Intended Nationally Determined Contributions (INDCs) -Continued

Parties

Qatar
Republic of Korea
Republic of Moldova
Republic of Macedonia
Russian
Rwanda
Saint Kitts and Nevis
Saint Lucia
Saint Vincent and the Grenadines
Samoa
SAN MARINO
Sao Tome and Principe
Saudi Arabia
Sénégal
Serbia
Seychelles
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Somalia
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South Sudan
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Sudan
Suriname
Swaziland
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Tajikistan
Thailand
Togo
Tonga
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Tunisia
Turkey
Turkmenistan
Tuvalu
UAE
Uganda
Ukraine
Uruguay

USA
Vanuatu
Venezuela
Vietnam
Yemen
Zambia
Zimbabwe

State of Qatar

Ministry of Environment

Intended Nationally Determined Contributions (INDCs) Report

November 19th, 2015

State of Qatar is pleased to submit its Intended Nationally Determined Contributions to the United Nations Framework Convention on Climate Change (UNFCCC) secretariat in accordance with decisions 1/CP.19 and 1/CP.20 in line with decision 24/CP.18 and the provisions and principles of the convention.

The Qatar National Vision 2030 contains four pillars: Human, Social, Economic and Environmental development. Qatar is trying to guarantee a freedom of economic enterprise on the basis of social justice and balanced cooperation between private and public activity, in order to achieve socio-economic development. It is through the fourth pillar, in particular, that the State of Qatar is seeking to preserve and protect its unique environment. This fourth pillar is of high importance as it seeks to strike a balance between development needs and environmental protection, and supports international efforts to mitigate the effects of climate change. Therefore, the State of Qatar is dealing with the potential impacts of climate change through initiating several contributions and activities.

1. National Circumstances

Qatar is a developing country (peninsula) located in the Arabian Gulf. The nature of this peninsula is very harsh as it suffers from a scarcity in drinkable water and local food supply with an average annual rainfall of only 82mm. State of Qatar depends highly on the desalination of the saline seawater as the main water sources in addition to the ground water.

Qatar is extremely vulnerable to sea level rise as it is liable to inland flooding of 18.2% of its land area, at less than 5m rise in sea level, along with the associated adverse impacts on the population as 96% are living on the coastal areas. Furthermore, climate change would cause the extinction of species such as whales, dolphins and turtles in addition to causing coral bleaching and other several impacts on the migration of some marine species and sea birds.

Although the essential living resources are rare, Qatar is blessed with oil and gas resources that are being used to overcome the living difficulty on this land. Since the exploration of hydrocarbons in Qatar, oil and gas in addition to their associated petrochemical industries have been contributing to the economic and social growth of the state. Qatar's ecological and human systems are vulnerable to the adverse impact of climate change as well as the impact of response measures due to its unique circumstances.

The international climate change measures and policies shall be in line with the provisions of the of the United Nations Framework Convention on Climate Change in particular, Article 3 paragraph 2 and Article 4 paragraph 8(h) and 10 and shall ensure the developing countries' eligibility for finance, technology transfer and capacity building.

2. Economic Diversification with Mitigation Co-benefits

Economic diversification is crucial to Qatar in order to maintain a steady and robust economy. Qatar seeks to enhance the diversification of its economy away from hydrocarbon in consistent with decision 24/CP.18. Qatar has been contributing indirectly to the global efforts to mitigate climate change by exporting Liquefied Natural Gas as a clean energy.

2.1. Energy Efficiency

According to Qatar National Vision 2030, the energy industry is taking into consideration the impacts of its development and growth on the environment. Many programs and projects in the country are pursuing energy efficiency and process optimization. Although the existing capacity and technology is not enough to support improvement and upgrade, Qatar is in process of employing available resources to achieve energy efficiency.

2.2. Clean Energy and Renewables

Despite the abundance of gas which is clean energy, Qatar is heavily investing in other natural resources. Attempts have been made to utilize clean energy and renewable sources such as solar and wind power. Efforts have been made into solar energy generation with a view to becoming a regional supplier of solar-generated electricity. However, based on the harsh environment and weather conditions, utilizing such renewables as reliable power sources is very challenging due to the lack of access to high technology, which is necessary for using these sources effectively and efficiently. Yet, some national entities started considering solar and wind sources to generate electricity for small buildings aiming to open a new market, in the hope of strengthening the economic diversification. Utilizing clean energy and renewables is an adaptive precaution to climate change impacts that would open a window to diversify the economy and reduce emissions to the atmosphere from the fuel combustion. Some of clean energy and renewable sources are available, however, they cannot be utilized without the needed support; especially, technology transfer.

2.3. Research and Development

Qatar is highly committed to advancing research and development. Qatar has invested heavily in research and development in various areas including sustainable energy, in line with its National Research Strategy. Many research activities are being carried out in various fields, improving the environment to adapt with climate change impacts, utilizing clean energy and renewables, reducing emissions to the atmosphere and developing technologies that convert emissions into useful products. These research efforts consider economical validation, economic-diversification and efficiency.

2.4. Education

Qatar is investing heavily in education. Great steps have been taken to create a world-class education system that aims to build an environmentally aware society. Universities and research facilities have programs that center around environmental studies, including climate

change. All in all, Qatar's emphasis on education is expected to produce graduates who are specialized in knowledge-based services, healthcare and green technologies. On the same grounds, young Qataris are always motivated to take advantage of the various opportunities for post-secondary education and training. These generations are encouraged to increase their involvement in the private sector by launching business training and capacity building programs. This involvement will, in turn, strengthen the new generation's capabilities and improve their analytical thinking, innovation and entrepreneurship to contribute to climate change efforts and sustainable development.

2.5. Tourism

Qatar has a long-term strategy towards advancing its tourism industry through a series of well-defined plans, programs, and policies developed according to international best practices, and following a nation-wide consultative process. The aim of this strategy is to reduce dependence on hydrocarbon resources by promoting sustainable tourism strategies, as well as to protect the country's economy from market fluctuations that can significantly affect its economic growth.

3. Adaptation actions with Mitigation Co-benefits

3.1. Water Management

According to Qatar National Vision 2030, efforts are initiated to place Qatar's resources management on a sustainable path for future generations. Qatar aims to use upgraded wastewater treatment plants to improve the treated water quality and further support using it for agricultural purposes to reduce the demand on fresh water and accordingly decrease the fuel consumption in water desalination and associated gaseous emissions. In addition, Qatar is undertaking the following key initiatives in relation to water management:

3.1.1 Water Conservation: Qatar will enact a comprehensive National Water Act establishing an integrated system of quality requirements, discharge controls and incentives for conservation.

3.1.2 Desalination: Qatar is moving towards more efficient forms of desalination, and is investing in research and development of new technologies, including the usage of renewable energy to power desalination plants.

These new technologies will minimize the environmental impacts of the desalination projects. Significant research and development activities about developing innovative desalination technologies and utilizing renewable energy for desalination and water treatment have been established at Qatar.

3.2. Infrastructure and Transport

Currently, Qatar's infrastructure is being improved and directed towards an efficient adaption and mitigation measure for reducing climate change impacts. Several projects are serving the goal. Qatar introduced public transportation to reduce the demand on private vehicles and direct the nation towards the use of the public transportation and expressway programs that would enhance the traffic flow and divert it outside the cities. Hence, local roads and drainage program is expected to enhance the network of drinking water, wastewater and treated sewage effluent. In Qatar, Vehicles Inspection Services regulates the emissions of vehicles. Qatar continues to improve the emission standards for new motor vehicles, in accordance with regional and global emission standards.

3.3. Waste Management

Qatar uses state-of-the-art waste treatment technologies which treats most of the collected waste generating significant amount of clean energy. Efforts are focused on adopting a strategy to contain the levels of waste generated by household, commercial sites and industries.

To improve waste management, the government recognizes a hierarchy of actions to alleviate the pressure on the environment and to reduce, reuse or recycle generated waste in addition the reduction of methane emissions. The waste management facilities will have the capability to convert waste to energy. Awareness programs are planned to encourage a sense of shared responsibility towards the environment.

3.4. Awareness

A sustainable environment could be achieved by public involvement. Therefore, awareness programs are being carried out to spread the idea of using less energy consumption devices and energy efficient building structures through thermal insulation systems. These programs are meant to adapt with climate change impacts that would bring down the emissions as a co-benefit, through encouraging the sense of shared responsibility towards the environment, along with the development of positive environmental attitudes and values.

4. Response Measures

Due to Qatar's dependence on the export of oil and gas, there is an uncertainty from the potential impact of the implementation of response measures to climate change that may negatively impact the strength of Qatar's economy and potentially the quality of life of its residents. Therefore, measures have to be assessed in order to avoid potential impacts of the implementation of these measures on Qatar with the necessity of international cooperation in this regard to achieve the objectives of sustainable development in line with the principles and provisions of the convention in particular with article 4.8.

5. Timeframe

The intended voluntary contributions in this report tend to cover the period 2021 to 2030 in line with the national vision.

6. Monitoring and reporting progress

A dedicated department for climate change within the Ministry of Environment has been established to strengthen the governance of climate change on national level and to implement standardized data collection and reporting. This national Monitoring, Reporting and Verification system could be used to track the progress of the actions and projects that may push towards achieving the aim of this INDCs.

7. Fairness and Ambition

This INDC is based on the provisions and principles on the convention and in particular article 3 paragraph 2 and article 4 paragraph 1, paragraph 8(h) and 10.

All national actions and plans described in this INDCs are voluntary and the means of implementation and support will be in accordance with the principles and provisions of the United Nations Framework Convention on Climate Change in particular Articles 4.7, 12.4.

Qatar reserves the right to further elaborate and update this INDCs in line with its special national circumstances and sustainable development imperatives with a view to avoiding adverse effects of the economic and social consequences of response measure.

Submission by the Republic of Korea

Intended Nationally Determined Contribution

In accordance with decisions 1/CP.19 and 1/CP.20, the Republic of Korea hereby communicates its Intended Nationally Determined Contribution (INDC) towards achieving the objective of the United Nations Framework Convention on Climate Change as set out in its Article 2, as well as accompanying information to facilitate clarity, transparency, and understanding of its INDC.

1. Korea's Mitigation Target

Korea plans to reduce its greenhouse gas emissions by 37% from the business-as-usual (BAU, 850.6 $MtCO_2eq$) level by 2030 across all economic sectors.

In accordance with the Framework Act on Low Carbon, Green Growth, Korea has made continued efforts to address climate change across all economic sectors and will strengthen its efforts to achieve the 2030 mitigation target.

<table>
<tr><td>Baseline</td><td>($MtCO_2eq$)<table><tr><td>Year</td><td>2020</td><td>2025</td><td>2030</td></tr><tr><td>BAU</td><td>782.5</td><td>809.7</td><td>850.6</td></tr></table>The scenario is based on the BAU projection of KEEI-EGMS (the Korea Energy Economics Institute Energy and GHG Modeling System), taking into account projections for key economic variables, including population, GDP, industrial structure and oil price.</td></tr>
<tr><td>Reduction Level</td><td>Emission reduction by 37% from the BAU level by 2030</td></tr>
<tr><td>Coverage</td><td>Economy-wide</td></tr>
<tr><td>Sectors</td><td>Energy, industrial processes and product use, agriculture and waste (A decision on whether to include land use, land-use change and forestry (LULUCF) will be made at a later stage.)</td></tr>
</table>

Gases	• Carbon Dioxide (CO_2) • Methane (CH_4) • Nitrous Oxide (N_2O) • Hydrofluorocarbons (HFCs) • Perfluorocarbons (PFCs) • Sulphur hexafluoride (SF_6)
Metric	Global Warming Potential (GWP) values from the IPCC Second Assessment Report (1995) used to calculate CO_2 equivalents
Inventory Methodology	• Consistent with methodologies used in Korea's Biennial Update Report (BUR) submitted in December 2014 • 1996 IPCC Guidelines used in general to calculate greenhouse gas emissions and sinks • 2006 IPCC Guidelines used to calculate greenhouse gas emissions from rice cultivation in agriculture (4C) and other waste (6D)
International Market Mechanism	Korea will partly use carbon credits from international market mechanisms to achieve its 2030 mitigation target, in accordance with relevant rules and standards.
Land Sector	In assessment of mitigation performance, a decision will be made at a later stage on whether to include greenhouse gas emissions and sinks of the land sector as well as the method for doing so.

2. Planning Process

2.1 Planning Process for the 2030 mitigation target

In preparation of its INDC, Korea established a dedicated task force comprising relevant ministries, including the Ministry of Environment (MOE) and the Ministry of Trade, Industry and Energy (MOTIE), chaired by the Prime Minister's Office.

A technical analysis for setting the 2030 mitigation target was conducted by a Joint Working Group of national research institutions, including the Greenhouse Gas Inventory & Research Center of Korea (GIR) and the Korea Energy Economics Institute (KEEI).

The results of the technical analysis of the Joint Working Group were reviewed by a group of experts put forward by different stakeholder groups such as business and civil society. The Korean government also collected feedback from various stakeholders through public hearings and a forum hosted by the National Assembly.

On that basis, the 2030 mitigation target was reviewed by the Committee on Green Growth, and finalized in accordance with national authorization procedures.

2.2 Sectoral measures for mitigation

Korea announced its voluntary mitigation target in 2009 to reduce greenhouse gas emissions by 30% from the business-as-usual (BAU) level by 2020. The target was stipulated in the Framework Act on Low Carbon, Green Growth which came into effect in April 2010.

Furthermore, Korea has continued its efforts to provide a legislative framework and national plans for addressing climate change. The Korean government finalized sectoral and annual targets in July 2011, and announced the National Greenhouse Gas Emissions Reduction Roadmap in January 2014 for sectoral action plans and their implementation.

In 2012, Korea launched the GHG and Energy Target Management System (TMS) for the industrial sector. The reduction through the TMS exceeded its industrial sectoral target for mitigation. In promoting cost-effective measures for mitigation, Korea adopted the Act on the Allocation and Trading of Greenhouse Gas Emission Permits in 2012, and launched a nation-wide Emissions Trading Scheme (ETS) in 2015. The ETS covers 525 business entities which account for 67.7% of national greenhouse gas emissions.

Korea obligated the power generators to supply a portion of electricity from renewable sources and is increasing the production of renewable energy in order to reduce greenhouse gas emissions from fossil fuel. The Korean government also supports the installation of facilities for the generation of renewable energy.

In the building sector, the Korean government is seeking to manage energy efficiency from the design stage to the operation stage by means such as establishing the Green Building Standards Code and a system for the Performance Evaluation of Eco-friendly Homes.

In the transport sector, the Korean government is continuing to expand infrastructure for environment-friendly public transportation, while introducing low-carbon standards for fuel efficiency and emissions produced from automobiles. The Korean government has decided to strengthen the average emission standard from 140g/km in 2015 to 97g/km in 2020. The Korean government provides various incentives, including tax reductions for electric and hybrid vehicles in order to promote low-carbon vehicles.

While implementing sectoral measures for mitigation, Korea established a domestic measurement, reporting, and verification (MRV) system to monitor businesses with large amounts of greenhouse gas emissions in the industry, power generation, building and transport sectors.

2.3 Follow-up for the implementation of the 2030 mitigation target

The Korean government will develop a detailed plan to implement the mitigation target in consultation with relevant stakeholders, once the mitigation target is finalized at the international level.

3. Adaptation

Recognizing the urgent need to address climate change and reduce its adverse effects, Korea developed the National Climate Change Adaptation Plan in 2010, which is currently being implemented.

In acknowledgement of their significant roles in adaptation, subnational and local governments are mandated to develop their own action plans for climate change adaptation by 2015 tailored to the local context.

At the national level, Korea is developing guidance and tools to support the assessment of vulnerability and risks, and is implementing projects on research and development for comprehensive and quantitative analysis of climate change impacts.

In order to promote a Climate Friendly and Safe Society, Korea aims to strengthen its capacity for climate change adaptation by implementing the following strategic actions:

- Strengthening infrastructure for climate change monitoring, forecasting and analysis;
- Developing a management system for disaster prevention and stable water supply;
- Developing a climate-resilient ecosystem;
- Making a systemic transition to a climate-resilient social and economic structure; and
- Enhancing the system for the management of negative impacts of climate change on health

4. Fairness and Ambition

Korea accounts for approximately 1.4% of global greenhouse gas emissions (including LULUCF, according to the WRI CAIT 3.0), but has set a fair and ambitious target to the extent possible. Korea will make continued efforts to implement the mitigation target.

Korea's mitigation potential is limited due to its industrial structure with a large share of manufacturing (32% as of 2012) and the high energy efficiency of major industries. Given the decreased level of public acceptance following the Fukushima accident, there are now limits to the extent that Korea can make use of nuclear energy, one of the major mitigation measures available to it.

Despite the challenges, Korea has set a target for 2030, which is expected to be in line with the recommendations of the IPCC Fifth Assessment Report to reduce global greenhouse gas emissions by 40-70% from 2010 levels by 2050.

In order to achieve the objective of the United Nations Framework Convention on Climate Change of holding the increase in the global average temperature below 2℃ above pre-industrial levels, Korea also aims to reduce its greenhouse gas emissions in a manner consistent with the recommendations of the IPCC Fifth Assessment Report.

Government of the Republic of Moldova

Republic of Moldova's Intended National Determined Contribution

1. Introduction

The Republic of Moldova 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^{o}C.

The Republic of Moldova hereby communicates its Intended Nationally Determined Contribution (INDC) 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 undertakings in adaptation planning, the Republic of Moldova has included in Annex 1 to INDC the information on adaptation contained in its draft Fourth National Communication currently under preparation, as well as in the Republic of Moldova's Climate Change Adaptation Strategy covering the period up to 2020 and the Action Plan on its implementation, approved recently by Governmental Decision No. 1009 as of 10.12.2014.

2. Republic of Moldova's Intended National Determined Contribution

The Republic of Moldova intends to achieve an economy-wide unconditional target of reducing its greenhouse gas emissions by 64-67 per cent below its 1990 level in 2030 and to make best efforts to reduce its emissions by 67 per cent.

The reduction commitment expressed above could be increased up to 78 per cent below 1990 level conditional to, a global agreement addressing important topics including low-cost financial resources, technology transfer, and technical cooperation, accessible to all at a scale commensurate to the challenge of global climate change.

In line with Lima Call for Climate Action, in particular its paragraph 14, the following quantifiable information is hereby submitted:

A) UP-FRONT INFORMATION ON MITIGATION

Intended National Determined Contribution	
Quantifiable information on the reference period	**Base Year**: 1990. **Total Emissions in Base Year**: 43.4 Mt CO_2 eq (without LULUCF) and 37.5 Mt CO_2 eq (with LULUCF). These data are provisional and will be defined on biennial basis through inventory submissions.
Timeframes and periods of implementation	Time frame of the commitment is from 1st January 2021 to 31st December 2030. Its achievement will be tracked periodically through the Republic of Moldova's Inventory of Greenhouse Gas Emissions and Sinks.
Type of contribution	Absolute reduction from base year emissions.
Coverage of contribution	Economy-wide absolute reduction from the base year emissions. The geographic coverage is the same as the country's geopolitical boundary (including the administrative territorial units on the left bank of Dniester river). Republic of Moldova intends to account for 100 percent of national greenhouse gas emissions and removals for the base year as published in the Republic of Moldova's Greenhouse Gas Emissions and Sinks, on a net-net basis.
Scope: inclusion of gases and sectors	**Gases Covered**: all greenhouse gases not controlled by the Montreal Protocol – Carbone Dioxide (CO_2), Methane (CH_4), Nitrous oxide (N_2O), Hydrofluorocarbons (HFCs), Perfluorocarbons (PFCs), Sulphur hexafluoride (SF_6), Nitrogen trifluoride (NF_3). **Sectors covered:** energy; industrial processes and product use; agriculture; land use, land-use change and forestry; and waste.
Reduction level	The Republic of Moldova is committed to an unconditional target of a 64-67 per cent reduction of its greenhouse gas emissions by 2030 compared to 1990 levels. The 64 per cent reduction corresponds to a self-sufficiency power system development scenario, while the 67 per cent reduction allows for a 30 per cent import of electricity. The reduction commitment could increase up to 78 per cent reduction below 1990 level conditional to a global agreement addressing important topics, including access to low-cost financial resources, technology transfer and technical cooperation commensurate to the challenge of global climate change.
Planning processes	Relevant legislative acts for the INDC implementation are required and will be considered being approved on Parliamentary level. By mid-2016, a draft Low Emission Development Strategy (LEDS) of the Republic of Moldova for the period up to 2030 will be developed. After consultations at the national level, the Low Emission Development Strategy of the Republic of Moldova until 2030 will be subject to approval by the Government by end of 2016. The LEDS is expected to be fully in line with the provisions of the European Union and the Republic of Moldova Association Agreement signed on 27th of June 2014 and any other relevant national legislation.

Intended National Determined Contribution	
Fair and ambitious	The Republic of Moldova's approach to considering fairness and ambition is to assess how its INDC contributes to meeting the ultimate objective of the Convention, of achieving stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. National commitments are well in line with the emissions pathways towards 2050 that correspond to keeping global warming below 2^{o}C compared to pre-industrial levels. It is worthwhile to note that fairness considerations in the national perspectives include various aspects and no single indicator on its own can accurately reflect fairness or a globally equitable distribution of countries' efforts. It is further important to note that the evolving nature of a country's circumstances is to be reflected in the fairness consideration: • Responsibility is reflected in a country's past, current and future greenhouse gas emissions. Total emissions, as well as per capita emissions, are to be considered. The Republic of Moldova's responsibility in terms of greenhouse gas emissions is low. In 2013, the Republic of Moldova emitted 12.8 Mt CO_2 eq (without LULUCF) and 12.7 Mt CO_2 eq (with LULUCF), which is less than 0.03 per cent of current world's emissions. Total and net per capita emissions were less than half of the world's average (3.2 tCO_2 eq/capita vs 6.4 tCO_2 eq/capita (reference), respectively 3.1 tCO_2 eq/capita vs 6.8 tCO_2 eq/capita respectively)[1]. Also, the Republic of Moldova has a low level of historic emissions, of about 0.05 per cent (without LULUCF) and/or of about 0.04 per cent (with LULUCF), since 1990. • The capacity to contribute to solving the climate change problem is closely related to the ability to invest in appropriate mitigation measures. Hence, one aspect of capacity is to take into account the GDP growth level and GDP per capita in fairness considerations. In this context, it is worth mentioning that within 1990-2014 period, the Real GDP decreased in the Republic of Moldova by 29 per cent, from 9.8935 to 6.9881 billion 2010 US$, while the real GDP per capita decreased by 14 per cent, from 2,261.9 to 1,950.2 2010 US$[2]. • The mitigation potential and abatement costs are other core aspects in considering a fair contribution of a country. The greenhouse gas intensity ("CO_2 emissions per GDP") indices decreased considerably within 1990-2013 period in the Republic of Moldova, from 4.4 to 1.9 kg CO_2 per real GDP 2010 US$ (without LULUCF), or by 56.4 per cent; and, from 3.8 to 1.9 kg CO_2 per real GDP 2010 US$ (with LULUCF), or by 56.8 per cent respectively. These values are still among the highest within the transition economies

[1] CAIT 2.0 WIR's Climate Data Explorer: <http://cait.wri.org/profile/Moldova>
[2] United States Department of Agriculture Economic Research Center International Macroeconomic Data Set: <http://www.ers.usda.gov/data-products/international-macroeconomic-data-set.aspx>.

Intended National Determined Contribution	
	from the Central and Eastern Europe and reveal a high mitigation potential to achieve the Republic of Moldova's reduction targets. But, in order to reach the conditional target of up to 78 per cent reduction of its greenhouse gas emissions by 2030 compared to 1990 levels, appropriate international financial support approximately equal to US$ 4.9-5.1 billion, i.e. about US$ 327-340 million per year until 2030, is needed; the support needed will be in addition to the domestic allocations to cover the required abatement costs. This support will allow adjusting the development pathway of the Republic of Moldova towards a low-carbon economy, thus moving towards progressive decoupling of carbon emissions from economic growth and ensuring a decent level of Real GDP per capita, equal to 4,483 US$/capita in 2030, which will still be approximately one-tenth of EU 28 average, forecasted to be US$ 43,516/capita[3] in 2030. As stated above, along with the international financial support for covering the abatement costs, the country will also need assistance in form of technology transfer and capacity building.
Key assumptions and methodological approaches	**Metrics applied:** The Republic of Moldova intends to use 100-year Global Warming Potential (GWP) values to calculate CO_2 equivalent totals. The Republic of Moldova intends to report emission totals using the Fourth Assessment Report values, and will consider future updates to GWP values from IPCC. **Methodologies for estimating emissions:** IPCC Guidelines 2006. **Approach to accounting for agriculture, forestry and other land use:** the Republic of Moldova intends to include all categories of emissions by sources and removals by sinks, and all pools and gases, as reported in the National Inventory of Greenhouse Gas Emissions and Sinks; to account for the land sector using a net-net approach; and to use a “production approach” to account for harvested wood products which is consistent with IPCC guidance. The Republic of Moldova may also exclude emissions from natural disturbances, as consistent with available IPCC guidance. There are material data collection and methodological challenges to estimate emissions and removals in the land sector. In compliance with IPCC Good Practice, the Republic of Moldova will continue to improve its land sector greenhouse gas reporting, which will involve the update of its methodologies. **Contribution of international mechanisms:** The Republic of Moldova may use bilateral, regional and international market mechanisms to achieve its conditional 2030 target, subject to robust systems that deliver real and verified emissions reductions. The unconditional INDC commitment will be met through domestic actions, although these would assist cost-effective implementation. In order to avoid GHG emissions’ double counting, an appropriate robust national MRV system will be put in place in the period of 2016-2017. It will cover the GHG emissions accounting from international bunkers and CDM projects as well, delivering real and verified emission reductions.

[3] United States Department of Agriculture Economic Research Center International Macroeconomic Data Set: <http://www.ers.usda.gov/data-products/international-macroeconomic-data-set.aspx>.

B) CLARIFYING INFORMATION ON MITIGATION ASPECTS IN THE REPUBLIC OF MOLDOVA

The Republic of Moldova's share in global greenhouse gas emissions is less than 0.03 per cent. In 2013, total and net greenhouse gas emissions of the Republic of Moldova equalled 12.8 Mt CO_2 eq (with LULUCF) and 12.7 Mt CO_2 eq (without LULUCF) (see table 1) and total and net per capita emissions were less than half of the world average (3.2 tCO_2 eq/capita vs 6.4 tCO_2 eq/capita, and 3.1 tCO_2 eq/capita vs 6.8 tCO_2 eq/capita respectively).

Table 1: Greenhouse Gas Emissions and Sinks Trends in the Republic of Moldova within 1990-2013 period, Mt CO_2 equivalent

	1990	1995	2000	2005	2010	2011	2012	2013
1. Energy sector	34.5213	11.7222	6.6728	8.4684	9.6473	9.8255	9.4690	8.4046
2. Industrial processes	1.8420	0.4784	0.2702	0.5605	0.5594	0.6011	0.6227	0.6726
3. Solvents	0.1261	0.0346	0.0288	0.0675	0.0612	0.0689	0.0759	0.0666
4. Agriculture	5.0639	3.2844	2.2899	2.3588	2.1007	2.0865	1.6400	2.1267
5. LULUCF	-5.8866	-1.0294	-1.3922	-0.3754	-0.6571	-0.4296	-2.4704	-0.0976
6. Waste	1.8655	1.9044	1.4690	1.2978	1.5707	1.5597	1.5567	1.5658
Total (without LULUCF)	**43.4188**	**17.4240**	**10.7307**	**12.7530**	**13.9394**	**14.1417**	**13.3642**	**12.8363**
Net (with LULUCF)	**37.5322**	**16.3946**	**9.3385**	**12.3776**	**13.2823**	**13.7120**	**10.8939**	**12.7387**

In 2013, about 65.5 per cent of the total national direct GHG emissions originated from Energy Sector. Other relevant direct GHG sources were represented by Agriculture Sector (16.6 per cent of the total), Waste Sector (12.2 per cent of the total) and Industrial Processes Sector (5.2 per cent of the total). The share of two other sectors (Solvents and Other Product Use and Land Use, Land-Use Change and Forestry Sector) was insignificant, less than 1.0 per cent (see figure 1).

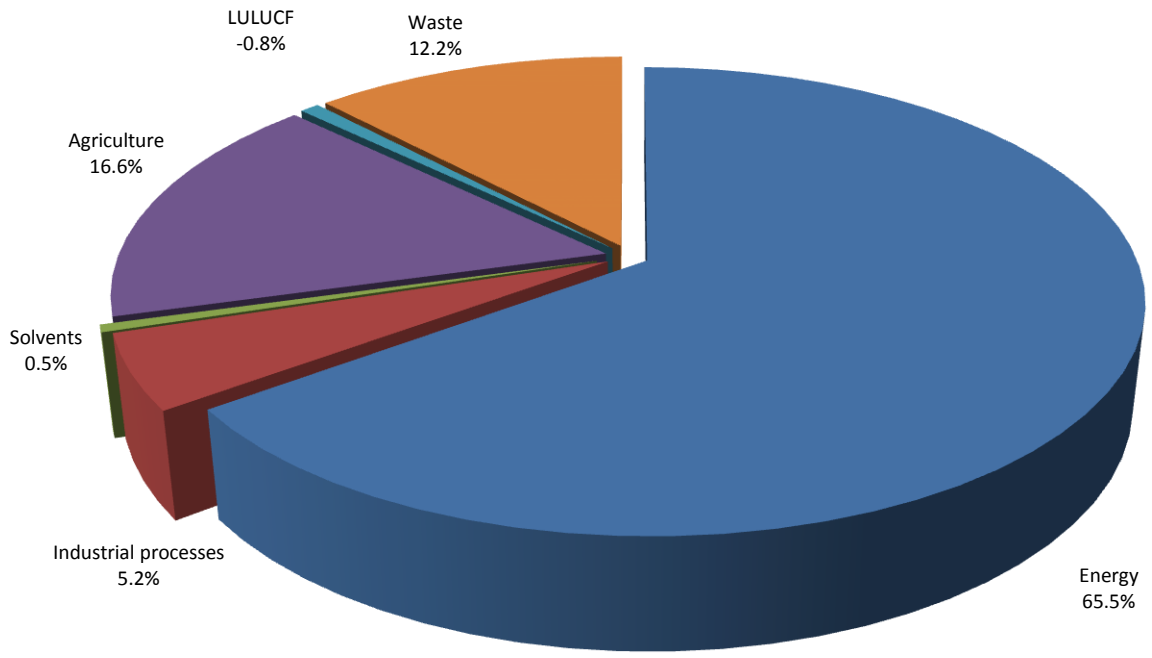


Figure 1: Breakdown of the Republic of Moldova's Total GHG Emissions by Sectors in 2013

In comparison with the 1990 year level, by 2013 the Republic of Moldova's GHG emissions were 70.4 per cent below 1990 levels (see figure 2).

From table 2, it is obvious that this reduction in GHG emissions over the last 24 years is in full consistency with a decrease in some important socio-economic indicators: population number decreased by 6.8 per cent, the GDP – by 32.2 per cent, the GHG intensity (CO_2eq/GDP) – by 56.4 per cent, the electricity consumption – by 52.3 per cent, the heat consumption – by 82.4 per cent, while the consumption of primary energy resources decreased by 78.3 per cent.

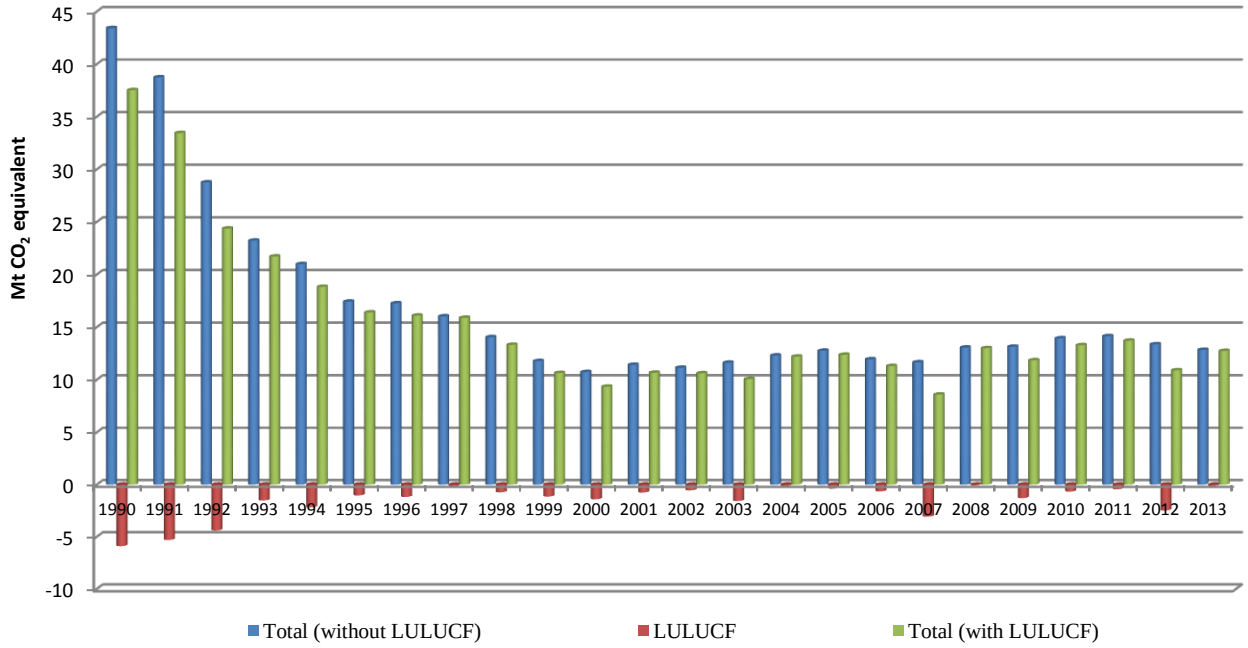


Figure 2: Greenhouse Gas Emissions and Sinks Trends in the Republic of Moldova within 1990-2013 period, Mt CO_2 equivalent

Table 2: Republic of Moldova's total GHG Emissions and Associated Variables, 1990-2013

	1990	1995	2000	2005	2010	2011	2012	2013
Population, million inhabitants	**4.3616**	**4.3479**	**4.2815**	**4.1479**	**4.0817**	**4.0738**	**4.0690**	**4.0647**
Change compared to 1990, %		-0.3	-1.8	-4.9	-6.4	-6.6	-6.7	-6.8
Inter-annual change, %		-0.1	-0.3	-0.3	-0.2	-0.2	-0.1	-0.1
Total emissions, Mt CO_2 eq	**43.4188**	**17.4240**	**10.7307**	**12.7530**	**13.9394**	**14.1417**	**13.3642**	**12.8363**
Change compared to 1990, %		-59.9	-75.3	-70.6	-67.9	-67.4	-69.2	-70.4
Inter-annual change, %		-17.0	-8.8	3.6	6.1	1.5	-5.5	-4.0
GHG per capita, tons per person	**10.0**	**4.0**	**2.5**	**3.1**	**3.4**	**3.5**	**3.3**	**3.2**
Change compared to 1990, %		-59.7	-74.8	-69.1	-65.7	-65.1	-67.0	-68.3
Inter-annual change, %		-16.9	-8.6	4.0	6.3	1.6	-5.4	-3.8
GDP, billion 2010 $US	**9.8935**	**3.9663**	**3.5229**	**4.9597**	**5.8116**	**6.2068**	**6.1633**	**6.7119**
Change compared to 1990, %		-59.9	-64.4	-49.9	-41.3	-37.3	-37.7	-32.2
Inter-annual change, %		-1.4	2.1	7.5	7.1	6.8	-0.7	8.9
GHG intensity, kg CO_2 eq/2010 $US	**4.4**	**4.4**	**3.0**	**2.6**	**2.4**	**2.3**	**2.2**	**1.9**
Change compared to 1990, %		0.1	-30.6	-41.4	-45.3	-48.1	-50.6	-56.4
Inter-annual change, %		-15.8	-10.7	-3.6	-0.9	-5.0	-4.8	-11.8
Energy imported, million tce	**16.703**	**5.109**	**2.535**	**3.123**	**2.960**	**3.075**	**2.918**	**2.977**
Change compared to 1990, %		-69.4	-84.8	-81.3	-82.3	-81.6	-82.5	-82.2
Inter-annual change, %		11.0	-18.0	4.2	5.0	3.9	-5.1	2.0
Energy consumed, million tce	**14.269**	**5.085**	**2.647**	**3.257**	**3.157**	**3.201**	**3.068**	**3.091**
Change compared to 1990, %		-64.4	-81.4	-77.2	-77.9	-77.6	-78.5	-78.3
Inter-annual change, %		9.7	-20.2	6.3	6.7	1.4	-4.2	0.7
Electricity produced, billion kWh	**15.690**	**6.168**	**3.624**	**4.225**	**6.115**	**5.785**	**5.802**	**4.491**
Change compared to 1990, %		-60.7	-76.9	-73.1	-61.0	-63.1	-63.0	-71.4
Inter-annual change, %		-25.8	-11.8	1.1	-1.3	-5.4	0.3	-22.6
Electricity consumed, billion kWh	**11.426**	**7.022**	**4.510**	**5.838**	**5.257**	**5.416**	**5.604**	**5.449**
Change compared to 1990, %		-38.5	-60.5	-48.9	-54.0	-52.6	-51.0	-52.3
Inter-annual change, %		-3.9	-4.4	-3.1	-0.9	3.0	3.5	-2.8
Heat produced, million Gcal	**22.212**	**7.278**	**3.846**	**4.830**	**4.487**	**4.376**	**4.239**	**4.307**
Change compared to 1990, %		-65.3	-81.7	-77.0	-78.6	-79.1	-79.8	-79.5
Inter-annual change, %		-3.1	-31.9	11.1	10.1	-2.5	-3.1	1.6
Heat consumed, million Gcal	**20.983**	**6.283**	**3.358**	**4.160**	**3.798**	**3.764**	**3.600**	**3.694**
Change compared to 1990, %		-70.1	-84.0	-80.2	-81.9	-82.1	-82.8	-82.4
Inter-annual change, %		-5.6	-29.6	11.6	9.4	-0.9	-4.4	2.6

The significant reduction in the level of socio-economic indicators over the 1990-2013 periods is a consequence of the deep transformation processes common during transition from a centralized economy to a market economy, specifically after the breakup of the Soviet Union and the declaration of the Republic of Moldova's independence on 27th of August 1991.

The country rated among the low-medium income countries in 1990, and it is at present one of the lowest income nations in Europe. Certain economic decline patterns had been registered prior to 1991, but the separation from the USSR has considerably accelerated the process.

The GDP level was decreasing continuously during the period from 1990 to 1999 inclusively, when it fell down to as little as 34 per cent of the 1990 level. The reasons for the economic collapse were numerous. First, the country had been fully integrated in the USSR economic system, and the independence resulted, among other things, in the cessation of any subsidies or cash transfers from the centralized government. Second, the end of the Soviet Era with its well established commercial links has resulted in the emergence of numerous obstacles for free movement of goods, and in access restrictions introduced by the emerging markets. Third, the lack of domestic energy resources and raw materials in the country has contributed considerably to the nation's strong dependence on other former Soviet Republics.

This dependence has affected consumers' capacity to pay for the energy used due to the increased prices of energy resources (ex., from 1997 to 2014 the natural gas tariff increased 13.0 times; electricity tariff increased 6.6 times; gasoline, diesel and liquefied gases prices increased 1.9 times), in the condition when about 95% of energy resources were imported. On the other hand, without applying cross subsidizations policies, the current energy prices have incentivized the population to take strong energy efficiency measures in the Republic of Moldova, which led to a significant decrease of the energy intensity, declining since 2006 with an average annual negative growth of 11.3 per cent.

At the same time, within 2000-2013 period, the real GDP increased by 90.5 per cent, from 3.5229 to 6.7119 billion 2010 US$, while the real GDP per capita increased by 120.0 per cent, from 842.8 to 1,854.1 2010 US$. The considerable real GDP growth achieved since 2000 seems to indicate that the economy is finally developing in the correct direction, although it should be remembered that in 2013 the real GDP reached only 68 per cent of the 1990 year level. It is worth mentioning that from 2000 to 2013, the electricity consumption increased in the Republic of Moldova by 20.8 per cent; the heat consumption – by 10.0 per cent, the consumption of primary energy resources – by 16.8 per cent; while the GHG intensity (CO_2eq/GDP) decreased during the same period by 37.2 per cent, showing the first signs of the decoupling of economic growth from the growth in greenhouse gas emissions, by 19.6 per cent within 2000-2013 periods (see figure 3).

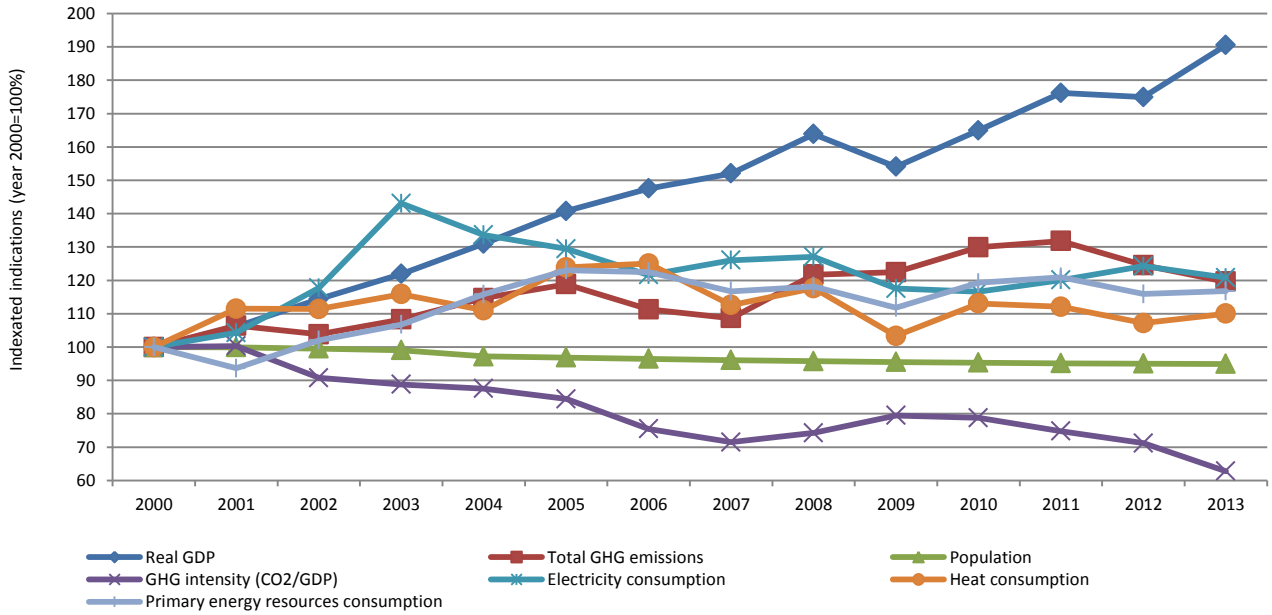


Figure 3: Trends in total GHG emissions and associated variables in the Republic of Moldova within 2000-2013 period

Pre-2020 Mitigation Policy Framework

In 2010, the Republic of Moldova joined the Copenhagen Accord and submitted an emission reduction target to the UNFCCC Secretariat, which is specified in Annex II to this Agreement "Nationally Appropriate Mitigation Actions of the Developing Countries". The target of the appropriate mitigation actions of the Republic of Moldova envisaged in this Agreement represents:

> "*A reduction of no less than 25% of the 1990 level total national GHG emissions has to be achieved by 2020 through implementation of global economic mechanisms focused on the climate change mitigation, in accordance with the Convention's principles and provisions*."

This target was provided without specific nationally appropriate mitigation actions, identified and quantified, or further clarification on the support needed. However, it was recognized that, to achieve this target, significant financial, technological and capacity building support will be needed, which can be provided by UNFCCC mechanisms.

The Environmental Protection Strategy for the years 2014-2023 and the Action Plan for its implementation was recently approved through the Governmental Decision No. 301 as of 24.04.2014[4]. According to this policy document, a 20 per cent GHG emissions reduction compared to the BAU scenario has to be reached in the Republic of Moldova by 2020.

Along with the overall national target, the policy document sets up GHG emissions reduction targets for seven economic sectors:

- power production sector – 25 per cent GHG emissions reduction compared to BAU scenario has to be achieved by 2020;
- buildings, industry and agriculture sectors – 20 per cent GHG emissions reduction compared to BAU scenario has to be reached by 2020;
- transport and waste sectors – 15 per cent GHG emissions reduction compared to BAU scenario has to be achieved by 2020; and
- LULUCF sector – an increase by 25 per cent of the net removals has to be reached by 2020.

The desired reduction of GHG emissions by 2020 of 20 per cent below the BAU scenario level requires decisive actions at the national and sector levels. For instance, considerable abatement contributions are expected to be achieved within the energy sector (533 ktep savings are envisaged from energy efficiency measures and 430 ktep savings from RES implementation covering the energy demand – the policy instruments in place envisage increasing the share of RES in the country's energy balance up to 20 percent by 2020, and covering up to 10 percent of the electricity demand with locally produced renewable energy by 2020).

Post-2020 Mitigation Policies Framework

Relevant legislative acts for the INDC's commitments implementation within 2021-2030 periods are required and will be considered being approved on Parliamentary level.

By mid-2016, a draft Low Emission Development Strategy (LEDS) of the Republic of Moldova for the period up to 2030 will be developed. After consultations at the national level, the Low Emission Development Strategy of the Republic of Moldova until 2030 will be subject to approval by the Government by end of 2016.

Thus, the Republic of Moldova stays committed to and striving for an ambitious international agreement on climate change in line with recommendations by science to maintain average global temperature increase below two degrees Celsius.

[4] <http://lex.justice.md/index.php?action=view&view=doc&lang=1&id=352740>.

3. FOLLOW UP

The Republic of Moldova urges all other Parties, in particular major economies, to communicate their INDCs in a manner that facilitates their clarity, transparency and understanding.

The Republic of Moldova requests the UNFCCC Secretariat to publish its INDC on its website and to take it into account when preparing the synthesis report on the aggregate effect of the INDCs communicated by Parties.

The Republic of Moldova looks forward to discussing with other Parties the fairness and ambition of the INDCs in the context of the below 2^{o}C objective, their aggregate contribution to that objective and ways to collectively further increase this ambition.

A) UP-FRONT INFORMATION ON ADAPTATION PLANNING

A.I. Climate change trends, impacts and vulnerabilities

The Republic of Moldova is a highly vulnerable country to the adverse impacts of climate change. Over the last 127 years, the Republic of Moldova has experienced changes in temperature and mean precipitation. The country has become warmer, with the average temperature increase greater than 1.0°C.

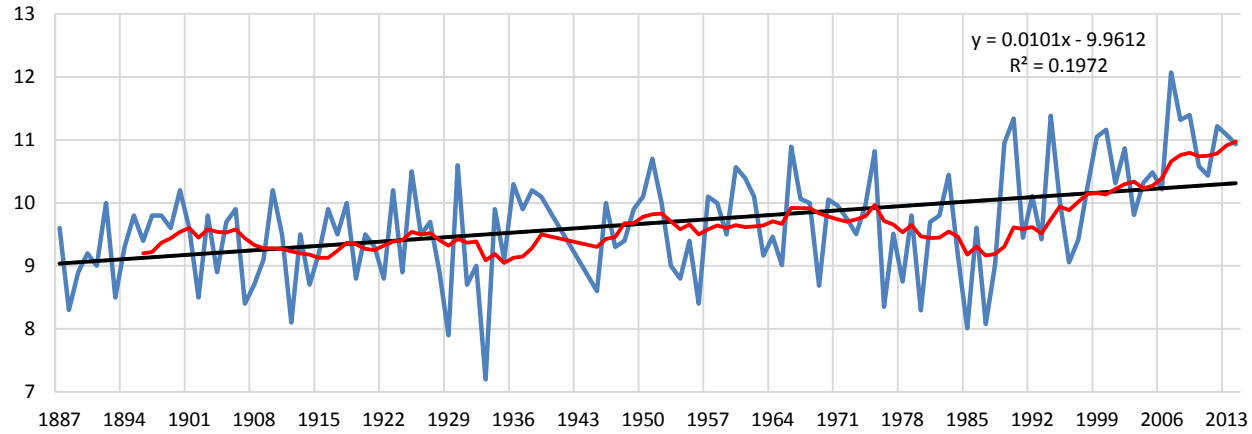


Figure 4: Trends of annual average air temperature change (°C) for 1887-2014: blue (actual course trend), black solid line (linear trend secular course) and red line (10 year moving average trend) at the meteorological station Chisinau, central part of the country

At the same time, the Republic of Moldova has experienced an increased number of extreme weather events, such as droughts and floods. An analysis of national climate data revealed that the frequency of droughts in the Republic of Moldova in a 10-year time span is 1-2 droughts in the Northern part of the country; 2-3 droughts in the Central part and 5-6 droughts in the South. Their frequency is increasing, especially over the last decades. During the 1990-2014 timespan, 10 years were marked by droughts, which reduced significantly the crop yields. In 1990, 1992 and 2003, droughts continued during the entire vegetation period (April-September). The disastrous droughts of 2007 and 2012 affected over 70 per cent of the territory of the country, being the most severe droughts in the entire instrumental record period.

