the process of finalizing such instruments.	
(1) Renewable energy - Hydroelectric power	Increase the share of hydroelectric generation within limits of technical Hydroelectric potential. Indicative goal - 9.4 GW by 2030	The Government of Myanmar is currently developing policies in this area, for example: <ul style="list-style-type: none"> <li>The <b>Long Term Energy Master Plan</b> (draft) which estimates that by 2030 total installed hydropower capacity could reach approximately 9.4 GWe.</li> <li>The <b>National Electrification Master Plan</b> (draft) is being developed alongside the Energy Master Plan. The Electrification Master Plan forecasts, 38% of the primary electricity generation capacity will be hydropower resource in 2030. The specific installed capacities will be confirmed once the draft policies and plans described in section 2.2 are finalised and harmonised.</li> </ul> Environmental Impact Assessment and all related tools, including social safeguards, and measurable monitoring framework.
(2) Renewable energy – Rural electrification	To increase access to clean sources of electricity amongst communities and households currently without access to an electric power grid system. Indicative goal: Rural electrification through the use of at least 30% renewable sources as to generate electricity supplies.	The Ministry of Livestock, Fisheries and Rural Development has received co-funding from a number of international development partners to develop mitigation actions in this sub-sector (such as the drafting of the <b>Comprehensive Village Development Plan</b> ). As a final result of the overall action, <b>6 million people in rural areas will have access to electricity generated by a variety of sources</b> , at least <b>30 % of which will be sourced from renewables</b> such as of mini-hydro, biomass, solar, wind and solar mini-grid technologies.
(3) Energy efficiency – industrial processes	To mitigate GHG emissions in the rapidly developing industrial production sector by:	The project “ <b>Improvement of Industrial Energy Efficiency</b> ” (Global Environment Facility (GEF) project #5321) is being carried out by the Government of Myanmar in partnership with UNIDO. The Government of Myanmar and the industrial private sector in Myanmar are providing USD13.8m towards the project which is also being supported a grant from the GEF Trust Fund (the total project



Action	Objective	Intended Implementation Plan
	<p>(a) Improving energy efficiency within the Myanmar industry</p> <p>(b) Focusing on the implementation of energy management systems compatible with the international standard ISO50001</p> <p>(c) Energy system optimisation</p> <p>Indicative goal: To realise a 20% electricity saving potential by 2030 of the total forecast electricity consumption.</p>	<p>cost is USD16.5m).</p> <p>The objective is to promote sustained GHGs reduction in the Myanmar Industry by improving policy and regulatory framework, institutional capacity building for industry energy efficiency; implementation of energy management system based on ISO 50001; and optimization of energy system in industry.</p> <p>This is an example of a project which will be carried in accordance with the <b>National Energy Efficiency and Conservation Policy, Strategy and Roadmap for Myanmar</b> which is currently being drafted (please see section 2.2 for further details).</p>
(4) Energy efficiency - Cook-stoves	<p>To increase the number of energy efficient cook-stoves disseminated in order to reduce the amount of fuel wood used for cooking.</p> <p>Indicative goal: To distribute approximately 260,000 cook-stoves between 2016 and 2031.</p>	<p>MOECAAF, as part of the <b>Comprehensive Plan for Dry Zone Greening (2001-31)</b>, has distributed approximately 286,000 cook-stoves during 2001-15, and plans to distribute an additional 260,000 cook-stoves between 2016 and 2031.</p> <p>The project falls under the <b>National Forestry Master Plan</b> and <b>National Energy Policy</b>, in order to reduce the use of wood from natural forests for cooking by 2030 (please see section 2.2 for further details).</p>



## 2.2. Institutional Arrangements and Planning for Implementation

In addition to the actions described in Section 2.1, Myanmar has and will implement a number of climate change mitigation policies and strategies, which will not only make the mitigation contributions identified above feasible, but also help to identify other mitigation actions for future implementation.

Policy Area	Objectives	Specific elements
<b>Climate Change &amp; Environment</b>	<ul style="list-style-type: none"> <li>To achieve climate resilient, low-carbon, resource efficient and inclusive development as a contribution to the overall policy for sustainable development.</li> <li>To mainstream environment and climate change into the national policy development and reform agenda.</li> <li>To strengthen the climate change related institutional and policy environment through sharing of technical knowledge and best practice, training and institutional support.</li> <li>To promote evidence-based planning and policy making through the integration of climate change mitigation experience into sub-national, state and regional development planning initiatives.</li> <li>To increase awareness of climate change at national, state and region and local level.</li> <li>To promote an economy based on green growth.</li> <li>To consistently monitor and take stock of the status of national environmental quality(i.e. through the use of standardised indicators).</li> </ul>	<ul style="list-style-type: none"> <li>The <b>National Climate Change Strategy and Action Plans</b> are under development and will be adopted in 2016. The strategy will devise the means to achieve the overall vision, and will set out a detailed implementation framework to address climate change in each sector.</li> <li>A <b>National Climate Change Policy</b> will be developed in 2016.</li> <li>The National Climate Change Policy, Strategy and Action Plan are being developed by the <b>MCCA programme</b> and MOECAAF. The programme is funded by the European Union's Global Climate Change Alliance Programme (approximately USD5m), and implemented by UN-Habitat and UNEP. The programme, which runs from 2013-17 is designed to increase awareness of climate change in Myanmar, to strengthen institutional capacity to develop policies address it, and to develop eco-system based adaptation practices. The programme is supported by a <b>Technical Working Group</b>, with representatives from all relevant ministries, cities, academia, Civil Society Organisations (CSOs) and technical partners. A <b>Climate Change Unit</b> within MOECAAF has been established to provide technical support with respect to climate change mitigation and adaptation.</li> <li>A MCCA has been established by the Union Government's cabinet, which is chaired at Ministerial level.</li> <li>The <b>Green Economy Strategic Framework</b> is under development and will be ready in 2016. The framework's development is supported by the WWF. The <b>National Environmental Policy, Framework and Master Plan (2030)</b> is also currently being developed with UNDP support and will update the <b>National Environmental Policy (1994)</b>.</li> <li>The <b>Environmental Conservation Law (2012)</b> is being implemented, and includes provisions to address climate change, as well as make provisions for <b>Environmental Impact Assessments</b> for development projects.</li> <li>The <b>State of Environment Report 2015</b> is being finalised for publication</li> </ul>



Policy Area	Objectives	Specific elements
<b>Forest Management</b>	<ul style="list-style-type: none"> <li>To decrease the rate of deforestation so that a significant mitigation contribution from the sector can continue to be realised.</li> <li>To preserve natural forest cover to maintain biodiversity and ecosystems in Myanmar</li> <li>To realize the co-benefits of the policy such as reducing soil erosion, thereby decreasing the risk of floods and landslides that may occur near rivers</li> <li>To increase the resilience of mangroves and coastal communities which are at risk of flooding.</li> <li>To increase capacity Sustainable Forest Management.</li> </ul>	<ul style="list-style-type: none"> <li>The <b>National Forestry Master Plan</b> was implemented in 2001 and will expire in 2030, upon which the next strategy will be designed and implemented. As part of implementing the Master Plan, each district in Myanmar produces a 10 year management plan so that overall goals can be met by 2030.</li> <li>In 2011, the <b>National Biodiversity Strategy and Action-Plan</b> was published as a complementary strategy to the Master Plan, and it was here that the level of ambition of increasing Protected Area Systems to 10% of national land cover was made.</li> <li>In the catchment areas of rivers, streams, lakes and dams, forest plantations, agroforestry practice, community forestry have been done and also to reduce soil erosion, contour bunds, sediment trapping dams, conserving natural springs and bioengineering measures are being done.</li> <li>Developing a coastal zone management plan to effectively conserve terrestrial and under water resources including mangrove forests. Also cooperating with international organizations providing technology and funding to reduce the risk of climate related disaster risk for local communities. The National Strategy Action plan (NSAP, 2015) has been published as well.</li> <li>Myanmar joined the UN-REDD Programme in November 2011, submitted its REDD+ Readiness Roadmap document in 2013, and developing country programme and taking actions in line with the REDD+ roadmap.</li> </ul>
<b>Energy</b>	<ul style="list-style-type: none"> <li>To achieve the optimal level of renewable sources in the primary energy fuel supply mix.</li> <li>To increase the understanding of the potential of renewable power in Myanmar's future growth plans of the National Energy Management Committee, to support the preparation of sustainable policies and strategies in the energy sector and assist in the formulation of a long-term Energy Master Plan.</li> <li>To realise a 20% electricity saving potential by 2030 of the total forecast electricity consumption.</li> </ul>	<ul style="list-style-type: none"> <li>The <b>National Energy Policy (2014)</b> is the overarching national policy which provides the framework for energy development and planning in Myanmar.</li> <li>The <b>Long Term Energy Master Plan</b> is in the final stage of drafting and is expected to be approved by the end of 2016.</li> <li>The <b>National Energy Efficiency and Conservation Policy, Strategy and Roadmap for Myanmar</b> draft is finalised and is expected to be approved in 2015.</li> <li>The <b>National Electricity Master Plan</b>, draft is finalised. It aims to harmonise the medium and long term decisions on primary energy source selection and transmission system planning.</li> </ul>



Policy Area	Objectives	Specific elements
<p><b>Other key sectors</b></p>	<ul style="list-style-type: none"> <li>• Rural electrification through the use of at least 30% renewable sources as to generate electricity supplies.</li> <li>• To reduce the increasing rate of GHG emissions and air pollution caused by the <b>transport sector</b>, especially from road transport.</li> <li>• To ensure that increasing <b>urbanisation</b> takes place in a sustainable manner.</li> <li>• To mitigate emissions, generate power and reduce pollution from non-recyclable <b>waste</b>.</li> <li>• To mitigate GHG emissions from the agriculture sector from <b>combustion of agricultural residues and growing rice</b> in paddy fields.</li> </ul>	<ul style="list-style-type: none"> <li>• The <b>Myanmar National Rural Development and Poverty Alleviation Programme</b> includes a <b>Rural Electrification Plan</b> which is currently being drafted and expected to be finalised in 2017.</li> <li>• Policies such as the <b>National Transport Master Plan and National Implementation Plan on Environmental Improvement in the Transport Sector</b> are being developed. Cities, like Yangon, are studying options for sustainable transport development for example, and CSOs are engaged in proposing solutions to challenges for implementation</li> <li>• To promote sustainable urbanisation, the Government of Myanmar is drafting a National <b>Urban and Regional Development Planning Law</b>, a <b>National Housing Policy</b>, <b>National Urban Policy</b>, and is <b>expanding its urban planning capacity</b>. Approximately 75 township-level planners are being trained to achieve policy goals, they are the first in Myanmar to receive such training.</li> <li>• The <b>National Waste Management Strategy and Action Plans</b> are currently being developed and are expected to be completed in 2017.</li> <li>• The <b>Ministry of Agriculture and Irrigation is researching</b> alternative wet and dry paddy production techniques. This is an example of how Myanmar is resolving the need to mitigate climate change whilst also adapting to it. To reduce GHG emissions from the burning of crop residues in fields, the Ministry of Agriculture and Irrigation is implementing effective mitigation actions such as energy from crop residues, promoting the use of organic fertilisers, and methods to shorten the time of composting agricultural by-products. The bio-char program is also being planned and will reduce GHG emissions to atmosphere as a result of less anaerobic decomposition in the production process. At the same time, this will increase crop production.</li> <li>• Research and development is vital to find the means and methods of reducing GHG emissions from agriculture sector. To perform the systematic research necessary Myanmar requires the support of technical experts, access to tools and relevant apparatus. Technology transfer and assistance from experienced countries will therefore be required. The major requirement for research works related to GHG emission reductions will be considered and prioritised in Myanmar's national comprehensive development strategy.</li> </ul>



## 2.3 Fair and Ambitious

As set out in Myanmar's Initial National Communication, due to its rich forest land, Myanmar is a net GHG emissions sink. It is therefore already providing a positive contribution to the global fight against climate change. Despite this, Myanmar is facing the serious negative impacts of climate change caused by industrialised nations. Myanmar now wishes to develop its economy, but without measures to address emissions in the future, economic growth may affect its status as a net GHG sink in the years to come. Myanmar is therefore committed to take the actions set out in this INDC in order to limit growth of its future GHG emissions and by doing so to create harmony and balance between economic development and environmental sustainability.

Myanmar has for example been implementing the National Environmental Policy since 1994. A series of strategies are also under development including the National Climate Change Strategy, a National Energy Master Plan, an Energy Efficiency Strategy and a Green Economy Green Growth Strategy. As the National Environmental Policy stipulates, development activities must integrate environmental considerations in order to achieve harmony and balance between socio-economic development and environmental sustainability. Continued development of such strategies will help in the identification and planning of climate change mitigation and adaptation projects and policies in the future. Myanmar is already implementing projects that will inform these strategies (e.g. in the industrial energy efficiency sector) which will result in significant direct emissions reductions and indirect emissions reductions through demonstrating technologies and processes.

This is the first time Myanmar has offered a mitigation undertaking under any UNFCCC process and given its LDC status and low contribution to global emissions, the contents of this INDC are considered to be a fair and ambitious contribution to global action on climate change.

## 3. Adaptation

### 3.1 Rationale for Adaptation

As a consequence of its geographic location and characteristics, Myanmar is inherently exposed to severe natural weather events, which have been increasing in intensity and frequency over the last sixty years. Being located in the centre of the southwest monsoon area of South East Asia, heavy-rain induced floods occur in many parts of the country which is crossed by large river systems and the Delta. The nation's coastal area covers more than 50% of the entire eastern side of the Bay of Bengal and the Andaman Sea and is therefore particularly prone to cyclones and associated strong winds, heavy rains and storm surges. Droughts are frequent, particularly in central Myanmar. Importantly, the largest part of the total 51.4 million population (2014 census) is concentrated in the Ayeyarwaddy basin area, so it sustains many significant socio-economic sectors and many livelihoods. The population is concentrated in two main areas: the Delta area (~50,400 km<sup>2</sup>) which is most exposed to recurring tropical storms, cyclones and floods and potential storm surge, and the 'Dry Zone' area, which is exposed to chronic droughts. In 2014, 70% of the population that resided in rural areas and depended on rain-fed agriculture, livestock and fishery and forest resources. According to the National Implementation Report of the Department of National Planning in 2012-13, the agriculture sector contributed 32.9% of national GDP. The livelihood of rural communities and the productivity of the agricultural sector as a whole are therefore largely influenced by climate conditions in these areas.

The economy of Myanmar and its society is therefore highly sensitive and vulnerable to climate change, climate variability and natural disasters. Adaptation to the changing climate is a priority. However the capacity to reduce risk and mitigate the effects of climate change is limited due to lack of technical, human resources, financial and legislative processes. This results in significant loss and damage, hampering the process of national development.



Myanmar's population recurrently suffers from loss of life and damage to infrastructure as a result of climate related disasters. Climatic changes have been recorded in the last six decades and they include increased temperatures, changes in total rainfall (increasing in some regions and decreasing in others), decreases in the duration of the south-west monsoon season as a result of late onset and early start times, and increases in the recurrence and severity of extreme weather events, such as floods, cyclones and droughts. Importantly, models predict ever more extreme changes in temperature, drought periods, changing rainfall patterns, increased risk of flooding, cyclones and strong winds, flood/storm surges, intense rains and sea-level rises along the nation's significantly long coastline by 2100. In line with vision (as stated in section 1 - National Circumstances section), Myanmar, after cyclone Nargis in 2008, has consistently invested in improving national capacity to respond to and recover from such disasters by reconstructing in a sustainable manner which will mitigate future loss and damage. However, the dimension and scale of the challenges to achieve sustainable rehabilitation are beyond the nation's current capacity. Myanmar therefore requires continuing support in this regard. The nature of support from international community has been elaborated under section 5 – Means of Implementation.

### **3.2 Priorities for Adaptation and Emerging Issues**

Increasing climate-induced hazards, significant exposure and vulnerabilities to climate change, make adaptation and disaster risk reduction (DRR) a priority for the country. In 2012, Myanmar identified short, medium and long-term priority actions in the sectors of: i) agriculture; ii) early warning systems; iii) forestry; iv) public health; v) water resources; vi) coastal zone; vii) energy, and industry; and viii) biodiversity by adopting the National Adaptation Programme of Action (NAPA). Within these sectors, the NAPA establishes four priority level sectors:

1. First priority level sector: resilience in the agriculture sector, developing early warning systems and forest preservation measures
2. Second priority level sector: public health protection and water resource management
3. Third priority level sector: coastal zone protection
4. Fourth priority level sector: energy and industry sectors, and biodiversity preservation

In addition, since 2011 the rapid institutional, technical, financial context has evolved and new issues are emerging. Among those, the need to communicate and inform effectively at all levels (primary education, public opinion, policy makers), the need to make fast-growing cities resilient, and to further upscale the achievements in the disaster risk reduction area need to be addressed.

Planning and prioritisation capacity is also developed under the Myanmar Action Plan on Disaster Risk Reduction (MAP-DRR, 2012) and the Disaster Management Law (2013).

### **3.3 Current and Planned Adaptation Efforts**

In line with the priorities established by the NAPA, and considering priorities that are emerging, the Government of Myanmar is implementing a series of actions both at the policy, legal and programme level. These actions will facilitate adaptation to climate change in the short, medium and long-term, through both its national budget and with international support. The list of all actions identified is not listed of this document. Instead, this INDC capture several examples of actions which demonstrate the determination of the country to adapt to climate change and to reduce risks of disasters, as follows:

1) Sectoral actions: Ministries are streamlining adaptation to climate change in their planning. The agriculture sector is implementing climate smart agriculture approaches through implementation actions such as legume crops diversification, measures in the agro-forestry sector and systematic control of soil quality and irrigation water. In addition, Myanmar is working to reduce climate change vulnerability and reduce poverty in rural areas and for subsistence farmers as a priority. Crop varieties are being researched with the involvement of universities, research institutions and local communities across the country for example. For instance, research is being carried out on the resilience of rice varieties' resilience to drought, flood tolerance, salt tolerance and into alternative varieties that are resistant to



pests and disease. Another important on-going project is “Addressing Climate Change Risks on Water Resources and Food Security in the Dry Zone of Myanmar” (funded by the Adaptation Fund and implemented by UNDP with line ministries, CSOs, communities and other stakeholders). In the livestock sector, actions have been taken in the recovery stages of areas affected by climate change through livestock management, loans for farmers, animal feed management research and provision of training to minimise risk of disease. The responsible ministry implement those activities within their own budget as well as with international support and co-operation with national non-governmental organisations (NGOs), international non-governmental organisations (INGOs) and the private sector. In the forestry sector, project examples include restoring degraded and sensitive forest areas through community based reforestation and enhancing rural livelihoods in degraded watershed areas, coastal areas and northern hilly regions. Specifically, Myanmar is implementing projects such as the *Rehabilitation and Restoration of Degraded Land and Reserved Forest through Community Participation, To Contribute to Climate Change Resilience and Socio-Economic Development of Local Communities Living the Central Dry Zone of Myanma*. A further example is the *Project for Mangrove Rehabilitation Plan for the Enhancement of Disaster Prevention in Coastal and Delta Areas*. With respect to early warning systems, projects include assessing the hydrological impact of climate change on river systems and developing flood and drought early warning systems for reducing the vulnerability of local communities to extreme weather events. End-to-end early warning system capacities are being developed with the assistance of international expertise. The Monsoon Forum is organised yearly to provide updates on forecasted data. Technical and financial resources in Myanmar today limit the extent in which data is collected, analysed and used however. Assistance to increase capacity in this area is therefore required. An Emergency Operation Centre (EOC) is being established to upgrade the response capacities to disasters. Among other issues which are being addressed include a focus on townships planning for adaptation. Eco-system based approaches to adaptation at township level will be tested during the course of 2016-18, including a vulnerability analysis of the following elements: urban planning, infrastructure development, environmental risk and livelihood patterns. This will be followed by implementation of solutions to identified issues. Adaptation activities are also being conducted in the water sector, with projects on water way improvement to reduce flooding, improving the control of the transportation of commodities and on river bank erosion. Small-scale infrastructure to reduce risk of reduction is also being promoted, with construction of cyclone shelters in coastal areas for instance.

2) Policy and legal instruments: The National Climate Change Strategy and associate action plans (to be approved in 2016), with its associated Capacity Development Assessment, will be used to enable adaptation to be featured into ministerial programming and planning. Existing tools include the Myanmar Action Plan on Disaster Risk Reduction (MAPDRR, 2012) currently being revised with the support of DRR partners, as well as the Disaster Management Law (2013). A Disaster Risk Reduction Working Group (DRR-WG) was formed in 2008 during the early recovery phase of cyclone Nargis, and is increasingly active with a diverse network of agencies working to increase capacity for DRR in Myanmar (over 60 members). Based on the Law of Protection of Farmers’ Rights and Enhancement of their Benefits (2013), farmers are entitled to receive assistance and the Ministry of Agriculture and Irrigation will provide assistance when affected by disasters. The National Water Resource Committee was formed in 2014 and the Water Policy (2014) and associated water directives were adopted. The Ministry of Construction is working to develop Myanmar specific national building codes with international support. An integrated water resource management strategy is now also being developed. The Forest Department within MOECAF is focusing on the sustainability of watersheds and to prevent sedimentation inside dams and reservoirs by drafting a National Watershed Management Policy (2014) and formulating Action Plans for establishing watershed plantations in watershed areas of major dams, reservoirs and water sources. Approaches on eco-system based adaptation are being explored, for instance by the UNDP and by MCCA programme with MOECAF.



3) Capacity-building, education, awareness and communication: Myanmar is in the process of establishing a Disaster Management Technical Centre to provide technical support on disaster management to ministries, sub-departments and other institutions at regional, state and lower administrative levels. The Ministry of Education is also including disaster risk reduction and climate change concepts and practices in school curricula and learning materials to achieve long-term positive impacts. The government, through the MCCA programme, will facilitate a communication campaign with media, working with CSOs and other stakeholders to increase broadcasts and news on climate change and production of awareness materials throughout 2016-17. The government is also increasing awareness and actions to mitigate health risks related to the negative impacts of climate change, including for example seasonal information on vector borne diseases using national media channels.

Myanmar is benefiting from major programmes, such as the BRACED project (£5m, 2015-18) funded by the UK's Department of International Development (DFID), a consortium of INGOs and UN partners, which aims at increasing resilience of communities to disasters in Myanmar. The projects funded by Adaptation Fund and Global Environment Facility will also have major impacts in vulnerable regions, as well as the already mentioned MCCA programme.

### **3.4 Requirements for Additional Planning, Financial and Technical Capacities**

The information above illustrates the attention given by Myanmar to adaptation, but more support and action is required. The NAPA highlighted priorities which the Government of Myanmar and partners are consistently implementing in the area of climate change adaptation and disaster risk reduction. Two elements should be considered. Firstly, priorities level sectors established under NAPA need to be elaborated under the framework of an overall adaptation plan, including the costing and monitoring framework that highlights the roadmap to resilience. Secondly, Myanmar requires sizeable support in terms of capacity-building, technology development and transfer, and financial support for effective implementation as the existing efforts are inadequate.

With respect to institutional capacity building, the MCCA programme is supporting mainstreaming of climate change in various sectors, analysing gaps and promoting training. This action itself will require more coordinated support, with an actionable monitoring and evaluation systems, and close coordination among development partners.

Capacity-building is also required in all sectors, to increase the ability to devise and implement adaptive solutions in all key sectors such as forestry, agriculture and early warning systems. Myanmar calls on the international community to continue supporting the development of capacities to achieve self-sustained adaptation as soon as is practically possible. A major obstacle continues to be access and availability of technologies. This is particularly true, for instance in the area of climate data analysis and short to long-term forecast, i.e. lack of advanced computing facilities to enable accurate warning and information and scenarios.

The needs to achieve the goals of the adaptation actions identified, as well realize the intended mitigation actions listed above contribution are described in more detail in Section 5 of this INDC.

Finally, Myanmar is budgeting for adaptive actions in all sectors with the national budget. However, the scale of the adaptation effort, considering the current level of capacities, and the trend of worsening changes in climate, means major support and investment is required. Investments, both from the Private and Public International Cooperation will be oriented for capacity building and technology development and transfer.

### **3.5 Ensuring Monitoring of Adaptation Efforts**

Given the evolving national and climate context and increasing challenges, Myanmar requires further planning to expedite progress and put a cost to the overall effort. A stock-taking exercise is planned by MoECAAF with UNEP in September 2015, which will constitute the basis for updating priorities and support advanced planning. A National Adaptation Plan will be developed too, to respond to these needs



starting from 2016. Myanmar will develop appropriate mechanism for monitoring of climate vulnerability, funds allocated for adaptation and the results of adaptation actions. However Myanmar requires the support of the international community in improving its planning and monitoring for adaptation efforts., and to implement priorities which may be re-prioritised.

## 4. Implementation of the INDC

### 4.1 Planning Process for Producing the INDC

The development of the INDC is a nationally led process. Political guidance has been sought from the highest institutional level within the Government of the Republic of the Union of Myanmar. MOECAF has acted as INDC focal point, facilitating the inputs from other line ministries. The INDC has been prepared through the review of key documents and a government drafting and validation process with all line ministries, which included: one kick-off meeting in March-April 2015, which highlighted priority areas; three interministerial consultations between April and July 2015 (which refined possible options), and a final validation workshop in August 2015. In addition, specific advanced technical meetings were conducted in priority sectors such as the Ministries of Environmental Conservation and Forestry; Energy, Electric Power, Rail Transportation, Transport, Agriculture and Irrigation, Science and Technology, Social Welfare, Relief and Resettlement and Industry. Following the consultation process a final round of ministerial consultations was carried out by MOECAF before the INDC was submitted to the Union Government' cabinet for approval before submission to the UNFCCC. MOECAF also worked with the MCCA for technical facilitation of the process.

Technical assistance for the development of the INDC has been received from the UK Foreign and Commonwealth Office and delivered by Ricardo-AEA Ltd of the UK, and MCCA. Financial support by the Global Environment Facility via the UNEP and technical advice provided by UNEP-DTU partnership was also received to facilitate the preparation of the INDC.

### 4.2 Implementation Plan

Five main aspects are crucial for successful implementation of the INDC, and international support is required for each aspect. The first is the development of a clear strategy and co-ordination plan which assigns responsibilities and sets deadlines for activities. The second and third, are separate needs assessments for mitigation and adaptation activities respectively which have to be carried out to identify specific requirements and gaps in technology, finance and to identify capacity building requirements in both areas. This has been detailed out in section 5 - Means of implementation. Fourth, mobilising resources for policy development, identification and purchase of suitable technologies for planned actions will be required. Implementation of projects can then begin and finally the fifth aspect of the plan will need to be implemented; a monitoring system will assist with the implementation of the plan at many stages, as outlined below.

A costing exercise including considering short, medium and long term priorities will be conducted to ensure the implementation plan has the necessary resources to deliver on intended contributions, intended actions and future policy development. The coordination of different ministries and stakeholders will be needed at all stages to successfully implement the plan.

Therefore, for implementation, the following activities will be necessary:

- The Union Government's cabinet will identify and mandate one of the existing national inter-ministerial committees to supervise and foster the implementation of the INDC. This may be the National Environmental Conservation Committee or National Energy Management Committee for example.
- Under this arrangement, MOECAF should serve as focal-point for coordination with the guidance of the selected national committee. MOECAF will assist relevant ministries to identify what is



needed to implement identified mitigation and adaptation actions, as well as to develop Myanmar's ability to attract climate finance. MOECA's role will also be to assist with the monitoring of the progress achieved by the line ministries in charge of the respective proposed actions and sectoral strategies outlined in the INDC.

- Myanmar would like to put in place a monitoring framework so that the selected national committee, through its ministry focal-point, will be able to further define financial and technical means of implementation most accurately, to measure progress on a regular basis and to issue policy guidance to the respective line ministries as needed. Myanmar recognises that high quality Measurement, Reporting and Verification-MRV system is the cornerstone of project management as it demonstrates progress against plans, allows responsible entities to steer activities to achieve set policy goals and provides valuable lessons for improving future design and implementation of activities. The set-up of an MRV system for Myanmar's INDC implementation will require the clear allocation of responsibilities, e.g. to the implementing agency concerned, the building of capacities within the relevant agency and relevant stakeholders providing data or performing other MRV activities is also necessary. The set-up of clear processes for data collection, evaluation, quality assurance and quality control, reporting and documentation/ archiving. These activities will require international support in the form of capacity building and financing. Where possible, Myanmar will use existing institutional structures, capacities and processes as a basis for this MRV system.
- The MRV system will have to include a component on costs and financial analysis. For this to be developed, Myanmar requires financial and technical assistance in order that the MRV system can efficiently, effectively and economically:
  - Update and provide financial data to support of the Ministry of Finance and the relevant line-ministries responsible for implementing identified actions
  - Collect information to provide updates on project progress on a regular basis, by establishing clear and straightforward reporting procedures for the line ministries in charge of the policies and actions which fall within their mandate to develop
  - Make the process of completing UNFCCC National Communications and other data requests with respect to emissions data a more efficient and accurate process
  - Provide analysis of observed changes in climate, as well as providing data for the update of models and projections for projects implemented with domestic resources and / or international partnerships
  - Can continue to improve collection of sectoral data and other key information.
- In addition, the development of the National Climate Change Strategy and its associated action plans will provide a platform for the coordination of stakeholders involved in the implementation of the INDC.
- Concerning adaptation, a National Adaptation Plan (NAP) will be developed to plan, cost, and guide actions to meet adaptation objectives and priorities. The NAPA implementation will be continued as planned in the document submitted to the INDC.

## 5. Means of Implementation

As an LDC, Myanmar requires further capacity-building along with access to technological and financial support from the international community to implement the INDC. In order to realise the intended mitigation contribution set out above and meet the nation's needs with respect to adaptation, Myanmar requires a significant amount of international support. The success of the mitigation and adaptation activities in Myanmar is wholly dependent on receiving sufficient technology-transfer, capacity-building and financial support from developed and more experienced countries, international agencies, donors, and the wider international community.



As defined in Myanmar's Initial National Communication, the NAPA and other documents related to climate change in Myanmar, support is required as follows:

**Technology Development and Transfer.** A preliminary Technology Needs Assessment (TNA) was completed by MOECAAF as part of the preparation of the Initial National Communication. There is a clear need for the transfer of Environmentally Sound Technologies (ESTs) such as renewable energy and energy efficiency technologies for mitigation and flood control technology and early warning technologies for adaptation. Myanmar's technology development and transfer needs also include technologies and skills transfer which support the implementation and operation of ESTs such as those that ensure the operation, repair and maintenance of ESTs. The understanding of technology development and transfer needs in Myanmar is still developing and an additional TNA should be completed with international support to better understand these requirements. Particularly in the energy sector, Myanmar needs to develop its knowledge, understanding and gain further access to technology that can support goals. Other examples would be the increased use of meteorological modelling technologies as these can help with the planning of renewable which are dependent on seasonal conditions, and also reduce the impact of extreme weather events by improving weather forecasting.

**Capacity-building.** Mitigating climate change and adapting to its impacts will require significant capacity building in all aspects of Myanmar's plans to implement actions identified in the INDC. Further, capacity building will help in the capturing of lessons learned so future policies and actions can be designed and implemented with maximum effect and efficiency. Human resources, scientific research, technical and institutional capacities all require development and international assistance is an important requirement in order that this can be achieved. The Initial National Communication highlighted that further work is required to develop an understanding of the specific capacity-building needs in the above mentioned areas. In addition, and of great importance, is the fact that Myanmar's current capacity with respect to MRV is at a very primary stage. As a consequence, there is limited reliable data to support the attraction of finance and calculate emission reductions. There are various stages of the MRV capacity building process but Myanmar will require international support at each step. Whilst the end goal may be a national greenhouse gas inventory system, this will most likely take years to develop. The first steps are likely to be readiness assessments, personnel and institutional capacity building and also sector level MRV system design.

**Financial Support.** Myanmar needs sufficient and sustained financial assistance across its climate change agenda. Myanmar strongly favours support from the international community in the form of targeted and systematically implemented new funds for LDCs such as the GCF. Increased co-ordination of financial support for mitigation and adaptation measures, outreach programmes and activities, and long-term research projects will make Myanmar's goals more likely to be realised, therefore Myanmar wishes to work closely with such funds to ensure financial support is used effectively. Myanmar also intends to build its capacity to effectively and efficiently participate in future market based mechanisms.

Financial support will first need to be determined by completing a detailed costing estimate in the very short term. It is envisaged that financial support will be utilised by Myanmar in a variety of ways including but not limited to:

- Financial support required for the Technology needs assessment for mitigation and adaptation activities, financial need assessment for estimation of implementation and operational and maintenance cost, identification of need assessment for capacity building for implementation and monitoring of mitigation and adaptation activities,
- Implementing identified actions in the forestry sector (e.g., forest assessments, reducing and stopping deforestation, rehabilitation of degraded forest lands, reforestation, forestry sector specific MRV and implementation of REDD+ projects,



- Implementing identified actions in the energy sector. For example clean technology development, implementation of technologies, making the use of ESTs financially viable for end users and the private sector,
- Addressing financial needs of the other key sectors which are emerging such as sustainable transportation, urbanisation, waste management and agricultural practices
- Development and implementation of other sectoral and eventually national MRV systems for monitoring of actions, producing GHG emissions inventories, quantifying development co-benefits, accounting for funds received,
- Reduction in vulnerability for example by setting up more effective early warning systems and increasing preparedness for disaster risk reduction,
- Recovering from damage already caused by climate change, e.g. rehabilitation of degraded forests and restoration of local ecosystems for people affected due to extreme weather events.

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<sup>i</sup> Global Climate Risk Index 2015, *Who Suffers Most from Extreme Weather Events? Weather-Related Loss Events in 1994 to 2013* and in 2013, Germanwatch and V.

<sup>ii</sup> *Union of Myanmar Post Nargis Joint Assessment*, US Centers for Disease Control and Prevention, United Nations, World Health Organization, *Union of Myanmar Post Nargis Joint Assessment*

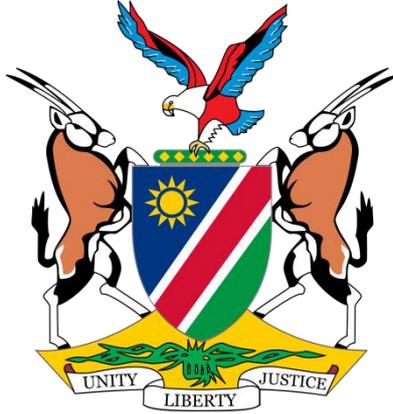
<sup>iii</sup> *National Adaptation Programme of Action (NAPA) 2012*, UNEP with the Department of Meteorology and Hydrology, Ministry of Transport, Republic of the Union of Myanmar, page 26

<sup>iv</sup> Cit. NAPA 2012, PRECIS Model still to be validated, page 28

<sup>v</sup> Myanmar Census 2014

<sup>vi</sup> National Energy Policy, The Republic of the Union of Myanmar, National Energy Management Committee, 2014

<sup>vii</sup> Initial National Communication, 2012



**REPUBLIC OF NAMIBIA**

**Intended Nationally Determined  
Contributions (INDC) of  
The Republic of Namibia  
to the United Nations Framework  
Convention on Climate Change**

**September 2015**

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## List of acronyms and abbreviations

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°C	Degrees centigrade
AFOLU	Agriculture, Forest and Other Land Use
a-INDC	Adaptation INDC
BAU	Business As Usual
CCU	Climate Change Unit
CH <sub>4</sub>	Methane
CIA	Central Intelligence Agency
CO <sub>2</sub>	Carbon dioxide
CP or COP	Conference Of Parties
CSO	Civil Society Organisation
DSM	Demand Side Management
eq	Equivalent
GCM	Global Circulation Model
GDP	Gross Domestic Product
Gg	Gigagram
GHG	Greenhouse Gas
ha	Hectare
INDC	Intended Nationally Determined Contribution
IPCC	Inter-Governmental Panel on Climate Change
IPPU	Industrial Processes and Product Use
km	kilometre
M	Million
MET	Ministry of Environment and Tourism
m-INDC	Mitigation INDC
N <sub>2</sub> O	Nitrous oxide
NAI	Non Annex I
NAMA	Nationally Appropriate Mitigation Action
NAP	National Adaptation Plan
NCCC	National Climate Change Committee
NGO	Non-governmental Organisation
NPC	National Planning Commission
UNFCCC	United Nation Framework Convention on Climate Change
US\$	United States Dollar

# INDC of the Republic of Namibia to the UNFCCC

## Preamble

Namibia as a Non-Annex I Party to the UNFCCC does not have commitments under the Convention. However, Namibia takes climate change issues seriously and the submission of the INDC is a clear testimony that the country is committed to fight climate change. To this end, Namibia has put in place policies and strategies to deal with the adverse impacts of climate change. We see climate change as a major threat to the economic development and the general welfare of the Namibian society.

Implementation of this INDC will represent a major challenge to the government of Namibia. Multiple shortcomings and constraints will have to be overcome while fulfilling the needs for systemic, Institutional and human capacity building, access and transfer of the latest environment friendly and clean production technologies, mitigation techniques and sufficient financing in a timely manner for smooth and successful implementation of the INDC. It is thus of vital importance that the Green Climate Fund be capitalised rapidly in order to provide the much needed funds to developing countries to enable them to meet their intended targeted contribution. The cost of implementation of the INDC components of Namibia will require about US\$ 33 billion at 2015 prices.

In spite of the country's socio-economic development being constrained by various factors, Namibia is already unconditionally contributing a share of its resources to combat climate change. This is expected to be about 10% of the INDC requirements in the future. Therefore, the implementation of this INDC is fully conditioned to the provision of the differential 90% of means of implementation required such as finance, technology transfer and the associated capacity building from Annex1 Parties as stipulated under Article 4 of the UNFCCC.

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## Summary

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In conformity with decisions 1/CP.19 and 1/CP.20 of the Conference of the Parties, the Republic of Namibia has to submit its Intended Nationally Determined Contributions (INDC) to the United Nations Framework Convention on Climate Change towards achieving the ultimate objective of the Convention as set out in Article 2 before the 01 October 2015. Namibia is thus pleased to submit its contribution towards meeting this objective along with information to facilitate clarity, transparency and understanding of its INDC.

The preparation of the INDC report focused mainly on existing policies, strategies and action plans developed and currently being implemented. In the preparation of this report, we prioritised and favoured options from the very broad possibilities that exist for both mitigation and adaptation, as well as the most attractive ones, on the basis of their potential for successful adoption at national level. Some of these actions will yield positive results in both mitigation and adaptation areas while benefiting other sectors of the economy at large.

Namibia, as a responsible Party, has showed the willingness to tackle climate change in support to international efforts and has already unconditionally embarked on mitigating GHG emissions. The country is geared towards a progressive decoupling of carbon emissions from economic growth to match the low carbon pathway embedded in its policies and strategies. Namibia is now presenting its ambitious potential contribution to reduce its emissions while also increasing its sinks conditional on

Namibia aims at a reduction of about 89% of its GHG emissions at the 2030 time horizon compared to the BAU scenario. The projected GHG emissions to be avoided in 2030 is of the order of 20000 Gg CO<sub>2</sub>-eq inclusive of sequestration in the AFOLU sector and compared to the BAU scenario

the support of the international community.

The contribution will be economy-wide and addresses the IPCC sectors Energy, IPPU, AFOLU and Waste. The reference is the Business As Usual (BAU) scenario to the 2030 time horizon based on the GHG inventory of 2010 and socio-economic projections (Table below).

Year	2010	2020	2030
Emissions (Gg CO <sub>2</sub> -eq)	-1339	12 441	22 647

Mitigation will be achieved in all sectors and the major contributor will be the AFOLU sector as depicted below.

Sector	Mitigation potential (Gg CO <sub>2</sub> -eq)	% BAU scenario in 2030
Energy	1301	5.7
IPPU	36	0.2

AFOLU	18 513	81.7
Waste	205	0.9
<b>Total</b>	<b>20 054</b>	<b>88.6</b>

The measures contributing to mitigation in the different sectors are provided in the table below.

Measure	GHG amount	% of BAU scenario in 2030
<b>ENERGY</b>		
Increase share renewables in electricity production from 33% to 70%	740	3.3
Increase energy efficiency and DSM	51	0.2
Mass transport in Windhoek, car and freight pooling	510	2.3
<b>IPPU</b>		
Replace 20% clinker in cement production	36	0.2
<b>AFOLU</b>		
Reduce deforestation rate by 75 %	13 537	59.8
Reforest of 20 000 ha per year	1779	7.9
Restore 15 M ha of grassland	1359	6.0
Reduce removal of wood by 50 %	701	3.1
Afforest 5000 ha per year	578	2.6
Plant 5000 ha of arboriculture per year	358	1.6
Fatten 100 000 cattle heads in feedlots	201	0.9
Soil carbon	180	0.8
<b>WASTE</b>		
Transform 50% MSW to electricity and compost	205	0.9

Emissions already avoided unconditionally by Namibia prior to 2010 are included in the BAU scenario. In 2010 reductions of the order of 162 Gg CO<sub>2</sub>-eq was achieved unconditionally through government funding and this is estimated to exceed 216 Gg CO<sub>2</sub>-eq in 2015. This emission reduction will result from investments made through the Solar Revolving Fund, the commissioned hydro generation plant of Ruacana and other DSM measures being implemented and planned. This unconditional share will represent about 10% of the mitigation potential when taking into consideration implemented and planned measures up to 2030.

The global goal is to meet the ultimate objective of the Convention namely, *the stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system* and limit global warming to below 2°C and Namibia is willing and strongly committed to contribute its fair share in this global objective. This is so despite the fact that the country is already operating with low emissions compared to the developed countries. Namibia aspires to continue its development for improving the welfare of its population while reducing poverty index, increase food security, eliminate societal inequalities, guarantee access to safe water and health, empower and educate all citizens.

## Facts about Namibia

- Percentage contribution in Global emissions – 0.059% in 2010
- Per capita emissions decreased from 0.0146 Gg CO<sub>2</sub>-eq to 0.0130 Gg CO<sub>2</sub>-eq from 2000 to 2010
- GDP production increased from about US\$ 200 to 300 per unit emission

Considering the above facts, Namibia therefore considers its INDC as fair, equitable, ambitious and adequate, given its development status and national circumstances.

Subject to provision of appropriate resources after the submission of the INDC, Namibia will strengthen its systemic, institutional and human capacities for the successful implementation, monitoring and reporting on its INDC. Namibia will need the support of the international community to overcome existing barriers, for the appropriation of technologies for both mitigation and adaptation, a sustained capacity building programme in the prioritized areas, technical support and funding to the tune of some 33 billion US\$. This enhanced Measuring, Reporting and Verification framework will better track progress and outcomes of the INDC activities, which will be reported in the National Communications and Biennial Update Reports regularly submitted to the secretariat.

Some of the other prerequisites for a successful and quick implementation of the INDC that the country will ensure are:

- Political stability;
- Good governance;
- An independent efficient judicial system;
- Appropriate legislation;
- Provision of incentives; and
- Implementation of robust awareness campaigns

The present existing structure for the implementation of climate change activities will be adopted for the INDC. The multi-sectoral NCCC will oversee the implementation and coordination of sector-specific and cross-sectoral INDC activities while also providing advice and guidance on them. The NCCC will report to Cabinet through the NPC while the Parliamentary Standing Committee on Economics, Natural Resources and Public Administration which usually advises Cabinet on relevant policy matters will do so for the INDC also. The MET, which is responsible for all environmental issues in the country and is also the National Focal Point to the UNFCCC will report on INDC activities to the UNFCCC. Met will also monitor, track and follow COP decisions on INDCs, including funding possibilities and transmit these to the concerned institutions. Sectoral activities will rest with the respective Ministries through their concerned Directorates.

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## National Circumstances

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### National development goals and priorities

Namibia is still a young nation having obtained its independence since only a quarter of a century. The country is still setting a robust base for economic development to meet the aspirations of its people while meeting the international agenda. In this context, Namibia is signatory to numerous Conventions and is striving to maintain climate change as a priority within its development framework. Namibia's development is guided by its long-term National Policy Framework, Vision 2030, which transcribes into National Development Plans for 5 year periods. The country is currently in its fourth NDP that privileges sustainability within the economic development agenda and aims at a low carbon economy.

### Climate change goal and context, the long term vision for GHG emissions management

Namibia is located in the South western region of the Africa continent, covers a land area of 825 418 km<sup>2</sup> and has a 1 500 km long coastline on the South Atlantic Ocean. The country is one of the biggest and driest in sub-Saharan Africa with characteristic high climatic variability in the form of persistent droughts, unpredictable and variable rainfall patterns, high temperature variability and scarcity of water. On account of this climatic situation, Namibia stands a high risks to suffer from the impacts of climate change. This has prompted government to take necessary actions to mitigate and adapt to climate change. Hence, the National Policy on Climate Change for Namibia was produced in 2011 to better translate government's will and commitment to tackle climate change. Furthermore, a National Climate Change Strategy and Action Plan for the period 2013-2020 has also been developed and paves the way to the strategic options to be adopted for coping with climate change challenges while contributing to the international agenda to meet decisions of the Conference of the Parties (COP).

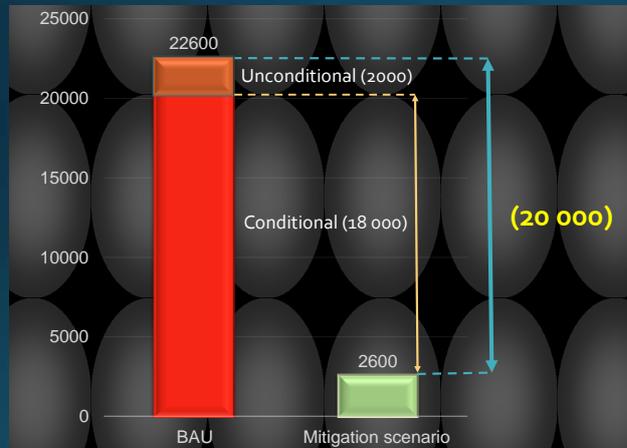
The cross-sectoral National Climate Change Committee (NCCC), which was created in 1999, oversees all climate change related activities. The latter are implemented by the Ministry of Environment and Tourism (MET) through the climate change unit (CCU) that was created to follow and monitor climate change projects. This unit also ensures that the reporting obligations of the country towards the Convention are met as and when necessary. Namibia has thus produced and submitted two National Communications and was the first NAI Party to submit the Biennial Update Report which, included impacts of GHG emission reduction for initiatives implemented up to 2010.

Though clear mitigation and adaptation plans have not been fully developed up to now, the endeavour is real since these strategies have been mainstreamed in the overall national policy, strategies. Namibia is presently developing its first Nationally Appropriate Mitigation Action (NAMA) and is working on its National Adaptation Plan (NAP) to better guide the country on its way to mitigate and adapt to climate change. The preparation of the INDC report focused mainly on existing policies, strategies and action plans developed and currently being implemented. In the preparation of this report, we prioritised and favoured options from the very broad possibilities that exist for both mitigation and adaptation, as well as the most attractive ones, on the basis of their potential for successful adoption at national level. Some of these actions will yield positive results in both mitigation and adaptation areas while benefiting other sectors of the economy at large.