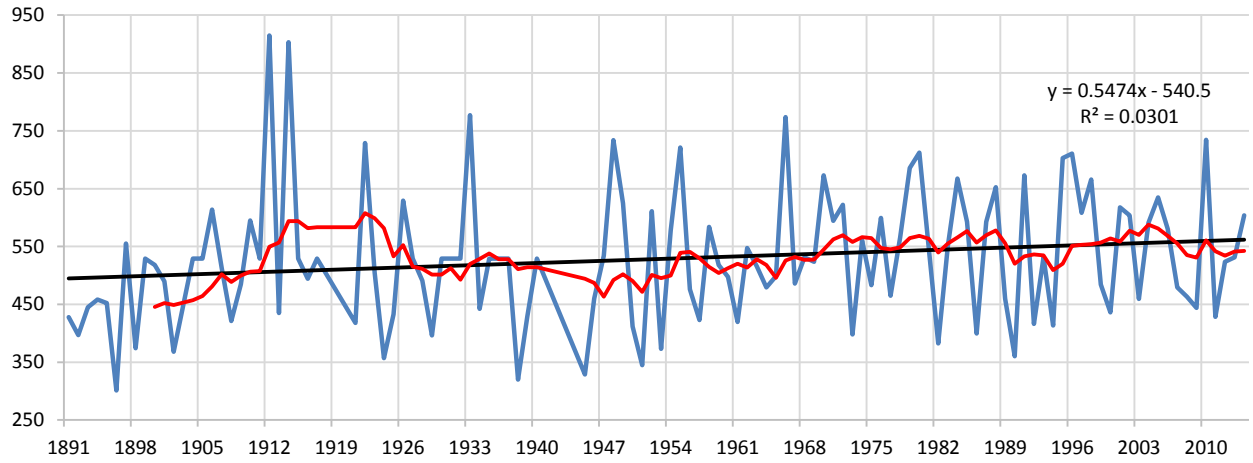


Figure 5: Trends of annual average precipitation (mm) for 1891-2014: blue (actual course trend), black solid line (linear trend secular course) and red line (10 year moving average trend) at the meteorological station Chisinau, central part of the country.

Floods also affect the Republic of Moldova on a recurring basis. In the past 70 years, 10 major floods on the great rivers of the Republic of Moldova (Dniester and Prut) were reported, and three of those occurred already in XXI century (2006, 2008 and 2010). Large floods on the smaller rivers of the country are also quite common.

The socio-economic costs of climate change related to natural disasters such as droughts and floods are significant. Both their intensity and frequency are expected to further increase as a result of climate change. During 1984-2006, the Republic of Moldova's average annual economic losses due to natural disasters were about US$61 million.

The 2007 and 2012 droughts alone caused losses estimated at about US$ 1.0 and 0.4 billion, respectively. The 2008 floods cost the country about US$120 million, and the total damage and losses produced by 2010 floods were estimated at approximately US$42 million.

The patterns of future temperature and precipitation conditions were computed for the Republic of Moldova from the global climate model output gathered as part of the Coupled Model Intercomparison Project Phase 5 (CMIP5).

Twenty one global coupled atmosphere ocean general circulation models (GCMs) were implied in this exercise under the Forth National Communication Project, the projections being made under the Representative Concentration Pathway (RCP) scenarios RCP 2.6, RCP 4.5, and RCP 8.5 available in the IPCC AR5.

The future climatic changes were assessed over the three Agro-Ecological Zones (AEZs) (North, Centre and South) of the Republic of Moldova for the near term (2016–2035), midterm (2046–2065) and long term (2081–2100) given relative to the reference period (1986–2005).

It was revealed that for temperature, the ensemble average changes consistently have the same sign across scenarios and their magnitude increase from the low RCP 2.6 radiative forcing pathway to the high RCP 4.5 and RCP 8.5, as moving into the later decades of the 21st century. The CMIP5 projections reveal warming in all seasons for the three AEZs, while precipitation projections are more variable across scenarios, sub-regions and seasons.

Annual changes for temperatures are very homogeneous over the three AEZs. The rate of warming is higher under RCP 8.5 scenario +4.6°C; medium +2.4°C under RCP 4.5; and smaller +1.3°C under the RCP 2.6 scenario by 2100. The ensemble, driven by RCP 8.5 emission scenario, estimates that the three AEZs will experience the most significant warming during summer from +5.9°C in North up to +6.1°C in South by 2100. The pattern of change derived from the ensemble RCP 2.6 models is quite similar, but the magnitude of change is lower from +1.3 to +1.5°C. The warming would be higher during winter up to +4.6°C in North, in the Centre and South temperature rise will be lower up to +4.2^{O}C according to the RCP 8.5 scenario. The RCP 2.6 scenario reveals less intense warming over the three AEZs, from +1.2 to +1.4°C.

The ensemble projections from the RCP 8.5 forcing scenario show that the three AEZs would exhibit a general annual decrease in precipitation varying from 9.9% in North to 13.4% in South. Controversially, according to RCP 2.6 scenario moderate increase in precipitation from 3.1% in North to 5.1% in South by 2100 is projected. Winters were been estimated to be wetter in the Republic of Moldova by the end of the 21st century. The ensemble projections show the largest increase in precipitation from 4.0% (RCP 2.6) to 11.8% (RCP 8.5) in winter over Northern and the lowest one from 3.0% (RCP 2.6) to 7.4% (RCP 8.5) in Central parts of the country by 2100. The precipitation decrease will be more extended in the three AEZs during summer; the greatest rainfall reduction from 13.2% (RCP 4.5) to 25.1% (RCP 8.5) is projected in Centre and the lowest one from 7.4% (RCP 4.5) to 18.1% (RCP 8.5) in the North of the Republic of Moldova.

A.II. Mid-term adaptation vision, goal and targets

The Republic of Moldova's Climate Change Adaptation Strategy until 2020 and the Action Plan on its implementation have been recently approved through the Governmental Decision No. 1009 as of 10.12.2014[5].

The **vision** of the Strategy is to develop and apply "*a mechanism for adaptation to actual and potential climate change impacts, integrated and implemented across all sectors of the national economy so as to reduce vulnerability and increase resilience to the effects of these changes*".

The **goal** of the Strategy is '*to assure that the Republic of Moldova's social and economic development is less vulnerable to climate change impacts by becoming more resilient'*.

The **general objective** of the Strategy is oriented towards '*increasing the capacity of the Republic of Moldova to adapt and respond to actual or potential climate change effects*'.

The **three specific objectives** of the Strategy are to:

1) Create by 2018 the institutional framework in the field of climate change that would assure the efficient implementation of adaptation measures at the national, sector and local levels.
2) Create by 2020 a mechanism to monitor the climate change impacts, the related social and economic vulnerability and for the management/dissemination of the information on risks and climate disasters.
3) Assure the development of climate resilience by reducing at least by 50% the climate change vulnerability and facilitate climate change adaptation in six priority sectors (agriculture, water resources, forestry, human health, energy and transport) by 2020.

The Action Plan on implementation of the Republic of Moldova's Climate Change Adaptation Strategy until 2020 is treated as 1st National Adaptation Plan (NAP). It is envisaged that the progress made in the area of adaptation to climate change will be determined on a periodic basis and in post-2020 period 4-year based NAPs and Sector Adaptation Plans (SAPs) will be developed and implemented. More detailed information on this issue is provided in section '*A.VI. Monitoring and reporting progress*'.

A.III. Current and planned adaptation undertakings

The Republic of Moldova's Climate Change Adaptation Strategy until 2020 and the Action Plan on its implementation is intended to serve as an umbrella strategy that creates the enabling environment for specific sectors and ministries to "mainstream" climate change adaptation and risk management in their existing and future strategies through a series of NAPs and SAPs, supported by a long-term financial strategy that includes national resources and international support to prevent the adverse effects of climate change and maximize the opportunities provided by them.

Specific Objective 1: *Create by 2018 the institutional framework in the field of climate change that would assure the efficient implementation of adaptation measures at the national, sector and local levels*

The specific objective 1 is envisaged be achieved through the following courses of action:

Action 1.1: *Develop the institutional framework in the field of climate change adaptation*

The Government has to create a strong institutional structure and the environment that would enable advocating for climate change adaptation across all sectors and at all levels of implementation with strengthening technical capacities and leadership for implementation of climate change adaptation measures. Institutional framework for climate risk management is

[5] <http://lex.justice.md/index.php?action=view&view=doc&lang=1&id=355945>.

needed to sustain the capacity to implement specific measures at sector level, based on a reasonable understanding of the risks. In the initial capacity development stage this is reflected in training and awareness rising among decision-makers and technical staff to develop foundational capacity.

Given the fact that the Ministry of Environment does not have a special structure that would develop and promote an effective climate change policy, the capacity building becomes indispensable to this ministry by creating a division specialized in climate policies. Considering the need to integrate climate change aspects in sectorial development policies, climate change units will also have to be created in the line ministries and these institutions shall be provided adequate financial resources.

Building the capacities of governmental institutions to manage and integrate climate change adaptation in sectoral development policies and sustainable practices to be implemented at national and local levels will be initiated at the beginning of the implementation of the Strategy. A training program will be developed and implemented on building the capacity to integrate climate risks and disasters in sectoral policies and sustainable practices related to climate change adaptation methods, adapted to the needs of local and national levels, and sector-specific issues, accordingly.

Action 1.2: *Mainstream climate change adaptation in the sectoral policies of national economy*

Responding to the risk posed by climate change will require coordinated and focused efforts of the Government in view of promoting policies and measures at national and sector levels to prevent adverse climate change effects. Central Public Authorities will need to amend the existing and/or develop new sectoral strategies and action plans on climate change adaptation to address climate risks as part of the policies and activities planned at sector level.

Mainstreaming climate change risks and adaptation into the national framework requires several steps to assure that information about climate-related risks, vulnerability, and options for adaptation is incorporated into planning and decision-making in key sectors as well as into existing national assessments and action plans.

Broadly speaking, these steps include: understand climate risks and existing knowledge on climate change adaptation; assess institutional and policy implications of key threats posed by climate change; amend the existing and/or develop new sectoral strategies and action plans that are climate-resilient.

To assure the implementation of these policies, actions on identifying funds for adaptation, creating mechanisms for performance coordination and monitoring will be needed. As this process is not linear, it requires that new information on climate risks and adaptation approaches be continuously integration to minimize the impacts.

The implementation of climate change adaptation measures while assuring the sustainable development and economic growth also requires the improvement of the existing legal framework, the development of efficient financial instruments to implement these measures and a change in the behaviour and attitude to consumption mode and generation method.

Thus, the relevant legislative acts will be reviewed to identify fields that do not enable the existing or potential adaptation activities, the legislation will be amended or new legislative and regulatory acts will be developed to assure that legislative and regulatory frameworks facilitate climate change adaptation at all levels, including autonomous adaptation of individuals, communities and private sector.

Action 1.3: *Develop the communication and the institutional cooperation in view of implementing adaptation policies*

In the spirit of joint action stemming from the general objective, public authorities will establish clear objectives and jointly achieve them, to protect the Republic of Moldova against the negative effects of climate change. They will propose measures and solutions and will implement actions under the leadership, guidance and coordination of the Ministry of Environment, in accordance with the national priorities and the European Climate Change Adaptation Policy and the obligations of the country under the Republic of Moldova-EU Association Agreement (AA) to implement these policies. Following the courses of action set out, decision makers and those who assure its implementation in all priority sectors should cooperate effectively to assure a secure future.

Since governmental institutions cannot assume themselves the responsibility to implement of climate change adaptation measures, the whole society should be ready to respond to requests by going through a transition process of changing attitudes and actions, from a reactive to a proactive approach to a climate change mitigation policy, fully accepted, adopted, implemented, and continuously updated by the Government. Public authorities need to focus on the cooperation with the business community, NGOs and academic/scientific community and combine the expertise and resources to raise the willingness to act. Public authorities need to assure the creation, sharing and dissemination of knowledge, as well as the exchange of best practices in all priority sectors. The development of public-private partnership will encourage for increasing the effectiveness of the approach specific to a field. Regional and international cooperation will be also developed, and as long as the provision of financial resources is limited, collaborative relationships with donor financial institutions will be developed.

The main instrument for strengthening the cross-sector coordination will be Communication Strategy on Climate Change Adaptation, which will establish an effective mechanism to disseminate, among relevant ministries, the information on implementation of climate change adaptation strategies, and as a feedback link inclusive, to have a two-way information flow.

Specific Objective 2: *Create by 2020 a mechanism for monitoring the climate change impact, related social and economic vulnerability, and managing/disseminating the information on climate risks and disasters*

The specific objective 2 will be implemented in three courses of action:

Action 2.1: *Continuous monitoring and research of climate change impacts, related social and economic vulnerability, and periodic updating of climate scenarios*

Continuous monitoring of climate change impacts at the national level allows for identifying the most likely evolution in this field, and providing opportunities for immediate action and decisions at the administrative level. As accurate as possible knowledge on potential climate change effects on economic and social sectors is needed to adopt effective climate change adaptation measures. Research activities need to be implemented on the following priorities:

a) determine the vulnerability of sectors, regions and natural/anthropogenic systems when extreme weather events take place;
b) identify the climate change evolution, as close as possible to the regional and local levels, and develop climate maps to identify at-risk areas in the country to undertake priority actions.
c) develop climate scenarios (average conditions and various extreme weather events) that are based on regional climate models, and assess the uncertainties related to such scenarios;
d) carry out research on climate change impact on sectors, regions and natural/anthropogenic systems.

Action 2.2: *Create a climate change database*

The Ministry of Environment will coordinate the creation of a national climate change database, acting in this regard jointly with the research institutions, academia, universities and NGOs. This database will contain full information on the evolution of climatic factors such as temperature, rainfall regimen, etc., including their variability, and the occurrence of extreme hydro-meteorological events. To create such a database, all available information will be collected and areas where knowledge and data are missing will be identified. The database will be completed and organized in a systematic manner so as to be easily accessible to stakeholders. The database will be expanded at the local level, as authorities at this level are the ones who often implement measures, which are not part of the central governmental structures' duties. A model of creating this database is the *Clearinghouse Mechanism*, developed at European level, which will be a tool for collecting and disseminating climate change information, data and case studies, and will also help to increase the coordination between the relevant sectoral policies.

Capacity building and strengthening of the national system of statistics collection/monitoring, reporting, to assure adequate management of electronic databases for periodic hydro-meteorological and climate information and other data needed to assess climate risks and impacts, will be considered some of the important elements for assuring the implementation of the national climate change adaptation policy.

Action 2.3: *Raise the awareness of all stakeholders on climate change risks and adaptation measures*

To implement climate change adaptation policies, the whole society together with public authorities, companies and NGOs, will assure an appropriate level of knowledge about climate change and its expected effects. The awareness on the need to promote climate change adaptation measures will facilitate the needed shift in attitudes and behaviour, and will improve the overall capacity to mitigate climate change effects. Awareness raising actions will be developed based on the need to change the attitudes and behaviour towards the use of natural resources, environmental protection and especially to climate change and the urgency of climate change adaptation actions.

At the same time, inclusion of climate change adaptation issues in the curricula at all levels and in the professional training process plays a very important role in the development of appropriate attitudes, so that young people and children have access to information on disaster and climate risk, appropriate emergency response and long-term adaptation options.

To achieve this goal, an effective awareness campaign will be conducted on climate change adaptation issue, on the potential and the current risks and threats associated with climate change and on the needed preventive actions. Raising the awareness level, disseminating information and proper training are essential elements in the decentralization of the efforts of identifying and implementing specific adaptation measures. The promotion and implementation of the Strategy on communicating climate change impacts and possible responses to them will be of particular importance in this regard, including a public information and awareness campaign through appropriate mass-media.

An early warning system on natural disasters of climatic origin will be created, by providing access for public to data and information needed to assess the climate risks and impacts, as well as the publication of regular monitoring reports as part of the strategy for communication of climate change impacts. By assuring the appropriate level of awareness and sensitivity, obvious behavioural changes are expected in society and at the community level.

Specific Objective 3: *Assure the development of climate resilience by reducing at least by 50% the climate change vulnerability and facilitate climate change adaptation in six priority sectors (agriculture, water resources, forestry, human health, energy and transport) by 2020.*

Climate change adaptation process will take place in different sectors and at different levels (national, regional, local) with a customized approach for each sector/location. As climate change has a different impact across the sectors and at different levels, measures on adaptation to climate change effects will also be different but will respect the same parameters. To provide viable sectoral solutions, adaptation will be mainstreamed in planning the development of the given sector and will be achieved by close cooperation between stakeholders. In this regard, adaptation measures will be mainstreamed in the current sectoral policies, or new Strategies and/or Action Plans for risk mitigation and climate change adaptation will be developed.

Thus, for each relevant sector specific measures will be identified and implemented taking into account:

a) assessment of the current stage (actions undertaken, their results, etc.) and experience gained;
b) general objectives, intermediate objectives and measures to be taken to achieve them;
c) indicators to monitor the progress of their implementation;
d) present and future research needs;
e) available and needed resources;
f) the institutional framework for implementation, and allocation of responsibilities;
g) risk management tools;
h) best practices for the integration of climate change adaptation measures in the development of national policies.

If necessary, the legal framework, regulations and financial instruments will be amended to implement climate change adaptation. Development and implementation of all climate change adaptation measures will be coordinated by the Ministry of Environment and achieved by line ministries.

Action 3.1: *Risk Management and Climate Change Adaptation in the* ***Agriculture Sector***

1) At the national level it will be necessary to:

a) identify vulnerable areas and subsectors, assess the needs and opportunities of alternative crops, and change varieties as a response to climate change;
b) support agricultural research and experimental production for the selection of crops and development of the best varieties that are better suited to the new climate conditions;
c) improve the capacities for the adaptation to climate change effects through raising the awareness of stakeholders with agricultural advice and essential information on farm management;
d) assure increased investments in efficiency of irrigation infrastructure, aqua-technologies and improvement of water resources management;
e) develop irrigation plans based on a careful assessment of their impact, future water availability and water needs, taking into account the supply-demand balance;
f) create tools for risk and crisis management to cope with the economic consequences of climate related events.

2) At the local/farm level, the following measures are important:

a) adapting of periods during which agricultural activities are carried out;
b) develop technical solutions to cope with extreme weather events, to protect the crops and livestock;
c) improve ventilation and air conditioning systems of livestock farms;
d) choose crops and varieties better adapted to changes in the growing season and to water availability, as well as greater resilience to new climate conditions;

e) crops adaptation by using the existing genetic diversity and new opportunities provided by biotechnology;
f) increase the efficiency of pest and disease control;
g) efficient use of water by reducing water losses, improving irrigation techniques, water recycling and storage;
h) improved soil management by increasing water retention to maintain the soil moisture;
i) landscape management by maintaining landscape elements that provide shelter to livestock;
j) introduce livestock species resilient to extreme temperatures and adapt the nutritional regime of livestock to demands caused by climate change;
k) popularization of new technologies addressing soil structure stability and soil treatment for enlarging the active layer of the root zone for enlarging water uptake;
l) runoff reduction by agronomic practices (no-tillage can reduce water runoff);
m) develop new complex agricultural water management programmes (combining irrigation, fishery and excess inland water management);

3) Other relevant measures will consist in:

a) developing good practice guides for agriculture sector, especially for non-irrigated agriculture;
b) developing and implementing local adaptation action plans (at community level);
c) developing and implementing plans for land improvement that would increase the precipitation likelihood (including afforestation, water surfaces, etc.);
d) use research to combat current vulnerabilities and change crops structure promoting an agriculture less exposed to climate change;
e) encourage crop/farm insurance;
f) improve the availability and applicability of modelling and adaptation options to be used by farmers (provide data and results on the reaction of water resource to possible climate change scenarios, promote the use of GIS technology, etc.);
g) develop infrastructure and technologies needed for local interventions to combat extreme weather events to protect crops and local communities.

Action 3.2: *Risk Management and Climate Change Adaptation in the* ***Water Resources Sector***

1) To protect water resources of the country against climate change, there is a need to conduct studies that will serve as a basis for climate change adaptation:

a) re-evaluate available water resources for each river basin;
b) determine the projected climate change influence on the maximum, medium and minimum flow of water courses;
c) determine the vulnerability of water resources to climate change;
d) assess water requirements of the major crops in the context of climate change (cross-sectoral studies with agriculture);
e) assess water needs for the main categories of consumption (drinking water, industrial water, domestic water, etc.) in the context of climate change;
f) assess the danger of floods, droughts and water scarcity in the river basins under different climate scenarios;
g) assess potential climate-change-related damages in case of flooding/drought.

2) To assure the availability of water at source in the country taking into account the current and future climate change, the following measures need to be undertaken:

a) build new infrastructure for transforming water resources into socio-economic ones (new accumulation lakes, new inter-basin derivatives, etc.);
b) modify the existing infrastructure to regulate the water flows whose distribution changes over time as a result of climate change (over-increased dam height);

c) design and implement solutions for rain water collection and usage;
d) extend solutions for recharging the ground layers with water;
e) build reservoirs without dams (with water level below the ground level);
f) protect wetlands, allowing thus groundwater recharge and reduce peak discharges downstream;

3) Other potential adaptation actions in water use will be directed to:

a) more efficient water use and conservation through the rehabilitation of water transport and supply/distribution facilities and through technological changes (promote technologies with reduced water consumption);
b) changes in the people's lifestyle (reduce water demand, use recycled water etc.);
c) increase the level of water recycling for industrial needs;
d) change the types of agricultural crops using those adapted to low water demand;
e) develop and implement a system of water prices and tariffs based on the season and available resource;
f) use lower quality water for certain purposes/uses.

4) Measures to be taken at river basin level to assure climate change adaptation:

a) update the directory landscaping and management schemes, so as to take into account climate change effects (decrease in the available water at the source, increase in water demand);
b) apply integrated water management principles for water quantity and quality;
c) introduce, at the stage of designing the accumulation lakes to be built, backup volumes to be used only in exceptional circumstances or creation of accumulation lakes with special operation regimen to supplement the available water resources in critical situations;
d) inter-basin transfers of water to compensate for water shortages in certain reservoirs;
e) set water quality targets and apply water quality criteria to prevent, control and reduce the transboundary impact, coordinate the regulations and issue clearances;
f) improve treatment of wastewater and domestic water;
g) harmonize the regulations on limiting the emissions of hazardous substances in water;
h) identify potentially risky areas.

5) Measures to be taken for flood risk management:

a) select certain local protection works (for some communities and socio-economic structures) instead of large-size protection works;
b) choose regularization of flood path (slowing and reducing floods as they occur) instead of increasing the height of existing dams or building new dams;
c) use the latest methods and technologies for the rehabilitation/construction of dams and carry out protective works in line with local spatial plans;
d) increase the awareness on flood risk among the exposed population (the appropriate response before and after the event, insurance contracts, etc.);
e) measures to protect irrigation infrastructure against flooding;
f) improved flood forecasting and installation of systems to provide dam break alerts;
g) effective collaboration between the Republic of Moldova, Ukraine, and Romania to monitor water discharges, improve weather/flood forecasting and early warning for all downstream countries.

6) Measures to be taken to combat drought/water scarcity:

a) services on monitoring and warning on the decreasing flow/drought at the national level;
b) reduce leakage in water distribution networks;

c) conservation measures and efficient water use (for irrigation, in industry);
d) cooperation with other countries aimed at sharing experiences in combating droughts;
e) plans for priority water supply/setting the hierarchy of water supply restrictions;
f) establish methodologies for drought thresholds and drought mapping;
g) increase water storage capacity;
h) re-assure water quality during drought.

Action 3.3: *Risk Management and Climate Change Adaptation in the* ***Health Sector***

Actions for improving climate change adaptation in the Health Sector could include:

a) develop integrated assessments of environmental, economic and health impacts of climate change;
b) discuss and design adaptation strategies to be used by the Health Sector;
c) appoint a lead body to coordinate the public health preparedness for and response to climate change; define roles and responsibilities;
d) review and strengthen the existing disease surveillance systems with a view of including further climate-related health outcomes, such as heat-related morbidity and mortality;
e) increase awareness of medical professionals, public and the most vulnerable groups;
f) improved medical access for remote communities and vulnerable groups (e.g., elderly, obese, and disabled);
g) identify, monitor and target risk groups and vulnerable populations;
h) develop treatment protocols for climate-related health problems;
i) provide training and guidance for medical professionals and advice for the public on measures to be taken during extreme weather events, such as heat-waves, flooding and drought;
j) upgrade current education and communication programmes for medical professionals with relevant information on climate change adaptation in health sector;
k) a monitoring system and evaluation mechanism to assess the effectiveness of preparedness and response measures;
l) apply new technology for scientific measurement (e.g. vector borne disease, water quality, climate change, etc.);
m) assessing the risk for the emergence of new, unfamiliar diseases and health impacts;
n) consider the cost and amount of energy and CO_2 emissions used by air-conditioning and advocate alternative cooling methods to the public;
o) increase the international and regional cooperation.

Action 3.4: *Risk Management and Climate Change Adaptation in the* ***Forestry Sector***

The following climate change adaptation measures could be implemented in the Forestry Sector:

a) revision and development of new important components of the forestry regulatory basis, as integral parts of the forestry regime, focusing on: maintenance and conservation of forestry stations; conservation of forestry genetic resources; ecological reconstruction of forests; certification of forests, forest products and forest management systems;
b) revision of the regulatory framework pertaining to development of an appropriate financial mechanism in conservation and development of forestry resources, needed for expansion of lands covered with forestry vegetation etc.;
c) development and approval of the regulation on implementation and assuring functionality of the principles of participatory management of public forest resources;
d) increasing the forest cover, including in the climate change context mitigation and biodiversity conservation;

e) development and implementation of projects aimed at planting protection forestry strips (buffer zones) for agricultural lands protection, anti-erosional purpose, and for waters protection;
f) establishment of plantation forests to meet the needs of population in fuel wood for heating, cooking etc.;
g) develop methodologies/technologies to assure forest ecosystems adaptability to climate change.

Action 3.5: *Risk Management and Climate Change Adaptation in the* ***Energy Sector***

Climate change adaptation measures to reduce losses/risks in the Energy Sector are as follows:

1) *Energy supply*:

a) *Mined resources* (oil and natural gas): replace water cooling systems with air cooling, dry cooling, or recirculating systems; improve design of gas turbines (inlet guide vanes, inlet air fogging, inlet air filters, compressor blade washing techniques, etc.); (re)locate in areas with lower risk of flooding/drought; build dikes to contain flooding, reinforce walls and roofs; adapt regulations so that a higher discharge temperature is allowed; consider water re-use and integration technologies at refineries.
b) *Hydropower*: build de-silting gates; increase dam height; construct small dams in the upper basins; adapt capacity to flow regime (if increased); adapt plant operations to changes in river flow patterns; operational complementarities with other sources;
c) *Wind*: (re)locate based on expected changes in wind-speeds.
d) *Solar:* (re)locate based on expected changes in cloud cover; and
e) *Biomass*: introduce new crops with higher heat and water stress tolerance; substitute fuel sources; early warning systems (temperature and rainfall); support for emergency harvesting of biomass; adjust crop management and rotation schemes; adjust planting and harvesting dates; introduce soil moisture conservation practices.

2) *Energy demand*: invest in high-efficiency infrastructure and equipment; invest in decentralized power generation such as rooftop photovoltaic generators; efficient use of energy through good operating practices.

3) *Energy transmission and distribution*: improve robustness of pipelines and other transmission and distribution infrastructure; burying or cable re-rating of the power grid; emergency planning; and regular inspection of vulnerable infrastructure such as wooden utility poles.

Action 3.6: *Risk Management and Climate Change Adaptation in the* ***Transport Sector***

The adaptation measures to reduce losses/risks in Transport Sector are outlined as following:

1) In case of *significant variations of temperatures, including heat waves*:

a) develop new, heat-resilient paving materials;
b) greater use of heat-tolerant streets and highways landscape protection;
c) proper design/construction, milling out ruts;
d) shifting construction schedules to cooler parts of day;
e) designing for higher maximum temperatures in replacement or new construction;
f) adaptation of cooling systems.

2) In case of *increases in extreme precipitation events*:

a) develop new, adverse climate conditions-resilient paving materials;
b) overlay with more rut-resilient asphalt;
c) using the most efficient technologies to assure sealing and renewal of asphalt concrete (for example, those that combine impregnation and surface treatment of asphalt concrete and

which, respectively, assures the revitalisation and renewal of bituminous binder quality, reducing the fragility of the upper asphalt layer, increasing its elasticity and flexibility, and its resilience to water and chemicals);

d) wider use of efficient road maintenance methods (*preventive maintenance*: include coatings, repairs, sealing by spraying cationic emulsions, crushed stone seals, sealing cracks with suspensions, etc.; *corrective maintenance*: include patching, repair of surface and surface treatments with sealants);
e) conduct risk assessments for all new roads;
f) improve flood protection;
g) greater use of sensors for monitoring water flows;
h) upgrading of road drainage systems;
i) pavement grooving and sloping;
j) increases in the standard for drainage capacity for new transportation infrastructure and major rehabilitation projects; and
k) engineering solutions, increase warnings and updates to dispatch centres, crews and stations.

A.IV. Gaps and barriers

a) Policy framework

- Lack of effective enforcement presents the key challenge facing implementation of the adaptation action plans; enforcement is specifically critical at the local level;
- Insufficient inter-institutional coordination of the implementation of national policies and strategies;
- Limited awareness on cross-sector-based policies and strategies;
- Systemic level impediments on enhancing the political commitment to address climate adaptation;
- Limited capacities (time, personnel and funding resources) to review and amend and/or develop new national policies and strategies focused on integrating climate change and disaster risk reduction considerations.

b) Coordination mechanisms

- Systemic level impediments to effective use of multi-level and multi-sector climate change coordination mechanisms to address climate change impacts and strengthen adaptive responses;
- Lack of an integrated, comprehensive and efficient monitoring of climate change adaptation implementation;
- Limited number of climate change policies and limited references to them make coordination mechanisms difficult, mainly ad-hoc and project driven;
- Limited use of criteria and indicators to guide and monitor the coordination work;
- Limited capacity of lead agencies to coordinate and promote a higher degree of local level involvement combined with a limited understanding and awareness by local authorities on climate change impacts and adaptation approaches to climate change;
- A link between climate change coordinating mechanisms and other relevant national coordinating mechanisms has yet to be established.

c) Institutional capacities and planning process

- The country still lacks a programmatic approach to addresses multiple sectors and levels of governance; it is envisaged that the next (4 year based) NAP, will address this aspect;
- The lack of an integrated planning process between the central public authority institutions and uncoordinated allocation of financial resources through various national funds;

- Concerns from high-level officials on the implications of following a programmatic approach;
- Limited institutional capacities to design, develop, implement and coordinate a programmatic approach;
- Lack of national policies and strategies that can guide a programmatic approach;
- Lack of a coherent presentation of statistical data between central public authorities;
- Limited technical and staffing capacity in addressing climate change issues;
- Non-coherent system of access to information for central and local public authorities.

d) Mainstreaming climate change adaptation into policies, plans and budgetary processes

- Limited understanding at national and sectoral levels of the concept of mainstreaming and how it can be undertaken;
- Climate change and climate change adaptation are not mainstreamed into national legislation on human health and related social services;
- Limited understanding by policymakers of the looming threat of climate change as a development issue and its links with, and implications for, resource allocation, economic growth and ecosystem services.

e) Technology transfer

- Low skills and knowledge on climate adaptive solutions; lack of advisory services in the context of identifying adaptation measures for different sectors;
- Low level of public-private partnerships in implementing climate change adaption measures;
- Undeveloped market and mechanism to promote technology innovations and adaptive technology transfer;
- Lack of comprehensive climate change and disaster management risks databases;
- Lack of documents of major importance for the territorial planning, such as the National and Regional Spatial Plans, General Urban Plans of the cities; these documents would contribute to the identification of adaptation actions at the local and regional level, and to improving the situation in the context of urban planning;
- Slow reforms and adoption of new technical and normative standards in transport and building sectors (adoption of Eurocodes); and reduced financial allocations for this task;
- Lack of medium to long-term investment planning, with little efforts on prevention adverse impacts of climate change, relying more on post factum removing of adverse effects;
- Inappropriate financial incentives and disincentives for adaptive technology transfer;
- Inadequate rural infrastructure and tenurial arrangements for climate change adaptation.

f) Financing climate change adaptation interventions

- There is no integration of climate change adaptation measures into the national budget;
- No dedicated budget to specific climate change adaptation activities;
- No financial strategy developed for adaptation to climate change;
- No climate indicators incorporated into planning and budgeting framework;
- No contingency budget in specific sectors for adaptation interventions.

A.V. Summary of needs

a) Research and development needs to meet adaptation targets

National research on climate change has to be linked to international research efforts and has to apply the knowledge gained at this level. Experienced research institutes will be encouraged to participate in supporting the development of the national climate change policy. Since most

research institutes conduct studies only on a contractual basis, adequate financial resources are crucial for conducting climate change research, and collaborative relationships will be developed with international financial institutions as long as financial resources remain limited for a long time. A major emphasis will be placed on building the capacities of Working Group members for climate modelling to develop climate models and perform impact assessment studies, for example, by facilitating the exchange of experience and research visits to international climate modelling centres.

It is equally important to monitor the climate change impact and conduct research in *priority sectors* such as: Agriculture, Health, Forestry, Energy, Transport, Water Resources etc.

Agriculture Sector

- Research needs to address not only change in temperature and precipitation and its impacts on agriculture, but also the interaction with hazards, directly or indirectly arising from atmospheric conditions, such as rainfall, flood, frost, drought, hail, heat waves, seasonal shifts (length of growing season, bud break, quality aspects), and changes in pest and disease patterns.
- Crop specific evaluations should be conducted to determine changes in seasonal development, characteristics of production, cultivation methods, etc., under climate change.
- Crop models are required to assess the impacts of climate change and increased atmospheric concentration of CO_2 on various crops, pastureland and livestock.
- Further, crop simulation models need to be interfaced with Geographic Information Systems (GIS) in order that these models can be applied for regional planning and policy analysis.
- In addition, a variety of approaches, such as economic regression models, microeconomic and macroeconomic models, and farm models should be used.

Health Sector

- Quantitative research is required to identify the regions of the Republic of Moldova most vulnerable to the adverse health effects of climate change.
- These areas will require focused adaptation measures, including better health clinics and tools, education of the public in these areas about how they can cope with new health concerns.
- Improved disease burden estimates need to be established, based on latest climate models to estimate:
    - heat-related mortality statistics based on existing mortality and population data at the national level and in key cities of the Republic of Moldova;
    - the impacts of projected changes in climate, taking into account various forms of acclimatization/adaptation; and
    - climate-water and foodborne diseases relationships using panel data on income and health to project cause-specific deaths and disability-adjusted life year (DALY) rates by demographic group.
- Further in depth studies on the socio-economic assessment of climate change in the health sector would be beneficial, including:
    - the health 'damage' costs of climate change under different mitigation scenarios;
    - the costs of preventing death, illness and injury under different mitigation scenarios (i.e. adaptation measures).

Water Resources Sector

- Defining critical thresholds in water resource;
- Improving the capacity to calibrate state-of-the art rainfall runoff models;
- Understanding of the economic and social impacts of climate change on water quantity, supply, and demand including irrigation, drinking-water supplies, recreation/tourism, hydropower and industry, and system losses;
- The capacities of developing and implementing systems of hydro-economic assessment of river basin will be enhanced to assess the further development of water resources and the related sustainable development, such as hydro-electric development, waste treatment and irrigated agriculture;
- Pre-feasibility or feasibility studies for irrigation and land use projects are needed (including from groundwater sources), and should be required to include an assessment of the physical and economic impacts of climate change;
- Assessments and analyses on social, economic and environmental costs and benefits of future adaptations will be performed.

Forestry Sector

- Establishing the climatic thresholds that correspond to the distribution limits of a forest type or species and develop a bioclimatic model to predict future steady-state forest distributions under a range of plausible climate change scenarios;
- Collecting historical analogues and life-history information to estimate how long it might take for the forest boundary to migrate a given distance;
- Calibrating a biogeochemistry model to predict changes in productivity and carbon stocks in each forest type, with and without the effects of elevated CO_2 concentrations;
- Evaluation of adaptive capacity including the inherent adaptive capacity of trees and forest ecosystems and the socioeconomic factors determining the ability to implement planned adaptation measures.

Energy Sector

- Assessing the possible effects (both positive and negative) of climate change on energy consumption:
    - effects of climate warming on energy use for space heating;
    - effects of climate warming on energy use for space cooling;
    - market penetration of air conditioning and heat pumps (all-electric heating and cooling), and changes in humidity;
- Conducting studies possible effects on energy generation and supply:
    - assessment of impact of increase temperatures and droughts on hydro energy potential;
    - impacts of climate change on energy generation from biomass;
    - wind resources changes (intensity and duration); and
    - electricity transmission and distribution;
- Research on efficiency of energy use in the context of global warming, with an emphasis on technologies and practices that save cooling energy and reduce electrical peak load.

Transport Sector

- Examining the long-term impacts of climate change on the Transport Sector in light of climate change projections to determine whether, when, and where the impacts could be consequential, particularly in light of the long planning horizons for transport infrastructure;

- Analysing options for adapting to these impacts, including the possible need to alter assumptions about infrastructure design and operations, the ability to incorporate uncertainty into long-range decision making, and the capability of institutions to plan and act on mitigation and adaptation strategies at the state and regional levels.

The promoted studies on climate change and on the vulnerability to its effects enable better knowledge about sectors, ecosystems and regions that are particularly exposed to climate change, facilitating the identification and promotion of vigorous and effective actions for mitigating the adverse effects of climate change in the country. The findings of these studies will substantiate the adoption of planned adaptation measures and will help to increase the domestic adaptation capacity in line with the achievement of objectives and national sustainable development and environmental protection priorities.

b) Needs for support required to execute current and mid-term adaptation undertakings

The implementation of climate change adaptation objectives needs to be supported by appropriate financial mechanisms. The implementation cost of the Republic of Moldova's Climate Change Adaptation Strategy until 2020 and the Action Plan on its implementation is estimated at about US$ 200 million.

The cost of inaction could be devastating, given the fact that natural disasters alone cause the country an average loss of about US$ 61 million each year. The estimates of future costs and benefits suggest that every euro spent on flood protection would avoid six euros of cost generated by damage.

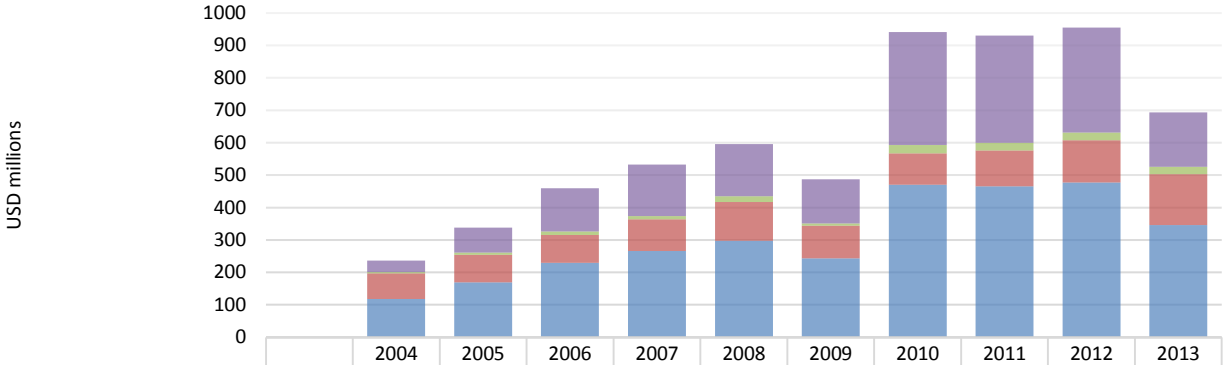
The provision and allocation of adequate financial resources are prerequisites for achieving a successful outcome of the climate change adaptation process. To support climate change adaptation initiatives, both domestic financial resources as well as international ones are required. Domestic financing can be secured both from the state budget and from other financial mechanisms (special funds: National Ecological Fund, National Fund for Regional Development, etc.). They will be important tools for directing the domestic monetary flows in environmental investments, and a means of strengthening the external and domestic financing). Foreign assistance and investments is envisaged to play the most important role in promoting climate change actions in all economic sectors and in catalysing the specific investments that will be needed to assure climate change adaptation in the Republic of Moldova. These investments are linked to a wide range of technologies intended to improve the energy efficiency, use of renewable energy, develop the related road and building infrastructure, and finally adapt to climate change. In this context, the international financial support is needed to implement in full extent the appropriate national and sectorial policies and strategies, or to resolve specific issues in the fields where the climate change impact is significant. Implementation of small and medium-scale pilot and demonstration projects will involve sustainability of external assistance to be received, including through financial mechanisms available under the UNFCCC.

It is anticipated, that the Strategy's objectives will be achieved to a greater extent under the conditions in which the Republic of Moldova gains access to the financial mechanisms of the UNFCCC, specifically to the Green Climate Fund, Special Climate Change Fund, Adaptation Fund and others, in view of implementing adaptation projects in the most vulnerable sectors of the national economy.

c) Summary of recent external support

According to the Organization for Economic Co-operation and Development (OECD) on-line database (see figure 6), Moldova ranks among the top ten countries of Europe that benefit from

external assistance. Also, it was the sixth country in Europe by development cooperation received, with a 5 per cent average of all the assistance provided to the region for 2011-2013.[6]



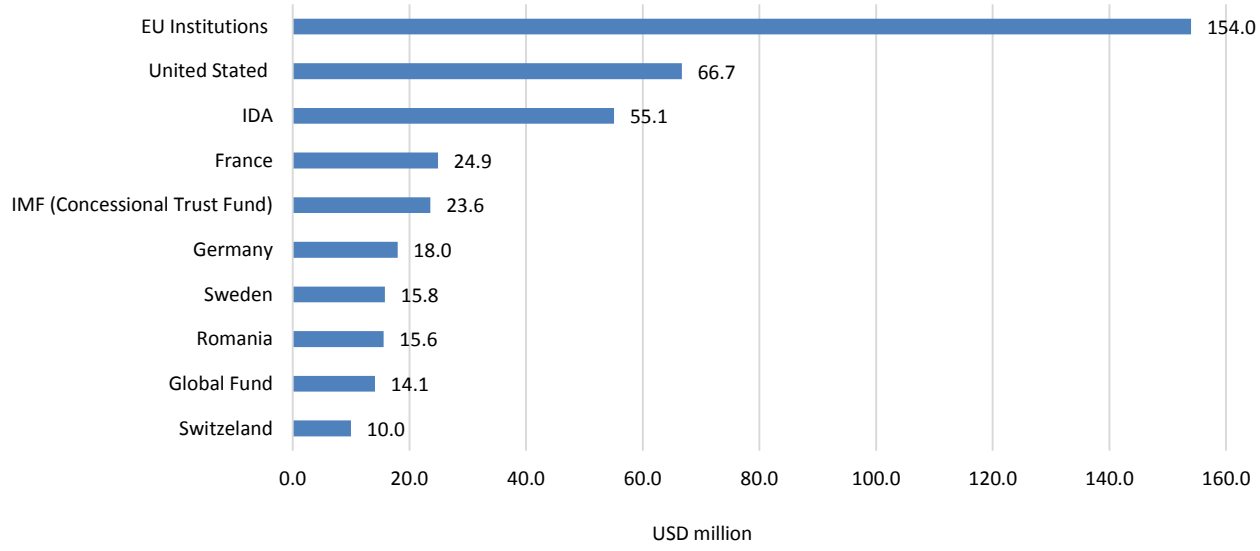
	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Multilateral, Total	36.04	76.5	132.58	158.84	160.96	136.58	348.26	330.92	323.66	167.7
Non-DAC Countries, Total	4.07	6.91	11.06	10.01	17.63	6.58	26.49	23.51	24.45	22.21
DAC Countries Total	78.4	85.7	86.09	97.44	119.58	100.48	96.05	111.08	129.6	156.71
All Donors Total	118.51	169.11	229.73	266.29	298.17	243.64	470.8	465.51	477.71	346.62

Source: <http://stats.oecd.org/qwids/>. **Abbreviation used:** DAC countries – OECD Development Assistance Committee countries (29 in total).

Figure 6: Bilateral, Multilateral and Private Donors' aid and other resource flows to the Republic of Moldova according to the International Development Statistics (IDS) online databases

Republic of Moldova's biggest donor since 2007 is the European Union, which started to provide aid to the Republic of Moldova through the European Neighborhood and Partnership Instrument (ENPI), created especially for the countries covered by the European Neighborhood Policies (ENP).

In terms of bilateral aid, the Republic of Moldova's "big league" partners are: USA, Sweden, Austria, Switzerland and Germany, which add to the plethora of smaller (in terms of granted ODA – Official Development Assistance) Eastern European donors – Romania, Poland, Czech Republic, Hungary, Slovakia, Bulgaria, Estonia, Hungary, Latvia, Lithuania, Slovenia, and Turkey. Top Ten Donors of Gross ODA for the Republic of Moldova is presented in figure 7.



Source: <https://public.tableau.com/views/AidAtAGlance_Recipients/Recipients?:embed=n&:showTabs=y&:display_count=no?&:showVizHome=no#1>.

Figure 7: Top Ten Donors of Gross ODA for Moldova, 2012-2013 average, USD million

[6] <http://www.oecd.org/dac/stats/documentupload/5%20Europe%20-%20Development%20Aid%20at%20a%20Glance%202015.pdf>.

In September 2009, the Government of the Republic of Moldova addressed to the donor community with the request for support in implementing the priority reforms for the country's economic growth, specified in the "We are relaunching Moldova" paper. As a result, during the reunion of the Advisory Group "Partnership for Moldova Forum," held in Brussels on 24 March 2010, the donors community committed to allocate to Moldova 1.84 billion euros (0.96 billion in the form of grant, 52% of the total; respectively, 0.88 billion in the form of credits, 48% of the total) for the 2011-2013 period. As a whole, the USA (through the Compact Program of the Millennium Challenge Corporation of the USAID, signed in 2010 in the amount of USD 262 million) has become one of Moldova's main bilateral development partners. The EU commitment and of the EU member states on future allocations have accounted for 40% of the resources promised during the reunion.

Towards the end of 2012, over 70% of the resources provided in the 2010 Brussels reunion had been contracted, through specific projects started in various national economy sectors. In addition, external funds of about 800 million euros have been attracted. Thus, a total amount of 2.6 billion euros were provided to the Republic of Moldova by the donor community in the 2010-2012 periods (by 40% more as compared to the financial commitments made during the Brussels reunion).

In 2012 the donor funds were estimated at about 474 million euros. According to the data of the State Chancery of the Republic of Moldova, the budget of the projects contracted in the reporting period account for about 206 million euros and the disbursements reported by the donors – about 465 million euros (about 98% of the estimated amount). For comparison, in 2007 the disbursements amounted to 266 million euros; in 2008 – 298 million euros; in 2009 – 244 million euros; in 2010 – 470 million euros; in 2011 – 451 million euros. For 2013 and 2014 there are provided 322 million and 213 million euros, respectively.

The manner of cooperation between the Republic of Moldova and the development partners has taken various forms: technical assistance, support for implementing various investment or social projects, the support provided to the budget for implementing sector policies or the support provided for supporting the state's payment balance. The objectives of the cooperation between the Government and its partners are agreed upon and stipulated in the medium-term framework cooperation agreements.

According to the data available for external development assistance, the highest share is held by the assistance with project implementation (75%), followed by sector budget assistance (about 17%), technical assistance, and assistance with maintaining the state payment balance. Given the budgetary constraints and of state debt servicing, the manner of attraction of external resources that is preferred by the Government are grants and/or concessional credits.

The amount of on-going external assistance in 2012, according to the information from the database of the State Chancery, the Republic of Moldova accounted for about 1.1 billion euros in the form of grants and 682.8 million euros in the form of loans. Accordingly, in 2012, the contracted resources were distributed as follows: about 109.4 million euros in the form of grants and 97.1 million euros in loans (EBRD, EIB, WB). The share of active grants in the total amount of external assistance has represented about 62%. For 2012, the grant-credit parity represented 53%, accordingly, 47% of the total amount of external assistance contracted during the year.

By the end of 2012, the Republic of Moldova was implementing 384 projects in various sectors, including 116 projects in governance and civil society, 58 projects in infrastructure and social services, 49 projects in education, 31 projects in agriculture, 29 multi-sectorial projects, 24 projects for private sector development, 19 projects in the environment and 16 projects related to energy generation and supply.

As a total, in 2012, there were launched 98 new projects, with new commitments in the amount of 206.6 million euros in various sectors. For 2013, the estimated amount of external assistance was 314 million euros.

It was quite difficult to estimate the external support allocated to date, specifically for adaptation-related work, as part of these projects and support received is cross-cutting and/or inter-sectorial, covering both mitigation and adaptation aspects.

On November 6, 2014 EU Commissioner for European Neighborhood Policy and Enlargement Negotiations and Prime-minister of the Republic of Moldova signed the Memorandum of Understanding on the Single Support Framework for EU support to the Republic of Moldova for the period of 2014-2017 together with a financing agreement to support the implementation of the Association Agreement (AA) and the Deep and Comprehensive Free Trade Area (DCFTA) – which the Republic of Moldova signed with the EU on 27 June 2014.

The three priority sectors are:

- public administration reform;
- agriculture and rural development;
- policy reform and border management.

The financial assistance for the period 2014-2017 amounts to EUR 410 million and EUR 30 million for DCFTA.

A.VI. Monitoring and reporting progress

The Republic of Moldova's Climate Change Adaptation Strategy until 2020 will be implemented through an Action Plan. To assure the financial support for the activities planned in the Action Plan, such activities will be included in the sectoral strategies for mid-term expenditures and in the annual work plans of institutions involved in this Strategy implementation.

The responsibility for implementing the Strategy rests with all competent institutions identified in the Action Plan.

The National Commission for implementation of mechanisms and provisions of the UNFCCC and of the Kyoto Protocol will coordinate the implementation and will conduct regular assessment of the level of indicators and progress achievement.

The monitoring of the Strategy implementation will be carried out by the Ministry of Environment of the Republic of Moldova, where a subdivision will be designated for that purpose.

Based on the collected and systematized information, it will prepare annual monitoring reports on implementation of the Strategy and will submit them for consideration and approval to the Government.

The monitoring reports to be developed will include information on the implementation of the indicators set in the Action Plan for each action, and every 3 years or as needed progress evaluation reports will be developed as well to assess the impact of activities carried out during the given time and the level of objectives implementation.

As the Strategy was not designed as a linear, but as an iterative process, therefore it will be updated and reviewed periodically, based on the monitoring and evaluation findings, as well as on the updated climate models, and in accordance with the most recent scientific researches.

Towards the end of the Strategy implementation, a final assessment report, containing information on the level of achievement of objectives and of the expected impact, will be prepared. Based on this report, the next stage of strategic planning of climate change adaptation has to be decided.

Further, the Republic of Moldova will put in place a four year based NAPs and SAPs. The proposed framework for NAPs and SAPs will allow for monitoring and planning along a 3-tier M&E approach.