## Mitigation Contribution

<b>Timeframe</b>	2030								
<b>Type of Contribution</b>	<p>The contribution will be economy-wide.</p> <ul style="list-style-type: none"> <li>• Emission reduction measures and actions have already been implemented unconditionally, using the limited resources of the country within the national budgets.</li> <li>• Thus, international support will be required to top up on the country's efforts and initiatives to meet the differential between the unconditional and conditional targets fixed in the INDC. The cost of implementation of the m-INDC component is estimated at US\$ 10.4 billion at 2015 prices.</li> <li>• Namibia does not rule out the use of international market-based mechanisms to achieve its 2030 target in accordance with agreed accounting rules.</li> </ul>								
<b>Reference</b>	<p>The reference is the Business As Usual (BAU) scenario to the 2030 time horizon based on the GHG inventory of 2010 and socio-economic projections.</p> <table border="1"> <thead> <tr> <th>Year</th> <th>2010</th> <th>2020</th> <th>2030</th> </tr> </thead> <tbody> <tr> <td>Emissions (Gg CO<sub>2</sub>-eq)</td> <td>-1339</td> <td>12 441</td> <td>22 647</td> </tr> </tbody> </table>	Year	2010	2020	2030	Emissions (Gg CO <sub>2</sub> -eq)	-1339	12 441	22 647
Year	2010	2020	2030						
Emissions (Gg CO <sub>2</sub> -eq)	-1339	12 441	22 647						
<b>Target level</b>	<p>Namibia aims at a reduction of about 89% of its GHG emissions compared to the BAU scenario at the 2030 time horizon. The projected GHG emissions avoided is of the order of 20 000 Gg CO<sub>2</sub>-eq in 2030, inclusive of sequestration in the AFOLU sector when compared to the BAU scenario.</p> <p>Emissions avoided prior to 2010 are included in the BAU scenario. Post 2010 reductions of the order of 162 Gg CO<sub>2</sub>-eq achieved unconditionally through government funding are not accounted for in the BAU scenario. It is estimated at some 216 Gg CO<sub>2</sub>-eq in 2015, already representing about 1% of the BAU scenario in 2030. The unconditional share will reach about 10% when taking into consideration implemented and planned measures up to 2030 which are accounted for in the BAU scenario.</p>								

## National emissions (Gg CO<sub>2</sub> Eq.) BAU and mitigation scenarios for the year 2030



Reduction of emissions by 89 % compared to the BAU scenario in 2030, including emissions and removals in the AFOLU sector

The contribution of the IPCC sectors are given in the table below.

Sector	Mitigation potential (Gg CO <sub>2</sub> -eq)	% of BAU scenario in 2030
Energy	1301	5.7
IPPU	36	0.2
AFOLU	18 513	81.7
Waste	205	0.9
<b>Total</b>	<b>20 054</b>	<b>88.6</b>

### Sectors

The sectors covered in this INDC are the four IPCC sectors Energy, Industrial Production and Product Use, Agriculture Forestry and Other Land Use (AFOLU) changes, and Waste.

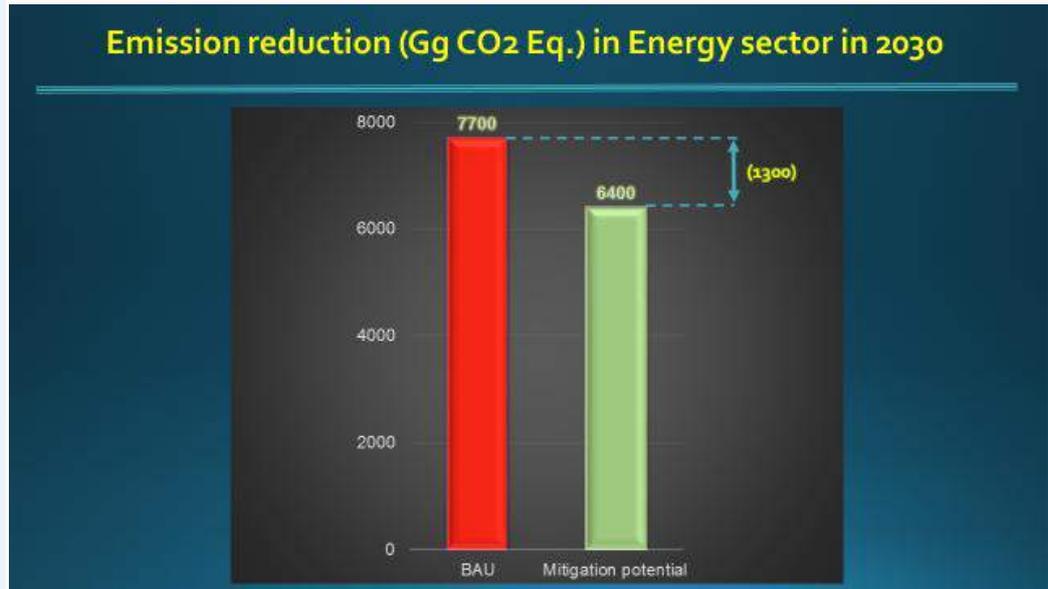
### ENERGY

The rationale behind the measures in the energy sector relates to broad actions to shift from fossil fuels to renewable energy sources, improve energy efficiency through various DSM measures, and reduce fossil fuel consumption through a series of measures in the road transportation sector.

The salient features are:

- Increase share of renewable energy (hydro, solar, wind and biomass) in electricity production from 33% in 2010 to about 70% in 2030;
- Implement an energy efficiency programme to reduce consumption by about 10% in 2030;
- Commission of a mass transport system in City of Windhoek to reduce number of cars (taxis and private) by about 40%;
- Implement a car pooling system to reduce fossil fuel consumption; and
- Improve freight transportation through bulking to reduce the number of light load vehicles by about 20%

These measures are expected to result in a reduction of some 1300 Gg CO<sub>2</sub>-eq.



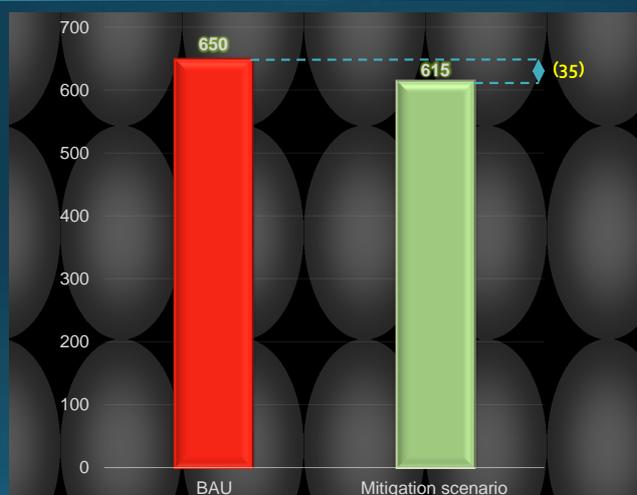
Potential contribution of the different measures in the energy sector are listed below.

Measure	GHG amount	% of BAU scenario in 2030
Increase share renewables in electricity production from 33% to 70%	740	3.3
Increase energy efficiency and DSM	51	0.2
Mass transport in Windhoek, car and freight pooling	510	2.3

### IPPU

Namibia is not a highly industrialized country and thus emissions from this sector are minimal. However, there exists a cement production unit with clinker production integrated. This process offers a potential for mitigation through the partial replacement of clinker in cement production. Replacing some 20% of the clinker will abate emissions by about 35 Gg CO<sub>2</sub>-eq.

## Emission reduction (Gg CO<sub>2</sub> Eq.) in IPPU sector in 2030



Potential contribution of the different measures in IPPU sector are listed below.

Measure	GHG amount	% of BAU scenario in 2030
Replace 20% clinker in cement production	36	0.2

### AFOLU

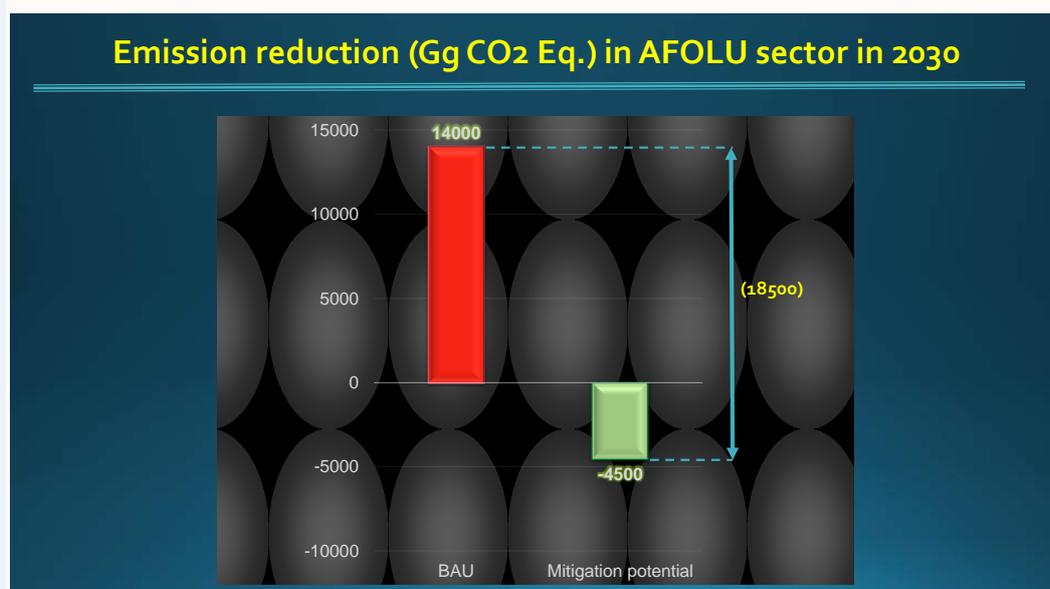
The AFOLU sector is a key category and among the highest emitters. Emissions come from the use of fuelwood, production of charcoal and wood removals for construction and other purposes, especially in the rural areas. The livestock industry is also a major contributor through mainly enteric fermentation but offers restricted mitigation avenues on account of the extensive production system.

Measures evaluated in the AFOLU sector are:

- Increasing the number of livestock heads in feedlots to reduce enteric fermentation by some 4%;
- Reducing N<sub>2</sub>O emissions by about 10% through production of biogas from the feedlot manure;
- Reducing chemical fertilizers by 20% through conservation and climate smart agricultural practices, use of organic manure and composts;
- Reducing deforestation rate by 75% in 2030;
- Reforesting 20 000 ha annually as from 2018;
- Implementing agroforestry systems over 5000 ha annually during the commitment period as from 2018;
- Converting 5000 ha of grassland annually as from 2018 to arboriculture up to 2030;
- Reducing wood removal in forests by 50%;
- Combating forest and grassland fires;
- Restoring 15 million ha of grasslands by 2030; and
- Conservation agriculture is practiced over about 80 000 ha by 2030.

These measures if implemented successfully will result in a combined reduction of

emissions and removals of the order of 18 500 Gg CO<sub>2</sub>-eq in 2030.



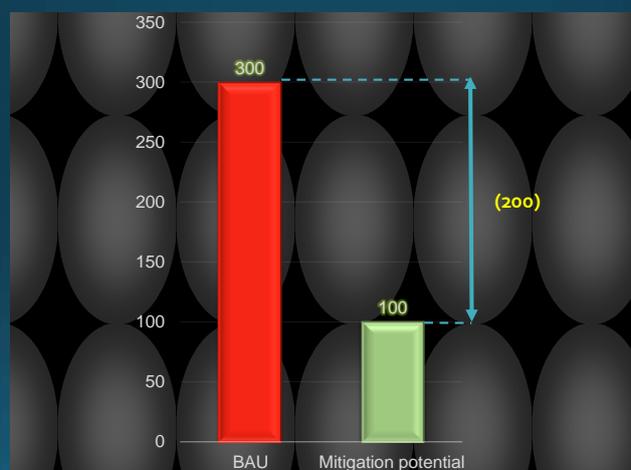
The potential contribution of the different measures in the AFOLU sector is provided in the Table below.

Measure	GHG amount	% of BAU scenario in 2030
Reduce deforestation rate by 75 %	13 537	59.8
Reforest of 20 000 ha per year	1779	7.9
Restore 15 M ha of grassland	1359	6.0
Reduce removal of wood by 50 %	701	3.1
Afforest 5000 ha per year	578	2.6
Plant 5000 ha of arboriculture per year	358	1.6
Fatten 100 000 cattle heads in feedlots	201	0.9
Soil carbon	180	0.8

## WASTE

Waste can be valorised through various systems to curb down emissions usually associated with the management practices being used presently. These will be reviewed to reduce emissions from both municipal solid waste and wastewater. It is planned to convert municipal solid waste and sludge from wastewater management systems from the main cities to energy. This measure will lead to a reduction of some 200 Gg CO<sub>2</sub>-eq. Additional benefits such as a cleaner environment, better sanitation, with fewer risks for health problems, will be reaped while the treated water can be used for irrigation to alleviate problems linked with water scarcity.

## Emission reduction (Gg CO<sub>2</sub> Eq.) in Waste sector in 2030



Potential contribution of the different measures in Waste sector are listed below.

Measure	GHG amount	% of BAU scenario in 2030
Transform 50% MSW to electricity and compost	205	0.9

### Gases

The direct gases carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>) and Nitrous Oxide (N<sub>2</sub>O) are covered in this INDC.

### Accounting Methodologies

The implementation and outcome of the contribution will be tracked and accounted for on the basis of the national GHG inventories compiled and presented in the National Communications and Biennial Update Reports submitted regularly to the UNFCCC secretariat. The method used for compiling the inventories will be those recommended by IPCC, namely the IPCC 2006 Guidelines and software.

The Global Warming Potentials adopted are from the IPCC Second Assessment Report.

- Carbon Dioxide 1
- Methane 21
- Nitrous Oxide 310

The accounting methods used for the Land sector will consist of tracking land use changes and fires through remote sensing technology, and forest inventories for improving and developing national emission and stock factors. Furthermore, reduction of wood removals, reducing deforestation, reforestation, forest management, preservation of protected areas and reserves, improved pasture management and curtailing of wild fires will be tracked by respective Ministries through the responsible Directorates, and in close collaboration with other institutions and the private sector. Since this sector is being refined, namely the maps for more accurately evaluating changes, Namibia reserves its right to amend this component of its INDC in the future.

Namibia has started to set up a Measuring, Reporting and Verification system and further actions will be taken to strengthen it and make it fully operational within the shortest possible lapse of time. The country also intends to set up a carbon register

	to record the outcome of all development activities linked with emission reductions and removals. The same carbon register will be used for emission offsets and trading on the international market.
<b>Equity and Ambition</b>	<p>Namibia is geared towards a progressive decoupling of GHG emissions from economic growth to match the low carbon pathway embedded in its policies and strategies. Namibia is now taking steps and presenting its contribution to reduce its emissions while also increasing its sinks subject to the conditional provision of the needed resources by the international community.</p> <p>The global goal is to meet the ultimate objective of the Convention namely, <i>the stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system</i> and limit global warming to below 2°C and Namibia is willing and strongly committed to contribute its fair share in this global objective. This is so despite the fact that the country is already operating with low emissions compared to the developed countries. Namibia aspires to continue its development for improving the welfare of its population while reducing poverty index, increase food security, eliminate societal inequalities, guarantee access to safe water and health, empower and educate all citizens. Some of the facts provided below give the status of the country within the global context.</p> <ul style="list-style-type: none"> <li>• Namibia’s contribution in Global emissions – 0.059% in 2010</li> <li>• The country was a net sink over period 2000 to 2010 but the capacity decreased from 18 278 to 1339 Gg CO<sub>2</sub>-eq</li> <li>• Net per capita removals decreased from 10 to 0.6 Gg CO<sub>2</sub>-eq</li> <li>• Per capita emissions decreased from 0.0146 Gg CO<sub>2</sub>-eq to 0.0130 Gg CO<sub>2</sub>-eq from 2000 to 2010</li> <li>• GDP production increased from US\$ 198 to 304 per unit emission</li> </ul> <p>Moreover, the Government of Namibia has invested in mitigation and sequestration of GHGs for more than a decade unconditionally which is a legitimate proof of the commitment of the country to reduce the global warming threat to humanity. These initiatives contributed to a reduction of some 160 Gg CO<sub>2</sub>-eq of its emissions in 2010. Considering this and the above facts, Namibia therefore considers its INDC as fair, equitable, ambitious and adequate, given its development status and national circumstances.</p>
<b>Institutional Arrangements and Planning Process</b>	<p>The reference document for identifying mitigation opportunities was the GHG inventory that provided the necessary information on activities responsible for emissions and removals and the level of these at national level. Those activities contributing most to GHG emissions (IPCC key categories) were prioritised and targeted for action as well as areas such as waste management that has a direct bearing on the quality of the environment and can provide multiple side benefits. Namibia’s policy is to practice an open transparent economic development with a wide range of partners. So, wide stakeholder consultation is current practice in the country when it concerns national issues such as mitigation of GHGs which is the cause for global warming and the resulting climate change.</p> <p>Stakeholders included the parliamentarians, ministries, government departments, city councils, the private sector, NGOs, CSOs, the academia and the communities. There has been one on one consultations and group meetings as the situation dictates to end up with national workshops for developing the INDC, validating it and</p>

buy in the participation of all in its implementation.

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## Adaptation Contribution

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### Rationale and process for developing INDCs on adaptation

Namibia is known to be one of the driest countries in sub-Saharan Africa, and is dependent on development sectors highly sensitive to climate. Primary economic sectors which are natural resource based such as agriculture, fisheries and mining account for about one third of the total GDP. Income distribution in Namibia is unusually inequitable. With an estimated Gini coefficient of 0.6 (2015 CIA World Factbook), Namibia has one of the most inequitable income distribution in the world. More than half of the population depends on subsistence agriculture and in drought years, food shortages are a major problem in rural areas. Namibia is therefore potentially one of the most vulnerable countries to climate change. The predicted temperature rise and evaporation increase as well as higher rainfall variability will exacerbate the existing challenges that Namibia is facing as the driest sub Saharan country. The potential effects of these climatic changes could prove catastrophic to the communities, population and economy at large.

Thus, adaptation is of prime importance to the country and is high on government's agenda to guarantee the welfare of the people while reducing risks and building resilience. Furthermore, Namibia is host to unique biodiversity within fragile ecosystems and is a biodiversity hotspot. The country's biodiversity stands too high a risk to allow these ecosystems to be destabilized by climate change which will result in the loss of such a precious world heritage. Adaptation is thus an obligation for the country to fulfil its role within the international context.

The INDC on adaptation has been developed on the basis of the sectoral strategies, plans, and vulnerability and adaptation assessments to climate change conducted for the country. These assessments have been undertaken to guide policies and strategies, mainstream adaptation to climate change in the development programmes to enable the country adapt while building resilience in the medium to longer term.

### Climate change trends, impacts and vulnerabilities

Historical climate data analysis shows an increase of about 0.2°C for every decade. Projections made using dynamical downscaling of 6 and 10 Global Circulation Models (GCM's), indicated increases of the order of 0.6 to 3.8°C for the 2035 - 2065 time period relative to 1961 - 2000. The highest temperature rise is projected to be inland. Historical rainfall data indicate a decreasing trend accompanied by changes in precipitation pattern. Projections for rainfall are more difficult and remain uncertain with a higher probability for a reduction.

The most destructive first order climate risks, most evident and experienced in the recent years, are long lasting floods and droughts. These in turn impacted heavily and directly on the population, and indirectly on human activities and resources such as agriculture, livestock, water, the coastal zone, natural ecosystems, biodiversity and health, amongst others. It has been estimated that this could result to an annual decrease of the GDP by some 6.5%. The resulting decline of the GDP will seriously hinder the country's progress while also preventing the empowerment of the poorest segments of the population that are most vulnerable to climate change.

Some of the observed impacts to-date that will be exacerbated in the future are:

	<ul style="list-style-type: none"> <li>• Lower crop yields and risk of crop failure;</li> <li>• Reduced livestock production;</li> <li>• Decline in fish stocks, catch and production;</li> <li>• Reduced water availability and lower water quality, impacting economic development, food security, health and sanitation;</li> <li>• Increased occurrence of water- and vector-borne diseases;</li> <li>• Increased pressure on cities following urbanization;</li> <li>• Increased damage to infrastructure;</li> <li>• Risk of extinction of endemic species and loss of biodiversity;</li> <li>• Loss of ecosystem services (such as medicinal plants and biomass energy);</li> <li>• Loss of soil fertility and increased soil erosion;</li> <li>• Decline in nature-based tourism due to ecosystem degradation; and</li> <li>• Shifts in wildlife distribution.</li> </ul>
<p><b>Long-term and near-term adaptation visions, goals and targets</b></p>	<p>Namibia is still to prepare its NAP and as such has not yet developed an advanced adaptation strategy and plan. Yet, past experiences of disastrous climate change impacts have obliged government to incorporate climate change adaptation in the development agenda. While the near term vision is prevention and repair, the long term goals and targets are to instil resilience to impacts of climate change in the most vulnerable sectors of the economy. This is a necessity as climate change is a reality in the everyday life of all Namibians. Being complacent will only aggravate the situation, as climate change is here to stay and all will have to live with it in the longer term. Broad avenues for adaptation to climate change in the future will come from:</p> <ul style="list-style-type: none"> <li>• Improving technical capacity at the national and sub-national levels to develop a greater understanding of climate change and its effects;</li> <li>• Developing and implementing appropriate responses and adaptation strategies to reduce the impacts of floods, low rainfall and high temperatures on people, crops, livestock, infrastructure and services;</li> <li>• Agricultural adaptation strategies could include: coordinating the timing of ploughing and crop planting with rainfall events; using drought-resistant crop varieties and livestock breeds; shifting livestock to alternative grazing areas and; implementing soil and water conservation policies and practices;</li> <li>• Improving ecosystem management, protection and conservation;</li> <li>• Developing common goals and facilitating better integration of different policies and practices in vulnerable sectors; and</li> <li>• Developing policies and programmes that accommodate and encourage new and diverse livelihood options while generating financial capital.</li> </ul>
<p><b>Current and planned adaptation undertakings and support</b></p>	<p>Adaptation to climate change has been an unconditional part of the national development system since quite some time now as a means to build resilience. It can be anticipatory or reactive, private or public, autonomous or planned. Government has already acted in these directions with a preference for risk reduction and enhancement of resilience, constituting the medium to long term process, as opposed to the reactive approach.</p> <p>Some of the major adaptation actions under way are:</p>

- Risk reduction to lower the vulnerability of the people and production systems;
- Setting up appropriate early warning systems to avoid losses and reduce impacts;
- Elimination and control of the invader bush to restore pastureland to their original state;
- Promotion of Climate Smart Agriculture and Conservation Agriculture;
- Urban and peri-urban agriculture;
- The green scheme (establishing of irrigation schemes along the perennial rivers of Namibia for food security);
- Promotion of better adapted crop varieties and livestock species;
- Biodiversity conservation;
- Protection of forests;
- Community forest management;
- Rationalization of the use of water resources for different economic sectors;
- Improved rural water supply;
- Recycling of Windhoek's wastewater into potable water;
- Artificial recharge of aquifers – 'banking water';
- Surveillance and prevention of diseases;
- Protection of the shoreline and beaches;
- Dredging of the port of Walvis Bay; and
- Surveillance of the lagoon protecting the port of Walvis Bay.

### Gaps, Barriers and Needs

Some of the recurrent gaps faced by the country are inadequate human capacity, lack of in-depth vulnerability studies, restricted access to the latest technologies, limited coverage of the country for systematic observation, relatively low awareness of a large segment of the population and, last but not least, insufficient funds to correct the gaps and barriers while enabling the country to embark on adaptation in sectors already strained by climate change. Some of the key barriers are:

- Lack of coordination and conflicting programme implementation;
- Framing of climate change as an environmental issue;
- Lack of access to information;
- Lack of effective decentralization and limited institutional capacity at the local level;
- Reactive approach versus long-term planning; and
- Insufficient evidence based on benefits of adaptation versus costs.

In addition to capacity building and technology transfer, Namibia estimates that some US\$ 22.6 billion at 2015 prices will be required to implement the a-INDC component successfully.

### Means of Implementation

The Cabinet of Namibia is the Government entity responsible for approving policies. The INDC will not be an exception to this rule and after the required technical validation, it will be officially endorsed by Cabinet before submission to the UNFCCC. The Parliamentary Standing Committee on

Economics, Natural Resources and Public Administration which usually advises Cabinet on relevant policy matters will do so for the INDC also. The MET, which is responsible for all environmental issues in the country, is also the National Focal Point to the UNFCCC. It is the coordinating body for all climate change activities through its Climate Change Unit (CCU) of the Directorate of Environmental Affairs. The CCU is supported directly by a formalized multi-sectoral NCCC for the implementation and coordination of sector-specific and cross-sectoral activities while also providing advice and guidance on climate change issues.

Since climate change affects directly or indirectly all socio-economic development sectors, it pays that all Ministries through their various departments, other Organizations and Agencies also actively collaborate and contribute in the implementation of INDC activities at the local, regional and national levels. Existing local and regional structures involved in climate change related activities will similarly form part of the implementation committees at their levels within their areas of jurisdictions.

Hence, this same structure will be adopted for the implementation of activities of the INDC. The National Planning Commission (NPC) which is usually the government institution responsible for monitoring implementation of the development programme can assist in monitoring of activities stemming from the INDC also. This option will ensure that these activities are integrated within the national strategies and plans with the proper feedback to Cabinet. This will also ensure a good follow-up of activities of a cross-cutting nature as well as those having both mitigation and adaptation benefits concurrently. The private sector will be a privileged partner of government for implementing the INDC, either on their own or as funding partners.

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## Summary of Needs

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Implementation of this INDC represents a major challenge to the government of Namibia. Multiple shortcomings and constraints will have to be overcome while fulfilling the needs for systemic, individual and institutional capacity building, access and transfer of the latest environment friendly and clean production technologies, mitigation and adaptation techniques and sufficient financing in a timely manner for smooth and successful implementation of the INDC. It is thus of vital importance that the Green Climate Fund be capitalised rapidly in order to provide the much needed funds to the developing countries to enable them to meet their intended targeted contribution.

Namibia will need the support of the international community to overcome existing barriers, for the appropriation of technologies for both mitigation and adaptation, a sustained capacity building programme in the prioritized areas, technical support and funding to the tune of some 33 billion US\$ at 2015 prices. The setting up of an appropriate climate observation system is of prime importance. Research will be essential to develop and project climate change scenarios at higher resolutions for the different regions of the country, enable precise evaluation and development of vulnerability indices for successful adaptation in the different economic sectors, assess and adapt technologies for adoption under the national circumstances and develop indigenous technologies to support resilience building. Key research areas for mitigation are forest inventories for better assessing the loss in sink capacity, refine emissions and removals estimates and the development of national emission and stock factors. Sufficient sustained support for capacity and funding will be needed to implement the NAMAs and NAP once they are finalized.

The implementation spans over the full period of 15 years to 2030 and some of the measures have already been planned. These can be implemented as soon as the enabling environment is created and the necessary appropriate support is made available. Given the urgency for actions to curb down emissions and enhance sinks, it is important that the international community reaches an agreement and sets up the needed framework for providing the required support.

With regards to possible financing possibilities, the government of Namibia tables on the following;

- Part contribution of the government;
- Grants from bilateral and multilateral partners;
- Soft and low interest loans from national, international and partner countries institutions;
- Foreign Direct Investments;
- Independent Private Partners; and
- The Namibian Private sector.

Some of the other prerequisites for a successful and quick implementation of the INDC are:

- Political stability;
- Good governance;
- An independent efficient judicial system;
- Appropriate legislation;
- Provision of incentives; and
- Implementation of robust awareness campaigns.

It is of note that these factors constitute the environment for attracting investors while offering the guarantee and trust to funding agencies. In many cases, legislation can be outdated and can be a serious barrier to implementation of some of the measures of the INDC. In the case of Namibia, there is an urgency to review existing legislation, regulations and norms to frame these in accordance with climate change concerns. There is a need to speed up the process, review and update the following important legislation and/or regulations:

- Feed-in tariffs for the general public and other organisations to supply the grid with electricity;
- Finalize Power Purchase Agreements rapidly following the delivery and signature of IPP licences;
- Implement regulations on energy efficiency, particularly energy audits in the industrial sector that are heavy consumers of energy;
- Implement the DSM strategy and set regulations to ensure import of energy efficient appliances;
- Review the taxation policy and legislation to promote the update of cleaner technologies and promote energy savings;
- Strengthen the enforcement of legislation and regulations;
- Review the legislations regulating forest exploitation to fit them to the new agenda; and
- Implement land policy reforms to promote reforestation and afforestation by the different land owner groups.

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## Monitoring and Reporting Progress

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The National Planning Commission (NPC) spearheads the implementation of the activities and the monitoring of the achievements of the National Development Plans, currently the NDP4. The analysis of economic development activities as dependent variables of recorded climatic parameters will indicate whether climate change is the responsible factor for deviations from set targets. Additionally, data are collected by the various government departments and fed to the National Statistics Agency for regular analysis to help assess progress and achievement of government plans and enable updating of strategies and plans. These analyses will serve as a barometer and support Monitoring and Evaluation (M&E) for identifying vulnerability areas, mitigation activities and other more specific needs. They will also serve as indicators to evaluate progress of both m-INDC and a-INDC initiatives.



## REPUBLIC OF NAURU

### Intended Nationally Determined Contribution (iNDC) Under the United Nations Convention on Climate Change

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#### Introduction

The Republic of Nauru is one of the smallest independent, democratic states in the world and is fully committed to supporting a successful outcome from the COP 21 on a new, ambitious, universal and legally binding agreement under the UNFCCC.

In this regard, the Republic of Nauru wishes to submit its initial Intended Nationally Determined Contributions (INDC) to the UNFCCC in accordance with the relevant paragraphs of Decision 1/CP.19 and 1/CP.20. Being a Small Island Developing State (SIDS), as per the Lima decision 1/CP.20 in paragraph 11, Nauru is mainly communicating information on strategies, plans and actions for climate resilience and low greenhouse gas emission development.

**Nauru reserves the right to revise this initial INDC prior to finalization and/or ratification under a new global climate agreement.**

#### Executive Summary

Nauru's Intended Nationally Determined Contribution (INDC) hinges on its National Sustainable Development Strategy (NSDS) 2005 – 2025 (revised in 2009), The Nauru Energy Road Map 2014-2020, The Second National Communication (SNC) to the UNFCCC (submitted in 2015), and The Republic of Nauru Climate Change Adaptation and Disaster Risk Management Framework (RONAdapt). In addition, relevant data and information have been used from the Nauru Bureau of Statistics and other, various government departments, private and civil society organizations. Extensive consultations with all relevant stakeholders were held during the preparation of Nauru's INDC. Like other small island nations Nauru has been profoundly disturbed with the implications of climate change since the problem appeared on the world scene. Being one of the smaller low lying island nations it is particularly vulnerable to the impacts of climate change including sea level rise.

With only around 10,000 persons, Nauru has very limited capacity to respond to a global threat of this magnitude. As such its response has to be streamlined to sit within its capabilities. In this respect its main concern is adaptation. This concern is predicated on projected temperature increases due to existing and inevitable near term future levels of greenhouse gases in the atmosphere which will be sufficient to cause global warming well beyond the 1.5 degrees Celsius that is considered safe for SIDS. This temperature increase will put in place an inevitable sea level rise that will be an existential threat to the Nauruan population.

In terms of adaptation Nauru is keen to improve its resilience which has been severely compromised by nearly a century of intensive phosphate mining. One such improvement will be transition to untapped clean energy sources, such as renewable resources rather than relying on the traditional imported dirty liquid fuels. The other pressing adaptation strategy is to improve the indigenous food supply and potable water availability and storage. In addition there is a concurrent need to rehabilitate the environment and improve the health of the population. The issue of loss and damage is important to Nauru, particularly when considering the current low level of mitigation ambition internationally and the science is telling us that there will be limits to adaptation. For our very survival it is fundamental that loss and damage must be considered as a separate and distinct element from adaptation in the 2015 COP21 agreement.

The main mitigation contribution is to achieve the outcomes and targets under the National Energy Road Map (NERM), NSDS and recommendations under the SNC and is conditional on receiving adequate funding and resources.

The key mitigation intervention is to replace a substantial part of the existing diesel generation with a large scale grid connected solar photovoltaic (PV) system which would assist in reducing the emissions from fossil fuels. Concurrent to the above there needs to be put in place extensive demand side energy management improvements which will complement the PV installation. The demand management improvements are expected to reduce emissions by bringing down diesel consumption further.

The cost of these mitigation measures is likely to be around US\$50 million ( US\$ 42 million for Solar PV and US\$ 8 million for demand side energy efficiency measures) with some uncertainty depending on the storage of energy either as electrical ( battery) or thermal (chilled water) to account for the high night time electrical load on the island.

Due to somewhat higher phosphate extraction in past years Nauru's emissions in 1990 were higher than at present and estimated to be around 80kt. If economic activity proceeds at the current pace the BAU estimate for 2030 emissions of CO<sub>2</sub> only will also be around 80 kt.

The mitigation contribution will be contingent on obtaining funding and technical assistance to put in place the energy transition and energy savings measures.

In conclusion, although a very small nation, Nauru wishes to play its part in the enormous challenge presented to the world by threat of global warming. In Nauru's case the threat is to its very existence.

## **National Circumstances**

The Republic of Nauru is one of the smallest independent, democratic states in the world housing a little over 10,000 persons. Nauru is a small, isolated, coral capped island which is 21 km<sup>2</sup> in area, 20 km in circumference. It is located in the central Pacific Ocean 42 km south of the equator and 1287 km west of the International Date Line.

Nauru is clearly one of the most severely impacted nations on earth from environmental degradation. It has been the subject of intense mining for the critical element phosphate for a good part of the 20th century. The mining has removed a large proportion of original forest, and arable land. Scarcity of arable land and fresh water resources, geographic isolation, dependence on imports for meeting basic food and energy needs, environmental degradation and the emergence of chronic health problems all make achieving sustainable development a difficult task, and at the same time also create vulnerability to other stresses, such as those brought on by climate change.

The phosphate, however, is now running out and it has only been recently that the Government has commenced secondary mining of the spent spoils of earlier extraction. The island is very low lying with the coastal areas only a few meters above sea level and not much higher in the central area. Along with the above characterisation the country has a number of challenges that make it quite unique in terms of facing the vagaries of climate change.

Nauru faces a full range of geologic and climatic hazards and is also subjected to climatic variability and extremes. The main climate change vulnerabilities in Nauru include drought, sea level rise and the effect that an increase in temperature will have on marine resources and already stressed water and vegetative resources. Due to environmental degradation, the island is already experiencing coastal erosion and declines in the productivity of its coral reef systems. Rising ocean temperatures, ocean acidification, sea level rise, and an increase in the number of intense storms and drought will cause further damage to these ecosystems. Climate-related disasters have already had huge impacts on the economic growth and national development.

A number of development strategies and policy instruments as a response to climate change have been introduced by the Government since 2005 through the economic reform programme which includes: NSDS 2005-2025 (rev 2009); Nauru's Utility Sector-A Strategy for Reform; National Energy Policy Framework; National Energy Roadmap 2014-2020; Nauru Utilities Cooperation Act and RONAdapt. However, Nauru's accomplishment remains on paper and it would require the necessary means of implementation through finance, capacity building and technology development and transfer to achieve tangible outcomes.

In common with many other small island nations the Government of Nauru realises the difficulties in terms of mitigation and has adaptation to climate change as its top priority. In this respect a transition from relying on imported fossil fuels by putting in place an indigenous solar energy supply is also an adaptation strategy to become more resilient and has as a co-benefit, mitigation.

## Adaptation

The Government of the Republic of Nauru considers the focus of its INDC to be primarily adaptation, with a strong emphasis on building resilience which also encompasses mitigation in an integrated manner. Through this approach the INDC serves to highlight our national sustainable development priorities, which encompass adaptation priorities. These include identifying current gaps and needs for support in terms of addressing adaptation on the ground. This INDC does not constitute additional commitments from Nauru. Rather, Nauru views its planned adaptation actions, and broader focus on building resilience, as part of the international commitment to Nauru under the UNFCCC.

Climate change adds to the already significant challenges of achieving the NSDS goals and it undermines food and water security, erode coastlines, damage marine ecosystems and will impede on progress already made. The impacts of climate change will also add extra burden to the national budget diverting resources away from other important sectors and activities such as education, health and economic development. Therefore, addressing climate change in the context of sustainable development means that there will be co-benefits for not only achieving the NSDS but also in building the resilience of Nauru to climate change.

Vulnerability in the case of Nauru is a combination of different factors including climate change. The NSDS outlines Nauru's main social, economic and environmental challenges, and key development priorities. These developmental and environmental challenges illustrate Nauru's vulnerability to external stresses and risks, including those posed by climate change. At the national and community scale in Nauru, some of the factors that create vulnerability are: scarce water resources; limited land and soil resources; environmental degradation; high concentration of income activities; dependence on imports; geographical isolation; low human capacity; chronic health problems; aid dependency; and risk of climate change and disaster. Further priorities are expected to emerge over time as Nauru increases its capacity to respond to vulnerability and risk or its lack of capacity to respond.

Nauru has taken successful steps to establish our RONAdapt as part of our national efforts to prepare for adaptation. The RONAdapt represents the Government of Nauru's response to the risks to climate change and disaster risk reduction and is therefore aligned with the development priorities embedded in the NSDS. It is intended to support achievement of our NSDS goals, by highlighting a series of actions that will also reduce Nauru's vulnerability to climate change and disasters. In doing so, it will improve the country's social, economic and environmental resilience.

Priority actions are given to those that will work towards the goals in the NSDS, as well as those in sectoral plans and strategies where these already give consideration to climate change and disaster risks. The priorities outlined targets the following goals:

- Water security;
- Energy security;
- Food security;
- A healthy environment;
- A healthy people

- Productive, secure land resources.

High priorities are given to actions that can contribute towards multiple development and resilience objectives simultaneously, often cross cutting across sectors. The priority actions are arranged under sectors targeting the following areas: water; health; agriculture; energy; land management and rehabilitation; infrastructure and coastal protection; biodiversity and environment; community development and social inclusion; and education and human capacity development. However, as highlighted earlier, the actions generally contribute to the goals of multiple sectors and at the same time to the overall NSDS goals.

Nauru faces a multitude of challenges, barriers and gaps. These include information gaps, limited capacity both institutional and human, and the unavailability of appropriate adaptation technology and lack of funds at the national level. Lack of funding at the national level has prevented many larger infrastructure projects from getting underway, such as a new hospital, electricity transmission system, improvements to port and airport, and land rehabilitation. At the national level, there are no nationally focussed adaptation projects due largely to the very limited funds available at the national level. At the regional level, Nauru is also involved in a relatively low but increasing number of adaptation projects and programmes and through the regional projects and programmes, some actions are being implemented on the ground that addresses the needs in relation to coastal zone management, water, capacity building, gender, policy and planning.

Addressing the challenges, barriers and gaps are therefore important for building the resilience of Nauru. These can be addressed through building and strengthening the information gap that are vital for planning and management in many sectors as sectors are currently constrained by poor information about current conditions and/or likely future changes. Strengthening institutions are also important actions and undertakings for adaptation in Nauru and this includes the finalisation of policies and plans that have only been progressed to draft form. Strengthening institutions for Nauru will also entail the need to build the human capacity of sectors. Human capacity is a critical part of capacity building in Nauru and is currently a major weakness in almost every sector. This could be addressed through activities funded and/or implemented with support of external partners, aiming to maximise opportunities for skills transfer to local staff and/or communities and to require future externally funded development projects, including those focused on climate change adaptation and disaster risk management to emphasise skills transfer components. In addition, the up-skilling of local staff should be a core priority of all project activities, since it will help position Nauru better to be able to respond to an array of future challenges, including planning for and responding to climate change and disasters.

The need for development of new technologies and transfer of existing appropriate technologies for adaptation in Nauru cannot be overstated. Technology Needs Assessment (TNA) will help countries like Nauru track their needs for new equipment, techniques, services, capacities and skills necessary to build resilience to climate change. However, TNA has not been initiated in Nauru due to various constraints including lack of institutional, human and financial capacity. The preparation of a detailed technology needs for adaptation is an important next step.

Implementation of many of the adaptation priorities will be heavily dependent on resources being made available by external development partners, to supplement limited domestic

funds. While dedicated climate funds are available at the international level, these can be challenging to access for a small country like Nauru. Therefore, Nauru intends to place considerable emphasis on working with its bilateral partners, regional agencies, for the financial and technical resources needed to implement its adaptation priorities, including the improvement of access and facilitation to international climate finance.

Responsibility for implementing climate change adaptation and disaster risk reduction related activities is shared across different parts of government and the community. However, at the operational level, the Department of Environment under the Ministry of Commerce, Industry and Environment (CIE) has the primary responsibility for coordination, monitoring progress and reporting on the RONAdapt implementation of Nauru's climate change activities at all government department/sector levels.

Monitoring and evaluation (M&E) are critical tasks for tracking progress on the implementation of climate change adaptation and disaster risk reduction priorities and goals. The M&E framework for adaptation reflects the desire for tracking and for learning, but also recognises the limited institutional, human and financial resources available in Nauru to dedicate to M&E.

The priority activities highlighted in the RONAdapt require, in most cases, further development through some additional steps before they are ready to be implemented. The financial costs for the activities are not provided, since there is insufficient detail on individual activities to be able to accurately indicate costs. The preparation of detailed cost estimates is an important next step in implementing each activity and it is expected to be undertaken in conjunction with the process of detailed design of the activities.

### **Loss and Damage from climate change**

Loss and damage is a significant issue for Nauru. The inclusion of loss and damage in the INDC is twofold. First, its purpose is to highlight the significance of the issue for Nauru and second, to present our views on loss and damage in the 2015 climate agreement.

The reality of the impacts of climate change that Nauru and Small Island Developing States (SIDS) are already experiencing means adaptation is absolutely critical. However, the science is telling us that we are quickly moving towards a reality where adapting will not be sufficient. The prospect for loss and damage associated with climate change for Nauru and SIDS are real. The IPCC findings in both the Fourth and Fifth Assessment Report from Working Group II show that there are substantial limits and barriers to adaptation. In Warsaw, Parties also acknowledged that loss and damage associated with the adverse effects of climate change involves more than that which can be reduced by adaptation.

The climate change projection for Nauru is expected to increase sea surface temperatures, rise in sea levels, ocean acidification and changes in ocean currents. These will in turn, impact on the whole of Nauru. The ability of corals and invertebrates to form will be affected by ocean acidification; coral bleaching will increase as a result of higher sea-surface temperatures; and the abundance of key oceanic fish species will be affected by changes to ocean currents, such as the Southern Equatorial Current, and to the area and location of the PEQD and the Warm Pool and their convergence. Sea level rise threatens to increase saltwater intrusion into precious groundwater reserves as well as to exacerbate coastal erosion and flooding during storm events, and changes in rainfall patterns will likely affect

water scarcity, while important fish resources may be affected by changes in ocean temperature and acidification.

Nauru calls for loss and damage to be included as a separate element of the 2015 agreement, one that is separate and distinct from adaptation. Loss and damage must be addressed in a robust, consistent and sustained manner. This can only be accomplished through a loss and damage mechanism that is anchored in the 2015 agreement. Anchoring the mechanism in the 2015 agreement will ensure that it is permanent.

Defining the relationship between mitigation, adaptation and loss and damage needs to be considered and reflected in the 2015 agreement, including a clearly defined relationship between mitigation ambition, adaptation costs as well as loss and damage, particularly when mitigation ambitions are currently grossly inadequate and adaptation measures are not sufficient to address climate impacts.

There is also an urgent need for technical work to be undertaken and should include an assessment of impacts and risks at different levels of CO2 concentration and warming, including 1.5 °C, especially the risks of ocean acidification, global and regional sea level rise and irreversible changes in the physical, ecological and human systems, including for specific regions and key sectors and systems. Observations and projections relevant to local and regional circumstances should cover exposure and vulnerability to climate change, the resulting impacts, adaptation options and loss and damage.

Nauru acknowledges that there is on-going work under the Warsaw International Mechanism on Loss and Damage, including a 2016 Review, and expects that the results of this on-going work be integrated into the mechanism that is anchored in the 2015 agreement.

Immediate and adequate financial, technical and capacity building support for loss and damage is needed and to be provided on a timely basis for Nauru and other SIDS to address loss and damage. It is beyond our current national means to address loss and damage from climate change and financial flows from developed countries for addressing loss and damage in Nauru and other vulnerable developing countries should be new and additional to financing for those for mitigation and adaptation.