First tier, *macro-level monitoring* would allow for tracking the evolution of the national adaptation planning process as a whole.

This would entail the development of a number of process-oriented indicators that would be followed across sectors. Examples of such indicators could include: number of SAPs; overall level of Government funding channelled towards adaptation needs; index of resilience/vulnerability of the Moldovan economy, etc. These indicators would provide an image of the overall dynamism of the adaptation planning process as a whole. As such, they may depend on the aggregation of data from lower-level indicators (e.g., data on adaptation funding by sector). The final indicator on level of resilience would allow for tracking of the impact of the adaptation process as a whole. It would have to be computed from recognized vulnerability indices and legitimate sources of data. The next NAP will be used to develop the 'Index', 'Methodology' and to gather 'Baseline Data'.

Second tier, *meso-level monitoring* would allow for tracking of progress and results at a disaggregated level, either sectoral or geographic (e.g., regional), depending on the choices made during planning phases.

These indicators would depend on the provision of data from regional or sectoral authorities. Such indicators would be the following: the number and type of adaptation measures included in sectoral/regional plans, proportion of sectoral budget dedicated to adaptation measures, number/type of sectoral stakeholders implementing adaptation or resilient measures, degree to which the sector/region's vulnerability has been reduced.

Similarly to the first tier, the final indicator would be an 'Index' for which the 'Methodology' would be determined in the early phases of NAP planning. Also, while these indicators remain somewhat process-oriented, it could be possible to adopt more concrete indicators within each sector (e.g., if water availability was a constraint to resilience, the water sector M&E framework could adopt an indicator on "overall water availability").

Sector-specific indicators would have to be agreed upon during the early phases of NAPs or SAPs planning, and could be renewed, depending on their relevance, at the end of each planning period. However, it would be important to keep a number of indicators similar from one sector to the next, to enable comparisons. The prioritization of adaptation measures will be done by the sectors or stakeholders participating in the development and implementation of NAPs and SAPs.

Each time a SAP or a NAP is proposed, it should contain prioritized measures for that planning period. The process of determining the prioritization and selection of certain adaptation options over others should be transparent, and based on rationalized criteria. Ideally, it would be carried out by a stakeholder group, which can consider different economic, environmental, social, cultural or political spheres and concerns. The M&E system will verify if the planned measures have been implemented accordingly. The Cost Benefit Analysis (CBA), Cost Effectiveness Analysis (CEA), Multi Criteria Decision Analysis (MCDA) and other relevant to case econometric assessment methods and tools will be used.

Third tier, a *micro-level structure of reporting* would also be defined. This would concern indicators related to specific adaptation actions that are adopted within individual sectoral or national plan. For each action or group of actions, a target and an indicator have to be developed (e.g., number of people trained; hectares of forest protected; kilometres of road upgraded; degree of water use (drop-per-crop) efficiency in the wine sector, etc.). Each of these indicators should be attached to the actions contained in the specific sectoral or regional action plan. As such, they would serve as the basis level of results tracking by stakeholders, and would be reported upon annually at least. They could be modified at each round of successive planning, and be aggregated to feed into the

meso- and macro-level reporting frameworks. Responsibility for providing information on these indicators would rest upon those who will also be tasked with the implementation of the adaptation actions.

The milestones for reporting under the national adaptation planning process would be as follows:

- micro-level indicators: annually;
- meso- and macro-level indicators: every two year.

As each NAP will be set for four years, this would mean that results could be tracked and aggregated twice per period, allowing for an informed planning process for the next phases. Naturally, the first planning period would also entail a baseline assessment of key indicators, and some time to develop the methodologies and indices.

At the end of a planning cycle, the data would be aggregated into a "NAP Impact Study", which would synthesize all results achieved during the period and make recommendations for the next period. This study will be submitted for consideration to the Government.

The main responsibility for reporting will be of the sectoral administrations, which would need to undertake annual and biennial reporting for micro- and meso-level indicators. All data would be provided to the coordination mechanism, whose secretariat could synthesize information to develop reports. The Secretariat would also provide sectoral administrations with templates and formats in order to allow for standardized tracking. Also, a database would be created to be administered by the coordination mechanism, being accessible however to all participating administrations, in order to facilitate the flow of information. In addition, micro-level reporting could be undertaken with the participation of local NGOs and associations which would participate in the implementation of targeted adaptation measures. Participation of NGOs at all levels of the M&E framework would allow for increased transparency and for broader ownership and dissemination of results.

As adaptation planning is an iterative process, gradually growing in scope and learning from the monitoring and review of on-going adaptation actions, a description of how adaptation progress will be nationally monitored, reviewed, updated, and reported can be an important element.

Submission by the Republic of Macedonia

Skopje, 4 August 2015

Subject: Intended Nationally Determined Contributions

Introduction

1. The Republic of Macedonia, as a party of the UN Framework Convention on Climate Change (UNFCCC), is fully committed to the negotiating process aimed at reaching a global agreement applicable to all Parties at the Paris Conference in December 2015. According to this Agreement, all Parties should be able to give their contribution on a fair and equitable basis and in line with their national circumstances, towards achieving the global objective of stabilizing greenhouse gas (GHG) concentrations in the atmosphere at a level which would prevent an increase in the global temperature of more than 2°C.

2. The Republic of Macedonia is a non-Annex I country to the UNFCCC (developing country) without quantified commitments for reducing the GHG emissions. At the same time, it has a status of a candidate country for European Union (EU) membership, having thus to adhere to the EU Climate and Energy Policy, which actually takes in commitments of the Annex I countries. The Republic of Macedonia, on voluntary basis endeavors to integrate as much as possible both aspects (UNFCCC and EU) in its national reports on climate change.

Intended Nationally Determined Contributions (INDC)

3. The Conference of Parties in Lima confirmed the Warsaw decision that all Parties should prepare their INDC in a manner that would ensure clarity, transparency and understanding of the INDC.

4. The Republic of Macedonia, in agreement with the Decision No. 42-17/91 of the 91st Session of the Government held on 28 July 2015, intends to give the following contribution to the global efforts for GHG emissions reduction (Macedonian INDC):

   To reduce the CO_2 emissions from fossil fuels combustion for 30%, that is, for 36% at a higher level of ambition, by 2030 compared to the business as usual (BAU) scenario. The CO_2 emissions from fossil fuels combustion cover almost 80% of the total GHG emissions in the country with a dominant share of the following sectors: energy supply, buildings and transport.

5. In line with the Lima Call for Climate Action, in particular paragraph 14, the Republic of Macedonia shall submit the following information for its INDC, presented in detail in a Background Document, which is an integral part of this submission (uploaded on http://www.klimatskipromeni.mk/Default.aspx?LCID=302, www.moepp.gov.mk).

INTENDED NATIONALLY DETERMINED CONTRIBUTIONS OF THE REPUBLIC OF MACEDONIA (INDC)

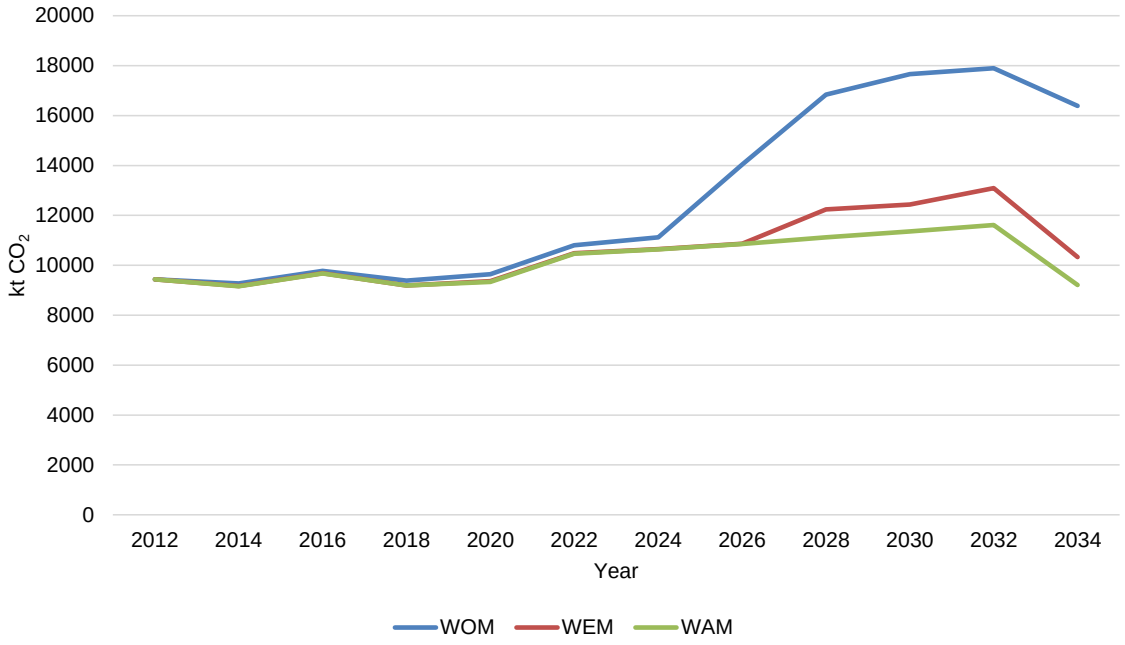
Profile	
Scope	**Climate Change Mitigation** Due to the extensive use of fossil fuels, particularly the dominant share of domestic lignite for electricity production, there is a significant potential in the country for GHG emissions reduction. Having this in mind, the focus of the Macedonian INDC is put on climate change mitigation, that is, on policies and measures which lead to GHG emissions reduction. However, this does not suggest that adaptation is less important. Vulnerable sectors and climate change adaptation shall be subject to a more detailed analysis in the future, from the point of view of INDC needs.
Type	**GHG emissions reduction and climate change mitigation policies and measures (projects)** **GHG emission reduction expressed as a baseline scenario target**
Greenhouse gases and emissions coverage	**CO_2, 80% of the total emissions (all emissions originating from fossil fuels combustion)** According to the GHG Inventory, almost 80% of the total GHG emissions are CO_2 emissions, originating from fossil fuels combustion, with dominant share of the sectors energy supply, buildings and transport.
Target sectors	**Energy supply, buildings and transport** Emissions from agriculture, forestry and other land uses, as well as in industrial processes and waste have not been analyzed since they have a relatively small share in total GHG emissions.
Target	**Baseline scenario target:** To reduce the CO_2 emissions from fossil fuels combustion for 30%, that is, for 36% at a higher level of ambition, by 2030 compared to the business as usual (BAU) scenario.

Climate change mitigation	
Methodology	**Modeling and scenario development:** - MARKAL energy planning model (least cost optimization - optimal scenario for energy system development at minimum cost of the whole system); - Bottom-up approach (modeling of policies and measures one by one and comparison to the BAU scenario); - Modeling period: up to 2035. **GHG inventory:** - Emissions for the period 1990 – 2012 calculated according to the methodology of the International Panel on Climate Change of 2006 (IPCC Guidelines 2006). **Global Warming Potential, GWP:** - GWP CO_2 = 1 (according to IPCC, UNFCCC Decision 17/CP.8). **Evaluation of economic and environmental aspects of mitigation**: - Marginal abatement cost curve. **Evaluation of social aspects of mitigation via green jobs**: - For measures in the buildings sector, macroeconomic Input-Output method with factors taken from other relevant studies, as per investments; - For energy supply technologies, with factors taken from relevant studies, according to the installed capacity.
BAU scenario (without measures, WOM) – assumptions	**Macroeconomic drivers:** - GDP projections: annual growth rate of 4.5% until 2035; - Population projections: annual growth rate of -0.09% until 2035. **Use of domestic resources:** - Not to construct any new hydro power plant due to lack of interest from investors and /or NGO and local population resistance; - The capacity of power plants with feed-in tariffs is limited to the capacity for which a decision for temporary preferential producer has been issued by the Energy Regulatory Commission of the Republic of Macedonia. That is 65.4 MW for small hydro, 50 MW for wind, 18 MW for solar power plants and 7 MW biogas power plants. **Energy supply technologies:** - The thermal power plant Oslomej, after its revitalization will use high quality coal from import; - Nuclear power plant shall not be constructed in the analyzed period. **Energy imports:** - Connection to a new gas pipeline is not planned (taking into account the current situation in the region), which means that the only available capacity is of the existing pipeline; - The price of imported electricity will be the price of electricity at the electricity market[1].

[1] Hungarian Power Exchange – HUPX, https://www.hupx.hu/en/Pages/hupx.aspx?remsession=1

	Demand side: - New technologies shall have the same efficiency as the existing technologies, but there is a possibility for the model to decide to change the existing technology which uses one fuel type to technology which uses a different fuel type.
Mitigation scenario (with existing measures, WEM)	**Mitigation policies and measures** **Energy supply** 1. Reducing distribution losses 2. Large hydro power plants 3. Small hydro power plants 4. Solar power plants 5. Wind power plants 6. Biogas power plants 7. Cogeneration biomass power plants 8. Central heating in Bitola 9. Solar thermal collectors 10. Biofuels 5% **Buildings** 11. Labeling of appliances 12. Public awareness campaigns, Energy Efficiency info centers 13. Refurbishment of buildings (in line with the Rulebook on Energy Performance of Buildings and Directive 2010/31/EU) 14. Construction of new buildings (in line with the Rulebook on Energy Performance of Buildings and Directive 2010/31/EU) **Transport** 15. Increased use of railway 16. Renewal of the vehicle fleet 17. Increased use of bicycles, walking and introduction of a parking policy
Higher ambition mitigation scenario (with additional measures, WAM)	**Additional mitigation policies and measures:** **Energy supply** 1. Additional natural gas power plants 2. Geothermal power plants 3. Biofuels 10% **Buildings** 4. Phasing out incandescent light bulbs 5. Phasing out resistive heaters 6. Construction of passive buildings 7. Gasification of the residential and the commercial sector **Transport** 8. Extension of the railway to Bulgaria 9. Electrification of transport

Emission projections



CO_2 emissions projections

According to the BAU scenario (WOM), CO_2 emissions by 2030 will almost double (from about 9 000 kt they will increase to about 18 000 kt). With the 17 measures included in the mitigation scenario (WEM), in 2030 a reduction of 30% compared to the BAU scenario can be achieved. Further on, with the higher ambition mitigation scenario (WAM), which includes improved and additional measures, the CO_2 emission reduction compared to the BAU scenario in 2030 shall be 36%. In all scenarios the CO_2 emissions shell have a growing trend, peaking between 2030 and 2032. In 2030, the CO_2 emissions shall increase for 31% under WEM scenario, that is, for 20% under WAM scenario, compared to the CO_2 emissions in 1990.

	BAU scenario (WOM)	Mitigation scenario (WEM)	Higher ambition mitigation scenario (WAM)
CO_2 emissions in 2030 (kt)	17 663	12 435	11 359
Deviation from the BAU scenario in 2030		-30%	-36%
CO_2 emissions in 1990 (kt)	9 445[2]		
CO_2 emissions in 2030 compared to the CO_2 emissions in 1990	+87%	+31%	+20%

Investments needed

In the **period 2015-2030**, the **additional investments** (relative to BAU scenario) needed for realization of the mitigation scenario are estimated at **4.2 billion Euros**, while for realization of the higher ambition mitigation scenario they are estimated at **4.5 billion Euros**.

Besides on national investments, the implementation of the national mitigation policies and measures shall also depend on the **involvement of the private sector (national and international) and on the access to new sources of finance and enhanced international support to be mobilized through new climate finance mechanisms, such as the Green Climate Fund.**

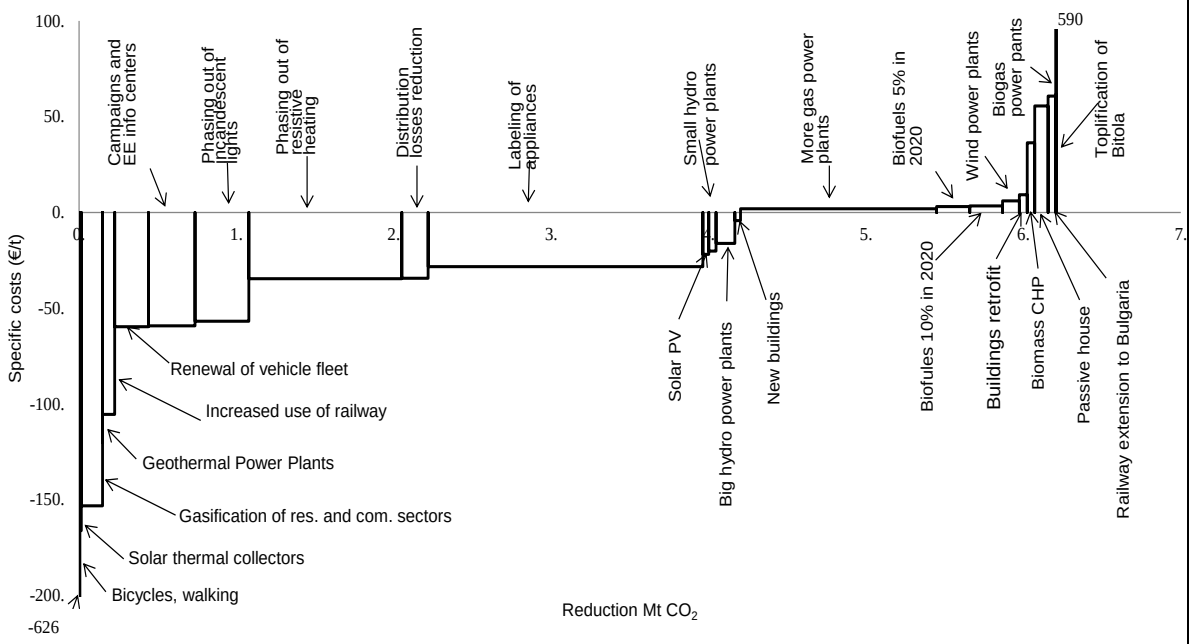
Use of international market mechanisms

The Republic of Macedonia is **following the negotiations** within the UNFCCC's Subsidiary Body for Scientific and Technological Advice (SBSTA) on a framework for establishing a **New Market Mechanism** - NMM as well as for establishing **non-market approaches** - NMA. Once the definition of these concepts is agreed, the Republic of Macedonia **shall consider potential linkage to its national mitigation actions.**

[2] GHG Inventory, First Biennial Update Report on Climate Change (FBUR), 2014

Assessing climate change mitigation policies and measures

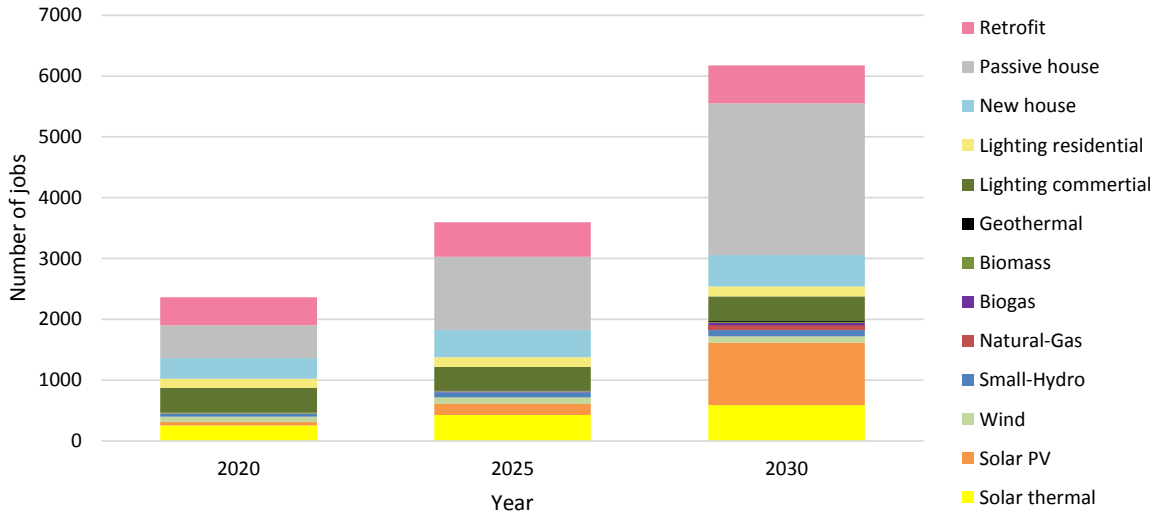
Economic and environmental aspects



Marginal abatement cost curve (2030)

By implementing policies and measures that have negative costs, by 2030, CO_2 emissions may be reduced for more than 4 Mt compared to the BAU scenario. Additionally, with relatively small investments, CO_2 emissions may be reduced for additional 2 Mt.

Social aspects (green jobs)



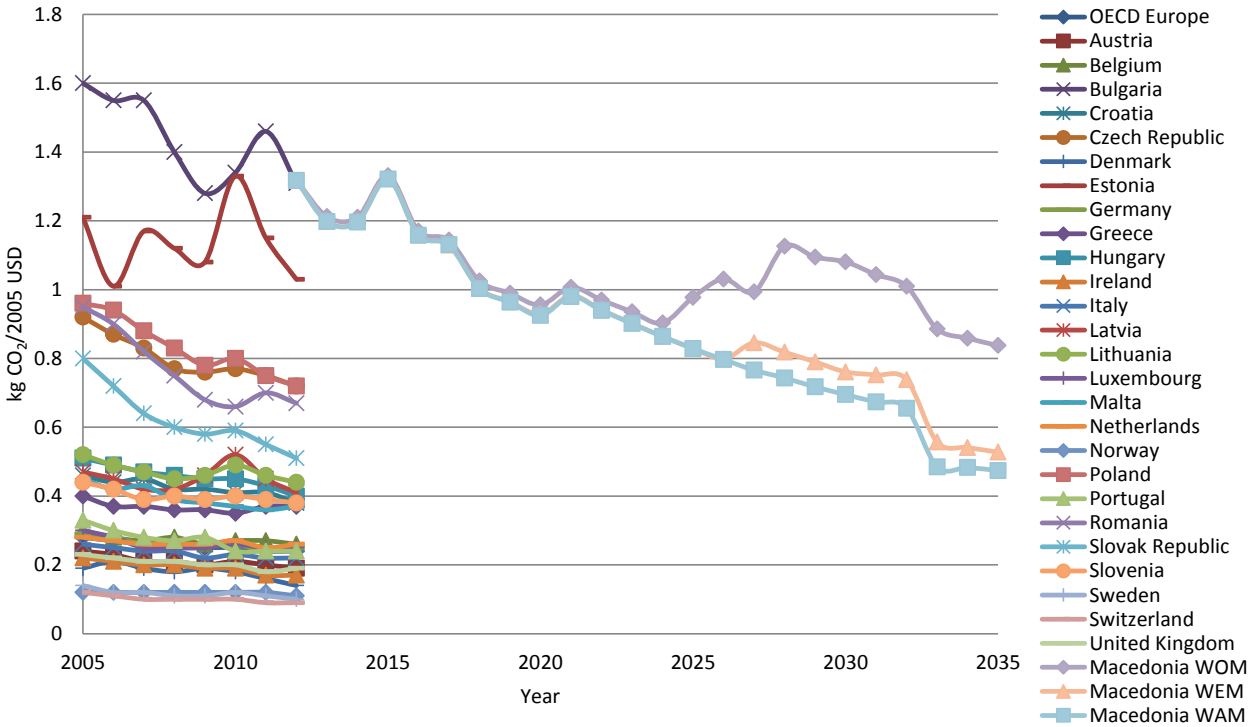
Domestic green jobs

By implementing energy efficiency measures in buildings and by introducing low-carbon energy supply technologies (renewables and gas) about 6000 green jobs can be created by 2030.

Consultation process	
Key stakeholders	The process for determining the Macedonian INDC was led by the **Ministry of Environment and Physical Planning (MOEPP)**, as the national institution responsible for climate change policies and national contact point for UNFCCC. The **National Climate Change Committee (NCCC) and the Technical Working Group at the National Sustainable Development Council** were also part of this process, as well as **other key stakeholders** – the Ministry of Economy and the Ministry of Transport and Communication as institutions which are responsible for policies in the target sectors, representatives of the business community, civil society organizations and the academic community. Also, the i**nternational institutions and donors** in the country had important role, primarily the United Nations Development Programme (UNDP) and the Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH (GIZ) which provided technical and financial support for this process. The analysis and the technical component of the process were carried out by an **expert team** which included the team of the Research Center for Energy and Sustainable Development of the Macedonian Academy of Sciences and Arts, one national expert and one international expert.
Most recent strategic and planning documents in the target sectors	On a strategic level, through the key challenge of the National Sustainable Development Strategy titled "Climate Change and Clean Energy", it is required to integrate climate change mitigation into the energy planning. Further on, in the Energy Strategy, in the chapter analyzing the energy sector in Macedonia in the light of sustainable development, the strong connection between energy sector and climate change has been recognized. Further coordination with the Ministry of Environment and Physical Planning, as the institution responsible for climate change, is required, as well as appropriate harmonization of the strategic and legislative solutions in the energy field with the strategic and legislative solutions for climate action. In order to identify specific mitigation policies and measures, the following documents have been taken into consideration: - Energy Strategy - Energy Efficiency Strategy - Strategy on Renewable Energy Sources - The Program for Implementation of the Energy Strategy - Energy Efficiency Action Plan - Action Plan on Renewable Energy Sources - Transport Sector Strategy - Pre-accession Economic Program - Program of the Government of the Republic of Macedonia - The Third National Communication on Climate Change - First Biennial Update Report on Climate Change
Roles of the stakeholders	Consultations took place at technical meetings (with senior representatives of line ministries and appointed contact persons) and at topical workshops with all stakeholders. Workshops were held on the following topics: - **Identification and validation of possible mitigation policies and measures in the target sectors** in agreement with the sector policies and planning documents, as well as with the European Policy on Climate and Energy - **Discussion about and validation of the assumptions used for the modelling** of the identified policies and measures in line with the sector policies and planning documents as well as with the European Policy on Climate and Energy - **Prioritization of identified measures and providing directions for development of mitigation scenarios** with existing and with additional measures

Equity and ambition (comparison with other European countries)

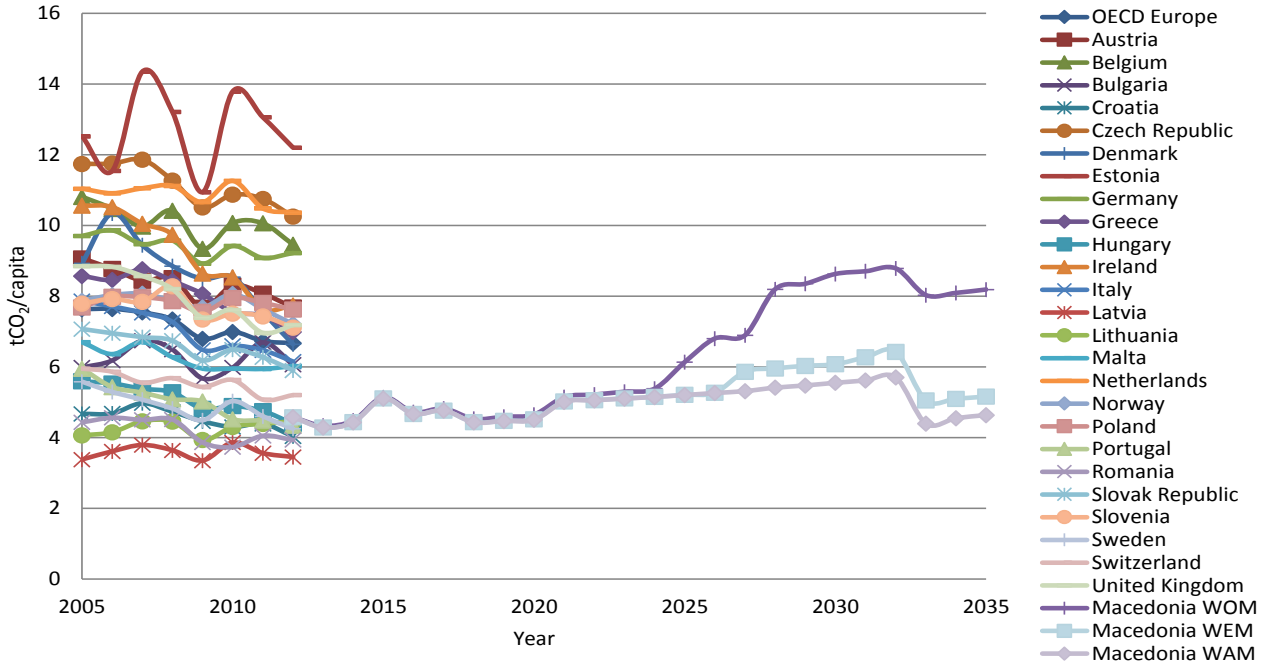
CO_2 emissions per GDP



Emissions kg CO_2/2005 USD[3]

CO_2 emissions per GDP of the Republic of Macedonia are similar to the figures of Bulgaria and Estonia. In the BAU scenario, this indicator shall be reduced from 1.4 kg CO_2/2005 USD to 1.1 kg CO_2/2005 USD, while in the mitigation scenarios the values in 2030 shall be reduced to 0.76 kg CO_2/2005 USD, and to 0.7 kg CO_2/2005 USD, respectively, which actually marks the **gradual transition to low-carbon economy**. This reduction trend is similar to the trend present in Poland and Romania. According to this indicator, the Republic of Macedonia, in 2035 shall reach the 2012 level of Lithuania, Hungary, Slovenia and other countries in this group with values of around 0.4 kg CO_2/2005 USD .

CO_2 emissions per capita



Emissions t CO_2/capita[4]

[3] Source for European countries: OECD data base and MARKAL model projections

[4] *Ibid.*

	The Republic of Macedonia is in the same group with the European countries with lower CO_2 emissions per capita – Lithuania, Portugal, Sweden and Hungary. In the BAU scenario there is a growing trend while in the mitigation scenarios, this indicator in 2035 would be at the same level as in 2012.

Future activities

6. This Submission is the first step in the process of determining national contributions and the Republic of Macedonia reserves the right to review and to conduct more detailed analysis, provided the assumptions under which these this INDC has been developed change as a result of the future global agreements and relevant decisions of COP, gas supply and other geo-political developments, as well as the point in time when the Republic of Macedonia will become an EU member country.

7. The Republic of Macedonia requests that this submission is published on the UNFCCC webpage and its contribution is included in the synthesis report prepared by the Secretariat on the cumulative effect of the contributions of all Parties.

Unofficial translation

The Russian Federation, recalling the statements of the Russian Federation at the UN Climate Summit in September 2014 and at the 20th Conference of the Parties to the UNFCCC in Lima in December 2014, as well as the Decision 1CP/.20 of the Conference *Lima Call for Climate Action*, i.e. para 13, which contains the invitation to all Parties to communicate their intended nationally determined contributions well in advance of the twenty-first session of the Conference of the Parties (by the first quarter of 2015 by those Parties ready to do so), **presents its intended nationally determined contribution (INDC) and clarifying information.**

However, the final decision of the Russian Federation on the INDC in the framework of the new climate agreement will be taken pursuant to the outcome of the negotiating process underway throughout the year of 2015 and the INDCs announced by major emitters of greenhouse gases.

INDC	**Limiting anthropogenic greenhouse gases in Russia to 70-75% of 1990 levels by the year 2030 might be a long-term indicator, subject to the maximum possible account of absorbing capacity of forests.**
Base year	1990
Time frames / periods for implementation	1 January 2020 — 31 December 2030
Scope and coverage	Economy-wide, in particular, as determined by decisions of the UNFCCC Conference of the Parties on reporting: • energy; • industrial processes and products use; • agriculture; • land use, land-use change and forestry; • waste. The INDC indicator is to be achieved with no use of international market mechanisms.
GHGs	The INDC includes information on the following GHGs: • Carbon dioxide (CO2); • Methane (CH4); • Nitrous oxide (N2O); • Hydrofluorocarbons (HFCs); • Perfluorocarbons (PFCs); • Sulfur hexafluoride (SF6); • Nitrous trifluoride (NF3).

Planning processes and forecasts	The Russian Federation currently has in force legally-binding instruments aimed at providing for limitation of the GHG emissions to at most 75% of 1990 levels by the year 2020 (Decree of the President of the Russian Federation of 30 September 2013 and Act of the Government of the Russian Federation of 2 April 2014 No. 504-p). These acts provide, inter alia, for organization of GHG emissions forecasting at the economy-wide scale and for each individual sector. The Russian Federation will further elaborate and adopt legislative and regulatory acts providing for achievement of the stated INDC target by 2030 based on the provisions of the Climate Doctrine and the Energy Strategy of the Russian Federation.
Methodological approaches used, in particular, for measurement and verification of anthropogenic GHG emissions and, in appropriate cases, their absorption	Methodological approaches are based on using the following methodologies: • IPCC 2006 Guidelines; • IPCC 2013 Revised Supplementary Methods and Good Practice Guidance Arising from the Kyoto Protocol; • IPCC 2013 Wetlands Supplement. The Russian Federation will use global warming potential values as contained in Decision 24/CP.19 of the UNFCCC Conference of the Parties.
Consideration of fairness and ambition based on national conditions	GDP of the Russian Federation in 2012 amounted to 172.9% of the 2000 level while the GHG emissions (without land use, land-use change and forestry) had reached only 111.8% of the 2000 level. Thus, as the GDP was growing significantly at that time period, the increase in GHG emissions was minimal. The economic growth and GHG emissions can be definitively decoupled upon achievement of the earlier announced indicator, i.e. limitation of the GHG emissions to at most 75% of 1990 levels by the year 2020, and the INDC announced for 2030. There will be GHG emissions reduction per GDP unit. At the same time, if contribution of the Russian forests is fully taken into account, limiting GHG emissions to 70-75% of 1990 levels by the year 2030 does not create any obstacles for social and economic development and corresponds to general objectives of the land-use and sustainable forest management

	policies, raising the level of energy efficiency, reducing energy intensity of the economy and increasing share of renewables in the Russian energy balance. Russian boreal forests have global significance for mitigating climate change, protecting water resources, preventing soil erosion and conserving biodiversity on the planet. Russia accounts for 70% of boreal forests and 25% of the world's forest resources. Rational use, protection, maintenance and forest reproduction, i.e. forest management, is one of the most important elements of the Russian policy to reduce GHG emissions.
How the INDC contributes to achieving the ultimate objective of the Convention (Article 2)	Reducing GHG emissions by 25-30% from 1990 levels by 2030 will allow the Russian Federation to step on the path of low-carbon development compatible with the long-term objective of the increase in global temperature below 2 degrees Celsius. This objective can be achieved with efforts of all Parties of the future climate agreement.

REPUBLIC OF RWANDA

INTENDED NATIONALLY DETERMINED CONTRIBUTION (INDC) FOR THE REPUBLIC OF RWANDA

INTRODUCTION

Rwanda, known as the "land of a thousand hills" is a landlocked country of 26,338 square kilometres, geographically located in Central Africa between 1°04' and 2°51' of south latitude and between 28°45' and 31°15' of east longitude[1]. The country has seen significant economic development in recent years, with GDP growing at an average of over 8% annually over the last decade and targeted to reach 11.5 % under the medium term development implementation framework EDPRS II[2]. It has a population of 10,515,973 people[3] which is growing at 2.8% per year. Important to note however is that Rwanda's fertility rate has reduced from 6.1 in 2005 to 4.2 in 2014 and that food crop production growth has grown more twice that of the population between 2007 and 2014 while per capita income has tripled from US$ 211 in 2001 to US$ 718 in 2014[4]. A vision for 2050 based on the Green Growth and Climate Resilience Strategy envisages Rwanda as a developed climate-resilient, low carbon economy, with a strong services sector, low unemployment and low levels of poverty. It would be a country where agriculture and industry have a minimal negative impact on the environment, operating in a sustainable way, and enabling self-sufficient basic necessities for all living in it. By 2050, development will be achieved with low carbon domestic energy resources and practices, reducing the country's contribution to climate change while allowing it to be independent of imported oil for power generation. Finally, Rwanda will have the robust local and regional knowledge to be able to respond and adapt to changes in the climate and the resulting impacts.

Rwanda is pleased to submit this INDC to replace the preliminary INDC submitted to the Convention in September 2015. This affirms the country's commitment to engage in the forthcoming international process of developing a climate change agreement.

[1] second National Communication report 2012
[2] Economic Development and Poverty Reduction Strategy II (2013-2018)
[3] Fourth Population and Housing Census 2012
[4] 4th Integrated Household Living Conditions Survey (2013/14)

Rwanda has been committed to addressing the challenge of climate change since 1998 when it ratified the United Nations Framework Convention on Climate Change (UNFCCC) and later the Kyoto Protocol in 2003. The country submitted its Initial National Communication to the UNFCCC in 2005, National Adaptation Programmes of Action (NAPA) in 2006, and the Second National Communication in 2012. The Third National Communication is under preparation.

Rwanda's INDC is built upon its National Strategy for Climate Change and Low Carbon Development Strategy. The full implementation of this strategy rests upon five enabling pillars: Institutional Arrangements; Finance; Capacity Building and Knowledge Management; Technology, Innovation and Infrastructure; and Integrated Planning and Data Management.

ADAPTATION CONTRIBUTION	
Rationale and process for adaptation contribution	Rwanda is highly vulnerable to climate change, as it is strongly reliant on rain-fed agriculture both for rural livelihoods and for exports of mainly tea and coffee. With the highest population density in Africa[5], adaptation concerns are central to the INDC. In recent years, extreme weather events in Rwanda increased in frequency and magnitude what, in some parts of the country, led to significant losses including human lives[6]. Floods and landslides were increasingly reported in the high altitude Western and Northern Provinces, whereas droughts made severe damages in the Eastern Province[7].
Summary of climate change trends, impacts and vulnerabilities	Rwanda has experienced a temperature increase of 1.4°C since 1970[8], higher than the global average, and can expect an increase in temperature of up to 2.0°C by the 2030s from 1970. Rainfall is highly variable in Rwanda but average annual rainfall may increase by up to 5-10% by the 2030s from 1970[9]. This is expected to lead to increasing rainfall intensity, leading to a higher frequency of floods and storms resulting in landslides, crop losses, health risks, and damage to infrastructure, as well as an increase in temperatures resulting in proliferation of diseases, crop decline and reduced land availability that impacts on food security and export earnings.
Adaptation vision and goals	
Vision for adaptation	Rwanda's long term vision is to become a climate resilient economy, with strategic objectives to achieve Energy Security and a Low Carbon Energy Supply that supports the development of Green Industry and Services; Sustainable Land Use and Water Resource Management that result in Food Security, appropriate Urban Development and preservation of Biodiversity and Ecosystem Services, as

[5] World Bank Data 2015
[6] The assessment of economic impacts of the 2012 wet season flooding in Rwanda 2013
[7] Rwanda baseline climate change vulnerability index 2015
[8] Green Growth and Climate Resilience Strategy 2011
[9] IPCC Fifth Assessment Report 2013

	well as to ensure Social Protection, Improved Health and Disaster Risk Reduction that reduces vulnerability to climate change impacts[10]		
Sector goals	The priority adaptation actions have been identified in Rwanda's Green Growth and Climate Resilient Strategy (2011), are on-going and will be partially or fully achieved by 2050. Many of the actions specified under the sectors programmes have both mitigation and adaptation benefits.		
Agriculture			
Programme of Action	**Actions**	**Descriptions and Goals/Targets**	**Mitigation benefit**
1. Sustainable intensification of agriculture	**1.1 Mainstreaming agro ecology techniques using spatial plant stacking as in agro forestry, kitchen gardens, nutrient recycling, and water conservation to maximise sustainable food production;**	Seasonal shortages of food supply as a result of poor harvests caused by droughts and flooding and soil erosion are among the most significant signs of how the agriculture sector is vulnerable to climate change in Rwanda. In order to adapt to this situation, Rwanda intends to mainstream agro ecology technologies in its current agriculture intensification programme and other natural resource-based livelihood programmes. 100% of the households involved in agriculture production will be implementing agro forestry sustainable food production by 2030.	Reduced GHG emissions from land use change
	1.2 Utilising resource recovery and reuse through organic waste composting and wastewater irrigation;	The steep nature of Rwanda's topography coupled with very high population density (415 inhabitants / km^2)[11] leads to several pressures on natural resources, including land, and this remains the main reason for land degradation. Arable lands also show little tolerance when it comes to climate change effects like heavy rains and draughts. In fact, heavy rains lead to soil	Reduction of methane emissions from landfills

[10] Green Growth and climate resilience Strategy, 2011

[11] Fourth Population and Housing Census, 2012

		erosion resulting in fertility decline and low productivity. Rwanda intends to promote recovery and reuse of both organic waste and wastewater in order to restore and maintain soil fertility. Organic waste use through composting, currently used at a small scale, will be implemented to reach 100% of the households involved in agriculture production countrywide by 2030. Waste water irrigation, mainly practiced in correction centers under national prisons services will be implemented countrywide by 2030.	
	1.3 Using fertiliser enriched compost	Rwanda relies on imported inorganic fertilisers for its agriculture intensification activities. For instance, 36000 Mt of these were imported in 2014 and these importations are likelly to increase in the near future. Although good at increasing yields, intensive use of inorganic fertilisers has adverse impacts to the environment in general and climate change in particular. In contrast, the use of organic fertilisers by composting has many environmental benefits whereby it provides an excellent way to manage the huge volume of organic waste and utilise it in a productive manner. The effectiveness of composted organic waste can be further improved by enriching and blending it with nutrients (Nitrogen phosphorus). This technique ensures a more efficient use of inorganic fertilizers, and adds valuable organic matter to soils, which also maximizes terrestrial carbon in farm soils. Rwanda intends to ensure the use of fertilizer enriched compost and shift from using pure inorganic fertilizers by	Reduce GHG emissions from fertilizer manufacturing processes

		2030.	
	1.4 Mainstreaming sustainable pest management techniques to control plant parasites and pathogens	Increasing average temperatures, changes in precipitation and water shortage are seen as climate change aspects that result in pests and diseases proliferation. In order to adapt to this, Rwanda intends to promote sustainable pest management techniques that incorporates a cropping system based on producing multiple crop and fodder yields but which is also designed to control plant parasites and pathogens such as stemborers and striga weed. Rwanda also intends to implement push-pull system using Napier grass and desmodium legume to manage pests under maize, sorghum, millets and rain-fed rice plantations. The main adaptation benefits of the push-pull system are the increase of yields, soil fertility improvement through nitrogen fixation and provision of a continuous supply of fodder to cattle from the harvest of Napier grass and desmodium. Thisimproves milk yields of cattle while reducing methane emissions as a result of improved fodder regimes.	Reduced GHG emissions from enteric fermentation
	1.5 Soil conservation and land husbandry	90% of Rwanda's crop land is on slopes ranging from 5 to 50% which makes it vulnerable to climate change impacts like soil erosion leading to permanent fertility loss. Rwanda intends to expand its soil conservation and land husbandry programmes trough: Installation of land protection structures like radical and progressive terraces where these structures will be installed on 100% of the relevant area by 2030; Development and implementation of an intensive agroforestry programme with	Reduced GHG emissions from farm land and increased carbon sink through agro forestry practices

		a target of covering 100% of arable land by 2030.	
	1.6 Irrigation and water management	The Rwandan agriculture mainly rain fed which makes it vulnerable to weather shocks. Rwanda intends to increase investment in irrigated agriculture to increase production, harness fresh water resources while ensuring food security to its population. Under this action, district irrigation master plans will be designed and small-scale schemes will be developed where possible based on water catchments, and farmer organisations trained in their development. Agricultural land fitted with operational irrigation infrastructure was estimated at 4% of the total land with irrigation potential in 2012. The overall target of the new irrigation programme is to reach 11% by 2030.	Efficient use of irrigation water reduce nitrogen losses including nitrous oxide emissions.
2. Agricultural diversity in local and export markets	**2.1 Add value to agricultural products through processing to meet its own market demand for food stuffs;**	Food stuff distribution faces challenges when it comes to rural community market places where traded commodities can be damaged under extreme weather conditions. Rwanda intends to expand local markets by constructing market infrastructure, including roofed market facilities, serviceable road and transport networks, developing decentralized village-based agricultural processing centers that incorporate low-carbon sources of energy, such as biogas-digesters and solar driers, and decentralized compost plants. This forms a conduit for agricultural-based trade based on less food miles for regionally and internationally imported food products. Strengthening local markets will also	Reduced GHG emissions as a result of using low carbon energy sources and reduced transport distance.

		build economic resilience in rural areas that is less dependent on linear commodity flows of raw goods leaving rural areas unprocessed and without added value. Group based organizations involved in agriculture production and running agro processing facilities were estimated at 10% of the total operating group based organizations in 2014. The target is for this percentage to increase by up to 90% by 2030. Also the installed capacity of agro processing installations is to reach 1,200,000 MT by 2030 from 400,000 MT[12] in 2014. In addition, Rwanda targets to have 100% of farmers with access to services for post harvest treatment and storage of food crops and reduce post harvest losses to at least 1% by 2030 from 10.4%, 27.4% and 8.3% in 2014 for maize, beans and rice respectively. The use of solar energy in warehouses will be actively promoted.	
Forestry			
Programme of action	**Actions**	**Description and goals/targets**	**Mitigation benefits**
3.Sustainable Forestry, Agroforestry and Biomass Energy	**3.1Promote afforestation/reforestation of designated areas through enhanced germplasm and technical practices in planting and post-planting processes;**	The Rwandan forestry sector provides the main part of the primary energy needs (97% of cooking energy) to the population. Since 2002, there have been consistent gap in wood products supply and demand with deficits reaching 12 million cubic meters in 2009. This deficit shows how the forest sector is and likely to remain under pressure.In order to deal with this main issue, Rwanda intends to improve the management of its forest resources by increasing efforts in using quality germplasm, planting	Reduced GHG emissions through sequestration

[12] Metric Tons

		trees at the right time (rain season) and improving post-planting care,. Furthermore, the country intends to use mixed-species approaches which contribute greatly to the achievement of both mitigation objectives and adaptation benefits of ecosystem resilience and biodiversity. Through this strategic action, the country's target is to achieve an overall 30% sustained forest cover of the total national land surface by 2030 from 28.8% in 2013.	
	3.2 Employ Improved Forest Management for degraded forest resources;	Land scarcity is a primary constraint to the expansion of Rwanda's forest resources. Rwanda should maximize the productivity of its many degraded forest plantations which present an opportunity to increase biomass supply without converting additional land. By 2030, Rwanda will implement public private partnerships to sustainably managing all forestry plantations through multiyear contracts with forests operators (in cooperatives) who will plant and maintain young plantations until they reach their commercial size.	Reduced GHG emissions through sequestration
Tourism			
Programme of action	**Actions**	**Description and goals/targets**	**Mitigation benefits**
4.Ecotourism, Conservation and Payment for Ecosystem Services Promotion in Protected Areas	**4.1 Maximise business tourism (the largest source of export revenues) through strategic conference management in order maximise the distribution and volume of business travellers**	Rwanda will promote business conferences in efforts to maximize the distribution and volume of business travelers throughout the year. These efforts will result in increased bed occupancy at available hotels and lodges within Kigali, and subsequent visitation to its surroundings including Volcanoes National Park (VNP), Nyungwe forest and Akagera National Park	

	throughout the year	Through this strategic action, Rwanda expects business and leisure tourists to increase from 545,000 people in 2012 to 1,262,000 people in 2030.	
Water			
Programme of action	**Actions**	**Description and goals/targets**	**Mitigation benefits**
5.Integrated Water Resource Management and Planning	**5.1Establish a national integrated water resource management framework that incorporates district and community-based catchment management;**	Rwanda will integrate management of water resources at the district and community levels, define catchment wide responsibilities, cluster catchment partner-districts according to sub-catchment regions, and improve understanding of water users within districts and catchments. The national framework for IWRM will be cascaded down to district and catchment levels. To this end, catchments committees and water users associations (WUAs) will be established and trained at district level to cover all the 30 districts by 2030. Also, detailed catchment management plans have will be developed and implemented for all the nine identified main catchments areas by 2030.	IWRM is expected to result in improved water resources in both quality and quantity. This will increase opportunities for hydropower development thus reducing emissions from fossil fuels used for electrical power generation.
	5.2 Develop water resource models, improved meteorological services, water quality testing, and improved hydro-related information management;	To allow precise planning of water resources and improved allocation, Rwanda will develop water balances at district and catchment levels, supported by hydrological models, improved rainfall monitoring, and a better understanding of agro-meteorology and water quality testing. The important national water datasets will be identified to enable monitoring of the water balance, model abstraction and future demand. Furthermore, assessments will be undertaken of water resources under a range of climate change scenarios. In this regard,	

		surface water quality monitoring will be carried out on selected sites of main rivers. All the existing 53 gauging stations will be upgraded to automated real time data stations by 2030.	
	5.3 Develop a National Water Security Plan to employ water storage and rain water harvesting, water conservation practices, efficient irrigation, and other water efficient technologies.	Rwanda will establish a comprehensive National Water Security Plan to expand water storage and irrigation infrastructure, rainwater harvesting, water conservation and water efficiency practices. This strategic action brings together the national policies and strategies for irrigation, water supply and sanitation, IWRM and energy. In this regard, an assessment of the current water storage capacity will be carried out and the improved water storage will be the main outcome of the assessment with reference to the IWRM subsector strategic plan. Rwanda will also implement the water resources master plan which identified potential sites for multipurpose dam construction countrywide for improved water storage. In addition to the detailed design for one of the identified, others will be initiated and finished by 2030. Rainwater harvesting will also be mandatory and will be made an integral part building codes by 2030.	
Land use			
Programme of action	**Actions**	**Description and goals/targets**	**Mitigation benefits**
6.Integrated approach to Sustainable Land Use Planning and Management	**6.1 Employ an integrated approach to planning and sustainable land use management;**	Given the size of the country and its very high demographic pressure, competition for land will continue to grow with increasing pressures from agriculture and livestock making land resources more vulnerable to climate change impacts. Encroachment on sensitive areas will persist until land	Combined actions under this programme will result in availing more land space which might be

		reforms are completed. Rwanda will implement rigorous planning and zoning regulatory framework to manage the changing demands on land. In addition to initiatives like systematic land registration and implementation of land tenure regularization reform. Rwanda intends to reduce the plot size for single family houses from current 600 m^2 to 300 m^2 by 2016 and to 225 m^2 by 2030.	converted to others uses such as new forest plantations thus serving as carbon sink.
	6.2Improve spatial data by harnessing ICT and GIS (Geographic Information System) technology;	Rwanda will develop National Spatial Data Infrastructure (SDI) to manage the nation's land information resources and to identify the fundamental datasets required to manage land and water resources, monitor land use and environmental change, support economic development, and enable Rwanda to better plan, monitor, and respond to the impacts of climate change. It is planned that the establishment of the National Spatial Data Infrastructure will be operational by 2030.	This strategic action will result in better estimations of GHG emissions from land use, land use change and forestry thus improving planning and implementatio n of specific mitigation actions for the same sector.
Cross cutting			
Programme of action	**Actions**	**Description and goals/targets**	**Mitigation benefits**
7.Disaster Management	**7.1 Conduct risk assessments and vulnerability mapping**	Specific risk and vulnerability assessments are key for better planning and implementation of relevant adaptation actions. In addition to the countrywide vulnerability index that was completed recently, Rwanda will conduct risk assessments and initiate	

		vulnerability mapping to develop effective disaster management systems. Risk assessments will be conducted and completed countrywide by 2030. Every five years, Rwanda will be updating the recently developed climate change vulnerability index as to reflect the real situation of vulnerability to Climate change at any given time in the country. In addition, other assessments (such as national communication) with a vulnerability assessment will be conducted periodically.	
	7.2 Establish an integrated early-warning system, and disaster response plans	Rwanda is exposed to climate related disasters like droughts, floods and landslides. In addition to existing disaster management initiatives mainly focusing on preparedness, assessment, mitigation and disaster reduction , Rwanda will establish and early-warning system in order to prevent the impact of natural climate disasters on humans. Rwanda will also improve its capacity in disaster preparedness and mobilization and distribution of relief to populations affected by specific disaster events.	
8.**Climate data and projections**	**7.3 Employ community-based disaster risk reduction (DRR) programmes designed around local environmental and economic conditions, to mobilise local capacity in emergency response, and to**	Rwanda will implement the following community based DRR activities: improved farming techniques that mitigate flood and landslide impacts; first aid training; and environmental and public health awareness for disease prevention, particularly following flood and storm episodes. In order to reduce locally-specific hazards, relocation from high risk zones is considered as one of the strategic actions. In addition to households previously relocated from high risk zones, Rwanda will relocate additional 30 000 households by 2030.	

	reduce locally-specific hazards		
	8.1 Improve observation facilities to provide all climate information necessary for future monitoring, climate trend detection, management of climate variability, early warning and disaster management	Rwanda will establish of additional observations in order to provide climate information necessary for future monitoring, climate trend detection, management of climate variability, early warning and disaster management by upgrading and maintenance of existing stations and calibration of meteorological instruments including weather radar.	

MITIGATION CONTRIBUTION	
Timeframe	up to 2030
Type of Contribution	Emission reductions from projected emissions resulting from the deviation of BAU emissions for the year 2030 based on policies /actions conditional on availability of international support for finance, technology and capacity building.
Estimated GHG emissions reduction	Estimated impact of policies/actions is underway and will be informed by the Third National Communication Report which will be completed by 2017.
Sectors covered	Energy, Transport , Industry, Waste and Forestry,
GHG covered	CO_2, N_2O, CH_4.
Mitigation actions	
Vision for mitigation	On the road to a low carbon economy, Rwanda aims to achieve Energy Security and a Low Carbon Energy Supply that support the development of Green Industry and Services and avoids deforestation.

Energy				
Programme of action	**Actions**	**Description and targets**		**Adaptation benefits**
		Baseline scenario	**Mitigation scenario**	
1.Low carbon energy mix	**1.1 Establishment of new grid connected renewable electricity**	In the current national energy mix , fossil fuel	Rwanda will increase the share of renewable	Through these initiatives, there will be

	generation capacity in the form of large-scale hydro power plants and solar PV power	electricity generation makes 32% of the total generation capacity, with a projection of 46% in 2020 and much more in 2030 under business as usual scenario. s	energy in country power generation through construction of hydro, solar power plants and methane to electricity power plantshenceshiftin g from using fossil fuels for its electricity needs. Further to this, Rwanda is committed to create a regional interconnectivity through construction of new transmission lines and sub-stations and will improve/upgrade existing ones This will allow the import of electricity that would be otherwise generated from fossil fuel power plants (diesel or peat power plant) to meet the fututе supply and demand for energy.	creation of off farm jobs thus increasing adaptive capacities of local communities. Availed electricity will create more opportunities for diversified commercial activities in the construction industry and services for example.
2.Sustainable Small Scale energy installation	**2.1 Installation of solar PV mini-grids in rural communities.**	Rural communities depend mainly on kerosene for their	Rwanda will establish up to 100 solar PV mini-grids in rural	Rural electrification will create additional

		lighting needs, wood fuel and agriculture residues for their cooking needs.	communities, with total capacity of up to 9.4 MWp and will establish rural productive zones using electricty for increasing the income generating potential of rural communities.	income generating activities for communities and lowers some of the daily energy-related burdens of community members, It will also contribute to the success of forestry management programmes where wood fuels are replaced by electricity
3.Energy efficiency and demand side management	**3.1 Increase energy efficiency through demand-side measures and grid-loss reduction**	Currently demand side management is not well undertaken in Rwanda and grid losses are estimated at 23%	Through the energy utility, Rwanda will establish dedicated energy efficiency and demand side management unit to oversee the design and implementation of relevant efficiency programs to clip electrical peak demand. The dedicated unit will also be in charge of planning and implementing measures aiming	Demand side management and energy efficiency initiatives would increase opportunities of more off farm jobs.

			at reducing grid losses. These are expected to drop from 23% c to 7.8% by 2030. The unit will also investigate expanding and managing bulk procurement and distribution of [13]CFLs for residential customers (based on current consumption and end-user affordability) with targeted subsidies for retrofits.	
	3.2 Promote environmentally sustainable use of biomass fuels	Biomass is almost wholly relied on for cooking and related uses by both urban and rural households. The single most important appliance in the biomass sector is the cookstove. This determines the efficiency with which biomass is used. Wood fuel consumption including charcoal was estmated at 4.2 Mt/year in 2010. With	Given the fact that poor performing cook stoves are still used in most cases leading to inefficiencies in fuel consumption and health effects, Rwanda intends to increase the diffusion of improved cook stoves and reach 100% of all households in needs 2030. Additional supporting initiatives are mainly the	Adaptation benefits under these initiatives rely in the fact that they will result in reduced deforestation thus ensuring sustainable basic energy source. Further to this, indoor airpollution will be reduced and quality of life improved. Revenues will also increase as a result of

[13] Compact fluorescent lights

		continued population growth and urbanisation , this consumption will exceed 11Mt/year by 2030 under the business as usual scenario.	installation of 35 000 domestic biogas digesters and 15 institutional biogas digesters annually, and increasing average charcoal yields up to 50% by 2030. In addition, Rwanda will enhance the use of LPG[14] through tax reductions on importations.	energy savings.
Transport				
Programme of action	**Actions**	**Description and targets**		**Adaptation benefits**
		Baseline scenario	**Mitigation scenario**	
4.Efficient resilient transport system	**4.1 Bus Promotion of public transport, improvement of transport infrastructure, setting vehicles' emission standards and regulations and integrated national transportation planning**	The Rwandan transport sector is experiencing a rapid growth of vihicles population and an increase in light duty vehicles equipped with (post-1998 era) 3-way catalytic converters. It is expected that under the busines as usual scenario, the annual increase in population vehicles will reach 16.5% from 12%	A high rate increase in population of vehicles and light duty vehicles would lead to the high GHG emission scenarios in the future as explained in the BAU. To avoid these emissions, By 2030, Rwanda will implement the following actions:Construction of central Bus Terminal(s) and Customer Service	Increase of climate resilience by creating affordable, reliable and accessible transport services to the community.

[14] Liquefied Petroleum Gas

		while light duty vehicles will increase 20% by 2030.	Centers inKigali,Standardized Route Optimization planning and implementation,Planning, rehabilitation and construction of intra-modal passenger terminals, Construction of 17 km BRT main corridor and 6 modern interchanges which will results in GHG emissions reductions estimated 1,260,000 tCO_2e.Construction of dedicated "rush hour" high speed bus lanes, Improvement of traffic and pedestrian controls and street lighting using solar pannels Enforcing Fleet renewal and scrappage (heavy, medium, mini-bus), Setting emission standards (equivalent to Euro standards)	

			for new vehicles, Use of higher fuel efficiencies and low carbon technologies for new vehicles, Standardized compliance and inspections for non-Rwandan registered vehicles,Integration with International Airport and convention/business center.	
Industry				
Programme of action	**Actions**	**Description and targets**		**Adaptation benefits**
		Baseline scenario	**Mitigation scenario**	
5.Green industry and private sector development	**5.1Scale up resource efficiency to reduce energy demand in agro processing industries**	Industrial emissions are mainly resulting from non efficient technologies that are being used by plants during the production process. As Rwanda pursues industrialization and development,under the BUA scenario, the industrial sector is expected to be the fastest growing sources of GHG emissions.	Under the mitigation scenario, Rwanda is committed to achieve energy efficiency by starting with agro-processing industries as large consumers of wood fuels. By 2030, Rwanda intends to avoid total GHG emission reductions of 146,000 tCO2e from Tea and Coffee industries. This action will	These initiatives will lower consumption of wood fuels thus sustaining adaptation roles of forests.

			focus on e energy efficiency improvements through the installation of less energy intensive equipments and technologies for drying, roasting packaging, improvements of water efficiency through loss minimization, recycling and reuse.	
	5.2 Establishment of Eco-industrial park of Green Industry complex	Rwanda has prioritized the development of industrial parks and special economic zones (SEZs) for export oriented markets. Development of such industrial parks will require significant energy and the concept of establishing green industrial parks will focus on reducing the carbon footprint of goods produced in these industrial zones through a greater use of renewable, energy efficient technologies and	Rwanda will establish Eco-Industrial Parks / Green Industries Complex where following principles will be applied: The production of goods and services in the industrial park must, at a minimum comply with defined standards; Any CO_2 emissions that remains after consideration of heating, cooling, fixed lighting and ventilation must be less that or equal to a pre defined carbon compliance limit.	

		shared resources.	Any remaining CO2 emissions, from regulated energy sources must be reduced to zero The actual emission reduction potential can vary greatly based on the actual level of low carbon technologies implemented and in implementing "zero-carbon" principle, the emission reduction potential can be as high as 80-100% compared to a baseline based only on carbon intensive energy source.	
Waste				
Programme of action	**Actions**	**Description and targets**		**Adaptation benefits**
		Baseline scenario	**Mitigation scenario**	
6.Implementation of Low carbon urban systems	**6.1 Utilization of urban waste as a high value resource stream**	Under the BAU, the waste sector will undergo substantial growth in the future based on expected population growth and urbanisation. The majority of solid waste collected in urban areas is centrally	With respect to the urban waste management By 2030, Rwanda is committed to achieve the following : Development and implementation of landfill regulations in all urban areas , Extraction and	Creation of off farm jobs during the implementation and operation phases thus enhancing climate resilience capacity of local

		deposited. With this continued trend the expected baseline scenario of annual GHG emissions from landfills will be high.	utilization of Landfill Gas (LFG) for power generation; approximately 586,000 tCO2e will be reduced from this action.	communities
Forestry				
Programme of action	**Actions**	**Description and targets**		**Adaptation benefits**
		Baseline scenario	**Mitigation scenario**	
7.Sustainable Forestry, Agro forestry and Biomass Energy	**7.1 Mandate licensing of sustainable charcoal production techniques**	In 2012 Rwanda had a sink (or negative emissions) of -2,540,000 tCO2e. It is difficult to directly predict the future use of wood resources or BAU, due to various streams of use, therefore the mitigation (sink) potential is derived for the savings of wood resources not used under alternative emission scenarios.	Rwanda will apply a Sustainable Charcoal Value Chain to reduce the demand of wood in charcoal production and downstream activities, leading to a potential net reduction in wood use of approximately 5,770,000 t between 2016 – 2030 (equal to 5,770,000 tCO_2 saved).	Most notable benefits resulting from this measure are mainly; improved forest productivity, improved access to efficiently produced domestic fuels, jobs creation, and potential lower fuel (charcoal) cost.
Fairness, equity, ambition and means of implementation (cross-cutting for both mitigation and adaptation)				
Fairness, equity and ambition	Rwanda is part of the Least Developed Countries and has a low human development index according to the Human Development Report 2014. The country is still facing social and economic challenges addressed in the Economic Development and Poverty Reduction Strategy (2013 - 2018). Adaptation is the first priority of the country due to high vulnerability of key economic activities such as agriculture, energy and forestry. In addition, Rwanda has one of the lowest GHG emissions per capita in the world estimated at 0.99			

	tCO2eq/person (2013)[15]. It should also be noted that the net emissions of Rwanda as per second national communication (emissions net of sequestration) were negative in 2005. Despite this, Rwanda has established mitigation targets in different sectors through its Green Growth and Climate Resilience Strategy and mainstreamed Green Economy in its Economic Development and Poverty Reduction Strategy. In this context, Rwanda considers that its Contribution is equitable and ambitious.
Planning processes	Rwanda's INDC has been developed taking into consideration various national guiding documents, including Green Growth and Climate Resilience Strategy (2011), Vision 2020, Economic Development and Poverty Reduction Strategy 2 (2013 - 2018), Sustainable Energy for All (2015 - 2030), and others. The development of this INDC was achieved through a participatory and transparent process through stakeholder consultations and workshops.
Means of Implementation	The Government of Rwanda already spends a substantial portion of its annual budget on infrastructure and the provision of social services, which contribute to low carbon and build climate resilience. However, the full implementation of this INDC will require predictable, sustainable and reliable support in the form of finance, capacity building and technology transfer. The initial costing of implementing the green growth and climate resilience strategy indicated that Rwanda will need 24.15 Billion USD in the sector of Water resource management, Agriculture and Energy up to 2030[16]. Costing of the remaining sectors will give the clear indication of financial needs. Rwanda successfully completed its Technology Needs Assessment (TNA). Elements of Rwanda's TNA process included institutional arrangements for TNA, extensive stakeholders' involvement and consultations, prioritization of sectors, barrier/market analysis and Technology Action Plans (TAP). Prioritized sectors in Rwanda's TNA were agriculture and energy.
Monitoring and reporting progress and MRV	The Republic of Rwanda through the Ministry of Natural Resources hold the responsibility to monitor and evaluate the implementation of INDCs through regular statutory stakeholders' consultative engagement including the Environment and Natural Resources Joint Sector Review (JSR) meetings. This will

[15] The Republic of Rwanda Statistical Yearbook 2014

[16] Report on Costing of Green Growth and Climate Resilience Strategy

	ensure the effective updating and implementation of both mitigation and adaptation plans.
Institutional arrangements	At the institutional level, the Ministry of Natural Resources (MINIRENA) is the Ministry responsible for formulating and monitoring national policies related to climate change and environment, while the Rwanda Environment Management Authority (REMA) is the official organ responsible for implementing national policies and strategies related to climate change and environment. A successful implementation of this INDC requires a close coordination and collaboration between MINIRENA, REMA and all potential stakeholders incuding the private sector, civil society and public institutions including Ministry of Agriculture and Animal Resources, the Ministry of Trade and Industry, Ministry of Local Government, the Ministry of Infrastructure, Ministry of Education, Ministry of Health, the Ministry of Finance and Economic Planning, Ministry of Disaster Management and Refugee Affairs, Rwanda Meteorology Agency, National Institute of Statistics, Rwanda Development Board, Rwanda Standards Board, Rwanda Agriculture Board; Rwanda Energy Group; Water and Sanitation Corporation; Rwanda Natural Resources Authority; Rwanda Biomedical Centre; Rwanda Transport Development Agency; Rwanda Housing Authority; Rwanda Revenue Authority; National Industrial Research and Development Agency; research centers and Universities. In order to coordinate and monitor the implementation of the adaptation and mitigation actions in the different sectors, Rwanda has set up different bodies and operationalized institutional arrangements, namely the Green Economy Technical Coordinating Committee and the National Fund for Environment and Climate change (FONERWA) as a national green fund to mobilize additional internal and external climate funds. In addition, MINIRENA has been accredited as implementing entity for Adaptation Fund and Green Climate Fund (GCF) while REMA has been nominated as national designated authority for GCF. These institutions are based on a sectorwide approach and work closely with development partners, civil society, academia and the private sector.
Participation in international market mechanism and other emission reduction mechanisms	The Government of Rwanda intends to sell carbon credits during the period to contribute towards achieving its Green Growth and Climate Resilience Strategy. Rwanda will also participate in other international emissions reduction mechanisms such as the Clean Development Mechanism (CDM), Nationally Appropriate Mitigation Actions (NAMAs), and the mechanism for Reducing Emissions from Deforestation and Forest Degradation (REDD+). Rwanda supports the development of effective accounting rules under the UNFCCC to guarantee the environmental integrity of market mechanisms.

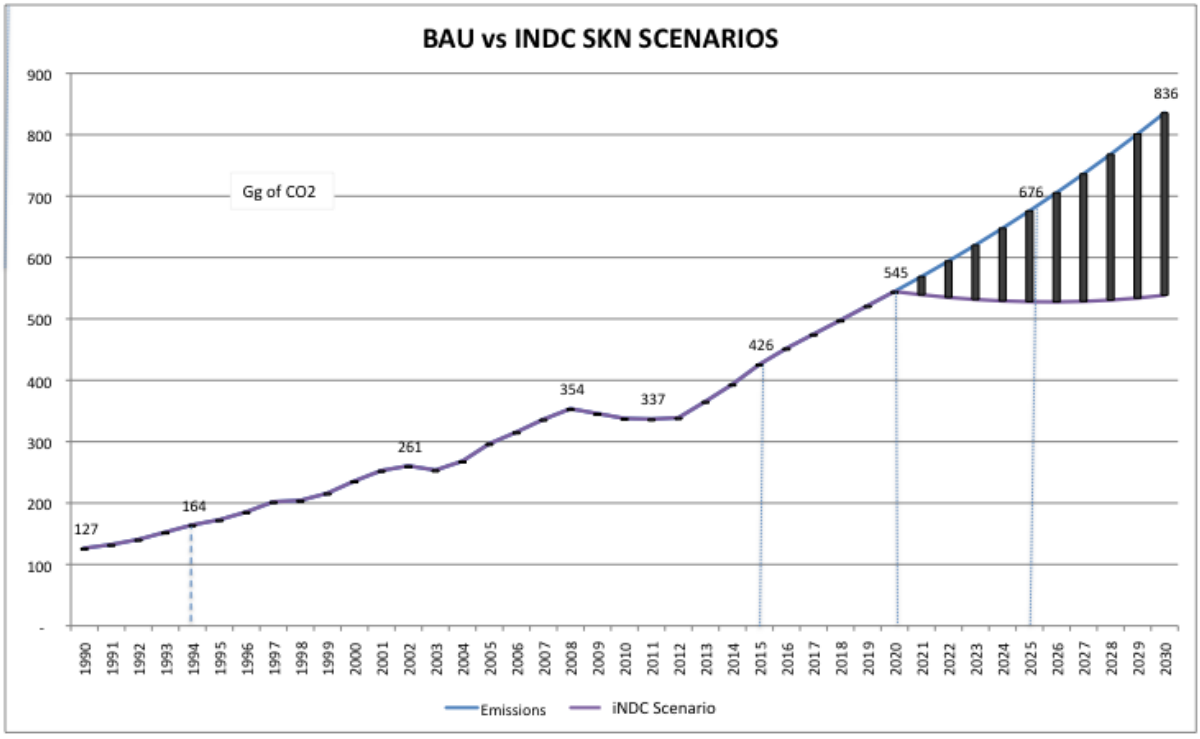
THE INTENDED NATIONAL DETERMINED CONTRIBUTIONS
FOR
THE FEDERATION OF ST. KITTS AND NEVIS

The **Federation of Saint Kitts and Nevis** is a democratic and sovereign country. The impacts of Climate Change are global and St. Kitts and Nevis, along with the International community are committed to addressing the adverse effects. In addition, climate change is one of the most critical issues facing the Caribbean region and it is already being experienced through rising sea levels, increasing mean temperatures and changes in rainfall and weather patterns. All these impacts, in many ways, affect the socio-economic development of the country in sectors such as St. Kitts and Nevis Tourism, Agriculture and Water.

St. Kitts and Nevis sustainability, as a nation, is dependent upon the collective and global response to aggressively reduce St. Kitts and Nevis Greenhouse gas emissions (GHG). In this regard the Federation of St. Kitts and Nevis proposes an emissions reduction target of 22% and 35% of St. Kitts and Nevis GHG emissions projected in the business as usual (BAU) scenario for 2025 and 2030 respectively.

The National Conservation and Environmental Protection Act (NCEPA) articulates strategic approaches to environmental protection, and serves as a framework for the declaration of sensitive ecological and historic sites that presents clearly vulnerability to climate change and vulnerability.

The Federation of Saint Kitts and Nevis, hereby communicates its Intended Nationally Determined Contribution (iNDC) towards achieving the UNFCCC objective as set out in Article 2 of the Convention, and in accordance with decisions 1/CP.19 and 1/CP.20.



MITIGATION CONTRIBUTION

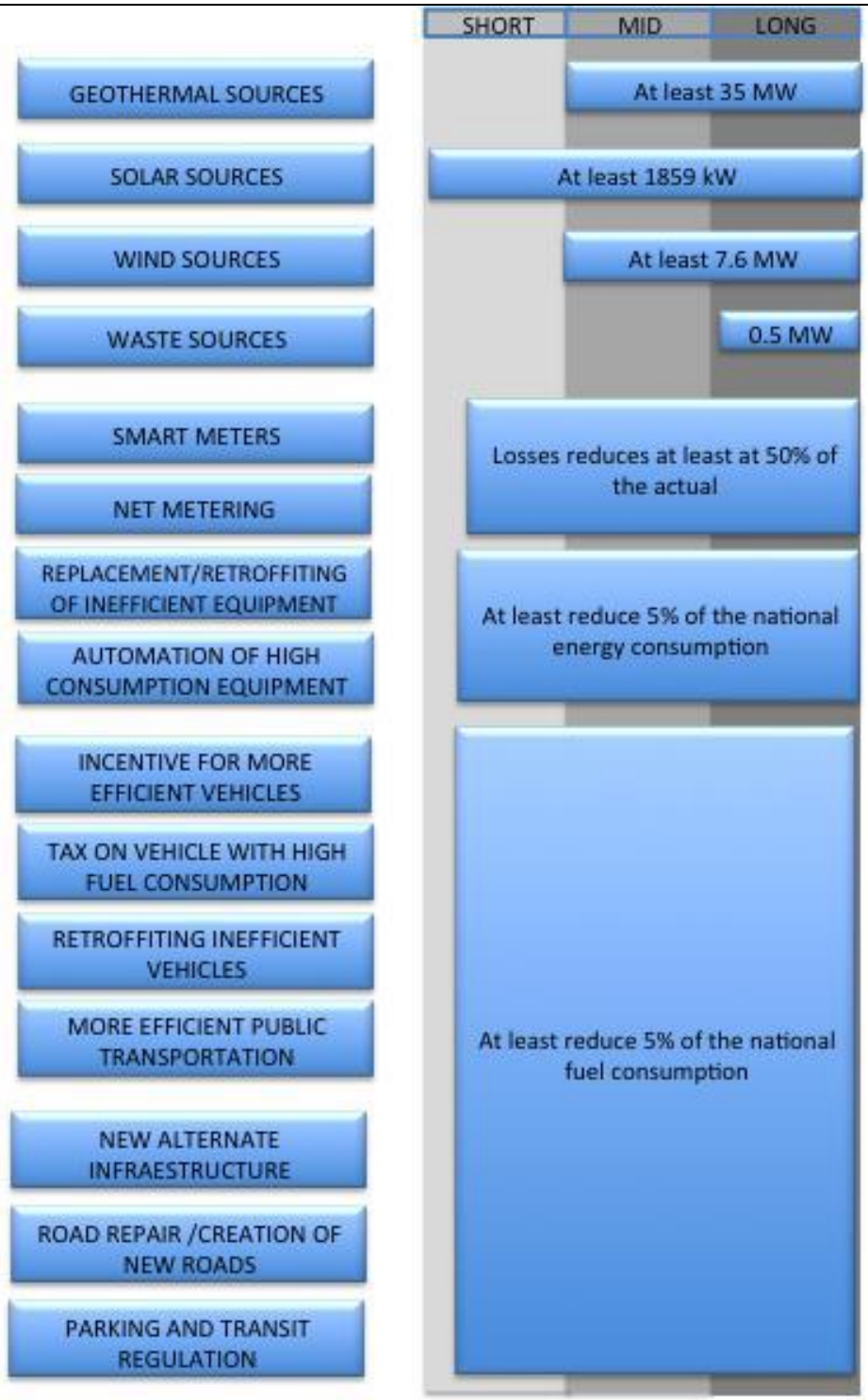
<table>
<tr><td>The reference point</td><td colspan="2">22% of the absolute GHG from the Business as Usual (BAU) in 2025.
35% of the absolute GHG from the BAU in 2030.</td></tr>
<tr><td>Time frame and/or Implementation period</td><td colspan="2">The time frame to implement the iNDC is from 2020-2030, mid-term review in 2025.</td></tr>
<tr><td>Type of commitment or contribution</td><td colspan="2">St. Kitts and Nevis type of commitment is in terms of absolutes numbers GHG reduction from the BAU.</td></tr>
<tr><td rowspan="3">Scope and coverage</td><td rowspan="3">All the economic sectors are covered and targeted into St. Kitts and Nevis' national contributions, but with special attention to the Energy and Transport sectors, since they are the highest contributors to the GHG national matrix. The high percentage of consumption is based on fossil fuels.</td><td>GHG coverage: CO2</td></tr>
<tr><td>Geographical coverage: National</td></tr>
<tr><td>Percentage of National coverage: 100%</td></tr>
<tr><td>Planning processes</td><td colspan="2">The iNDC preparation has been built upon from previous climate and non-climate activities and includes a consultative process, involving key actors to obtain useful information at the sectoral level.

The implementation process is still under discussion to ensure that there is highest participation and ownership from the key actors. A very comprehensive plan for the implementation phase must take place to track and monitor the policies and measures within the iNDC.</td></tr>
<tr><td>Assumptions and methodological approaches</td><td colspan="2">The methodology used to measure and monitor St. Kitts and Nevis' national contributions is "Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories".

St. Kitts and Nevis' iNDC is conditional and based on the availability of financing and technological support.</td></tr>
</table>

	St. Kitts and Nevis supports the inclusion of the International Carbon Markets and any other Market Mechanisms in a post-2020 agreement on climate change and any future emission reductions pre-2020, should be accounted as part of our contributions.
Level of ambition in iNDC	St. Kitts and Nevis is committed to tackling the adverse impacts of climate change. It considers its iNDC to be ambitious and continues to exhibit evidence of environmentally sound development. Furthermore, St. Kitts and Nevis' inventories of GHGs demonstrate that the country is a net sink for global carbon emissions, although like other Small Island Developing States, it is expected to bear the brunt of the impacts. St. Kitts and Nevis proposes to reduce its GHG emissions by focusing on electricity generation and the transport sector. Under its proposed mitigation actions it is intended that the policies and measures would increase the use of renewable energy sources by 50%, taking into consideration that this ambitious target could be considered risky within the short time frame. To reduce the risk St. Kitts and Nevis must ensure that the relevant policies and measures are created within its natural, financial, technological and human resources to implement the measures necessary to achieve the intended emissions reductions.

Policies and Measures



* Details in Annex1.

Estimation of GHG impacts

Value/Year	BAU Gg de CO2	INDC Scenario Gg de CO2	Impact on Emissions Reduction	%
2025	676	528	148	22%
2030	836	540	296	35%

ADAPTATION CONTRIBUTION

The Federation of Saint Kitts and Nevis is committed to building resilience and mitigating the negative impacts of external shocks including natural disasters, according to NCEPA, and many others institutional and regulation requirement that have been developed in the country.

For St. Kitts and Nevis the most vulnerable sectors and areas include:

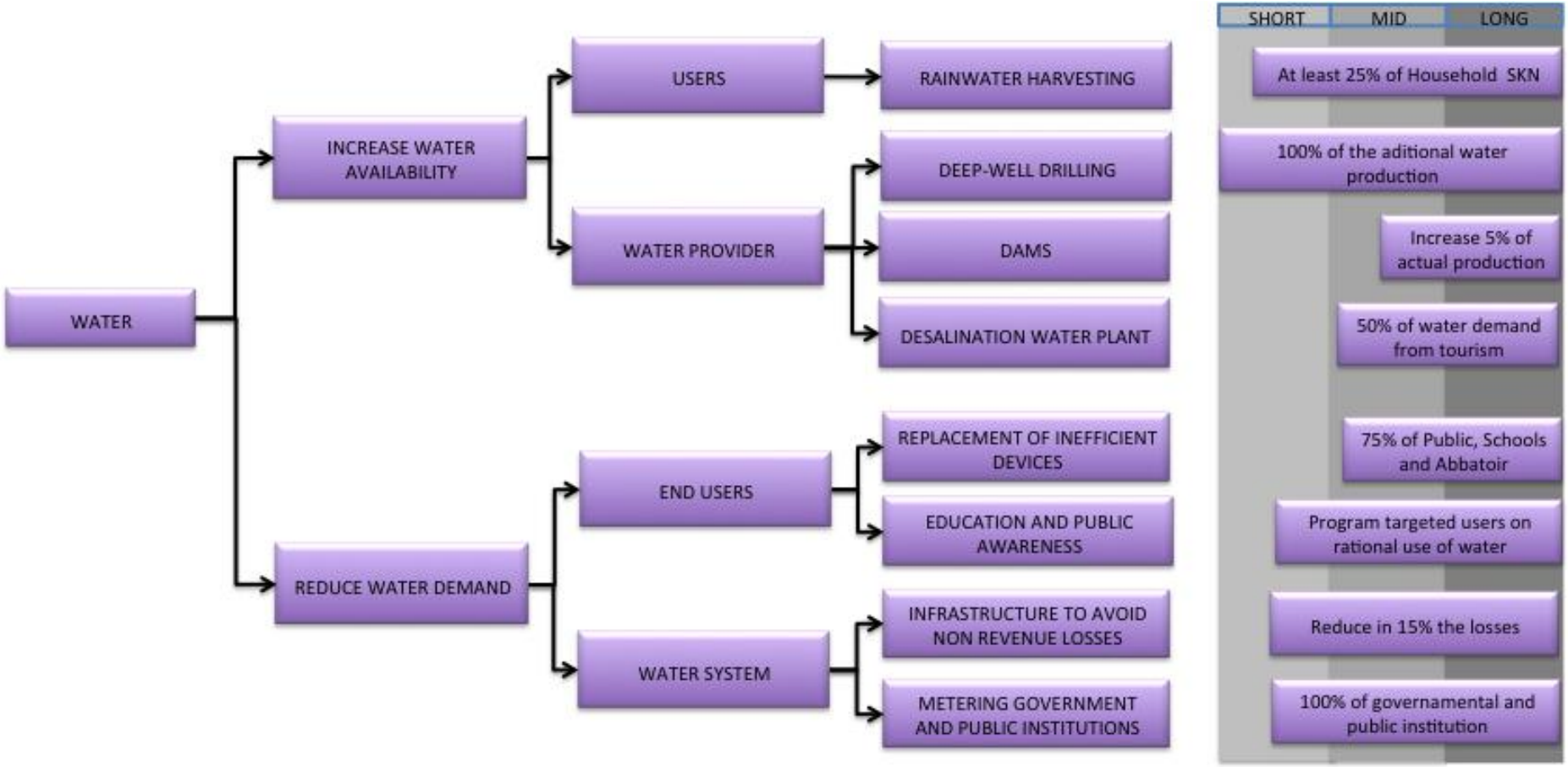
- Forestry and Terrestrial Ecosystems
- Coastal Ecosystems
- Water resources
- Human Settlements
- Agriculture
- Tourism
- Human Health

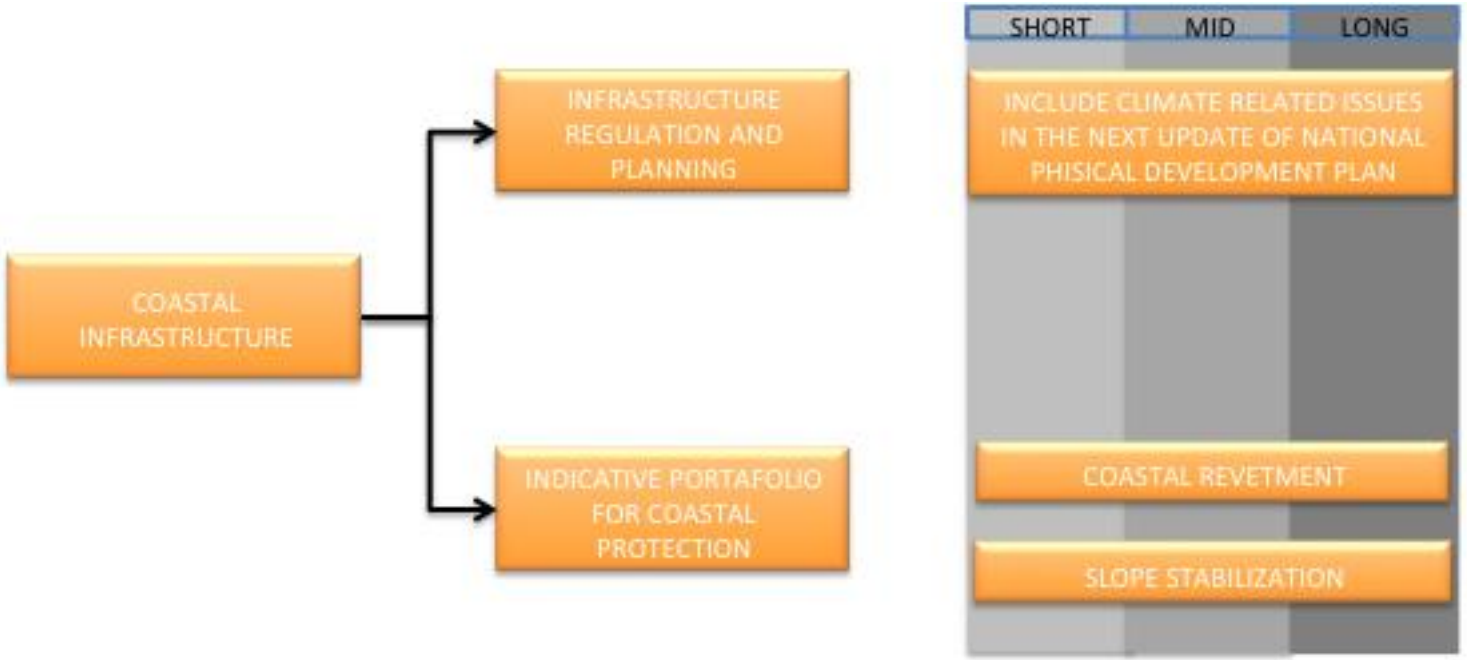
Climate change is one of the major threats for key vulnerable sectors that are linked to vital pillars for sustainable development. Forestry and water supply are intimately linked to potable water, tourism, and agriculture. Moreover, St. Kitts and Nevis, a twin island state, is abundant in nearshore and marine resources which provide the basis for a range of economic and social activity relevant to the tourism and fishing industries. Some of these marine resources include coral reefs, beaches, mangroves, freshwater lagoons and sea-grass beds. Tourism, water supply and coastal infrastructure, are also being affected by the sea-level rise, saline intrusion and flooding.

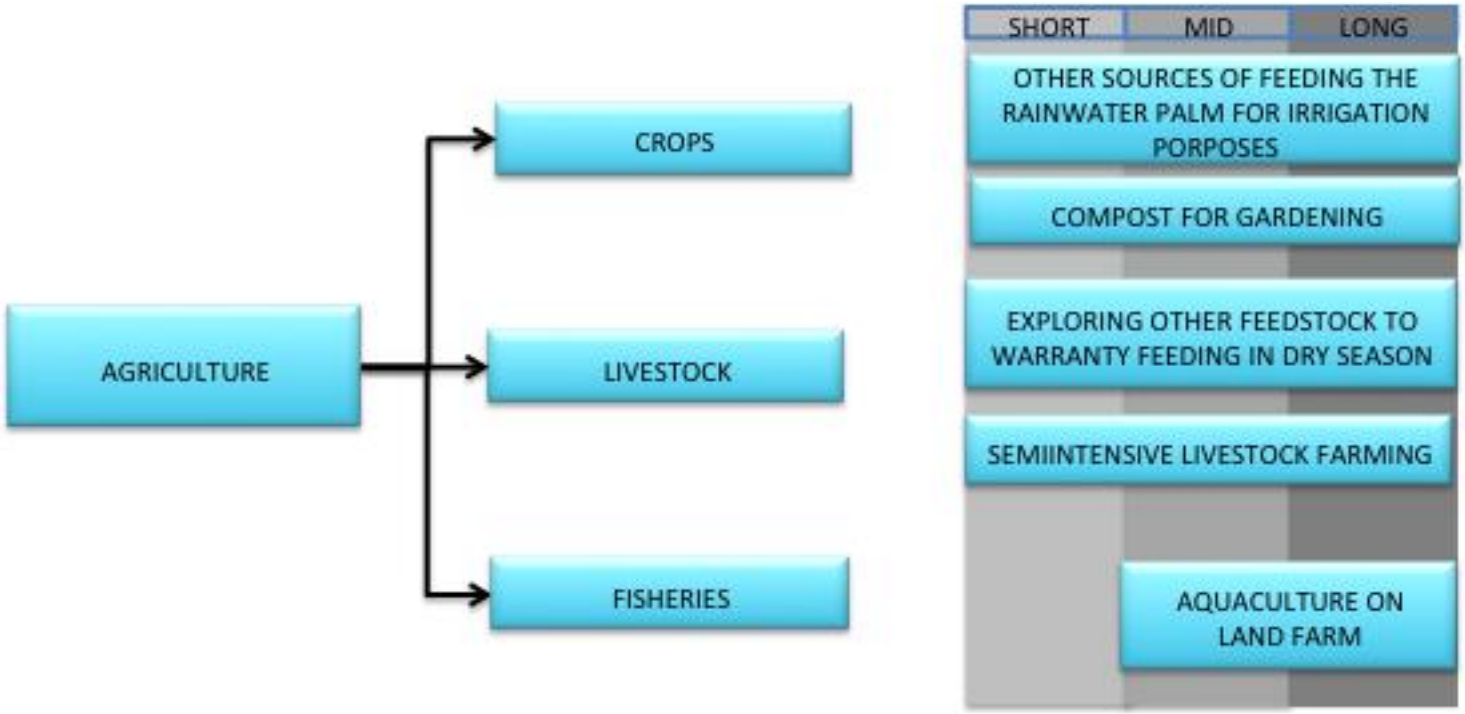
St. Kitts and Nevis wishes to highlight three areas in its iNDC that are considered important to its social and economic sustainability and their interlinkages with others sectors.

- Water
- Agriculture
- Coastal zone

St. Kitts and Nevis plans develop a comprehensive plan to build resilience in the following sectors:


WATER
INCREASE WATER AVAILABILITY
REDUCE WATER DEMAND
USERS
WATER PROVIDER
END USERS
WATER SYSTEM
RAINWATER HARVESTING
DEEP-WELL DRILLING
DAMS
DESALINATION WATER PLANT
REPLACEMENT OF INEFFICIENT DEVICES
EDUCATION AND PUBLIC AWARENESS
INFRASTRUCTURE TO AVOID NON REVENUE LOSSES
METERING GOVERNMENT AND PUBLIC INSTITUTIONS
SHORT
MID
LONG
At least 25% of Household SKN
100% of the aditional water production
Increase 5% of actual production
50% of water demand from tourism
75% of Public, Schools and Abbatoir
Program targeted users on rational use of water
Reduce in 15% the losses
100% of governamental and public institution


COASTAL INFRASTRUCTURE
INFRASTRUCTURE REGULATION AND PLANNING
INDICATIVE PORTAFOLIO FOR COASTAL PROTECTION
SHORT
MID
LONG
INCLUDE CLIMATE RELATED ISSUES IN THE NEXT UPDATE OF NATIONAL PHISICAL DEVELOPMENT PLAN
COASTAL REVETMENT
SLOPE STABILIZATION

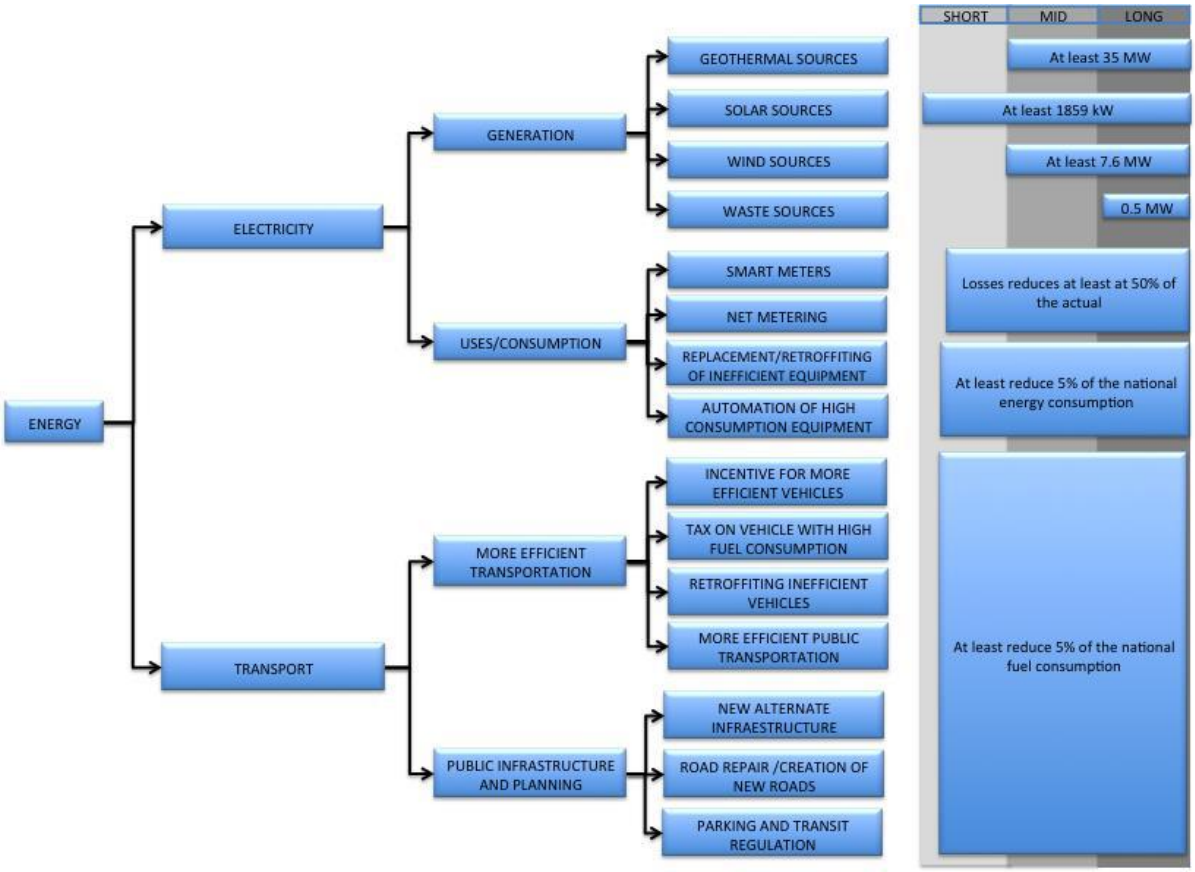

AGRICULTURE
CROPS
LIVESTOCK
FISHERIES
SHORT
MID
LONG
OTHER SOURCES OF FEEDING THE RAINWATER PALM FOR IRRIGATION PORPOSES
COMPOST FOR GARDENING
EXPLORING OTHER FEEDSTOCK TO WARRANTY FEEDING IN DRY SEASON
SEMIINTENSIVE LIVESTOCK FARMING
AQUACULTURE ON LAND FARM

IMPLEMENTATION SUPPORT

St. Kitts and Nevis is aware of the importance of developing a comprehensive plan which must serve as the preparation stage for the implementation process.

In order to ensure the effective implementation of the plan proposed above, the local actors must be involved and therefore empowered and prepared to execute the necessary tasks. The preparation process may require, *inter alia*, technical training, capacity building workshops, expert guidance, and feasibility and technical studies. It is important to highlight the relevance of the institutional capacity, as well as the necessary establishment of institutional coordination and political support to meet the desired national goals. Furthermore, technical and economically feasibility studies for all levels of implementation (actions, projects, programs, policies), as well as a comprehensive analysis for policy implication would be required. It is also relevant to prepare a sectorial financing plan with specific funding sources and disbursement planning to implement the necessary policies and measures.

ANNEX 1:


ENERGY
ELECTRICITY
TRANSPORT
GENERATION
USES/CONSUMPTION
MORE EFFICIENT TRANSPORTATION
PUBLIC INFRASTRUCTURE AND PLANNING
GEOTHERMAL SOURCES
SOLAR SOURCES
WIND SOURCES
WASTE SOURCES
SMART METERS
NET METERING
REPLACEMENT/RETROFFITING OF INEFFICIENT EQUIPMENT
AUTOMATION OF HIGH CONSUMPTION EQUIPMENT
INCENTIVE FOR MORE EFFICIENT VEHICLES
TAX ON VEHICLE WITH HIGH FUEL CONSUMPTION
RETROFFITING INEFFICIENT VEHICLES
MORE EFFICIENT PUBLIC TRANSPORTATION
NEW ALTERNATE INFRAESTRUCTURE
ROAD REPAIR /CREATION OF NEW ROADS
PARKING AND TRANSIT REGULATION
SHORT
MID
LONG
At least 35 MW
At least 1859 kW
At least 7.6 MW
0.5 MW
Losses reduces at least at 50% of the actual
At least reduce 5% of the national energy consumption
At least reduce 5% of the national fuel consumption

SAINT LUCIA

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

Communicated to the UNFCCC on November 17, 2015

NATIONAL CONTEXT

Like all Small Island Developing States (SIDS), Saint Lucia faces an uncertain future as a consequence of both the emerging and anticipated impacts of global climate change on all aspects of its development. These include, but are not limited to, threats to coastal infrastructure and economic assets from sea level rise; the impacts of more intense and possibly more frequent extreme weather events; negative impacts on human and ecosystem health, water, food production and financial services sectors; changes in rainfall distribution and intensity, resulting in both floods and droughts; degradation of coastal resources; and saline intrusion into aquifers. Some of these impacts are already being felt, resulting in high outlays of financial resources for corrective and restorative measures, negative impacts on livelihoods, pressures on public sector finances and loss of life. In addition, Saint Lucia like other SIDS, faces the prospect of irreversible and permanent loss and damage resulting from human-induced climate change, despite best efforts at adaptation and mitigation.

Cognizant of this challenge to its sustainable development, the Government of Saint Lucia has taken decisive measures to address the climate change phenomenon. As a first step, Saint Lucia ratified the United Nations Framework Convention on Climate Change (UNFCCC) in June 1993 and the Kyoto Protocol in August 2003. It has also met its commitments under Article 4 (1) by submitting its Initial National Communication to the Conference of the Parties in 2001 and its Second National Communication (SNC) in 2012. The country is currently preparing its Third National Communication (TNC) for submission in 2016.

Under the Initial National Communication process, vulnerability and adaptation assessments of key economic, social and environmental sectors were conducted and used as the basis for preparing the 2003 National Climate Change Policy and Adaptation Plan. An updated version of this plan was endorsed by the Cabinet of Ministers in 2015. In addition, several sector-focused vulnerability assessments were conducted to inform related adaptation policies and interventions. Government and the local NGO community have also undertaken sector-based and wider public education and awareness programmes to inform various publics of the anticipated and emerging consequences of climate change and to seek to build resilience to these impacts.

Saint Lucia's greenhouse gas emissions are miniscule in global terms, with the country having contributed approximately 0.0015% of global emissions in 2010 at a per capita rate of 3.88 tCO_2-eq. Notwithstanding this low contribution to the climate change phenomenon, the

country is committed to global efforts to reduce greenhouse gas emissions to levels which will restrict global temperature increase to well below 1.5^0C above preindustrial levels.

To this end, the country developed a Sustainable Energy Plan in 2001 and has committed to providing up to 35% of electricity generation from renewable sources by 2020. The country's commitment is further reflected in its Energy Policy (2010) and the ongoing review of the Electricity Supply Services Act to help to create an enabling environment to achieve this goal.

Against this background, the Government of Saint Lucia responds to Decisions 1/CP.19 and 1/CP.20 of the Conference of the Parties to the UNFCCC by communicating to the Parties its intended Nationally Determined Contribution to global efforts to reduce greenhouse gas emissions, consistent with Article 2 of the Convention.

MITIGATION

Intended Nationally Determined Contribution

The mitigation targets of this iNDC are set against a Business As Usual (BAU) projection and consider emissions reductions from the Energy Demand, Electricity Generation and Transportation sectors.