## Mitigation

<b>Mitigation Contribution</b>	
Time Frame	2020 - 2030
Type of Contribution	<p><u>Conditional Reduction based on identified mitigation actions</u></p> <p>To replace a substantial part of electricity generation with the existing diesel operated plants with a large scale grid connected solar photovoltaic (PV) system with an estimated cost of 42 million US\$ which would assist in reducing the emissions from fossil fuels.</p> <p>Concurrent to the above there needs to be put in place extensive demand side energy management improvements with an estimated cost of 8 million US\$ which will complement the PV installation. The demand management improvements are expected to reduce emissions by bringing down diesel consumption further.</p>

	<p>The conditional mitigation contribution discussed above would require a total investment estimated at 50 million US\$ including substantial technical, capacity building and logistical assistance due to the limited capacity on the island.</p> <p><u>Unconditional Reduction</u></p> <p>The unconditional contribution includes a secured funding of US\$5 million for implementation of a 0.6 MW solar PV system which is expected to assist in unconditional reduction of CO<sub>2</sub> emissions marginally. This initiative will be used as a model project for the larger Solar PV plant and in addition assist in terms of technology transfer and institutional learning.</p>
Type of Reduction	Being a Small Island Development State and a developing country with lowest total emissions in the world, Nauru's mitigation contributions are non-GHG targets through implementation of conditional and unconditional policies, measures and actions. Nauru also recognizes that mitigation contributions from developed countries may be absolute economy-wide emissions reduction targets relative to a base year while the developing countries can communicate policies, measures and actions departing from business as usual emissions.
Sectors	Sectoral (energy sector) commitment focussed on a transition to renewable energy in the electricity generation sector and energy efficiency through demand side management.
Gases	CarbonDioxide(CO <sub>2</sub> )
BAU Emissions	The expected trajectory in emissions is highly uncertain due to paucity of reliable data and uncertainties in economic activities on the island. Contributing factors include both the small size of the economy and the uncertainty of phosphate extraction opportunities and the other recently commenced activities including offshore banking and housing Australian bound refugees. An extrapolation of trends in the last three years suggests economic growth of around 2.2% p.a. Of concern are high levels of expansion in the electricity sector with growth over the same period being around 13% p.a. Estimates, however, are that CO <sub>2</sub> emissions will increase from 57 kt p.a. in 2014 to close to 80 kt p.a. in 2030. The mitigation options are envisaged to assist in reducing CO <sub>2</sub> emission levels by 2030. It is important to note that the BAU emission estimates are not accurate due to substantial gaps in data for the sectors.
Methodology	The baseline, BAU and mitigation scenario assessments was done using best available historical data entered into the GACMO model which uses IPCC 2006 guidelines and conversion factors. Where data was not available default factors in the software were used.
Planning Process	Nauru's iNDC originates from a series of strategies, policies and assessments concerned with sustainability, environmental protection and energy supply developed or commissioned by the Government

	<p>over the past decade. These include: National Sustainable Development Strategy (NSDS) 2005 – 2025 (revised in 2009), The Nauru Energy Road Map 2014-2020 and The Second National Communication (SNC) to the UNFCCC (submitted in 2015). Further, Extensive consultations with all relevant stakeholders were held during the preparation of Nauru's iNDC.</p>
<p><b>Fairness, Equity and Ambition</b></p>	
<p>Fairness, Equity and Ambition</p>	<p>Although a very small nation with absolute levels of CO<sub>2</sub> eq emissions under 0.0002 % of world emissions (2014), Nauru wishes to play its part in the enormous challenge presented to the world by threat of global warming. In Nauru's case the threat is to its very existence.</p> <p>Nauru is also faced with serious economic challenges. Its once thriving phosphate industry has ceased operation thus depriving Nauru of its major lifeline revenue source. The local infrastructure, including power generation, drinking water and health services, has been adversely affected in recent years by the decline in income from phosphate mining. With fewer prospects in the phosphate industry, Nauru has to look at other alternative revenue sources to support its economic development. Unfortunately, for a country of the size of Nauru (21 km<sup>2</sup>) with its limited natural resources, the options are not many.</p> <p>The global goal underlying the assessment of mitigation contribution is to reduce fossil fuel imports by using indigenous renewable energy and implementing energy efficiency measures. In light of the above, for such a remote island already severely damaged by phosphate mining, Nauru's mitigation contribution is quite ambitious. With regards to equity Nauru cannot be expected to mitigate out of its own resources and would need extensive international assistance.</p>



**Government of Nepal**  
**Ministry of Population and Environment**  
**INTENDED NATIONALLY DETERMINED CONTRIBUTIONS (INDC)**  
*Communicated to the UNFCCC Secretariat in February 2016*

## A. BACKGROUND

Nepal, a least developed, mountainous and land-locked country, is one of the least contributors to the emissions of greenhouse gases (GHGs). With aspirations of the people to improve the country's economy; its development agenda is constrained by the fact that it is one of the most vulnerable countries to the adverse impacts of climate change.

### 1. Nepal's Vulnerability to Climate Change

Nepal's mountainous and challenging topography and socio-economic conditions (ranks 145 on the Human Development Index, nearly one-fourth of its population live below poverty line) make it a highly vulnerable country to climate change.

Nepal has experienced changes in temperature and mean precipitation. The country, with the exception of some isolated pockets, has become warmer. Data on trends from 1975 to 2005 showed 0.06°C rise in temperature annually whereas mean rainfall has significantly decreased on an average of 3.7 mm (-3.2%) per month per decade. Under various climate change scenarios, mean annual temperatures are projected to increase between 1.3-3.8°C by the 2060s and 1.8-5.8°C by the 2090s. Annual precipitation is projected to reduce in a range of 10 to 20% across the country.

In Nepal's Himalaya, total estimated ice reserve between 1977 and 2010 decreased by 29% (129 km<sup>3</sup>). The number of glacier lakes increased by 11% and glaciers recede on an average by 38 km<sup>2</sup> per year during the same period. Hence, climate change has visible and pronounced impacts on snows and glaciers that are likely to increase the possibilities of Glacier Lake Outburst Floods (GLOFs). Nepal has suffered from the impacts of increased frequency of extreme weather events, such as landslides, floods and droughts resulting in the loss of human lives as well as high social and economic costs.

The 2013 study on Economic Impact Assessment of Climate Change in Key Sectors (agriculture, hydropower and water-induced disasters) has estimated direct cost of current climate variability and extreme events equivalent to 1.5 to 2% of current GDP/year (approximately USD 270-360 million/year in 2013 prices) and much higher in extreme years. In the case of hydropower, the model projected lower dry season flows and thus lower energy availability. The additional energy generation capacity needed to meet future demand under this scenario, due to climate change, has been estimated at 2800 MW by 2050 with an increase in costs of USD 2.6 billion (present value) for the period through to 2050. Overall, the economic costs of climate change in Nepal for these three sectors could be equivalent to 2-3% of current GDP/year by mid-century.

Overall, Nepal is one of the most vulnerable countries to climate change, water-induced disasters and hydro-meteorological extreme events such as droughts, storms, floods, inundation, landslides, debris flow, soil erosion and avalanches. Based on National Adaptation Programme of Action (NAPA) 2010, out of 75 districts, 29 districts are highly vulnerable to landslides, 22 districts to drought, 12 districts to GLOFs, and 9 districts to flooding.

Nepal is ranked as the eleventh most earthquake-prone country in the world. It experienced a devastating earthquake of 7.6 magnitudes on 25 April 2015 with around 9,000 casualties

and over 22,000 injuries. The destruction was widespread as it ruined houses, heritage sites, schools, health posts, infrastructures (roads, bridges and hydro-electricity plants) and social systems (water supply, agricultural land, trekking routes, and sports facilities). Lives of about 8 million people have been severely impacted by this earthquake demanding unbelievably high cost of reconstruction.

Earthquake and climate-induced disasters have accelerated vulnerabilities and risks to water, sanitation and food security resulting in further aggravation of country's vulnerabilities to climatic hazards.

## **2. Nepal's Emission Scenario**

Nepal's greenhouse gas (GHG) emission is only around 0.027% of total global emissions. According to the Second National Communication (2015), GHG emissions from the energy sector is in increasing trend, and this is almost negligible in industry sector. With an agricultural economy, larger portion of GHGs emissions is from the agricultural sector, but the emissions due to increased use of fossil fuels have risen over time. For 1994, total GHGs emission from energy, industrial processes, agriculture and waste (without Land Use, Land-Use Change and Forestry, LULUCF) was estimated at 29,347 CO<sub>2</sub>-eq Gt while it has declined to 24,541 CO<sub>2</sub>-eq Gt for 2000. However, total GHGs emission for 2008 has reached to 30,011 CO<sub>2</sub>-eq Gt, slightly increased from 1994 emission level. The country as a Party to the United Nations Framework Convention on Climate Change (UNFCCC) pursues and supports efforts to limit the increase in temperature to well below 2°C leading to 1.5°C above pre-industrial levels in order to reduce the risks and adverse impacts of climate change.

Nepal believes that the cumulative impacts of Intended Nationally Determined Contributions (INDCs) submitted to the UNFCCC would greatly contribute to limiting temperature rise to safe levels and making this planet livable. Nepal has prepared its INDC in the process of implementing the decisions of the Conference of the Parties (COPs) through a broad-based stakeholder consultation processes.

## **B. NEPAL'S ENHANCED ACTIONS TO ADDRESS CLIMATE CHANGE**

Nepal has initiated several activities to reduce climate hazards and build resilience, help climate vulnerable communities cope with climate change impacts, and reduce impacts of climate change on its people, property and natural resources. Key and most relevant activities are briefly summarized below:

### **1. Institutions**

#### ***a. Institutional Strengthening***

The Government of Nepal is strengthening its institutions to ensure implementation of climate change and Reducing Emissions from Deforestation and Forest Degradation plus (REDD+) programmes. The Climate Change Management Division in the Ministry of Population and Environment, and REDD Implementation Centre under the Ministry of Forest and Soil Conservation are dedicated to developing necessary prerequisites for the effective implementation of the UNFCCC provisions. The National Planning Commission and relevant

ministries have also made necessary arrangements to integrate climate change concerns into their policies and programmes. Nepal has also established the Recovery and Reconstruction Authority to rebuild infrastructures and settlements devastated by the earthquake of April 2015 and make Nepal greener and more resilient to natural hazards. Several non-governmental and community-based organizations are also engaged in strengthening national and local entities to provide services to the climate vulnerable communities.

#### ***b. Coordination Mechanism***

Nepal has established coordination mechanisms at highest political level for necessary policy guidance and coordination and at local level for implementation on the ground. Establishment of Climate Change Council, Climate Change Coordination Committee and REDD Coordination and Monitoring Committee at the political levels and Multi-stakeholder Climate Change Initiatives Coordination Committee and REDD Working Group chaired by Secretaries of the concerned ministries provide guidance, ensure coordination and function to align climate change with development activities. The REDD Multi-Stakeholder Forum acts as an outreach and communication platform. The climate change networks managed by civil society organizations also contribute to generating and sharing knowledge on climate change and its impacts.

## **2. Policies, Strategies and Frameworks**

#### ***a. Climate Change Policy***

Nepal's Climate Change Policy (2011) envisions a country spared from the adverse impacts of climate change, by considering climate justice, through the pursuit of environmental conservation, human development, and sustainable development – all contributing towards a prosperous society. The Policy has objectives of, inter alia, reducing GHG emissions by promoting the use of clean energy; enhancing the climate adaptation and resilience capacity of local communities for optimum utilization of natural resources and their efficient management; and adopting a low-carbon development pathway by pursuing climate-resilient socio-economic development.

#### ***b. Forestry Sector Policies and Strategies***

Nepal emphasizes in mitigating adverse impacts of climate change, and in adopting adaptation measures. It strategizes to develop mitigation-friendly forest management systems. The working policies emphasizes, inter alia, to make community-based forests and watershed management climate adaptation-friendly, enhance carbon sequestration through sustainable management of forests, and support programmes that reduce carbon emissions from forest areas. More than 25,000 community-based forest management groups across the country are directly engaged in managing about 30% of the country's total forest area. These community-based organizations are not only contributing to sequestering carbon dioxide by sustainable management of forest resources but also playing effective roles in designing and implementing Community Adaptation Plans of Action (CAPAs) based on forests and non-forests benefits.

Considering climate change mitigation and resilience as one of the major strategic pillars, the Forestry Sector Strategy (2016-2025) aims to enhance Nepal's forest carbon stock by at least

5% by 2025 as compared to 2015 level, and to decrease mean annual deforestation rate by 0.05% from about 0.44% and 0.18% in the Terai and Siwalik hills respectively. It also aims to put in place forest carbon trade and payment mechanism and mainstream community/ecosystem-based adaptation by 2025.

Forest areas are planned to be managed in a variety of modalities and regimes including community forests, leasehold forests, collaborative forests and protected areas following a landscape approach to resource conservation and management. The benefits of forests are projected to use in forest-enterprise development, adaptation to climate change and contribution to local and national economy while sustainably conserving watershed and biodiversity.

The Nepal Biodiversity Strategy and Action Plan (2014-2020) emphasize biodiversity conservation and ecosystem resilience as keys to national prosperity. The Strategy recognizes legitimate rights of all Nepali people including indigenous people and local communities, women, Dalits and other disadvantaged social groups over local biological resources.

### ***c. Energy Policy***

Nepal has a policy for maximum utilization of hydropower potential to meet its domestic demand of electricity by mitigating adverse environmental impacts. It also has a policy to accelerate renewable energy services, and increase access to the Renewable Energy technologies with subsidy provisions.

The National Rural Renewable Energy Programme (NRREP), under implementation, provides a framework for the local communities across the country to have access to not only energy but also energy efficient technologies through various subsidy programmes.

By 2020, Nepal intends to expand its energy mix focusing on renewable by 20% and diversifying its energy consumption pattern to more industrial and commercial sectors.

### ***d. Environment-Friendly Vehicle and Transport Policy***

The Environment-friendly Vehicle and Transport Policy (2014) aims, inter alia, to reduce emission from transport sector, increase the share of electric vehicle up to 20% by 2020, promote the transformation of other regular vehicle to electric vehicle, and provide subsidy scheme for the promotion of electric and non-motorized vehicles. It has a strategic approach to avoid unnecessary travel, reduce trip distance, promote the shift towards more sustainable transport modes such as non-motorized transport component in the transport plan, and further promote public transport systems. The Policy calls for an improvement in transport practices and technologies through diversifying towards electricity, hybrid and natural gases; promoting progressive and affordable standards for fuel quality, and regulating vehicle emissions in order to ensure compliance with air quality.

### ***e. National REDD Strategy***

Nepal is finalizing the National REDD-plus Strategy and considers that REDD+ initiatives would further contribute to promoting sustainable management of forests, carbon sequestration and adaptation co-benefits. It has a vision to optimize carbon and non-carbon benefits of forest ecosystems for the prosperity of the Nepali people, and has objectives of, inter alia, reducing carbon emission, and enhancing carbon sequestration and climate resilience

through both mitigation and adaptation approaches by minimizing the causes and effects of drivers of deforestation and forest degradation, and intensifying sustainable management of forest resources.

Nepal will pilot a sub-national project on REDD+ to reduce about 14 million tons of CO<sub>2</sub>-eq by 2020 by addressing the drivers of deforestation and forest degradation and strengthening governance mechanisms in all types of forests and protected areas.

***f. Low Carbon Economic Development Strategy***

As a roadmap to opt low carbon pathways, Nepal is in the process of finalizing its Low Carbon Economic Development Strategy (LCEDS) to further promote the use of renewable energy and look into the cross-sectoral approaches of the economy where GHGs emissions can be minimized. This pathway will aid Nepal to bolster social and economic developments and ensure environmental conservation while achieving the goals of sustainable development by reducing poverty.

***g. National Adaptation Programme of Action***

As a least developed country Party to the UNFCCC and in accordance with the decisions of the seventh session of the COP held in Marrakesh, Nepal has prepared its National Adaptation Programme of Action (NAPA) to Climate Change in September 2010 through extensive consultative processes to address the most urgent and immediate needs of adaptation. The effective implementation of NAPA priorities would provide multiple opportunities to help climate vulnerable communities and ecosystems cope with the adverse impacts of climate change, and improve livelihoods by addressing most urgent and immediate adaptation needs.

***h. National Framework on Local Adaptation Plans for Action***

In order to localize climate change adaptation, Nepal has adopted a National Framework on Local Adaptation Plans for Action (LAPA) to ensure integration of adaptation and resilience into local to national planning processes. This ensures bottom-up, inclusive, responsive and flexible planning. The LAPA contributes to sensitizing local people and stakeholders, carrying out vulnerability and adaptation assessment; identifying, selecting and prioritizing adaptation options; and formulating and implementing adaptation plans. The framework provides opportunities to develop and implement a stand-alone LAPA and/or integrate adaptation options into the regular planning and implementation processes. At present, Nepal is implementing LAPAs in 90 Village Development Committees and 7 Municipalities – the lowest administrative units in the country. Similarly, about 375 local adaptation plans and nearly 2200 Community Adaptation Plans of Action (CAPAs) for community forests have been developed.

***i. National Adaptation Plans***

In 2015, Nepal launched a process to formulate and implement National Adaptation Plan (NAP) to address medium and long-term adaptation needs and reduce climate vulnerabilities. This will also promote integration of climate change adaptation into sectoral policies, strategies, plans and programmes. The NAP will be developed through country- driven, extensive consultation, participatory and transparent approaches and concerned ministry-led Thematic Working Groups.

#### ***j. Environment Friendly Local Governance Framework***

Nepal is implementing an Environment-Friendly Local Governance (EFLG) Framework with the objectives of mainstreaming environment, climate change adaptation and disaster management in the local planning processes. The Framework also aims to make the local governance system environment-friendly and initiate sustainable development activities at the field level such as household and communities. Some of the indicators that the framework prioritizes are:

- Promote renewable and clean energy and energy efficient technology
- Increase greenery through tree plantation and management of gardens and parks
- Plant trees in at least 10% of the current open/barren land
- Promote rainwater harvesting and ponds construction
- Enhance waste management through environment friendly technology
- Promote sustainable and organic farming and reduce the use of agro-chemicals
- Increase disaster management skills at the local level
- Control industrial pollution through effective regulations

In addition, the Local Governance and Community Development Programme has prioritized to implement rural renewable energy programmes, local climate change adaptive living facility and poverty-environment initiatives in selected districts, VDCs and municipalities to mitigate climate change impacts and help communities adapt to climate change.

#### ***k. Channeling Funding for Climate Change Activities***

The Government of Nepal is practicing a dedicated climate change budget code in its fiscal planning and budgeting processes to channel funding for climate change and related activities. The Climate Change Policy obliges to channel over 80% of the total climate finance to grassroots level activities.

In addition, the Agriculture Development Strategy (2015), National Conservation Strategy Framework (2015), Disaster Risk Reduction Management Strategy and periodic policies provide ample opportunities to help climate vulnerable communities to adapt and build resilience to climate change impacts.

### **3. Adaptation Actions**

The Government of Nepal also realizes the importance of reducing climate change impacts and implements climate adaptation actions to protect life and improve livelihoods of the climate vulnerable communities and also improve ecosystem services. Nepal has also made significant progress in implementing adaptation actions as prioritized in its NAPA to help adapt and build resilience to climate change impacts. The LAPA Framework ensures the process of integrating climate change adaptation and resilience from local-to-national level planning processes that are bottom-up, inclusive, responsive and flexible.

#### ***a. Adapting to Climate Change***

The Government of Nepal is implementing climate change adaptation and resilience programmes and projects with support from Least Developed Countries Fund (LDCF), multilateral agencies and bilateral supports. At present, Nepal Climate Change Support

Programme (NCCSP), Community-based Flood Risk and GLOF Risk Reduction programme, Ecosystem-based Adaptation Programme, including enhancing capacity, knowledge and technology support to build climate resilience of vulnerable communities, Hariyo Ban Project (climate adaptation component), and Multi-stakeholder Forestry Programme (adaptation co-benefits) are under various stages of implementation. Localizing climate adaptation actions has been deeply rooted in planning and implementation of NCCSP target areas. Additional efforts are underway to promote climate change adaptation into planning and programming processes.

#### ***b. Building Climate Resilience***

The Government has accorded high priority to build climate resilience by integrating it into policies, strategies and programmes. At present, projects such as building climate resilient watersheds in mountainous eco-regions, building resilience to climate related hazards, mainstreaming climate change risk management in development, and building climate resilient communities through private sector participation are under various stages of implementation and are contributing to develop human resources so as to integrate climate change concerns in sectoral plans and programmes.

Nepal's Pilot Program for Climate Resilience (PPCR) comprises four components i) Building Climate Resilience of Watersheds in Mountain Eco Regions, ii) Building Resilience to Climate Related Hazards, iii) Mainstreaming Climate Change Risk Management in Development, and iv) Building Climate Resilient Communities through Private Sector Participation. All the PPCR components have been launched and are at different stages of implementation. The ongoing programs are complimenting each other and various climate change programs in Nepal including those to implement LAPAs and other NAPA priorities.

### **4. Knowledge Management**

Nepal has initiated knowledge generation and dissemination by establishing a Climate Change Knowledge Management Centre. Several governmental, non-governmental and community-based organizations, academic and research institutions are involved in generating and disseminating data and information on climate change and its impacts in the recent years.

### **5. Mitigation Actions**

#### ***a. Clean Energy Development Pathways***

Nepal's energy use is primarily dominated by traditional sources energy, mainly biomass for domestic purposes. Renewable energy contributes to only 1% of the total energy use. Currently, 56% of the population has regular access to electricity for lightning. Despite a huge potential for renewable energies such as hydropower, solar power and wind energy, these resources have not been sustainably captured due to geographical, technical, political and economical reasons. As a result, the country is facing acute power shortage of electricity and load shedding may stretch up to 15 hours per day in winter season.

Regardless of these difficulties, Nepal has continued to prioritize the generation and utilization of clean energy, particularly through hydro-electricity at a larger scale. For the last

two decades, micro-hydro, solar, biogas and improved cook stoves have been promoted at the rural scale and in line with the National Rural and Renewable Energy Programme in the recent years.

The Subsidy Delivery Mechanism for renewable energy has been adopted since 2006 to ensure disbursement of subsidy in a cost effective and easy access manner in rural areas. Recently, the Government of Nepal has launched an initiative to promote solar energy, renewable energy technologies and energy-efficient technology in urban areas.

Moreover, the recent fuel crisis that sparked from September 2015 has accorded high priority to scale-up production of renewable energy technologies in order to meet the energy demands of urban, peri-urban and rural areas. Nepal is planning to generate clean energy as follows:

- 4,000 MW of hydroelectricity by 2020 and 12,000 MW by 2030;
- 2,100 MW of solar energy by 2030 with arrangements to distribute it through the grid;
- Additional 220 MW of electricity from bio-energy by 2030;
- Additional 50 MW of electricity from small and micro hydropower plants;
- Increase the share of biogas up to 10% as energy for cooking in rural areas; and
- Equip every household in rural areas with smokeless (improved) cooking stoves (ICS) by 2030.

#### ***b. Afforestation and Enhancing Carbon Sequestration***

The Government has a strategy to maintain at least 40% of the total area of the country under forests. It further promotes afforestation in public and private lands, environment-friendly infrastructure development and the conservation of biodiversity. It also promotes the management of ecosystems in different eco-regions of the country which will endorse sustainable management of forests, enhance capacity of local communities in adaptation and resilience, widen carbon storage through sustainable forest management and reduce carbon emissions. It also seeks to make the forest management plan climate e adaptation- friendly, and implement REDD+ policies.

The Government has announced a forest decade for 2014-2023, with a theme: '**one house one tree, one village one forest and one town several parks**' that aims at creating new forests and tree groves in areas where forests have already been lost, in addition to managing natural forests. The forests and watersheds lying on the chain of Siwalik hills are also being managed on the basis of upstream-downstream linkages in which both the forest ecosystems in the Siwalik and the fertile cultivated land in the down south are taken into consideration as complementing to each other. Conservation and management of this area, including implementation of forests, soil and water conservation activities, is expected to greatly sequester carbon and could function as the carbon sink.

#### ***c. Moving Towards Environmentally Sustainable Transport System***

Promotion of public transport system and use of bicycles, introduction of fuel tax used in Kathmandu Valley for air quality improvement and further promotion of non-motorized transport would contribute to the reduction of pollution in urban areas.

#### ***d. Promoting Climate Friendly Practices in Agriculture***

Nepal is implementing farmers' schools where local varieties of crops will be promoted using local and indigenous knowledge and building on efficient technologies. Similarly, efforts are underway to develop flood and drought-resistant crop varieties to cope with climate change impacts. Nepal with its Agriculture Development Strategy will gradually move towards commercial agriculture considering climate change vulnerabilities.

#### ***e. Waste Management and Air Pollution Control***

Nepal promotes the generation of energy from waste, by converting and managing waste and minimizing the release of methane.

#### ***f. Building Codes***

Nepal in its drive for reconstruction in the post-earthquake situation will strive to promote greener, smarter and better homes as guided by the National Reconstruction Authority. The building code has provisioned for at least two trees in home garden, and rainwater harvesting and solar light in urban homes.

### **C. NEPAL'S INDC**

Nepal, a land-locked mountainous country, faces challenges of reducing poverty and addressing people's basic needs. With the increasing adverse visible impacts of climate change and recent earthquake, Nepal is continuously facing additional burden from climate change and urgently requires huge investments in adapting and building resilience to climate change in order to protect its people, property and natural resources. It is, therefore, imperative for Nepal to tackle the impact of poverty and climate change simultaneously to achieve Sustainable Development Goals.

Moreover, the current energy mix of the country shows that most of Nepal's energy is dependent on biomass followed by fossil fuels. The residential sector consumes most of the energy. Nepal has to diversify its energy mix and energy consumption patterns to more renewable and other economically productive sectors. However, given its current economic situation, Nepal will need technical and financial supports from development partners to provide relevant technologies, and build its capacity to be cleaner and greener while flourishing as one of the top tourism destinations in the world. In view of this, Nepal follows the low-carbon development pathway while promoting climate adaptation and resilience.

The Government of Nepal realizes the importance of reducing the impact of climate change and seeks to implement climate adaptation actions to protect life and life-support systems as well as improve the livelihoods of climate vulnerable communities. The cumulative impacts of INDCs would greatly contribute to limiting the rise in temperature to safe levels and make this planet livable. Hence, Nepal has prepared this INDC through a broad-based stakeholder consultation processes.

Nepal hereby communicates its INDC in response to the decisions of the Conference of the Parties to the UN Framework Convention on Climate Change:

1. Nepal has initiated the process for the formulation of National Adaptation Plans (NAPs). Therefore, Nepal's adaptation needs for future and in the context of post-2020 will be envisioned through the NAPs.
2. Nepal places climate change adaptation at the centre of its development plans and policies. It aims to strengthen implementation of Environment-Friendly Local Governance (EFLG) Framework in Village Development Committees and municipalities to complement climate change adaptation, promote renewable energy technologies, and water conservation and greenery development.
3. Nepal will undertake scientific (bio-physical as well as social sciences) approaches to understand and deal with the impacts of climate change in mountains, hills and low-land ecosystems and landscapes. It will develop and implement adaptation strategies for climate change affected sectors.
4. Nepal will study and understand further loss and damage associated with climate change impacts with the support from scientific and academic communities.
5. Nepal plans to formulate the Low Carbon Economic Development Strategy that will envision country's future plan to promote economic development through low carbon emission with particular focus on: (i) energy; (ii) agriculture and livestock; (iii) forests; (iv) industry; (v) human settlements and wastes; (vi) transport; and (vii) commercial sectors.
6. By 2050, Nepal will achieve 80% electrification through renewable energy sources having appropriate energy mix. Nepal will also reduce its dependency on fossil fuels by 50%.
7. Nepal aims to achieve the following target under NRREP, reducing its dependency on biomass and making it more efficient.

<b>Technologies</b>	<b>Targets</b>
Mini and Micro Hydropower	25 MW
Solar Home System	600,000 systems
Institutional Solar Power Systems (solar PV and solar pumping systems)	1,500 systems
Improved Water Mill	4,000 number
Improved Cooking Stoves	475,000 stoves
Biogas	130,000 household systems, 1,000 institutional and 200 community biogas plants

8. Nepal will develop its electrical (hydro-powered) rail network by 2040 to support mass transportation of goods and public commuting.
9. Nepal will maintain 40% of the total area of the country under forest cover and forest productivity and products will be increased through sustainable management of forests. Emphasis will equally be given to enhance carbon sequestration and forest carbon storage and improve forest governance.
10. By 2025, Nepal will strive to decrease the rate of air pollution through proper monitoring of sources of air pollutants like wastes, old and unmaintained vehicles, and industries.

## D. FINANCING NEPAL'S INDC

Nepal will make efforts to implement its INDC and contribute to the global efforts of reducing GHGs emissions and helping life and life-support systems to adapt and build resilience to climate change impacts. However, Nepal requires bilateral and multilateral grant support in the following priority areas to meet both qualitative and quantitative targets as mentioned above:

- a. Formulate and implement NAP and implementation of NAPA and LAPAs;
- b. Conduct research and studies on loss and damage associated with climate change impacts, and develop and implement measures to reduce climate vulnerabilities;
- c. Create an enabling environment to promote private sector investments and foreign direct investments in low carbon (energy efficiency and renewable energy) technologies;
- d. Develop electrical rail network in the low lands of Nepal;
- e. Control drivers of deforestation and forest degradation to enhance carbon sequestration;
- f. Provide better price from carbon markets to ensure an equitable benefit sharing mechanisms and maximize benefits at the local level to help sustainable management of forests;
- g. Sell carbon credits at a better price from its renewable energy and REDD+ programmes;
- h. Convert waste to energy;
- i. Address climate-induced disasters in earthquake affected areas and rebuild Nepal better;
- j. Enhance agricultural sector by adopting climate-friendly technologies and reducing climate change impacts; and
- k. Capacity building at institutional level to plan and implement adaptation and mitigation programmes and projects.

Nepal will maximize the use of existing monitoring and evaluation mechanisms to realize the state of implementation of the INDCs along with technical and financial support made available for Nepal.



**NEW ZEALAND**

**Submission to the ADP**

**Addendum to New Zealand's Intended Nationally Determined Contribution**

**25 November 2015**

New Zealand communicated its intended nationally determined contribution together with accompanying information on 7 July 2015.

New Zealand, through this submission, presents an addendum to its INDC to provide further clarity, transparency and understanding about its intended approach to accounting for emissions and removals from forestry and other land use in achieving our 2030 target.

## Addendum to New Zealand's INDC: Forestry assumptions and methodologies

<b>Approach to accounting for forestry and other land use</b>	
<b>Purpose of Addendum</b>	The purpose of this addendum is to enhance the clarity, transparency and understanding of New Zealand's INDC by setting out the assumptions about accounting for anthropogenic greenhouse gas emissions and removals from forestry and other land use underpinning the INDC submitted on 7 July 2015.
<b>Methodologies</b>	New Zealand's accounting for forestry and other land use will be based on a combination of the 2006 IPCC Guidance and the 2013 IPCC Kyoto Protocol Supplement, providing for Kyoto Protocol accounting approaches to be applied to the GHG Inventory land-based categories. This approach recognises that accounting methodologies need to focus on anthropogenic effects, accommodate the specific biophysical characteristics of land use, and create efficient incentives for mitigation that can reconcile multiple sustainable land management objectives.
<b>Forestry and other land use approach</b>	<p>New Zealand's forestry and other land use approach assumes accounting will be either land or activity based, and will apply existing IPCC methodologies to distinguish areas subject to direct human-induced change from those under pre-existing management, as follows:</p> <ol style="list-style-type: none"> <li>a. Forests established after the base year will continue to be accounted for as they would under the Kyoto Protocol, but once they attain their long-term average carbon stock, taking into account all carbon pools and activities, the forest will transfer to the Forest management/Forest remaining forest category, where it will be accounted for under a business-as-usual reference level. New Zealand will continue to account for all deforestation emissions.</li> <li>b. Forests established before the base year will continue to be accounted for under a business-as-usual reference level, as per the Kyoto Protocol, to address the dynamic effects of age structure resulting from activities and practices before the reference year, and the ongoing cycles of forest harvest and regrowth that occur as part of normal, sustainable forest management.</li> <li>c. Accounting provisions to address natural disturbance, land-use flexibility, legacy effects, non-anthropogenic effects and additionality since the base year will also continue to apply, building on existing guidance. Harvested wood products accounting will be based on the production approach.</li> </ol> <p>New Zealand's forestry and other land use approach builds on experience with accounting under the Kyoto Protocol to recognise and focus on additional action, and will create incentives for the establishment of new forests, recognise permanent, long-term enhancements of carbon sinks resulting from new management, and take responsibility for deforestation, while accommodating the long-term cycles in net emissions and removals that arise from sustainable forest management.</p>



## **NEW ZEALAND**

### **Submission to the ADP**

#### **New Zealand's Intended Nationally Determined Contribution**

**7 July 2015**

New Zealand hereby communicates its intended nationally determined contribution and the accompanying information to facilitate clarity, transparency and understanding (decisions 1/CP.19 and 1/CP.20 refer).

Regarding the invitation to Parties to consider communicating their undertakings in adaptation planning, please refer to Chapter 6 of New Zealand's 6<sup>th</sup> national communication submitted to the UNFCCC in December 2013.<sup>1</sup>

New Zealand commits to reduce GHG emissions to 30% below 2005 levels by 2030.

New Zealand's INDC will remain provisional pending confirmation of the approaches to be taken in accounting for the land sector, and confirmation of access to carbon markets. New Zealand will participate actively in discussions on the land sector with our negotiating partners, both in the lead-up to and after COP 21, and will confirm details of the accounting approach we will take prior to or upon ratification of the Paris agreement. In order to achieve domestic reductions and to do so at an affordable cost, we have identified a need for cost-effective mitigation technology, and in particular that our continuing investment in agricultural research delivers results that can be commercialised within the time period covered by this contribution.

New Zealand will communicate its final NDC following agreement on the rules to apply in the above areas.

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<sup>1</sup> [http://unfccc.int/files/national\\_reports/annex\\_i\\_natcom/submitted\\_natcom/application/pdf/sixth-national-communication\\_20131220\[1\].pdf](http://unfccc.int/files/national_reports/annex_i_natcom/submitted_natcom/application/pdf/sixth-national-communication_20131220[1].pdf)

## Information to facilitate clarity, transparency and understanding

Time period	2021 to 2030
Type of commitment	Absolute reduction from base year emissions managed using a carbon budget.
Base year	1990
Reduction level	Emissions will be reduced to 30% below 2005 levels by 2030. The 2005 reference has been chosen for ease of comparability with other countries. This responsibility target corresponds to a reduction of 11% from 1990 levels.
Scope and coverage	The target is economy-wide covering all sectors: <ul style="list-style-type: none"> <li>• Energy</li> <li>• Industrial processes and product use</li> <li>• Agriculture</li> <li>• Forestry and other land use</li> <li>• Waste</li> </ul> and all greenhouse gases: <ul style="list-style-type: none"> <li>• CO<sub>2</sub></li> <li>• CH<sub>4</sub></li> <li>• SF<sub>6</sub></li> <li>• HFCs</li> <li>• PFCs</li> <li>• N<sub>2</sub>O</li> <li>• NF<sub>3</sub></li> </ul>
Methodological approaches for estimating anthropogenic greenhouse gas emissions and removals	This INDC was prepared using 100 year Global Warming Potentials (GWPs) from the IPCC 4 <sup>th</sup> assessment report, the IPCC 2006 greenhouse gas inventory methodologies, and the 2013 IPCC KP Supplement.

New Zealand's INDC assumes that any rules agreed between Parties will allow for the following:

Approach to accounting for the land sector (agriculture, forestry and other land uses)

Application of accounting methodologies that build on existing IPCC guidance where available (including the 2006 IPCC Guidelines and the 2013 IPCC Kyoto Protocol supplement), recognising the specific biophysical characteristics of the land sector and the need to manage multiple objectives, including global food security.

Accounting will be land or activity-based, recognise permanent and additional carbon stock changes, and include provisions to address natural disturbance, permanence, land-use flexibility, legacy and non-anthropogenic effects. Harvested wood products accounting will be on the basis of a production approach.

Use of international market mechanisms:

Unrestricted access to global carbon markets that enable trading and use of a wide variety of units that meet reasonable standards and guidelines to:

- ensure the environmental integrity of units/credits generated or purchased
- guard against double-claiming/double-counting, and
- ensure transparency in accounting.

New Zealand will finalise this INDC following full and final agreement on the accounting rules/guidelines to apply in the above areas, or confirmation in Paris that accounting rules agreed post-Paris will not be applied retroactively.

## National circumstances<sup>2</sup>

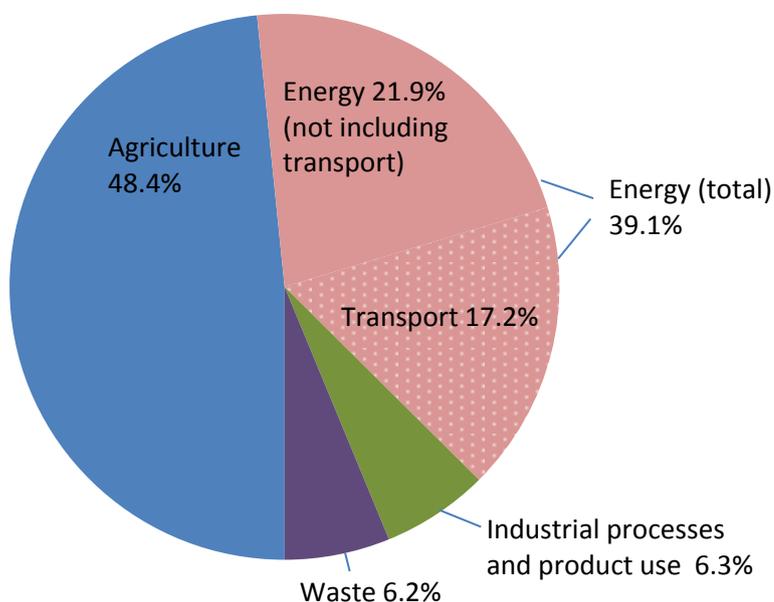
New Zealand is a small, narrow, island country with an open, trade reliant economy that is founded in our land sector. We are dependent on road transport to service a small (but growing) and widely distributed population (4.6 million as of March 2015 at a density of 17 people per square kilometre). Māori (New Zealand's indigenous people) make up 14.9 percent of New Zealand's population.

New Zealand has abundant, diverse renewable energy resources and a proud history of renewable energy development. Around 80 percent of our electricity has come from renewable sources in recent years – this is among the highest in the OECD. We are making progress towards reaching our target of 90 percent of electricity coming from renewable sources by 2025.

The emissions intensity of New Zealand's economy has decreased by 33 percent since 1990. In 2013 New Zealand produced approximately 400 tonnes of CO<sub>2</sub>-equivalent per unit of GDP<sup>3</sup>.

Our land sector is central to New Zealand's economy; it is also a key economic and spiritual resource for Māori. Around 74 percent of New Zealand's exports come from the land sector. Agricultural emissions derived from the production of food for the rest of the world account for approximately half of our total greenhouse gas emissions. However, New Zealand is one of the most efficient agricultural producers in the world.

**New Zealand's 2013 greenhouse gas emissions by sector**  
(as reported in its national inventory report submitted to the UNFCCC in April 2015)



<sup>2</sup> Further information on New Zealand's national circumstances can be found in Chapter 2 of New Zealand's 6<sup>th</sup> national communication:

[http://unfccc.int/files/national\\_reports/annex\\_i\\_natcom/submitted\\_natcom/application/pdf/sixth-national-communication\\_20131220\[1\].pdf](http://unfccc.int/files/national_reports/annex_i_natcom/submitted_natcom/application/pdf/sixth-national-communication_20131220[1].pdf)

<sup>3</sup> Emissions intensity decrease is on a gross emissions basis. GDP unit is millions of NZD in 2009/10 prices.

Our forests are also important. Our planted forests have enabled the phase out of timber from our natural, indigenous forests, protecting these original forests and providing a sustainable supply of timber and wood products for both export and domestic use. Historical forest planting and resulting harvest cycles also have a significant impact on New Zealand's emissions (removals by forest land were 33 percent of gross emissions in 2013) and will continue to do so well into the future.

New Zealand's policy response to climate change is informed by a combination of its unique national circumstances, the level of its targets, and recognition that climate change is a global long-term issue necessitating a global response. New Zealand is committed to being part of this response and has gazetted a target of reducing emissions to 50 percent of 1990 levels by 2050.

The Climate Change Response Act 2002 (the Act) contains the legal framework which enables New Zealand to meet its international climate change obligations. The Act was amended in 2008 to encompass the New Zealand Emissions Trading Scheme (NZ ETS) which is New Zealand's principal policy response for reducing domestic emissions and its primary mechanism to meet international emissions reduction commitments.

New Zealand also works with others to influence emissions well beyond our own footprint. New Zealand has a long-standing commitment to providing leadership in research, innovation and technical solutions to reduce greenhouse gas emissions from agriculture, and sharing this knowledge internationally. The New Zealand Agricultural Greenhouse Gas Research Centre<sup>4</sup> was established to deliver knowledge, technologies and practices to enable New Zealand to enhance agricultural productivity in a carbon constrained world.

New Zealand was a founding member of the Global Research Alliance on Agricultural Greenhouse Gases (GRA).<sup>5</sup> The GRA was established with the aim of increasing international cooperation, collaboration and investment in agricultural greenhouse gas research, to find ways to grow more food without growing greenhouse gas emissions. New Zealand is also an active member of the Friends of Fossil Fuel Subsidy Reform group, and a member of the Climate and Clean Air Coalition.

### **Consultation on the INDC**

Prior to taking decisions on its INDC, the New Zealand Government undertook a public consultation process including publication of a discussion document, public meetings, hui and an invitation to make submissions. Over 17,000 written submissions were received from more than 15,600 submitters. The consultation document (*New Zealand's climate change target*) and related publications (*A general equilibrium analysis of options for New Zealand's post-2020 climate change contribution*, and *Modelling the economic impact of New Zealand's post-2020 climate change contribution*) are available on the Ministry for the Environment's website<sup>6</sup>.

### **Fairness and ambition:**

#### **Fairness:**

It is important to New Zealand that the international community shares the effort required to combat climate change in a fair manner. Each Party must contribute to the extent its circumstances permit. Although New Zealand is responsible for low levels of emissions now

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<sup>4</sup> <http://www.nzagrc.org.nz/>

<sup>5</sup> <http://www.globalresearchalliance.org/>

<sup>6</sup> <http://www.mfe.govt.nz/publications/climate-change/new-zealands-climate-change-target-our-contribution-new-international>

and historically (0.15 percent of global emissions in 2012), New Zealand is committed to doing its fair share in working towards a multilateral climate change solution.

The likely cost to the New Zealand economy of meeting the 2030 target in terms of GDP is greater than that implied by other Parties' tabled targets. This is due to a number of factors, such as already achieving a high level of renewable electricity generation, and almost half of New Zealand's emissions originating from agriculture.

**Ambition:**

New Zealand has set an economy-wide target of 30 percent below 2005 levels by 2030 (which equates to 11 percent below 1990 levels). New Zealand also has a longer term target of reducing emissions to 50 percent below 1990 levels by 2050.

The dominance of biological methane and transport emissions in New Zealand's emissions profile pose particular challenges to our transformation to a low emissions economy. Nonetheless we are taking serious action on each. New Zealand has committed \$45 million to the Global Research Alliance on Agricultural Greenhouse Gases out to June 2019 and a further \$48.5 million through the New Zealand Agricultural Greenhouse Gas Research Centre for research into technology to reduce agricultural greenhouse gas emissions. Maintaining support for this research will continue to be a priority for us.

On transport, in principle New Zealand is well placed to take advantage of its existing baseload of renewable sources of electricity generation (approximately 80 percent in 2014). We have set a target of increasing renewable generation to 90 percent by 2025. This will further support transformation of our transport sector.

Transformation of the transport and agriculture sectors will take longer than the 2021-2030 period covered by this INDC. New Zealand's long-term emission pathway anticipates accelerated emission reductions post 2030 once agricultural mitigation technology becomes more widely applied and uptake of low-emission transport technology increases.

We recognise tackling atmospheric stocks of carbon dioxide as our most pressing collective problem. The limited domestic abatement potential available to New Zealand requires us to make use of global carbon markets to be able to make a contribution that progresses beyond our current target, as this INDC does.

This INDC represents a progression beyond New Zealand's current target, not only in terms of headline number, but also in terms of cost and emissions impact. It also represents a significant reduction from BAU emissions and continuing improvement in the emissions efficiency of the New Zealand economy. The contribution is consistent with the conditional target range pledged by New Zealand at COP 16.