Table 1: Nationally Determined Mitigation Targets

Baseline (all sectors)	2010	643 $GgCO_2$-eq	
Unconditional Target	Not stated		
Conditional Target measured against the BAU emissions projections	Year	% change relative to BAU projection	Emissions Reductions
	2025	16% reduction	121 $GgCO_2$-eq
	2030	23% reduction	188 $GgCO_2$-eq

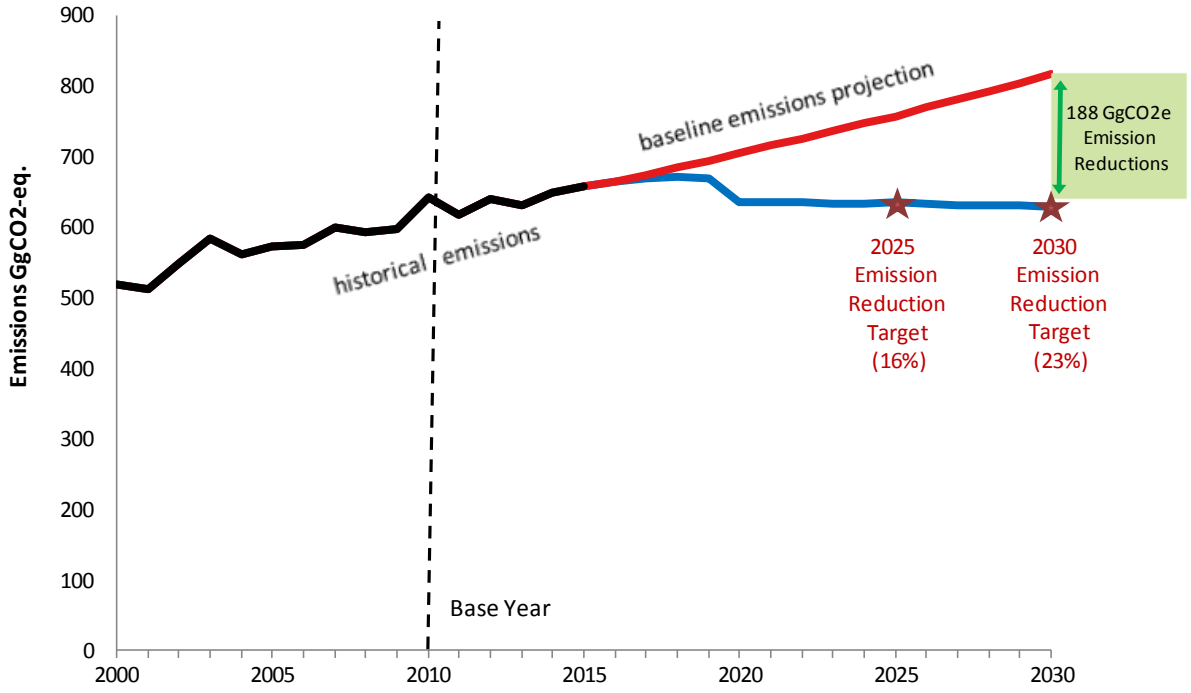


Figure 1: Graphical Representation of Intended Nationally Determined Contribution Methodological Approach

Table 2: Coverage, Scenarios and Methodological Approaches

Types of Targets	Emissions reductions targets are based on projected reductions for 2025 and 2030 calculated from the BAU emissions projections
Coverage	A sector-based approach across the entire economy is used to determine reduction targets for the energy sector.
Gases Covered	• Carbon Dioxide (CO_2), Methane (CH_4) and Nitrous Oxide (N_2O)
Sectors Covered	• Energy • Electricity Generation • Transport
BAU Scenario	2010: 643 $GgCO_2$-eq 2025: 758 Gg CO_2-eq 2030: 816 $GgCO_2$-eq
Mitigation Scenario	GHG mitigation projections to 2030 were estimated with 2010 emissions as the baseline against which growth and the impact of mitigation measures were calculated. The drivers of emissions growth considered were economic growth, changes in population, energy supply and prices, the adoption of new technologies and the impact of government policies and measures.

Methodology for Estimating Emissions	Saint Lucia's GHG inventory produced for the TNC provided historical emissions data between 2000 and 2010 that align with the 1996 Intergovernmental Panel on Climate Change (IPCC) guidelines for conducting emission inventories. Projections to 2030 were developed for each individual source category for CO_2, CH_4 and N_2O. A single baseline was selected in order to have a single starting point for the mitigation options analysis. The sectors covered were: Energy Demand: Electricity Generation; Transport; Industrial Processes; Agriculture; and Waste. Land-Use, Land-Use Change and Forestry (LULUCF) was not included in the baseline projection because of the high degree of uncertainty in developing projections of sources and sinks within this sector. Following a prioritization of all possible mitigation actions, emissions projections were made based on assumed economic growth, changes in population, energy supplies and prices, as well as the adoption of new technologies and the impacts of government policies. Further, it was decided that to balance pursuing an aggressive mitigation target with realistic outcomes for the iNDC, projected emissions reductions from the Energy, Electricity Generation and Transportation sectors only will be considered. Uncertainties over the permanence of projected emissions reductions from the Agro-Forestry, Reforestation and LULUCF sectors, and the absence of decisive international action to phase out HFCs persuaded the exclusion of related projected emissions reductions in this analysis. Further, the small estimated 2030 emissions of 2.1 $GgCO_2$.eq persuaded the exclusion of the Waste sector from the analysis, as well as that of Industrial Processes, which was eliminated during the prioritization process because of its small size compared to the rest of the economy. Related emissions are captured under the energy sector. It must be noted though, that while LULUCF is not included in terms of specific projected emissions reductions, there is recognition in this report, that Saint Lucia's forestry cover acts as a sink, whose value should not be underestimated. Significant work is currently being conducted to improve forest inventory data, develop policies for forest management and protection and to identify reforestation projects. While estimates of potential greenhouse gas emission reductions have not been included in the iNDC, preliminary information indicates that LULUCF projects could potentially contribute as much as 4% additional emission reductions relative to the BAU by

	2030. LULUCF sector contributions may be included in future updates to the iNDC if sufficient data become available.
Market Instruments	National level market-based instruments, such as cap-and-trade emission trading schemes and offsetting, are crucial to price carbon emissions and keep the costs of mitigation in Saint Lucia low. These will be pursued to encourage implementation of the proposed mitigation measures drawing on any applicable international arrangements.

Table 3: Information to Facilitate Clarity, Transparency and Understanding.

Parameters	Information
Time frame	2030, with intermediate target in 2025
Type of commitment	Absolute economy-wide emissions reductions using a 2010 baseline and based on specific sector interventions against the BAU scenario
Baseline	758 $GgCO_2$-eq in 2025 and 816 $GgCO_2$-eq in 2030, excluding LULUCF
Proposed Interventions	Energy: • Energy Efficient Buildings • Energy Efficient Appliances • Water Distribution and Network Efficiency
	Electricity Generation: • 35% Renewable Energy Target by 2025 and 50% by 2030 based on a mix of geothermal, wind and solar energy sources. • Improvements to Grid Distribution and Transmission Efficiency
	Transport: • Efficient Vehicles • Improved and Expanded Public Transit
Estimated Impact of Emissions Reductions interventions	• Reduction of 121 GgCO2-eq by 2025 • Reduction of 188 $GgCO_2$ - eq by 2030.
Conditions	While national efforts are underway and will continue to be exerted toward emission reduction, external support is a pre-requisite to achieving the emissions reduction targets set out in this iNDC.
Reviews	Implementation will be reviewed every 5 years

Planning Process

Saint Lucia's iNDC was prepared though a consultative process involving key sector stakeholders who were engaged initially under the TNC process, to provide inputs into the development of the Greenhouse Gas Inventory and Mitigation Assessment chapters and then through a validation exercise, to seek national support for the proposed measures and targets. The effort received considerable technical support and guidance from Stiebert Consulting, Enviro Economics, Climate Analytics and the National Renewable Energy Laboratory (NREL) of the USA.

Fairness and Ambition

Conscious of the existential threat posed by climate change to Saint Lucia and indeed most SIDS, the government is steadfast in its conviction that global mitigation efforts should focus on stabilizing global GHG emissions at levels that will limit increases in global average temperatures to well below 1.5^0C above preindustrial levels. As a demonstration of this conviction, and notwithstanding its minuscule contribution of about 0.0015% of global emissions (2010 estimate), the Government of Saint Lucia has decided to pursue an aggressive and ambitious plan to reduce its emissions by focusing on the Energy, Electricity Generation and Transportation sectors. Under the mitigation plan, and actions proposed in this iNDC, Saint Lucia expects its per capita emissions (excluding figures for LULUCF) to decrease from 3.88 tCO_2-eq (2010 estimate) to 3.29 tCO_2-eq by 2030, compared to the per capita emissions of 4.25 tCO_2-eq it would have increased to under the BAU scenario. This ambitious target must be considered against the background of the country's small, open economy and limitations in natural, financial, technological and human resources to implement the measures necessary to achieve the intended emissions reductions. It must also be noted that the value of Saint Lucia's forest cover as a carbon sink is recognized, despite the fact that these values are not included in the projections.

Common but Differentiated Responsibilities and National Circumstances

Saint Lucia embraces the principle of common but differentiated responsibilities and national circumstances enshrined in Article 4 of the Convention in its efforts to address climate change mitigation and adaptation.

In this regard, the country accepts the need for it to contribute to the global mitigation efforts but intends to pay greater attention to adaptation efforts, given its unique circumstances as a SIDS in one of the most vulnerable regions of the world. Despite Saint Lucia's miniscule GHG emissions, the country's unique national circumstances, including its importation of its fuel for electricity generation, means that there are co-benefits associated with its mitigation efforts, especially those related to environmental protection, foreign exchange savings and human health benefits, which may be achieved through, *inter alia*, renewable energy and energy efficiency initiatives.

Financial Requirements and Implementation Support

Total cumulative investment costs to achieve the mitigation targets by 2030 are expected to be in the order of US$ 218 million (at 2015 prices) and government programme costs are estimated to be US$ 23 million. Total cumulative investment costs to achieve the mitigation targets by 2025 are expected to be in the order of US$ 183 million (at 2015 prices) and government programme costs are estimated to be US$ 19 million. Investment costs refer to the total capital finance required to implement the mitigation actions that is incremental to baseline expenditures. This does not include the energy savings associated with implementing measures or changes in operating costs. Programme costs refer to expenditures by the government for supporting the programme and include costs for planning, conducting studies, developing strategies, implementing regulations, enforcement, capacity building and public awareness campaigns. The Government of Saint Lucia, recognising its current national effort toward emission reduction and being fully cognisant of its vulnerability to extreme events and the likelihood of being caught in a cycle of repair and recovery, commits to meeting the mitigation targets contained in this iNDC on condition that it receives financial and technological assistance to do so.

Enabling Environment

The Government of Saint Lucia has created a robust policy and legal framework to support reforms, which will accrue to net greenhouse gas emissions reduction. Where required, a review of relevant policies and legislation will be undertaken in order to ensure that stronger implementation possibilities are explored. Some of these are listed below.

Table 4: Key National Policies, Legislation and Actions that address Climate Change Mitigation[1] and Adaptation

Sector	Key National Policies, Legislation and Actions
Energy Demand / Electricity Generation	• Adopted National Energy Policy (2010) • 35% Renewable Energy Target by 2020 • Introduced incentives for renewable energy • Prepared draft of Revised Electricity Supply Act (2015) • Passed National Utility Regulatory Commission Bill (establishes an independent regulatory commission to oversee electricity production) • Draft Revised Building Code (includes energy efficiency measures) • National Energy Efficiency Labelling Standards (Air-Conditioning units, tubular and compact fluorescent lamps) • Developing draft Geothermal Development Bill
Transportation	• Introduced a new levy to control importation of used vehicles

[1] Draft Saint Lucia Mitigation Assessment (2015) (Stiebert Consulting, Enviro Economics)

Sector	Key National Policies, Legislation and Actions
	• Reduction of excise tax and duty for importers of fuel efficient vehicles and alternative energy vehicles • Escalating taxes on higher engine capacity vehicles • Proposed Transport Policy and Strategy[2]
Agriculture / Fisheries	• National Fisheries Plan 2013
Waste	• Secretariat of the National Water & Sewerage Commission to regulate water and wastewater operators activated in 2012 • Pursuing a Waste Management Strategy that includes the conversion of waste to energy
Land-Use, Land-Use Change and Forestry	• Conduct of a comprehensive forest inventory in 2009 • Development of natural resource management plan for the north-east part of Saint Lucia[3] • Draft National Land Policy 2014
Industrial Processes	• Approved hydrochloroflurocarbon (HCFCs) Phase Out Management Plan • Draft Code of Practice for Refrigeration and Air Conditioning Technicians
General	• Establishment of a multi-sectoral National Climate Change Committee • Adoption of a revised National Climate Change Adaptation Policy (2015) • Development of a Strategic Programme for Climate Resilience • Adoption of a National Coastal Zone Management Policy • Adoption of a National Environmental Policy and National Environment Management Strategy (2004; Revised 2014) • Sustainable Energy For All initiative[4] • Annual observance of Energy Awareness Week. • Development of a Climate Change Public Education and Awareness Strategy Implementation Plan

Sustainable Development Benefits

Achievement of the mitigation targets will translate to significant sustainable development benefit for Saint Lucia. The medium-term vision for Saint Lucia is: *An innovative and*

[2] This indicates that there will be further potential for emission reduction in the transport sector when implemented

[3] UNEP GEF Iyanola – Natural Resource Management of the NE Coast Project (GEF ID 5057)

[4] Barbados Declaration on Achieving Energy for All in Small Island Developing States, Bridgetown, Barbados, (2012)

industrious nation, grounded in the principles of patriotism, integrity, and good governance, striving towards sustainable development and equitable development for all.[5] The benefits to flow from the mitigation interventions are consistent with this vision and include significant investments and technological advancement, with the accompanying employment generation, significant savings of foreign exchange to pay for fuel, as well as savings in energy costs across all sectors. They will also result in reduced emissions, with accompanying benefits to the local and global environments, and human health.

ADAPTATION

Like all Small Island Developing States, Saint Lucia has a high and increasing vulnerability to climate change, precipitated by increasing global temperatures, sea level rise and extreme weather events. Projected impacts, several of which are already occurring, include infrastructural damage, floods and droughts, reduced agricultural productivity, reduced supply of potable water, erosion, declining marine biodiversity, health impacts and increasing insurance cost, among others. These and other impacts have claimed lives, adversely impacted livelihoods and diverted significant investments away from developmental to restorative and rebuilding investments. The island's vulnerability is accentuated by its small geographic area, high dependence on its natural resources for economic and social development and its location in one of the highest-risk areas of the planet.

Notwithstanding its minimal contribution to the climate change phenomenon, the Government of Saint Lucia accepts the need to contribute to the global mitigation effort but is aware of the need for its emphasis to be placed on adaptation. To this end, Government has recently approved the Saint Lucia Climate Change Adaptation Policy (CCAP) (2015). The CCAP seeks to ensure that Saint Lucia and its people, their livelihoods, social systems and environment are resilient to the risks and impacts of climate change. The CCAP also provides a framework for addressing the impacts of climate change in an integrated manner across all key sectors, based on three interconnected processes, namely:

- **Adaptation Facilitation**; which entails creating the appropriate policy, legislative and institutional environment;
- **Adaptation Financing**; which involves putting in place measures to ensure adequate and predictable financial flows; and
- **Adaptation Implementation**; which entails taking concrete actions to prepare for, or respond to, the impacts of climate change.

Implementation of the CCAP will encompass activities geared towards building the resilience of households, communities, vulnerable groups, enterprises, sectors and ultimately the nation. Implementation measures are being identified at the national and community levels, with regional and international support and backstopping provided through agreed modalities. Effort is being directed to achieving the following objectives by 2022:

a) Priority adaptation measures to the adverse effects of climate change developed and implemented at all levels;

[5] Saint Lucia Medium Term Development Strategic Plan 2011

b) Identification of vulnerable priority areas and sectors and appropriate adaptation measures using available and appropriate information, recognizing that such information may be incomplete;
c) Adaptation measures in vulnerable priority areas supported by existing data sets and traditional knowledge, or new data developed as necessary; and
d) Appropriate adaptation measures integrated into national and sectorial development strategies and linked as far as national circumstances will allow to the national budgeting process.

During the development of the CCAP, a Strategic Programme for Climate Resilience (SPCR) also emerged and this has highlighted some key priority areas in need of urgent action, to complement ongoing efforts. These include, but are not limited to:

Adaptation Facilitation

1. National Level Policy, Legislative and Institutional Framework
2. Public Education and Outreach
3. Research and Systematic Observation and Data and Information Acquisition and Knowledge Management
4. Human Resource Capacity Building
5. Technology Transfer

Adaptation Implementation

1. Climate Resilience Measures in Critical Buildings
2. Coastal Zone Management for Climate Resilience
3. Community and National Level Interventions in Water Resource Conservation and Management
4. Food Security
5. Sustainable Land Management/Slope Stabilisation
6. Human Health

Adaptation Financing

A range of modalities for making adequate financing available and accessible to address climate change in the public sector, private sector and civil society as a whole.

Even as steps are being taken to pursue the objectives of the CCAP, it is intended that Saint Lucia's Third National Communication, which is currently under preparation, will draw upon the growing international understanding of the vulnerabilities of SIDS to the impacts of global climate change, as well as the expanding national policy framework and local understanding and experiences, to develop an adaptation strategy in keeping with emerging circumstances.

Notwithstanding, the following are among the many critical adaptation interventions identified in the Second National Communication:

Building Codes	Natural Defences (mangroves, wetlands etc.)
Comprehensive Land Use Plan	Early Warning Systems
Rainwater Harvesting	Irrigation Systems
Drainage Infrastructure	Research and Systematic Observation

Financing will be a critical constraint to Saint Lucia's ability to adapt to the impacts of climate change, with international funding through the UNFCCC architecture being critical. The Government of Saint Lucia will further pursue a mix of adaptation financing options and sources including, but not limited to, economic and fiscal incentives; private sector financing; support from regional agencies and programmes and bilateral processes; and in limited cases, highly concessional financing for the private sector, civil society and the general public.

CONCLUSION

In submitting this iNDC, Saint Lucia, as a small emitter of greenhouse gases, calls on all Parties to make their submissions, to ensure that their iNDCs are in keeping with their contributions to global emissions and to their respective responsibilities under the Convention and to take actions that will result in the restriction of global temperature increase to well below 1.5^0C above preindustrial levels.

St. Vincent and the Grenadines

Intended Nationally Determined Contribution

Communicated to the UNFCCC on November 18, 2015

1. The National Context

St. Vincent and the Grenadines is a multi-island nation consisting of 32 islands each with its own characteristics. It is located in the Eastern Caribbean and has a population of approximately 110,000. St. Vincent is the largest of the 32 islands that comprise the nation, covering roughly 390 sq. km (150 sq. miles). The Grenadines extend 72 km (45 miles) to the southwest. The other inhabited islands, north to south, are Young Island, Bequia, Mustique, Canouan, Mayreau, Union Island, Palm Island, and Petit St. Vincent. The Government of St. Vincent and the Grenadines (GoSVG) ratified the United Nations Framework Convention on Climate Change (UNFCCC) in 1996 and the Kyoto Protocol in 2004. This INDC represents St. Vincent and the Grenadines' intention and has no legal status. Any form of commitment is yet to be decided, pending the outcomes of the 21st Conference of the Parties to the UNFCCC in Paris in December 2015.

The geography, geology and socio-economic circumstances of St. Vincent and the Grenadines make it extremely vulnerable to climate-related natural disasters. Due to its mountainous topography, most activities on the mainland are concentrated on the narrow, low-lying coast line, at risk to sea-level rise (SLR) and coastal erosion while the landscape also adds risks of landslides and flash flooding. An increase in severe weather events will result in significant expenditures, which will further constrain St. Vincent and the Grenadines' social and economic growth.

St. Vincent and the Grenadines have suffered significant impacts over the past five years (2010 to 2014[1]) as a result of severe weather events. In total, the loss to the country was in excess of US$600 million[2] over that period, equating to approximately 35% of its Gross

[1] Hurricane Tomas (October 2010); tropical storm (April 2011 and December 2013); two prolonged droughts (2010 and 2014)

[2] http://gov.vc/pmoffice/images/stories/Speeches/2015%20budget%20address%20-%20final.pdf

Domestic Product (GDP). With per capita GDP amongst the lowest in the Caribbean[3], severe weather events caused by anthropogenic climate change will fundamentally restrict economic development. The increased coastal erosion, droughts, storms, floods and landslides of the last decade have severely impacted livelihoods and government have neither the financial or technical resources to address these challenges.

Climate projections for St. Vincent and the Grenadines suggest an increase in average atmospheric temperature; reduced average annual rainfall; increased Sea Surface Temperatures (SST); and the potential for an increase in the intensity of tropical storms[4]. There is currently no monitoring of sea level around St. Vincent and the Grenadines; however observations from tidal gauges surrounding the Caribbean basin indicate that SLR in the Caribbean is broadly consistent with the global trend.

The Intergovernmental Panel on Climate Change (IPCC), in their 5th Assessment Report, states the following projected changes over 2081–2100 (relative to 1986–2005) for the Caribbean for an intermediate low-emissions scenario:

- a decrease in average annual rainfall of about 5–6%;
- a 1.2°C to 2.3°C median annual increase in surface temperature; and
- sea level rise projections in the region of 0.5 m to 0.6 m[5].

With climate-related events already causing damage and loss, these projections have dire implications for agriculture, water availability, and the protection of public and tourism infrastructure if no meaningful action is taken.

Despite the obvious focus on adaptation to climate change and the fact that greenhouse gas (GHG) emissions from St. Vincent and the Grenadines only account for approximately 0.001% of global emissions[6], the GoSVG is striving to reduce its emissions. As well as developing a national Energy Action Plan, there is a comprehensive Mitigation Assessment in the forthcoming Second National Communication. The largest contributor to reducing emissions will be the installation of a geothermal electricity generation facility, which when operational will provide over 50% of the country's electricity needs. Further to this, initiatives are underway to improve energy efficiency in buildings and transport as well as reduce emissions from waste going to landfill.

St Vincent and the Grenadines would like to express its support for the Republic of China (Taiwan) which has completed its own INDC despite not being a Party to the UNFCCC. Taiwan has committed to reduce its GHG emissions by 50 percent compared to its business-as-usual scenario by 2030 (20% lower than 2005). We, therefore, urge the UNFCCC to consider the observership of Taiwan in this mechanism.

[3] http://caribjournal.com/2013/10/16/ranking-the-caribbean-by-gdp-per-capita/#

[4] CARIBSAVE Climate Change Risk Atlas (CCCRA) - St. Vincent and the Grenadines. DFID, AusAID and The CARIBSAVE Partnership, Barbados, West Indies.

[5] IPCC, 2014: Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part B: Regional Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change

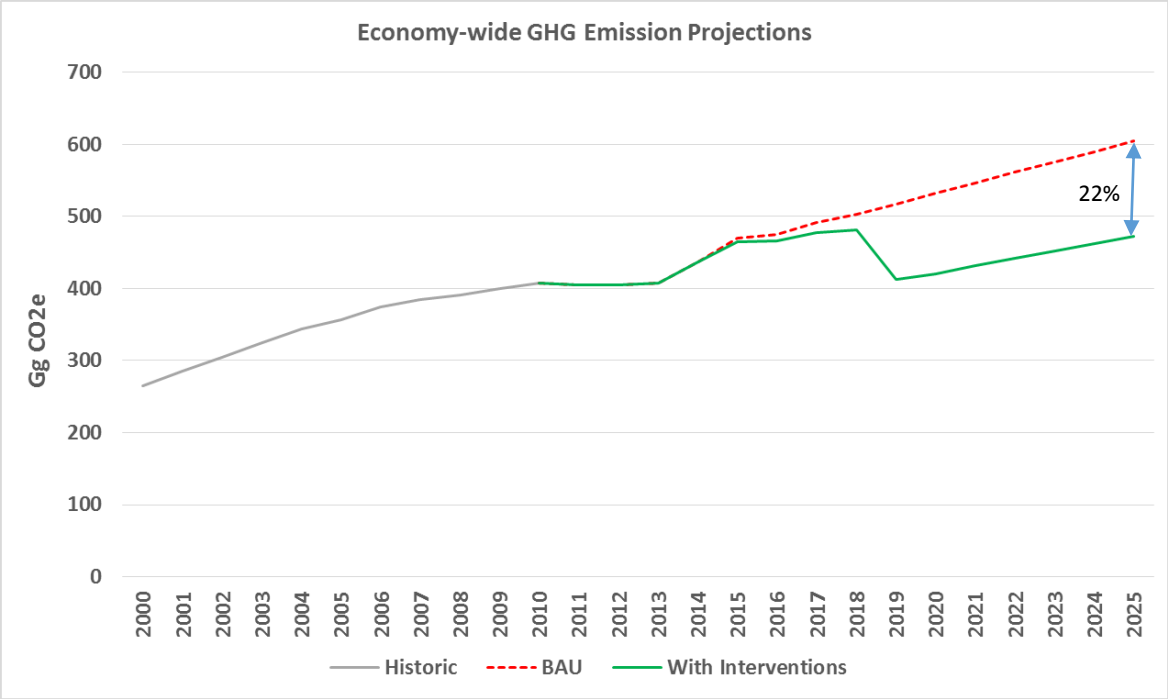
[6] Based on national GHG emissions taken from the forthcoming Second National Communication

2. Mitigation

Economy-wide Contribution

St. Vincent and the Grenadines intends to achieve an unconditional, economy-wide reduction in greenhouse gas (GHG) emissions of **22% compared to its business as usual (BAU) scenario by 2025**.

Figure 1: Projected BAU and 'With Interventions' GHG emission scenarios for St. Vincent and the Grenadines



While the proposed contribution is economy-wide and is in comparison to all sectors and sources of emissions[7], the contribution is based upon key measures in the energy (including energy generation, energy efficiency and transport) sector. The following sections explain the strategies and measures which will be undertaken to deliver the contribution.

The energy sector accounted for approximately 68% of St. Vincent and the Grenadines' GHG emissions in 2010[8] with projected further growth through to 2025, and is therefore the focus of its mitigation activity. Within the sector, approximately 50% of emissions can be attributed to energy generation and approximately 50% from transport. The following sub-sector mitigation contributions have been identified:

i. Renewable energy: the plans for renewable energy generation are focused on the development of the country's proposed geothermal power plant (planned to be completed in 2018). The facility, when complete, will generate approximately 50% of the national annual electricity consumption needs. In addition to the geothermal

[7] Excluding international aviation and shipping

[8] St. Vincent and the Grenadines 2010 Mitigation Assessment (to be published shortly as part of the Second National Communication). This forms part of the Second National Communication Report, which will be submitted to the UNFCCC shortly.

plant, the national energy utility is renovating existing hydro power facilities to improve efficiency and generation capacity as well as enabling and encouraging the installation of small-scale photovoltaics (PV) in the private and public sectors.

ii. Energy efficiency: there is an objective to achieve a 15% reduction in national electricity consumption[9] compared to a BAU scenario by 2025. Planned measures in this sector include the retrofitting of street lighting nationally, a new building code and an energy labelling scheme for appliances.

iii. Transport: new policies to reduce the import duty paid on low emission vehicles are in the process of being introduced to encourage their use. It is estimated that this will result in avoided emissions of approximately 10% over the next 10 years[10].

Significant potential for greater reductions (e.g. improved public transport) is achievable if international finance can be made available, however this needs further analysis to quantify the reduction potential and support required and consequently these measures have not been included in the economy-wide contribution at this stage. Currently, transport is the fastest growing source of emissions and reductions from this sector will be largely dependent on international financial support and technology transfer.

iv. Land Use, Land Use Change and Forestry (LULUCF): St. Vincent and the Grenadines intends to develop its GHG sinks though reforestation, afforestation reduced deforestation and reduced forest degradation. At this stage, good quality data does not exist for the forestry inventory, however this is in the process of being addressed. Once the forestry inventory is compiled, policies and actions will be developed for the sector, however the related contribution is not quantifiable at this stage. Policies and actions may be delivered through mechanisms such as the 'Clean Development Mechanism' (CDM) and 'Reducing Emissions from Deforestation and Forest Degradation' (REDD).

3. Information to Facilitate Clarity, Transparency and Understanding

Parameter	Information
Timeframe and/or period for implementation	2025
Type of contribution	Economy-wide emission reduction against BAU
Reference point or base year	2010 base year (407 Gg CO_2e[11])

[9] St. Vincent and the Grenadines Energy Action Plan (2010). The proposed date to achieve this target (2020) has been revised back to 2025 to allow more time for the implementation of policies.
[10] St. Vincent and the Grenadines 2010 Mitigation Assessment (to be published shortly as part of the Second National Communication).
[11] St. Vincent and the Grenadines 2010 Mitigation Assessment (to be published shortly as part of the Second National Communication).

Parameter		Information
Estimated quantified impact on GHG emissions		Reduction in GHG emissions of 22% compared to its business as usual (BAU) scenario by 2025.
Business as usual methodology		The following assumptions have been made to generate the BAU scenario: • Electricity supply – extrapolation of projected energy demand 2015-2018[12] • Non-electrical energy supply - assumed to grow consistent with population growth • Domestic transport – extrapolation of historical road vehicle numbers • Municipal Solid Waste generation per capita – assumed to grow consistent with population growth • All other sources (which are estimated together to contribute less than 10% of GHG emissions) have been assumed to increase in line with population growth other than the LULUCF sector, where no change is assumed from 2010. • A fixed BAU scenario is being used for the INDC[13].
Coverage	% national emissions	100%[14]
	Sectors[15]	• Energy (including domestic transport) • Industrial processes and product use • Agriculture • Land use, land use change and forestry • Waste
	Gases	• Carbon dioxide (CO_2) • Methane (CH_4) • Nitrous oxide (N_2O) • HFCs
	Geographical boundaries	Whole country
Intention to use market-based mechanisms to meet contribution		International support for a Nationally Appropriate Mitigation Action (NAMA) will be sought for the transport sector.

[12] Provided by VINLEC (the national electricity utility provider)
[13] BAU scenarios for an INDC can be fixed or dynamic. In this case, a fixed BAU will be used.
[14] Excludes international shipping and aviation and is consistent with IPCC good practice.
[15] Potential emissions reductions from Industrial Processes and Product Use, Agriculture and Land Use, Land Use Change and Forestry were not considered, although these sectors are included in the baseline inventory and therefore the 'economy-wide' savings.

Parameter	Information
	St. Vincent and the Grenadines considers the use of instruments for achieving and financing flexibly part of its mitigation target. Therefore St. Vincent and the Grenadines supports the inclusion of the International Carbon Markets and mechanisms such as the CDM in a post-2020 agreement on climate change including the use of the mitigation outcome pre-2020. We propose that such an instrument, together with an appropriate accounting system (MRV), is used to help finance low carbon and climate resilient infrastructure investments. St. Vincent and the Grenadines considers that certain low emission development options mentioned in this INDC, or additional actions, could be entirely or partially funded by the transfer of international carbon assets mobilized through bilateral, regional and international carbon markets while taking into account environmental integrity and transparency.
Metrics and methodology	• Consistent with methodologies used in St. Vincent and the Grenadines' forthcoming Second National Communication (2006 IPCC Guidelines) • Global Warming Potential on a 100-year timescale in accordance with the IPCC's Fourth Assessment Report

4. Vulnerability and Adaptation

4.1 National programmes that support climate change adaptation

The economy of St. Vincent and the Grenadines is strongly linked to its natural resources. The country has a long history of coping with natural disasters and, through traditional land cultivation methods and cultural association with the sea, Vincentians also have a long history of natural resource conservation.

The St. Vincent and the Grenadines National Economic and Social Development Plan 2013 - 2025 has been elaborated around a specific set of strategic goals, objectives and targets so as to facilitate and guide the optimal improvement of the quality of life for all Vincentians. The Plan, which encapsulates the issues of Rio and the post 2015 UN Development Agenda, has been adopted by all Ministries and is used to guide programmes and activities.

In particular, Goal 4 of the Plan; '*Improving Physical Infrastructure, Preserving the Environment and Building Resilience to Climate Change'* seeks to ensure that St. Vincent and the Grenadines develops its physical infrastructure, while preserving the country's delicate environment, as well as mitigating the effects of climate change. To reduce the adverse impacts of climate change, the Plan proposes several adaptation measures to reduce future

restoration costs and to protect the natural environment. Public education and awareness of the potential negative effects of climate change are at the forefront of this Plan[16]. The proposed strategic interventions include:

- Increase public awareness with regard to climate change issues;
- Build resilience to minimise damage to settlement and infrastructure;
- Minimise damage to beach and shoreline integrity and marine ecosystems;
- Minimise the negative impact of climate change on agriculture and human health; and
- Develop appropriate legislative and regulatory framework, for proper environmental management, and institutional systems for responding and mitigating effects of climate change[17].

4.2 Existing vulnerabilities in the agriculture, forestry and fisheries sectors

Agriculture is one of the largest economic activities on St. Vincent and it contributes significantly to the economic and social development of rural livelihoods in particular. Offshore fisheries are also important and are predominately small scale and artisanal. Tourism activities are concentrated in the Grenadines islands and all other livelihood activities in these islands are inherently linked to tourism. Such livelihoods are vulnerable to climate change impacts, as they are heavily dependent on the stability of the climate conditions or natural resources.

The agriculture sector in St. Vincent is especially sensitive to extended periods of drought, unevenly distributed rainfall and natural disasters when coupled with existing practices such as mono-cropping and poor soil and water management. Three extreme climatic events over a span of three years (2009 – 2011 inclusive) highlighted the vulnerability in this sector.

- In 2009 there was a water shortage resulting from drought conditions. Many residents in Georgetown practise agriculture and farmers suffered losses from reduced crop production that year. As a consequence, food prices rose and produce had to be imported from other islands to supplement the limited supply in St. Vincent.
- In 2010 hurricane Tomas resulted in losses totalling EC $35 million, mainly to banana and plantain production.
- During the second week of April 2011 heavy rainfall caused rivers to overflow and landslides in the north-eastern section of St. Vincent in a major agricultural area. This occurred while the sector was still recovering from damages caused by hurricane Tomas in the previous year.

4.3 Existing vulnerabilities in the tourism sector

Expected increases in the frequency or magnitude of certain weather and climate extremes (e.g. heat waves, droughts, floods, tropical cyclones) as a result of climate change will affect

[16] St. Vincent and the Grenadines National Economic and Social Development Plan 2013-2025
[17] St. Vincent and the Grenadines National Economic and Social Development Plan 2013-2025

the tourism industry through increased infrastructure damage, additional emergency preparedness requirements, higher operating expenses (e.g. insurance, backup water and power systems and evacuations) and business interruptions.

Results from the SLR modelling work conducted in 2011 indicate that 1 metre SLR places 10% of the major tourism properties at risk, along with 1% of road networks, 50% of airports and 67% of sea ports. Engineered structures and natural environments (e.g. mangroves) can protect against some of these impacts to coastal regions, but the dynamics of these erosion processes will demand some adaptation of coastal infrastructure and settlements[18].

4.4 Existing vulnerabilities in the coastal zone

More than 90% of the infrastructural development of St. Vincent and the Grenadines lies on a narrow coastal belt less than eight meters above sea-level. These include the island's main communication and emergency response structures - roads, airports, telecommunication, financial, and technical support centres[19]. Additionally, many of the coastal protection ecosystems such as dunes, mangroves and reefs have been removed or are degraded, which exacerbate vulnerability of coastal infrastructure to storm and hurricane activity (particularly wind and storm surges).

4.5 Existing vulnerabilities in the water resources sector

Watersheds have also been affected by land degradation due to "squatting, mono-cropping with poor agricultural techniques, global weather patterns (changes in rainfall distribution, drought and elevated atmospheric temperatures), deforestation and excessive use of agrochemicals"[20].

Climate models suggest that the country will experience drying throughout the year (even during the wet season). Further reduced rainfall would severely impact the water supply of rivers and streams in St. Vincent and is of particular concern for the Grenadine islands which have a very high dependence on rainwater for freshwater supply. An increase in the intensity of rainfall in fewer rain days is also expected, which means that not only is the country vulnerable to droughts, but also to the secondary effects of torrential rains such as landslides and the contamination of water supplies.

4.6 Existing vulnerabilities in the health sector

Vector borne diseases may increase due to increased precipitation and temperatures in St. Vincent and the Grenadines. In the St. Vincent and the Grenadines Strategic Plan For Health 2007 – 2012 it was stated that "National household and Breteaux indices continue to be above and beyond internationally accepted levels". Dengue is specifically mentioned[21] but malaria cases have also been reported. Data obtained from the Ministry of Health reported 1 imported case of malaria in 2008 and another in 2010. The Caribbean Environmental

[18] The CARIBSAVE Climate Change Risk Atlas (CCCRA)-St. Vincent and the Grenadines
[19] Forthcoming 'Vulnerability and Adaptation Chapter for the Second National Communication to the UNFCCC'
[20] World Bank, 2006; The CARIBSAVE Climate Change Risk Atlas (CCCRA)-St. Vincent and the Grenadines
[21] St. Vincent and the Grenadines Strategic Plan for Health 2007-2012

Health Institute (2007) has also stated that "There are serious issues related to availability of water, health and sanitation in the context of vector control"[22].

4.7 Efforts to adapt to climate change

A number of steps to address climate change related issues have been taken over the years but now that such efforts are being integrated, it is timely that St. Vincent and the Grenadines is revisiting its draft National Climate Change Policy to further give weight and direction to its efforts in response to climate change.

St. Vincent and the Grenadines has recognised the need to take an integrated approach to adaptation by linking local activities with national policies and sector specific experiences. Climate change adaptation activities have been mainstreamed into national development planning (through the National Economic and Social Development Plan) and continues to be a major focus and several actions have been identified to support resilience building at all levels. The areas which have been incorporated within the plan include: culture, identity and national pride; economic; social capital; governance; national security; energy, disaster management and the environment; physical infrastructure and education, telecommunications, science and technology[23]. The National Economic and Social Development Plan possess nine over-arching goals including:

- High and sustained levels of economic growth;
- Reduced unemployment and poverty levels;
- Improved physical infrastructure and environmental sustainability;
- High levels of human and social development;
- Safe and secure nation;
- Technologically advanced work-force;
- Increase national pride and cultural renaissance;
- Regional integrity; and
- Enhanced global solidarity.

Future priorities will include the development of a public education framework, targeted at providing a curriculum for climate resilient agriculture, based on traditional techniques and expertise.

4.8 National climate change adaptation programmes

The main activities being implemented at the national level include the following:

1. **The Pilot Programme for Climate Resilience (PPCR)** is the largest project in St. Vincent and Grenadines specifically designed to address climate risk and resilience. The PPCR proposes to enhance climate risk management through the following broad strategies:
    a. Strengthen community resilience to cope with climate hazards;
    b. Increase institutional capacity to undertake climate risk management;
    c. Strengthen knowledge and awareness;

[22] The CARIBSAVE Climate Change Risk Atlas (CCCRA)-St. Vincent and the Grenadines
[23] St. Vincent and the Grenadines National Economic and Social Development Plan 2013-2025

d. Prepare comprehensive hazard maps for public institutions and communities;
e. Design and implement gender sensitive disaster risk management initiatives; and
f. Collaborate with communities at all levels of climate and disaster risk management.

The PPCR has four main components[24]:

Component 1: Climate vulnerability risk assessment and risk reduction. This component is being piloted in Union Island, Arnos Vale Watershed and the Georgetown Watershed and a range of data relative to other components has been collected.

Component 2: Data collection, analysis and information management. There are three key aspects to this Component: the acquisition and installation of telemetric weather stations and software; coastal zone impacts modelling and the development of a harmonized platform for data analysis and data management.

Component 3: Comprehensive framework for strengthening of the existing policy, legal and institutional framework to address Climate Change. This component seeks to strengthen the existing policy, legal and institutional framework. It will commence with comprehensive review of current policies, plans and legislative framework to improve SPRC implementation in St. Vincent and the Grenadines. It will also involve finalising various policies, drafting a disaster management plan and preparing and finalising an Environmental Management Act and Environmental Impact Assessment Regulations.

Component 4: Design and implementation of a public education and capacity building programme. This component will provide for a range of initiatives in support of public and private sector capacity building. These include a national 3–year public education programme to build community based climate risk and resilience, provide a national curriculum for schools in climate change and disaster risk reduction, plan and develop an early warning system for St. Vincent and the Grenadines, provide technical training and extend the school risk assessment to cover all constituencies in the country.

4.9 Adaptation planning in the agriculture sector

Agriculture which for decades underpinned the economy of St. Vincent and the Grenadines has declined significantly over the last decade due to restrictive trade regimes. This has resulted in significant land use change as demand for housing is often met by developing agricultural lands. However, the Government of St. Vincent has demonstrated its commitment to agricultural diversification and through its policies and programmes. These efforts include the following:

- Support for small scale farmers from the government, in production technologies, agri-business management, good agricultural practices and pest and disease control; policy initiatives to address climate change issues, environmental protection, risk mitigation and fisheries development; and a national plan for dealing with food security.

[24] Strategic Programme for Climate Resilience: St. Vincent and the Grenadines Phase 1

- An innovative project which abandoned land into a model for sustainable living and farming systems in St. Vincent, young persons in local primary and secondary schools are taught organic agriculture, environmental art and creative land use.
- The implementation of the National Forest Resources Conservation Plan (1994-2003) and Integrated Forest Management and Development Programme to address issues of rapid deforestation, limited involvement of communities in forest resource management, weak institutional capacity, lack of an approved forestry policy framework, fragmented environmental management and limited awareness of the importance of forests to national development.
- Enhancing the adaptive capacity of rural economies and natural resources to climate change through the management and protection of land based natural resources and agricultural production systems.

4.10 Adaptation planning in the coastal zone

Coastal areas already face pressure from natural forces (wind, waves, tides and currents) and human activities, (beach sand removal and inappropriate construction of shoreline structures). The impacts of climate change, in particular SLR, will magnify these pressures and accelerate coastal erosion. Areas at greatest risk in St. Vincent and the Grenadines are Belmont Walkway, Canash Beach, Indian Bay, Johnson Point and Villa Beach including notable resorts, ports and an airport that lies at less than 6 m above sea level and will therefore be affected"[25].

The country has started to promote itself as a dive destination and has signed on to the Caribbean Challenge Initiative (CCI) with the pledge to protect 20% of its near shore marine and coastal resources by 2020. Other initiatives include:

- Participating in the 'Improving the Management of Coastal Resources and the Conservation of the Marine Biodiversity in the Caribbean Region' project which is seeking to address marine resources management and strengthen capacity of stakeholders through a common institutional framework for management of marine protected areas (MPA) in the Caribbean Region.
- Formulating coastal zone related policies through the activities of the PPCR.
- Reducing climate change induced risks for the population through coastal protection through various specific initiatives including:
    - the Sans Souci Coastal Defence Project;
    - At the Water's Edge (AWE): Coastal Resilience in Grenada and St. Vincent and the Grenadines (2011-2016) project; and
    - Coastal Protection for Climate Change Adaptation in the Small Island States in the Caribbean 2014-2018 project.

The Fisheries Division is proposing a Coastline Protection Project which would provide the synergy with the Sans Souci Coastal Defence Project in terms of halting beach and cliff

[25] The CARIBSAVE Climate Change Risk Atlas (CCCRA)-St. Vincent and the Grenadines

erosion, stabilize the shoreline and restore the beach and near-shore reef. Additional benefits are to attract and provide habitat for fish, lobster and other marine life.

4.11 Adaptation planning in the water resources sector

St. Vincent and the Grenadines has not devised a National Water Policy or Water Management Plan but there is a Draft Road Map toward Integrated Water Resources Management (IWRM) Planning for Union Island, St. Vincent and the Grenadines. Importantly, there are efforts that contribute to adaptation at the community and household level. These initiatives are:

- The construction of Reverse Osmosis plant in Bequia.
- Rooftop rainwater harvesting systems have been installed through several projects:
    - at 6 sites in St. Vincent and the Grenadines (Sandy Bay Government School, Georgetown Community Centre, Park Hill Primary School, Langley Park Government School, Richland Park Government School and Liberty Lodge Boys Training Centre). The beneficiary schools are also used as hurricane shelters.
    - For households in selected communities in St. Vincent to secure and provide potable drinking water when there is water scarcity or shortage of water available.

4.12 Adaptation planning in the health sector

The policy of the Government of Saint Vincent and the Grenadines is to provide universal health care that reflects the principles of equity, affordability, quality, and cultural acceptance for its citizens. Whilst there is no explicit action towards adapting the health sector to climate change, The Millennium Development Goals, the Essential Public Health Functions, and the Caribbean Cooperation in Health, Phase III, and other initiatives provide a good basis for adaptation.

4.13 Disaster risk reduction and climate change adaptation

St. Vincent is a member of the Caribbean Disaster Emergency Management Agency (CDEMA) an inter-regional supportive network of independent emergency units that responds to disasters wherever they occur in the region. The National Emergency Management Organisation (NEMO) falls under the ambit of the Prime Minister's Office.

In St. Vincent and the Grenadines, there is recognition of the importance of disaster management to environmental management. In the National Environmental Management Strategy and Action Plan, Principle 9 is to "Prevent and Manage the Causes and Impacts of Disaster"[26]. Two strategies, with specific activities, are therefore designed to help NEMO achieve this part of the environmental management plan. *Strategy 29 is to "Establish at the community and national levels, appropriate and relevant integrated frameworks to prevent,*

[26]Homer & Shim, St. Vincent & the Grenadines Environmental Management Strategy and Action Plan, 2004

prepare for, respond to, recover from and mitigate the causes and impacts of natural phenomena on the environment and to prevent manmade disasters"[27].

- Regional Disaster Vulnerability Reduction (RDVRP) Project 2011-2018 estimated to cost US$20.92 million is addressing policy, data management, infrastructure and capacity issues in the areas of Climate Change Adaptation and Disaster Risk Management. It seeks to measurably decrease the vulnerability of people and the national economy of St. Vincent and the Grenadines to climate change and natural hazards.
- The Pilot Project on Climate Resilience (PPCR) is addressing mainly infrastructural support in response to climate change and sea-level rise.

5. Fairness and Ambition

Despite its negligible contribution to global GHG emissions (approximately 0.001%) and the fact that it is still a developing economy, St. Vincent and the Grenadines is taking significant and ambitious steps to reduce its national emissions. The proposed, unconditional contribution would result in a reduction in projected per capita emissions[28] to 4.3 tonnes CO_2e in 2025, which is less than the global average of 5.3 tonnes CO_2e emissions per capita in 2025, the level required to be consistent with returning warming to below 1.5°C above pre-industrial levels[29]. This demonstrates that St. Vincent and the Grenadines' ambition to reduce emissions is significant and reflects a fair contribution in the global context for 2025, while allowing the country's economy to continue to develop.

6. Planning Process

The development of the INDC has involved detailed stakeholder consultation with public and private sector experts to determine the level and type of contribution, how the contribution will be achieved and identify the procedures that will see climate change integrated into central institutional processes. This will be summarised by St. Vincent and the Grenadines forthcoming Climate Change Policy. The Ministry of Health, Wellness and Environment will be responsible for facilitating multilateral dialogue on climate change issues as well as overseeing implementation of the INDC.

Elements of the INDC are already enshrined in the national agenda through the existing 'National Social and Economic Development Plan 2013-2025' (Strategic Goal 4), which addresses the strategic necessity to adapt to the changing climate to protect its delicate environment while reducing GHG emissions. The 'National Physical Development Plan' also references the importance of energy efficiency in buildings and transport. The national electricity utility provider, VINLEC, has also established a feed-in-tariff to encourage the installation of distributed PV.

[27] The CARIBSAVE Climate Change Risk Atlas (CCCRA)-St. Vincent and the Grenadines
[28] Estimated to be 5.4 tCO2e per capita in the BAU scenario
[29] The global target to avoid 1.5°C of warming is 5.3 tCO2e per capita in 2025, assuming a global population of 8.1 billion (http://databank.worldbank.org/data/reports.aspx?source=Health%20Nutrition%20and%20Population%20Statistics:%20Population%20estimates%20and%20projections) and global emissions of 43 GtCO2e (http://climateanalytics.org/files/ca_briefing_benchmark_emissions_1p5_and_2oc_2020_2025_2030_20150210_final_bh_may.pdf)".

Whilst the report has been prepared as partial fulfillment of the country's obligations to the UNFCCC, there are many domestic benefits of developing and implementing an INDC. St. Vincent and the Grenadines' INDC clearly demonstrates its political commitment and help realize non-climate benefits that support developmental priorities, in particular, reduced spending on imported fossil fuels. Additionally, these actions are consistent with the strategies and programmes identified in the *Climate Change and the Caribbean: A Regional Framework for Achieving Development Resilient to Climate Change* endorsed by the CARICOM Heads of State.

7. Means of Implementation

St. Vincent and the Grenadines has shown its commitment to mitigating climate change by independently taking concrete measures to reduce its emissions, particularly through renewable energy and waste initiatives[30]. It is hoped that this commitment and ambition will be recognised by the international community as progressive (in the context of the country's SIDS status) and that it will enable the country to leverage international finance (through the Green Climate Fund for example), technology transfer and capacity-building support to help further reduce emissions, especially in the areas of transport, renewable energy and energy efficiency.

In particular, St. Vincent and the Grenadines would welcome financial and capacity-building support to help produce a Nationally Appropriate Mitigation Action (NAMA) for the country's transport sector. This is a key priority if national GHG emissions are to be stabilised and reduced over the coming years. Similar international support in capacity-building and finance for the LULUCF sector is also sought to help establish a related programme of mitigation actions.

Despite the injection of funds to the country through the PPCR, the need for financing climate change adaptation and mitigation in St. Vincent and the Grenadines remains significant. This is especially so considering the extent of vulnerabilities and the percentage of the population potentially exposed. Devastating losses already being experienced and projected climate change impacts suggest that mobilizing additional, adequate and timely financing is vital to the country's socio-economic development.

[30] Facilities for waste segregation have been put in place, however to date little segregation has been achieved.

Samoa's Intended Nationally Determined Contribution

SEPTEMBER 2015

EXECUTIVE SUMMARY

The Independent State of Samoa is committed to combating climate change, and to the success of the negotiations for a new legally binding agreement under the United Nations Framework Convention on Climate Change at COP 21 in Paris.

Samoa is a small island developing state in the Pacific that is highly vulnerable to the impacts of climate change. However, it is only responsible for an insignificant amount of global greenhouse gas emissions. Despite this fact, Samoa is committed to addressing issues associated with climate change including adaptation and mitigation measures.

Pursuant to relevant sections of decisions 1/CP.19 and 1/CP.20 of the United Nations Framework Convention on Climate Change, Samoa hereby presents its Intended Nationally Determined Contribution as well as information to facilitate the clarity, transparency and understanding of the contribution.

Samoa is committed to reducing its GHG emissions from the Electricity sub sector through the adoption of a **100% Renewable energy target for electricity generation through to the year 2025.**

Samoa's commitment is conditional on reaching the 100% renewable electricity generation target in 2017 and receiving international assistance to maintain this contribution through to 2025.