REPUBLIC OF NIGER



Fraternity – Labor - Progress

## «Intended Nationally Determined Contribution (INDC) » of Niger

September, 26<sup>th</sup>, 2015

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## SUMMARY OF THE NIGER INDC

National circumstances	<ul style="list-style-type: none"> <li>- Population: 17.7 millions (80% rural, 20% urban) inhabitants.</li> <li>- Population growth rate: 3,9% (General Census of Population and Dwellings (RGPH), 2011).</li> <li>- Low GDP, US \$6,303.5 million in 2015 (National Institute of Statistics) (INS), or US \$413 per inhabitant, with an agriculture sector that contributes 80% to the income of the populations and is very dependent on climatic risks.</li> </ul>
Losses and damage	<ul style="list-style-type: none"> <li>- Average losses due to drought: more than US \$70 million.</li> <li>- Damage to the economy from floods for the 2000's: US \$18 million.</li> </ul>
National objectives	<ul style="list-style-type: none"> <li>- Assure food security; combat poverty; contribute to the reduction of world greenhouse gas (GHG) emissions (objective 2°C at the 2050 horizon); promote rational management of natural resources, a low-carbon and green-growth development strategy; enhance the resilience of populations and agricultural, forest and pastoral ecosystems.</li> <li>- Adaptation is essential for the country. In order to participate in the mitigation efforts of the international community, Niger favours adaptation actions with strong co-benefits.</li> <li>- Mitigation in the energy sector requires large investments to facilitate access to cheap, sustainable and clean energy.</li> <li>- While mobilising its own national resources, the country hopes to use climate financing and benefit from the support of international cooperation.</li> </ul>
Emissions for the reference year	<ul style="list-style-type: none"> <li>- 30,801 GgCO<sub>2</sub>e. (Second National Communication (SCN), 2000),</li> <li>- Breakdown: Land use, land-use change and forestry (LULUCF), 55.6%; agriculture, 34.6%; energy, 8.5%; waste, 1.2%; industrial processes, 0.06%.</li> </ul>
Coverage and scope of the contribution	<ul style="list-style-type: none"> <li>- 100% of the national territory covered by the intended contributions.</li> <li>- Gases covered: CO<sub>2</sub>, CH<sub>4</sub>, N<sub>2</sub>O (88.7% of the gases emitted).</li> <li>- Agriculture, forestry and other land uses (AFOLU) sector: 89% of the total GHG emissions.</li> <li>- Energy sector: 9% of the total GHG emissions.</li> </ul>
Contribution	<ul style="list-style-type: none"> <li>- Contribution based on a mixed results-and-action approach, unconditional and conditional according to the reference Business as Usual (BaU) scenario.</li> <li>- Results approach: % reduction of emissions, 2020-30.</li> <li>- Action approach: Strategic Framework for Sustainable Land Management (SF-SLM) actions, 2015-29 (Nigerans Feed Nigerans Initiative (I3N) focus).</li> </ul>
Periods	<ul style="list-style-type: none"> <li>- BaU : 2000 and 2030, based on the emissions from the three national communications: Initial National Communication (CNI), 1990, 9,000 GgCO<sub>2</sub>e; Second National Communication (SCN),</li> </ul>

	<p>2000, 30,801 GgCO<sub>2</sub>e; Third National Communication (TCN), 2008, 35,900 GgCO<sub>2</sub>éq.; 2020, 66,821 GgCO<sub>2</sub>éq.; 2030, 96,468 GgCO<sub>2</sub>éq.</p> <ul style="list-style-type: none"> <li>- Implementation period: 2015-2030 (National Durable Land Management Strategy) (SF-SLM).</li> </ul>
Reduction of GHG emissions from now to 2030	<ul style="list-style-type: none"> <li>- Unconditional reduction of 2.5% (BaU 2020) and 3.5% (2030).</li> <li>- Conditional reduction of 25% (BaU 2020) and 34.6% (2030, or a reduction of 33,400 GgCO<sub>2</sub>e).</li> </ul>
GHG emissions mitigation measures at the 2030 horizon	<p><u>AFOLU (Agriculture, Forestry and Other Land Uses) :</u></p> <ul style="list-style-type: none"> <li>- Upscaling of good sustainable land management practices over all agroecological areas in order to increase the resilience of ecosystems and households and sequester carbon.</li> <li>- Sustainable management of forests in order to reduce GHG emissions due to deforestation.</li> </ul> <p><u>Energy:</u></p> <ul style="list-style-type: none"> <li>- Electricity: Improvement of the rate of access to electricity (overall, exceed 10% in 2010, 60% in 2030, of which 47% to 100% is in the urban zone and 0.4% to 30% in 2030 is in the rural zone.</li> <li>- Cooking energy: reduction in the demand for wood energy per inhabitant by the mass spread of improved cook stoves, with a rate of penetration of 100% in urban areas and 30% in rural areas; promotion as domestic gas of biogas and biofuels at both the industrial and family level.</li> <li>- Spread of multifunctional platforms.</li> </ul> <p><u>Renewable energy:</u></p> <ul style="list-style-type: none"> <li>- Exceed a capacity of 4 MW in 2010, 250 MW in 2030, 130 MW of which comes from the Kandadji hydroelectric plant and 20°MW comes from wind energy (currently 0.035 MW).</li> <li>- Double the rate of energy mix to reach 30% energy mix in the primary and final energy balance.</li> </ul> <p><u>Energy efficiency:</u></p> <ul style="list-style-type: none"> <li>- Decrease of 25% in the GDP energy intensity (modern and traditional energy).</li> <li>- Improving energy efficiency in industries and households, transportation and electricity distribution (reduction of losses from 12% to less than 10% in the 2020 horizon).</li> <li>- Low-carbon home construction (without framing).</li> </ul>
Implementation process	<ul style="list-style-type: none"> <li>- Enhancement of institutional, technical, financial and telecommunications capabilities and technology transfer.</li> <li>- Development of standard files, Strategic Environmental and Social Assessments (SESA) and Environmental and Social Impact Assessments (ESIA), Measurement, Notification and Verification (MVN) procedures, project registration.</li> <li>- Inclusive participation (private sector, NGO's, civil society).</li> </ul>

Assumptions and methodology	<ul style="list-style-type: none"> <li>- Second National Communication (SNC), 2000.</li> <li>- IPCC 2006 directives for national GHG inventories.</li> <li>- Energy sector: LEAP, MAED, MESSAGE software.</li> <li>- AFOLU sector: EX-ACT, TARAM software.</li> </ul>
Climate change adaptation measures	<ul style="list-style-type: none"> <li>- Application of all Strategic Framework for Sustainable Land Management (SF-SLM) techniques: <ul style="list-style-type: none"> <li>- Restoration of agricultural/forestry/pastoral lands: 1,030 000 ha.</li> <li>- Assisted natural regeneration: 1,100,000 ha.</li> <li>- Fixation of dunes : 550,000 ha.</li> <li>- Management of natural forests: 2,220,000 ha.</li> <li>- Hedgerows: 145,000 km.</li> <li>- Planting of multiuse species: 750,000 ha.</li> <li>- Planting of <i>Moringa oleifera</i> : 125 000 ha.</li> <li>- Seeding of roadways: 304,500 ha.</li> <li>- Private forestry: 75,000 ha.</li> </ul> </li> </ul>
Financial needs over ten years, for the period 2020-2030	<ul style="list-style-type: none"> <li>- Total cost of the INDC over 10 years: US \$8.667 billion (US \$866.7 per year), or 48% of the GDP and US \$490 per inhabitant, of which: <ul style="list-style-type: none"> <li>- Adaptation: US \$1.607 billion, of which US \$0.337 billion (21%) is unconditional and US \$ 1.270 (79%) is conditional.</li> <li>- Mitigation: US \$7.060 billion, of which \$0.830 billion unconditional (12%) and \$6.230 US conditional (88%).</li> </ul> </li> </ul>
Ambitious and fair character	<ul style="list-style-type: none"> <li>- Since Niger is a non- Annex I Party to the UNFCCC, it has no quantitative obligations with respect to mitigation.</li> <li>- However, Niger is contributing to the reduction of worldwide climate change impacts through a double results/actions approach.</li> <li>- Emissions of 30,801 GgCO<sub>2</sub>e in 2000 (the Second National Communication reference year) represent 2.8 tons per inhabitant and 0.07% of the worldwide emissions of CO<sub>2</sub>. Despite its important need to develop its economy and combat poverty, Niger's ambition is to limit its emissions to 2,1 tCO<sub>2</sub>e/inhabitant in the 2030 horizon (within the framework of the conditional objective).</li> <li>- Since 2015, Niger has been implementing its INDC, through the Strategic Framework for Sustainable Land Management and the Kandadji hydroelectric plant, among other things.</li> <li>- Niger supports the mechanisms of the international CO<sub>2</sub> market, such as the Clean Development Mechanisms (CDM), but revised to facilitate the access of National Development Programmes (NDP) to this financing. For this purpose, it hopes to see a high price for CO<sub>2</sub> (US \$50 /t) that will permit it to reach the global objective of 2°C.</li> </ul>

## 2 NATIONAL CONDITIONS

Niger is a Sahelian country, three-fourths of the area of which (1,267,000 km<sup>2</sup>) is situated in the desert zone, which makes it highly exposed to climate risks, with rainfall that is highly variable during the year, in terms of both space and time.

Its population of 17.7 million has a high rate of demographic growth (3.9% per year) (RGPH, 2011). A completely landlocked country, its GDP was US \$6.3 billion in 2015, or US \$413 per inhabitant, with a human development index of 0.374, placing it in the lowest rank of countries (UNDP). The production of the primary sector, dominated by the agropastoral sector with 37% of the GNP and 80% of employment (INS), varies greatly from year to year.

The objectives of Niger's INDC are to assure food security, combat poverty and contribute to the reduction of world greenhouse gas (GHG) emissions so that they will not increase in excess of 2°C in the 2050 horizon thanks to green growth and a low-carbon development strategy, the purpose of which is to assure resilience of the population and ecosystems.

It should be recalled that in June 1992 Niger signed the United Nations Framework Convention on Climate Change (UNFCCC) and ratified it on 25 July 1995. It also signed the Kyoto Protocol in December 1996 and ratified it on 17 March 2004. In the context of implementing this agreement, Niger prepared and presented to various Conferences of the Parties (COP's) the Initial National Communication and the Second National Communication on climate change. The Third National Communication is now being prepared. In these communications, GHG inventories were performed in five sectors: land use and land use change and forestry; agriculture/animal husbandry; energy; industrial process and use of solvents; and waste management. For more than three decades Niger has made important investments related to reducing vulnerability to climate change, particularly with projects implementing the Maradi commitment (1984) to combat desertification. Although the results of these inventories showed that Niger is first of all a carbon sink because of GHG sequestration, the first three sectors, which are the greatest emission sources in the country, have been the subject of specific mitigation studies.

Like other non-Annex I countries of the list of the UNFCCC, Niger has no obligation to present GHG emissions mitigation measures. At the same time, the fact remains that, since it is a Party to the Convention and in conformity with the commitments made by the states Party to the UNFCCC at the time of COP20 in Lima, Peru, Niger is committed to contributing to the world effort to reduce GHG emissions so that the increase in the global temperature will not exceed 2°C in the 2050 horizon.

With this in view, Niger participates in the global effort to stabilise GHG emissions by presenting its ambitions and its capacity to mitigate these emissions. This capacity depends largely on the application of sectoral priorities and the national strategic frameworks for sustainable development. Thus, Niger's priority is to focus first of all on strategies for adaptation and resilience to climate change.

For Niger's INDC, the adaptation options considered as top priority are those that will permit the higher co-benefits with respect to climate change mitigation, particularly those good adaptation practices and techniques which, at the level of the country's eight regions, will permit carbon sequestration and reduction of GHG emissions at the same time. These adaptation options have already been well defined in the existing strategic frameworks, such as the Economic and Social Development Plan (PDES 2012-2015 and 2016-2020), which flows from the Sustainable Development and Inclusive Growth Strategy - Niger 2035 (SDDCI), the 3N Initiative (Nigerans Feed Nigerans), the National Policy on Climate Change (PNCC), the Strategic Framework for Sustainable Land Management (SF-SLM), and the National Strategy and Plan of Action for Climate Change and Variability (SNPA-CVC).

The preparation of the INDC has included the following steps: designation of an INDC focal point; establishment of the Technical Steering Committee (TSC) made up of the stakeholders; the scoping mission and kick-off workshop; the collection of data and documentary research; the workshop on capacity development and validation of options and analytical results; the national validation workshop on the draft INDC; the adoption of the INDC by the government of Niger; and the submission of the INDC to COP21 in Paris on December 15.

### **3 PRIORITY SECTORS**

The National Communications indicate that the AFOLU and energy sectors represent on average 89% and 9% of Niger's total GHG emissions. Given the potential offered by the country's resources, the national concerns are focussed on issues related to adaptation, particularly in the AFOLU (agriculture/animal husbandry and land use) sector, and on issues related to mitigation, principally in the AFOLU sector and the energy sector (transportation and residential and industrial energy).

The strategy is based on the vision of climatically intelligent agriculture and on access to modern energy services for everyone in 2030. The search for solid co-benefits that combine mitigation and adaptation is the basis for Niger's INDC. However, while the AFOLU and energy sectors are the priority action areas of the INDC on climate change in Niger, the implementation of the INDC actual represents cross-sectoral support for all sectors of the economy.

### **4 MITIGATION COMPONENT**

#### **4.1 General objectives**

Niger's strategy is based on the vision of climate-smart agriculture and on access to modern energy services for everyone in 2030. Concerning the latter point, Niger has adopted the Regional White Book of the Economic Community of West African States (ECOWAS), which recognizes that access to modern energy services makes a major contribution to improved access to basic social services (health, education, potable water); to increased productivity of households in cooking, lighting and transportation; to giving impetus to the creation of income-producing economic activities; to freeing women from chores such as gathering wood and water and shelling peas and beans; to preserving the environment and improving the quality of life of rural populations; and to promoting local jobs and stabilising populations in order to contain the rural exodus and check uncontrolled urbanisation.

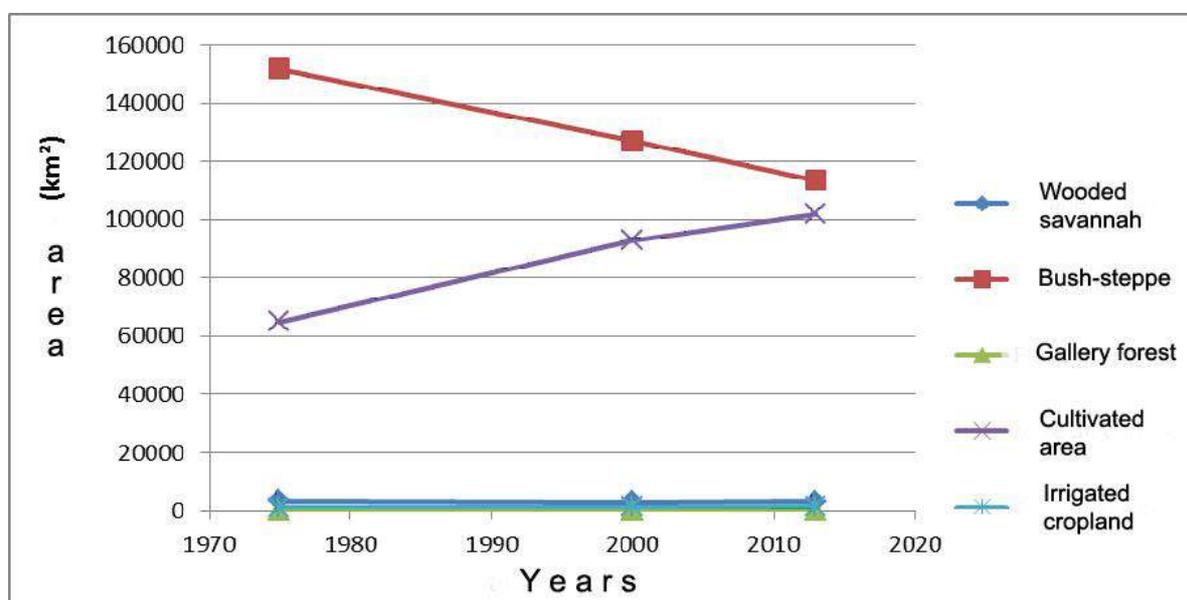
## 4.2 Reference scenario

### 4.2.1 AFOLU sector

The AFOLU sector is characterised by the significant growth of cultivated areas at the expense of forests (the shrub-steppe habitat and grazing lands). This leads to the need to decouple the trends in these types of land occupation by upscaling the good practices of sustainable land management (SLM). The AFOLU sector consists of the following sub-sectors.

- Land use, land-use change and forestry sub-sector (LULUCF):

The loss of 100,000 ha per year to deforestation is due to the clearing of land for agriculture and the exploitation of timber, used principally as household firewood. The shrub-steppe habitat (grazing areas) is giving way to agriculture, with around 4 million ha of grazing land disappearing between 1975 and 2013. This makes it necessary to have an approach based on climate-smart agriculture (CSA). The figure below shows the changes in km<sup>2</sup> of agricultural land and shrub-steppes in Niger from 1975 to 2013 (CILSS/USGS, 2015).



- Agriculture-livestock sub-sector:

The agriculture sub-sector consists of agricultural and grazing activities and its GHG emissions come from enteric fermentation (60%), manure management (39%), on-site burning of residues, agricultural soils and rice growing (1%).

The potential agricultural land represents 13% of the country, of which 40% is cultivated. Low fertilisation, reduced summer fallow and expansion of cultivated land leads to soil degradation through the growth of water and wind erosion and makes it impossible to assure that the biomass of the soil will be maintained.

Only 30% of the irrigable potential of 330,000 ha (I3N 2012-15), located essentially in the Niger river valley and some adjacent valleys, is utilised. Given the country's need for rice, which in the long term will increase because of population growth, it is necessary to implement a policy of increasing the rice-growing area.

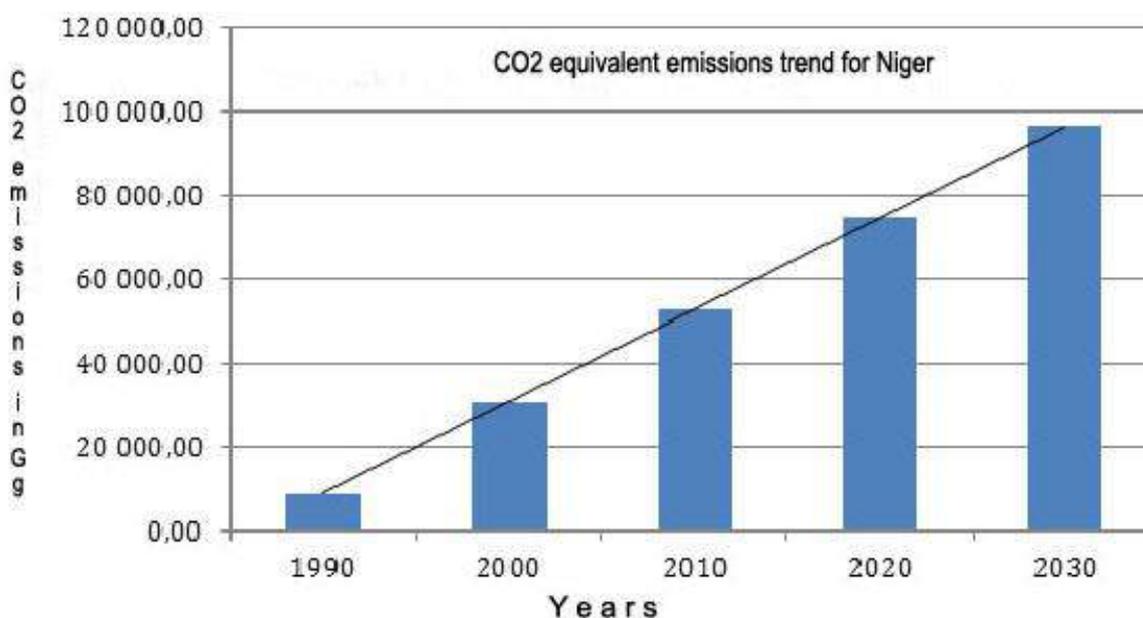
The potential for animal husbandry is significant (37 million head in 2008, SDE, 2013-35) thanks to vast grazing areas that can be exploited through transhumance and the development of large above-ground water resources. The population's attachment to the practice of grazing is encouraged by the presence of a market of almost 160 million consumers in Nigeria, which shares a 1,500 kilometre border with Niger.

#### 4.2.2 Energy sector

The National GHG Inventory Report of 2000 divides the GHG emissions of the energy sector among transportation (41%), residential (37%), power production units (15%) and manufacturing industries (5%). The other sub-sectors (business and institutional, agriculture-fishing-fish farming, mines) total less than 3%. National energy consumption is going to triple between now and 2030, principally because of strong growth in the residential, transportation, industrial and mining sub-sectors.

#### 4.2.3 Overall GHG emissions trends under BAU

Taking 2000 as the base year (SNC) and an INDC implementation period extending from 2015 to 2030 (SF-SLM), the figure below shows the GHG emissions trend for Niger between 1990 and 2030.



The base year emissions are 30,801 GgCO<sub>2</sub>e, distributed between LULUCF: 55.6%; Agriculture: 34.6%; Energy: 8.5%; Waste: 1.2%; and Industrial processes: 0.06%.

The 2000 and 2030 BaU are based on the emissions levels in the three National Communications: Initial National Communication, 1990: 9,000 GgCO<sub>2</sub>e; Second National Communication, 2000: 30,801 GgCO<sub>2</sub>e; Third National Communication, 2008: 35,900 GgCO<sub>2</sub>e; BAU, 2020: 66,821 GgCO<sub>2</sub>e; BAU, 2030: 96,468 GgCO<sub>2</sub>e.

## 4.3 Conditional and unconditional mitigation measures

### 4.3.1 AFOLU sector

The upscaling of good SLM practices are, at the same time, measures of adaptation to climate change and measures to mitigate GHG emissions. Their implementation is the object of ongoing and planned projects and is accompanied by research into the improvement of agro-silvo pastoral productivity. These have been selected for the INDC: restoration of agricultural, forest and grazing land: 1,030,000 ha; assisted natural regeneration: 1,100,000 ha; dune fixation: 550,000 ha; management of natural forests: 2,220,000 ha; hedgerows: 145,000 km; planting of multi-use species: 750,000 ha; planting of *Moringa oleifera*: 125,000 ha; seeding of roadways: 304,500 ha; and private forestry: 75,000 ha. A total cost model for upscaling good SLM practices comes to US \$1.27 billion. The strategic framework for sustainable land management (SF-SLM 2015-2029) indicates mobilisation of financing at the level of 10% of the costs of upscaling, i.e. US \$107.6 in 2009, through the unconditional budget of the government and the financial partner. The conditional SLM comes to US \$968.06 million.

### 4.3.2 Energy sector

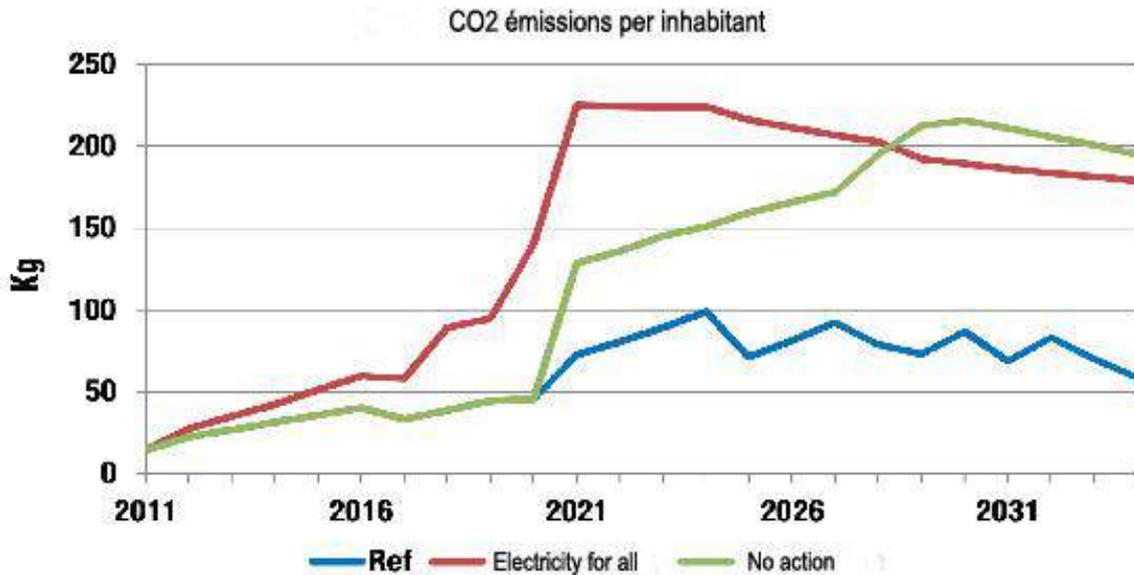
The unconditional mitigation options in the energy sector concern the management of the residential sub-sector through rural electrification and the conservation and replacement of wood energy; the management of the transportation and residential sub-sectors; rural electrification; economising of wood energy and reduction of specific consumption in transportation; management of the sector concerned with the demand for and transformation and dissemination of renewable energies; improving the energy efficiency of the sectors; and promoting solar photovoltaic for pumping and electrification.

The conditional technologies for the energy sector in the medium and long terms relate to: exploitation of photovoltaic and thermal solar energy; exploitation of wind energy; construction of a nuclear power plant and a gas power plant; hydroelectricity; economising the use of wood for cooking; energy efficiency; use of biogas; and construction of frame-free buildings. The impact of the electricity scenarios on the reduction of GHG has been evaluated in an IAEA report.<sup>1</sup> CO<sub>2</sub> emissions per inhabitant will increase more significantly in the Electricity for All scenarios and the no action scenario (without reduction of GHG). This is explained by the greater utilisation of coal in electricity production under these two scenarios. The National Action Plan for Sustainable Energy for All (SE4ALL) is calculated to cost US \$6 billion in the 2030 horizon. The unconditional financing that has been mobilised and the conditional financing total US \$5.28 billion.

The mitigation potential of the energy sector is 700 GgCO<sub>2</sub>e, i.e. 0.7% of the total national emissions. A reduction in this emission is noted in the Electricity for All scenario beginning in 2025, which is explained by the growth of production from gas and by the entry of nuclear power production into the system, as shown in the figure below (CO<sub>2</sub> emissions per inhabitant under three scenarios).

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<sup>1</sup> Evaluation study of electricity supply and demand in Niger from 2010 2035, 2014.

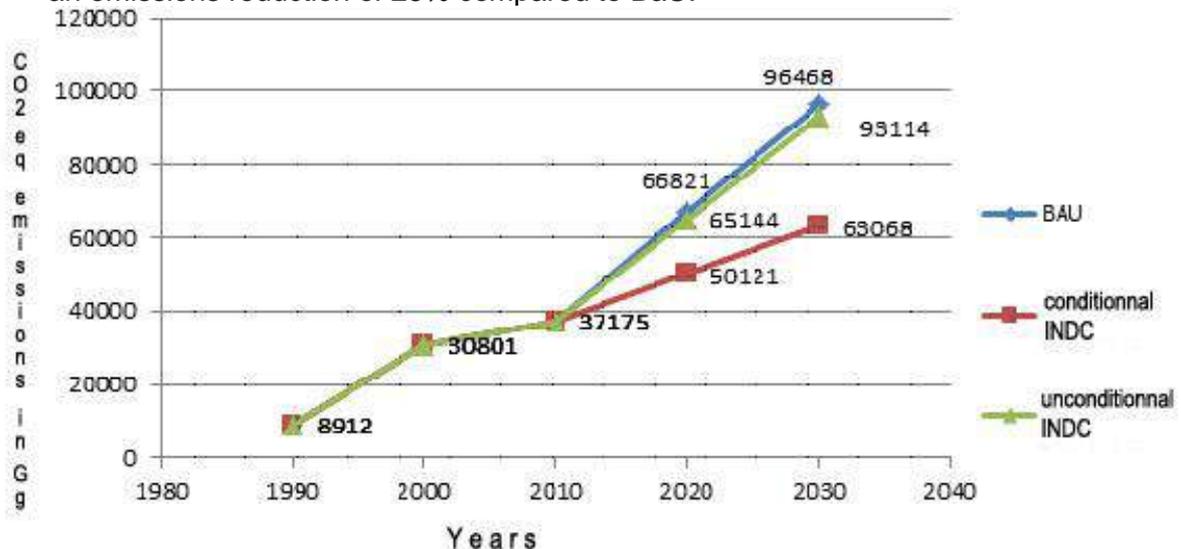


Source: PANEDT/IAEA, 2014

#### 4.3.3 Mitigation of the two sectors put together

Niger's contribution is based on a results-action mix. The emissions reduction of the two priority sectors, AFOLU, and energy is estimated at 33,400 GgCO<sub>2</sub>e, 34,7% compared to BaU in 2030. According to figure 3 below:

- For 2030, the INDC with unconditional financing permits a GHG emissions reduction of 3.5% compared to BAU, while the INDC with conditional financing permits an emissions reduction of 34.6 % compared to BaU.
- For 2020, the INDC under unconditional financing permits a 2.5% reduction of GHG emissions compared to BaU (2030), while the INDC with conditional financing permits an emissions reduction of 25% compared to BaU.



The overall cost of the conditional INDC is US \$6.25 billion, or 87%, and the overall cost of the unconditional INDC is US \$827 million, or 13%, as shown in the table below (summary of GHG emissions reductions and costs for 2020-2030).

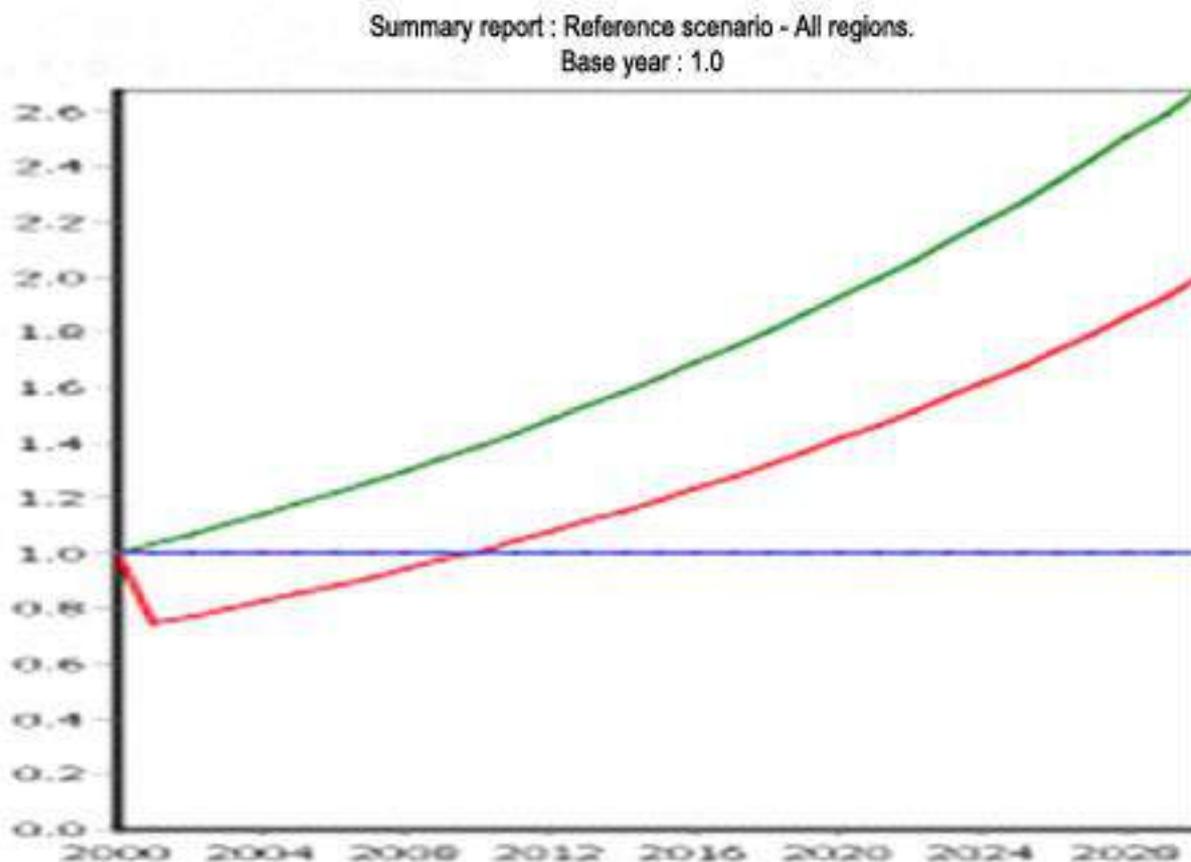
	GHG reduction in comparison to BaU 2020	GHG reduction in comparison to BaU 2030	Costs compared to BaU 2030 in billions of USD
Conditional INDC	25%	34.6%	6.25
Unconditional INDC	2.5%	3.5%	0.83

#### 4.4 Ambition and fairness

Niger's GHG emissions of 30,801 GgCO<sub>2</sub>e represent 2.8 t per inhabitant and only 0.061% of world CO<sub>2</sub> emissions. Since it is non-Annex I Party to the UNFCCC, Niger does not have a quantitative obligation in terms of mitigation. However, despite its great need to develop its economy and the need to lift a large part of its population out of poverty, Niger's ambition is to limit its emissions to 2.1 t CO<sub>2</sub>e per inhabitant in the 2030 horizon, within the framework of a conditional objective. To do this, Niger hopes to see a carbon price commensurate with international concerns (US \$50/t), which would facilitate the double results/actions approach and optimise its contribution on a worldwide scale.

#### 4.5 Method used to estimate emissions

The reported GHG emissions contained in the three National Communications have been used to establish the greenhouse gas trends in Niger from 1990 to 2030. In the AFOLU sector, the EX ACT programme has been used to simulate the carbon stored in the projects between the two dates. In the energy sector, the LEAP model has been used, as shown in the figure below (projection of total energy demand in the 2029 horizon).



For the study on “the evaluation of Niger’s energy demand and supply for the period 2010-2035” (Ministry of Energy and Petroleum/Bureau of Energy, December 2013), the IAEA models MAED and MESSAGE were used.

## **5 ADAPTATION COMPONENT**

### **5.1 Justification of the component**

Niger is not a country that represents a source of GHG emissions, but rather a net absorption sink. Moreover, since Niger is situated along the edge of the dry areas of the Sahara, it is directly impacted by the consequences of climate change. Taking into consideration the potential offered by the country’s resources, the national concerns are centred first of all on issues related to adaptation (with its mitigation co-benefits) in the priority AFOLU sector, and then in the priority energy sector (transportation and residential and industrial energy). The other areas important to the country are those related to transfer of technology and capacity building.

### **5.2 Impacts of climate change and Niger’s vulnerability**

Various studies carried out in connection with the National Communications on climate change in Niger mention the increasing variability of precipitation in terms of both space and time; a trend of increased temperatures, particularly since 1996; increased frequency and intensity of extreme climate risks (droughts, floods, violent winds and sand and dust storms, the enemies of crops); the silting of water courses (Niger River valley and Lake Chad) and oases; drought losses in Niger estimated at more than US \$70 million (World Bank, Climate Risk Assessment, Niger, 2012); the damage, including costs, caused to key sectors of the economy by the floods in the 2000’s, estimated at US \$18 million (DPCS, OCHA 2009).

### **5.3 National Priorities for Adaptation to Climate Change**

The national priorities for the AFOLU sector relate to improving the resilience of the agriculture, animal husbandry and forestry sub-sectors. The other priorities concern water resources, fishing, fauna, health and capacity building of the actors at all levels. Adapting to climate change is a challenge for the country. In order to achieve it, the adaptation techniques appropriate for Niger relate in particular to sustainable land management (SF-SLM 2014), renewable energy and energy efficiency. Because of its relevance and its conclusions, the SF-SLM is the chosen reference document for the INDC.

### **5.4 Niger’s initiatives supporting adaptation**

Of the projects focussed on adaptation to climate change in Niger, the following are already under way:

- Projects financed by the French Development Agency (AFD), including extension of the NIGELEC electrical network (US \$46.33 million); the socioeconomic development of Kandadji (US \$15.8 million); support for the food security of households (US \$1.36 million); development and management of the Badaguichiri watershed (US \$12.4 million); and management of the natural forests for the sustainable supply of wood energy to Sahelian cities (Bamako, Ouagadougou and Niamey) (US \$1.7 million).
- The PANA Resilience/FEM/ACDI project (US \$7.0 million), which has been going on since 2010 at the commune level in seven regions and allows the good practices to be put to use in the use of improve varieties, market gardening, use of meteorological data, seeding of degraded grazing areas and income-producing activities.
- The African Climate Change Adaptation Programme (P2AA) (US \$610,000), which is setting up an index-based insurance prototype to prevent episodes of drought.

- The PNUD/FED Community Based Adaptation project (CBA) costing US \$4.26 million over four years beginning in 2015, which is operating in the departments of Dakoro and Bermo.
- The Climate-Smart Agriculture Support Project of HC-13N, financed by the World Bank in the amount of US \$111 million beginning in 2016 and lasting five years in 20 departments.
- The PRASE-FEM project, the objective of which is to facilitate access to power services, for a cost of US \$5.47 million.
- The Strategic Programme for Climate Resilience (PSRC), consisting of three projects (PAC-RC, PROMOVARE and PDIPC) and financed at the level of US \$100 million.
- The Food Security Support Project in the Maradi region (PASADEM) for a cost of \$ US 31.7 million, which is dealing with aspects of resilience in the rural environment.
- And a number of other projects financed through bilateral and multilateral cooperation.

## **5.5 Adaptation measures**

The consultations with stakeholders have stressed the need for the INDC to seek complementarities with existing processes by preventing its contents from replacing, duplicating or weakening the national climate change response processes that are already under way, such as the National Adaptation Programme (NAP) and Nationally Appropriate Mitigation Actions (NAMA), which are the reference national processes for adaptation and mitigation. Thus, in order to be complementary with the existing processes, the INDC aims at specific measures and is committed to applying them. In the priority AFOLU priority sector, the implementation of the proposed INDC relates to the application of a set of techniques coming from the SF-SLM over the period 2015-2030. The table in Annex 2 lists the techniques from the SF-SLM and the objectives in terms of areas covered that have to be achieved to implement them in the INDC. Thus, the cost of upscaling the SF-SLM is estimated at US \$1.27 billion (conditional), knowing that US \$0.337 billion (unconditional) has already been mobilised, for an overall adaptation cost of US \$1.607 billion. Mitigation in the energy sector requires much larger investments in order to permit access to clean, sustainable and affordable energy. However, in the National Adaptation Plan and the INDC's vision for 2050, Niger would have to include all or part of a wide range of infrastructures (highways, bridges, dikes, construction projects to mobilise and enhance water resources, projects and networks to clean up used water and solid waste).

## **5.6 Co-benefits**

The co-benefits in the AFOLU sector consist of the results of implementing and upscaling the Climate-Smart Agriculture activities: strengthening of the good practices of assisted natural regeneration and recovery of degraded land; improvement of the balance sheet of cereals and fodder, along with food and nutritional security; development of local agro-climate information; job creation and reduction of the rural exodus; and strengthening of social cohesion. The projected annual benefits and costs of implementing and upscaling the techniques recommended in the SF-SLM and selected for the AFOLU sector in Niger's INDC are presented in the table in Annex 3, and the cost of implementing the SF-SLM over the first ten years (2016-2030) is estimated at US \$127,393,000. The co-benefits in the energy sector relate to improvement in the people's living conditions as a result of increased income through social welfare, access to potable water, education and health, as well as access to new information and communication technologies (NICT) and energy equipment, development of local entrepreneurship, alleviation of women's domestic duties and reduction of the rural exodus through job creation.

## **5.7 Accent on Climate-Smart Agriculture**

The techniques of climate-smart agriculture (CSA) are consistent with the objectives of the INDC (adaptation, mitigation and food security) by strengthening grassroots development. Climate-smart agriculture takes into account weather information, early warning, the management of risks and disasters and index-based agricultural weather insurance. The inclusion of climate change in local (PDC programme), regional and national planning (in the health and animal husbandry sectors) are tested and approved good practices in Niger and are therefore taken into consideration in the INDC. The advantages brought by the measures of climate-smart agriculture should satisfy from the outset all of the actors involved in the responses to climate change: on the one hand the people of Niger and their government, who thus set adaptation to climate change and food security as a priority and, on the other hand, the international community, which sees that the mitigation of climate change is effectively taken into account in the adaptation measures. In addition, these measures can be put in place immediately and thus make it possible to give priority to this action since the technical experimentation phase is being carried out in the various agroecological regions of the country (it remains only to upscale them) and because their impacts and their costs and benefits have been evaluated and their socioeconomic relevance and economic return have been demonstrated. Emphasising these objectives and results, which are clearly defined in Niger's INDC, should allow the technical and financial partners to support this integrated vision of adaptation and mitigation. This will make it possible to galvanise their technical and financial support for the implementation of these responses, which are both workable and well suited to linking good climate change options to national development.

## **6 IMPLEMENTATION OF THE INDC**

### **6.1 Institutional structure**

The process of implementing the INDC is an opportunity to build institutional and technical capacities, stimulate policy integration and promote inclusive development. The national institutions necessary to implement the INDC programmes exist. They are the Ministry of the Environment, Urban Hygiene and Sustainable Development (MESUDD), the agency currently responsible for the preparation of the INDC, in cooperation with the Executive Secretariat of the National Council of the Environment for Sustainable Development (CNEDD), the focal point for the UNFCCC. However, alternatives can be envisaged: institutional anchoring of the INDC to MESUDD, with focal points in the concerned institutions; establishment of an operationally independent executive agency; a supreme authority for the INDC, etc. An institutional analysis will have to be considered to evaluate these options.

## 6.2 Obstacles and gaps

To obtain the necessary financing, one option would be to request international aid from the donors (the conditional option). Another option would be to attract financing from the private sector to implement the SF-SLM. For this purpose, the communities have the possibility of selling mitigation services on the carbon market. The possible problems with this option are the difficulty of accessing this market and the low level of current prices for carbon credits. Whether the financing is acquired conditionally or unconditionally, follow-up actions will be essential to assure efficient use of the funding that is granted.

Another major obstacle to implementing the INDC is the country's high rate of population growth. At present, this rate is 3.9% per year, although the government is committed to reducing the rate to 2.5% in the 2035 horizon (Sustainable Development and Inclusive Growth Strategy (SDDCI) 2012-2035).

The illiteracy of the rural population represents a real impediment to the dissemination of the technologies of climate-smart agriculture and sustainable land management so that these techniques can be upscaled. Effective schooling and the spread of literacy among the rural population, accompanied by a rural extension system, are in any case necessary to allow understanding and implementation of the techniques recommended in the INDC.

The low qualification level of human resources, the insufficiency of logistical means and the institutional conflicts related to supporting the upscaling of good practices require strengthening of rural leadership, particularly in the AFOLU sector. It is also necessary to secure agricultural and pastoral land tenure and to have competent field operators to improve the absorption capacity.

The implementation of these measures requires improved coordination between institutions, synergy between policies and strategies, and appropriate allocation of expertise in the case of cross-sector projects.

## 7 THE COUNTRY'S NEEDS

The sustainable development objectives to which the INDC contributes cannot be realised without the transfer of appropriate technologies and the financing and building of competencies, while taking into account the national economic and social development priorities defined for the various strategic frameworks.

### 7.1 Financial support

Attaining the objectives of Niger's INDC requires a total investment estimated at US \$8.667 billion, US \$7.5 billion of which (87% of the total) is dependent on access to new sources of financing (the Green Climate Fund and other climate financing mechanisms). The unconditional financing coming from the government's own resources and public development aid is estimated at US \$1.167 billion, or 13% of the total cost.

### 7.2 Technology transfer

In order to implement the INDC, Niger will emphasise the need for the transfer of knowledge and technology in the priority sectors of AFOLU and energy. This needs relate essentially to the upscaling of the good practices of climate-smart agriculture, to renewable energy technologies, to energy efficiency and to other action areas such as integrated water resources management (IWRM), urban waste management, fauna, fishing, social and health protection etc.

### **7.3 Capacity building**

Capacity building relates to the design of bankable projects and the understanding of the donors' rules and procedures; the evaluation of adaptation projects in terms of economic and financial analysis; the establishment of the measurement, notification and verification system (MNV); knowledge and understanding of the INDC implementation process; strategic environmental and social assessments (SESA) and environmental and social impact statements (ESIA); land use planning; good practices for carbon management and sequestration; the carbonisation chain of charcoal for domestic use; the mapping of soils; the development of a national forestry plan; and the rational management of liquid and solid wastes etc. These activities should concern, first of all, the stakeholders in the INDC implementation process in Niger: the actors concerned with implementation of the INDC; the economic actors, primarily rural smallholders, the Producer Organisations (PO: agriculture, animal husbandry etc.) and any INDC investor that already has in place advanced planning for his project; and representatives of the civil society and NGO's. If INDC investments represent around 83% of the total amount, the operating cost can be estimated at 17% (particularly follow-up and evaluation), 10% of which is to be allocated to technology transfer and capacity building.

### **7.4 Monitoring, evaluation and management**

The INDC's institutional implementation structure includes the following: a "Country monitoring and evaluation system" which takes into account gender, measurement, notification and verification (MNV) procedures, and a register of INDC projects.

The monitoring and evaluation system and INDC capitalisation will be implemented based on: monitoring and evaluation of the implementation process which will examine aspects of inter-sector coordination, of the decision-making process, etc., follow-up and evaluation of the effects and impacts of the INDC based on relevant criteria and indicators and the definition of corrective measures for climate, environmental, economic and social protection, monitoring of risk and of the evolution of vulnerability to climate change at the national level, and capitalisation of experiences and the lessons learned.

## 8 ANNEXES

### 8.1 Annexe 1 : Abbreviations and acronyms

AFD	Agence Française de Développement (French Development Agency)
AFOLU	Agriculture, Forestry and Other Land Uses
ANR	Assisted Natural Regeneration
BaU	Business as Usual (normal course of affairs without the INDC)
CBA	Community Based Adaptation
CC	Climate Change
CDM	Clean Development Mechanism
CILSS	Comité Inter-Etats de Lutte contre la Sécheresse au Sahel (Inter-State Committee to Combat Drought in the Sahel)
CSA	Climate-Smart Agriculture
CNEDD	Conseil National de l'Environnement pour un Développement Durable (National Environmental and Sustainable Development Council)
CNI	Initial National Contribution
CO <sub>2</sub>	Carbon dioxide
COP	Conference of the Parties
CTN-CVC	Commission Technique Nat. sur les Chang. et la Variabilité Clim. (National Technical Commission on Climate Change and Variability)
ECOWAS	Economic Community of the West African States
ESIA	Environmental and Social Impact Assessment
Ex-ACT	Ex-Ante Carbon-Balance Tool (software)
FED	European Development Fund
FEM	Global Environment Facility
GCF	Green Climate Fund
GDP	Gross Domestic Product
Gg CO <sub>2</sub> e	Gigagrammes equivalent carbon dioxide
GHG	Greenhouse gas
I3N	Initiative « Les Nigériens Nourrissent les Nigériens » (Nigerans Feed Nigerans Initiative)
IAEA	International Atomic Energy Agency
INDC	Intended Nationally Determined Contribution
INS	Institut National des Statistiques (National Institute of Statistics)
LDC	Less Developed Countries
LEAP	Long-range Energy Alternatives Planning system (software)
LULUCF	Land Utilisation, Land Use Change and Forestry
MAED	Energy Demand Analysis Model
MESSAGE	Model for Energy Supply Strategy Alternatives and their General Environmental Impacts
MESUDD	Ministry of the Environment, Urban Hygiene and Sustainable Development
MNV	Measurement, Notification, Verification (MDP, REDD etc.)
NAMA	Nationally Appropriate Mitigation Actions
NAP	National Adaptation Programme
OCHA	Office for the Coordination of Humanitarian Affairs
P2AA	African Climate Change Adaptation Programme
PANA	National Action Plan for Adaptation
PASADEM	Maradi Project to Support Food Security for Development

PDC	Plan de Développement Communal (Commune Development Plan)
PDES	Programme de Développement Economique et Social (Economic and Social Development Plan)
PNCC	Politique Nationale sur les Changements Climatiques (National Climate Change Policy)
RGPH	Recensement Général de la Population et de l'Habitat (General Census of Population and Housing)
SCN	Seconde Communication Nationale (Second National Communication)
SDDCI	Stratégie de Développement Durable et de Croissance Inclusive (Sustainable Development and Inclusive Growth Strategy)
SDE	Schéma de Développement de l'Elevage (Animal Husbandry Development Scheme)
SESA	Strategic Environmental and Social Assessment
SLM	Sustainable Land Management
SF-SLM	Strategic Framework for Sustainable Land Management
SNPA/CVC	Strat. Nat. et le Plan d'Action en matière de Chang. et Variabilité Clim. (National Strategy and Action Plan for Climate Change and Variability)
TARAM	Tool for Afforestation and Reforestation Approved Methodologies
TCN	Troisième Communication Nationale (Third National Communication)
TFP	Technical and Financial Partner
TMC	Technical Monitoring Committee
UNDP	United National Development Programme (PNUD)
UNFCCC	United Nations Framework Convention on Climate Change

## 8.2 Annex 2: Projected annual benefits and costs of adaptation measures

Techniques	Surface area (in thousands of ha)	First quantified benefit	Second quantified benefit	Costs (in thousands of \$)
Restoration of agricultural land	1,030	Increased yields	Increased earnings	309,000
Assisted natural regeneration	1,100	Increased yields	Increased earnings	33,000
Dune fixation	550	Increased yields	Increased earnings	220,000
Management of natural forests	2,220	Timber.	-	222,000
Planting of hedgerows (145,000 km) :	29	Increased yields	Increased timber	46,980
Planting of gum trees and doum	750	Gum and leaves	Increased timber	300,000

palms				
Planting of Moringa oleifera	125	Leaves	-	37,500
Herbaceous seeding	304.5	Straw and fodder	-	30,450
Private forestry	750	Timber	-	75,000
TOTAL	6,858			1,273,930

Source: Workshop on capacity building of actors, CPDN 2015.

### 8.3 Annex 3 : Projected areas in sustainable land management (SLM) for the INDC

The annual cost of implementing the Strategic Framework for Sustainable Land Management (SF-SLM) over the first ten years (2016-2030) is estimated at US \$127,393,000, as indicated in the table below (proposed schedule and budget for Niger's INDC adaptation measures, in areas and costs per year for the first ten years).

SF-SLM technologies	Projected annual areas for the period 2016-30 (in ha/year)	Annual budget for the period 2016-30 (in US\$)
1. Restoration of agricultural land	68,667	30,900,000
2. Assisted natural regeneration	73,333	3,300,000
3. Dune fixation	36,666	22,000,000
4. Management of natural forests	148,000	22,200,000
5. Hedgerows	9,667	4,698,000
6. Planting of gum trees and douma palms	50,000	30,000,000
7. Planting of <i>Moringa oleifera</i>	8,333	3,750,000
8. Herbaceous seeding	20,300	3,045,000
9. Private forestry	50,000	7,500,000
TOTAL		127,393,000

Source: Workshop on capacity building of actors, INDC, 2015.

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## **NIGERIA'S INTENDED NATIONALLY DETERMINED CONTRIBUTION**

### **1. National Context**

In 2014, Nigeria became the largest economy in sub-Saharan Africa. Nigeria is a lower middle income developing country, the GDP per capita in current US\$ is about \$2,950. The economy is diversifying and has grown over 6% per year for the past decade. Yet, significant challenges remain. Food insecurity, poor access to energy and high unemployment, amongst others, remain principal constraints on economic development and are of primary concern to the government. Those below the poverty line of US\$1.25 PPP still make up 30% of the population. The recent sharp decline in world oil prices has put pressure on the federal government budget, which continues to depend significantly on export revenues. The Nigeria INDC, therefore, focuses on the delivery of direct development benefits and sustainable growth of the economy.

In addition to these challenges, the country is considerably impacted by climate change. The north of the country, for example, is highly vulnerable to drought. A recent Pew Research Center global attitudes survey<sup>1</sup> found that 65% of Nigerians are very concerned about the threat climate change poses, ahead of global economic instability (48%). HE President Buhari has stated in his inaugural speech that Nigeria is committed to tackling climate change. Nigeria's INDC demonstrates its determination to contribute to the success of the Paris climate summit in December 2015 and to grow its economy sustainably while reducing carbon pollution.

The INDC promotes sustainable development and delivering on government priorities. The policies and measures included in the Nigeria INDC will deliver immediate development benefits and do not compromise sustainable growth, on the contrary. Ambitious mitigation action is economically efficient and socially desirable for Nigeria, even when leaving aside its climate benefits. The policies and measures alleviate poverty, increase social welfare and inclusion, as well as improving individual well-being, which includes a healthy environment. Furthermore, by not undertaking these measures Nigeria would incur significant adaptation costs from exacerbated climate change.

Nigeria has been actively engaged in international climate policy negotiations since it became a Party to the UN Framework Convention on Climate Change (FCCC) in 1994 ratifying its Kyoto Protocol in 2004. Nigeria submitted its First National Communication (FNC) in 2003 and a Second National Communication in February 2014. Nigeria is host to a number of Clean Development Mechanism projects, as well as projects financed by the Adaptation Fund. In September 2012, the Federal Executive Council approved the Nigeria Climate Change Policy Response and Strategy. HE, President Muhammadu Buhari, The President of the Federal Republic of Nigeria on 26 November 2015, approved the Nigeria INDC.

## 1 Summary

The table below summarises Nigeria's INDC.

**Table 1: Summary of key aspects of Nigeria's INDC**

Aspect	Detail																								
Type of objective	Reduction from Business as Usual (BAU)																								
Target year	2030																								
Implementation Period	2015-2030																								
Base data period	2010-2014																								
Summary of objective	Economic and social development: grow economy 5% per year, improve standard of living, electricity access for all																								
Unconditional and conditional mitigation objectives	20% unconditional, 45% conditional																								
Key measures	<ul style="list-style-type: none"> <li>• Work towards ending gas flaring by 2030</li> <li>• Work towards Off-grid solar PV of 13GW (13,000MW)</li> <li>• Efficient gas generators</li> <li>• 2% per year energy efficiency (30% by 2030)</li> <li>• Transport shift car to bus</li> <li>• Improve electricity grid</li> <li>• Climate smart agriculture and reforestation</li> </ul>																								
Trajectory [update figure once agreed]	<table border="1"> <caption>Carbon Dioxide Equivalent Emissions (Millions of tonnes)</caption> <thead> <tr> <th>Year</th> <th>Business As Usual</th> <th>Unconditional</th> <th>Conditional</th> </tr> </thead> <tbody> <tr> <td>2010</td> <td>330</td> <td>330</td> <td>330</td> </tr> <tr> <td>2015</td> <td>420</td> <td>420</td> <td>420</td> </tr> <tr> <td>2020</td> <td>520</td> <td>500</td> <td>450</td> </tr> <tr> <td>2025</td> <td>650</td> <td>580</td> <td>470</td> </tr> <tr> <td>2030</td> <td>900</td> <td>700</td> <td>480</td> </tr> </tbody> </table>	Year	Business As Usual	Unconditional	Conditional	2010	330	330	330	2015	420	420	420	2020	520	500	450	2025	650	580	470	2030	900	700	480
Year	Business As Usual	Unconditional	Conditional																						
2010	330	330	330																						
2015	420	420	420																						
2020	520	500	450																						
2025	650	580	470																						
2030	900	700	480																						
Emissions per US\$ (real) GDP	0.873 kg CO <sub>2</sub> e (2015) [0.491 kg CO <sub>2</sub> e (2030)]																								
GDP per capita (US\$)	2,950 (2014) 3,964 (2030; real 2015 US\$)																								

Estimated emissions per capita	Current: around 2 tonnes CO <sub>2</sub> e 2030 BAU: around 3.4 tonnes CO <sub>2</sub> e 2030 Conditional: around 2 tonnes CO <sub>2</sub> e
Global Warming Potentials used	IPCC Fourth Assessment Report
Cost Estimate Data	National Cost = \$142b; National Benefits = \$304b (World Bank report “Low Carbon Development Opportunities for Nigeria” (2013))
Gases covered	CO <sub>2</sub> , N <sub>2</sub> O, CH <sub>4</sub>
Emissions as % of global total	<1% (2010)
Historical emissions (1850-2010)	2,564.02 million tonnes

Under a business-as-usual growth scenario, consistent with strong economic growth of 5% per year, Nigeria’s emissions are expected to grow to around 900 million tonnes per year in 2030, which translates to around 3.4 tonnes per person. The key measures below could potentially reduce emissions by around [45%] compared to business as usual.

Yet, Nigeria has a great potential for climate smart development, given support for implementation. Much of the reduction potential identified has zero net cost or indeed achieves a net economic benefit. That is, the measures would benefit Nigeria overall, even before taking into account the climate benefits.

**Table 2: Key mitigation measures**

Measure	Potential GHG reduction (million tonnes per year in 2030)
Economy-wide energy efficiency	179
Efficient gas power stations	102
Work toward ending of gas flaring	64
Climate smart agriculture	74
Reduce transmission losses	26
Renewable energy	31

## 2 National Development Strategy and Planning

In recent years, two development strategy documents have directed the development process in Nigeria:

- i. **Vision 20:2020:** The Federal Government’s economic growth plan, *Nigeria Vision 20:2020, Economic Transformation Blueprint* (2009), recognizes the changing

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climate as a threat to sustainable growth in the next decade. It sees climate change as a critical challenge globally and, in Nigeria, as a potential driver of “*damaging and irrecoverable effects on infrastructure, food production and water supplies, in addition to precipitating natural resource conflicts.*” This recognition is an important first step towards a climate change adaptation strategy and action plan.

- ii. **Transformation Agenda 2011 – 2015:** The agenda converts the full suite of priority policies and programs into projects, in order to ensure continuity, consistency and commitment of national development efforts. It identified 1613 projects across from 20 Ministries.

In retrospect, however, the policy and implementation framework did not adequately address issues of climate change.

## 2.1 Climate Change Policy Framework

In order to reflect the increasing importance of climate change issues in Nigeria, the Federal Executive Council adopted in 2012 the *Nigeria Climate Change Policy Response and Strategy*. To ensure an effective national response to the significant and multi-faceted impacts of climate change, Nigeria has adopted a comprehensive strategy, as well as a number of specific policies. The strategic goal of the *Nigeria Climate Change Policy Response and Strategy* is to foster low-carbon, high growth economic development and build a climate resilient society through the attainment of the following objectives:

- ✓ Implement mitigation measures that will promote low carbon as well as sustainable and high economic growth;
- ✓ Enhance national capacity to adapt to climate change;
- ✓ Raise climate change related science, technology and R&D to a new level that will enable the country to better participate in international scientific and technological cooperation on climate change;
- ✓ Significantly increase public awareness and involve private sector participation in addressing the challenges of climate change;
- ✓ Strengthen national institutions and mechanisms (policy, legislative and economic) to establish a suitable and functional framework for climate change governance.

Nigeria has adopted adaptation policies and measures described in more detail in section 3.2.2.

## 2.2 Climate Change Adaptation

### 2.2.1 Impacts and Vulnerability

The impacts of climate change in Nigeria vary in extent, severity and intensity. In the absence of in-depth quantitative research the economic costs can only be approximated. The following summary shows what is at risk:<sup>ii</sup>

- **Overall Economy:** According to a 2009 DFID study, if no adaptation action is taken, between 2-11% of Nigeria’s GDP could be lost by 2020. The Post Disaster Need Assessment (PDNA) Report following 2012 flood revealed that the total damage caused by the disaster amounted to \$16.9billion, representing 1.4% of real GDP growth in that year. In this regard, climate change poses a significant threat to the achievement of development goals, especially those related to eliminating poverty and hunger and promoting environmental sustainability.
- **Agriculture and Food Security:** Agriculture is one of the sectors most sensitive to climate change. Under a business-as-usual scenario, agricultural productivity could decline between 10 to 25 per cent by 2080. In some parts of the north, the decline in yield in rain fed agriculture could be as much as 50 percent. This in turn would impact GDP, reducing it by as much as 4.5 percent by 2050,<sup>iii</sup> even though the share of agriculture in GDP will decline from 40 to just 15 percent. Furthermore, in the

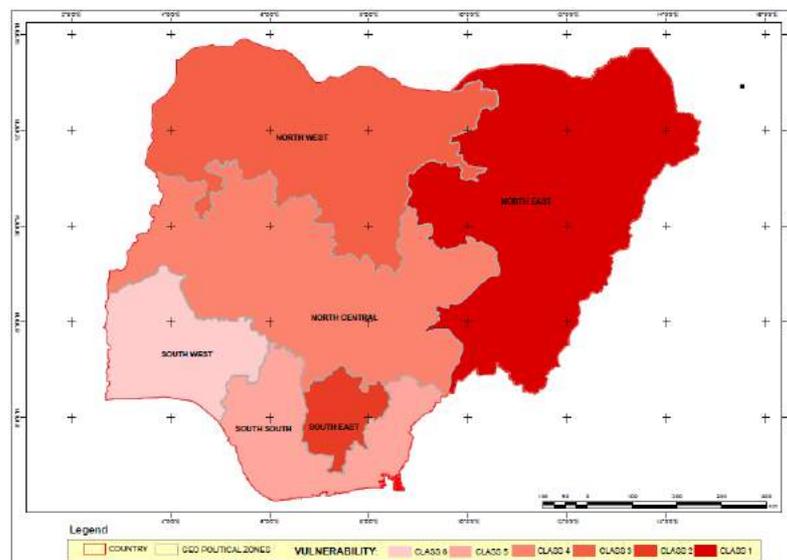
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absence of mitigating measures, the net import of yams and other vegetables is expected to decrease in the long-term. The net import of rice, however, is expected to increase by as much as 40 percent.

- **Water:** A considerable proportion of the population is at risk of water stress, with less than 40% having direct access to potable water. Climate change brings increased variability in rainfall, resulting in flooding in some humid areas in the south in the country and a decrease in precipitation in the savannah north. This may result in droughts and decrease in surface water resources in the north. It is possible that changes in surface runoff and groundwater flows in shallow aquifers can be linked to climate variability with long-term implications for permanent and seasonal water bodies. The rapid shrinking of Lake Chad from about 45,000 km<sup>2</sup> in 1960 to less than 3,000 km<sup>2</sup> in 2007 is mainly attributed to changes in the climatic conditions in the region. Hydro-electric power generation suffers frequently from low in-flow into the dams and water transportation along inland channels has also been negatively impacted. (Federal Ministry of Environment, 2010).
- **Floods and Droughts:** Climate change would result in increased variability in rainfall, predictably resulting in floods in many parts of the country, particularly the humid areas, with devastating consequences. Single extreme climate events have the potential to wipe out years of development. For example, the total value of destroyed physical and durable assets caused by the 2012 floods has been estimated to be ₦1.48 trillion (US\$9.5 billion) or about 2% of the rebased GDP of US\$510 billion.
- While floods may further ravage the humid areas to the south, a decrease in precipitation is expected in the savannah north. This may result in increased drought frequency and decrease in surface water resources, thus increasing its dependence on underground water sources. The increasing aridity in the northeast of the country has drastically reduced opportunities for sustainable agriculture and is considered a contributing factor to the current conflict and high degree of insecurity in the region.
- **Soil Erosion:** Climate change-related heavier and steadier than normal rainfall that is expected in the southern part of the country will worsen soil erosion that is already of catastrophic condition in the sub-region. Recent increase in the number of reported severe landslides in south eastern States of the country is an attestation to the possible climate change-induced changes in erosion intensity.
- **Sea Level Rise:** Nigeria's coastline is already undergoing pronounced morphological changes as a result of natural extreme events, such as sea surges and tidal waves. Global warming-induced accelerated sea level rise (ASLR), anticipated to be 0.5 - 1m this century, would exacerbate the poor condition of the country's coastline. With specific reference to the Niger Delta, it is estimated that with an ASLR of about 0.5m, about 35% of the highly-productive delta could be lost. With ASLR of about 1.0 m by 2100 (French et.al., 1995) about 75% of the delta could be lost.
- **Energy:** Climate change will have significant effects on the energy sector in Nigeria. In particular, rising temperatures would result in increased energy demand for air conditioning, refrigeration and other household uses. This in a context of severe shortages of energy supply.
- **Tourism:** Tourism, one of Nigeria's fastest growing industries, could be negatively affected as many tourist attractions are located along the coastal zone of the country. Traditional festivals (e.g. the Argungu River festival in Kebbi State) attracting many tourists may be impacted by reduced river flow.
- **Ecosystems:** Forests and other ecosystems, already under significant pressure, would be adversely affected by climate change. Persistent flooding and water logging could make coastal forest regeneration more difficult. On the other extreme, the savannah biome of northern Nigeria would be very vulnerable to a reduction in rainfall in the region. This could result in degradation of habitats and the intensification of desertification.

The summary of impacts above shows Nigeria to be highly vulnerable to climate change. The 2014 World Climate Change Vulnerability Index, published by the global risk analytics company Verisk Maplecroft, classifies Nigeria as one of the ten most vulnerable countries in the world. A recent government study determined vulnerability across Nigeria’s geographical regions, focusing on the three principal determinants of vulnerability: adaptive capacity, sensitivity and exposure. The *relative vulnerability* of the six geopolitical zones of Nigeria is shown below. There is a general south-north divide. The three northern zones show higher vulnerability than those in the south. This reflects the higher rainfall and socio-economic development of the south. The south-south shows highest relative variability among the three southern zones, reflecting the challenges of coastal flooding and erosion, as well as the impact of petroleum exploration and exploitation in that part of the country.

**Figure 1: Spatial variation in relative climate change vulnerability (Second National Communication, 2013)**



The southwest is least vulnerable, the northeast, on the other hand, is most vulnerable. Understanding these spatial vulnerabilities is crucial to shaping climate-resilient development in Nigeria.

## 2.2.2 Adaptation Policy Framework

Nigeria’s response to climate change has focused on increasing resilience and managing the unavoidable impacts. The ***National Adaptation Strategy and Plan of Action for Climate Change Nigeria (NASPA-CCN)*** describes our adaptation priorities, bringing together existing initiatives and priorities for future action. The 2011 NASPA-CCN Vision is a Nigeria in which climate change adaptation is an integrated component of sustainable development, reducing the vulnerability and enhancing the resilience and adaptive capacity of all economic sectors and of all people – particularly women, children, and resource-poor men – to the adverse impacts of climate change, while also capturing the opportunities that arise as a result of climate change. Our goal is to take action to adapt to climate change by reducing vulnerability to climate change impacts and increasing the resilience and sustainable wellbeing of all Nigerians; and to reduce or minimize risks by improving adaptive capacity, leveraging new opportunities, and facilitating collaboration inside Nigeria and with the global community.

To this end, a set of thirteen sector-specific strategies, policies, programmes and measures have been prepared, which are included in full in Annex 1 to this INDC. The objectives of these are to reduce the impacts of climate change through adaptation measures that can be

undertaken by the Federal, State and Local Governments, civil society, private sector, communities and individuals, including measures that will:

1. Improve awareness and preparedness for climate change impacts
2. Mobilize communities for climate change adaptation actions
3. Reduce the impacts of climate change on key sectors and vulnerable communities
4. Integrate climate change adaptation into national, sectoral, State and Local Government planning and into the plans of universities, research and educational organizations, civil society organizations, the private sector and the media.

In light of the INDC focus on mitigation potential in key sectors, we highlight below adaptation strategies for some high-emitting sectors:

## Strategies, policies, programmes and measures for key sectors

### A. STRATEGIES FOR AGRICULTURE (CROPS AND LIVESTOCK)

1. **Adopt improved agricultural systems for both crops and livestock (for example, diversify livestock and improve range management; increase access to drought resistant crops and livestock feeds; adopt better soil management practices; and provide early warning/meteorological forecasts and related information).**
2. **Implement strategies for improved resource management (for example, increase use of irrigation systems that use low amounts of water; increase rainwater & sustainable ground water harvesting for use in agriculture; increase planting of native vegetation cover & promotion of re-greening efforts; and intensify crop and livestock production in place of slash and burn).**
3. **Focus on agricultural impacts in the savanna zones, particularly the Sahel, the areas that are likely to be most affected by the impacts of climate change.**

### B. STRATEGIES FOR FORESTS

1. **Strengthen the implementation of the national Community-Based Forest Resources Management Programme.**
2. **Support review and implementation of the National Forest Policy.**
3. **Develop and maintain a frequent forest inventory system to facilitate monitoring of forest status; and initiate a research programme on a range of climate change-related topics, including long term impacts of climatic shifts on closed forests.**
4. **Provide extension services to CSOs, communities and the private sector to help establish and restore community and private natural forests, plantations and nurseries.**
5. **Improve management of forest reserves and enforce low impact logging practice.**

### C. STRATEGIES FOR ENERGY

1. **Include increased protective margins in construction and placement of energy infrastructure (i.e. higher standards and specifications).**
2. **Undertake risk assessment & risk reduction measures to increase resilience of the energy sector.**
3. **Strengthen existing energy infrastructure, in part through early efforts to identify and implement all possible 'no regrets' actions.**
4. **Develop and diversify secure energy backup systems to ensure both civil society and security forces have access to emergency energy supply.**
5. **Expand sustainable energy sources and decentralize transmission in order to reduce vulnerability of energy infrastructure to climate impacts.**

### D. STRATEGIES FOR TRANSPORTATION AND COMMUNICATIONS

1. **Include increased protective margins in construction and placement of transportation and communications infrastructure (i.e. higher standards and specifications).**

2. Undertake risk assessment and risk reduction measures to increase the resilience of the transportation and communication sectors.
3. Strengthen existing transportation and communications infrastructure, in part through early efforts to identify and implement all possible ‘no regrets’ actions.
4. Develop and diversify secure communication backup systems to ensure both civil society and security forces have access to emergency communication methods.

#### E. STRATEGIES FOR INDUSTRY AND COMMERCE

1. Increase knowledge and awareness of climate change risks and opportunities
2. Undertake and implement risk assessments and risk reduction measures
3. Incorporate climate change into ongoing business planning
4. Review and enforce land use plans in industrial areas in light of climate change
5. Encourage relocation of high risk industries, facilities and markets
6. Promote and market emerging opportunities from climate change
7. Encourage informal savings and insurance schemes, and arrange for the availability of medium term credit (especially for industries in crisis).

#### F. STRATEGIES FOR VULNERABLE GROUPS

1. Adapt to our national, the World Meteorological Organization- Global Framework for Climate Services (WMO-GFCS) to Nigeria's needs (National Framework for Application of Climate Services - NFACS) to reduce vulnerability of communities through enhanced advocacy and implementation of the five Pillars of the Framework.

**The National Agricultural Resilience Framework (NARF 2014)** is based on principles of adaptive management and participatory engagement as the central tenets of the overall implementation strategy. The NARF articulates policy options, opportunities and required interventions to achieve the following strategic objectives:

- ✓ Strengthening the overall policy/institutional framework for improved resilience and adaptation to climate variability and change in the agricultural sector, including planning and implementation, systems for resource mobilization, and effective project monitoring and evaluation.
- ✓ Evaluation and introduction of risk transfer and risk management strategies (e.g., improved seasonal and real time weather forecasts, insurance based risk mitigation options etc.) into the agricultural sector and widespread deployment of same through communication technologies, including mobile phones.
- ✓ Improving productivity through training community and grass root farmers on land and water management strategies (e.g., irrigation farming, water harvesting, soil fertility enhancement and erosion control etc.) improved farming practices and using policy instruments such as economic incentives, regulations and communication.
- ✓ Reinforcing existing social safety nets through support systems that reduce vulnerability and improve livelihood conditions for the vulnerable, especially women and children.
- ✓ Improving farming systems research capacity within the National Agricultural Research System (NARS) to enable and support the implementation of climate friendly agriculture in Nigeria.
- ✓ Revamping extension services, including building new capacity for evidence-based assessment and management of climate risk for resilience in the agriculture sector.

In addition to the above-mentioned key climate change related policies, several other environmental and sectoral policies and plans implicitly address climate change issues. For example, the National Policy on Environment supports “*the prevention and management of natural disasters such as floods, drought, and desertification*” and one of the objectives of Nigeria’s Agricultural Policy is to “*protect agricultural land resources from drought, desert encroachment, soil erosion, and floods*”. Other examples include Nigeria’s *Drought Preparedness Plan, National Policy on Erosion and Flood Control, National Water Policy,*

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*National Forest Policy*, and *National Health Policy*. The challenge facing the government is sustained and coordinated implementation of policies and measures across a whole range of sectors. This INDC will be instrumental in making progress in this regard.

### 3 Mitigation Contributions Summary

#### 3.1 Business as Usual emissions projections

Nigeria's economy and population are both growing rapidly, and the population is attaining a higher standard of living. This growth will have a strong impact on future emissions. Following careful review of the re-based GDP data for 2010-2014<sup>iv</sup> and official population projections the "business-as-usual scenario" was developed as part of the preparation of this INDC. This scenario assumes an economic growth at 5%, population growing at about 2.5% per year, all Nigerians to have access to electricity (both on-grid and off-grid) and demand is met, industry triples its size by 2030.

Under this scenario, emissions are projected to grow 114% by 2030 to around 900 million tonnes – around 3.4 tonnes for every Nigerian. Under a high growth scenario, with economic growth at 7%, this climbs to over one billion tonnes.

#### 3.2 Mitigation potential assessment

The mitigation actions, which could be undertaken, were assessed in a bottom up manner, building on expert assessments of both the challenges facing individual sectors, as well as a review of policies and measures already in place. The measures included in Nigeria's INDC are expected to deliver significant development benefits. The mitigation actions that bring the largest development benefit are reducing air pollution, indoors and outdoors, with enormous immediate health and social benefits. Secondly, innovation in "clean" technologies brings resource efficiency and produces more knowledge and jobs than those in "dirty" technologies. Thirdly, fiscal reform is proving an efficient mitigation action. This releases significant resources in the budget that can fund investments in efficient infrastructure and other fiscal policies, thus creating jobs and fuelling growth. Beyond mitigation actions that could be quantified, several qualitative policies and measures have been identified.

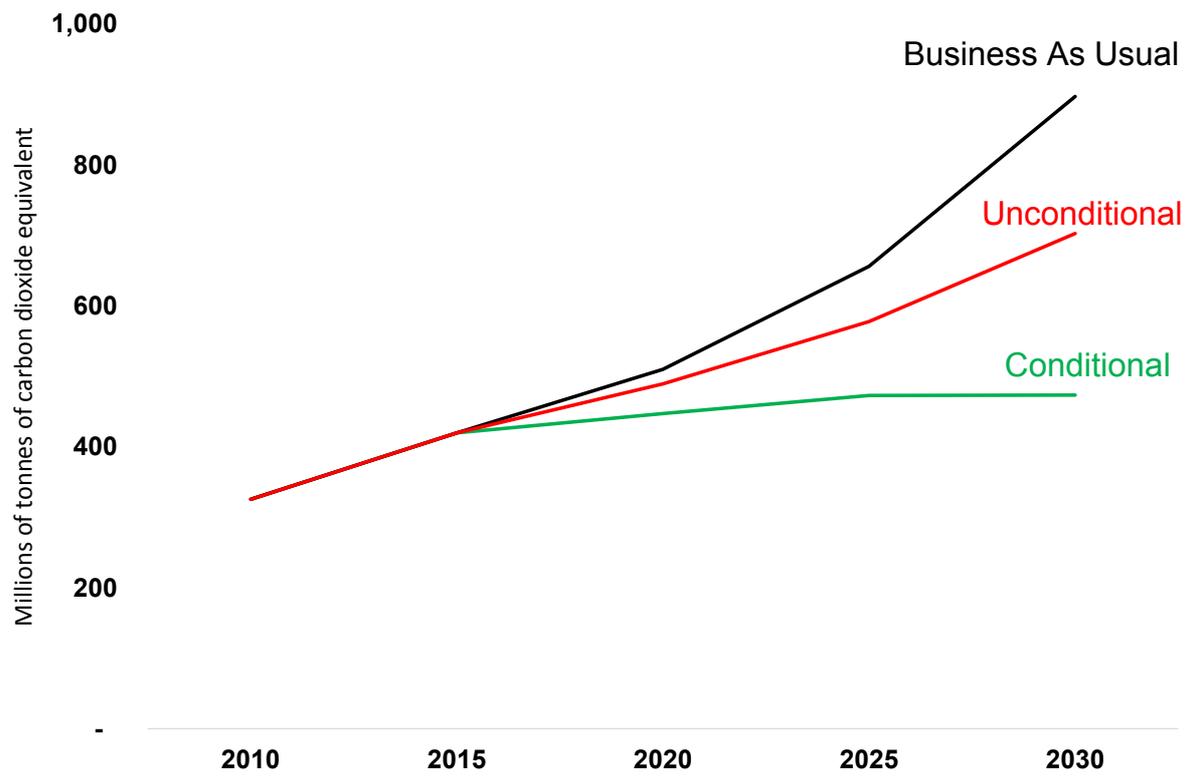
#### 3.3 Unconditional contribution

In the event an ambitious, comprehensive legally binding global agreement is reached at COP21 in Paris, Nigeria will make an unconditional contribution of 20 per cent below BAU that is consistent with the current development trends and government policy priorities. The policies and measures that will deliver these savings are cost-effective, even at the current high interest rate, which constrains investment. They include improving energy efficiency by 20 percent, 13 GW of renewable electricity provided to rural communities currently off-grid, and ending gas flaring.

#### 3.4 Contribution conditional on international support

Nigeria can make a significant additional contribution with international support, in the form of finance and investment, technology and capacity building. The combined policies and measures described below can deliver in a cost-effective manner direct development benefits to the country and reduce emissions 45 per cent below BAU. The key measures are an increased level of energy efficiency and a significant reduction in the use of generators, while providing access to energy for all Nigerians.

**Figure 2: Mitigation contributions**



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## 4 Mitigation contributions

### 4.1 Background

For the purpose of developing the INDC, a LEAP model of the Nigerian economy and its emissions was constructed.<sup>v</sup> By using a bottom-up approach to modelling, an economy-wide emissions contribution for 2030 could be prepared that is grounded in sector-based analysis. The Nigeria 2030 LEAP model contains references to all relevant data sources and key assumptions<sup>vi</sup>.

The resulting package of policies and measures included in the Nigeria INDC prioritizes those actions that were quantifiable and cost-effective. The criteria against which potential mitigation actions were assessed were:

- ✓ Cost effectiveness
- ✓ Mitigation potential
- ✓ Poverty alleviation and job creation
- ✓ Feasibility of implementation
- ✓ Short-term results
- ✓ Gender and social inclusion
- ✓ Health and air quality
- ✓ Land (degradation) and water quality, incl. deforestation

The mitigation actions included in the INDC to a large extent implement or enforce existing policies or strategies. However, additional legislation and regulatory changes will be required. An assessment of the changes required to the regulatory and legislative framework will be undertaken upon finalization of the INDC.

The measures identified are as follows:

1. Energy
  - Renewable energy, particularly decentralized
  - Multi-cycle power stations
  - Scalable power stations of 20-50MW
  - Enforced energy efficiency
  - Use of natural gas rather than liquid fuels
2. Oil and Gas
  - Improved enforcement of gas flaring restrictions
  - Development of Gas-to-Power Plants at Gas Flare Sites (micro grid)
  - Blending 10% by volume of Fuel-Ethanol with Gasoline (E10) and 20% by volume of Biodiesel with Petroleum Diesel (B20) for Transportation Fuels.
3. Agriculture and Land Use
  - Climate Smart Agriculture
  - Stop using charcoal
4. Industry
  - Benchmarking against international best practice for industrial energy usage
  - Adoption of green technology in industry
5. Transport
  - Modal shift from air to high speed rail
  - Moving freight to rail
  - Upgrading roads
  - Urban transit

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- Toll roads/ road pricing
  - Increasing use of CNG
  - Reform petrol/ diesel subsidies

The portfolio of policies and measures by sector are described in more detail below. A brief problem statement for each sector precedes them.

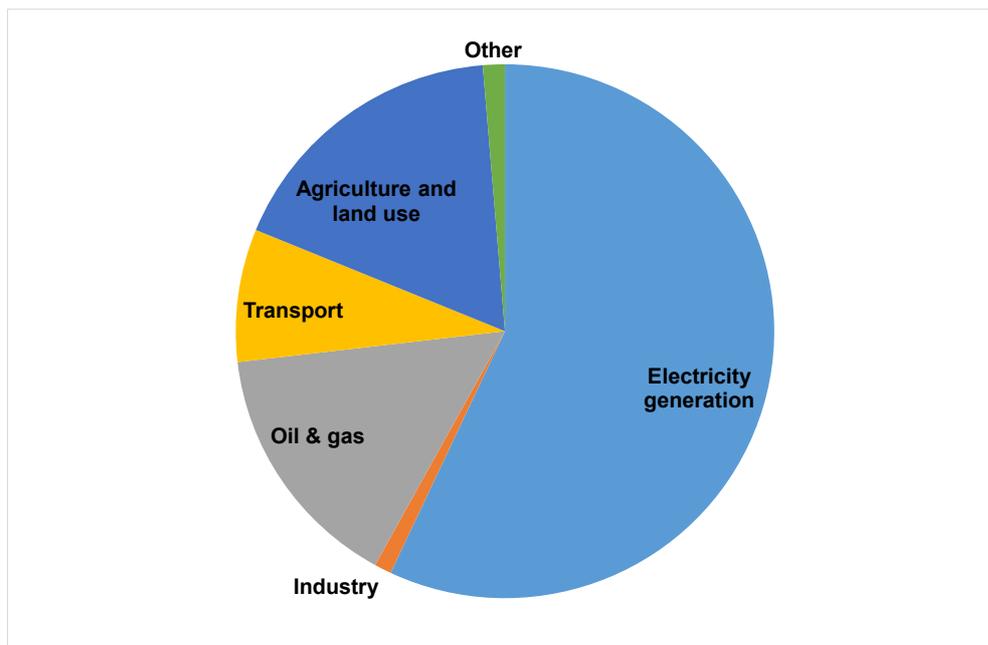
The INDC delivers immediate development benefits and the measures are cost-effective. Unfortunately, the cost of inaction could not be quantified. There are policies and measures that are not cost-effective today but would deliver significant climate and other benefits in the medium to long term. These can only be implemented with significant international support.

The urgent challenge is that in the current fiscal situation those measures that require large upfront investment, even if cost effective over the life of the investment, will be carefully reviewed before being implemented.

## 4.2 Mitigation actions by sector

Figure 3 below shows the major sectors where emission reductions take place in the conditional contribution.

**Figure 3: Source of 2030 emission reductions by sector**



### 4.2.1 Agriculture, forests and land use change

The livelihoods of Nigeria's poorest farmers are already at risk from climate change. Rising temperatures, too little rain or too much rain, thriving pests all lead to crop losses. Without access to improved seeds, fertilizer and appropriate technologies, such as irrigation systems and finance, Nigeria's food security will be at risk. With growing food demand from a growing population, declining harvests would strain supply, increasing malnutrition and possibly reverse recent progress in alleviating poverty. Improving agriculture is a central part of Vision 20:2020. The ambitions laid down in the Agricultural Transformation Agenda (ATA) cannot, however, be met without climate smart agriculture (CSA). CSA seeks to address the combined challenges of food security and climate change. Its aims are to sustainably increase agricultural productivity and support equitable increases in farm incomes, enhancing food security and development. It is also aimed at adapting and building

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resilience of agricultural and food security systems to climate change, thus, reducing greenhouse gas emissions from crops, livestock and fisheries. Farmers take agro-ecological measures that increase the resilience of the farming systems, as opposed to such measures that promote high external input farming, industrial meat production and large-scale industrial agriculture, which contribute to climate change. The benefits of improved practices go beyond improved yields. With improved yields come improved diets, growing productivity and reinvestment in rural communities, it puts children back in school. Improved productivity results in reduced food imports and reduced emissions. Appropriate incentives to farmers, and training, will be important. The best incentive for farmers is likely to come in the form of improved yields. Ultimately, the livelihoods of the poorest farmers are secured, as is security at large. This is important even though the share of the sector in the economy is reducing.

One example is agroforestry, where trees are mixed with crops and animals on the same land, can be another option for carbon fixing and for providing mulch material. Estimates of the benefits from agroforestry range from total (lifetime) emissions reductions of 158 million tonnes to 712 million tonnes. Another example is a reduction of methane emissions from livestock, through improved feeding and breeding.

Halting deforestation and the conservation of remaining natural forests, as well as reversing forest degradation is important. A failure to do so undermines the productive capacity of the land, as well as key ecosystems. The use of fuel wood and charcoal for fuel is also a major source of degradation of Nigeria's forests. By some estimates, at the current rate of deforestation, there will be no significant forest remaining in a few years' time, unless strong action is taken. It must, however, be recognized that charcoal provides essential fuel for many in Nigeria and its use cannot simply be reduced without providing alternatives. Efficient cookstoves are one way to reduce fuel demand, and alternative heating sources such as LPG could be provided. To what extent the use of LPG – a fossil fuel – delivers a genuine climate benefit, compared to wood-based charcoal, needs to be considered. Further work is needed in this regard.

The overall cost per tonne of mitigation achieved in the sector is assumed to be negligible because the non-carbon benefits of the measures justify the costs. However, farmers may need assistance, because there may, for example, be upfront costs which low-income farmers will need help to meet.

#### 4.2.2 Gas Flaring

The flaring of associated gas is illegal, the reality is a different one. There is a lack of gas infrastructure, until recently a relative lack of domestic demand for natural gas, and no transparent gas market. It has also been suggested that the subsidization of other fuels makes gas less attractive than it should be. Penalties are low and enforcement weak, the benefits of utilization accrue elsewhere. As a result of the foregoing, the companies responsible for ending the flaring have at present little incentive to do so. Gas flaring was responsible for around 48 million tonnes of emissions in 2010<sup>vii</sup>. Yet it is possible and cost-effective to Nigeria to reduce and ultimately end the practice.

There are many potential productive uses for this gas such as feeding industrial clusters with a centralized gas supply. This would combine well with other options, such as increased use of natural gas (e.g. CNG) in transport and in power generation. The key difficulty may be enforcement, but the benefits are large. Eliminating flaring by 2030 could save around 64 million tonnes of CO<sub>2</sub> per year.<sup>viii</sup> The World Bank estimates that this would have a net benefit of \$61 per tonne. It could combine well with other mitigation measures such as substitution of natural gas-fired electricity generation for diesel generators.

#### 4.2.3 Energy

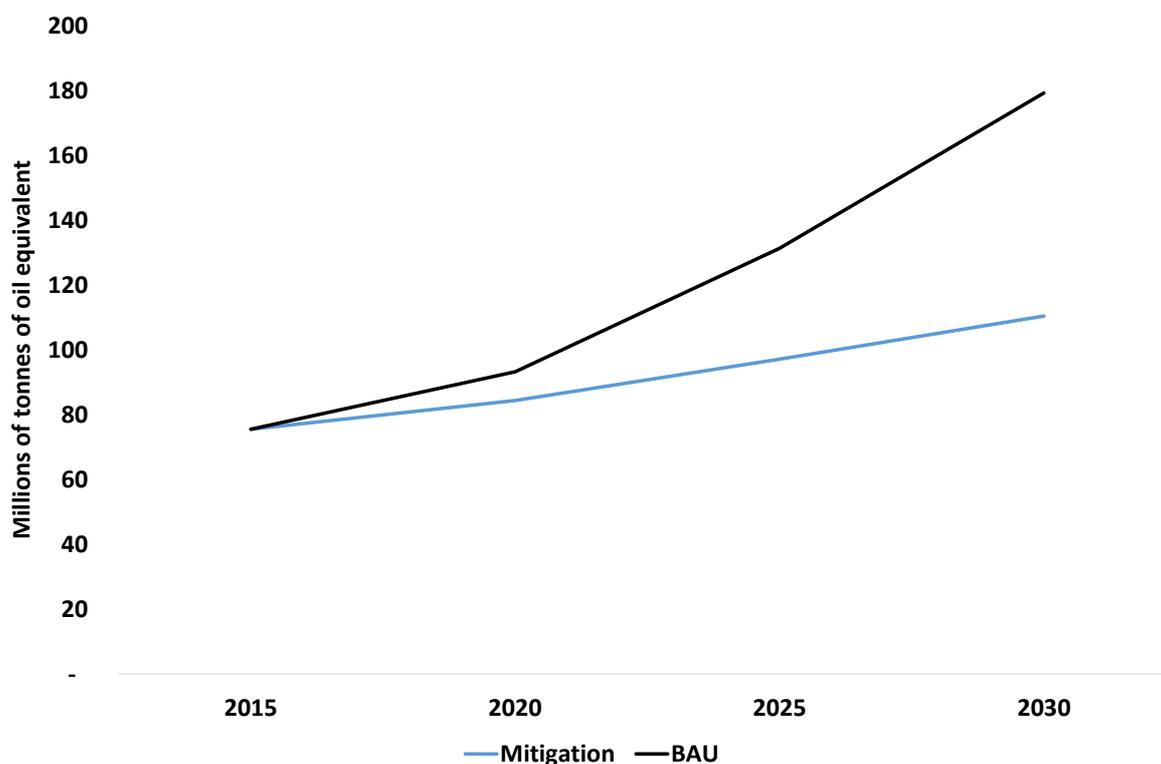
The government has made addressing the need to provide access to energy for all Nigerians a priority. At present, a significant share of demand for energy, and electricity in particular, remains unmet. The current grid is unable to reliably serve the existing industrial and urban

customer base. A shortfall in generation capacity has led to the proliferation of small generators, which are inefficient and polluting. Most rural communities remain off the grid, about 60% of the population lack access to electricity. At the current rate of grid expansion they will largely remain under-served. The potential to both provide energy access and to reduce emissions is enormous. The mitigation options for energy address both energy demand and energy supply.

This can be achieved through implementation of three significant policies. Firstly, reliable gas-powered generation, using associated gas currently flared, can replace small generators. Secondly, rural electrification will be driven by cost-efficient renewable solutions. Thirdly, energy efficiency is greatly improved so as to reduce overall demand for energy and in doing so serve more people, faster.

In many cases, energy efficiency measures are cost-effective. Yet, the upfront costs of these measures can be an important challenge. In the short-term, it is usually more expensive to purchase efficient equipment than to keep older equipment operating. Nigeria's National Renewable Energy and Energy Efficiency Action Plan looked at a 40% energy efficiency target for the country, equivalent to around 2.5% improvement per year. This leads to a reduction in energy demand as shown in Figure 3 below.

**Figure 3: Energy demand – business as usual versus efficient green scenarios**



By abandoning the grid-paradigm and investing in the provision of energy for poor communities, the development potential of two thirds of Nigerians is unleashed. At present, poor Nigerians pay a significant “poverty penalty” in order to meet their energy needs. They pay proportionately more for energy, spend more time acquiring fuels, and suffer the health impacts from poor fuel quality. This puts a significant brake on development and the empowerment of women in particular. Importantly, reduced dependence on fossil resources can also increase security. A further benefit of rural electrification on- and off-grid using renewable solutions is that many small entrepreneurs can find work in the sector. Several projects and studies are under way in the area of pay-as-you-go and leasing contracts with small down payments, as well as micro-finance options for SME entrepreneurs.

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Renewable electricity generation is a financially attractive option in Nigeria. This is particularly true for those households that are not connected to the national electricity grid. Analysis shows that renewable energy presents a significant saving over diesel generators.<sup>ix</sup>

The use of more efficient gas power stations, small-scale stations near a source of gas, or replacing existing diesel generation with natural gas, is also attractive, especially so when a station is refurbished, as the cost of the alternative is higher.<sup>x</sup>

Savings could also be made by reducing losses from the electricity transmission network.

Finally, the removal of consumer and producer subsidies for fossil fuels can help stabilize government budgets. While intended to reduce the cost of living for the poor, these subsidies have ended up mostly benefiting the rich.

#### 4.2.4 Transport and Infrastructure

The current state of infrastructure in the country is inadequate. The road system is overburdened and poorly maintained. The fast-growing economy has brought many more cars on the road, traveling more miles. Past attempts to improve infrastructure seem to have failed due to policy inconsistency, poor maintenance and poor accountability. Recently, significant new investments in rail transport have been initiated.

Many of the mitigation options can be summarized as “modal shift” – moving passengers or freight from one form or mode of transport to another, less polluting, one. Air pollution in major urban areas is severe and the health benefits of these measures immediate. For example, when High Speed Rail (HSR) is available in Nigeria, a shift from air travel to HSR could begin. Significant investments are being made to revive rail transport, which also has the potential to carry a share of the fast-growing cargo load. With the early stage status of the high speed rail network in Nigeria, it is not possible to quantify the costs and potential accurately.

Measures to increase the efficiency of existing vehicles and the transport system are also possible. Improvements in urban transit systems are difficult to quantify. The price of travel can be adjusted to make it more reflective of the true cost. Initiatives to deliver this aim include road pricing and reform of subsidies.

In addition to improved maintenance and a modal shift for cargo, the most direct benefits would be seen from the introduction of fuel efficiency standards and the use of LPG / CNG for buses and taxis.

#### 4.2.5 Manufacturing

Diversification of the economy is a priority for the government of Nigeria. Over 90% of Nigerian businesses are micro- and small enterprises. Their success is key to alleviating the high unemployment, especially prevalent among youth in rural areas. Enabling entrepreneurs to thrive, especially in smaller towns requires investment in basic infrastructure.

Industrial productivity, in general, has been most significantly impacted by unreliable electricity supply. Nigerian companies also face stiff low-cost competition from consumer goods produced elsewhere. The regulatory environment can be tough to navigate. Domestic demand, however, is growing steadily and has driven significant new investment in key manufacturing sectors.

As Nigeria develops economically, emissions from its industry can be expected to grow significantly. This economic development is welcome and will bring benefits for all Nigerians. At present, the majority of emissions in the sector are from the cement and oil and gas industry. In the future other industries might contribute a greater proportion than today. In the absence of an efficiency mind-set and lack of efficiency benchmarks or standards this might lead to exponential emissions growth in the sector. The use of best available technology at the time of construction of a new industrial facility will reduce future fuel demands and

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emissions. In addition, in most cases the use of best practice technology will lead to lower lifetime costs for the businesses involved. The issue can be upfront capital – ability to pay a possibly higher initial cost for the best available equipment, even if this would be recouped over time with lower running costs. Well-functioning financial markets are essential for this – consideration could also be given to some form of industrial development “soft” loans, repayable as the equipment is used.

#### 4.2.6 Short-lived pollutants and air quality

Poor air quality is the bane of urban residents and a health threat. Drastic measures to reduce soot (black carbon) pollution from cars and trucks, small generators and industry are needed. Failure to do so could make Nigeria’s mega-cities unliveable. This includes enforcement of the importation ban of cars over 15 years’ old, stricter inspections, and further consideration of setting efficiency standards for new cars similar to those in South Korea.

Those who rely on fuel wood and charcoal for cooking and heating, primarily women, are exposed to serious indoor air pollution. Providing affordable clean alternatives is the only way forward.

Other short-lived pollutants with a high global warming impact, such as industrial gasses, are not produced in Nigeria. Here the adoption of standards for imported equipment will be considered, in particular in the field of refrigeration and air conditioning where there is a risk of dumping of HCFC and HFC installations that are being phased out in OECD countries. Methane emissions are discussed in the section on gas flaring.

#### 4.2.7 Climate smart cities

Lagos, Kano and Abuja are among the fastest growing cities globally. Keeping them liveable is a major challenge. Providing basic infrastructure, like potable water, waste and sewerage services, affordable housing, electricity, roads and transit services puts a strain on government at all levels. There is, however, a growing movement to improve urban livelihoods through integrated planning focusing on creating workable communities that are affordable to lower middle income families. This requires innovative financial products catering to families underserved by banks.

Lagos in particular is already strongly impacted by flooding. The government is investing to make the city more resilient to climate change. Reducing the environmental footprint of mega-cities will, for example, require promulgating new housing standards. The transit system, building on lessons learned from the introduction of BRT, needs maintenance and investment. Highway expansion may be financed through tolls. Waste management systems are strained, improvements in this area have immediate benefits for health and quality of life.<sup>xi</sup>

#### 4.2.8 Gender impacts and Social inclusion

The degree to which people are affected by climate change impacts is influenced by their social status, gender, wealth, political power and access to and control over resources. Women and youth, but also remote communities, still have less economic, political and legal clout than, for example, men and the urban middle class. They are more directly impacted and less able to cope with climate impacts. At the same time, mitigation measures can empower these groups that are socio-economically disadvantaged in a differentiated manner. An example is the poverty penalty paid by households in search of potable water and fuel wood. Women benefit most from clean efficient cook stoves, gaining in health and in productive time where these are introduced. They, however, have difficulty accessing financial institutions. Similarly, agricultural extension services have proven to reach more men than women. New policies and measures need to be assessed against their ability to bring social inclusion and be culturally appropriate, as well as improve livelihood security, increase resilience and reduce emissions. The measures included in the Nigeria INDC were deemed to at a minimum be gender neutral and / or to enhance social inclusion.

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## 5 Methodology and Information to facilitate clarity, transparency and understanding

### 5.1 Transparency

The Lima Call to Climate Action suggested a **list of information** that countries can include in INDCs to ensure transparency and understanding. Nigeria is fully committed to increasing transparency. This INDC contains key data that may enable independent assessment of ambition and compatibility through full transparency. At present, Nigeria does not have a full GHG inventory and accompanying MRV system. We are committed to developing one with support from international partners. The LEAP model and government data that have informed the INDC will be made publicly available. Key aspects of the approach are:

- timeframe                      base period data 2010-2014, projections 2015 - 2030
- scope of gases                CO<sub>2</sub>, CH<sub>4</sub> & N<sub>2</sub>O (other gases assumed to be negligible)
- sectors                         IPCC guidelines and definitions were used for all sectors

## 6 Fairness and ambition

Parties have been requested to show “how the Party considers that its intended nationally determined contribution is fair and ambitious, in light of its national circumstances, and how it contributes towards achieving the objective of the Convention as set out in its Article 2.” Article 2 of the Framework Convention calls for a stabilization of greenhouse gases in order to avoid dangerous climate change, as well as the need to adapt. Nigeria is a low middle income country with a large, fast growing population. Without ambitious mitigation action, Nigeria’s per capita emissions are projected to grow to 3.4 tonnes CO<sub>2</sub>e. Coming from a low development base, emissions from Nigeria’s conditional contribution are expected to stabilize slightly above today’s level of 2 tonnes per capita, once the full package of policies and measures has been implemented with international support. Global per capita emissions need to converge around 2 tonnes per capita by 2050. The Government of Nigeria considers, therefore, that its contribution is in line with its common, but differentiated responsibility and respective capability and makes a fair and ambitious contribution to the global effort to prevent dangerous climate change.