Economy-wide emissions reduction conditional on external international assistance.

Samoa recognizes that achieving this highly ambitious target will require significant efforts to removing existing barriers. These include increases in human capacity, technology and capital investment.

1. INTRODUCTION: CONTEXT AND NATIONAL PRIORITIES

Samoa, a small island developing state in the South Pacific is at the forefront of efforts to address issues associated with the impacts of climate change. Like other islands in the region, the impacts of climate change on the environment are already quite evident and will continue to pose significant threats in the future.

On a global scale, Samoa's contribution to Greenhouse Gas (GHG) emissions are negligible as highlighted in its Second National Communication (SNC) and second GHG Inventory, 2007[1]. Total emissions for the year 2007 was estimated at 352,034 tCO_2-e or about 0.0006% of 2004 global GHG emissions (IPCC, 2007). However, despite the low contribution to global emissions, Samoa is ramping up its efforts to reduce its GHG emissions and demonstrate to the global community the actions being undertaken by a small and vulnerable country to address climate change.

Samoa has demonstrated significant commitment to addressing climate change by establishing a target of generating 100% of its electricity from renewable energy sources. This commitment is proposed to be implemented over two time periods. The first target is to reach 100% renewable electricity generation by the year 2017. The second target is to maintain this 100% contribution through to 2025 in anticipation of the increasing electricity demand.

The Strategy for Development of Samoa (SDS) highlights the key strategies for development across the priority sectors. The overarching theme for the SDS 2012 – 2016 is *Boosting productivity for sustainable development*[2]. The SDS highlights the importance of the environment as a priority area and has identified the mainstreaming of climate change across all sectors and increased investment in renewable energy as some of the main strategic outcomes. This political commitment to mainstream climate change issues is driving a number of actions that are aimed at not only adapting to the impacts of climate change but also accelerating efforts to reduce GHG emissions. The focus of Samoa's INDC is on mitigation given the short timeframe to prepare the report and carry out comprehensive stakeholder consultations. It is intended that this document will be a living document to be revised and updated when necessary.

Samoa is one of the most vulnerable countries to the impacts of climate change and some of these effects are already being felt across the country. Ongoing and planned activities are targeted at building resilience, disaster risk reduction and adapting to the adverse effects of climate change. Some of these adaptation measures are also expected to have mitigation potential.

[1] Samoa's Second National Communication to the UNFCCC, 2007
[2] Strategy for the Development of Samoa 2012 - 2016

Samoa's Intended Nationally Determined Contribution		
Period for defining actions & Reference Year		The target year is 2025 measured against the base year of 2014. Implementation period 2015 - 2025
Type and level of commitment		Samoa is targeting the Energy Sector with a focus on the Electricity sub sector. 26% of electricity was generated from renewable energy sources in 2014. Samoa commits to generating 100% of its electricity from renewable energy sources by 2025. This is conditional on Samoa attaining this target in 2017 and receiving external assistance to maintain the contribution of renewable sources at 100% through to 2025. Assistance required to reach this target include human, technological and financial resources. Further economy-wide emissions reductions are conditional on Samoa receiving external financial assistance from the international community.
Estimated, quantified emissions impact		In 2014, ~55,065 tCO_2-e of Samoa's GHG emissions were from the electricity sub sector. (Estimates of GHG emissions were based on methodologies used in 2nd GHG Inventory, Second National Communication and IPCC 2006 Guidelines)
Coverage	% National emissions (as at 2015)	The electricity sub sector accounted for ~13% of total GHG emissions in 2014 assuming business as usual scenario in all sectors since 2007. (IPCC 2006 Guidelines)
	Sectors	Energy
	Gases	CO_2
	Geographical boundaries	Whole country
Intention to use market based mechanisms to meet commitments		Samoa currently uses no market mechanisms but is willing to pursue the potential of markets where possible.
Land sector accounting approach		Not Applicable

Planning Processes	This INDC was prepared using a targeted approach whereby key stakeholders from the energy and climate change sector were consulted to provide the necessary information for compiling the report. The short timeframe allocated for the development of Samoa's INDC did not allow for a comprehensive national consultation process. However a substantial amount of work has been done at the national level in the energy sector and has helped facilitate the formulation of Samoa's INDC.
Fairness and Ambition	Samoa's Second National Communication and GHG Inventory highlighted the insignificantly low contribution of its emissions to the global aggregate. However, Samoa recognizes the potential for reduction of its emissions to not only support global efforts and demonstrate its willingness to address climate change issues but also to support the government's development vision of improved quality of life for all. As a small island developing state in the Pacific, Samoa faces the immense challenge of dealing with the adverse effects of climate change. This is made even more difficult by the fact that it has limited financial, technical and human resources. In setting itself a target of generating electricity from 100% renewable sources, Samoa has set a highly ambitious and fair target to demonstrate its commitment to reducing its emissions.
Methodology	This INDC was prepared using IPCC 2006 Guidelines and GHG Inventory has been updated using latest available data. Key assumptions and drivers are highlighted in Samoa's 2nd National Communication with BAU projection based on continuing economic and population growth with no GHG abatement measures.

2. SAMOA'S MITIGATION CONTRIBUTION

Samoa is committed to reducing its greenhouse gas emissions and at the same time pursue a low carbon emission development pathway which would have significant economic benefits.

The Energy sector which accounted for 50% of total GHG emissions in 2007 is targeted for emissions reductions in this INDC and in particular the electricity subsector (Figure 1). The National Energy Coordinating Committee[3] which is the key decision making body in the energy sector has set a target for Samoa to generate 100% of its electricity from renewable sources by

[3] The National Energy Coordinating Committee is a high level committee chaired by the Prime Minister and comprises key Cabinet Ministers and chief executive officers of ministries and agencies in the energy sector.

2017. This ambitious target is supported by a combination of policy level actions and development projects.

In 2007 total emissions from the electricity subsector were 44,214 tCO_2-e and represents emissions from diesel-fuelled thermal plants. Renewable energy contributed 48% of total electricity requirements in 2007. However, by 2014, renewable energy sources including solar photovoltaic, wind and hydropower contributed only 26% of total electricity generation. This drop in renewable energy contribution was due to the reduction in hydropower contribution when 3 of the hydropower plants were destroyed by Cyclone Evan. This highlights the vulnerability of Samoa to extreme climatic events which are expected to be more frequent as a result of climate change.

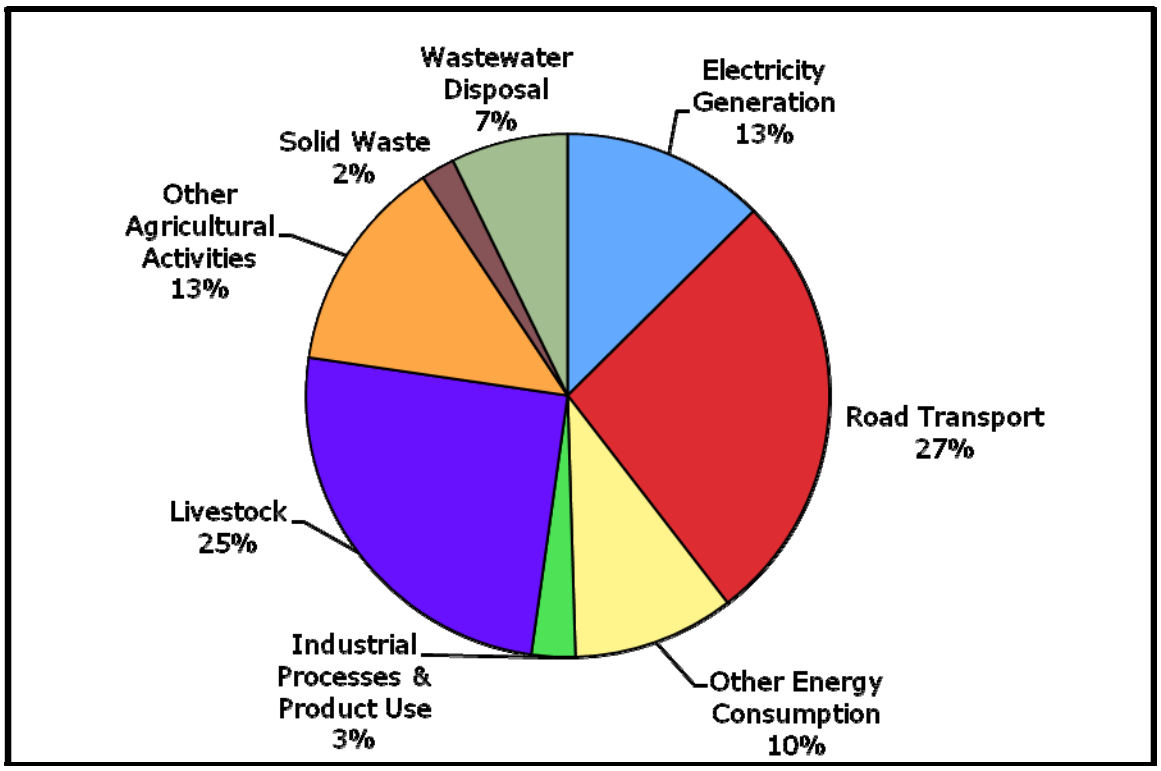


Figure 1: Samoa's sectoral GHG emissions (GHG Inventory, 2007)

The energy sector in Samoa is heavily reliant on imported fossil fuels to meet its needs. As the population grows GHG emissions are also expected to increase. Transportation and electricity generation are the two main contributors to emissions in the sector with the electricity sector contributing around 13% in GHG emissions in 2007.

Historically electricity generation has relied on two main sources, hydro and diesel-fuelled thermal power plants. Climate variability and oil price volatility have impacted electricity services in the past. Cyclones and other natural disasters have restricted the contribution of hydro power to the energy mix and in 2012; the destructive Cyclone Evan destroyed 3 of the 5 hydropower plants thereby reducing the capacity of this renewable energy source to the overall energy mix. In light of this and with a commitment to ensure energy security and reducing the

impacts of electricity generation on the environment, Samoa has taken steps to promote the use of renewable energy sources to displace fossil fuel for electricity generation.

KEY POLICY ACTIONS

An essential element to the realization of Samoa's commitment to climate change mitigation is having a favourable policy environment in place.

The *Samoa Energy Sector Plan 2012 – 2016* is a key guiding document for the energy sector with a theme of "sustainable energy towards energy self sufficiency". The Energy sector plan sets out a plan to deliver outcomes consistent with the Strategy for Development for Samoa with an overarching goal of increasing energy self sufficiency.

The *Electricity Act 2010* introduces key regulatory changes which have allowed the private sector to be involved in generating electricity and selling it back to the utility. This has allowed independent power producers (IPPs) to build and operate renewable energy power plants and sell electricity to the grid.

Other key policy drivers include the Greenhouse Gas Abatement Strategy, Climate Change Policy 2007 and the draft Energy Efficiency Act.

CAPITAL PROJECTS

Samoa has already undertaken and implemented a range of mitigation projects in the energy sector. These projects include various renewable energy projects for electricity generation as well as energy efficiency projects aimed at both supply and demand management. A combination of both renewable energy projects and energy efficiency measures is necessary to achieve the target as set out in the INDC. Significant donor assistance through grant financing has enabled the implementation of many of these projects. Future projects will need similar financing support.

Some of these projects include:

- Grid connected solar photovoltaic projects with a total installed capacity of 6MWp as of September 2015. This is a combination of both utility owned projects and IPPs and total capacity is expected to increase over the next couple of years;
- Wind Power - 550kW of installed capacity;
- Hydro Power – rehabilitation of 3.5MW hydro power plants destroyed by Cyclone Evan in 2012 as well as additional small run-of-river schemes;
- Bioenergy – 12MW of various projects aimed at utilizing biomass, biogas or alternative bioenergy source for electricity generation to be implemented by IPPs.
- Energy Efficiency – Projects aimed at controlling the importation of energy inefficient appliances such as product and labelling standards, retrofitting older and less efficient light bulbs with more efficient alternatives in the residential sector and other demand side management programs.

3. **ADAPTATION**

Samoa recognises that the adverse effects of climate change will have significant impact on the country particularly in sectors such as agriculture, coastal infrastructure, health, forestry, meteorology, tourism, and water. These sectors were prioritized in the National Adaptation

Programme of Action (NAPA)[4] and adaptation projects in these sectors have been successfully implemented with external financial support. While the focus of Samoa's INDC is on Mitigation, Samoa highlights the need to build on work that has been undertaken to ensure actions that have been identified during the implementation of previous adaptation objects are addressed at a future stage.

The effects of climate change and climate variability in the short and long term will continue to impact Samoa and through the implementation of some of the adaptation projects, emissions reductions are also possible. As with mitigation activities, implementation of adaptation projects are heavily dependent upon external financial assistance from the international community. Building climate resilience, disaster risk reduction as well as adaptation projects in vulnerable sectors require significant external assistance and this has been highlighted through the prioritisation of climate change in national planning.

4. SUPPORT FOR IMPLEMENTATION

Samoa has relied heavily on external assistance to fund many of its renewable energy initiatives. While the introduction of IPPs has transferred some of the financial burden of capital investment onto the private sector, the government is still faced with the task of improving existing transmission and distribution infrastructure.

As the country moves towards a more diverse mix of generation technologies, more investment is needed to upgrade and maintain existing infrastructure. The use of intermittent technologies such as solar photovoltaic and wind also puts pressure on the grid to maintain stability of supply. Storage and grid improvements become a priority once all these projects are online which are also capital intensive. To meet the target as set out in the INDC, Samoa needs financial assistance from donors and development partners to implement proposed renewable energy projects and also improve the existing infrastructure and technologies.

Substantial progress has been made in achieving the target set out for the electricity sector through investment in renewable energy projects, energy efficiency programs and policy reforms. However, international support is necessary to ensuring the low emission pathway chosen by the electricity sub sector is achieved.

The potential for economy-wide emissions reduction is conditional on assistance provided to other sectors such as transport, agriculture, forestry and waste. These sectors have set in place plans and strategies to reduce emissions; however, implementation is a common problem across all sectors due to limited human, financial and technical resources. The transport sector which has the highest sectoral emissions in particular has a regulation in place to restrict emissions from vehicles to a certain level. However enforcement has not been possible due to a lack of technical capacity, technological capacity and financial resources. Enforcement of this regulation will have significant impact on reducing emissions from this sector.

[4] The Samoa National Adaptation Programme of Action, 2005 (NAPA) was developed to identify key sectors with immediate adaption needs.

REPUBLIC OF SAN MARINO

Submission of San Marino to the ADP

San Marino, 30 September 2015

San Marino's Intended Nationally Determined Contribution

Introduction

The Republic of San Marino, as a party of the UN Framework Convention on Climate Change (UNFCCC), is fully committed to the negotiating process aimed at reaching a global legally binding agreement applicable to all Parties at the Paris Conference in December 2015 in line with keeping global warming below 2°C.

San Marino 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.

Intended Nationally Determined Contributions (INDC)

The Republic of San Marino, on the basis of the decision of the Government held on 28 September 2015, commits to reduce GHG emissions to 20% below 2005 levels by 2030.

In line with the Lima Call for Climate Action, in particular paragraph 14, the Republic of San Marino shall submit the following information for its INDC.

Information to facilitate clarity, transparency and understanding

Quantifiable information on the reference point (including, as appropriate, a base year):

Base year: 2005

Emissions in base year: 0,213 Mt per year (provisional, will be defined through the next inventory submissions).

Time frames and/or periods for implementation:

Time frame of the commitment is until end 2030. This quantified commitment will be translated into a progressive commitment over the period.

Scope and coverage:

Gases covered: all greenhouse gasses not controlled by the Montreal Protocol: CO2, CH4, N2O, HFCs, PFCs, SF6, NF3

Sectors covered: energy; industrial processes and product use; agriculture; land-use, land-use change and forestry; waste.

San Marino supports the inclusion of international aviation and shipping on the basis of future internationally agreed rules applicable to all parties.

Net Contribution of International Market Based Mechanisms:

The Republic of San Marino intends to achieve its goals of reducing emissions exclusively through domestic measures. However, the use of international mechanisms based on the market is not excluded if domestic reductions will prove insufficient to achieve the targets set.

Planning processes:

Since 2008 environmental policies have been implemented with a view to improving energy performance of buildings, production of electricity from renewable sources, energy consumption reduction. Moreover, a virtuous policy has been undertaken in waste management, reduction of solvent emissions into the atmosphere and application of new technologies in agriculture and land use including through a more careful territorial planning.

These policies will continue to be implemented in the coming years.

Assumptions and methodological approach:

Metric Applied Global Warming Potential on a 100 year timescale in accordance with the IPCC's2th Assessment Report.

Methodologies for Estimating Emissions: IPCC Guidelines 1996, IPCC Guidelines 2006 and IPCC 2013 KP Supplement.

Fairness and ambitions of the INDC:

San Marino contribution to global emissions is 0,00052%. Nevertheless, San Marino undertakes to achieve a reduction of emissions in line with the goal of keeping global warming below 2° C.

The population country is still increasing, 10% in the last 10 years. This increase has a consequence on the energy consumption.

National Circumstances

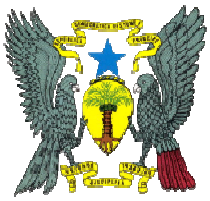
With an area of 61.19 km^2 and a population of about 32,500 inhabitants, the Republic of San Marino is one of the smallest and least populous countries in the world. Its territory includes about 10 km^2 of woods and 28.6 km^2 of agricultural areas. It is located in Southern Europe and is an enclave in central Italy.

The Republic of San Marino ratified the United Nations Framework Convention on Climate Change (UNFCCC) on 5 July 1994 and the Kyoto Protocol on 21 January 2010, as a non-Annex I country without quantified commitments for reducing the GHG emissions. Furthermore, San Marino accepted the Doha Amendment on 20 July 2015.

San Marino economy is based on small- and medium-sized enterprises. Tourism is thriving, with over 2 million tourists every year. The country has a modest agricultural sector, which offers high quality and genuine products and a well-diversified banking and financial sector. In 2013, the GDP of the Republic of San Marino was equal to 1,357.1 million euro, corresponding to 40.462 euro per inhabitant.

In 2014 the country's energy needs were equal to 259 GWh of electricity and 45 Gg of fuels. The Republic of San Marino is totally dependent on energy imports since it has neither fossil fuel sources nor energy production plants.

The small territory of San Marino has a limit access to renewable energy options such as hydroelectric, wind or geothermal power. As a consequence, in the last years, the Government of San Marino has promoted the development of solar energy, in particular solar PV, throughout forms of incentives, benefits and bonuses.



SAO TOME AND PRINCIPE
INTENDED NATIONALLY DETERMINED CONTRIBUTION

(SEPTEMBER 2015)

Supported by

Democratic Republic of Sao Tome and Principe

Intended Nationally Determined Contributions (INDC)

National background: Development Benchmarks and National Priorities and Climate Change Context	
Sao Tome and Principe (STP) is a small island state consisting of two islands and several islets located in the Gulf of Guinea, with an area of 1001 km^2. With a total population of about 187,356 inhabitants, of which over 65% are below the poverty line, and less than 50% have access to electricity services. GDP growth is around 4% which is not sufficient to meet STP's major development needs. Furthermore, over 90% of the State Budget (OGE) come from foreign aid and the debt rate is high (70% of GDP). The country is an absolute sink of greenhouse gases, i.e. it contributes to the sequestration of CO_2 but on the other hand it is one of the countries most affected by climate change (CC). Climate change adaptation and risk reduction from climate change impacts is a priority for the national authorities, although, STP has taken steps to identify additional mitigation measures that can contribute to the reduction of national GHG emissions. The implementation of measures, both for adaptation and mitigation requires financial resources, access to technology and capacity building, through external assistance. The state of Sao Tome and Principe has a legal and institutional framework to manage and respond to challenges on environmental issues: The Ministry of Infrastructure, Natural Resources and Environment, through the General Directorate of Environment (DGE) established, in 2007, by Presidential Decree No. 2/2007, involved in the implementation of the United Nations Framework Convention on Climate Change, in collaboration with the National Institute of Meteorology (NIM); the Law No.10/99 – Basic Law on Environment of 15 April 1999 establishing the legal framework of the environment in Sao Tome and Principe. The Decree No.13/2012, published in the Daily Gazette of the Republic No. 81, of July 11, 2012, created the National Committee for Climate Change for the implementation, coordination, monitoring and evaluation of the United Nations Framework Convention on Climate Change.	
CONTRIBUTION IN TERMS OF ADAPTATION	
1. Rationale and process for developing	STP adaptation measures are aimed at improving the

INDCs on adaptation	country's ability to adapt to the adverse consequences of CC, thus contributing to the country's development. The rationale for the inclusion of the adaptation component in the INDC takes into consideration that the country is already a sink of greenhouse gases. In addition, , the country shows vulnerability and fragility conditions as a developing small island state, for which the negative impacts of CC are evident in all sectors of the national economy, such as: Agriculture and Livestock; Forest and Soil; Water, Energy and Fishing; Coastal Zone and Population; Health and Education. Being a LDC, STP requires external support to implement a CC resilient development. In this regard the INDC process is also considered as a mechanism to raise awareness of the national adaptation program at the international level in order to attract technical, financial and capacity-building support for its implementation.
2. Summary of Climate Change trends, impacts and vulnerabilities.	STP is already suffering the impacts of CC. Several tyrends have been observed: increasing temperature, decreasing rainfall, longer dry season “gravana”, decreasing river flow level, which causes the risk of decreasing groundwater reservoirs , floods, raising sea level and increasing coastal erosion. These trends have negative economic impacts on energy production, fishing activities, forestry and agro forestry, agriculture and livestock. All these trends and impacts have already been identified and documented (in the Second National Communication) and they represent a major concern for the country.
3. Reporting on long-term and near-term adaptation visions, goals and targets	Depending on the future availability of financial, technological and capacity-building support provided by

	the international community, the country plans in short and medium terms to implement the following actions: I. Strengthening the National Service of Civil Protection and Fire, by 2025, to respond to fire and other environmental disasters, increasing resilience to climate change, thus contributing to social well-being; II. Reduce the number of people living in vulnerable areas at risk, by providing housing in safer areas; III. Develop a national program for sustainable management of the forest and agro forestry ecosystems by 2025; IV. Introduce radar reflectors on board all fishing vessels by 2025, reducing the number of accidents at sea; V. Train and equip fishermen with means to enable safe fishing and train them in the proper use of fishing gear. In the medium and long terms, Sao Tome and Principe will be conditionally committed to implement the following activities , depending on the availability of financial, technological and capacity-building support, from the international community: I. Reduce the illegal and indiscriminate felling of trees by 15%, by 2030; II. Develop scientific and technical research on adaptation of new productive crop varieties with a broad spectrum of tolerance to adverse climate impacts by 2030; III. Promote forestry / planting of species resistant to dry and low rainfall by 2030; IV. Improve pasture with grazing selection by applying rotation management of the of plots by

	2030; V. Increase the resilience to erosion and maritime, river and storm flooding of coastal areas through improved Coastal Protection for vulnerable communities; VI. Reduce the use of nitrogen fertilizers in agriculture by 2030.
4. Reporting on current and planned adaptation undertakings and support	To achieve the objectives of the above mentioned actions in paragraph 3, 17 specific projects were identified and listed in the NAPA, which implementation require external financial support in addition to technological support and capacity building.
5. Gaps and Barriers	<u>Financial Barriers:</u> I. Difficult access to finance; II. Relatively long time for return on investment; III. Limited budgets from the State to create an enabling environment for resource mobilization to encourage private sector investment. <u>Technological barriers and lack of skilled human resources</u> I. Non- sufficient and inappropriate technological abilities in the national market; II. Absence of adequate capacity-building of national experts on specific issues; II. Low access to modern and efficient technology. <u>Institutional and Political barriers:</u> I. Instability of the CC Committee; II. Deficient and incomplete disclosure of information on

	Climate Change; III. Absence of availability to a centralized CC database with needed information; IV. Absence of policies and regulatory activity for key sectors (energy, water, forests etc.).
6. Summary of Needs	The realization of the priority adaptation projects identified and not yet properly implemented, require external financial support in order to ensure their feasibility. As well as, STP requests the technologies support and capacity building.
MITIGATION IN TERMS CONTRIBUITION	
1. Timeframe	2020-2030
2. Type of contribution	The type of contribution selected by STP in terms of mitigation is based on results, i.e. the reduction of greenhouse gases to levels below the BAU. The BAU scenario by 2030 was based on the last GHG inventory of 2005.
3. Target Level	Taking into consideration the country's national economic, social and environmental situation, STP will not present any unconditional contributions. The contributions of STP with regard to mitigation are conditioned by financial support, technological support and capacity-building that the country will receive from abroad.
4. GHG Reduction	In 2005, emissions were about 93 ktCO2eq, and BAU projection indicates that to fulfil the condition of the supposed growth parameters by 2030, the emissions will reach 240 ktCO2eq.

	The measures which STP has considered as potential contributions to this date, are as follows: I. Isolated Mini Power plant (1 MW); II. Hydro Power plant connected to the main network (9 MW); III. Photovoltaic solar panels (12 MW); III- Mini-hydro Power plant connected to the main grid (4 MW). The implementation of these four (4) measures would mean an introduction of about 47% renewable energy in the national electricity system compared to the projected BAU electricity production, of which 34% is hydro and 13% solar (PV). Thus, STP would be able to contribute to the reduction of Greenhouse Gases by about 57 $ktCO_2eq$, which approximately corresponds to a 24% national emission reduction by 2030 related to 2005. In 2030, it is expected that national emissions will be about 240 $ktCO_2eq$, according to the BAU scenario. Net emissions from LULUCF under the BAU scenario are expected to be around -630 $ktCO_2eq$, indicating that STP will continue to be a carbon sink country, in which net absorptions will be - 400 ktCO2eq.
5. Means of Implementation	To implement the above listed mitigation activities, it is estimated that a total investment of not less than US$ 59 million in the form of external aid will be required between 2020 and 2030. According to the mitigation measures identified, the necessary technologies are: I. Hydropower Electricity Generation Systems; II. Photovoltaic Electricity Generation Systems. Thus, STP requests the technologies support and capacity building

6. Sectors	The scope of the contribution covers all sectors of the national economy.
7. Gases	CO_2, CH_4, NO_x
8. Accounting Methodology	With the support of GACMO model, developed by UNEP DTU Partnership, the BAU scenario was constructed based on the national GHG Inventory (IGEE) of 2005 IGEE, according to the IPCC guidelines for NAI countries. The mitigation measures were selected and prioritized based on consultation with stakeholders, which formed the basis for the calculation of the mitigation scenario, calculated using the GACMO model. The calculations were performed without including the absorption of CO_2 of forests.
9. Institutional Arrangements	Apart from the legal framework referred to in the *National Circumstances*, for the analysis of mitigation, it took into account the Kyoto Protocol, ratified on May 19, 2008, by Presidential Decree No. 9/2008 and the Legal Regime of the Energy Sector created by Decree-law No. 26/2014.
10. How is it equitable and adequate?	STP is a GHG sinkhole country. However, it is willing to make further efforts to reduce its emissions depending on the financial support, technological resources and support for capacity-building it may receive from the international community.
11. Market mechanisms of participation	According to the Marrakesh Call for Climate Action, agreed at the Ministerial Dialogue of the Seventh African Forum of Carbon, in April 2015, Sao Tome and Principe recognizes the experience gained from the implementation of the Clean Development Mechanism and want to be supported by market mechanisms with high environmental integrity, contributing to sustainable development and establishing strong incentives to harness the power of private sector.

	Sao Tome and Principe supports the use of market mechanisms including the results of mitigation pre-2020, such as the use of Emission Reduction Certificates (ERCs) generated by CDM projects and programs.
12. Monitoring and Progress Report	The country elaborated a Monitoring and Progress Report System proposal (MPR) to (INDC) according to the needs, complying with international requirements of the monitoring activities and progress of certain national contributions to adaptation and mitigation.

The Intended Nationally Determined Contribution of the Kingdom of Saudi Arabia under the UNFCCC

Riyadh, November 2015

The Kingdom of Saudi Arabia is pleased to submit its Intended Nationally Determined Contribution (INDC) to the United Nations Framework Convention on Climate Change (UNFCCC) Secretariat pursuant to the decisions 1/CP.19 and 1/CP.20.

The INDC of the Kingdom of Saudi Arabia is based on the principles listed in Art. 3 of the UNFCCC and the approach specified in the Economic Diversification Initiative adopted as UNFCCC decision 24/CP.18 in Doha 2012. The Kingdom will engage in actions and plans in pursuit of economic diversification that have co-benefits in the form of greenhouse gas (GHG) emission avoidances and adaptation to the impacts of climate change, as well as reducing the impacts of response measures. This will help the Kingdom to achieve its sustainable development objectives. In this spirit, the Kingdom of Saudi Arabia desires to actively contribute to the UNFCCC negotiations maximizing long term benefits and minimizing potential negative side effects for Saudi Arabia.

Executive Summary

The actions and plans outlined in this submission seek to achieve mitigation co-benefits ambitions of up to 130 million tons of CO_2eq avoided by 2030 annually through contributions to economic diversification and adaptation. These ambitions are contingent on the Kingdom's economy continuing to grow with an increasingly diversified economy and a robust contribution from oil export revenues to the national economy. It is also premised on the fact that the economic and social consequences of international climate change policies and measures do not pose disproportionate or abnormal burden on the Kingdom's economy. This is fully consistent with Article 3 paragraph 2 and Article 4 paragraph 8(h) and 10 of the United Nations Framework Convention on Climate Change.

A dynamic baseline will be developed on basis of a combination of two scenarios. One scenario assumes economic diversification with a robust contribution of oil export revenues, and the other on an accelerated domestic industrialization based on sustainable utilization of all indigenous resources including oil, gas and minerals.

I. National Circumstances

Physical, economic and social factors determine the vulnerability of a country to climate change and the Kingdom of Saudi Arabia exhibits significant vulnerability in all three aspects. The Arabian Desert dominates the country, which spans approximately 2.2 million km^2 of the Arabian Peninsula. Current climatic conditions range from semi- to hyper aridity, with

extremely low rainfall (<150mm/year in most areas), high evapotranspiration and resultant water scarcity. In the long term, a significant share of the infrastructure on the coastlines may be vulnerable to sea level rise. Trade and services may also be vulnerable to heatwaves and sandstorms as well as other indirect vulnerabilities including price volatility in exports and imports of goods and services.

1. Economic diversification is a key factor influencing the stability and sustainability of the growth of any country's economy, hence an economy's reliance on one income resource puts at risk its ability to maintain a level of growth in the long run. Oil production, processing and export are the primary economic activities of the Kingdom of Saudi Arabia, however there are opportunities for gas, minerals and their derivatives to contribute to the Kingdom's economy.

2. From 1970 to date, the Kingdom of Saudi Arabia has developed ten 5-year national development plans (covering the period 1970-2019) to guide the development process for the Kingdom and provide economic and social stability in the medium to longer term. Central to all these plans is the policy of economic diversification designed to diversify the Kingdom of Saudi Arabia's sources of national income and reduce dependence on revenues from a single source by increasing the share of other productive sectors in gross domestic product. These sectors include the manufacturing industries, energy and related derivatives, mining, tourism and information technology industries.

3. Two scenarios applied for determining dynamic baselines for the period 2000–2030 are differentiated into three time-periods. First time period covers the years 2000-2015. The year 2000 is used because it is the year that most recent inventory data obtained using the Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories is available (second national communications). Second and third time- periods are from 2016 to 2020 and 2021-2030 respectively.

3.1. Scenario 1: Economic diversification with a robust contribution from oil and its derivatives export revenues. Export revenues channelled into investments in high value-added sectors such as financial services, medical services, tourism, education, renewable energy and energy efficiency technologies to enhance economic growth. Ambitions outlined in this INDC are set under this scenario.

3.2. Scenario 2: Accelerated domestic industrialization based on sustainable utilization of oil and gas. A heavy industrial base built to use domestic oil resources as feedstock or energy source. Increasing contributions of petrochemical, cement, mining and metal production industries to the national economy. Economic growth will be much slower under this scenario, and will be difficult for the Kingdom to finance its INDC ambitions with domestic resources. In this case, this INDC will be adjusted to account for this scenario.

3.3. The main difference between the two baseline scenarios is the allocation of oil produced for either domestic consumption or export. While exported oil will not contribute to the GHG emissions of Saudi Arabia, the domestic consumption will increase its GHG emissions. For the ex-ante estimations, the baseline is determined based on differently weighted combinations of the two scenarios. Between 2016 and 2020, Saudi Arabia reserves the right to further elaborate on its INDC and make additional submissions to

account for these scenarios. During the run-up to the validity period of the INDC, the baseline scenarios will be updated.

II. Contribution to Economic diversification with mitigation co-benefits

The Kingdom of Saudi Arabia has ambitious plans to diversify its economy away from heavy reliance on income generated from a single resource. Therefore, contribution to the climate ambition will be integrated in the future policy to promote this plan. The INDC is thus driven by the aim to implement measures that accelerate the diversification process under paragraph 3.1 above (scenario 1). The following actions and plans will generate mitigation co-benefits and contribute to economic diversification:

1. **Energy Efficiency:** implement measures and initiatives that will promote, encourage and support actions in generating mitigation co-benefits in energy efficiency. Strengthen the Saudi Energy Efficiency Program and expand its focus. Currently, the program focuses on three main sectors, namely industry, building and transportation that collectively account for over 90% of the energy demand in the Kingdom. Support initiatives that will produce far-reaching co-benefits, such as the introduction of efficiency standards in the building and transportation sectors as well as the implementation of energy efficiency measures, in various industrial establishments. Encourage and expedite the conversion of single cycle power plants to combined cycle power plants.

2. **Renewable energies**: Invest and implement ambitious programs for renewable energy to increase its contribution to the energy mix. The scope will include solar PV, solar thermal, wind and geothermal energy and waste to energy systems. A competitive procurement process for renewable energy is currently under preparation and evaluation.

3. **Carbon Capture and Utilization/Storage**: promote and encourage actions in this area. As part of its sustainability programme, the Kingdom of Saudi Arabia plans to build the world's largest carbon capture and use plant. This initiative aims to capture and purify about 1,500 tons of CO_2 a day for use in other petrochemical plants. Saudi Arabia will operate on pilot testing basis, a Carbon Dioxide – Enhanced Oil Recovery (CO2-EOR) demonstration project to assess the viability of CO_2 sequestration in oil reservoirs and any other useful applications. Forty million standard cubic feet a day of CO_2 that will be captured, processed and injected into the Othmaniya oil reservoir. This pilot project has comprehensive monitoring and surveillance plans. The success of this pilot will determine the extent this program will contribute to the Kingdom's ambition in addressing climate change.

4. **Utilization of gas**: Encourage investments on exploring and producing natural gas to significantly increase its contribution to the national energy mix. The success on realizing the Mitigation co-benefit ambition in this area will depend on the success of exploring and developing natural gas.

5. **Methane recovery and flare minimization**: Actions will be taken to conserve, recover and reuse hydrocarbon resources and minimize flaring and fugitive emissions.

III. Contributions to Adaptation

Saudi Arabia is continuously investing considerable efforts and resources in activities that help protect and renew the Kingdom's natural environment including protection of the biodiversity of land, seas and coastlines. Saudi Arabia differentiates its adaptation measures into those with mitigation co-benefits and those that are entirely aimed at adaptation and raising resilience. Adaptation measures can also contribute to economic diversification. The INDC in this area is driven by the aim to implement measures that will enhance resilience and accelerate the diversification process of its economy under paragraph 3.1 above (scenario 1).

1. **Adaptation with mitigation co-benefits**: The following adaptation measures are expected to have significant mitigation co-benefits, depending on their degree of implementation and availability of funds to pursue planned activities:

1.1. **Water and waste water management**: Implement actions that will promote and encourage the reduction, recycle and reuse of water and wastewater in the municipal, industrial and commercial sectors in a manner that will reduce energy consumption, desalinated water production and unground leakage.

1.2. **Urban planning**: Encourage actions that promote the development and use of mass transport systems in urban areas. Take the necessary actions to expedite the development of the metro system in Riyadh. In addition support and expedite the planning and development of metro systems in Jeddah and Dammam.

1.3. **Marine Protection**: Implement coastal management strategies that are designed to reduce coastal erosion, increase the sinks for blue carbon, maintain related ecosystems and address the threats that climate change poses for marine livelihoods. Support the planting of mangrove seedlings along its coasts. In addition, strengthen and enhance the coral reef restoration program throughout the northwestern Arabian Gulf.

1.4. **Reduced desertification**: Undertake measures to enhance desertification management. Support actions that will promote the stabilization of sand movements around cities and roads, while increasing sinks for capacity through using green belts as barriers. Develop and enhance arid and semi-arid rural areas through various natural resource conservation activities, biodiversity and eco-system based adaptation efforts. The objective is to improve soil quality, water, pasture and wildlife resources through a system of protected areas and reserves. Mitigation co-benefits may include those relating to reducing land degradation and improving land management practices, especially for agriculture and forestry.

2. **Adaptation undertakings**: The following adaptation contributions are expected to support Saudi Arabia's efforts to address climate change and raise resilience to its impacts:

2.1. **Integrated coastal zone management planning (ICZM):** Take the necessary action to develop and implement ICZM plans that would take into account the protection of coastal **infrastructures** such as roads, residential areas, industrial complexes, desalination plants, seaports, etc.;

2.2. **Early Warning Systems (EWS): Develop** and operationalize EWS that would reduce vulnerability due to extreme weather events such as rainstorms, floods and dust storms by increasing resilience of infrastructure;

2.3. **Integrated water management planning**: Develop and implement plans that will harness new sources of freshwater, construct additional dams for collection of drinking water and recharging of aquifers.

IV. Addressing Response Measures

Saudi Arabia will take the necessary actions to understand international policy measures to response to climate change, assess the implications of these measures on its economy, and take necessary steps to raise its resilience to these impacts. International cooperation in addressing response measures is important for the Kingdom to achieve its sustainable development objectives and realize its ambitions in addressing climate change; these include:

1. Socio-economic research studies to assess the impacts of mitigation policy measures implemented outside Saudi Arabia on the Saudi economy, including collection of information and development of modelling tools.

2. Research and development activities to provide technologies that enhance economic competitiveness. Research into understanding the long-term impacts of response measures on energy market stability and to develop measures that can sustain a stable energy market in the long run. Technology cooperation on the basis of the approaches outlined in paragraphs 24-29 in decision 5/CP.7 will allow for the identification of appropriate technological options, which are consistent with national priorities, and domestic human and financial resources in order to promote enabling environment for economic diversification and technological development (e.g. carbon capture utilization and storage).

3. The long-term aim of such measures is to achieve a growth of domestic industries that exceeds the loss of revenue from oil export triggered by decrease in fossil fuel consumption and market distorting actions such as fuel taxes, subsidies and incentives for all complementary sources of energy.

V. Timeframe

The assessment of baseline covers the period 2021 to 2030. As time progresses, this assessment will be expanded until 2050. Estimates and ambitions will be adjusted depending on the level of development and progress toward economic diversification (as outlined in paragraph 3 above) as well as feedbacks from different sectors of the economy.

VI. Means of Implementation

The implementation of Saudi Arabia's INDC is not contingent on receiving international financial support, but the Kingdom of Saudi Arabia sees an important role for technology cooperation and transfer as well as capacity building for INDC implementation.

1. The ambitions set out in this INDC would require technical assistance and sustained capacity building efforts and upgrading of skills at the individual and systemic levels to support their implementation. Saudi Arabia therefore looks for benefiting from all the assistance made available to developing countries in respect of enabling activities within the framework of the UNFCCC.

2. Cooperate on research programme on the impacts of response measures on international energy markets and economies of fossil fuel exporting countries, as well as success parameters of economic diversification initiatives. Moreover, such international cooperation should focus on the development, diffusion and transfer of less greenhouse gas-emitting advanced technologies including fossil fuel technologies.

3. With regard to adaptation, collaboration on the following technologies is seen as crucial: (a) water saving, recycling, capture, irrigation and sustainable management for agriculture purposes; (b) early warning system against meteorological extreme events (such as floods, storms and droughts; and (c) transportation technologies that are resilient to the adverse effects of climate change while reducing and/or capturing transportation-related emissions. Saudi Arabia aims to create long-term partnerships with universities, research institutes and the private sector in order to enable utilization of these technologies.

VII. Monitoring and reporting progress on INDC implementation at the national level

4. The Kingdom of Saudi Arabia acknowledges that a monitoring, reporting and verification (MRV) system forms an essential part of its national arrangements for ensuring the successful delivery of its economic diversification and adaptation measures with mitigation co-benefits. The Kingdom's MRV system for INDC will be an integral part of the existing and future monitoring and reporting structures under the oversight of its Designated National Authority. The MRV system will be deployed to track progress towards achieving INDC actions and projects and any modifications thereof.

VIII. Ambition and Fairness

As a Party to the Convention, the Kingdom of Saudi Arabia's INDC is based on the UNFCCC and in particular, its Article 3 paragraph 2 and Article 4 paragraph 8 (h) and 10. Saudi Arabia is in the process of diversifying its economy. Being highly vulnerable to climate change and actions and plans to address it, the Kingdom of Saudi Arabia will be engaged in several actions to address climate change and make its development more sustainable. The INDC's focus on economic diversification as well as adaptation actions with mitigation co-benefits allows to effectively address and tap on synergies for both responses to climate change. The ambition is also reflected in the high capital and investment volumes required for economic diversification, particularly if structural changes to the economy is required and to projects and actions outlined to implement the INDC.

The contribution achieved through the mitigation co-benefits fulfils the requirement of fairness, given that the sum of these contributions leads to a significant deviation from a business-as-

usual emissions path for an economy that highly depends on oil and gas. The measures outlined in this INDC would achieve significant annual mitigation co-benefits estimated to be up to 130 million tons of CO_2eq by 2030. The measures focus on harnessing the mitigation potential in a way that prevents "lock in" of high-GHG infrastructure. These contributions would only be possible under scenario 1 pathway of sustained economic growth.

REPUBLIQUE DU SENEGAL

Un Peuple – Un But – Une Foi

MINISTERE DE L'ENVIRONNEMENT ET DU DEVELOPPEMENT DURABLE

CONTRIBUTION PREVUE DETERMINEE AU NIVEAU NATIONAL

(CPDN)

Septembre 2015

Résumé

La Contribution Prévue Déterminée au niveau National (CPDN) du Sénégal s'inscrit dans le cadre de sa stratégie de développement, le Plan Sénégal Émergent (PSE), ainsi que ses programmes sectoriels de gestion durable de ses ressources naturelles et environnementales. L'État du Sénégal met en œuvre plusieurs projets et programmes ayant pour objectif l'accélération de la croissance économique, la réduction de la pauvreté et l'amélioration de la qualité de vie des citoyens. Cette stratégie repose en grande partie sur l'exploitation de ses ressources naturelles et exige, afin de garantir une croissance durable et responsable, une bonne gestion de ces ressources.

Plusieurs études réalisées au Sénégal renseignent sur les conséquences du changement climatique. Les impacts observés montrent une évolution à la baisse de la pluviométrie, une hausse certaine des températures moyennes, une élévation du niveau de la mer et des perturbations sur la disponibilité de ressources hydrauliques et halieutiques, des sols et espaces cultivables. Elles traduisent une vulnérabilité des écosystèmes du Sénégal, nécessitant des actions précises d'atténuation et d'adaptation aux perspectives climatiques futures afin d'en maîtriser les impacts potentiels, notamment en termes socio-économiques sur les 60% de la population dont la subsistance dépend directement de ces ressources.

La CPDN du Sénégal a été élaborée par une équipe de consultants locaux sous l'encadrement de la Direction de l'Environnement et des Etablissements Classés (DEEC) et du Ministère de l'Environnement et du Développement Durable en collaboration avec le Comité National sur les Changements Climatiques (COMNACC), sur la base d'un processus participatif et inclusif. Une évaluation rigoureuse de la situation environnementale, la participation d'experts sectoriels, des collectivités locales, de la société civile et l'implication de l'État ont permis de produire un ensemble d'actions significatives qui manifestent l'engagement du Sénégal à contribuer au défi collectif que représente le changement climatique. Cette évaluation a permis d'identifier sur les volets d'atténuation et d'adaptation, les secteurs portant de façon prioritaire les activités de maîtrise des impacts du changement climatique comme étant : l'agriculture, la pêche, la foresterie, le transport, la gestion des déchets, l'énergie et l'industrie.

Un atelier national tenu le 14 septembre 2015, présidé par le Ministre de l'Environnement et du développement durable a permis de valider des engagements précis de réduction des émissions de Gaz à effet de serre (GES) pour le Sénégal à l'horizon 2035. La CPDN a été adoptée au conseil des ministres du 16 septembre 2015.

Malgré des capacités limitées et le faible niveau des émissions actuelles du Sénégal, cette contribution traduit la volonté de l'État à prendre part aux stratégies globales d'atténuation et d'adaptation aux changements climatiques. La mise en œuvre de la CPDN est estimée à un coût financier de 21,5 milliards de dollars US et nécessite d'importants moyens humains et technologiques, mais aussi l'appui de la communauté internationale afin de permettre des réductions encore plus significatives d'émissions de GES.

Des simulations ont permis d'évaluer les impacts et les retombées socio-économiques escomptées de ces mesures. Bien qu'intervenant directement sur les secteurs cités précédemment, ces mesures constituent un levier d'amélioration de la situation économique nationale de la santé publique, de la gestion des problèmes liés à l'urbanisation, entre autres problématiques jugées essentielles.

Sigles et acronymes

AFAT	Agriculture Foresterie et Autres Affectations des Terres
BAU	Cours Normal des Affaires – *Business As Usual*
BRT	Bus à Haut Niveau de Service – *Bus Rapid Transit*
CCNUCC	Convention-Cadre des Nations Unies sur les Changements Climatiques
CET	Centre d'Enfouissement Technique
CETUD	Conseil Exécutif des Transports Urbains de Dakar
CIVD	Centre Intégré de Valorisation des déchets
CN	Communications Nationales
COMNACC	Comité National sur les Changements Climatiques
CORDEX	Expérimentation des méthodes dites de désagrégation – *Coordinated Regional Climate Downscalling Experiment*
CPDN	Contribution Prévue Déterminée au niveau National
CRN	Centre de regroupement
CRODT	Centre de Recherche Océanographique Dakar Thiaroye
CSE	Centre de Suivi Écologique
DGPRE	Direction de la Gestion et de la Planification des Ressources en Eau
ECO_2	Équivalent en dioxyde de carbone (Équivalent CO2)
GDT	Gestion Durable des Terres
GES	Gaz à Effet de Serre
Gg	Giga Gramme
GIEC	Groupe d'experts Intergouvernemental sur l'Évolution du Climat
IDH	Indice de Développement Humain
IPCC	Panel Intergouvernemental sur le Changement Climatique – *Intergovernemental Panel on Climate Change*
MRV	Mesure Rapportage Vérification – *Measure Reporting Verification*
ONAS	Office National de l'Assainissement
PANA	Plan d'Action National d'Adaptation
PAP	Plan d'Actions Prioritaires
PAPIL	Programme d'Appui à la Petite Irrigation Locale
PEID	Petits États Insulaires en Développement
PGIES	Projet de Gestion Intégrée des Écosystèmes
PIB	Produit Intérieur Brut
PIUP	Procédés Industriels et Utilisation des Produits
PMA	Pays les Moins Avancés
PNA	Plan National d'Adaptation
PNGD	Programme National de Gestion des Déchets
PRACAS	Programme de Relance et d'Accélération de la Cadence de l'Agriculture Sénégalaise
PSE	Plan Sénégal Émergent
RCP	Trajectoires Représentatives de Concentration – *Representative Concentration Pathways*
RNA	Régénération Naturelle Assistée
SRI	Système de Riziculture Intensif
CO_2	Dioxyde de Carbone ou gaz carbonique
CH_4	Méthane
N_2O	Protoxyde d'azote ou oxyde nitreux
MW	Mégawatt
MWc	Mégawatt-crête

Table des matières

FICHE PAYS

DONNEES ADMINISTRATIVES

Nom officiel : République du Sénégal
Superficie : 196 722 km²
Capitale : Dakar
Villes principales : Kaolack, Saint-Louis, Thiès, Touba, Ziguinchor
Langues officielles : Français
Langues courantes : Wolof, Diola, Puular, Sérère et Soninké

DONNEES SOCIO-DEMOGRAPHIQUES

Population : 13 508 715 habitants
Personnes âgées de moins de 25 ans : 62%
Personnes âgées de plus de 60 ans : 5,2 %
Taux d'accroissement de la population : 2,5%
Densité : 69 habitants au km²
Taux d'urbanisation: 44 %
Taux de prévalence pauvreté : 46,7% (2011)
IDH : 163e sur 187 pays (PNUD, 2013)

DONNEES ENVIRONNEMENTALES

Longueur côte océanique : 700 Km
Type de climat : sahélien
Réseau hydrographique : fleuve Sénégal (1 770 km), fleuve Gambie (1 150 km), lac de Guiers (600 millions de M^3)
Émission Gaz à Effet de Serre: 7 525 Gg ECO2 (2000), 13 076 Gg ECO2 (2005)

DONNEES ECONOMIQUES

Monnaie : Franc CFA
PNB : 27,72 milliards USD (2013)
Taux de croissance du PIB en 2015 : 4,6%
PIB par habitants : 2 100 USD

SECTEURS CLES

AGRICULTURE

- Contribution au PIB en 2012 : 7,2%
- Source de revenus de 60% de la population du Sénégal
- Vision : atteindre l'autosuffisance en riz en 2017

ELEVAGE

- Contribution au PIB en 2012 : 4,2%
- Taille du cheptel : 15 millions de têtes

PECHE

- Contribution au PIB en 2012 : 2,2%
- Part de la pêche artisanale : 95%
- Nombre d'emplois créés : 600 000

FORESTERIE

- Contribue à la satisfaction des besoins en combustibles domestiques, alimentation, santé, habitat
- Déforestation annuelle nette : 40 000 ha par an

Introduction

L'État du Sénégal a défini un cadre de référence pour sa politique économique et sociale à travers le Plan Sénégal Émergent (PSE). Ce plan définit une vision ambitieuse du bien-être économique à l'horizon 2035, déclinée en une stratégie décennale et un premier plan d'actions prioritaires sur cinq ans (PAP 2014-2018) et détaillée sur trois axes : (1) la transformation structurelle de l'économie et la Croissance ; (2) le capital humain, la protection sociale et le développement durable ; (3) la gouvernance, les institutions, la paix et la sécurité.