The relevant quantitative and qualitative information to facilitate an assessment by the UN FCCC secretariat and the international community of fairness and ambition is provided below in Table 3.

**Table 3: Key data**

Information	Value	Source
Historical emissions (1850-2010)	2,564.02 million tonnes (MT)	CAIT database, World Resources Institute
1990 emissions	163.91 MT	Nigeria’s Second National Communication
2000 emissions	214.21 MT	Nigeria’s Second National Communication
2010 emissions	263.0 MT	Energy Commission of Nigeria

Information	Value	Source
Estimated emissions per capita	Current: around 2 tonnes CO <sub>2</sub> e 2030 BAU: around 3.4 tonnes CO <sub>2</sub> e 2030 Conditional: around 2 tonnes CO <sub>2</sub> e	ECN (estimated 2015 emissions), World Bank (population estimate), LEAP scenario
Emissions per US\$ (real) GDP	0.873 kg CO <sub>2</sub> e (2015) 0.491 kg CO <sub>2</sub> e (2030)	ECN, Re-based GDP LEAP 2030 ambition scenario
Emissions as % of global total	<1% (2010)	ECN (2010 emissions estimate) and US EPA global estimate
GDP per capita (US\$)	2,950 (2014) 3,964 (2030; real 2015 US\$)	Re-based GDP LEAP 2030 BAU scenario

Nigeria believes a Paris agreement should ensure that the collective mitigation ambition is adequate to keep global temperatures below 1.5 degrees Celsius above pre-industrial levels by the end of the century.

The Nigerian INDC does its fair share towards achieving this long-term goal. The conditional contribution contained in it results in a slight growth in absolute emissions, with emissions peaking towards 2030. Absolute emissions are then anticipated to plateau.

## 7 INDC Implementation

INDC implementation will fall under the remit of the *Nigeria Climate Change Policy Response and Strategy* (NCCPRS) adopted in 2012, in line with the strategic goal to foster low-carbon, high growth economic development and build a climate resilient society. Implementation will be taken forward by existing governance arrangements under the NCCPRS, with coordination being managed by the Department of Climate Change. The appropriate line ministries and agencies will carry out specific implementation activities.

The implementation of the full contribution is conditional on the availability of adequate financing for investment in the mitigation actions contained therein. The INDC can provide public and private sector investors with a road map for Nigeria's development. Nigeria welcomes support for mitigation policies and measures in the form of direct investments and loans. Finance and investment can come from both public and private sources, including the Green Climate Fund and international financial institutions, such as the World Bank, IFC and AfDB. The international bilateral sources should include reliable, new and additional ODA. Contingent on agreement in Paris, it may also include financing through carbon market mechanisms.

International finance and investment, technology and capacity-building will be needed to achieve the ambitious intended contribution. Further work is needed to determine the exact domestic share of the full contribution, as well as the total investment required. We will seek to specify the technical support and capacity building needs in support of the achievement of the policies and measure as soon as possible. To this end, a strategic plan to guide INDC implementation shall be developed. The aim of this plan would be to improve cross-sectoral coordination and policy coherence, as well as enforcement of existing measures. In the

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course of a review of legislative and regulatory changes required, the legislature will be consulted.

Specific activities to be carried out in the INDC implementation will include:

- Review of mitigation potential identified in INDC preparation against the *Strategic Framework for Voluntary Nationally Appropriate Mitigation Action*). This framework was intended to enable Nigeria to develop strategic, long-term, participatory, transformational measures and comprehensive programs in driving towards a low carbon climate resilient and pro-growth and gender sensitive and sustainable development path. Implementation of the INDC crucially depends on international support for policies and measures through the NAMA framework.
- Review of Nigeria's current climate finance landscape, support needs and the international funding landscape, along with an assessment of climate finance readiness and gaps. This will include possible use of funding through carbon market mechanisms subject to the detailed provisions of the Paris agreement.  
Gap analysis of existing data sharing and reporting structures and processes and make initial recommendations on the appropriate form and structure of a national MRV system, including completing and maintaining the national GHG inventory and assuring data quality.
- Promoting public awareness and education on climate-compatible development.
- Training and capacity building, including simplified user-friendly tools for analysis and further development of the LEAP model.

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## Annex 1 NASPA Sectoral strategies

### **A. STRATEGIES FOR AGRICULTURE (CROPS AND LIVESTOCK)**

1. Adopt improved agricultural systems for both crops and livestock (for example, diversify livestock and improve range management; increase access to drought resistant crops and livestock feeds; adopt better soil management practices; and provide early warning/meteorological forecasts and related information).
2. Implement strategies for improved resource management (for example, increase use of irrigation systems that use low amounts of water; increase rainwater & sustainable ground water harvesting for use in agriculture; increase planting of native vegetation cover & promotion of re-greening efforts; and intensify crop and livestock production in place of slash and burn).
3. Focus on agricultural impacts in the savanna zones, particularly the Sahel, the areas that are likely to be most affected by the impacts of climate change.

### **B. STRATEGIES FOR FRESHWATER RESOURCES, COASTAL WATER RESOURCES AND FISHERIES**

1. Initiate a national programme for integrated water resource management at the watershed level
2. Intensify programmes to survey water quality and quantity for both ground and surface water
3. Implement programmes to sustainably extend and improve water supply and water management infrastructure
4. Explore water efficiency and management of water demand, particularly in Sahel and Sudan savanna areas
5. Enhance artisanal fisheries and encourage sustainable aquaculture as adaptation options for fishing communities.

### **C. STRATEGIES FOR FORESTS**

1. Strengthen the implementation of the national Community-Based Forest Resources Management Programme.
2. Support review and implementation of the National Forest Policy.
3. Develop and maintain a frequent forest inventory system to facilitate monitoring of forest status; and initiate a research programme on a range of climate change-related topics, including long term impacts of climatic shifts on closed forests.
4. Provide extension services to CSOs, communities and the private sector to help establish and
5. restore community and private natural forests, plantations and nurseries.
6. Improve management of forest reserves and enforce low impact logging practice.

### **D. STRATEGIES FOR BIODIVERSITY**

1. Support the active implementation of the National Biodiversity Strategy and Action Plan (NBSAP), particularly those strategic actions that address climate change impacts.
2. Support recommended climate change adaptation policies and programmes in sectors that affect biodiversity conservation, including agriculture, forestry, energy and livelihoods.
3. Support and implement programmes for alternative livelihoods in order to reduce unsustainable resource use that contributes to loss of biodiversity (see Sector/Theme 11. Livelihoods).

### **E. STRATEGIES FOR HEALTH AND SANITATION**

<ol style="list-style-type: none"> <li>1. Undertake research to better understand the health impacts of climate change in Nigeria.</li> <li>2. Strengthen disease prevention and treatment for those diseases expected to increase as a result of climate change.</li> <li>3. Reinforce programmes to build and maintain wastewater and solid waste management facilities.</li> <li>4. Promote and facilitate the adoption of practices and technologies that reduce exposure and health impacts from extreme heat.</li> <li>5. Establish early warning and health surveillance programmes.</li> </ol>
<p><b>F. STRATEGIES FOR HUMAN SETTLEMENTS AND HOUSING</b></p>
<ol style="list-style-type: none"> <li>1. Develop climate change adaptation action plans for urban areas, particularly those at greatest risk.</li> <li>2. Assist communities to reduce vulnerability through participatory planning of land use &amp; housing.</li> <li>3. Discourage building/urban encroachment into vulnerable areas, high risk zones &amp; low lying areas.</li> <li>4. Discourage housing and settlement practices that are maladaptive in the face of climate change.</li> <li>5. Strengthen rural settlements in order to reduce migration.</li> </ol>
<p><b>G. STRATEGIES FOR ENERGY</b></p>
<ol style="list-style-type: none"> <li>1. Include increased protective margins in construction and placement of energy infrastructure (i.e. higher standards and specifications).</li> <li>2. Undertake risk assessment &amp; risk reduction measures to increase resilience of the energy sector.</li> <li>3. Strengthen existing energy infrastructure, in part through early efforts to identify and implement all possible 'no regrets' actions.</li> <li>4. Develop and diversify secure energy backup systems to ensure both civil society and security forces have access to emergency energy supply.</li> <li>5. Expand sustainable energy sources and decentralize transmission in order to reduce vulnerability of energy infrastructure to climate impacts.</li> </ol>
<p><b>H. STRATEGIES FOR TRANSPORTATION AND COMMUNICATIONS</b></p>
<ol style="list-style-type: none"> <li>1. Include increased protective margins in construction and placement of transportation and communications infrastructure (i.e. higher standards and specifications).</li> <li>2. Undertake risk assessment and risk reduction measures to increase the resilience of the transportation and communication sectors.</li> <li>3. Strengthen existing transportation and communications infrastructure, in part through early efforts to identify and implement all possible 'no regrets' actions.</li> <li>4. Develop and diversify secure communication backup systems to ensure both civil society and security forces have access to emergency communication methods.</li> </ol>
<p><b>I. STRATEGIES FOR INDUSTRY AND COMMERCE</b></p>
<ol style="list-style-type: none"> <li>1. Increase knowledge and awareness of climate change risks and opportunities</li> <li>2. Undertake and implement risk assessments and risk reduction measures</li> <li>3. Incorporate climate change into ongoing business planning</li> <li>4. Review and enforce land use plans in industrial areas in light of climate change</li> <li>5. Encourage relocation of high risk industries, facilities and markets</li> <li>6. Promote and market emerging opportunities from climate change</li> <li>7. Encourage informal savings and insurance schemes, and arrange for the availability of medium term credit (especially for industries in crisis).</li> </ol>
<p><b>J. STRATEGIES FOR DISASTER, MIGRATION AND SECURITY</b></p>
<ol style="list-style-type: none"> <li>1. Strengthen capacity to anticipate disasters and impacts on internal migration and security</li> <li>2. Strengthen capacity to respond through information and awareness, training,</li> </ol>

<p>equipment, plans and scenarios, and communication</p> <ol style="list-style-type: none"> <li>3. Strengthen individual and community-based emergency preparedness and response capacity in high risk areas</li> <li>4. Strengthen rural infrastructure and the availability of jobs to discourage out-migration.</li> </ol>
<p><b>K. STRATEGIES FOR LIVELIHOODS</b></p>
<ol style="list-style-type: none"> <li>1. Develop a replicable approach/model that uses intermediate NGOs, community members and radio to diffuse climate change adaptation approaches and information and to gather feedback on adaptation actions focused on livelihoods.</li> <li>2. Build a network of intermediate NGOs capable of working on climate change and livelihoods issues, where these NGOs support a number of communities in high risk states.</li> <li>3. Animate communities with appropriate engagement methods, in order to elicit and document valid climate change and livelihood related needs/vulnerabilities.</li> <li>4. Use or reinforce available (endogenous) community resources to reduce vulnerability and build livelihood-linked capacity to adapt to climate change.</li> <li>5. Encourage community participation and active roles by both genders in all livelihood development initiatives.</li> </ol>
<p><b>L. STRATEGIES FOR VULNERABLE GROUPS</b></p>
<ol style="list-style-type: none"> <li>1. Create awareness among government staff, including disaster and emergency management personnel, about climate change impacts and how these impacts affect vulnerable groups.</li> <li>2. Provide basic training for government staff on gender awareness tools to enhance implementation capacities.</li> <li>3. Adapt government programmes, including emergency response plans and programmes directed at vulnerable groups, to better address the impacts of climate change on these groups.</li> <li>4. Adapt public service facilities, including school buildings, to withstand storms and excess heat.</li> <li>5. Intensify immunization of children and youth to provide protection against diseases that are expected to become more prevalent with climate change.</li> <li>6. Retrain health workers to appreciate emerging climate change challenges within the context of immunization delivery and other comprehensive healthcare delivery.</li> <li>7. Encourage faith-based and civil society organizations to provide social welfare programmes and other support to address the climate change-induced needs of vulnerable groups.</li> <li>8. Adapt to our national, the World Meteorological Organization- Global Framework for Climate Services (WMO-GFCS) to Nigeria's needs (National Framework for Application of Climate Services - NFACS) to reduce vulnerability of communities through enhanced advocacy and implementation of the five Pillars of the Framework.</li> </ol>
<p><b>M. STRATEGIES FOR EDUCATION</b></p>
<ol style="list-style-type: none"> <li>1. Provide evidence-based information to raise awareness and trigger climate change adaptation actions that will protect present and future generations in Nigeria.</li> <li>2. Develop skills-based curriculum in subjects like science, geography, social studies, language arts, environmental education and technology that will empower children to better respond to the threats of climate change.</li> <li>3. Train teachers on climate change adaptation teaching strategies and techniques at pre-primary, primary, secondary and tertiary levels of education in Nigeria.</li> </ol>

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<sup>i</sup> Pew Research Center, spring 2015 Global Attitudes survey report Q13a-g.

<sup>ii</sup> See e.g. HBS, 2010; Abiodun, et al., 2011; Cervigni et al., 2013, Hassan et al., 2013; Oladipo 2013 a&b

<sup>iii</sup> Cervigni et al. 2013

<sup>iv</sup> In 2014, the Nigeria GDP was “rebased” to include a greater number of economic activities (46 compared to 33 previously). This improved coverage (including of the informal sector), the inclusion of new industries. Methodological improvements led to significant increases in the contribution of the services sector, manufacturing, construction, and water & electricity. On the other hand, value added by the agricultural and the oil & gas sectors declined notably relative to GDP.

<sup>v</sup> LEAP, the Long-range Energy Alternatives Planning System, is a widely-used software tool for energy policy analysis and climate change mitigation assessment.

<sup>vi</sup> The emissions reference values were derived from the relevant IPCC guidelines. Cost estimates were mainly drawn from the detailed World Bank study on Low Carbon opportunities in Nigeria, with additional input from the United Nations Environment Program (UNEP) Greenhouse gas Abatement Cost Model (GACMO of 14 August 2015).

<sup>vii</sup> Source: World Bank

<sup>viii</sup> Analysis of possible flaring scenarios in Ibitoye (2014)

<sup>ix</sup> Tariffs for those connected to the network are around 30 Naira per unit (kWh), but the costs per unit of electricity for small diesel generators can be much higher. Analysis shows that solar and wind systems could save roughly US\$0.10/kWh (around 20 Naira per unit) compared to a diesel system, with an abatement cost per tonne of CO<sub>2</sub> of -\$46 (that is, a *saving*).

<sup>x</sup> Levelised costs of efficient combined cycle units are usually lower than those for single-cycle units – and much lower than for diesel units - so this option is cost effective even before considering climate benefits. A policy of requiring all new power stations to use internationally best available combined-cycle units would be quite significant. The estimated benefit is US\$15 per tonne of CO<sub>2</sub> saved, with annual savings of 20 million tonnes.

<sup>xi</sup> In the absence of comprehensive data the emissions reductions cannot be quantified.



# NIUE

## Intended Nationally Determined Contributions

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### Key messages

Niue's future is imperilled by the effects of climate change for which it bears absolutely no responsibility. Niue faces severe events and slow onset events from changes to the climate system caused by others.

Niue believes that loss and damage must be addressed in a sustainable and consistent manner to highlight its significance and relevance in climate change, especially in developing countries. It is beyond Niue's national measures to address loss and damage alone from climate change. Building on the Alliance of Small Island States (AOSIS) position, Niue is calling for loss and damage to be included as a separate element of the 2015 Paris Agreement, an element that should be distinct from adaptation.

Against a high climate risk backdrop, the objective of Niue's National Strategic Plan is to build a sustainable future that meets our economic and social needs while preserving environmental integrity, social stability, and the Niue culture. Much of the time and capacity of our small public service is put to devise and implement plans to build climate resilience and enhance our disaster preparedness. Donor support is critical to these efforts.

While Niue's contribution to global greenhouse gas emissions is negligible (less than 0.0001%), and Niue is a net sink given the growth of our forests, nevertheless we are taking steps to reduce our emissions, in particular in the energy sector. The Niue Strategic Energy Road Map (NiSERM) 2015-2025 outlines Niue's aspiration to meet 80% of its electricity needs from renewable energy sources by 2025, which would in turn reduce the country's high reliance on imported fossil fuel. Part of this goal can be achieved through national resources and identified assistance, but achieving such high levels of electricity from renewables (from around 2% today) is very ambitious and will need considerable contributions of financial and capacity support from our partners.

### Section 1: Introduction

Niue has the distinction of being among the world's least populated nation states and with a future that is imperilled by the effects of climate change for which it bears absolutely no responsibility. In January 2004 the capital of Niue was destroyed by the category 5 Cyclone Heta. Niue knows the effects of severe events. It is also seeing the impacts of slow onset events as its underground freshwater lens faces contamination from rising sea levels.

Niue is a small Pacific Island Country (PIC) located partway between Tonga, Samoa and the Cook Islands. The island is approximately 259 km<sup>2</sup> with an Exclusive Economic Zone (EEZ) of 300,000km<sup>2</sup> and is reputedly one of the world's largest elevated coral atolls. The average height above sea-level is 23 metres and highest point less than 70m.

Niue is vulnerable to climate risks such as tropical cyclones (TCs) and droughts; geological risks such as earthquakes and tsunami; and human-caused risks such as disease outbreaks and contamination of its only fresh water supply. Niue's risk profile is also inherently linked to its isolation and limited capacity to manage and respond to disasters and climate change impacts. Traditional coping strategies have tended to make

way for an increased reliance on external support, as New Zealand fulfils its obligations to provide support to Niue in times of disaster.

Niue has no surface water and relies upon groundwater resources and rain catchments. Groundwater is recharged via rainfall infiltration and rainfall currently exceeds the rate of extraction. However, Niue's porous soil renders its underground fresh water vulnerable to contamination, from both human causes (e.g. agricultural chemicals) and natural sources (e.g. sea water). Agriculture is predominantly focused on subsistence production, principally of root crops. The combination of relatively poor soils and dependence on rainfall makes agricultural production highly sensitive to changes in rainfall frequency and amount.

Niue has a population of approximately 1500 (2013 census) spread across 14 villages. Large scale outward migration, usually from younger age groups, has occurred since 1971, predominantly to New Zealand for education, employment opportunities and family ties, as well as perceived higher standards of living abroad. As a result, there are over 20,000 people identifying themselves as Niuean that live in New Zealand.

Niue's economy is heavily dependent on support from New Zealand, which has a statutory obligation to provide economic and administrative assistance to Niue. Aid accounts for 70% of Niue's GDP, which is NZ\$10,000 per capita. Other sources of financial resources include taxation, government trading activities, sovereign assets and additional support from development partners. Low population, scarcity of natural resources, isolation and high costs of transportation lead to Niue's economy being far from self-sufficient.

Climate change will exacerbate the already vulnerable situation in Niue outlined above. The most recent report from the Pacific-Australia Climate Change Science and Adaptation Planning Program (PACCSAP) provides the following future projections to 2100 for Niue:

- El Niño and La Niña events will continue to occur in the future (*very high confidence*), but there is little consensus on whether these events will change in intensity or frequency;
- Annual mean temperatures and extremely high daily temperatures will continue to rise (*very high confidence*);
- Mean annual rainfall could increase or decrease with the model average indicating little change (*low confidence* in this model average), with more extreme rain events (*high confidence*);
- The proportion of time in drought is projected to increase or decrease in line with average rainfall (*low confidence*);
- Ocean acidification is expected to continue (*very high confidence*);
- The risk of coral bleaching will increase in the future (*very high confidence*);
- Sea level will continue to rise (*very high confidence*); and
- Wave heights may decrease in December–March (*low confidence*), with no significant changes projected in June–September waves (*low confidence*).

In particular, climate change impacts are likely to further exasperate both freshwater lens and coastal water quality issues for Niue. For these reasons, protecting and enhancing natural resources, adequate sanitation and wastewater treatment are among the government's main priorities.

The risks climate change poses to Niue are therefore highly significant, and the ability of Niue to effectively respond to minimise or avoid these risks is minimal. Niue therefore must rely on the international community to avoid the dangers of climate change. This requires significant reductions in global greenhouse gas emissions so that climate is stabilised to allow Niue's natural and social systems to adapt, and partnerships are developed between Niue and more developed nations to implement effective and efficient adaptation responses.

## Section 2: National Response

The draft Niue National Strategic Plan (2014-2019) has a vision of Niue ke Monuina – A Prosperous Niue. The objective is to build a sustainable future that meets our economic and social needs while preserving environmental integrity, social stability, and the Niue culture.

The achievement of Niue ke Monuina is supported by seven national development pillars and specific strategies under each of those pillars. Progress of the journey to prosperity is measured by targets and indicators corresponding to each of the pillars.

1. Financial Stability – Ensure that sufficient financial resources are secured, and responsible fiscal management is prudent, sustainable and supports healthy development strategies;
2. Governance – Ensure that good governance reflects the principles of transparency and accountability and is practised at all levels;
3. Economic Development and Maintain Crucial Infrastructure – support families, public services, and the private sector through tourism development with a safe, reliable, affordable healthy infrastructure;
4. Social – Enjoy a harmonious and healthy lifestyle in a thriving, educated and safe community that has access to a wide range of quality social services and healthy development opportunities;
5. Environment – Sustainable use and management of Niue’s natural resources and environment for present and future generations;
6. Tāoga Niue – Promote, preserve and strengthen Niuean cultural heritage, language, values and identity;
7. Private Sector Development – Be a prosperous and skilled island nation underpinned by a thriving and entrepreneurial private sector.

While building resilience to climate change is not explicitly mentioned it is an integral part of Pillar 5, and is of fundamental importance to all seven national development pillars.

## Section 3: Approach to Building Resilience to Climate Change

Within the context of the draft NNSP 2014-2019 the key guiding documents for building resilience to climate change in Niue are the National Climate Change Policy (2009) and Niue’s Joint National Action Plan (JNAP) for Disaster Risk Management and Climate Change Adaptation (2012).

The Vision of the National Climate Change Policy is for a “Safer, More Resilient Niue to Impacts of Climate Change and Towards Achieving Sustainable Livelihood”. The Policy Goal is “To promote understanding of and formulate appropriate responses to the causes and effects of climate change in support of national sustainable development objectives.”

To attain this Policy Goal the following objectives have been identified along with associated Strategies:

1. Awareness Raising – To promote public awareness and improve stakeholder understanding of the causes and effects of climate change and climate variability and as well as on vulnerability, adaptation and mitigation responses;
2. Data Collection, Storage, Sharing, and Application – To improve and strengthen the collection, storage, management and application of climate data, including greenhouse gases and emissions, to monitor climate change patterns and its effects;
3. Adaptation – To develop effective adaptation responses and enhance adaptive capacity in order to protect livelihoods, natural resources and assets, and vulnerable areas to the impacts of climate change to all sectors;
4. Mitigation – To mitigate the causes of climate change and implement effective mitigation measures to reduce greenhouse gas emissions;

5. Governance and Mainstreaming – To mainstream climate change issues into national development; and ii) establish an effective regulatory and institutional framework to facilitate the development and implementation of national responses to climate change;
6. Regional and International Cooperation – To ensure Niue obtains maximum benefits from relevant international and regional instruments relating to climate change and that it meets its commitments under them.

In its commitment to building resilience, Niue has developed the Niue Joint National Action Plan (JNAP). The JNAP strongly recognises the links between disaster risk management and climate change action, and thus aims to operationalise the Climate Change Policy and vulnerabilities identified in the draft Second National Communication (SNC). The JNAP also fulfils meeting the task of operationalising the Coastal Development Policy.

The JNAP has the following goals:

- Goal 1 – Strong and effective institutional basis for disaster risk reduction / climate change adaptation;
- Goal 2 – Strong public awareness and improved understanding of the causes and effects of climate change, climate variability and disasters;
- Goal 3 – Strengthened livelihoods, community resilience, natural resources and assets;
- Goal 4 – Strengthened capacity to adapt renewable energy technologies, improve energy efficiency and energy security;
- Goal 5 – Strengthened disaster preparedness for effective response.

Achievement of these Goals is through specific objectives and actions associated with these, which are fully costed for donor support.

Revision of the Climate Change Policy and JNAP will likely be required both before and post 2020 with costing of further identified activities for donor funding towards building a resilient Niue.

#### Section 4: Sector Policies and Plans

In addition to the NNSP and the Climate Change Policy there have been a number of recent policies which have integrated climate change considerations into the decision making process. These include the Forest Policy, the Niue National Energy Policy, and the Ecosystems Approach to Fisheries Management. Furthermore, a number of Government departments have incorporated climate change policies into their corporate plans, for example the Agriculture Sector Plan.

Other priority sectors for integration of climate change considerations into policies and plans include:

- Water Resource management
- Food security
- Climate Change Adaptation & Health Plan developed in 2013 by the Niue Health Department with donor partners
- Waste & sanitation management strategy for general, liquid and organic wastes
- Building Code Review, update, including development of national standards

Donor funding will be required to support development of relevant sector policies and plans, all of which will need to be developed, implemented & monitored to ensure full alignment with the goal of achieving climate resilience. All sector plans will also need to incorporate measureable indicators to align with the NNSP, and will need to be fully costed for donor funding.

By 2020, new sector plans will be required that are all fully costed for donor funding.

## Section 5: Mitigation context

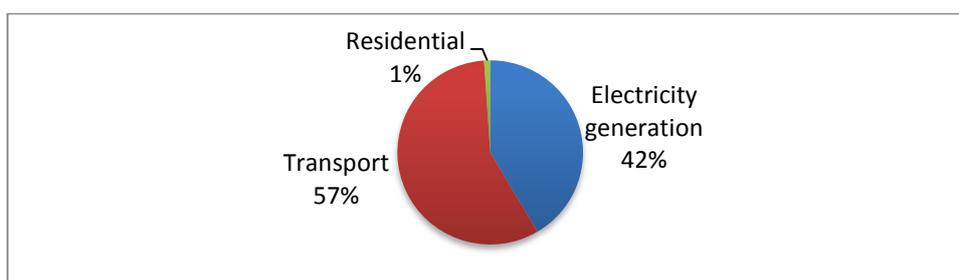
Niue is one of the world's least populated countries with low per capita emission of greenhouse gases. This means that Niue's contribution to this global problem is small, accounting for less than 0.0001% of global greenhouse gas emissions. Removals from Niue's forests outweigh its emissions many times over. As such, Niue is a net carbon sink, removing in the order of 139Gg CO<sub>2</sub>-e from the atmosphere each year.

However, Niue recognises there may be considerable scope through technological and behavioural means to lower its emissions this further, congruent with Niue's ambition to be a globally responsible citizen. It is anticipated that mitigating greenhouse gas emissions can have substantial collateral benefits including: decreased national expenditure associated with the escalating costs of importing fossil fuels; improved energy security; improved local air quality; support for Niue as an eco-tourism destination and encouraging sustainable development in the Pacific region.

Efforts to reduce GHG emissions are complementary to Niue's focus on its vision to 'build a sustainable future that meets our economic and social needs while preserving environmental integrity, social stability, and the Niue culture'.

The sectoral breakdown of Niue's GHG emissions from the forthcoming Second National Communication (2009 data, excluding waste) shows that the vast majority of Niue's emissions come from the energy sector. As shown in Figure 1 below, transport contributes the bulk of energy sector emissions at 57%, and electricity generation the remainder, at 42%. The focus of GHG mitigation efforts for Niue is thus firmly on transport and electricity generation.

Figure 1: Breakdown of Niue energy sector GHG emissions (2009, Second National Communication)



In 2015, Niue has a 100% electricity penetration rate and total electricity demand is fairly stable, having recorded only 3% growth from 2008 to 2012. However Niue is 96% dependent on imported fuel for power generation and 100% dependent on imported fuel for land, sea and air transportation.

### Electricity generation

Reliable, affordable, secure and sustainable energy supply is key to achieving prosperity for all Niueans. In light of Niue's vulnerability on imported oil, the Niue Strategic Energy Road Map (NiSERM) 2015 – 2025 was developed, with the goal of "a sustainable energy sector for a Prosperous Niue". The NiSERM builds on the 2005 Niue Energy Policy (NEP) and the Niue National Strategic Plan (NNSP) 2014 – 2019, to pursue five key motivations identified by stakeholders:

1. Reduced dependence on fossil fuels
2. Improved energy efficiency
3. More sustainable, cleaner energy
4. Improved cost-effectiveness of energy services
5. Attract funding for energy sector development

Niue is committed to transitioning the electricity sector from fossil fuel to renewable energy. The NiSERM outlines Niue's aspiration to meet 80% of its electricity needs from renewable energy sources by 2025, which would in turn reduce the country's high reliance on imported fossil fuel. This aspiration underpins Niue's contribution in this INDC, outlined in Section 6.

The period 2000-2009 saw progress on greenhouse gas emission mitigation in the form of the installation of solar hot water heating, public education campaigns, increased grid penetration and distributed use of renewable technologies, and the promotion of using low emission fuel sources and financial support for the uptake of more efficient appliances.

However, Niue faces difficulties in mitigating climate change for two primary reasons. First, Niue lacks environmental base data which would be able to support climate related decision-making. Second, Niue lacks the capacity to monitor and evaluate energy supply initiatives. Without this support there is no way to evaluate the cost or emission reduction effectiveness of programmes and take an adaptive management approach.

Recent installations of solar PV, identified as the most feasible renewable energy source for Niue, have seen grid stability issues arising that is inhibiting additional solar grid connections. The power sector in Niue urgently requires technical assistance to address this issue.

There are further issues in establishing a renewable industry in Niue. These are the high degree of subsidisation of electricity prices, a small market, high capital costs and lack of technological knowledge within the utility.

### **Transport**

The majority of fuel use is for land transport and the other major fuel user is the airline industry. As international regulations limit scope for national interventions, Niue is focusing mitigation efforts on land transport.

There is no public transport system in Niue and therefore private vehicles are the primary mode of transport. There is currently no regulation that restricts the type of vehicles allowed into the country, however in 2011 Customs regulations were amended to encourage the import of fuel-efficient vehicles into Niue, and targets have been set under the NiSERM to deploy more fuel efficient vehicles.

Efforts are hampered by the limited availability of technological solutions for the transport sector. However, this may be changing with the emergence of electrical vehicles, that could serve to be a resource for electricity grid stability and a means of reducing oil dependence, providing solar charging as part of the path to a 100% renewable electricity grid. The Government welcomes international assistance in the development of opportunities for deep emissions cuts in the transport sector.

### **Land Use Change and Forestry**

As mentioned, Niue is a net sink of greenhouse gases. It is important that the capacity of removals of greenhouse gases by AFOLU be maintained, if not enhanced. Currently, forestry activity is low and population decline has resulted in significant conversion of cropland to secondary rainforest. Removals can be assumed to be highly sensitive to future population increases, residential infrastructure replacement after cyclones or commercial forestry resumption. The Government of Niue is concluding a National Forest Policy to provide strategic direction for the island's forest areas.

## Section 6: Mitigation contribution

COUNTRY: Niue		DATE: November 2015
Parameter	Information	
Period for defining contribution (outcomes)	2020, 2025	
Type and level of contribution	<p>In line with Niue's resilience approach to reduce dependence on imported fossil fuels, Niue will achieve a <b>38% share of renewable energy of total electricity generation by 2020</b>. (In 2014 the renewable energy share was 2% and this contribution assumes assistance to address critical grid stability issues). This will in part be delivered by a 10% reduction in residential, commercial and government electricity demand by 2020. This contribution will be maintained out to 2025 and will be delivered using national resources and international assistance being identified to achieve the goals of the NiSERM.</p> <p><b>Conditional upon additional international assistance</b>, Niue could increase its contribution to an <b>80% share of renewable energy of total electricity generation, or to even higher levels, by 2025</b>. This would require additional support for energy storage and renewable energy generation, and strengthened frameworks for project delivery.</p> <p>Specific actions to deliver the above contributions are outlined in Annex 1. While required investment to achieve the contributions has not been fully quantified, investments required are far smaller than those needed to deliver a resilient future for Niue in the face of climate change.</p>	
Estimated quantified emissions impact	<p>In 2009 electricity generation contributed 2.1 Gg CO<sub>2e</sub> as an emissions source.</p> <p>The NiSERM Business as Usual forecast predicts a 33% increase in diesel consumption for electricity generation from 2009-2020 and 75% increase by 2025, assuming economic and population growth and no GHG abatement measures.</p> <p>A 38% renewable energy contribution in 2020 would equate to a reduction of 364,000 litres of diesel per annum, or approximately 1.2 Gg CO<sub>2e</sub> per annum.</p> <p>An 80% renewable energy contribution in 2020 would equate to a reduction of 977,000 litres of diesel per annum, or approximately 3.1 Gg CO<sub>2e</sub> per annum.</p>	
Coverage	Sectors	Electricity (42% of reported 2009 energy sector emissions)*
	Gases	Carbon dioxide (CO <sub>2</sub> ); Methane (CH <sub>4</sub> ); Nitrous oxide (N <sub>2</sub> O)
	Geography	Whole country
Planning Processes	<p>This INDC was prepared primarily using pre-existing national policy documents, and sector policies and plans to ensure accurate reflection of national development priorities, with pre-existing stakeholder support. The INDC was reviewed by key ministry representatives and formally approved by Cabinet.</p>	

\* note that waste and agriculture sectors were not reported in 2009 GHG inventory.

## Section 7: Statement on “Fair and Ambitious”

While Niue’s contribution to global greenhouse gas emissions is negligible (less than 0.0001%), and Niue is a net sink given the growth of our forests, nevertheless we are taking steps to reduce our emissions, in particular in the energy sector. The Niue Strategic Energy Road Map (NiSERM) 2015-2025 outlines Niue’s aspiration to meet 80% of its electricity needs from renewable energy sources by 2025, which would in turn reduce the country’s high reliance on imported fossil fuel. Part of this goal can be achieved through national resources and identified assistance, but achieving such high levels of electricity from renewables (from around 2% today) is very ambitious and will need considerable contributions of financial and capacity support from our partners.

## Section 8: General caveats statement

The preparing of this INDC came during Niue’s development of its Second National Communication. As such, data on GHG emissions are provisional and therefore subject to revision. The Second National Communication, once completed, will provide a more comprehensive presentation of Niue’s circumstance, plans and needs.

While there is a relatively high confidence regarding data on fuel importation and consumption, data collection on other emissions sources is not yet developed sufficiently to make higher tier inventories possible.

To obtain a better picture of the AFOLU sector will require an accurate, quality controlled survey of land use status using up-to-date satellite imagery and GIS mapping. Waste surveys currently lack the sample size and coverage to be statistically meaningful.

## Annex 1

### Specific strategies, policies, plans and actions, including timing and support needs

The table below provides a summary of current priority items that Niue wishes to highlight as needing support or that are significant initiatives that the government will take from its own budget resources. Available information dictates that these relate narrowly to mitigation actions; however, the list will be expanded in future to include a more holistic set of priorities compatible with Niue's resilience building development strategy. The investments required to achieve Niue's mitigation contribution, while not fully quantified, are far smaller than those needed to deliver a resilient future for Niue in the face of climate change.

Item	Planned period of implementation	Conditional on additional support?	Support partner(s) identified?	Notes
<b>Priority enabling activities:</b>				
Resolve grid stability issues	2016	Yes	No	Crucial to integrate existing installed PV generation before increasing solar installations. Est. investment: \$5.4m USD
Develop national capacity to monitor and evaluate energy supply and efficiency initiatives	2016-2020	Yes	No	
Advance land use change accounting through acquisition of recent, multi-spectral satellite imagery and relevant processing and verification	2016-2020	Yes	No	
<b>Priority near-term activities:</b>				
Investigation and implementation of renewable energy resources including additional solar PV, wind and assessing biofuel, biogas potentials	2015-2020	No	Partial	Funding to support resource identification secured. Requires investment for project implementation.
Build in-country capacity to operate and maintain renewable energy	2015-2020	No	Partial	Partial SPC funding identified, additional \$0.07m USD investment required.

Item	Planned period of implementation	Conditional on additional support?	Support partner(s) identified?	Notes
Implement energy efficiency through supply side loss reduction, develop energy auditing, equipment standards and labelling, regulatory reform and fuel substitution for transport and cooking.	2015-2020	No	Partial	Funding to support resource identification secured. Requires additional \$0.6m USD investment.
Efficient supply and storage for fuels and LPG and economics assessments on fuel supply and storage	2015-2020	Yes	Partial	SPC technical support identified. Additional \$4.4m USD investment required.
<b>Priority longer-term activities:</b>				
Implement additional renewable energy generation capacity to increase RE share from 35% to 80%	2020-2025	Yes	No	If achieved through solar PV 1.8MW of additional capacity would be required by 2025.
Matching energy storage capacity	2020-2025	Yes	No	
Transport sector transition away from fossil fuels	2020-2030	Yes	No	Requires pre-feasibility work on electric vehicles, before broader implementation strategy as options become more commercially viable

## **Submission by Norway to the ADP**

### **Norway's Intended Nationally Determined Contribution**

#### **1. Introduction**

Norway is fully committed to the UNFCCC negotiation process towards adopting at COP21 a protocol, another legal instrument or an agreed outcome with legal force under the Convention, applicable to all Parties, in line with keeping global warming below 2°C.

Norway hereby communicates its intended nationally determined contribution and the accompanying information to facilitate clarity, transparency and understanding, with reference to decisions 1/CP.19 and 1/CP.20.

Regarding the invitation to consider communicating undertakings in adaptation planning, Norway refers to the information contained in its recent Sixth National Communication.

#### **2. Norway's Intended Nationally Determined Contribution**

Norway is committed to a target of an at least 40% reduction of greenhouse gas emissions by 2030 compared to 1990 levels. The emission reduction target will be developed into an emissions budget covering the period 2021-2030.

Norway intends to fulfil this commitment through a collective delivery with the EU and its Member States.

In the event that there is no agreement on a collective delivery with the EU, Norway will fulfil the commitment individually. The ambition level will remain the same in this event.

## 2.1. Information to facilitate clarity, transparency and understanding

### 2.1.1. Quantification of the INDC

Type of commitment	Absolute emission reduction from base year emissions
Coverage	Economy wide; 100% of emissions covered
Base year	1990
Base year emissions	About 52.0 Mt CO <sub>2</sub> -equivalents. <sup>1</sup> The base year emissions estimated in line with decision 24/CP.19 will be reported in Norway's next national GHG inventory submission.
Time frame	2021-2030
Reduction level	At least 40% reduction in 2030 compared to 1990. To be developed into an emissions budget for the period 2021 to 2030.
Scope: inclusion of gases	All greenhouse gases not controlled by the Montreal Protocol  CO <sub>2</sub> - Carbon dioxide CH <sub>4</sub> - Methane N <sub>2</sub> O - Nitrous oxide PFCs - Perfluorocarbons HFCs - Hydrofluorocarbons SF <sub>6</sub> - Sulphur hexafluoride NF <sub>3</sub> – Nitrogen trifluoride

<sup>1</sup> The land sector (land-use, land-use change and forestry) is not included in this figure. If the sector was included the 1990 figure would be about 41.8 Mt CO<sub>2</sub>-equivalents.

Scope: Sector/source categories	Energy; industrial processes and product use; agriculture; land-use, land-use change and forestry; waste.
Metric (GWP values)	Global Warming Potential on a 100 year timescale in accordance with the IPCCs 4 <sup>th</sup> Assessment Report.
<b>Assumptions and methodological approaches:</b>	
Inventory methodology	IPCC 2006 guidelines
Accounting for the land sector (scope, accounting basis)	<ul style="list-style-type: none"> <li>• In the case of a collective delivery with the EU and its member states, the final approach to accounting for emissions and removals in the land sector will be decided upon later, based on the dialogue with the EU.</li> <li>• Norway will work towards a common framework for land sector accounting, for all Parties. Norway does not currently have a final position on the content and structure of such a framework.</li> <li>• In the event that Norway will implement the commitment individually, the final approach to accounting in the land sector will be decided upon later, based on the principles described below and the progress made internationally towards a common framework for land sector accounting: <ul style="list-style-type: none"> <li>• Norway’s commitment will include emissions and removals in the land sector, ensuring incentives to implement new measures in the sector as well as sustaining existing measures.</li> <li>• The final choice of land sector accounting shall not affect the ambition level for 2030 compared to when the land sector is not included. The commitment to reduce emissions by at least 40% by 2030 compared to 1990 includes additional measures in the land sector.<sup>2</sup></li> <li>• Norway will apply a comprehensive land-based approach to accounting for emissions and</li> </ul> </li> </ul>

<sup>2</sup> Before further guidance on land sector accounting is established and the accounting basis for Norway’s commitment is finalised, net removals in the land sector compared to 1990 as the base year will be accounted for. In the base year, net removals in the sector was 10.1 Mt CO<sub>2</sub>-equivalents, while the projected net removals in 2030 constitute 21.2 Mt CO<sub>2</sub>-equivalents. Removals beyond the level in the base year and the projected level will count towards the 40% commitment. This will constitute additional action in the land sector. When the difference of 11.1 Mt between the base year level and the projected level is included, the commitment would need to be recalculated to ensure that the ambition level stays unchanged. Net removals in the base year and the projection may be adjusted as a consequence of improved emission inventory data in future national GHG inventory submissions.

	<p>removals in the land sector.</p> <ul style="list-style-type: none"> <li>• Methodological changes in calculating emissions and removals from the land sector shall not affect Norway’s ambition.</li> <li>• Norway will consider the possibility of applying the Kyoto Protocol rules for natural disturbances and carbon stock changes in harvested wood products.</li> </ul>
<p><b>Expected use of international market based mechanisms, including how double counting will be avoided</b></p>	
<ul style="list-style-type: none"> <li>• Through collective delivery with the EU</li> </ul>	<ul style="list-style-type: none"> <li>• Norwegian emissions are covered by the EU ETS, and Norway will through our participation in the ETS contribute to the necessary emission reductions. The EU ETS ensures that no double counting occurs.</li> <li>• In meeting the emission reduction target in the non-ETS sectors, Norway assumes access to flexibility in implementation in line with what EU member states have. This includes flexibility among EU member states. Regarding the non-ETS sectors, Norway’s assumption is that an agreement between Norway and the EU on collective delivery will ensure that no double counting occurs.</li> <li>• In this situation, there will be no use of international market credits towards the target. Norway does, however, support inclusion of market based mechanisms in the 2015 agreement, and the opportunity to continue using units accruing from the CDM and JI.</li> </ul>
<ul style="list-style-type: none"> <li>• In the case of an individual commitment</li> </ul>	<ul style="list-style-type: none"> <li>• If the commitment should be implemented by Norway individually, the ambition level of at least 40% emission reduction by 2030 compared to 1990 still stands.</li> <li>• In this situation, Norway assumes that we will have access to flexible mechanisms as in the case with collective delivery with the EU. Norway will continue to use market based mechanisms under the UNFCCC. Strict criteria will be applied to ensure that such credits represent real and verifiable emission reductions and that double counting is avoided.</li> <li>• Norway will seek an agreement of accounting for Norway’s participation in the EU ETS.</li> </ul>

### **2.1.2. Planning processes and national circumstances**

The government presented a White Paper to the Parliament in February, with the proposed emission reduction target and implementation through collective delivery with the EU. Final decisions in the Norwegian parliament were made on 24 March 2015.

Norway will enter into a dialogue with the EU to develop the terms for a collective delivery of the commitment of at least 40% emission reduction by 2030 compared to 1990. The intention is to provide more information on this solution before the UN Climate Conference in Paris.

According to the broad political agreement in 2012 on climate change, the aim is that Norway will be carbon-neutral in 2050. As part of an ambitious global climate agreement where other developed nations also undertake ambitious commitments, Norway will adopt a binding goal of carbon neutrality no later than in 2030. This means that Norway will commit to achieving emission reductions abroad equivalent to Norwegian emissions in 2030.

Norway's long term goal is to become a low emission society by 2050. Towards 2030, Norwegian domestic emissions will be reduced as part of the effort to meet our 2030 commitment.

Norway's emissions profile, emissions development and current policies and measures are described in our sixth National Communication, submitted in 2014. Norway will continue to implement ambitious national climate policies. These policies will be under continuous development. With reference to the White Paper, the priority areas for enhanced national climate policy efforts are:

- Reduced emissions in the transport sector
- Low emissions technology in industry
- CO<sub>2</sub> capture and storage
- Renewable energy
- Environmentally friendly shipping

### **2.1.3. Fairness and ambition of the INDC of Norway**

Norway's approach to considering fairness and ambition is to assess how our INDC contributes to meeting the ultimate objective of the Convention, of achieving stabilisation of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system.

The scientific basis for such assessment is the most recent assessment report by the IPCC. The 5<sup>th</sup> Assessment Report shows that scenarios that are likely to limit global warming below 2°C require that global emissions must be reduced by 40 to 70% by 2050 compared to 2010 levels. Norway's commitment to reduce greenhouse gas emissions of at least 40% by 2030 compared to 1990 is well in line with the emissions pathways towards 2050 that correspond to keeping global warming below 2°C. Thus, Norway is doing its fair share for the global goal of keeping

global warming below 2°C compared to pre-industrial levels. This is consistent with industrialised countries taking the lead.

An emission reduction target of 40% by 2030 compared to 1990 is at the high end of emission reductions that should be implemented by OECD-countries, given a global cost-effective, regional distribution of emission reduction targets (IPCC WGIII, table 6.4).

Under the second commitment period of the Kyoto Protocol, Norway is committed to an emission reduction corresponding to average annual emissions over the period 2013-2020 at 84 per cent of the 1990 emission level. The commitment under KP 2 is consistent with the Norwegian target of 30 per cent reduction of emissions by 2020, compared to 1990. Norway's INDC represents a significant progression beyond current undertaking. Given a successful outcome where the commitment is implemented through a collective delivery with the EU, the overall emission reduction will take place within Europe.

## **2.2. General observations and assumptions**

If the agreement or related COP decisions are amended before their entry into force in such a way that they include rules or provisions that in effect alters the assumptions under which this INDC has been developed, Norway reserves the right to revisit the INDC.

If it can contribute to a global and ambitious climate agreement in Paris, Norway will consider taking a commitment beyond an emission reduction of 40% compared to 1990 levels, through the use of flexible mechanisms under the UN framework convention beyond a collective delivery with the EU.

## **3. Follow up**

Norway requests that this submission is published on the UNFCCC webpage and that our INDC is included in the synthesis report to be prepared by the secretariat. Norway encourages other countries to submit their INDC well before Paris and is prepared to provide further information towards Paris.



وزارة البيئة والشؤون المناخية  
MINISTRY OF ENVIRONMENT AND CLIMATE AFFAIRS

سلطنة عمان  
وزارة البيئة والشؤون المناخية

تقرير حول  
المساهمات المحددة على المستوى الوطني  
(INDCs)

٢٠١٥ م

## مقدمة :

يستعرض التقرير الحالي المساهمات المحددة وطنيا لسلطنة عمان والتي تم إعدادها بالتعاون مع الجهات ذات العلاقة لتحقيق تنفيذ الالتزام بمقرر مؤتمر الأطراف التاسع عشر (1/CP19) والذي نص على دعوة جميع دول الأطراف لإعداد تقرير حول المساهمات المحددة وطنيا من أجل تحقيق هدف الاتفاقية المنصوص عليه في المادة الثانية من الاتفاقية .

وقد تم إعداد التقرير الخاص بالسلطنة حسب المعلومات الواردة في مقرر مؤتمر الأطراف العشرين (1/CP20) والتي تم توفيرها من أجل ضمان الوضوح والفهم والشفافية ، ويشتمل هذه التقرير على مواضيع متعلقة بمساهمة السلطنة في مجالي التخفيف والتكيف مع التغيرات المناخية.

## المساهمات المحددة وطنيا المقدمة من سلطنة عمان:

- إن تنفيذ المساهمات المحددة وطنيا المقدمة من قبل سلطنة عمان يعتمد على توفير الدعم المالي وبناء القدرات ونقل التكنولوجيا من قبل الاتفاقية الإطارية بشأن تغير المناخ .		
أ	المساهمات المحددة وطنيا	<ul style="list-style-type: none"><li>• تعتمد توقعات انبعاثات غازات الدفيئة في سلطنة عمان على النمو الاقتصادي والاجتماعي.</li><li>• يتوقع أن يكون مجموع انبعاثات غازات الدفيئة في السلطنة في عام ٢٠٣٠ م (٩٠٥٢٤) جيجا جرام في حالة عدم تطبيق المساهمات المحددة وطنيا كما هو موضح في الرسم البياني.</li></ul>

ستقوم السلطنة بالتحكم في الزيادة المتوقعة لانبعاثات غازات الدفيئة بنسبة ٢% إلى (٨٨٧١٤) جيجا جرام خلال الفترة من ٢٠٢٠-٢٠٣٠ م كما هو موضح في الرسم البياني التالي :



توقعات انبعاثات غازات الدفيئة (١٩٩٥ - ٢٠٣٠م)

<ul style="list-style-type: none"> <li>● تخفيف حرق غاز الشعلة في الصناعات البترولية .</li> <li>● زيادة مساهمة الطاقة المتجددة.</li> <li>● زيادة مشاريع كفاءة الطاقة في المشاريع الصناعية.</li> <li>● تطوير قوانين وتشريعات جديدة في مجال تغير المناخ لدعم التقنيات منخفضة الكربون وكفاءة الطاقة .</li> <li>● تقليل استخدام الهيدروكلوروفلوروكاربونات في قطاع التبريد والتبريد.</li> </ul>	<p>ب</p> <p>نوع المساهمات في مجال التخفيف</p>
<p>٢٠٢٠ - ٢٠٣٠م</p>	<p>ج</p> <p>الإطار الزمني</p>

د	سنة الأساس	<ul style="list-style-type: none"> <li>• لا ينطبق</li> <li>• تم استخدام بيانات عام ١٩٩٤م من أجل إعداد توقعات النمو لانبعاثات غازات الدفيئة وفقا لبيانات البلاغ الوطني الأول للسلطنة.</li> </ul>
هـ	النطاقات المغطاة حسب: <ul style="list-style-type: none"> <li>• الحدود الجغرافية</li> <li>• القطاعات</li> <li>• غازات الدفيئة</li> </ul>	تشمل كل السلطنة في القطاعات التالية : <ul style="list-style-type: none"> <li>• الطاقة</li> <li>• العمليات الصناعية</li> <li>• النفايات</li> <li>• الغازات المستهدفة:  <ul style="list-style-type: none"> <li>• ثاني أكسيد الكربون</li> <li>• الميثان</li> <li>• أكسيد النيتروز</li> <li>• الهيدروكلوروفلوروكاربونات</li> <li>• البيروفلوروكاربونات</li> </ul> </li> </ul>
و	المنهجية المستخدمة	الدليل الاسترشادي للهيئة الدولية المعنية بتغير المناخ
ز	تأثيرات تغير المناخ المتوقعة على السلطنة	تشمل تأثيرات تغير المناخ على السلطنة كل من: <ul style="list-style-type: none"> <li>• الأعاصير والعواصف المدارية ،</li> <li>• الفيضانات ،</li> <li>• ارتفاع درجة الحرارة</li> <li>• ارتفاع مستوى سطح البحر ،</li> <li>• تآكل الشواطئ ،</li> <li>• ندرة المياه والتصحر ،</li> <li>• انخفاض كمية الأسماك والتأثيرات على البيئة البحرية والزراعة.</li> </ul>

ح	<p>نوع المساهمات في مجال التكيف</p>	<p>إن تنفيذ الجهود الإضافية المتعلقة بالتكيف في السلطنة سيكون مشروطاً بتقديم الدعم المالي وبناء القدرات ونقل التقنيات من قبل الاتفاقية الإطارية بشأن تغير المناخ. تعتزم السلطنة في حال توفر ذلك القيام بجهود إضافية في التكيف في المجالات التالية :</p> <ul style="list-style-type: none"> <li>• الأعاصير المدارية وتآكل الشواطئ وارتفاع مستوى سطح البحر .</li> <li>• قطاع الأسماك والبيئة البحرية .</li> <li>• ندرة المياه والتصحر .</li> <li>• الحماية من الفيضانات .</li> <li>• أمن الطاقة .</li> <li>• أمن الغذاء .</li> <li>• إستراتيجية للتكيف مع التغيرات المناخية .</li> </ul>
ط	<p>إحتياجات السلطنة من التمويل وبناء القدرات ونقل التقنيات</p>	<p>سوف يتطلب تنفيذ الجهود والخطط المشار إليها أدناه في السلطنة إلى توفير الدعم المالي وبناء القدرات ونقل التقنيات من قبل الاتفاقية الإطارية بشأن تغير المناخ .</p> <p>١- في مجال التخفيف :</p> <ul style="list-style-type: none"> <li>• المباني المستدامة .</li> <li>• تطوير الطاقة المتجددة .</li> <li>• كفاءة الطاقة .</li> <li>• استخدام النقل منخفض الكربون .</li> <li>• استخدام تقنيات منخفضة الكربون في الصناعات .</li> <li>• إعادة تدوير الميثان من المخلفات الصلبة ومرادم النفايات .</li> <li>• مصارف الكربون .</li> </ul> <p>٢- في مجال التكيف</p> <ul style="list-style-type: none"> <li>• الأعاصير والعواصف المدارية .</li> <li>• قطاع الطاقة .</li> <li>• الفيضانات وتآكل الشواطئ .</li> <li>• قطاع موارد المياه .</li> <li>• قطاع الصحة .</li> <li>• قطاع الأسماك والبيئة البحرية .</li> <li>• قطاع الزراعة .</li> </ul>



وزارة البيئة والشؤون المناخية  
MINISTRY OF ENVIRONMENT AND CLIMATE AFFAIRS

**SULTANATE OF OMAN**  
**MINISTRY OF ENVIRONMENT AND CLIMATE AFFAIRS**

**SUBMISSION**

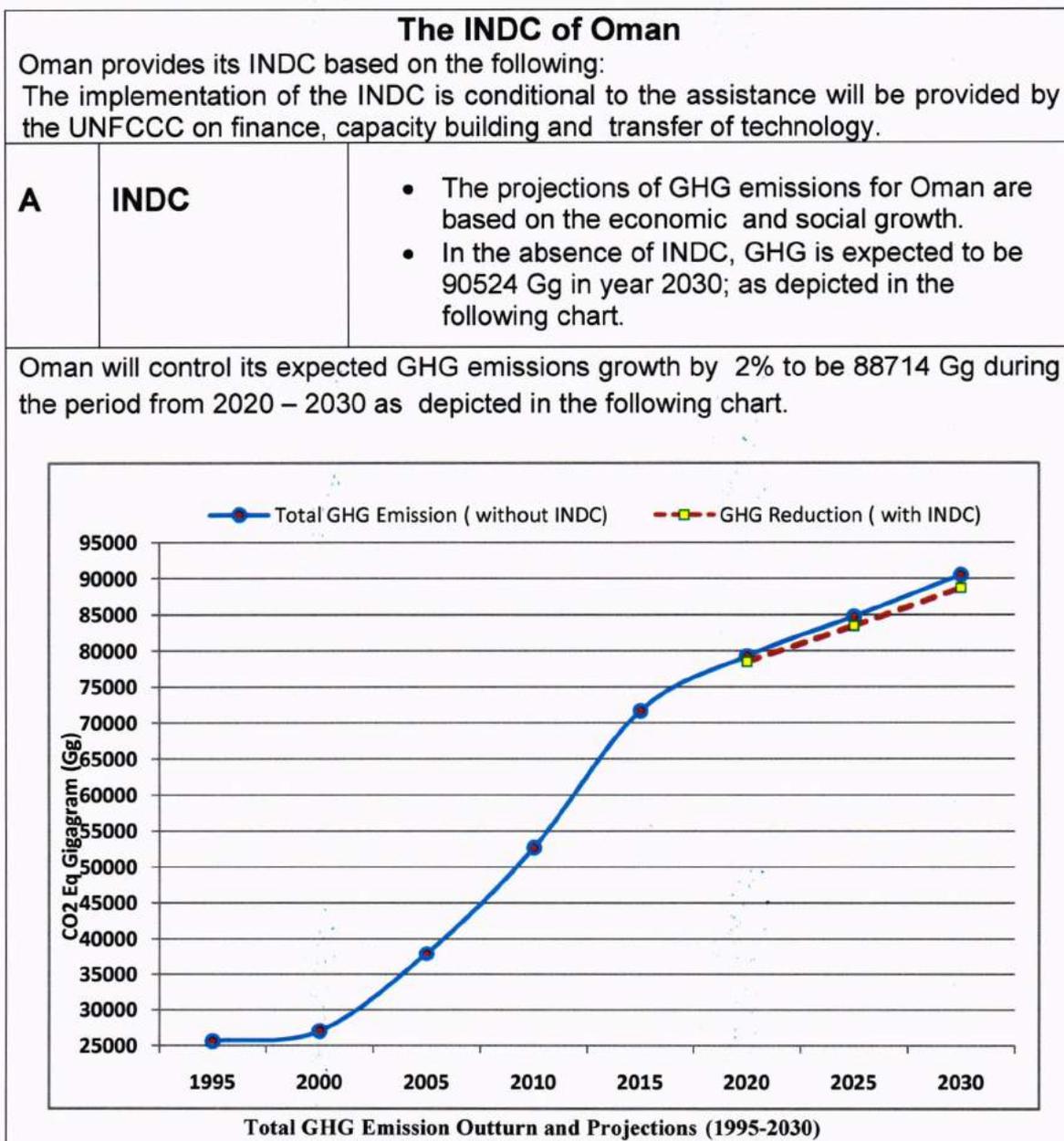
**ON**

**INTENDED NATIONALLY DETERMINED CONTRIBUTIONS  
(INDCs)**

**2015**

## Introduction

The present document ( Oman INDC) has been prepared in coordination with various stakeholders in the country as per the mandate of Conference of the Parties (COP) and by its decision 1/CP.19, wherein all Parties have been invited to initiate or intensify domestic preparations for their INDCs towards achieving the objective of the Convention as set out in its Article 2. It takes into consideration the two aspects i.e. mitigation and adaptation. The information in the document are provided as per decision 1/CP.20 .



<b>B</b>	<b>Type of mitigation contributions</b>	<ul style="list-style-type: none"> <li>• Reduction in Gas flaring from oil industries;</li> <li>• Increase the share of renewable energy;</li> <li>• Increase the energy efficiency projects among industries;</li> <li>• Develop new legislation on climate change which will support the adoption of low carbon and energy efficiency technologies.</li> <li>• Reduction of HCFC use in foam and refrigeration sector.</li> </ul>
<b>C</b>	<b>Timeframe or time period</b>	2020 to 2030
<b>D</b>	<b>Base year</b>	<ul style="list-style-type: none"> <li>• N/A .</li> <li>• The year 1994 has been considered for the GHG growth projections in accordance with the Initial national communication.</li> </ul>
<b>E</b>	<b>Coverage in terms of: Geographical boundaries; Sectors; Greenhouse gases</b>	<p>Entire country for the following sectors:</p> <ul style="list-style-type: none"> <li>• Energy;</li> <li>• Industrial processes; and</li> <li>• waste</li> </ul> <p>Following GHGs will be targeted:</p> <ul style="list-style-type: none"> <li>• Carbon dioxide (CO<sub>2</sub>);</li> <li>• Methane (CH<sub>4</sub>);</li> <li>• Nitrous oxide (N<sub>2</sub>O);</li> <li>• Hydrochlorofluorocarbons (HCFCs) ); and</li> <li>• Perfluorocarbons (PFCs);</li> </ul>
<b>F</b>	<b>Baseline methodologies</b>	IPCC Guidelines
<b>G</b>	<b>Projected climate impacts and related assumptions</b>	<p>The identified climate change impact are:</p> <ul style="list-style-type: none"> <li>• Tropical cyclone &amp; storm surge,</li> <li>• Flush flooding,</li> <li>• Heat waves,</li> <li>• Sea level rise,</li> <li>• Coastal erosion,</li> <li>• Water scarcity and desertification ,</li> <li>• Reduction in fisheries &amp; impacts on marine environment and agriculture.</li> </ul>

<p><b>H</b></p>	<p><b>Type of adaptation contributions</b></p>	<p>In addition to the efforts made by the Sultanate on adaptation, further efforts would be made conditional to the fund, capacity building and transfer of technology which will be provided by the UNFCCC.</p> <p>The efforts will be in the following areas:</p> <ul style="list-style-type: none"> <li>• Tropical cyclone, coastal erosion and sea Level rise</li> <li>• Fisheries and marine environment;</li> <li>• Water scarcity and desertification;</li> <li>• Flood protection ;</li> <li>• Energy security;</li> <li>• Food security; and</li> <li>• Development of national adaptation strategy on climate impacts</li> </ul>
<p><b>I</b></p>	<p><b>Oman's requirements of Finance, Transfer of Technology and Capacity Building</b></p>	<p>Fund, capacity building and transfer of technology from the UNFCCC will be required by the Sultanate of Oman to make further efforts in the following areas:</p> <p><b>1. Mitigation</b></p> <ul style="list-style-type: none"> <li>• Sustainable buildings;</li> <li>• Development of renewable energy.</li> <li>• Energy efficiency</li> <li>• Low carbon transport initiatives;</li> <li>• Low carbon technologies among the industries;</li> <li>• Methane recovery from solid waste dumping sites; and</li> <li>• Carbon sinks</li> </ul> <p><b>2. Adaptation</b></p> <ul style="list-style-type: none"> <li>• Tropical storms and high wind speeds;</li> <li>• Energy sector;</li> <li>• Coastal erosion and flooding;</li> <li>• Water Sector;</li> <li>• Health sector</li> <li>• Fisheries and marine environment; and</li> <li>• Agriculture Sector</li> </ul>

## **Pakistan – Intended Nationally Determined Contributions (INDCs)**

1. Pakistan's Intended Nationally Determined Contributions (Pak-INDCs) is submitted in compliance to the decision (1/CO.20) taken at the 20<sup>th</sup> Session of the Conference of Parties of the United Nations Framework Convention on Climate Change (UNFCCC) held in Lima, Peru.
2. Pak-INDC is rooted in Vision 2025 of Pakistan – a roadmap of economic growth, social inclusion and sustainable development. It is also aligned with the country's continued commitment to the issue of climate change as reflected in the National Climate Change Policy as well as national policies on agriculture, power, energy, energy efficiency, water and other sectors.
3. Pakistan's development needs are expected to grow necessitating the requirement of affordable sources of power generation, development of infrastructure and enabling industry to take a lead role in meeting the transformation.
4. However Pakistan is committed to reduce its emissions after reaching peak levels to the extent possible subject to affordability, provision of international climate finance, transfer of technology and capacity building. As such Pakistan will only be able to make specific commitments once reliable data on our peak emission levels is available.
5. A process of calculating the country's future emission projections through detailed studies and analysis is currently underway. Potential for mitigation exists in all sectors of the economy. The GHG emission projections along with possibility of economy wide mitigation and its abatement cost will be determined after the completion of this exercise.
6. Adaptation to impacts of Climate change is a vast area of untapped opportunities in Pakistan due to its multi-sectoral nature of economy, huge infrastructure needs, distinct climatic zones, ecological systems and administrative arrangements. The investment costs for adaptation interventions are being determined in consultation with the provinces and other stakeholders, and will also be conveyed in due course of time.
7. Pakistan is committed to the objectives of UNFCCC for the overall benefit of all humanity. It will therefore actively engage with the international community in development of responsive global climate governance that is beneficial to all. Together with other Parties, Pakistan will promote and support low-carbon, climate resilient development.

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## Republic of Palau

### Intended Nationally Determined Contribution

November 2015

#### 1. Introduction

The Republic of Palau is committed to the successful conclusion of negotiations under the Ad-Hoc Working Group on the Durban Platform for Enhanced Action (ADP) in order to adopt, at COP21, a new legally-binding agreement under the United Nations Framework Convention on Climate Change (UNFCCC) applicable to all Parties, to come into effect in 2020.

In accordance with decisions 1/CP.19 and 1/CP.20, the Republic of Palau is pleased to communicate its Intended Nationally Determined Contribution (INDC) towards achieving the objective of the UNFCCC, as well as accompanying information to facilitate clarity, transparency, and understanding of its INDC.

The Republic of Palau is also pleased to provide additional accompanying information on our mitigation effort and support for implementation.

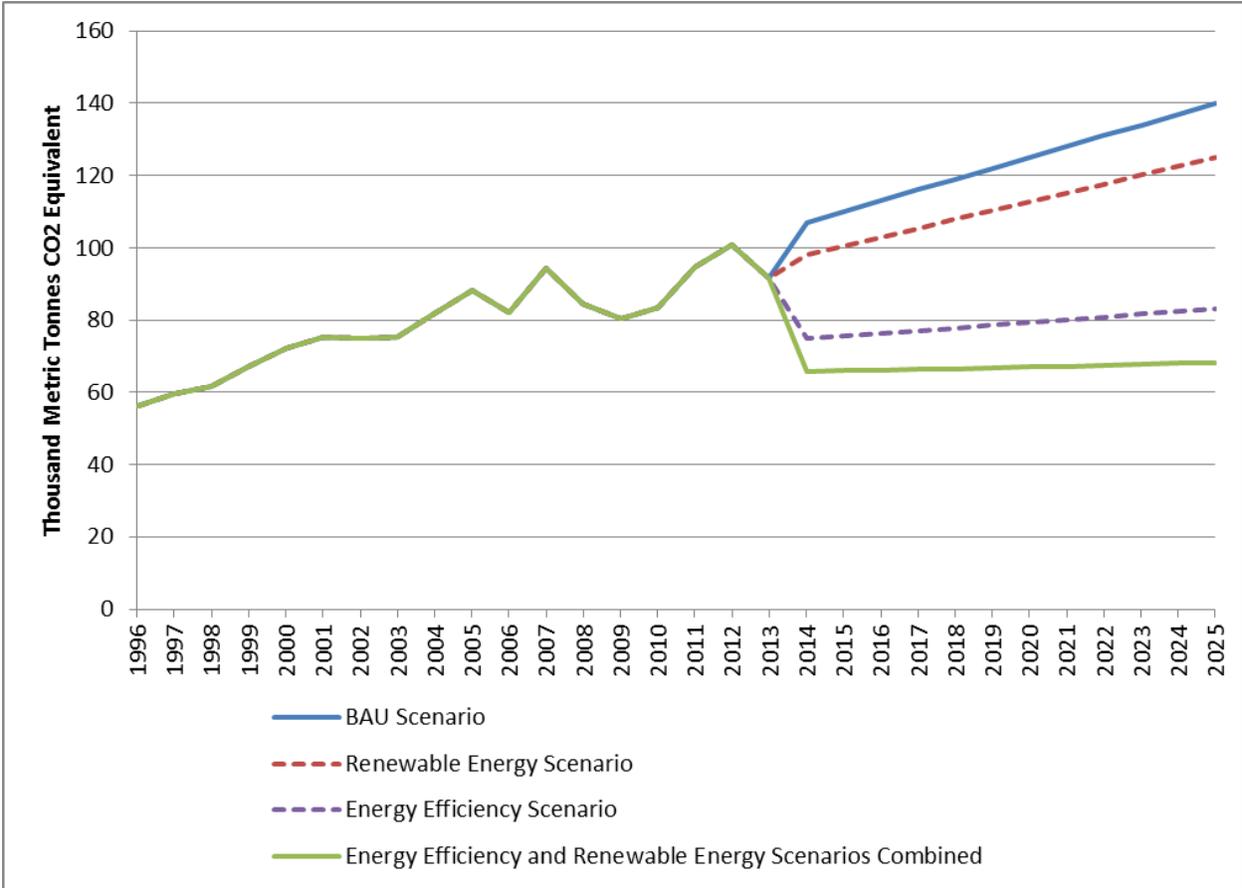
#### 2. Intended Nationally Determined Contribution – Mitigation [Contribution]

Timeframe	Start year: 2020	End year:2025
Type of commitment	Absolute energy sector emissions reduction target, with additional reductions coming from the waste and transport sectors.	
Reference/base year	Reference/base year is 2005 – emissions were approximated at 88 thousand tCO <sub>2</sub> e	
Estimated quantified emissions reductions	Indicative targets: <ul style="list-style-type: none"><li>- 22% energy sector emissions reductions below 2005 levels by 2025</li><li>- 45% Renewable Energy target by 2025</li><li>- 35% Energy Efficiency target by 2025</li></ul>	
Coverage	Energy (electricity generation), transport and waste sectors	

	Gases: Carbon dioxide (CO <sub>2</sub> ) and methane (CH <sub>4</sub> )
Baseline assumption	<p>Business as Usual (BAU) emissions scenario projections are based on economic growth in the absence of new climate change policies and measures in addition to those in place in 2015, and greater coverage and implementation of existing measures.</p> <p>BAU projections include the electricity sector only, which is Palau's largest emitting sector. BAU assumptions include a GDP per capita growth of 3.72% per year (historical 15 year CAGR) and EIA oil price projections in reference case as the basis for residential, government and commercial sector energy use growth projections. Commercial energy use growth projections also took into consideration energy use by private generators in the tourism sector.</p> <p>Emission from the waste management and transport sectors are not included in the BAU projection however emission reduction initiatives will be addressed on a project basis.</p>
Intention to use market-based mechanisms to meet target	No
Land sector accounting approach	N/A
Planning Process	<p>Palau's INDC is grounded in the <i>Palau Climate Change Policy</i>, which was informed by input from communities, civil society and other stakeholders, as well as on the preparatory work for Palau's second National Communication which was also widely consulted.</p> <p>The <i>Policy</i> establishes Palau's National Appropriate Mitigation Actions (NAMA) and National Adaptation Plan (NAP) as well as the institutional and policy frameworks for: (a) climate change mitigation via management of greenhouse gas emissions including carbon sinks; and (b) climate change adaptation and risk reduction and management. It establishes the policy framework that will guide and inform action in accordance with Palau's <i>National Master Development Plan – Palau 2020</i>.</p>
Fair and Ambitious	<p>The Republic of Palau's total emissions are <i>de minimis</i> in the global context. Given Palau's remoteness, the small size of the economy, low GDP per capita, dependence on partnership support and vulnerability to climate change, Palau's proposed targets are ambitious and fair as measured against other nations.</p> <p>Under the BAU scenario emissions would be 140 thousand tCO<sub>2</sub>e in 2025, compared to 68 thousand tCO<sub>2</sub>e if both the renewable energy and energy efficiency targets are met.</p>

	<p>Emissions in 2005 were approximated at 88 thousand tCO<sub>2</sub>e. Full implementation of the renewable energy and energy efficiency strategies outlined below puts Palau on a trajectory to reducing emissions by half as against BAU in 2025, the equivalent of 22% under 2005 emissions levels.</p>
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**Business-As Usual emissions projection against INDC full implementation emissions projection (and Renewable Energy and Energy Efficiency scenarios disaggregated)**



**3. Accompanying Information on Palau’s INDC**

**a. General information on Palau**

Palau is joining the community of nations, both industrialised and developing, in taking action to address the causes and impacts of climate change. Palau is particularly vulnerable to the impacts of climate

change, principally from sea level rise and the increase in extreme events (drought, flooding, Category 4 and 5 typhoons). Sea-level rise threatens vital infrastructure, settlements, and facilities that support the livelihood of island communities. Moreover, under most climate change scenarios, water resources in small islands are likely to be seriously compromised. Subsistence and commercial agriculture will be adversely affected by climate change, and ocean warming and acidification will heavily impact coral reefs, fisheries, and other marine-based resources crucial to our livelihoods, economy and culture.

**b. Mitigation: Current and Future Policies and Measures to achieve INDC targets**

**i. Current Policies and Measures**

Currently Palau is working to increase the share of renewables in our energy mix and to increase energy efficiency initiatives. To date, total renewable energy efforts have only reached 8% of the needed 22%, principally because two grid-connected solar projects (1.5 and 3.5MW respectively) never came to fruition. However to date Palau has achieved an approximately 30% reduction in energy use due to efficiency measures taken.

Current renewable energy and energy efficiency policies and measures include: a pilot loan subsidy for solar roof panels which will be increased to cover more homes if successful; a Home Energy Efficiency Program at the Palau National Development Bank; prepaid metering at Palau Public Utilities Corporation; distribution of CFL light bulbs; government building retrofits; and, a pilot Energy Audit program for large commercial buildings.

**ii. Future Policies and Measures to achieve INDC targets**

To achieve the renewable energy target Palau will need considerable additional installed capacity, including the 5MW of solar already planned (two or more solar projects plus additional roof-top solar) plus an additional 10 MW to power the water sector. Palau will also have to work to reduce transmission and distribution losses. (Solar Capacity Factor is assumed to be 15.3%.)

To implement the Energy Efficiency target, Palau will:

- Increase the Energy Retrofit Program;
- Institute a Tropical EE Building Code;
- Adopt the Energy Star Appliance Standard;
- Implement an Energy Labeling Scheme;
- Significantly expand our Cool Roof Program;
- Expand Energy Audit program to include all government and non-government buildings;
- Enhance the Building Managers Working Group; and
- Improve Wastewater Infrastructure.

Many of these renewable energy and energy efficiency initiatives will depend on the availability of partnership finance and technology support.

**i. Additional project based initiatives in the transport and waste sectors**

*Reducing Methane Emissions from the Solid Waste Sector*

- Palau has developed a “National Solid Waste Framework” but has not had funding to implement the planned actions. A key next step is to analyze landfill gas emissions and evaluate the potential for landfill gas capture projects at the national landfill site.

*Transport Sector*

- Currently there is a pending national legislation that would mandate the use and commercial sale of four stroke outboard motor engines only to reduce emissions.
- Palau is investigating a project to convert waste cooking oil to biofuel for diesel vehicles, beginning with public school buses and a potential public bus route.

**c. Support for Implementation**

Climate change presents a major challenge for Palau’s sustainable development, for which the nation relies significantly on development partnerships. Similarly, as noted above, implementation of many of the policies and measures needed to achieve our emissions reduction target will depend on the availability of partnership finance, technology support and capacity development.

Based on a first-order estimate, the upfront investment cost for the renewable energy and energy efficiency measures in Palau’s INDC would be on the order of \$5.5 million USD. This investment has the potential to generate savings, on a net-present-value basis, of \$2.5 million by 2025. This figure doesn’t show the full picture of potential returns on investment though, as there was not sufficient data to assess the energy efficiency savings which have the potential to be substantial.



## **PAPUA NEW GUINEA**

# **Intended Nationally Determined Contribution (INDC) Under the United Nations Framework Convention on Climate Change**

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### **Summary**

Papua New Guinea (PNG) has both very low absolute emissions and relatively low per capita emissions. The nation is, however, committed to also be a responsible global citizen contributes meaningfully to the reduction of global emissions by transitioning to a low carbon economy.

PNG shares the deep concerns of its nearby Pacific Island neighbours in terms of existential threats to some of the more vulnerable low lying countries. In addition there are the same existential threats to coastal and low lying areas of PNG itself.

From a historical perspective, PNG's greenhouse gas (GHG) emissions have been negligible and the state of the economy is such that the main burden for any mitigation undertaken by the country must be the responsibility of the developed countries that have been primarily responsible for the bulk of the world's emissions.

The primary mitigation effort of PNG lies in reducing emissions from land use change and forestry. PNG can contribute to addressing the global mitigation gap by reducing deforestation and promoting forest conservation and sustainable management of its forests. The main forestry effort will be coordinated through the existing REDD+ initiative.

However, PNG's current economic development is seeing a growth in fuel use therefore a big effort will be to reduce fossil fuel emissions in the electricity generation sector by transitioning as far as possible to using renewable energy. The target in this respect will be 100% renewable energy by 2030, contingent on funding being made available. In addition PNG will improve energy efficiency sector wide and reduce emissions where possible in the transport and forestry sectors. The main forestry effort will be coordinated through the existing REDD+ initiative.

In summary PNG is committed to assist in global mitigation efforts but the country's effort will be contingent on external, adequate and predictable funding being made available. In addition it is likely that in the near term GHG emissions will need to rise with economic growth to enable severe developmental problems to be resolved.

## **PNG's National Circumstances**

Papua New Guinea (PNG) is the eastern part of the world's second largest island land mass in the tropical West Pacific. It is one of the more undeveloped regions in the world with low per capita incomes and serious health and social problems. A large proportion of its 7 million plus population live a lifestyle that has remained little changed for millennia, with extremely low use of fossil fuels and GHG emissions. In the last decade or two the situation in PNG has been changing and there has been considerable physical infrastructure development in the main urban areas due to proceeds from the development and sale of the country's rich natural resources, including minerals and oil and gas. There have been, however, significant challenges in managing and utilizing these resources sustainably and ensuring that suitable sustainable development goals and plans are in place to guide the needs of the present without comprising the ability of the future generations to meet their own needs. In terms of climate change, the growth in the PNG economy has produced a concurrent increase in GHG emissions, as also seen in countries the world over.

### **National development goals and context**

In October 2009, the Government launched a 40 year development strategy: PNG Vision 2050. The intention is to transform the nation's mind-set and attitude and align the people, institutions and systems into educated, healthy and prosperous society. The vision stresses the importance of engaging the community into the process of building a strategy for sustainable development for all. Vision 2050 is underpinned by seven Strategic Focus Areas:

1. Human Capital Development, Gender, Youth and People Empowerment;
2. Wealth Creation;
3. Institutional Development and Service Delivery;
4. Security and International Relations;
5. **Environmental Sustainability and Climate Change;**
6. Spiritual, Cultural and Community Development; and
7. Strategic Planning, Integration and Control

The current theme of this new development road map is to shift the country's socio-economic growth away from the current emissions-intensive growth strategy towards a more sustainable path that is able to leverage PNG's competitive advantages, natural wealth and significant human capital into the future.

Foreign direct investment in the mining sector has increased significantly in recent years which have provided direct benefits including job opportunities to local Papua New Guineans. As the economy comes to rely more heavily on resource extraction, policies will be put in place to ensure that the benefits of growth are shared widely to reduce poverty and regional inequality, and promote sustainable development.

In May 2015 the PNG Government passed the Climate Change Bill to become the first nation in the Pacific region to implement a law that will, among other things, minimise the effects of climate change as a result of infrastructural development.

## **PNG's Mitigation Contribution**

### **Existing National GHG Emissions and BAU projections of GHG emissions**

The mitigation options for PNG are based on previous reports including the draft Second National Communication to the UNFCCC (SNC), third party reports and various national development plans.

The APEC energy supply and demand outlook 2009 gave the total primary energy supply in 2005 as a little under 2 MTOE which would give a CO<sub>2</sub> emission level of around 6 Mt CO<sub>2</sub> as of that year. 2010

CO<sub>2</sub>eq emissions were estimated from earlier reports including the draft SNC to be around 5 Mt tonnes (from a primary energy supply of 1.8MTOE) which would give a per capita emission level of around 0.7 tonnes compared to the world average of just under 6 tonnes. It is likely, however, that the previous PNG figures do not include emissions from the indigenous oil and gas production sector. The growth of this sector in recent years has produced additional emissions which are likely to be around 5 Mt per annum (0.8 Mt Oil Search, 3.2 Mt Exxon Mobil, and 1 Mt other, including mining) as of 2014. The total would give around 10 Mt CO<sub>2</sub>eq. This would give per capita emissions (2014) of around 1.4 tonnes per person per year which is still low by world standards. As noted there is considerable uncertainty in these estimates as the figures given in the draft SNC are under revision for the final document.

In addition, the draft SNC report reports the PNG forestry CO<sub>2</sub> emissions (FOLU) as 413 Gg for 1994 and 2199 Gg for 2010 or around 2 Mt for 2010. It was noted in the draft SNC that forestry removals are estimated to vary considerably from year to year. Due to the uncertainty in forestry emissions, waste emission and agricultural emissions the numbers reported in this INDC document do not include these sectors. Emissions from the forestry and agriculture sectors are expected to rise concurrently to national economic growth, as demand increases for forest and agricultural commodities – fuelled by both domestic and international markets, and demands of the rural populace put increasing demands on the forest for food, fodder, fuel and building materials.

### **Gases considered**

The paucity of reliable data at the present time regarding emissions suggests that PNG limit the gases considered to CO<sub>2</sub> only, except for the indigenous oil and gas production sector where CH<sub>4</sub> is also included in the industry calculations.

### **Expected trajectory**

Projections of emission levels are difficult to make as they are likely to be dominated by changes in the mining, oil and gas sectors. Estimates are optimistic in terms of the gas sector exporting LNG with predictions of a doubling of capacity in the near future. LNG production is very energy intensive and will incur a concurrent increase in emissions. According to the Asian Development Bank (ADB), “New gas exports (LNG) are forecast to drive a growth surge to 15.0% in 2015 that will subside to 5.0% in 2016. In contrast with mining and petroleum, the rest of the Papua New Guinea economy is projected to grow by a more modest 4.0% in both years.”

Longer term national economic projections suggest emission increases at around the 3-4% level per annum, meaning that the 2014 emission level of 5 Mt per year could increase to around 8 Mt per year by 2030. A doubling of oil and gas sector emissions would produce some 10 Mt of additional CO<sub>2</sub> eq. emissions by the same date but the actual figure would depend on the extent of economically extractable oil and gas reserves, which are not well documented.

Thus with BAU CO<sub>2</sub> emissions in 2030 could reach 18 Mt CO<sub>2</sub> per year (including CO<sub>2</sub> eq in the oil and gas sector only).

### **Assumptions and methods for establishing BAU emissions**

The method for establishing BAU emissions has included examining past reports including the draft SNC with cross checks to stakeholder information including Government and private sector sources.

## **Mitigation opportunities**

Immediate mitigation opportunities for PNG are extremely limited if economic growth progresses at current rates and the oil and gas sector expands as anticipated, other than in the forestry sector through the implementation of REDD+ activities, in the context of adequate and predictable support. The main opportunities exist in the electricity supply sector, energy efficiency, transport and forestry. The key technologies for mitigation are renewable energy deployment technologies in the electricity sector. Considerable assistance will, however, be needed in terms of human resource development and institutional support, technology transfer and capacity building in order to carry out the mitigation measures.

**Electricity supply:** PNG has a number of opportunities to transfer a proportion of its electricity generation to renewable options. In this regard the relatively high installed capacity of hydro of around 200MW presents itself as a large scale storage facility for intermittent renewable inputs to be fed to the main Port Moresby grid. In addition there are opportunities for additional hydro throughout the country. There is also geothermal potential, with 56 MW installed (2010) and 22 TWh/annum possible, albeit mostly in remote areas. PNG also has considerable biomass resources although there are indications of overexploitation of natural forests and harvesting of these will affect land use emissions in the forestry sector. Any final balance needed to achieve close to 100% renewables could be filled using solar PV.

**Energy efficiency:** has also been identified as a relatively low cost easily implemented option but, however, one that has not been seriously implemented in the country for various reasons including financial constraints. Energy efficiency will become more important as higher cost renewable resources are employed.

**Transport:** The number of motor vehicles in PNG has been increasing in recent years along with economic development in the main urban centres. The increasing social preference for individual transport is likely to limit mitigation options in the transport sector in the near future.

**Forestry:** PNG has extensive forest areas which present opportunities for mitigation. In the past rapid exploitation of these forests by uncontrolled logging and land use conversion to agriculture has produced increased FOLU emissions. PNG has been a global leader in the promotion of a mechanism to provide incentives to developing countries for the reduction of emissions from deforestation and forest degradation through the UNFCCC, and has been building national and regional capacities to implement REDD+ activities since 2009. PNG is assessing its drivers of deforestation and will develop a national REDD+ strategy over the next two years that will including specific policies and measures to implement REDD+. The policies and measures will aim to reduced emission from deforestation and forest degradation, as well as support sustainable management, conservation and enhancement of forest carbon stocks, thereby leading to enhanced removals from the forestry sector.. A key current shortcoming is the lack of data on forestry emissions and removals, which is currently being addressed through national assessments of land use change and the implementation of a national forest inventory. Data for forestry emissions will therefore be forthcoming in the next few years, which will allow a more accurate estimation of the potential emissions reductions and enhanced removals that PNG can achieve in its forestry sector through REDD+ implementation.

## **Methodology and assumptions**

The methodology used for calculating emissions has been to identify the drivers of carbon emissions in various sectors and estimate the annual GHG emissions from each activity. In accordance with IPCC guidelines, emissions from shipping, aviation and the burning of fossil fuels that are exported have not been included.

For future reports on land use, land-use change and forestry (LULUCF) activities, a net approach will be used (in line with IPCC guidelines). PNG will be using the IPCC 2006 guidelines to estimate emissions and removals for all sectors.

In terms of the methodology to estimate emissions into the future to obtain a BAU scenario to the year 2030 it can only be estimated in terms of existing economic and population growth patterns. Population growth is high and around 2.7% pa. Economic growth is also high in the formal sector and dependant on the resource production sectors in mining and oil and gas.

## **Options for Mitigation contribution for INDC**

### **Time frame for contribution**

Due to the lead times in terms of technology transfer, capacity building, infrastructure development required, modelling and detailed costing of projects a 2020 – 2030 timeframe is put forward.

### **Mitigation contribution**

The main mitigation contribution for PNG would be in terms of an indicative replacement of fossil fuelled electricity generation with renewable energy sources. This could be accomplished at a rate determined by the availability of external funding.

Due to the difficulty in accounting for actual emissions and the difficulty of large scale mitigation in the transport and land use sectors PNG will opt for a national target in the electricity sector in terms of becoming carbon free by a 2030 target date. This option has been explored both in official PNG Government policy and also by external third party reports such as the recent ANZ report (August 2015). In this regard there are many options in terms of PV, geothermal, biomass fuelled plants and additional hydro which could be investigated. Together these could make the country close to 100% renewable in the power sector. Longer term increases in energy consumption would, however, have to be restrained and ameliorated by extensive energy efficiency options.

**Energy Efficiency options:** Energy efficiency and conservation is always a good mitigation opportunity but would require external funding and assistance. Even though energy conservation and the use of renewable energy may save money in the long term, higher up-front costs have often prevented their use in the past.

**Improve data gathering and human resource capability.** PNG would like to vigorously pursue mitigation options in the future; however, considerable assistance will be needed in terms of capacity building and technology transfer for emissions data collection and tracking mitigation progress. Without improving national capacities in this area there is a high likelihood that regulation of the government and the private sector in terms of emissions will not be effective.

**Oil and Gas sector:** This sector is a generator of jobs and national economic growth and consequently considerable capital is being spent on developing this sector. Unfortunately the sector is responsible for considerable emissions and if the world does mitigate climate change seriously the production situation may change dramatically and the capital expended in the sector may become a stranded asset. While this change is unlikely to happen before 2030, if the world does follow mitigation strategies that reduce all fossil fuel use to zero, as required by IPCC AR5 RCP 2.6, there will of course be no market for hydrocarbons after 2050.

**Transport:** Transport will continue to be a significant emitter of CO<sub>2</sub> and mitigation needs to be seriously addressed. Options include improving public transport by introducing energy efficient busses in the main urban centres, and the future introduction of infrastructure for more sophisticated modes of public transport, such as trains and trams.

**Forestry/land use:** PNG will implement REDD+ activities under the UNFCCC to reduce emissions and enhance removals from this important sector, which PNG has set as a priority, as can be seen from its creation of a REDD+ Directorate within the Office for Climate Change and Development (OCCD). Extensive capacity building, technology transfer and technical assistance is required to implement effective actions and ensure the collection of accurate data.

### **Domestically financed contribution**

Little domestic finance is available but Government assistance will be provided where possible. Private finance could be made available especially for the mining and oil and gas sectors. Energy efficiency initiatives could be encouraged by policy decisions.

### **Internationally supported contributions**

The transition to renewable energy in the electricity sector thus would need to be mostly financed from external sources. The first step would be to quantify the funding needed and work with PNG Power to finalise a plan that would fit into the existing main grids.

Financing for the implementation of REDD+ activities under the UNFCCC are currently being supported by the UN-REDD Programme, the World Bank's Forest Carbon Partnership Facility (FCPF), and the European Union. These lines of support focus on REDD+ readiness and data collection. Further international financial support will be required for effective national scale REDD+ implementation.

### **Means of Implementation for supported Mitigation Contribution**

The GoPNG has the Climate Change Act to implement the contribution together with sectoral agencies

### **Tracking and Monitoring Progress**

Sectors and gases covered- Electricity sector for targeted reductions. Forestry to be covered under REDD+, Gasses: Carbon Dioxide only.

Accounting Methods for tracking the mitigation contribution (e.g., for economy wide reduction below BAU, based on GHG inventory developed using, say, tier II; for EE goal it would be approach to measure EE gains and estimation of GHG impact; etc.

The GoPNG will use IPCC Guidelines and sectoral accounting methods to track contributions.

The greatest challenge in terms of tracking and monitoring progress is to put in place robust measures for data collection. Existing systems and institutions will be built on to create adequate national capacities for carrying out these tasks, if adequate and predictable support can be sourced to support these efforts.

### **MRV approach for mitigation actions**

The national measurement, reporting and verification process in place will cater for the monitoring of the INDC activities.

### **Equity and Ambition**

Papua New Guinea is a developing country that has not been responsible for most of the GHG emissions of the world. In addition it still faces multiple development challenges. Of the country's approximately 7 million people, over 90% are employed in the informal sector and live an almost

entirely sustainable fossil fuel free existence. Domestic and international surveys reveal widespread illiteracy, malnutrition, poor health and vulnerability to natural hazards, many of which will become more salient with climate change. In terms of equity PNG cannot be expected to mitigate out of its own resources and would need considerable international assistance.

## **Adaptation**

While there is considerable attention in terms of mitigation to keep the world average temperature increase below 2 degrees Celsius and effort in the Pacific Island countries to limit this increase to below 1.5 degrees Celsius the scientific opinion expressed in the latest 2014 IPCC AR5 reports suggests otherwise. In this respect adaptation must be a high priority for PNG.

The natural environment already poses significant risks to Papua New Guinea today; hazards like coastal flooding, inland flooding and droughts take a severe toll on the people and the economy. Climate change are predicted to exacerbate some of these event-driven hazards and may also introduce new hazards due to gradual shifts in climatic conditions – most prominently, increased malaria penetration in the highlands, changed agricultural yields and damaged coral reefs.

Throughout the country, natural disasters driven by climatic conditions (i.e., excluding seismic and volcanic activity) as well as gradual shifts in climatic conditions disrupt daily life, cause damage to assets and infrastructure, destroy livelihoods, endanger cultural and ecological treasures, and kill or injure people. Adaptation is included because it gives reports on specific activities, national projects, targets, objectives and goals on adaptation by identifying, coordinating and monitoring projects that supports specific adaptation solutions that protect people against the risk of climate change. The government of Papua New Guinea through the Office of Climate Change and Development has put its emphasis on identifying the specific nine (9) hazards prevalent in Papua New Guinea.

1. Coastal Flooding and Sea Level Rise
2. Inland Flooding
3. Food Insecurity caused by crop failures due to droughts and inland frosts
4. Cities and Climate Change
5. Climate Induced Migration
6. Damage to Coral Reefs
7. Malaria and Vector Borne Diseases
8. Water and Sanitation
9. Landslides

In the National Climate Change Development Management Policy the Adaptation Strategies, Risk Management has been prioritised and quantifying and prioritising hazards is one of the key activities of the strategies as given above.

### **Summary of needs for adaptation**

In summary PNG is highly vulnerable to the effects of climate change and given the temperature increases locked in by present world emissions of greenhouse gasses, adaptation is a high priority. The country will need financial support, capacity building and technical support to face the uncertain future posed by climate change.



# Contribuciones Nacionales de la República del Paraguay

## Visión Paraguay 2030

### Plan Nacional de Desarrollo

“El Paraguay es un país competitivo, ubicado entre los más eficientes productores de alimentos a nivel mundial, con industrias pujantes e innovadoras, que empleen fuerza laboral capacitada, proveedor de productos y servicios con tecnología, hacia una economía del conocimiento; con índices de desarrollo social en el rango más alto de Sudamérica; conectado y abierto a los vecinos y al mundo; ambiental y económicamente sostenible; con elevados índices de seguridad jurídica y ciudadana; con atención a los pueblos indígenas, fuerte protagonismo de la mujer; con jóvenes visionarios y entrenados liderando el país; con un Estado democrático, solidario, subsidiario, transparente, y que promueva la igualdad de oportunidades. A través de una amplia alianza entre un Gobierno Abierto, empresas privadas socialmente responsables, y una sociedad civil activa”



TEKOKHA  
RESAI  
SÁMOHYHYHA  
SECRETARÍA DEL  
AMBIENTE

TETĀ REKUÁI  
GOBIERNO NACIONAL  
Jajapo Oñondivepa Tape Pyahu  
Construyendo Juntos un Nuevo Rumbo

Paraguay, es un país mediterráneo, con casi siete millones de habitantes que tuvo el mayor crecimiento económico en toda Latinoamérica en los últimos 30 años. En los últimos años el país viene apostando a posicionarse como un lugar atractivo para inversiones y está desarrollando políticas ordenadas en todo el país. Es un país que cuenta con innumerables riquezas naturales y la producción de energía limpia es una de las actividades más relevantes del país, así como un creciente desarrollo agropecuario con un sistema productivo basado casi en su totalidad por la agricultura de conservación o sistema de siembra directa y una ganadería creciente con mercados altamente rentables que requieren al país mayor esfuerzo en la producción de alimentos para el mundo.

Paraguay dispone de abundante energía, limpia y renovable, que lo sitúa como primer exportador mundial neto de energía eléctrica. Comparte con Brasil la Hidroeléctrica Itaipú, que es una potencia mundial en la producción de este tipo de energías.