Le PSE établit les bases d'une accélération de la croissance économique assise en grande partie sur l'intensification de l'activité dans les secteurs primaire et secondaire. Or, la combinaison, d'une part, des conséquences délétères du changement climatique sur les terres arables, ressources hydrauliques et halieutiques et d'autre part, de la forte croissance démographique du pays, sont susceptibles de compromettre le succès de ce plan national.

Compte tenu de la forte sujétion du pays au changement climatique et conformément à sa tradition de coopération internationale, le Gouvernement du Sénégal entend contribuer à l'effort collectif au travers de la mise en œuvre de mesures d'atténuation de ses émissions de GES et de mesures d'adaptation dans ses secteurs d'activités.

La CPDN du Sénégal s'inscrit donc dans le cadre du PSE, en écho avec ses Plans d'Actions Prioritaires.

1. Contexte

Les mesures proposées par le Sénégal s'appuient sur un diagnostic approfondi de la situation environnementale s'étant attaché à étudier :

- L'évolution des tendances climatiques de 1961 à 2010 et les perspectives climatiques ; et
- L'impact des changements notés sur différents secteurs d'activités économiques tout en soulignant les vulnérabilités de certains systèmes naturels et économiques par rapport à ces tendances.

1.1. Évolution des tendances climatiques et perspectives

Il existe un consensus sur les tendances des indicateurs climatiques structurants des écosystèmes sénégalais : les modifications constatées des températures, de la pluviométrie et des caractéristiques des surfaces de la mer sont appelées à continuer.

- **Températures :** de façon générale il est observé une forte augmentation des températures minimales alors que les températures maximales ont subi une légère augmentation. Les prévisions indiquent une variation moyenne de +1,1 à 1,8 degré Celsius à l'horizon 2035[1].
- **Pluviométrie :** l'analyse de l'évolution moyenne montre une diminution des précipitations de 1951 à 2000 sur les zones de référence[2]. Les tendances futures prévoient la continuation de cette tendance à l'horizon 2035 et des épisodes extrêmes qui varieront entre -30% et +30%.
- **Surface de la mer :** il est observé une augmentation de la température des eaux d'environ 0,04 °C à 0,05 °C par an de 1980 à 2009 et une augmentation progressive de la salinité des eaux marines de la côte sénégalaise. Entre 1943 et 1965, les données du marégraphe de Dakar indiquent une augmentation moyenne du niveau de la mer de 1,4 mm par an[3]. D'après les dernières évaluations, le niveau actuel devrait continuer à augmenter[4].

1.2. Impacts des changements climatiques et vulnérabilités des systèmes

Le diagnostic des effets du changement climatique met en exergue les impacts sur les systèmes biophysiques et socio-économiques.

[1] Données de l'Agence Nationale de l'Aviation Civile et de la Météorologie (ANACIM)
[2] Podor, Dakar, Tambacounda, Ziguinchor
[3] Elouard et al, 1977 ; Emery et Aubrey, 1991
[4] Projections d'élévation du niveau marin du GIEC

1.2.1. Impacts et vulnérabilités des systèmes biophysiques

Les impacts constatés et prévus du changement climatique affectent les systèmes biophysiques clés du Sénégal :

- **Les réserves hydrauliques.** La baisse des précipitations et l'augmentation de l'évapotranspiration ont entrainé une baisse de plus de 50% du débit des fleuves Sénégal et Gambie, une remontée des eaux marines sur la Casamance, le Sine et le Saloum, un assèchement du Ferlo et des vallées associées, une baisse générale du niveau des nappes, l'assèchement des rivières continentales et autres plaines d'inondation et la salinisation des eaux douces et des terres de culture dans les biefs maritimes.
- **La biodiversité et les écosystèmes.** Selon le Groupe d'experts Intergouvernemental sur l'Évolution du Climat (GIEC), les changements climatiques entraîneront des perturbations physiologiques chez certaines espèces, mais aussi des modifications dans le fonctionnement des écosystèmes. Certains écosystèmes du territoire national sont particulièrement vulnérables notamment les forêts de mangroves, la zone des Niayes, certaines zones humides côtières.
- **Les sols et les terres agricoles.** Du fait de la baisse de la pluviométrie et de l'augmentation de la température attendues, on assiste à une réduction du couvert végétal, une érosion hydrique et éolienne, une dégradation des sols dénudés et une salinisation des terres. Cette situation est plus marquée dans des régions comme Fatick, Kaolack, Ziguinchor et dans la zone des Niayes où les déficits pluviométriques seront les plus accentués.
- **Les océans et les mers.** On constate un réchauffement de la température de l'océan, des modifications de l'hydrodynamisme et des mécanismes d'enrichissement trophiques (upwelling et apports des estuaires et fleuves) ainsi qu'une érosion côtière rapide, conséquence directe de l'élévation du niveau de la mer.

1.2.2. Impacts et vulnérabilités des systèmes socio-économiques

Le changement climatique affecte également des secteurs économiques clés sénégalais, notamment en matière d'emploi. Parmi ceux-ci, quatre sont notés :

- **Le tourisme.** La Petite Côte, le littoral casamançais et les îles du littoral, principales zones touristiques du Sénégal, sont très vulnérables face à l'érosion côtière. Le tourisme balnéaire représente plus de 50% de l'offre touristique nationale. Ce secteur est particulièrement dépendant de la qualité du littoral. Les zones balnéaires de Saly et de Djifère ainsi que la zone culturelle de Saint-Louis sont les plus touchées par le phénomène de l'érosion. Pour la zone spécifique de Saly, qui dispose d'une capacité annuelle de plus de 8 000 lits, 30% des infrastructures ont perdu leurs plages qui représentaient le principal attrait touristique de la zone[5].
- **L'agriculture.** La contribution du secteur au PIB est passée d'une moyenne de 10% entre 1997 et 2001, à un peu plus de 7% entre 2007 et 2011. L'effet conjugué de la diminution de la pluviométrie et de l'augmentation de la température affectent négativement les rendements agricoles et la productivité du secteur de l'élevage. La réduction attendue de la surface des terres agricoles aura pour conséquence la baisse de 30% de la production céréalière à l'horizon 2025[6]. Des impacts sont également attendus sur le secteur de l'élevage. Ces effets combinés favorisent des conflits entre éleveurs et agriculteurs pour l'accès aux ressources.
- **La pêche.** Les perturbations marines impactent les ressources halieutiques et la résilience des communautés de pêcheurs. On observe une migration et une diminution des stocks de certaines espèces qui jouent un rôle prépondérant dans l'alimentation, les économies locales et l'exportation. Une étude de COMFISH/USAID fait par exemple état de la diminution du stock de sardinelles au Sénégal. Ceci fragilise les communautés de pêcheurs et détériore la sécurité alimentaire.
- **L'habitat et la santé.** De 1980 à 2009, les inondations ont affecté plus de 900 000 personnes, causé 45 décès et entrainé des dégâts matériels estimés à plus de 142 millions de dollars US (71 milliards de FCFA). Les inondations récurrentes grèvent lourdement le budget national et favorisent l'émergence de nombreuses maladies liées à l'eau.

Ces constats justifient la nécessité d'élaborer une **contribution du Sénégal en matière d'atténuation et d'adaptation face aux changements climatiques**. Elle focalise les efforts sur la protection des écosystèmes physiques et biologiques dans les secteurs clés que sont: l'agriculture, la foresterie, l'élevage, la pêche, l'industrie et l'énergie, la santé ainsi que la gestion des chocs climatiques récurrents.

[5] World Bank Group (décembre 2014), *Situation économique au Sénégal - Apprendre du passé pour un avenir meilleur*
[6] Funk et al. 2012 in Edward R. et al, 2004

1.3. Équité et ambition

Le Sénégal est un Pays Moins Avancé (PMA) et doit encore faire face à de nombreux défis sur le plan socio-économique. Les activités proposées dans le cadre de la CPDN sont mises en œuvre aussi bien sur la base des ressources nationales qu'avec le soutien de la communauté internationale. Ces activités sont équitables par rapport aux capacités nationales et à la vulnérabilité du pays.

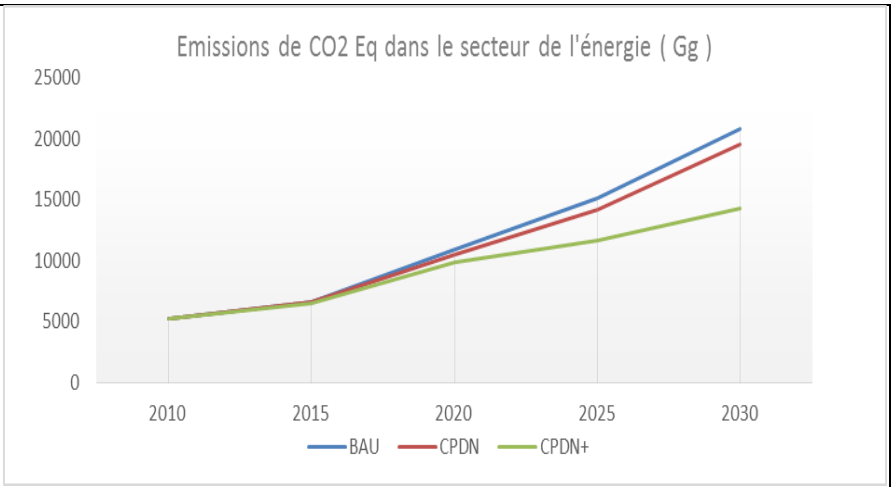
La CPDN est ambitieuse en ce qu'elle va au-delà de la proposition de stratégies et de programmes accordés aux PMA et aux PIED.

2. Mesures d'atténuation

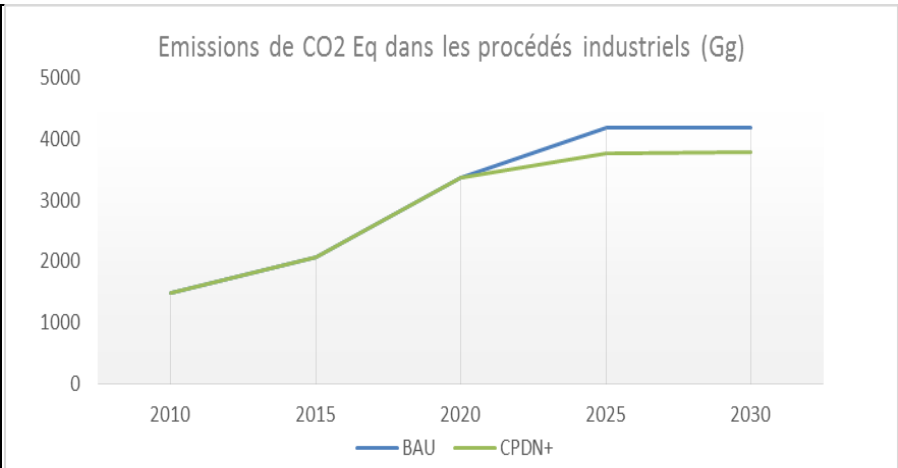
La CPDN du Sénégal, sur le volet atténuation, vise la mise en œuvre d'activités spécifiques ayant un impact sur la réduction des émissions des GES, aussi bien sur la base des ressources nationales (objectifs de la contribution inconditionnelle) qu'avec le soutien de la communauté internationale (objectifs contribution conditionnelle) en rapport à ses capacités. Ces activités couvrent trois gaz : le dioxyde de carbone (CO_2), le méthane (CH_4) et les oxydes nitreux (N_2O).

2.1. Activités sectorielles

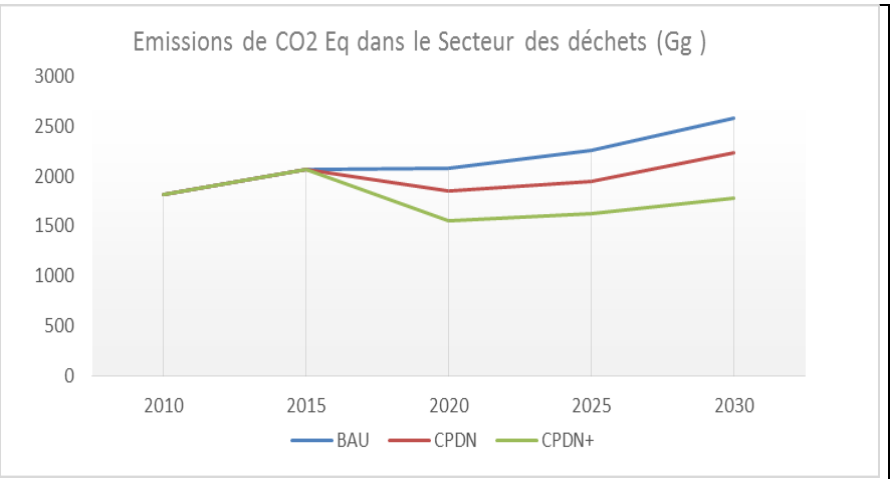
Les activités qui génèrent des réductions d'émissions de GES seront réalisées dans les sous-secteurs suivants : (1) l'énergie, à travers la production de l'électricité, l'efficacité énergétique et le transport, (2) l'Agriculture Foresterie et Autres Affectation des Terres (AFAT) à travers la gestion des fumiers, la riziculture, les sols agricoles, les engrais organiques, les terres forestières et les plantations,(3) l'industrie et (4) la gestion des déchets par le biais des traitements des déchets solides, des eaux usées industrielles, domestiques et commerciales.

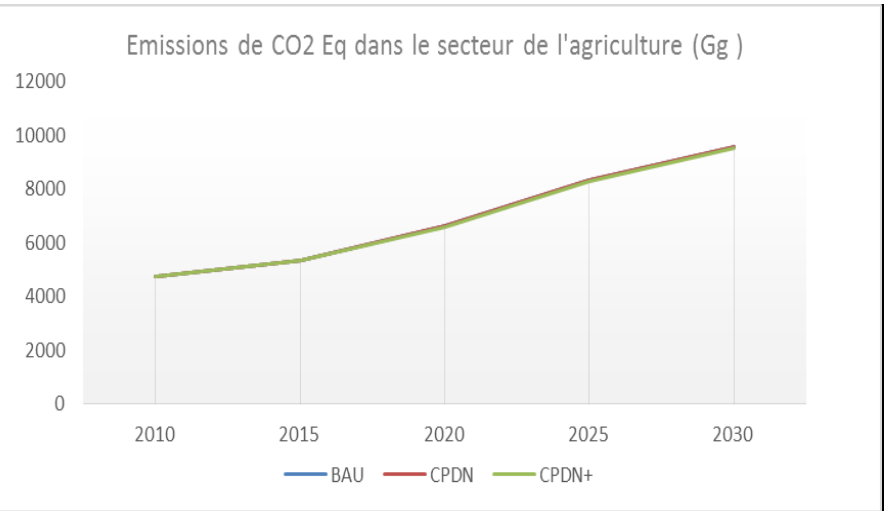
Secteur Énergie **Année de Référence : 2010** **Méthodologie : IPCC 2006** **Gaz concerné : CO_2**		
Objectif sous-secteur électricité et combustible domestique	**Options inconditionnelles**	**Options conditionnelles**
Renforcement de la distribution en électricité et en combustible domestique	Programme EnR (energie Renouvelabe) 1 • Solaire PV : centrales d'une puissance cumulée totale de 160 MWc • Éolienne : centrales d'une puissance cumulée totale 150 MW • Hydraulique : centrales d'une puissance cumulée totale de 144 MW / 522 GWh • Électrification Rurale (PNUER) • 392 villages électrifiés en mini-réseau électrifiés solaire ou hybride (diesel / solaire) • Combustibles domestiques - construire et diffuser • Installation de 27 500 bio digesteurs domestiques • Production et diffusion de 4,6 millions de Foyers Améliorés pour bois de feu ; • Production et diffusion de 3,8 millions de foyers améliorés de charbon de bois.	• Programme EnR2 (2020 à 2025) – éoliennes mise en service de centrales d'une puissance totale cumulée de 200 MW • Solaire PV : mise en service de centrales d'une puissance totale cumulée de 200 MWc • Biomasse : mise en service de centrales d'une puissance totale cumulée de 50 MW • Solaire – CSP : mise en service de centrales d'une puissance totale cumulée de 50 MW • Hydraulique : Injection sur le réseau de 200 GWh supplémentaires en 2025 • Remplacement de la centrale à charbon Jindal 320MW Charbon par deux centrales à Cycles Combinés au Gaz Naturel Liquéfié (CCGN) de 400 MW (2025 : 200 MW et 2028 : 200 MW) • 5000 villages électrifiés par voie solaire (mini-réseau) pour l'accès universel à l'électricité • Combustibles domestiques - construire et diffuser • 7,6 millions de foyers améliorés de bois de feu • 6,8 millions de foyers améliorés de charbon de bois • 49 000 bio digesteurs domestiques
Objectif sous-secteur efficacité énergétique	**Options inconditionnelles**	**Options conditionnelles**
Amélioration de l'efficacité énergétique	• Production de matériaux d'isolation thermique à base de typha au Sénégal et adoption de la technique de Voûte Nubienne	• Éclairage efficace (Diffuser 3 millions de lampes à LED) • Programme d'efficacité énergétique dans les bâtiments tertiaires et dans

	dans l'habitat rural et les infrastructures communautaires • Phase pilote de promotion des équipements de froid alimentaire • Audits obligatoires pour les grandes entreprises • Études d'approvisionnement en énergie pour les nouvelles installations (75 études/an) • Programme pilote mise à niveau environnementale • Valorisation des déchets dans l'Agro-industrie (biogaz)	l'administration • Promotion des équipements de froid alimentaire performants : remplacement de 95% du parc d'équipements • Efficacité énergétique de l'éclairage public (remplacement de 75 000 lampadaires) • Mise à niveau environnementale des entreprises (50 entreprises par an, avec des incitations financières) • Valorisation des déchets dans l'agro-industrie : 4 millions de GJ de biomasse agricole à travers des systèmes de Co/tri-génération (115 MW) • Efficacité énergétique des cimenteries • Gaz naturel : substituer 40% du charbon dédié à l'autoproduction d'électricité par du gaz naturel
Objectif sous-secteur transport	**Options inconditionnelles**	**Options conditionnelles**
Renforcement Transport en commun	• Bus Rapide Transit (BRT) pilote (Ligne Rouge : Dakar/ Guédiawaye)	• Option 1 : Autre BRT (Ligne Verte)
Niveau de Réduction des émissions par rapport au BAU	Années 2020 2025 2030 4% 7% 6%	Années 2020 2025 2030 10% 23% 31%
Coûts globaux	**1 361 174 866 USD**	**1 708 057 959 USD**

Secteur Industrie	
Année de référence : 2010	
Méthodologie : IPCC 2006	
Gaz concerné : CO_2	
Objectifs	**Options conditionnelles**
Amélioration des procédés industriels	• Substitution du CO_2 au *Clinker* dans la fabrication du ciment
Niveau de réduction des émissions par rapport au BAU	• Réduction de 10% en 2025 et 10% en 2030
Coûts	**109 000 000 USD**

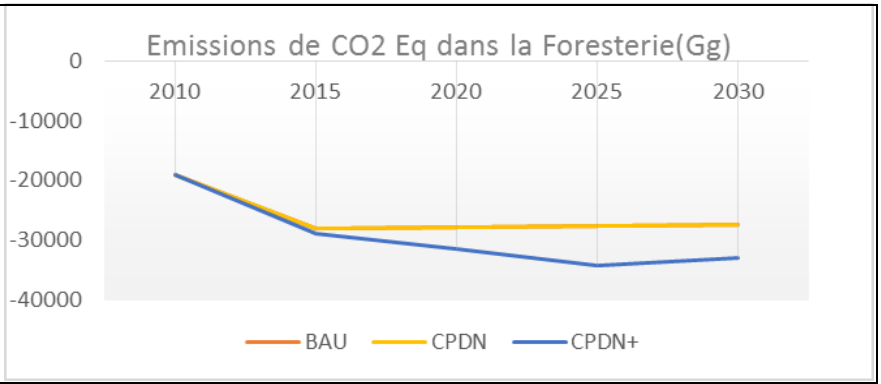
Note: L'élimination de 35% de la consommation de HCFC-22 vers 2020 aura un impact significatif sur les réductions des émissions de GES dans le secteur de l'industrie.

Secteur Déchets **Année de référence : 2010** **Méthodologie : IPCC 2006** **Gaz concernés : CO_2, CH_4, N_2O**		
Objectifs	**Options inconditionnelles**	**Options conditionnelles**
Assainissement et valorisation des déchets	• Construction de 3 Centres intégrés de valorisation des déchets (CIVD) dans les communes de Tivaoune, Touba et Kaolack • Renforcement de la capacité d'épuration de la STEP de Camberène, Rufisque et installation de nouvelles STEP dans les villes de Ziguinchor, Fatick, Kaolack, Kolda, Matam, Joal, Nioro et Bakel	• Réhabilitation de 357 décharges sauvages répertoriées • Valorisation matière organique (compostage) et énergétique (méthanisation) • Construction d'infrastructures de gestion durable des déchets - 100 Points de Regroupement Normalisés (PRN) - 17 Centres Intégrés de Valorisation des déchets (CIVD) • Récupération énergétique du méthane
Niveau de réduction des émissions par rapport au BAU	• Réduction de 11% en 2020, 14% en 2025 et 13% en 2030	• Réduction de 26% en 2020, 28% en 2025 et 31% en 2030
Coûts	**6 900 000 USD**	**1 370 000 000 USD**

Secteur Agriculture[7] **Année de Référence : 2010** **Méthodologie: IPCC 2006** **Gaz concerné : CO_2, CH_4 et N_2O.**	

[7] Les courbes BAU, le CPDN et le CPDN + sont surperposées.

Objectifs	Options inconditionnelles	Options conditionnelles
	Programme de Relance et d'Accélération de la Cadence de l'Agriculture Sénégalaise (PRACAS)	• Système de Riziculture Intensif (SRI) : Économie de près de 40 % en eau par rapport à la riziculture traditionnelle inondée
		• Gestion Durable des Terres • Application des bonnes pratiques d'Agroforesterie, de Régénération Naturelle Assistée (RNA) et d'utilisation de la fumure organique sur la moitié des superficies emblavées à l'horizon 2035
Mise en œuvre des projets et programmes	Programme de Relance et d'Accélération de la Cadence de l'Agriculture Sénégalaise PRACAS • Projets et Programmes du PSE (PRACAS)	• Agroforesterie • Combinaison d'arbres, cultures classiques et/ou d'animaux sous forme d'arrangement • Récupération des effluents des biodigesteurs installés spatial ou temporel
Niveau de réduction des émissions par rapport au BAU	• Réduction de 0,08%, 0,14% et 0,19% respectivement en 2020, 2025 et 2030	• Réduction de 0,35%, 0,51% et 0,63% respectivement en 2020, 2025 et 2030
Coûts	**396 105 823 USD**	**1 796 052 928 USD**

Secteur Foresterie[8]		
Année de référence : 2010		
Méthodologie : IPCC 2006		
Gaz concerné : CO_2		
Objectifs	**Options inconditionnelles**	**Options conditionnelles**
Réduction des émissions liées à la consommation de bois de chauffe et de charbon	• Aménagement et gestion participative des forêts (plus de 30 forêts avec PROGEDE) • Effort de domiciliation de l'exploitation du bois et du charbon dans les forêts aménagées	• Mise en défens des forêts non encore aménagées • Aménagement de 20 forêts par an pendant 5 ans (Aménagement in fine de 1 million ha de forêts) • Substitution des meules traditionnelles par la meule casamançaise • Diversification des combustibles domestiques

[8] Les courbes BAU et CPDN sont superposées.

Réduction des Émissions liées à la déforestation et la dégradation des forêts	• Renforcement de la surveillance et de la gestion participative des forets par une augmentation des effectifs des agents du service des Eaux et Forêts (effectif x 2) • Reboisements, Grande muraille verte (GMV), des éco-villages, reboisements annuels et restauration des mangroves par l'Etat et d'autres acteurs, etc.	• Réduction du taux de déforestation (qui est de - 40 000 ha) de 25% à partir de 2023 • Aménagement de 20 forêts par an pendant 5 ans dont 60% de forêts classées et 40% de forêts communales • Mise en défens/RNA, reboisement par enrichissement des forêts • 4000 ha/an de mangroves mis en défens et reboisés à partir de 2017
Réduction des émissions liées aux feux de brousse et de pâturages **BAU :** 907.656,2 ha brûlés en moyenne de 2006 à 2010	• Réduction annuelle des superficies brûlées de l'ordre de 5% à partir de 2020	• Réduction de 30% des superficies brulées dès 2020 et 90% à partir de 2025
Séquestrations dues au reboisement des forêts classées **BAU** : 22 392 ha/an de 2011 à 2035	22 392 hectares reboisées par annuellement depuis 2011	200 000 à 204 000 ha reboisées annuellement à partir de 2017
Coûts	**655 000 USD**	**76 800 000 USD**

2.2. Impacts sur les émissions globales

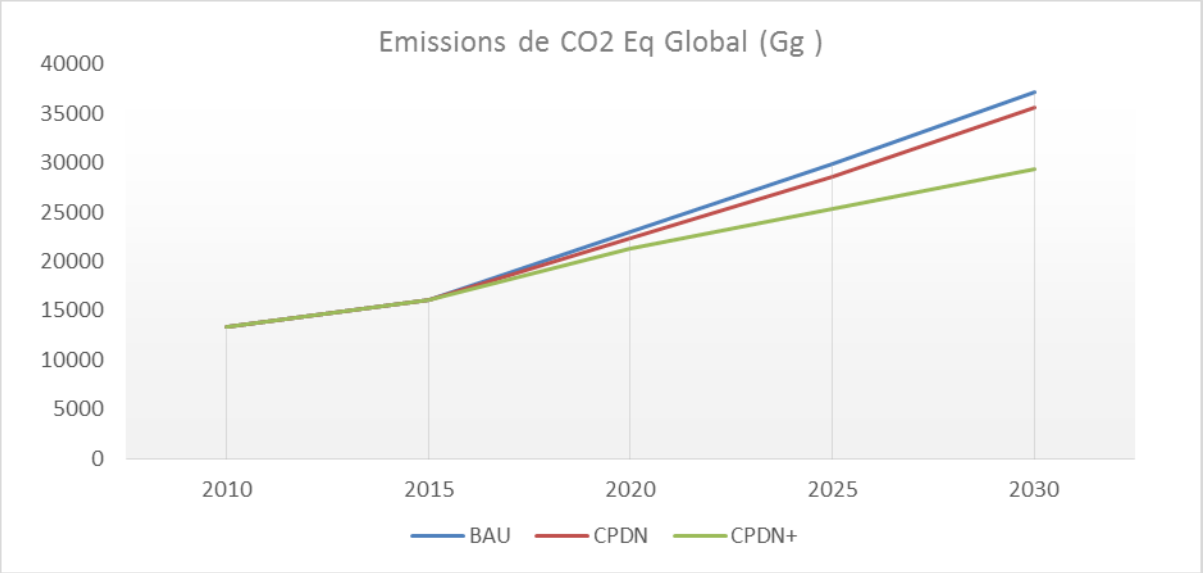
Sous l'option inconditionnelle (CPDN), les réductions d'émissions par rapport à leur trajectoire prévue sont de de 3%, 4% et 5% respectivement en 2020, 2025 et 2030. Avec l'option conditionnelle (CPDN+), les réductions d'émissions attendues sont de l'ordre de 7%, 15% et 21% sur les mêmes années.

Tableau 1: Objectifs d'atténuation des contributions inconditionnelle et conditionnelle

	Inconditionnelle			*Conditionnelle*		
Secteurs	***2020***	***2025***	***2030***	***2020***	***2025***	***2030***
Énergie	4%	7%	6%	10%	23%	31%
PIUP[9]	0%	0%	0%	0%	10%	10%
Agriculture	0,08%	0,14%	0,19%	0,35%	0,51%	0,63%
Déchets	11%	14%	13%	26%	28%	31%

[9] Procédés industriels et usage des produits

Figure 1 : Trajectoire globale des émissions



2.3. Mise en œuvre des options d'atténuation

2.3.1. Besoins financiers

Les besoins en financement de la contribution inconditionnelle s'élèvent à plus de **1,8 Milliards de dollars US.** Les besoins en financement de la contribution conditionnelle s'élèvent à **5 Milliards dollars US.** Le financement de la contribution conditionnelle est attendu dans le cadre des mécanismes financiers qui accompagneront l'Accord.

2.3.2. Besoins technologiques

Pour l'agriculture et la foresterie, il s'agira de renouveler les équipements et de renforcer les capacités techniques en cartographie et systèmes d'informations géographiques, et utilisation du GPS.

Pour l'énergie, un besoin d'assistance technique pour combler les lacunes et expertises pour le développement a été identifié pour accompagner l'implantation, l'exploitation et la maintenance durable des technologies suivantes :

- Centrales à Cycles Combinés au Gaz Naturel ;
- CSP (TES + Dessalement + GN) ;
- Éoliennes à aimant permanant et entrainement direct ;
- Logistique du Gaz Naturel et infrastructures requises ;
- système de co/tri-génération
- Système de surveillance, de mesure et de suivi.

Ces partenariats permettront d'évaluer les besoins en formation afin d'élaborer des programmes de formation de niveaux technicien, ingénieur, maitrise /doctorat.

2.4. Utilisation des mécanismes de marché

Concernant l'utilisation des mécanismes de marché, l'Etat du Sénégal n'a pas l'intention de réaliser sa contribution en achetant des unités de réduction d'émissions issues de tout mécanisme de marché existant ou à venir. Néanmoins, le Sénégal sera un pays d'accueil de projets de tout mécanisme international sur le climat visant à assurer la protection de la planète par le respect des normes qui offrent des résultats réels, permanents, supplémentaires et vérifiés tout en évitant le double comptage des émissions et répondant à ses objectifs de développement durable.

En outre, le Sénégal soutient la poursuite du Mécanisme de Développement Propre (MDP) établi en vertu du Protocole de Kyoto et sa poursuite sous une forme à définir dans le cadre du nouvel Accord.

Les éléments de la CPDN qui sont conditionnels, avec l'aide internationale, pourraient inclure des projets qui sont inscrits dans le cadre de mécanismes non liés au marché établi en vertu de la Convention.

2.5. Retombées socio-économiques des mesures prévues

Le changement climatique exacerbe la dégradation du capital environnemental du Sénégal. En retour, tous les secteurs clés de l'économie subissent directement ou indirectement le phénomène dont les conséquences compromettent la bonne marche de l'économie[10]. D'importants bénéfices socio-économiques sont attendus des mesures préconisées.

2.5.1. Production d'électricité, biomasse et déchets

Les mesures destinées à réduire les émissions de CO_2 dans les domaines de la production d'électricité, de la biomasse et des déchets sont susceptibles d'apporter les retombées suivantes :

- Contribution significative à l'indépendance énergétique du pays ;
- Diminution des déficits d'approvisionnement et de vulnérabilité aux fluctuations des prix internationaux des hydrocarbures ;
- Amélioration de la balance des paiements, voire un allègement du budget de l'État consacré aux subventions pour l'énergie ;
- Création d'emplois estimée à environ 40 000 emplois nets, directement et indirectement[11] ;
- Contribution au développement local: le développement en milieu rural du biogaz et du bio-charbon est créateur de micro et petites entreprises et d'emplois ;
- Diminution de la pollution atmosphérique locale et par conséquent de la baisse des effets néfastes sur la santé des populations ;
- Utilisation des formes d'énergies modernes dans les foyers allégeant ainsi la charge de travail des femmes et contribuant à l'amélioration des performances scolaires des enfants.

2.5.2. Efficacité énergétique, transport et industrie

Dans les domaines de l'efficacité énergétique dans le bâtiment, du transport et de l'industrie, les mesures destinées à réduire les émissions de CO_2 apporteraient les retombées suivantes :

- Allégement significatif des factures énergétiques pesant lourdement sur les entreprises et les ménages;
- Adoption de réglementations imposant aux entreprises des audits énergétiques et des études d'approvisionnement en énergie et permettant d'améliorer leur performance énergétique de 5% à 15%[12] et leur marge de productivité et de compétitivité.

3. Mesures d'adaptation

L'ensemble des secteurs ciblés pour la relance de l'économie nationale sénégalaise, tels que l'agriculture, l'élevage, la pêche, le tourisme, les questions de santé et de nutrition, l'accès à l'eau, qui constituent la trame de fond du PSE, demeurent vulnérables aux impacts du changement climatique.

Des options structurantes telles que les ouvrages de protection côtière, les bassins de rétention, les retenues collinaires, les technologies de lutte contre la dégradation des terres, les réseaux d'adduction d'eau potable ont été mises en œuvre pour atténuer leur vulnérabilité et réduire les retombées négatives sur les populations. Cependant, au regard des projections climatiques futures et de l'état des lieux des systèmes biophysiques, environnementaux et socio-économiques, il est nécessaire de procéder à une mise à l'échelle de ces pratiques appropriées.

À cet effet, la composante adaptation au changement climatique, au-delà de l'élaboration de la CPDN, constitue une préoccupation nationale. Le Sénégal a pour ambition d'intégrer l'adaptation au changement

[10] Rapport sur l'État de l'Environnement au Sénégal, CSE 2010

[11] Cette estimation ne tient pas compte du projet de centrale à cycle combiné au gaz naturel devant remplacer la centrale au charbon (320MW). Elle s'appuie sur *Renewable Energy and Jobs / Déc. 2013 IRENA Report.*

12 Rapport CPDN Efficacité énergétique Industrie

climatique dans la formulation et la programmation des politiques de développement à l'instar d'autres priorités telles que la lutte contre la pauvreté, la santé et les Programmes Nationaux de Lutte contre le VIH sida, le paludisme, la tuberculose, etc., pour assurer une trajectoire maitrisée des objectifs de la croissance.

3.1. Objectifs de l'adaptation

Les options énumérées dans le tableau ci-dessous représentent les objectifs sectoriels du Sénégal aux horizons 2016-2035, en matière d'adaptation.

Tableau 2 : Options adaptation aux horizons 2016-2035

Secteurs	Description des options
Biodiversité	• Mise en œuvre des instruments tels que : la Stratégie et le Plan National d'Action sur la Biodiversité (SPNAB), la Politique Nationale de Gestion des Zones Humides (PNZH), le projet de loi-cadre sur la biodiversité et les aires protégées ; • Renforcement de la résilience des écosystèmes;
Zones côtières	• Mise en place et soutien d'un observatoire du littoral ; • Protection des zones vulnérables et /ou déplacement des populations vulnérables ; • Études scientifiques et techniques sur la restauration des écosystèmes côtiers menacés ;
Ressources en Eau	• Maitrise de la ressource ; • Gestion Intégrée des Ressources en Eau ;
Pêche	• Promotion de l'assurance-pêche; • Prévention et gestion des risques et catastrophes ; • Amélioration de l'efficacité de la gestion et extension des aires marines protégées et des parcs marins ; • Développement de l'aquaculture durable et gestion durable des ressources halieutiques ;
Agriculture	• Promotion des technologies de Gestion Durable des Terres (GDT) ; • Amélioration et adaptation des productions végétales et forestières ; • Promotion de l'assurance agricole ; • Promotion de l'information climatique ; • Mise à l'échelle de la gestion concertée des ressources naturelles ;
Élevage	• Développement d'unités pastorales ; • Promotion de l'assurance pastorale ; • Amélioration génétique des espèces ; • Amélioration et adaptation de la production et santé animale ;
Inondation	• Renforcement des infrastructures d'assainissements et des systèmes de drainage des eaux pluviales dans les villes ; • Planification des écosystèmes urbains intégrant les bassins versants ;
Santé	• Renforcement et mise en œuvre du système de surveillance épidémiologique.

3.2. Coûts des options à l'horizon 2035

Le coût total des options d'adaptation au changement climatique à l'horizon 2035 s'élève à **14 558 millions de dollars US** et se compose comme suit :

Tableau 3 : Coût du plan d'actions d'adaptation en millions de dollars US

Secteurs	Engagement national Période2016-2035 (1)	Financement externe Période2016-2035(2)	Total (1) +(2)
Biodiversité	22,34	193,66	216
Zones côtières	400	6646	7046
Ressources en Eau	550	1654	2204
Pêche	40	280	320
Agriculture	400	1200	1600
Élevage	200	616	816
Inondation	160	1 976	2136
Santé	60	160	220
Total	**1 832,34**	**12 725,66**	**14 558**

3.3. Obstacles

Le caractère dynamique de la vulnérabilité, souvent influencé par plusieurs facteurs (environnementaux, socio-économiques, politiques et institutionnels), rend complexe toute action d'adaptation au changement climatique. Les points ci-dessous constituent alors des enjeux majeurs que le Sénégal devra maîtriser :

- **La planification de l'adaptation au niveau national.** Les initiatives entreprises et mises en œuvre apportent des réponses à des situations d'urgence et nécessitent une planification à un niveau macro. L'élaboration, en cours, du Plan National d'Adaptation (PNA) permettra d'intégrer une approche de planification à long terme dans les futures initiatives du Sénégal.
- **La bonne maitrise du cadre réglementaire et des moyens de mise en œuvre des engagements.** La mise en place des procédures législatives simplifiées et des codes sectoriels (code de la pêche, code de l'environnement, code forestier, code de l'énergie) adaptés au contexte national va favoriser un plus grand engagement des décideurs publics et privés et faciliter l'exécution des engagements. La bonne exécution des engagements nécessitera également le renforcement des moyens techniques (données quantitatives et qualitatives), technologiques (matériels et équipements de travail) et humains dont dispose le Sénégal.
- **La mise en place d'une approche multisectorielle**. Le changement climatique impacte de façon transversale les secteurs clés de l'économie nationale. Une résilience efficace face à cette problématique nécessite l'adoption d'une approche multisectorielle permettant de renforcer la concertation entre les acteurs du domaine et faciliter la mise en place d'un cadre harmonisé des interventions futures.
- **L'élaboration d'une stratégie de communication efficace**. Il est essentiel que les acteurs politiques soient sensibilisés aux effets du changement climatique au même titre que les communautés les plus touchées par les inondations, l'érosion côtière, la réduction des terres arables. L'adoption d'une stratégie de communication orientée « citoyen » et « décideur » devient alors une nécessité afin de mieux impliquer toutes les parties prenantes dans le processus entamé par le Sénégal.

3.4. Facteurs clés de succès

Le Sénégal bénéficie de facteurs favorables à l'atteinte des objectifs fixés dans le cadre de l'atténuation et l'adaptation au changement climatique. Ces facteurs sont identifiés aux plans institutionnel, réglementaire, stratégique et national.

- **Au plan institutionnel**
  - Le Sénégal a signé en juin 1992 et ratifié en juin 1994 la Convention Cadre des Nations Unies sur les Changements Climatiques (CCNUCC);
  - Il dispose d'un Comité National sur les Changements Climatiques (COMNACC) qui constitue un cadre opérationnel d'information, de sensibilisation, de formation et d'appui aux différents projets et programmes sur les questions de changement climatique.
- **Au plan réglementaire**
  - L'adaptation de la biodiversité aux changements climatiques a fait l'objet d'une intégration dans les différents codes sectoriels (codes forestier, de l'environnement, de la chasse et de la protection de la nature, de la pêche, minier, de l'eau, de l'urbanisme et de la construction);
  - La loi du littoral prévoit également des dispositions réglementaires en matière d'adaptation aux changements climatiques.

- **Aux niveaux stratégique et national,** plusieurs initiatives ont également été mises en œuvre comprenant, entre autres, la Stratégie et le Plan National d'Action sur la Biodiversité (SPNAB), la Politique Nationale de Gestion des Zones Humides (PNZH), la Nouvelle Politique Forestière (2005-2025).

3.5. Retombées socio-économiques des mesures prévues

Des retombées importantes sont attendues des options d'adaptation à mettre en œuvre par le Sénégal à l'horizon 2035. Ces retombées touchent plusieurs aspects mais les bénéfices les plus significatifs sont attendus sur le plan socio-économique sur les secteurs ci-après :

Sols et Agriculture

- Réduction de l'incidence de la pauvreté ;
- Contribution à une meilleure sécurité alimentaire et nutritionnelle ;
- Renforcement de la résilience ;
- Création d'emplois ;
- Augmentation des rendements agricoles moyens à 3,2 tonnes en 2035 pour le scénario tendanciel BAU vs. 4,2 tonnes en 2035 pour le scénario de la politique volontariste en faveur des sols.

Pêche

- Création d'une valeur ajoutée 9.200 millions de dollars US dans le secteur à l'horizon 2035[13] ;
- Meilleure contribution économique et sociale du secteur à travers une gestion durable de la pêche (maîtrise des crises et du climat).

Zones côtières

- Réduction des risques socio-économiques impactant négativement les performances économiques du secteur touristique des zones les plus dégradées ;
- Lutte contre la diminution du rendement de la pêche et des coûts directs sur les infrastructures côtières.

Ressources en eau

- Limitation de l'exode rural et de ses effets néfastes ;
- Obtention d'une « eau productive » génératrice de valeur ajoutée dans les régions agricoles grâce aux ouvrages mis en place ;
- Création des opportunités d'emplois dans les zones concernées par les travaux d'ouvrage ;
- Rechargement des nappes phréatiques ;
- Contribution à la lutte contre les problèmes de salinisation ;
- Participation à la lutte contre les inondations ;
- 9,08 millions de dollars US de bénéfices de l'adaptation au risque de submersion marine à Saint-Louis;
- Réduction du coût actualisé net (CAN) liés à l'érosion côtière, estimé par la Banque Mondiale à 688 millions de dollars US.

Santé

- Réduction des coûts de détérioration de l'état de santé des populations estimés à 2.400 millions de dollars US à l'horizon 2080[14].

Inondation

- Les bénéfices socio-économiques attendus de la prévention des inondations correspondent aux pertes et dégâts évités[15] ;
- Réduction du risque lié à la prolifération des maladies hydriques (diarrhée, dysenterie), du paludisme et des maladies cutanées ;
- Réduction du risque de déperdition scolaire due à l'occupation des écoles par les sinistrés ou à l'impossibilité de se rendre dans les salles de classe lors de la saison des pluies.

[13] Sous l'hypothèse que les mesures d'adaptation soient correctement appliquées et que le secteur puisse maintenir une valeur ajoutée équivalente

[14] Banque mondiale, 2013

[15] Pertes liées aux inondations de 2009 : 360 000 personnes touchées (Région de Dakar en majorité), pertes en capital de 104 millions USD et de coûts de réhabilitation et de remise en état de 204,5 millions USD.

4. Suivi-Évaluation

Sous la supervision de la Direction de l'Environnement et des Établissements Classés du Ministère de l'Environnement et du Développement Durable, le suivi et l'évaluation des projets/programmes sera fait à travers :

- Le COMNACC qui sera la plateforme chargée de veiller au suivi de la mise en œuvre des activités prévues dans la présente contribution. Il assurera le suivi des différents indicateurs de la CPDN en relation avec les s départements sectoriels ;
- La mise en place d'un dispositif de suivi de la mise en œuvre du Plan National d'Adaptation (PNA) en cours d'élaboration qui va assurer la gestion de l'ensemble des projets et programmes identifiés comme options en atténuation et en adaptation;
- La mise en place d'un Observatoire du littoral pour les zones côtières ;
- L'adoption d'un système d'alerte précoce pour la prévention des risques et catastrophes ;
- La mise à contribution du Centre de Gestion de la Qualité de l'Air à Dakar (CGQA) pour le suivi des paramètres climatiques et atmosphériques définis dans la CPDN ;
- Les comités régionaux changements climatiques (COMRECC) incluant les collectivités locales à travers les structures décentralisées, les structures déconcentrées des départements sectoriels, les représentants du secteur privé, les ONG et les OCB.

Spécifiquement pour le volet atténuation, la contribution du Sénégal sera suivie, notifiée et vérifiée au travers des éléments contenus dans les communications nationales, les rapports biennaux actualisés et les dispositions relatives aux Mesures d'Atténuation Appropriées au niveau National (MAAN) qui sont en cours de développement.

5. Conclusion

La contribution énoncée par le Sénégal traduit la forte volonté du gouvernement à atténuer les émissions des GES dans les secteurs tels que l'énergie et l'industrie qui, aujourd'hui, contribuent le plus aux émissions de CO2 enregistrées au niveau national. Elle énonce également plusieurs mesures d'adaptation spécifiques compte tenu de l'impact du changement climatique sur les axes clés de l'économie sénégalaise.

Cet effort sans précédent constitue une condition de réussite du Plan Sénégal Émergent (PSE) d'où la forte implication des décideurs politiques sénégalais sur la définition et le suivi de cette contribution.

Le succès dépendra aussi de l'ensemble des pays engagés dans la lutte contre le changement climatique à travailler dans une approche concertée et de mise en commun des moyens.

Intended Nationally Determined Contribution of the Republic of Serbia

Although non-Annex 1 Party to the Convention, the Republic of Serbia express its willingness to contribute to global GHG emissions reduction in accordance with its capabilities, national circumstances and development goals. Those contributions are even greater taking into account extreme, already observed and projected climate change and its impacts on sectors and systems.

According to the national analyses, the period 1960-2012 is characterized by an average trend of mean annual temperature of 0.3°C per decade. Depending on the scenario, a rise in temperature will ranging between 3.2 and 4 °C by the end of the century and precipitation deficit of up to 20%. These will be followed by the intensification of extremes, particularly in regard to temperatures.

The most vulnerable sectors are agriculture, hydrology, forestry, as well as human health and biodiversity. From the mid-20th century, the river discharges in Serbia generally records a negative trend. Average annual long-term trend in river discharges, excluding large rivers, is negative and about -3% per decade, with variable spatial distribution. This reduction is expected in the future, particularly after 2050, ranging from a few to over 20%. These changes will cause, among other things, problems related to water availability, water quality and the intensity and frequency of floods and droughts.

Droughts, insect invasions and the occurrence of forest fires have significantly influenced forest ecosystems in R. Serbia. In the long run, climate change may cause a transformation of entire forest ecosystems, changing the distribution and composition of Serbian forests. By the end of the 21st century, about 90% of today's beech forests will be outside the bioclimatic niches they inhabited in the 20th century and around 50% will be found in the zone where mass mortality is likely to occur.

Climate change will affect the spatial variation in agroclimatic conditions, the conditions for plant breeding and the selection of suitable varieties. Warming will also affect the phenology of plants, leading to faster development. Certain scenarios for the period 2071-2100 indicate the expected corn yield reduction from -52 to -22% for the whole territory of the Republic Serbia, for conditions without irrigation. The impact on other crop and vegetable varieties can also be expected.

As regards biodiversity and natural ecosystems, changes in climate may lead to changes in the phenological cycles; morphological changes, physiology and behavior of species; loss of existing habitats and emergence of new species; changes in the number and distribution of species; increased number of pests and diseases; genetic changes and extinction of species unable to adapt.

Impacts of climate change on health are becoming more pronounced in recent years. During the heat wave in July 2007, increased mortality was recorded in Belgrade. Climate change will certainly lead to changes in the distribution and increase in frequency of vector-borne infectious diseases (malaria, dengue fever, West Nile virus, etc.), as well as the spread of infectious diseases through water.

Since 2000 the Republic of Serbia has faced several significant extreme climate and weather episodes that have caused significant material and financial losses as well as losses of human lives. The two most prominent events are the drought in 2012 and the floods in 2014. The

drought in 2012 was particularly strong, and contributed to a decrease in yields of some crops by 50%. Estimates show that the droughts in 2000, 2003, 2007 and 2012 caused over 3.5 billion Euros worth of damage and the floods in 2014 over 1.5 billion Euros. Estimates show that the material damage incurred by forest fires in the period 2000-2009 is worth more than 300 million Euros.

Taking into account the impacts of climate change and the need to reduce the risk thereof, and recognizing the importance of its contribution to global GHG emission reduction, the Republic of Serbia has identified GHG emissions pledges at the national level.

Type	Overall emission reductions compared to GHG base-year emissions
Scope	GHGs which are not controlled by the Montreal Protocol: • CO_2 • CH_4 • N_2O • HFCs • PFCs • SF_6
Base year	1990
Period	1 January 2021 – 31 December 2030
Level of GHG emission reduction	GHG emission reduction by 9,8% until 2030 compared to base-year (1990) emissions
Percentage of GHG emissions covered	100%
Planning process	Climate change strategy with an action plan, that should be finalized in 2017, will further define the precise activities, methods and implementation deadlines
Fair and ambitious	In 2010, the Republic of Serbia, as a developing country, associated with the Copenhagen Accord and in the letter of support expressed readiness for voluntary GHG emission limitation until 2020 by 18% compared to emissions in 1990. The Republic of Serbia, as an EU candidate country, harmonizes national with the EU legislation, contributing on that way additionally to national emissions reduction.
Key assumptions	
Calculation method	Global warming potential on a 100 time scale in accordance with the IPCC's 4th Assessment Report
Methodologies for assessing GHG emissions	IPCC Guidelines 2006 and IPCC 2013 KP Supplement
Scope	
Sectors/Source categories	In accordance with IPCC Guidelines 2006 and IPCC 2013 KP Supplement
Needs for adaptation measures	

Sector vulnerability and impacts of climate change	The greatest impacts of climate change have been observed and reflected in agriculture, hydrology, forestry, human health and biodiversity sectors.

Loss and damage associated with extreme events in the period 2000-1015
The total damage caused by extreme climate and weather conditions, since 2000, exceeds 5 billion euros, and more than 70% of the losses are associated with drought and high temperatures. Another major cause of significant losses was floods. Currently there is no analysis of the damage resulting from long-term slow changes in the climate system that has been observed in the past decades. The total estimated investment in implementation of projects that can be considered as adaptation measures in the period 2000-2015 amounts to approximately $ 68 million. There are no estimates for long-term investments in the area of adaptation to climate change in the Republic of Serbia.

Republic of Seychelles

Intended Nationally Determined Contribution (INDC) Under The United Nations Framework Convention On Climate Change (UNFCCC)

September 2015

1. Introduction

1. The Republic of Seychelles 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, which will come into effect and be implemented from 2020.