Desde el año 1973 cuenta con una Ley Forestal que obliga a los propietarios a mantener el veinticinco por ciento de su área de bosques naturales, y en caso de no tener este porcentaje mínimo, el propietario deberá reforestar una superficie equivalente al cinco por ciento de la superficie del predio. Además, en la Reserva de la Biosfera del Chaco los propietarios deben poseer como mínimo cincuenta por ciento de la superficie con mínimas alteraciones antrópicas, o en condiciones naturales, y preferentemente la realización de actividades tendientes al mantenimiento de Servicios Ambientales.

Paraguay posee aproximadamente 18.500.000 hectáreas de bosques (FRA, FAO 2005) que representan 45% de la superficie total del país, y nos dan un valor de 2,9 hectáreas de bosque per cápita.

En la última década, el país ha logrado importantes avances en el aspecto macroeconómico, con sólidos resultados en el ámbito fiscal, monetario y con el inicio de importantes reformas sociales. Con estas medidas la pobreza y pobreza extrema fueron disminuyendo en este periodo de 15 años en coincidencia con el crecimiento económico.

Para responder a los desafíos económicos y sociales el Gobierno del Paraguay ha elaborado un Plan Nacional de Desarrollo (PND) para el período 2014-2030, donde esta expresada nuestra visión país al 2030. El Plan Nacional de Desarrollo está organizado en torno a tres pilares temáticos: **i)** reducción de la pobreza y desarrollo social; **ii)** crecimiento económico inclusivo, e **iii)** inserción del Paraguay en los mercados internacionales. Asimismo, se apoya en un marco económico de mediano plazo que prevé políticas fiscales sostenibles, mejoras en las iniciativas de recaudación tributaria, una mayor eficacia de las políticas de protección social y su focalización, y una inclusión financiera más amplia.

Las contribuciones del Paraguay están ajustadas a las circunstancias nacionales presentes y los objetivos a largo plazo fijados en el Plan Nacional de Desarrollo, así como el apoyo en el financiamiento y la cooperación tecnológica internacional. Paraguay es un país que ha expresado su deseo de contribuir con acciones positivas para reducir los efectos adversos del cambio climático, y en este plan se incluyen aspectos estratégicos vinculados a cambio climático en tanto para la mitigación y la adaptación.

Dentro del Plan Nacional de Desarrollo de Paraguay existen muchos objetivos planteados en lo económico, social y ambiental y los que están vinculados al cambio climático son los siguientes;

- Transporte multimodal eficiente
- Control efectivo de la deforestación
- Aumentar ingresos por venta de carbono
- Crecimiento del PIB de 6,8% anual.
- Aumentar los ingresos nacionales por la venta de servicios ambientales (créditos por sumideros de carbono).
- Aumentar la cobertura de áreas forestales y biomasa protegida (% de cobertura forestal y % ponderado por biomasa globales).
- Aumentar en 60% el consumo de energías renovables (% participación en la matriz energética).
- Reducir en 20% el consumo de combustible fósil (% participación en la matriz energética).
- Aumento de la Eficiencia en los sistemas productivos agropecuarios.

Las líneas de acción correspondientes serán:

- Desarrollar una matriz energética sostenible.
- Incorporar tecnologías para la explotación de nuevas fuentes de energía sustentable (incluye energía solar, eólica, biomasa).
- Promover el manejo sostenible de los ecosistemas forestales e impulsar actividades de reforestación con fines de protección y de generación de ingreso y disminución del proceso de pérdida y degradación de los bosques nativos.

En este último año el Paraguay ha demostrado sus compromisos en los aspectos climáticos y ambientales ya que ha presentado un Plan Nacional de Forestación y Reforestación, donde a través de un decreto presidencial se autoriza al Viceministerio de Minas y Energía a establecer regímenes de certificación y fondeo al Banco Nacional de Fomento de 40.000.000 US\$ para el inicio de plantaciones forestales con fines energéticos y maderables, lo que directamente repercutirá en una menor presión que hay sobre los bosques nativos para la utilización de la biomasa.

Paraguay también publicó su Plan Nacional de Cambio Climático – Fase 1– Estrategia de Mitigación, en el cual se describen las prioridades nacionales con respecto a esta línea de acción, y ha centrado sus esfuerzos en transversalizar las acciones vinculadas a la mitigación de los efectos adversos del cambio climático, de forma a articular estrategias para su efectiva implementación.





Paraguay es un país particularmente vulnerable a los impactos de la variabilidad del cambio climático. La adaptación es un elemento imprescindible para ajustarnos ante estos cambios del clima con el fin de moderar el daño. La escasa información y falta de estrategias sobre cómo hacer frente a los impactos del cambio climático provocan problemas ambientales, sociales, de salud y económicos; por lo que es necesario encaminar los planes de acción hacia la adaptación, en los cuales se incluya la participación de todos los actores posibles.

Basados en las responsabilidades comunes pero diferenciadas de cada uno de los países como lo menciona el artículo cuarto de los compromisos de la CMNUCC, donde las prioridades nacionales y regionales de desarrollo, están enfocados de acuerdo a sus circunstancias nacionales. Y en donde el mismo artículo indica que al llevar a la práctica los compromisos hay que atender las necesidades y preocupaciones específicas de las partes que son países en desarrollo derivadas de los efectos adversos del cambio climático o del impacto de la aplicación de medidas de respuesta, en especial de algunos países “entre los cuales citan a los **países sin litoral**”.

Por tanto en las siguientes paginas están descritas las contribuciones nacionales del Paraguay con lo cual nuestro país se fija metas ambiciosas y justas a fin de evitar emisiones por un valor de 429 MtCO<sub>2</sub>eq. durante el periodo de implementación de este plan de acción, y a partir del 2030 evitar emisiones por un total de 83 MtCO<sub>2</sub>eq. en forma anual, establecidos de acuerdo a los cálculos de desarrollo proyectados en los estudios existentes.

***“Este documento fue preparado, elaborado y socializado por la Secretaria del Ambiente como autoridad de aplicación de la Ley 251/93 “Que aprueba el Convenio Marco de las Naciones Unidas sobre el Cambio Climático”, y se encuentra sujeto a la aprobación del Poder Ejecutivo.”***



## CONTRIBUCION NACIONAL DE LA REPUBLICA DEL PARAGUAY

<b>Tipo de Meta</b>	Desviación de las emisiones con respecto a la línea base proyectada al 2030. “Desviación del escenario de Business as Usual”
<b>Meta Global</b>	20% de reducciones en base al comportamiento de las emisiones proyectadas al 2030. <ul style="list-style-type: none"> <li>- <u>Meta Unilateral</u>: 10% de reducción de emisiones proyectadas al 2030</li> <li>- <u>Meta Condicionada</u>: 10% de reducción de emisiones proyectadas al 2030</li> </ul>
<b>Línea Base</b>	<u>Punto de Referencia</u> : INGEI año base 2000 presentado en la Segunda Comunicación Nacional. <b>Proyección de emisiones</b> <ul style="list-style-type: none"> <li>- INGEI proyectado año base 2011: 140 Millones de toneladas de CO2 equivalentes (en revisión)</li> <li>- INGEI proyectado año base 2020: 232 Millones de toneladas de CO2 equivalentes (en revisión)</li> <li>- INGEI proyectado año base 2030: 416 Millones de toneladas de CO2 equivalentes (en revisión)</li> </ul>
<b>Alcance</b>	<u>Sectores</u> : todos los sectores citados en las guías metodológicas del IPCC para la realización de los inventarios de gases de efecto invernadero. <u>Gases</u> : Todos los gases citados por el Protocolo de Kyoto <u>Cobertura</u> : Nacional
<b>Periodo de Aplicación</b>	2014-2030 (De acuerdo a lo establecido en el Plan Nacional de Desarrollo).
<b>Periodos de revisión</b>	Cada 5 años. Además, Paraguay se reserva el derecho de revisar, actualizar o ajustar la propuesta de contribuciones así como los compromisos fijados de acuerdo a las actualizaciones de las comunicaciones nacionales. Así también de acuerdo a los nuevos compromisos que deriven del nuevo acuerdo climático global.
<b>Metodología</b>	<ul style="list-style-type: none"> <li>- Plan Nacional de Desarrollo 2014-2030, Política Nacional de Cambio Climático, Estrategia de Mitigación del Plan Nacional de Cambio Climático Fase I, Primera Comunicación Nacional, Segunda Comunicación Nacional, Estadísticas Nacionales del Banco Central del Paraguay, Compendio Estadístico Ambiental del Paraguay.</li> <li>- Inventario de Gases de Efecto año base 2000, que fue presentado en la Segunda Comunicación Nacional y realizado con las guías metodológicas del IPCC 1996.</li> <li>- Los potenciales de calentamiento global (Global Warming Potential) son los citados en las Guías del IPCC 1996.</li> </ul>
<b>Nivel de Ambición</b>	- El nivel de ambición unilateral está sustentado en el Plan Nacional de Desarrollo 2014-2030.



	<ul style="list-style-type: none"> <li>- Las metas condicionadas serán consideradas a partir de la cooperación internacional e intercambio tecnológico, en base a las prioridades nacionales identificadas en el Plan Nacional de Desarrollo 2014-2030.</li> </ul>
<b>Adaptación</b>	<ul style="list-style-type: none"> <li>- Para el Paraguay la adaptación es una prioridad establecida en el Plan Nacional de Desarrollo 2014-2030. El Plan Nacional de Adaptación al Cambio Climático está en proceso de construcción.</li> <li>- Los sectores prioritarios identificados son; <ul style="list-style-type: none"> <li>▪ Recursos hídricos</li> <li>▪ Bosques</li> <li>▪ Producción agrícola y ganadera</li> <li>▪ Ordenamiento Territorial</li> <li>▪ Energía</li> <li>▪ Infraestructura</li> <li>▪ Salud y saneamiento</li> <li>▪ Gestión de riesgos y desastres naturales</li> <li>▪ Sistemas de alerta temprana</li> </ul> </li> </ul>
<b>Financiamiento</b>	<ul style="list-style-type: none"> <li>- Paraguay necesita promover la aplicación de recursos financieros necesarios para implementar planes, programas y proyectos de adaptación y mitigación al Cambio Climático en los siguientes sectores prioritarios: <ul style="list-style-type: none"> <li>▪ Seguridad y soberanía alimentaria</li> <li>▪ Agua (provisión y saneamiento)</li> <li>▪ Energía</li> <li>▪ Diversidad biológica y bosques</li> <li>▪ Salud</li> <li>▪ Industrias limpias</li> <li>▪ Infraestructura</li> <li>▪ Transporte</li> </ul> </li> <li>- Financiamiento climático a través de los distintos fondos existentes (Fondo Verde para el Clima, Fondo de Adaptación, Mecanismos de mercado y no mercado, Fondo Mundial de Medio Ambiente, etc.)</li> </ul>
<b>Transferencia de Tecnología</b>	<p>Paraguay está impulsando mecanismos que promuevan la transferencia de tecnología, a fin de promover y facilitar la investigación y el análisis de las medidas tecnológicas y soluciones aplicables a la vulnerabilidad y adaptación a los efectos del Cambio Climático, incluyendo aquellas que garanticen la reducción de la pobreza, soberanía y seguridad alimentaria.</p>
<b>Medios de implementación</b>	<p>Las INDC de Paraguay incluyen una contribución unilateral y otra condicionada.</p> <ul style="list-style-type: none"> <li>- La contribución incondicional asume acciones unilaterales.</li> <li>- La contribución condicional asume actividades nacionales a ser implementadas que requerirán de cooperación internacional en cuanto a financiamiento, transferencia de tecnología, creación de capacidades.</li> </ul>





# Republic of Peru

## **INTENDED NATIONALLY DETERMINED CONTRIBUTION (iNDC) FROM THE REPUBLIC OF PERU**

*September, 2015*

## I. INTRODUCTION

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Since the ratification of Peru as a Party of the United Nations Framework Convention on Climate Change (UNFCCC), the country has maintained a position which is cautious of the national interests, collaborative in front of peer countries (in the context of the Latin America and the Caribbean region), and proactive in the pursuit of international synergies and convergence of decisions oriented to the ultimate goal of the UNFCCC.

Peru makes its best efforts regarding its commitment to the ongoing UNFCCC negotiating process for the approval of the new global climate agreement that will allow for the fulfillment of the objective described in Article 2 of the Convention.

The INDC responds to the reality and circumstances of the country, and aligns to the two pillars under which the 20<sup>th</sup> session of the Conference of the Parties (COP20) in Lima was conducted: sense of urgency and high level of ambition. Peru, with the presidency of the Conference of the Parties (COP) of the UNFCCC, demonstrated not only its commitment to organize the COP20, but also presented itself as a country responsible for its actions and one that envisages its development in an optimistic manner.

Peru is a country with low per capita and total emissions, with a global share of emissions of only 0.3%, of which approximately half of them generate through land use, land-use change and forestry sector activities (LULUCF).

On the other hand, however, Peru has seven out of the nine characteristics to be recognized by the UNFCCC as a "particularly vulnerable" country; these features are intensified by anthropogenic processes that cause the degradation of ecosystems and environmental pollution. The country also faces diverse threats of hydro-meteorological origin, as indicated by national emergencies and disasters, 72% of which are related to this kind of phenomena (extreme drought and rain, floods, frost, etc.).

Peru has gone through a rapid economic growth along the past ten years, which has helped to dramatically reduce poverty figures; this growth has led to significant progress in social inclusion, provision of basic health, education, and infrastructure, among other services. This has been achieved while complying with the country's international commitments and the domestic action necessary to face the conditions imposed by climate change.

Thus, we have been implementing innovative projects, based on domestic resources and contributions from international cooperation, in several regions and sectors in order to test and expand systems and strategies designed to address climate change, thereby enhancing the social and physical resilience of the territory. In parallel, we have been implementing different initiatives that are enabling the transformation of the national energy consumption and generation matrixes through switching fuels to natural gas, and promoting renewable energy sources which have given place to the connection of wind farms, solar and biomass power plants to the national grid, among other examples.

In this context, it is necessary to continue and increase the promotion, development and implementation of complementary and synergistic actions of mitigation and adaptation in order to meet the ethical responsibilities at the national and international levels, maintaining

a highly competitive economy that is in line with the new global trends, and to maximize the social and environmental benefits of efficient and inclusive productive sectors, as a result of sustainable use of natural resources,. In this framework, the iNDC considers both mitigation and adaptation components.

The iNDC has been founded upon a solid base of information and actions, being undertaken on climate change since 2003, which has allowed content to be developed and viable scenarios that fulfill strict selection and evaluation criteria to be proposed to the iNDC formulation process. This input has nourished a participatory process that included internal discussions over specific or ongoing viable proposals that are included in sectoral planning, for which existing sectoral plans, programs and instruments were considered. This formulation process has generated over 100 meetings at a political and technical level and has incorporated the advice of more than 300 experts.

In short, Peru has implemented the required effort to submit an iNDC based on initiatives in accordance with national circumstances and capabilities and in line with national economic development, poverty reduction and social inclusion goals. The initiatives will also pursue to maximize the overall benefit in adaptation and mitigation as a result of sound management of national forest resources.

Throughout this process it is considered that there is a need for constant updating and revision of the information basis and its evolution, as well as for the implementation and feedback actions needed in the context of national development.

The proposed iNDC will be subjected to ratification of the Congress, should it be required by the decisions of the UNFCCC. In this sense, the iNDC will be final only after the existence of a formally ratified global climate agreement or other agreements of the UNFCCC. Considering that this proposal is tentative, and that future agreements will not be retroactive, Peru also reserves the right to update or adjust the iNDC in line with the current proposal and with the agreements derived from the new global climate agreement under the Convention.

Pursuant to decision 1 / CP.19 and 1 / CP.20, the Peruvian State formally communicates the iNDC proposal and its complementary information.

## II. INDC IN MITIGATION

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### 2.1. Proposal of iNDC in Mitigation

The Peruvian iNDC envisages a reduction of emissions equivalent to 30% in relation to the Greenhouse Gas (GHG) emissions of the projected Business as Usual scenario (BaU) in 2030.

The Peruvian State considers that a 20% reduction will be implemented through domestic investment and expenses, from public and private resources (non-conditional proposal), and the remaining 10% is subject to the availability of international financing<sup>1</sup> and the existence of favorable conditions (conditional proposal).

### 2.2. Complementary information

#### i) Type and reference point.

The Peruvian proposal is an emissions reduction compared to a Business as Usual (BaU) baseline scenario starting in 2010, as reference year, and ending in 2030. The projection considers the total emissions and removals of the LULUCF sector. For transparency and a better understanding of the national effort, the document contains the emissions of the reference and target year, with and without the emissions from this sector:

**Table 11: GHG emissions - BaU scenario**

	Emissions (MtCO <sub>2</sub> eq) including LULUCF	Emissions (MtCO <sub>2</sub> eq) excluding LULUCF
2010 (base year)	170.6	78.0
2030 (target year)	298.3	139.3

The Peruvian State reserves the right to update the BaU scenario, based on new information available before 2020.

#### ii) Scope and coverage

- **Scope:** National
- **Considered GHG emissions:** the main GHG considered in the iNDC are carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>) and nitrous oxide (N<sub>2</sub>O).
- **Sectors:** The categories considered in the 2010 National GHG Inventory are similar to those considered in the projections of the BaU scenario. In the BaU scenario

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<sup>1</sup> It should be noted that Peru will not assume conditional commitments that might result in public debt.

projections, the emissions from international aviation and freight were not considered due to lack of an agreed accounting framework; nor were considered emissions from rail or sea national transport, since they have marginal percentage participation in the subcategory "Transport" and detailed information is not available. The "Solvent and product use" category has zero emissions.

The period for implementation covers January 1<sup>st</sup>, 2021 to December 31<sup>st</sup>, 2030.

The Ministry of Environment (MINAM), as the national focal point for the UNFCCC, designed a process since 2014 in which three levels of dialogue were included:

- a) "Technical and scientific" with experts for the calculation of emissions, based on technical parameters and the estimation of the costs of mitigation options;
- b) "Technical and political" with representatives of the Ministries linked to the emission sources and mitigation options in order to gather technical opinions in the framework of political and sectoral plans; and,
- c) "High political level", for which a Multisectoral Commission (MC) was established at the level of Ministers or Deputy Ministers, responsible to develop the technical report containing the proposed Peruvian iNDC (Supreme Resolution N° 129-2015-PCM).

The MC incorporated the representation of the Presidency of the Ministers Council and the following Ministries: Economy and Finance; Energy and Mines; Agriculture and Irrigation; Transport and Communications; Production; Construction, Housing and Sanitation; Foreign Affairs; Education; Justice and Human Rights; Health; Culture; Development and Social Inclusion; and Environment. The last one held the Presidency of the MC, and assumed the role of Technical Secretariat.

As an input for the formulation and review of the progress and the preliminary results of the iNDC, a decentralized public consultation process was held. National and subnational governmental entities, and representatives of civil society, including indigenous organizations, participated to ensure that the iNDC was constructed with transparent and participatory criteria.

For the implementation process, channels and coordination mechanisms with relevant institutions and actors will be maintained, taking into account the results of the international agreements and consolidating the progress and commitments obtained.

In addition to governmental efforts, the participation of the national and international private sector, as well as the access to new financing sources and to international support, will enable that the level of expected emissions reduction, as well as the socioeconomic and environmental co-benefits related to the mitigation efforts, are fulfilled.

**iii) Assumptions and methodological approaches.**

To calculate the 2010 National GHG Inventory and national BaU projections (based on the estimation of sectoral BaU scenarios according to its own dynamics) the 1996 and 2006 Intergovernmental Panel on Climate Change (IPCC) guidelines and the 2003 Good Practice guidelines, national statistics and projections of population and Gross Domestic Product (GDP) were used. National experts, that coordinated with the relevant government sectors, developed the sectoral projections. The base year of the BaU projections were aligned with the 2010 National GHG Inventory.

We used the values of Global Warming Potential published in the Second Report of the IPCC, in accordance with the National GHG Inventories submitted to the UNFCCC (CH<sub>4</sub> : 21 and N<sub>2</sub>O : 310 ).

BaU projections consider the removals of the LULUCF sector.

**iv) Ambition, fairness and contribution to achieve the objective of the UNFCCC (Article 2).**

Based on the evaluation process, we can infer that there is sufficient room for upgrading the iNDC on subsequent review phases that are necessary in light of the decisions of the UNFCCC.

The Peruvian iNDC is fair and ambitious. In one side, the 2010 national GHG emissions accounted for only 0.3% of global emissions, with per capita emissions significantly lower than the average of Latin America and the world; but on the other side, Peru is among the most vulnerable countries to the effects of climate change. This combination means that even while the country must make an important economic and social effort in its adaptation process, it is committed to a significant reduction of GHG emissions which are based on extensive initial work for the participatory development of goals by 2030.

For the country, it is also ambitious to work actively in strengthening mechanisms and activities to introduce the mitigation variable in its planning processes, and for the achievement of its development goals, involving in the process all the stakeholders that will ensure economic, social and environmental sustainability, and resulting in improvements in competitiveness and social and environmental changes. The proposal has an increased ambition by incorporating and articulating forecasts and efforts on Climate Change adaptation.

Peru's proposal is - in short - in line with the ultimate objective of the UNFCCC by formulating emission reductions in the different activities at the national level.

**v) International Market Mechanisms**

At the time of submitting the iNDC proposal, the acquisition of emission reductions through existing or new international market mechanisms is not considered for its compliance. This is in order to avoid adjustments or duplications for ownership or accounting reasons. However, Peru is considering selling emission reductions provided this is not an obstacle for the compliance with the national commitment.

### III. INDC IN ADAPTATION

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#### 3.1. Precedents

After the results of the COP20 in Lima, the determination of the Parties to strengthen their adaptation actions was affirmed, and the Parties were invited to consider communicating their efforts in adaptation or the inclusion of a component referring to adaptation in their intended nationally determined contributions (INDC). Therefore, in line with decision 1 / CP.20 and within the framework of its national circumstances and development priorities, Peru assumes the challenge of submitting an INDC in adaptation.

The proposal is based on information from previous years, but with greater emphasis on information after 2003 due to the formulation of the National Climate Change Strategy and the Regional Strategies, the Second National Communication and the Adaptation and Mitigation Action Plan against Climate Change. The adaptation proposal is based on national and regional vulnerability studies, as well as those of prioritized basins, and the results of different projects and practical experiences on adaptation<sup>2</sup>. It is also based on the documents developed under the InterCLIMA<sup>3</sup> program, and on a set of goals already included in sectoral plans and programs, complemented with crosscutting goals and approaches that seek to incorporate effectively the topic of climate change in the development of the country.

Through the consultation process, the proposal has been enhanced by sectoral and stakeholders contributions working on different levels of government.

#### 3.2. Vulnerability and impacts of climate change in Peru

Peru has seven of the nine characteristics recognized by the UNFCCC to describe a country as "particularly vulnerable": low-lying coastal area, arid and semi-arid lands, areas liable to flood, drought and desertification, fragile mountain ecosystems, disaster-prone areas, areas with high urban atmospheric pollution and economies highly dependent on income generated from the production and use of fossil fuels<sup>4</sup>. The processes of ecosystem degradation and environmental pollution from anthropogenic origin exacerbate these conditions.

In addition, the country faces a high exposure to hydro-meteorological threats, where 72% of total national emergencies are related to this kind of phenomena, such as severe droughts, rains, floods, frost, among others<sup>5</sup>.

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<sup>2</sup> Interventions started with the PROCLIM Program in 2003, which allowed the analysis of the current and future vulnerability in the basins of Piura and Mantaro; and later with the "Second National Communication on Climate Change (CNCC2 in Spanish)", the "Regional Project of Adaptation to Climate Change (PRAA in Spanish)", the "Program for Adaptation to Climate Change (PACC in Spanish)"; the projects "Public Investment and Climate Change Adaptation (IPACC in Spanish)", "Glaciers 513", the Adaptation project based on Mountain Ecosystems "EbA Mountains" and others.

<sup>3</sup> Annual event that allows the elaboration of an updated report on the progress, challenges and priorities in the national management of Climate Change.

<sup>4</sup> National Strategy on Climate Change. Ministry of Environment 2015. Approved by Supreme Decree N° 011-2015-MINAM.

<sup>5</sup> Second National Communication on Climate Change. Ministry of Environment, 2010

Studies reveal that temperature and rainfall regimes are changing throughout the country. Climate scenarios predict water regime irregularities in 2030. In the Mountain regions, it is predicted that annual rainfalls would show deficiencies between -10% and -20%; in the northern and central Amazon area (high jungle) annual rainfalls it would be up to -10%, and in the northern and southern coast it would show increases between + 10% and + 20%. It is worth mentioning that the retreat of tropical glaciers in the country also modifies the hydrological regimes: seven basins studied in the "Cordillera Blanca" (mountain range) have exceeded a critical transition point in their retreat, showing a decline in the dry season discharge<sup>6</sup>.

Moreover, in rural areas and areas inhabited by indigenous people, development is largely based on primary and extractive activities that depend on vulnerable ecosystems; the agricultural sector uses 65% of the rural Economically Active Population (EAP); and over 80% of the EAP in the rural area live in poverty conditions and work in agriculture, fishing and mining.

Peru is exposed to the cyclical and adverse climate impacts of "El Niño", which affects primary sectors such as agriculture and fishery, and natural, economic and social infrastructure. Major events during the 1997-1998<sup>7</sup> "El Niño" registered losses of more than 3,500 million dollars (more than 4.5% of the 1997<sup>8</sup> GDP) mainly due to the impact on primary production sectors and infrastructure destruction. In addition, annual climatic events such as frost, drought and floods severely affect many different parts of the country. These phenomena are exacerbated and expanded due to climate change, including greater difficulties in forecasting their cycles and intensities.

Peru has 84 out of the 117 life zones of the world. This factor can determine that, even in the most moderate climate change scenario, the potential growth of the country will be adversely affected since many activities of high economic potential depend on eco-systemic resources that this diversity provides (such as the hydropower, agriculture, livestock and tourism sectors). Consequently, it is expected that extreme climate events, which are more frequent, would affect aggregate production, limiting the availability of resources, damaging infrastructure and consequently affecting national growth.

Finally, it is important to take into consideration that 76% of the population lives in urban areas, with an annual growth rate of 2.1%, whereas rural areas have grown at a rate of 0.01% per annum<sup>9</sup>. That is why it is essential to consider the vulnerability of cities and promote the concept of "Resilient Cities" as units of climate risk management.

Studies that quantify the impact of climate change on national economic growth show that in 2030, under a climate change scenario, real GDP would be lower than the GDP without climate change by 5.7% to 6.8%. In 2050, the gap would be between 20.2% and 23.4%. This is equivalent to an average annual loss between 7.3% and 8.6% of the potential GDP<sup>10</sup> up to 2050.

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<sup>6</sup>Baraer et al. Glaciers recession and Water Resources in the "Cordillera Blanca" (Mountain Range) in Peru. 2012

<sup>7</sup> Multiannual Macroeconomic Framework, 2015-2017 (Ministry of Economy and Finance, 2015)

<sup>8</sup> "El Niño" Lessons. Peru (CAF, 2000)

<sup>9</sup> National Institute of Statistics and Informatics, 2007

<sup>10</sup>Climate change and its effects in Peru (Vargas, 2009)

### **3.3. Priorities in adaptation**

The sectors and systems that the country needs to address on a priority basis have been identified based on available scientific information, processes of formulation of management and planning tools and consultations with relevant sectors, regions and civil society. In addition, it has been taken into account that these sectors / systems meet the defined prioritization criteria. These sectors / systems are:

- i) Water (Water resources)
- ii) Agriculture
- iii) Fishery
- iv) Forestry
- v) Health

In accordance with the determined sectors and systems that are vulnerable to climate change - and focusing on people and their livelihoods – the vulnerable populations that need to be addressed on a priority basis has been determined. These are: rural populations related to subsistence family farming and/or weak market linkages, many of them grouped in peasant and indigenous communities; small farmers; artisanal fishermen; native communities; small forest producers; and, from a health perspective, infants, women and seniors.

### **3.4. INDC Proposal in adaptation**

After a review of the vulnerabilities and adaptation priorities of the country, and based on the study of the national goals established by the current national planning documents (Bicentennial Plan, National Plan for Disaster Risk Management - PLANAGERD, Environmental Action Plan - PLANAA, Environment Agenda 2014) and sectoral planning documents (PLANGRACC-A<sup>11</sup>, Budget Programs, Integral Plan of mitigation and adaptation to the effects of climate change on public health, among others), the adaptation component is formulated for different sectors and prioritized systems.

The established goals try to reach a main objective for 2030: "Peru adapts to the adverse effects and takes advantage of the opportunities imposed by climate change."<sup>12</sup> Scopes, objectives and goals were identified under this vision for each sector / system. In addition, five crosscutting areas, where action must be taken in order to address adaptation effectively, are identified: disaster risk management, resilient infrastructure, poverty and vulnerable populations approach, gender approach and promotion of private investment in climate change adaptation. Goals are proposed for each one of them (see Table 2).

The objectives and goals are formulated in consultation with the relevant sectors.

It is worth mentioning that the instrument for complying with the goals established in the INDC in adaptation will be the National Adaptation Plan, whose formulation process begins in the last quarter of 2015.

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<sup>11</sup> Risk and Adaptation to Climate Change Management Plan, in the Agrarian Sector (Ministry of Agriculture and Irrigation, 2012)

<sup>12</sup> Objective corresponding to the 2021 Vision of the National Strategy on Climate Change (Ministry of Environment, 2015).

**Table 2: Summary of the INDC in adaptation**

	<b>1. WATER</b>	<b>2. AGRICULTURE<sup>13</sup></b>	<b>3. FISHERY</b>	<b>4. FORESTRY</b>	<b>5. HEALTH<sup>14</sup></b>
Scope	Includes supply (resources) and demand (use): direct human consumption, agriculture and livestock, energy, mining and industry. It includes physical and eco-systemic infrastructure.	Considers protecting the sector and its contribution to the economy, and includes attending the most vulnerable groups (small and subsistence farmers).	Considers protecting the sector and its contribution to the economy, and includes attending the most vulnerable groups (artisanal fishermen).	Considers protecting ecosystem services that forests provide, and attend the most vulnerable groups (indigenous communities and small forest producers).	Considers increasing the adaptive capacity of health services in order to face CC, and the resilience of vulnerable populations to its effects.
Intermediate objectives	<b>Encourage and promote actions and projects that increase the availability of water in the context of CC.</b>	<b>Reduce the negative impact of climate change on the agrarian activity (agriculture, livestock and forestry).</b>	<b>Reduce the vulnerability of the fishery and aquaculture sector to Climate Change</b>	<b>Promote comprehensive land management with a landscape approach, oriented to increase forests resilience to CC, and reduce the vulnerability of local populations.</b>	<b>Reduce vulnerability and increase the population resilience to the health effects of climate change.</b>
Crosscutting areas/ Goals	<b>1. Disaster Risk Management<sup>15</sup></b> <ul style="list-style-type: none"> <li>Increase the number of prioritized districts, due to hydro-meteorological and climate events, that are monitored.</li> <li>Increase the number of people with education and knowledge in disaster risk management and adaptation to climate change.</li> </ul>				
	<b>2. Resilient Public Infrastructure</b> - Climate Shield of the National Public Investment System (SNIP in Spanish) <ul style="list-style-type: none"> <li>Incorporate guiding elements in the methodological guidelines for the development of public investment projects of the National Public Investment System (SNIP), that allow, for relevant sectors, performing these activities in a climate change context.</li> </ul>				
	<b>3. Poverty and Vulnerable Populations Approach</b> – adjustments to the design of programs and regulatory frameworks with adaptation criteria <ul style="list-style-type: none"> <li>Increase the number of programs and instruments against poverty that incorporate adaptation to climate change.</li> </ul>				
	<b>4. Gender and Intercultural Approach</b> <ul style="list-style-type: none"> <li>Formulation and approval of the Action Plan on Gender and Climate Change</li> <li>Encourage the participation of indigenous organizations in actions on climate change.</li> </ul>				
	<b>5. Promotion of private investment in adaptation</b> - evaluate the introduction of innovative mechanisms to encourage private investment that increase the resilience of vulnerable systems.				

 Goals conditioned to international funding

<sup>13</sup> Measures applied to all kinds of agriculture.

<sup>14</sup> The National Health System officially recognizes five functions: disease prevention, health promotion, health protection, health restoration and rehabilitation.

<sup>15</sup> Goals consistent with the 0068 Budget Program

### **3.5. Resources required for the development and communication of the iNDC in adaptation**

Peru is making a substantial effort to adapt to the combined effects of variability and climate change, and the proof of that is the large number of established goals that are part of national plans, budget programs and on-going projects, including those with international cooperation.

However, the country still needs international support in terms of funding, research, technology and capacity building to fulfill the proposed goals. The need to support the development and implementation of an effective monitoring, evaluation and reporting system is foreseen.

The proposed iNDC distinguishes goals that have funding from those conditioned to international funding.

## **IV. CROSSCUTTING APPROACHES**

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Mitigation and adaptation national policies and instruments incorporate a gender perspective to promote and ensure active, continuous, full and equal participation of women and men in the consultation and decision-making processes for the control and access to natural resources, management of GHG emissions and generation of mitigation and adaptation strategies. This is currently based on the implementation of the National Plan for Gender Equality 2012-2017 (PLANIG in Spanish) and the future Peruvian Action Plan on Gender and Climate Change (PAGCC-Peru in Spanish) which is framed in the National Strategy on Climate Change (ENCC in Spanish).

The implementation phase of the iNDC will maintain the intercultural and intergenerational foundation considered in the formulation phase.

## **V. COMMITMENT TOWARDS A NEW INTERNACIONAL CLIMATE AGREEMENT**

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### **5.1. Consensus Position:**

With respect to the negotiation towards a new climate agreement for the post 2020 period, Peru supports a global agreement that is a short and concise document by which a long-term system is established with legally binding obligations for all countries. Our country considers that the agreement should contain a global vision to be subscribed by all Parties and that is aimed to be achieved through individual and collective efforts in accordance with the principles of the Convention. It should also ensure that Parties progressively increase their level of ambition. At the same time, the agreement should be accompanied by decisions adopted during COP21 related to the implementation of commitments under the new agreement.

To ensure that the agreement will serve as an instrument that incentivizes and facilitates the ambition of countries, it should clarify and establish the necessary processes to renew in a

successive and periodic basis the nationally determined contributions in mitigation, adaptation and means of implementation components. Each one of the components has specific characteristics but the agreement must establish a link between them. Adaptation is key to respond to the impacts of climate change and the political balance between adaptation and mitigation is a priority in Peru. In addition, Peru has defined its mitigation commitment in order to participate in the collective effort to keep global warming below the 1.5 C° – 2 C°. At the same time, means of implementation are crucial to facilitate mitigation and adaptation activities in developing countries.

## **5.2. Details about the positions in adaptation and mitigation:**

### **a. Adaptation:**

- The new agreement should strengthen the political parity between adaptation and mitigation.
- In order to encourage ambition in adaptation, a qualitative global goal will be required, as well as collective and individual efforts that allow closing the gap in adaptation.
- Funding for adaptation must be strengthened and increased, including the Green Climate Fund.
- The exchange on experiences and best practices in adaptation must be strengthened between the Parties.

### **b. Mitigation:**

- A global goal for mitigation should be included. This goal will be met through the efforts of all countries in accordance to science and the principles of differentiated equity.
- Mechanisms that allow countries to increase their ambition and fulfill their commitments shall be established, such as market mechanisms.
- The mitigation component should include a system of rules, for example, to avoid double counting of emission reductions and to monitor the implementation of commitments allowing for the full aggregation of mitigation commitments. This is important to ensure the environmental integrity of the agreement.
- REDD+, as defined in the Warsaw framework and the related decisions, will be an important tool for the country to achieve its mitigation commitments, and there is the need to reinforce support for this mechanism under the new agreement.

In the negotiations, Peru is an active member of the Independent Alliance of Latin America and the Caribbean (AILAC, in Spanish). The other members of this negotiating group are Colombia, Costa Rica, Chile, Guatemala, Panama and Paraguay.

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**REPUBLIC OF THE PHILIPPINES**  
*Intended Nationally Determined Contributions*  
Communicated to the UNFCCC on October 2015

The Republic of the Philippines is pleased to submit its Intended Nationally Determined Contributions in accordance with Decisions 1/CP.19 and 1/CP.20 of the Conference of Parties of the United Nations Framework Convention on Climate Change (UNFCCC). The submission is anchored on its policy declaration under the Climate Change Law of 2009, as amended in 2012, whereby the State shall cooperate with the global community in the resolution of climate change issues.

**PREAMBLE**

The Philippine INDC is premised on the philosophy of pursuing climate change mitigation as a function of adaptation. As a country highly vulnerable to climate and disaster risks, mitigation measures as presented in the INDC will be pursued in line with sustainable development and a low-emission development that promotes inclusive growth. As such, the pursuit of the mitigation measures of the country is conditioned on the financing resources, including technology development and transfer, and capacity building. Furthermore, the support for these initiatives will be substantially provided under a new agreement expected to be forged by the 21<sup>st</sup> Session of the Conference of Parties in December 2015.

The information presented in this submission is based on available data at the time of the INDC's formulation. The INDC will be updated as more data become available.

The discussion on adaptation and loss-and-damage is intended to provide part of the critical context of the mitigation proposal in this INDC. The adaptation actions with additional support from international sources will enhance the country's capacity towards climate resiliency and also its capacity to implement the mitigation options.

The Philippines recognizes its responsibility to contribute its fair share in global climate action, particularly in the effort to realize the ultimate aim of the Convention to avoid dangerous anthropogenic interference with the climate system. Based on fair share, the country will commence a broad consultative process to determine the propriety of the need to peak its emissions taking into consideration the country's economic growth and development. The country however views the need to peak its emissions as an opportunity to transition as early as it can to an efficient, resilient, adaptive, sustainable clean energy-driven economy, and it is determined to do so with partners from the global community.

The full implementation of the Philippine INDC is contingent on the provision of all elements under the means of implementation section. The Philippines still recognizes the leadership role of developed countries in addressing climate change.

## **NATIONAL CONTEXT**

The Philippines, an archipelagic country with a population of more than 100 million, is highly vulnerable to the impacts of climate change and natural hazards. In the Global Climate Risk Index of Germanwatch, the Philippines ranked fifth with respect to the long-term Climate Risk Index (CRI) for the period of 1994 to 2014. In terms of the 2013 CRI, the Philippines is identified as the most affected country (ranked 1st).

While the Philippines is making significant strides toward a more inclusive growth aimed at further reducing poverty and creating more opportunities for shared prosperity, the challenge is to pursue economic development while simultaneously having to deal with the impacts of climate change and natural hazards. Climate change and natural hazards will progressively impact sectors that are strategically important for the growth of the economy, e.g., agriculture, fisheries, and water resource management. Increase in temperature, coupled with changes in precipitation patterns and hydrological regimes, can only exacerbate the country's existing vulnerabilities, threatening its sustainable development and the survival of future generations of Filipinos.

Recognizing the critical and complex challenges posed by climate change, the Philippines continuously pursues institutional reforms factoring sustainable and responsible use of natural resources, respect for, protection, promotion, and fulfillment, as well as, the full enjoyment of human rights by all, including the indigenous peoples and local communities, gender equality and the full and equal participation of women, intergenerational equity, biodiversity conservation, food and water security. The Philippine government has put in place a comprehensive climate change policy agenda, to wit:

- Passage of the Climate Change Act of 2009 and amended in 2012 which established the *Climate Change Commission (CCC)* to lead policy development and coordinate, monitor and evaluate climate response. The Cabinet Cluster on Climate Change Adaptation and Mitigation (CCAM) was also created to focus on increasing convergence and coordination among government agencies with key roles on adaptation and mitigation. The amended law also led to the introduction of the Peoples' Survival Fund allocating national budget for adaptation needs of local communities and local governments.
- Enactment of the National Disaster Risk Reduction and Management Law of 2010 serving as guide to mitigate impacts of disasters and increase resilience in the face of natural disasters.
- Adoption of the *National Framework Strategy on Climate Change (NFSCC) in 2010* laid the foundation and roadmap for addressing climate change. It identified adaptation as the anchor strategy and considered mitigation as a function of adaptation.

- Issuance of the *National Climate Change Action Plan (NCCAP)* in 2011 set the tone for the Government to implement short, medium and long term actions in seven thematic areas of food security, water security, ecological and environmental stability, human security, climate smart industries and services, sustainable energy, and knowledge and capacity development.
- Promulgation of complementary sectoral laws (e.g. Ecological Solid Waste Management Act of 2000, Biofuels Act of 2006 and the Renewable Energy Act of 2008) that led to the increase in the utilization of renewable energy sources, reinforcing and institutionalizing climate change mitigation actions, as well as, creating opportunities for synergy and collaboration for an efficient utilization of limited resources.
- The Philippines is endowed with diverse ecosystems, which are considered extremely important for enabling the country to develop resilience in the face of climate change. Among these are its forests and marine resources, which are seen as contributing to both adaptation and mitigation needs. Marine ecosystems can play a crucial role with its potential on blue carbon. Some of these ecosystem contributions are articulated in the Philippine National REDD Plus Strategy and the recently updated Philippine Biodiversity Strategy and Action Plan. The Philippine legislature is poised to declare by law 97 protected areas as national parks under the Expanded National Integrated Protected Areas Systems, which could contribute to increasing resiliency against climate change.

## **PLANNING PROCESS OF THE INDC**

The Planning for the Philippine INDC is consistent with the Philippine Development Plan, the National Framework Strategy on Climate Change, the National Climate Change Action Plan and the National Disaster Risk Reduction and Management Plan. These plans and the INDC were developed through exhaustive, inclusive and participatory processes.

- Consultations on the preparation of the INDCs were organized and conducted with relevant government agencies including the Office of the President, the Senate and House of Representatives.
- Internationally accepted tools and methodologies were used by government agencies to identify possible mitigation options as input to the INDC.
- Consultations were also conducted with the civil society and the relevant business sectors.

## **MITIGATION**

The Philippines intends to undertake GHG (CO<sub>2</sub>e) emissions reduction of about 70% by 2030 relative to its BAU scenario of 2000-2030. Reduction of CO<sub>2</sub>e emissions will come from energy, transport, waste, forestry and industry sectors. The mitigation

contribution is conditioned on the extent of financial resources, including technology development & transfer, and capacity building, that will be made available to the Philippines.

In the identification and selection of mitigation options, national circumstances particularly the country's climate vulnerabilities and capacity to implement, were among the critical determinant factors.

#### Assumptions Used

- For the Baseline scenario, historical GDP from 2010 – 2014 and an annual average of 6.5% for 2015 – 2030
- Average annual population growth of 1.85%
- *Loss-and-Damages* from climate change and extreme events will not require substantial diversion of resources for rehabilitation and reconstruction thereby affecting development targets as well as mitigation commitments under this INDC.
- Identified co-benefits for mitigation options such as environmental and socio-economic benefits are realized.
- Climate projections were considered in the assessment of mitigation options

#### Methodology and Tools

- 2006 IPCC guidelines for the GHG inventory
- Tools used
  - 2006 IPCC software
  - Agriculture and Land Use (ALU) Software for agriculture, forestry and other land uses
  - Long Range Energy Alternative Planning (LEAP)
  - Multi-criteria Analysis (MCA)
- Assessments conducted
  - Integration of climate change considerations in the assessment such as analysis of climate projections' impacts on hydropower potential as an RE option for mitigation.
  - Cost-benefit Analysis including the Marginal Abatement Cost Curve until 2030 for sectors with mitigation potential
  - Multi-criteria Analysis for prioritizing mitigation actions

## **ADAPTATION**

Recognizing the vulnerability of the country to the impacts of climate change, the State prioritizes adaptation and adopts it as the anchor strategy as espoused by the National Framework Strategy on Climate Change and subsequently elaborated in its National Climate Change Action Plan.

The Philippines strives to ensure that climate change adaptation and disaster risk reduction are mainstreamed and integrated into the country's plans and programs at all levels. The path towards a low emission development will require climate resilience and improved adaptive capacity. Financial resources, technology transfer and capacity building support for adaptation will ensure that the country's committed

mitigation INDC will be attained. The following priority measures, among others, would need such identified implementation support:

1. Institutional and system strengthening for downscaling climate change models, climate scenario-building, climate monitoring and observation;
2. Roll-out of science-based climate/disaster risk and vulnerability assessment process as the basis for mainstreaming climate and disaster risks reduction in development plans, programs and projects;
3. Development of climate and disaster-resilient ecosystem(s);
4. Enhancement of climate and disaster-resilience of key sectors – agriculture, water and health;
5. Systematic transition to a climate and disaster-resilient social and economic growth; and
6. Research and development on climate change, extremes and impacts for improved risk assessment and management.

## **LOSS AND DAMAGE**

The basic foundation for prioritizing adaptation measures is to ensure that loss and damage from climate change and extreme events are minimized to ensure achievement of national development targets through building capacities and enhancing resilience to avoid and mitigate losses in a sustainable manner.

The Philippine INDC assumes that *Loss-and-Damages* from climate change and extreme events will not require diversion of substantial resources for rehabilitation and reconstruction thereby adversely affecting the country's capacity to meet national development targets as well as mitigation commitments under this INDC.

## **MEANS OF IMPLEMENTATION**

The Philippines is already undertaking initiatives to mainstream and institutionalize climate change adaptation and mitigation into the plans and programs of the government as reflected in government expenditures. The Philippine government has installed a system for tagging its expenditure for climate change adaptation and mitigation and is envisioned to use this system for its annual budgeting process starting 2015.

Highlighting the vulnerability of the country, public financing will prioritize adaptation to reduce vulnerability and risks to the community, at the same time providing a policy environment that will enable participation of the private sector to optimize mitigation opportunities and reduce business risks towards a climate smart development.

Full implementation of the Philippines' INDC requires support in the form of adequate, predictable and sustainable financing.

Likewise, implementation of both national development targets and mitigation initiatives necessitate the continuous development and strengthening of the country's

capabilities and capacities. External assistance would be required to enable the Philippines to develop and adopt the most appropriate technologies to improve adaptive capacities and resilience. Capacity and capability are needed in the field of climate and natural hazard modeling, science-based risk and vulnerability assessment as well as risk management measures including risk sharing and risk transfer mechanisms.

Technology transfers and innovations are needed to support adaptation and minimization of loss-and-damages as well as enhanced capacity for mitigation. Technical inputs and assistance are critical for certain sectors such as grid efficiency improvement, standard development for energy and water efficiency, cost-effective renewable energy, alternative or high-efficiency technology for conventional power generation, among others.

The Initial INDC submission of the Philippines is based on current available data. This INDC will be updated as more data become available. It is also conditional on the agreement to be reached by Parties. In finalizing and updating these INDCs, after the Paris agreement is adopted, the Philippines will be guided by best practices in participatory and consultative decision-making involving all concerned agencies, sectors, and stakeholders. These processes must be linked to a robust means of implementation, which include financial support, technology development and transfer, and capacity building.