2. In accordance with decisions 1/CP.19 and 1/CP.20, the Republic of Seychelles hereby communicates its Intended Nationally Determined Contribution (INDC) towards achieving the objective of the UNFCCC as set out in its Article 2, as well as accompanying information to facilitate clarity, transparency, and understanding of its INDC. The information is provided in tabular form that is accompanied by supporting documentation.

3. As a Small Island Developing State (SIDS), the republic of Seychelles is vulnerable to the impacts of climate change and climate variability, and it gives priority concern for adaptation to climate change as communicated in this INDC. Given that the Republic of Seychelles is a net sink, its contributions to climate change mitigation to contribute towards the objectives of the UNFCCC will be the co-benefit of enhancing its energy security and reducing its energy bill.

The Republic of Seychelles will reduce its economy-wide absolute GHG emissions by 122.5 $ktCO_{2e}$ (**21.4**%) in 2025 and estimated 188 $ktCO_{2e}$ in 2030 (**29.0**%) relative to baseline emissions.

2. Mitigation contribution

Time frame and /or period for implementation	Start year: 2020	Mid-term year: 2025	End year: 2030
Type of commitment	Absolute economy-wide emission reductions covering public electricity, land transport and solid waste management (LULUCF is excluded)		
Estimated quantified emission reductions	122.5 $ktCO_{2e}$ in 2025 and 188 $ktCO_{2e}$ in 2030 relative to baseline emissions		
Financial requirements	The cost of achieving the reduction objective (2030) has been estimated to be at least **USD 309 million**. Including the cost of energy efficiency measures such as building codes, standards and labels, and energy audits will increase the total cost of implementation, which is expected to be met partly through domestic funding and conditional on international climate financing including through the Green Climate Fund among others.		
Type of reference	Emissions reduction relative to Business-As-Usual baselines		
Coverage	**% national emissions**	~95%	
	Sector	Energy • Public electricity (generation and demand side management) • Land transport Waste • Solid waste management [sectors not listed do not contribute significantly to emissions; opportunities for emission reductions in LULUCF are limited]	
	Baseline description	Business As Usual scenario of emission projections based on economic growth in the absence of climate change policies, starting from 2010 in the case of public electricity and land transport sub-sectors (to which non-GHG outcomes have been applied), and 2012 for emission from solid waste management (to which a project-based approach is used).	
	Gases	CO_2 CH_4 [emissions from other gases are insignificant]	
	Geographical boundaries	Republic of Seychelles	

Intention to use market-based mechanisms to meet target	No
Land sector accounting approach	Not Applicable
Metric applied	GWP of CH_4 = 21
Methodological approaches	Consistent with methodologies used in the Second National Communication 2011 (1996 IPCC Guidelines); Used combined margin grid emission factor (2014) to calculate emission reductions from public electricity sub-sector
Planning process	• Planning processes for preparation of the INDC: The INDC was developed using a multi-stakeholder consultative process by engaging relevant stakeholders in and outside government. The INDC process involved several bilateral meetings and two rounds of national consultations, and it has highlighted synergies with other UNFCCC-related processes, including the Third National Communication (TNC), Biennial Update Reports (BURs), National Adaptation Planning (NAP), and Nationally Appropriate Mitigation Actions (NAMAs), and technology Needs Assessment (TNA). The INDC process was coordinated by the Department of Energy and Climate Change (DECC), Ministry of Environment and Energy and Climate Change. The Cabinet of Ministers has been apprised of the validated INDC and they endorsed the INDC on 23rd September 2015, • Planning processes for implementation and monitoring of the INDC: The overall implementation, and monitoring and evaluation of the INDC will be carried out by the Department Energy and Climate Change (DECC) of the Ministry of Environment, Energy and Climate Change, under the Chair of the National Focal Point for Climate Change who is also the Head of the DECC.
Fair and ambitious	The emissions of Seychelles are less than 0.003% of global emissions. Further, Seychelles are currently a net sink and under the Business-As-Usual scenario it is expected to become a net emitter between 2024 and 2025. In this context, the contribution of Seychelles is considered fair and ambitious. With our contribution, Seychelles will remain a net sink in 2030. The fairness of our contribution also relates to the fact that as a SIDS, adaptation is a higher priority for Seychelles.

3. Adaptation Contribution

4. The Government of Seychelles considers adaptation to climate change as a high priority to reduce the country's vulnerability. The cost of achieving the implementing the adaptation contributions (2030) has been estimated to be at least USD 295 million.

3.1 Climate Change Trends, Impacts and Vulnerabilities

5. Seychelles is about to embark on its *Third National Communication* to the UNFCCC, which will eventually produce updated findings with respect to climate change trends and projected impacts. For now, existing data from the *Second National Communication* must be used to guide planning for climate change. The main climate change threats facing Seychelles are similar to those threatening other small island developing states: changes in rainfall patterns leading to flooding, landslides on one hand and extended periods of drought on the other, increases in sea temperature, changes in acidity and damage to marine ecosystems, increases in storms and storm surges, and sea level rise during the longer term. **Research is needed to better understand changes** in cyclone patterns, ocean and air currents, and the interplay between climate change and other climate phenomena such as El Niño.

6. The threats caused by climate change will have significant impacts on Seychelles in the short, medium and longer term on infrastructure, agriculture, fisheries, tourism, energy and water security, biodiversity, waste management and on human health and well-being. Although the exact impacts are not known, and more research is needed to better understand the implications of a change global climate on the islands, **it is critical that Seychelles take measures to better understand** the threats and begin longer-term planning for adaptation. All national plans and strategies that address climate change adaptation consistently mention Seychelles' shortfalls in terms of capacity building and research. The *National Climate Change Strategy* (2009) addresses this specifically and, although some progress has been made, it was highlighted at the stakeholder workshop that improved gender-sensitive capacity building, research and education was needed to underpin all climate change adaptation efforts in order to make them effective and resilient.

7. Recent studies conducted in Seychelles, by research partners from Cuba and Japan, highlighted that much of the human activity is concentrated around the low-lying, coastal areas which are at the highest risk of flooding from heavy rainfall, storm surges, and sea level rise during the longer term. A recent UNISDR report has revealed that most disasters occurring in Seychelles were related to storms, floods, rain and landslides, and recommended that future planning should focus on losses from flooding and landslides which also caused the greatest economic losses. The report also noted concern about **lack of clear policy on the protection of critical infrastructure** in the country, such as roads, ports, government buildings, energy generation, water distribution and sewerage systems.

8. A Vulnerability/Resilience Profile exercise undertaken in Seychelles revealed that Seychelles was most vulnerable and least resilient in terms of biodiversity resources and sustainable consumption and production (both with significant implications for climate change adaptation) the tourism industry (the country's crucial economic sector) and food security, Other areas of concern were sea level rise, coastal and marine resources, water security and energy security.

9. Seychelles vulnerabilities with respect to climate change are:

    - Critical Infrastructure (roads, ports, government buildings, electricity, water and sewerage management systems);
    - Tourism (in proximity to the coast or in areas vulnerable to flooding and landslide);
    - Food Security (currently reliant on food imports, and need support for local sustainable and climate-smart agriculture and fisheries efforts);
    - Coastal and Marine Resources (considering the aims of the *Blue Economy* and *Seychelles Strategic Plan 2015)*;
    - Water Security (particularly considering issues of storage and distribution);
    - Energy Security (particularly considering the reliance on fossil fuels);
    - Health (particularly addressing the burden placed on high-density populations in the coastal areas and general vulnerability to climate-sensitive diseases);

- Waste (particularly for landfill sites in high risk, coastal locations); and
- Disaster preparedness (particularly addressing the need for more research to understand climate change impacts, and resources to predict, prevent and respond to disasters).

3.2 Statement of Long Term Vision

10. Seychelles' long-term vision is to minimise the impacts of climate change through concerted and proactive action at all levels of society. This vision is nested in the country's broader aspiration of sustainable development: finding strategies to realise the nation's economic, social and cultural potential through an innovative, knowledge-led and gender-sensitive approach. Seychelles' approach to climate change adaptation is guided by a collective understanding of the need to ensure that all actions taken must conserve the integrity of the Seychelles natural environment and heritage for present and future generations.

11. During the longer term, Seychelles' aims to:

    - Advance understanding of climate change, its impacts and appropriate responses;
    - Build gender-sensitive capacity and social empowerment at all levels to adequately respond to climate change;
    - Put in place measures to adapt, build resilience and minimise vulnerability to the impacts of climate change, especially in critical sectors such as water, food and energy security, and disaster management;
    - Develop policy direction and strategies to encourage and enhance action on technology development and transfer of cleaner technologies; and
    - Scale-up financial resources and investment to support action on adaptation.

3.3 Statement of Current and Near-Term Planning and Action

12. Seychelles *National Climate Change Strategy* provides an overarching framework and direction for climate change adaptation in Seychelles. This plan was incorporated into, and updated, in the *Seychelles Sustainable Development Strategy*, 2012-2020, Chapter 12, which provides strategic goals and objectives to guide adaptation until 2020. These plans called for the mainstreaming of climate change adaptation into all sectoral plans and this has progressed in several sectors including tourism, health, finance, agriculture, biodiversity, fisheries, disaster management, and land-use planning.

13. More recently, climate change adaptation has been mainstreamed in the *Seychelles Strategic Plan (2015)* which is the definitive document intended to guide land-use management during the next 25 years (to 2040). The plan has been developed with reference to sectoral plans by various ministries and is intended to provide an integrated framework for the development of new plans, particularly regarding land use.

14. Also recently, the *Seychelles Biodiversity Strategy and Action Plan (2015-2020)* has been launched, and includes many cross-sectoral projects with climate change adaptation implications. Projects address issues such as sustainable tourism, watershed management, sustainable agriculture and fisheries, disaster planning, research and a shift toward ecosystem-based adaptation approaches to biodiversity conservation.

15. The Ministry of Environment, Energy and Climate Change has recently restructured and created the new Climate Change Division which will serve as the national focal point for climate change adaptation planning and implementation of projects. The University of Seychelles has recently established the *Blue Economy Research Institute* which should be strengthened and fully funded and function as a hub for climate change related research. Other government ministries, agencies and civil society organisations will continue to contribute to adaptation efforts guided by their own sectoral plans but in collaboration with the Ministry.

16. Moving towards the longer-term adaptation goal, the **main actions** up to and beyond 2030 are to increase resilience and reduce vulnerability of livelihoods and island life with respect to critical infrastructure, tourism, food security coastal and marine resources, water scarcity, energy security and health.

Vulnerabilities	Increased Resilience from
Critical Infrastructure	Climate change adaptation to be mainstreamed in all sectors with critical infrastructure Planning process for all new developments, with associated improvements in the building codes and their rigorous enforcement
Tourism	Greater co-management of the sector by the Ministry of Tourism and Department of Risk and Disaster Management as well as with the Ministry of Environment, Energy and Climate Change
Food Security	A sustainable modern agriculture supported by new and innovative technologies across all food production supply and value chains, and by skilled and qualified human resources and integrated with the *Blue Economy* and *Seychelles Strategic Plan 2015*
Biodiversity	Fully implemented *Seychelles Biodiversity Strategy and Action Plan* Fully implemented and enforced *Biodiversity Law* Fully bio-secure border
Water Security	Fully integrated approach to water security that addresses issues such as ecosystem health, waste management, water treatment and supply, sewage, agriculture, etc
Energy Security	More resilient energy base with greater innovation of renewable energy where practicable Efficient fuel-based land transport and more use of electric vehicles charged with renewable energy technology Strengthened cooperation between Government entities
Health	Health sector able to respond to population increase and its additional climate-related health burden Exploration of relevant potential science and technology innovations
Waste	Waste managed according to strict hierarchy and waste policy fully implemented Exploration of relevant potential science and technology innovations

17. Further details of the actions to be taken are contained in the monitoring plan in *Supplementary Information*.

3.4 Statement of Gaps, Barriers and Needs

18. ***Capacity Building, Education and Awareness*** - Much has been accomplished during the past ten years to educate the public about the causes and impacts of climate change, and mitigation and efforts. While civil society is generally aware of the problem of climate change, much more work is needed to educate different stakeholder groups about climate change adaptation measures and to help them develop capacity to research, develop and implement these and other appropriate strategies. There is a need to accelerate efforts to integrate climate change education into the school curriculum at all levels, including primary, secondary and professional centres and ensure that adequate attention is given to adaptation measures. On a more fundamental level, there is a need for Seychelles to reinforce and enhance the quality of STEM (science, technology, engineering and mathematics) education at all levels to develop a new generation more capable of climate change adaptation leadership. The University of Seychelles has already integrated climate change into the Environmental Science BSc programme, though needs more support to offer climate change specialist training at diploma, undergraduate and graduate level to build on the, currently, very limited group of climate change specialists in the country. In-service training is also needed for teachers and other professionals working in diverse sectors (government, private sector and civil society) to help them integrate climate change adaptation measures into their work.

19. ***Research and Monitoring*** - Seychelles limited research and monitoring capacity for climate change reflects a challenge common to many islands with a small population. The establishment of the *Blue Economy Research Institute* based at the University of Seychelles offers new opportunities for research into and monitoring of climate change adaptation efforts, though requires greater input of financial and human resources to meet this potential. Many government sectoral plans and strategies also call for research and monitoring related to climate change adaptation but they lack the human and financial resources to fully undertake this task. The way forward will include innovative approaches in partnerships between the University, local agencies and overseas research institutions.

20. ***Technology*** - In many cases, Seychelles lacks the technological capacity to undertake effective research on climate change modelling and risks, monitoring of climate change impacts and

implementation of adaptation measures. In some cases, the knowledge may be there but the technology is prohibitively expensive, e.g. in terms of diversifying away from fossil fuels for renewable energy, or protecting critical infrastructure. The way forward for these challenges will also include alliances with overseas partners including donors, a trend that has already been initiated by several government agencies including Seychelles Meteorological Service, the Department of Risk and Disaster Management, and the Ministry of Environment, Energy and Climate Change. The National Institute for Science, Technology and Innovation will reinforce the technological capacity to undertake effective research on climate change-related issues.

21. ***Legislation*** – Seychelles is already in the process of revising some of its legislation to reflect emerging sustainable development issues, including climate change. There is a need to finalise amendments to the *Town and Country Planning Act*, and to enforce and provide resources as well as for the new *Disaster Risk Management Act*. Other legislation may also need to be reviewed and amended in light of climate change adaptation needs.

3.5 Summary of Existing Support

22. General support includes EUR 2 M of budgetary support from the *Global Climate Change Support Fund* which was awarded to the Government of Seychelles to implement aspects of the *National Climate Change Strategy*, granted in 2010.More specific support includes:

- ***Ecosystem-Based Adaptation*** – Seychelles is currently implementing three ecosystem-based adaptation projects funded by the GEF Climate Change Adaptation Fund, UNEP and the Government of China. The projects focus on management of coastal ecosystems, protection of mangroves, and sustainable watershed management collectively;
- ***Water Security*** – Public Utilities Corporation is implementing a project to address deficiencies in water security, funded by a loan from the European Investment Bank and a loan from the Agence Française de Développement and designed to address deficiencies in water security. A further loan and grant of about EUR 20 M from the African Development Bank will help the Government to finance part of the Mahé Sustainable Water Augmentation Project and meet targets as set out in the 2008-2030 *Water Development Plan* supported by the African Water Facility. The project will address water supply to the residential, commercial and tourism sectors;
- ***Food Security*** – The Ministry of Agriculture and Fisheries and its associated parastatals (Seychelles Agriculture Agency and the Seychelles Fishing Authority) have been receiving support from donors including the African Development Bank, the International Fund for Agriculture Development, the Japanese Government and others to help work towards more sustainable agriculture and fisheries and contribute to improving food and nutrition security;
- ***Energy Security*** – Seychelles is currently implementing two GEF-funded projects focused on solar photovoltaic energy and energy efficiency, both of which address energy security issues in terms of electricity. The European Union funded the development of a new *Energy Act* which has paved the way for the integration of renewable energy sources into the electricity grid. The United Arab Emirates donated a wind farm to Seychelles in 2013 to help diversify the electricity supply;
- ***Disaster and Risk Management*** – Seychelles has received assistance from the regional European Union funded Islands Project and other sources to support an improvement in disaster preparedness and communication with the public and the private sector. A Cuban research team and Japan-funded study have assisted Seychelles with disaster and risk modelling related to climate change; and
- ***Education and Capacity Building*** – Many government and civil society partners have contributed to an ongoing climate change education programme targeting schools, the general public, artists, and professions from diverse sectors. For instance, the University of Seychelles has partnered with local and overseas institutions to develop its Environmental Science degree programme.

3.6 Description of Monitoring and Implementation Plans

23. The process of implementing the Vision to build gender-sensitive capacity, education and awareness, research and monitoring across critical sectors will be nationally monitored, reviewed, updated, and reported by the Ministry of Environment, Energy and Climate Change and will be focused on short-term monitoring of activities and processes, and outputs rather than on longer-term outcomes.

24. The *National Climate Change Committee* is a multi-stakeholder group chaired by the Ministry and about to embark on the *Third National Communication*. The committee will function as the main body to coordinate and monitor implementation of climate change adaptation projects, and identify emerging gaps and opportunities for further action.

25. An indicative monitoring plan is elaborated in the *Supplementary Information* which will be monitored by the Climate Change Division of the Ministry of Environment, Energy and Climate Change. This will be aligned with the Department of Public Administration initiative (Monitoring and Evaluation and Administrative Governance) which is being introduced across all ministries to facilitate ministry-wide monitoring.

4. Supplementary information on the INDC for the Republic of Seychelles

MITIGATION

The Voluntary Initiatives of Seychelles

The Republic of Seychelles has developed strategic tools for the sustainability of its development and economic reforms, such as *Seychelles National Climate Change Strategy*, 2009. The Strategy has five priority objectives to:

- Advance understanding of climate change, its impacts and appropriate responses;
- Put in place measures to adapt, build resilience and minimise the country's vulnerability;
- *Achieve sustainable energy security and to reduce greenhouse gas emissions*;
- Mainstream climate change considerations into national policies, strategies and plans; and
- Build capacity and social empowerment at all levels.

The *Energy Policy* that was proposed in 2010 has set a target for 15% of energy supply to be met from renewable energy sources in 2030. The expected target in 2020 is 5%. In the long term, the Policy envisages that 100% of energy supply will be from renewable energy sources. Discussions with the Seychelles Energy Commission (SEC) have revealed that these targets are now being applied primarily to the power sector rather than being applied to primary energy supply. The Policy has also proposed the adoption of demand side energy efficiency practices that would decrease the energy intensity by at least 10% in 2020.

The Mitigation Context of Seychelles

The mitigation assessments have been guided by the fact that Seychelles is an insignificant emitter of GHGs by world standard as it accounted for only 0.001% of the global emissions of GHGs in 2000, and less than 0.003% of world emissions in 2011. Further, excluding the offsetting capacity of ocean biomass and marine ecosystems (or blue carbon), Seychelles was a net sink of GHGs in 2000 at -564,232 tCO_{2e} according to the Second National Communication (SNC), 2011. Accordingly, Seychelles is not expected to become a net emitter of GHGs before 2025. Voluntary emission reductions will only postpone the time when Seychelles will become a net emitter.

According to the SNC, ~95% of all national emissions took place in the energy sector in 2000. The remaining 5% of national emissions was accounted by forestry. The generation of public electricity and transport accounted for 82.0% and 82.8% of all emissions in 2000 and 2007, respectively. Public electricity and transport are therefore priority sectors for emissions reductions. In 2000, emissions related to fuel combustion in cooking represented 6% of national emissions. These values show that the priority sector for mitigation is the energy sector, of which public electricity and transport are significant potential sub-sectors for GHG emission reductions.

Emissions from industrial processes and agriculture are insignificant in Seychelles. The emissions from agriculture were deemed to be so insignificant that the SNC mentions that it might not be necessary to calculate emissions from agriculture in the future. Concerning forestry, it was estimated that 8,000 m^3 of biomass was harvested annually amounting to an annual emission of 12,540 tCO_2. In contrast, the sink capacity of forests was 837,380 tCO_2 with an expected loss in sink capacity of 1% every 5 years. Solid waste generated some 2,510 tCH_4 in 2000 (SNC, 2011).

In Seychelles, climate change mitigation to stabilize the climate system is not a primary objective. Mitigation is rather seen as an important outcome or by-product of decreasing the country's dependence on imported fossil fuels (i.e. increase in energy security), and to enhance its balance of trade profile (through a reduction in its energy bill) (Seychelles National Climate Change Strategy, 2009). The energy bill of Seychelles represented 25.15% of its total import bill in 2014. Except for the generation of 2.15% of renewable electricity in 2014, all the other energy needs of the Seychelles were met from imported fossil fuels.

GHG Emissions Scenarios

Non-GHG Outcomes in Public Electricity and Transport

The *Energy Policy 2010* has provided guidance regarding energy use scenarios in the power sector (electricity production and consumption) and transport to 2030.

Electricity Generation

It is estimated, that the renewable energy sources described above, together with the necessary legislation, can contribute with 15% - 20% renewable energy in the supply matrix in 2030. Wind power and, in the longer term, PV, are expected to contribute substantially.

Electricity Consumption

It is estimated that implementation of the policies outlined here has the potential to save 15% - 30% of electricity consumption towards 2030 compared to the baseline.

Transport

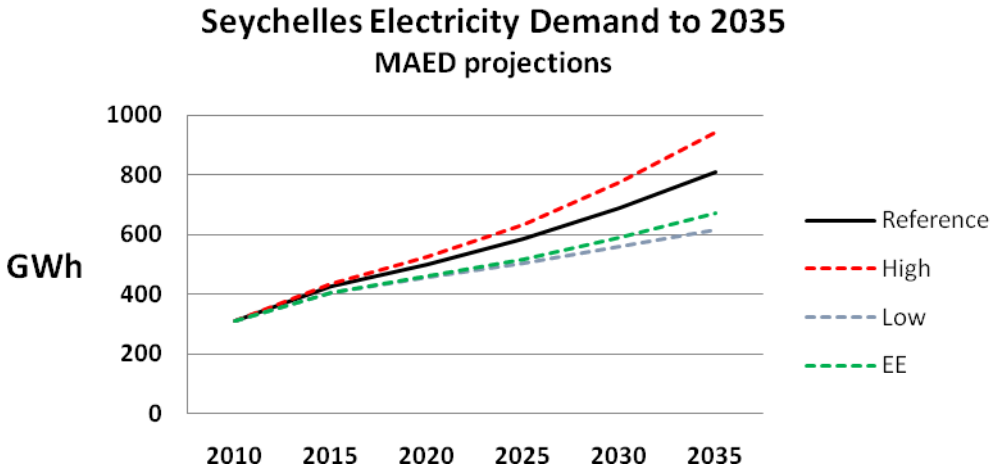
Keeping a high penetration of public transport, targeting fuel efficiency and biofuels in import regulation, and moving towards electric vehicles and two-wheelers, have the potential to reduce oil imports for transport purposes by 15% to 30% (or perhaps more) by 2030 compared to the baseline.

Public Electricity

Concerning electricity demand, the SEC has carried out projections of electricity to 2035 under different GDP growth rate and energy efficiency scenarios using Model for Analysis of Energy Demand (MAED). These are summarised in the schematic below. The Reference (Ref), Low and High scenarios refer to annual GDP growth rates of 5%, 3% and 6%, respectively. The Energy Efficiency (EE) scenario is one where the annual energy intensity drops by 20% compared to 10% in the Reference scenario. This scenario is based on the Reference scenario (scenario 1) with a GDP growth rate of 5% per year, except that in Industry the *energy intensity will decrease by 20% per year* in all the sub-sectors of industry for motor fuel uses, electricity specific uses and thermal uses except in Agriculture and Others in Manufacturing. This is due to energy efficiency improvement and technology innovation which are likely to occur in the next 25 years.

- The implementation of a National Energy Efficiency Programme includes the following activities:
- Promotion of energy-efficient appliances: target of10% energy savings in 2035
- Promotion of solar water heating: target of 80% of needs in Households, and 80% in Services by 2035,
- New Regulations on the use of air-conditioning, target of 20% energy savings in the service sector,
- New Building Code for Household dwellings (features natural ventilation, roof insulation,..), target of 50% energy savings on fans & AC in households by 2035,
- Promotion of cogeneration (production of hot water from waste heat from electricity generation) in hotels, target to cover 20% of hot water needs by 2035.

It is assumed that for the period of the study 2010-2035, the population will grow at a constant rate of 1% per year, corresponding to the annual average growth rate (AAGR) for the preceding 10 years. It is assumed that the structure of the GDP is the same as for 2010 throughout the study period 2010-2035.

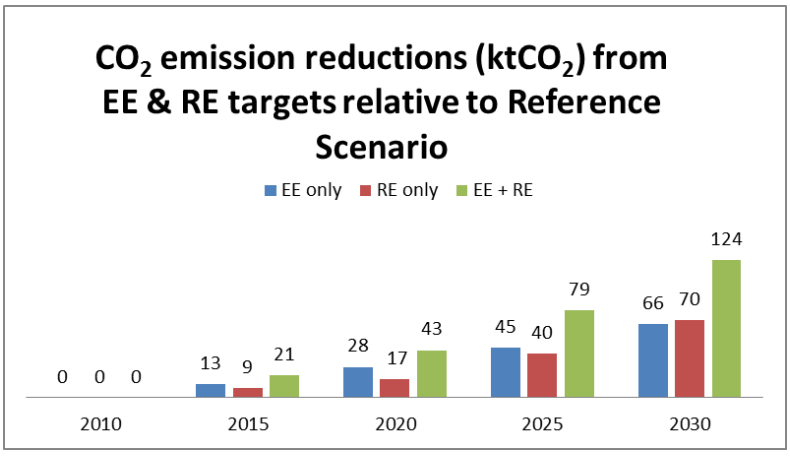


The SEC has revealed that the realistic non-GHG targets that have been proposed in the Energy Policy 2010 should be 15% for diversification of electricity generation using renewables by 2030, and to achieve the energy efficiency scenario given in the figure above.

In order to calculate the emission reduction potentials of these non-GHG targets applied to the MAED scenario projections, the grid emission factor of Seychelles has been calculated using the Clean Development Mechanism (CDM) Methodological Tool 07 – i.e. "Tool to calculate the emission factor for an electricity system (Version 04.0)". For electricity supply diversification from renewable energy sources that are intermittent such as wind and solar PV, the combined margin emission factor has been calculated as 0.67887 tCO_2/MWh. For all other renewable energy sources and end use energy efficiency, the combined margin emission factor has been calculated as 0.65936 tCO_2/MWh.

GHG Emission Reductions from Supply Side Diversification and Energy Efficiency

Since the supply side diversification in Seychelles is expected to be primarily from solar PV and wind energy (as per the proposal made in the Energy Policy 2010), the combined margin emission factor = 0.67887 has been applied to convert the non-GHG target of 15% renewables in the electricity mix in 2030 into the equivalent amount of GHG emissions. Similarly, the emission factor = 0.65936 tCO_2/MWh has been applied to obtain the emission reductions associated with demand side energy efficiency gains. The GHG emission scenarios were calculated using a combination of the Reference scenario and the non-GHG targets of 15% RE and 15.5% EE in 2030.



Transport

Projections have been made in the SNC regarding the increase in baseline emissions from road transport sector from 66, 525 tCO_2 in 2005 to 167,087 tCO_2 in 2030. The projections correspond to an increase in the number of vehicles from 10,622 in 2005 to 20,000 in 2030. Fossil fuel consumption is expected to increase from 21,324 t (2005) to 53,620 t in 2030. Using a target of 30% reduction in fuel use, which is expected to produce a proportional decrease in GHG emissions, the total emissions arising

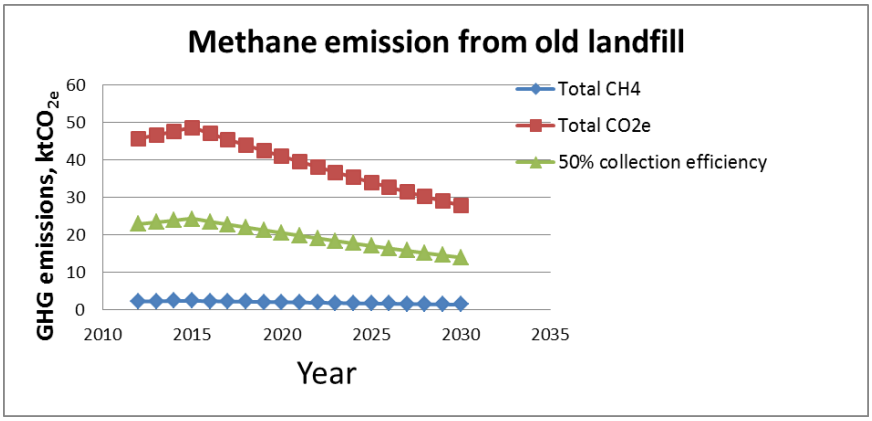
from road transport is expected to be 116.96 $ktCO_2$ in 2030. This target corresponds to a reduction in emission of 50.13 $ktCO_2$ in 2030. Assuming a target of 18% for 2025, the corresponding emission reduction is expected to be 26.5 $ktCO_2$.

Project-based Approach

The climate change mitigation contribution of Seychelles has been calculated using a combination of outcome- and project-based approaches, while avoiding double accounting. There are projects that are not captured in the outcome targets discussed above, and which might be implemented after 2020. Examples of such projects are solid waste management and end-use energy efficiency in the water sector that is not captured in the EE scenario that is discussed above. The EE in the water sector are not included in the INDC because most measures are expected to be implemented before 2020.

Solid Waste Management

Data regarding methane (CH_4) emissions from the old landfill in Mahe was provided by the SEC. Currently, the emissions are not captured neither for flaring nor for electricity generation. The projected emissions profile of CH_4 is shown in the figure below for the period covering 2012 and 2030. The INDC has included a conservative scenario where only 50% of the emissions are captured for flaring. There is currently no provision for power generation using the captured emissions.



Seychelles as a Net Sink

According to the SNC (2011), Seychelles is currently a net sink. With GHG emissions projected to increase from 310,816 tCO_2 in 2005 to 911,985 tCO_2 in 2030, and its removal capacity decrease from 813,780 tCO_2 in 2005 to 773,896 tCO_2 in 2030, Seychelles is not expected to become a net emitter until 2024-2025. The reduction in sink capacity is projected to take place by 1% every 5 years, and it is assumed that this cannot be avoided since reclaiming land for built-up areas (to protect forests) has proved to be too costly (SNC, 2011).

By taking into account the emission reductions arising from (1) RE and EE (i.e. 124 $ktCO_{2e}$ in 2030), (2) land transport (i.e. 50.13 $ktCO_{2e}$ by 2030), and (3) methane capture and flaring from the old landfill (i.e. 13.91 $ktCO_{2e}$ by 2030), the total emissions in 2030 can be reduced by 188 $ktCO_{2e}$ – i.e. the contribution of Seychelles. With this contribution, Seychelles will be a net sink of GHGs by about 50 $ktCO_2$ in 2030, and it will become a net emitter only after 2033. These calculations do not take into account the potential for additional sinks in the form of marine ecosystems – i.e. blue carbon (Seychelles Strategic Plan 2040, 2015).

In 2025, the emission reductions against the baseline scenarios have been calculated at 122.5 $ktCO_2$ – RE and EE = 79 $ktCO_2$, land transport = 26.5 $ktCO_2$, and methane capture = 17 $ktCO_2$.

ADAPTATION

To support the Statement of Long-Term Vision

Another essential component of overall country resilience to climate change is recognising and planning for **Critical Infrastructure**, particularly roads, ports, government buildings, energy generation, and water and sewerage management systems. Building capacity in managing the country's critical infrastructure requires clear linkages between responsible Government entities, a responsive education and awareness programme targeting infrastructure users, supported by appropriate research, and followed by reflexive monitoring.

Climate change adaptation needs to be mainstreamed into planning process for all new developments, with associated improvements in the building codes and their rigorous enforcement. A critical role is that of the Department of Risk and Disaster Management which needs upgrading in capacity with enhanced mapping underpinned with commensurate internet bandwidth. The Department should be linked in real time to Seychelles Meteorological Service to assist in understanding risks and hazards, improving emergency response system, whilst engaging directly with, and empowering, communities and islands to plan, mitigate risks and respond.

The key economic sector is **Tourism** and this sector requires nimble, adaptive responses, particularly where its success is predicated on proximity to the coastal or island areas. Tourism tends naturally to adapt to market forces and the suitability of the tourism offering for the future will need not only to recognise market pressures but also those driven by climate change. Consequently, it will be essential that the Blue Economy Research Institute in conjunction with the National Institute of Science, Technology and Innovation produces relevant products that enable the tourism sector to respond in a timely fashion.

Adaptive responses may include expanding marine tourism (yachts, ocean-based experiences) and mountain tourism (away from the coast). Greater co-management of the sector by the Ministry of Tourism and Department of Risk and Disaster Management as well as with the Ministry of Environment, Energy and Climate Change.

Food Security has been recognised by the Government as a crucial issue and it is widely understood within Government and agreed that there are clear linkages between water, food, ecosystem health and well-being of the people. Seychelles is in the process of implementing an ecosystem-based approach to watershed management and its implications for foods supply as well as water security. The Ministry of Agriculture and Fisheries is currently working on a feasibility study for a project to improve food and nutrition security and this project also addresses issues of water and soil management with reference to climate change.

The Ministry recognises that sustainable modern agriculture requires new and innovative technologies, and investment supported by skilled and qualified human resources. The Ministry anticipates additional resources being committed to enhance human capacity development at the Seychelles Agricultural Agency, revitalising the extension services and also providing opportunities for young Seychellois to study climate-smart and ecosystem-based approaches to agriculture, put in place programmes for sustainable industrial and artisanal fisheries, sustainable mariculture, promote home gardening, improve port infrastructure for artisanal and industrial fisheries, reduce illegal, unreported and unregulated activities; and continue to support the insurance scheme for farmers and fishers.

With so much territory protected from human land use and with a remarkably narrow coastal strip, Seychelles has real challenges in designing a future to take into account climate change which has jurisdiction over the entire coastal strip through, storm surge, high winds and salty air. Much has been made of the "blue economy" and for islands that would seem to be a logical consideration. Seychelles needs to fast-track its blue-economy ambition into action so that it can develop innovative and additive links with the *Seychelles Strategic Plan 2015* which is in its closing formulation. For island states, it is too short-sighted in terms of climate change and island development to orchestrate land use plans without due consideration of the primary engine ~ the blue economy.

A current Marine Spatial Planning project underway also has potential to coordinate connections between different interests in the blue economy, **biodiversity**, whether they be conservationist or exploitative in nature.

The issue remains that little research has been done regarding the impacts of climate change on Seychelles' fisheries, both industrial and artisanal, and more research will provide valuable insights to guide adaptation strategies for the fishing sector.

With 50% of Seychelles under protection, that is an enviable basis for the future. The newly-launched *Seychelles Biodiversity Strategy and Action Plan* addresses climate change as a cross-cutting theme and identifies a series of projects to improve biodiversity conservation though cross-referencing issues such as water and food security. A new Biodiversity law is currently being drafted which will update the existing laws related to the protection of biodiversity and strengthening of the capacity of those charged with their protection. There is a need to balance protected areas and room for development whilst developing a strong capacity for biosecurity. Such requirements offer ideal scope to inform a strengthened Blue Economy Research Institute.

Water Security, particularly considering issues of storage and distribution, requires urgent attention and needs to take into account projected population growth, whilst reducing demand for treated water, using more rainwater, improving efficiency of the distribution system, and improving water storage capacity. Increasing water demand from the residential, commercial, agriculture, and tourism sectors is exacerbated by changes in rainfall patterns and a limited water storage capacity. The ecosystem-based watershed project mentioned previously is currently being implemented to address water supply from an ecosystem perspective. Another demonstration project is being implemented on La Digue focused on integrated water resource management. Both of these projects represent an integrated approach to water security that address issues such as ecosystem health, waste management, water treatment and supply, sewage, agriculture, etc. It is advocated that this approach is mainstreamed throughout island water resource management. In addition, the Public Utilities Corporation is currently implementing a project to improve water security by increasing efficiency of the system and reducing demand from consumers. This project also addresses the linkages between the treated water system and energy efficiency. It is essential that these endeavours are linked to the Blue Economy Research Institute to optimise knowledge-sharing and research throughout Government.

Energy Security, particularly considering the reliance on fossil fuels is vital to the longer-term sustainability of Seychelles. There is a need to keep the options for diversifying electricity sources under continual review, whilst exploring more opportunities for the application of renewable energy technologies and strategies for using waste as an energy form. Commensurate with this, the distribution grid needs to maintain flexibility, and plans engaged to move critical infrastructure out of flooding/storm surge risk areas. Whilst the introduction of renewables is a usual early thought that has to be cautioned with detailed feasibility studies, innovations are possible, though require well-programmed research.

Mechanised transport is essential given the terrain of Seychelles. This currently relies on fossil-fuelled vehicles and infrastructure that is degraded. Both require upgrading as these are critical and underpin all other sectors ~ moving people to school, work and shops. The departments responsible for road maintenance and repair in case of flooding, erosion and landslides collaborate to some degree to deal with crises, but a strengthening of cooperation between them in term of troubleshooting and planning would be desirable (e.g. Seychelles Land Transport Agency, the Department of Transport, Department of Risk and Disaster Management and the Ministry of Environment, Energy and Climate Change).

The **Health** burden due to high-density populations in the coastal areas needs to be managed through improved research, response and planning. There are known challenges within the coastal zone related to chemical and solid waste.

The conventional **waste** hierarchy (reduce, re-use, recycle) should be implemented fully and the use of organic waste for soil improvement promoted. Traditionally, on Seychelles, waste management has been mostly about disposal rather than looking at waste as an opportunity (especially through the circular economy). Seychelles has a relatively new waste policy (2013) which highlights the waste hierarchy with landfill being the last option, though for most forms of waste this may be the only option.

Waste management sites are located in the limited coastal area on all three main islands; the new landfill on Mahé has been designed to collect leachate though this is only expected to last five to six years and thus far there is no plan or location identified for the next landfill. There is growing interest in business opportunities presented by recycling by the private sector, and this movement is being supported by the Government as well as by civil society organisations. The Government is conducting feasibility studies to look at the potential of a waste to energy facility, which would probably take the form of a biogas plant.

***To support the* Statement of Current and Near-Term Planning and Action**

The Department of Risk and Disaster Management has mainstreamed climate change concerns into its work and is guided by a new policy and law (*Disaster Risk Management Act, 2015*) that provide clear guidance. The Department is receiving some support under various funding programmes but requires more input in terms of human and financial resources to fulfil the mandate as guided by the *National Progress Report on The Implementation of the Hyogo Framework For Action (2013-2015)* which details many actions focusing on building capacity in communities and districts to prepare for and respond to disaster (climate change mediated) events. In addition, the *Seychelles National Disaster Risk Policy (2014)* provides several areas for near-term action: Establishing sound, integrated and functional legal and institutional capacity for total disaster risk management in Seychelles; Improving risk identification, assessment and monitoring mechanisms in Seychelles; Reducing the underlying risk and vulnerability factors by improving disaster risk management applications at all levels; Strengthening disaster preparedness for effective response and recovery practices at all levels; and Enhancing information and knowledge management for disaster risk management.

The Ministry of Agriculture and Fisheries is looking at food security issues, including nutritional issues, and has developed a *Food and Nutrition Security Policy* as well as an investment plan. The Ministry recognises that sustainable modern agriculture requires new and innovative technologies, and investment supported by skilled and qualified human resources. The Ministry anticipates additional resources being committed to enhance human capacity development at Seychelles Agricultural Agency, revitalising the extension services and also providing opportunities for young Seychellois to study climate-smart agriculture technologies.

The Ministry of Education has recently integrated climate change into the secondary geography curriculum, and climate change issues are often addressed in extra-curricular school activities in primary (wildlife clubs) and secondary schools. Climate change has also been addressed in the programmes of many of the professional centres. The Ministry has the opportunity to identify opportunities for building on the work already being done, particular with respect to adaptation strategies related to the different sectors.

The Ministry of Environment, Energy and Climate Change, through its *Seychelles Energy Policy (2010-2030)* outlines key strategies for energy security and has a ten-year outlook and action plans for energy security, efficiency, renewable energy (as documented in the *Seychelles Sustainable Development Strategy, Volume 2, Chapter 11 – Energy and Transport*). Many of the planned projects are underway, the *Energy Act* is in force and has paved the way for the introduction of power supplied to the grid from diverse sources. Two GEF projects are being implemented, focused on energy efficiency and solar photovoltaic, both of which will also contribute significantly to an improvement in the energy security of Seychelles.

The Ministry of Tourism has a master plan (2012 -2020) which indicates its focus on climate change where appropriate. The priorities for sustainable tourism are documented in the *Seychelles Sustainable Development Strategy, Volume 2, Chapter 8 – Tourism* and include: Minimising negative impacts of tourism on environment (and society) generally; and addressing climate change through training of tourism environmental representatives, training of the Seychelles Tourism Board in sustainable tourism development and training of environmental conservationists.

The Ministry of Land Use and Habitat is largely guided by the *Seychelles Strategic Plan (2015)* which is the definitive document intended to guide land use management during the next 25 years to 2040. Climate change adaptation is a cross-cutting theme with maps/plans for areas for growth showing intense areas of development along east coast of Mahé including the Victoria area. There is little mention of risks due to sea level rise and storm surges and the plans contradict predictions from the Cuban Study projections (map chapter 3) which could be addressed through further research as indicated previously.

The Ministry of Health recently developed a *Seychelles National Climate Change and Health Adaptation Plan of Action* (2014-2018) in collaboration with the Ministry of Environment, Energy and Climate Change. This plan will foster closer ties between the two ministries and guide adaptation efforts related to public health.

The National Institute of Science, Technology and Innovation (NISTI) is a newly-enacted body under the Ministry of Investment, Entrepreneurial Development and Business Innovation. It has an oversight and

leadership mandate with regards to the growth and development of science, technology and innovation across all sectors and programmes, and has potential to contribute to climate change mitigation and adaptation action. Also of interest, is that it has been mandated to assist the transition to a Seychelles knowledge-based economy between now and 2026.

***To support the* Description of Monitoring Plan**

VISION: Minimise impacts of climate change through sustained action at all levels of society		
Components	**Activities/Processes**	**Outputs**
Blue Economy Research Institute	• Scope out strengthening Institute needs • Feasibility Study to cost climate change research activities by the Institute • High speed networks to sectors • Appropriate training • Establishment of a national data hub • Collaboration with local (e.g. the National Institute for Science, Technology and Innovation, Seychelles Meteorological Office), and overseas research partners • Support innovative and research-based approaches to climate change education for both informal and formal education sectors and their staff • Support enhancement of Science, Technology, Engineering and Mathematics education in schools at all levels	Functional research Institute based at the University of Seychelles capable of attracting, retaining and funding postgraduate programmes in climate research with proactive links to all sectors including education sector and their professional centres
Critical Infrastructure	• Scope critical infrastructure needs • Appropriate training • Create clear linkages between responsible Government entities • Develop a responsive education and awareness programme targeting infrastructure users • Link to Blue Economy Research Institute and the National Institute for Science, Technology and Innovation • Instil reflexive monitoring • Department of Risk and Disaster Management upgraded and linked in real time to the Seychelles Meteorological Service • Improved road maintenance and repair • Need to re-think basic philosophy to incorporate climate-smart designs • Ensure prioritised with near, mid- and long term aims	Climate change adaptation needs mainstreamed into all sectors with critical infrastructure Planning process for all new developments, with associated improvements in the building codes and their rigorous enforcement All new builds to incorporate rainwater harvesting, solar PV and other sustainable building features
Tourism	• Link to the Blue Economy Research Institute • Receives and acts upon relevant products • Reviews and acts upon potential adaptive responses • Training in climate change for hoteliers and tourism students at the Seychelles Tourism Academy	Greater co-management of the sector by the Ministry of Tourism and Department of Risk and Disaster Management as well as with the Ministry of Environment, Energy and Climate Change
Food Security	• Complete feasibility study for a project to improve food and nutrition security • Enhance human capacity development at Seychelles Agricultural Agency and Seychelles Fishing Authority • Revitalise extension services and provide opportunities to study climate-smart and ecosystem-based approaches to agriculture and fisheries • Programmes for sustainable industrial and artisanal fisheries, sustainable mariculture • Promote home gardening, improve port infrastructure for artisanal and industrial fisheries, reduce illegal, unreported and unregulated activities; and support the insurance scheme for farmers and fishers • More research needed regarding the impacts of climate change on Seychelles' fisheries, both industrial and artisanal, and more research will provide valuable	A sustainable modern agriculture and fisheries supported by new and innovative technologies, investment, and by skilled and qualified human resources Integrated *Blue Economy* and *Seychelles Strategic Plan 2015*

VISION: Minimise impacts of climate change through sustained action at all levels of society		
Components	**Activities/Processes**	**Outputs**
	insights to guide adaptation strategies for the fishing sector • Fast-track the blue-economy ambition and develop innovative and additive links with the *Seychelles Strategic Plan 2015*	
Biodiversity	• Fast-track full implementation of *Seychelles Biodiversity Strategy and Action Plan* and the new Biodiversity law • Fully developed capacity for biosecurity including emphasis on invasive alien species	Fully implemented Action Plan Fully implemented and enforced Biodiversity and Biosecurity Laws Fully bio-secure country borders
Water Security	• Undertake a Water Security Review • Fast-track improvements to water security by increasing efficiency of the system and reducing demand from consumers • Link to the Blue Economy Research Institute and the National Institute for Science Technology and Innovation to optimise knowledge-sharing and research	Fully integrated approach to water security that addresses issues such as ecosystem health, waste management, water treatment and supply, sewage, agriculture, etc
Energy Security	• Keep the options for diversifying electricity sources under continual review • Explore more opportunities for the application of renewable energy technologies • Plan to move critical infrastructure out of flooding/storm surge risk areas • Replacement of fossil-fuelled vehicles where practicable and upgrading of infrastructure • Collaboration with the National Institute for Science Technology and Innovation to optimise knowledge-sharing and research	More resilient energy base Greater use of renewable energy where practicable Optimum fuel-based fleet Strengthened cooperation between Government entities
Health	• Actively managed health burden through improved research, response and planning	Health sector able to respond to population increase and its climate-related health burden
Waste	• Actively managed waste hierarchy • Fast-track implementation of new waste policy • Decommission landfills in flood risk areas • Research and commercialisation of waste-based products • Urgent completion of waste-to-energy feasibility studies	Waste is managed according to strict hierarchy and waste policy fully implemented Decision taken on waste-to-energy

Cost of priority mitigation actions

The cost of achieving the reduction objective in 2030 has been estimated to be at least USD 309 million as detailed in Table 1. Including the cost of energy efficiency measures such as building codes, standards and labels, and energy audits will increase the total cost of implementation. The cost of emission reductions does not include the implementation of a biofuel policy in the transport sector, nor does it include any actions related to the decongestion of Victoria, Mahé.

Table 1: Estimate (lower bound) of the cost of mitigation

Sector/sub-sector	**Mitigation action**	**Cost (million USD)**
Public electricity[1]	90 MW of solar PV (capital expenditure, and operation & maintenance cost over lifetime of 20 years)[2]	191.7

[1] As per the *Energy Policy 2010*, the target of 15% renewable electricity in 2030 is met predominantly using solar PV

[2] The capital cost of 1 MW installed of solar PV has been assumed to be USD 1.75 million, while the operation & maintenance cost has been taken as 19,000 USD/MW/yr.

Waste management	Retrofitting the old landfill (Providence 1) with landfill gas capture and flaring equipment[3]	20.8
Land transport	30% of private vehicles are electric by 2030[4]	66.7
	15.8 MW of solar PV for meeting the energy demand of electric vehicles (capital expenditure, and operation & maintenance costs)	29.8
	TOTAL	309

Cost of priority Adaptation Actions

The threats caused by climate change will have significant impacts on Seychelles in the short, medium and longer term on infrastructure, agriculture, fisheries, tourism, energy and water security, biodiversity, waste management and on human health and well-being. Although the exact impacts are not known, and more research is needed to better understand the implications of a change global climate on the islands, it is that Seychelles take measures to better understand the threats and begin longer-term planning for adaptation as depicted in the table below. Hence, the total cost of implementing the adaptation component of the INDC is estimated to exceed USD 295 million.

Table 2: Estimate (lower bound) of the cost of adaptation

Sector/sub-sector	Adaptation action	**Cost (million USD)**
Critical Infrastructure	• Climate change adaptation to be mainstreamed in all sectors with critical infrastructure ; • Planning process for all new developments, with associated improvements in the building codes and their rigorous enforcement ; • Building the resilience of communities	70.00
Tourism/ Coastal Management	• Implement Coastal rehabilitation and protection measures in criticalareas due to coastal erosion caused by SLR ; • Build Coastal resilience • Reduce vulnerability to flooding and landslide in critical areas ; • Strengthen the early warning System and capacity building In coastal areas; • Greater co-management of the sector by the Ministry of Tourism and Department of Risk and Disaster Management as well as with the Ministry of Environment, Energy and Climate Change	45.00
Food	• A sustainable modern agriculture supported by new and	35.00

[3] There is no provision for generating electricity using the landfill gas.

[4] This target corresponds to 6,667 vehicles. The incremental cost of an electric car compared to a conventional one is taken tobe USD 10,000.

Security	innovative technologies across all food production supply and value chains, and by skilled and qualified human resources and integrated with the *Blue Economy* and *Seychelles Strategic Plan 2015 ;* • Integrate of early warning systems in agriculture ; • Invest in research and innovation to strengthen Seychelles' climate resilience	
Biodiversity	• Fully implemented *Seychelles Biodiversity Strategy and Action Plan ;* • Fully implemented and enforced *Biodiversity Law ;* • Fully bio-secure border	15.00
Water Security	• Fully integrated approach to water security that addresses issues such as ecosystem health, waste management, water treatment and supply, sewage, agriculture, etc ; • Increase strorage capacity by building a dam ; • Improving water resource management:	85.00
Health	• Health sector able to respond to population increase and its additional climate-related health burden e.g dengue fever,lestopirosis etc… • Exploration of relevant potential science and technology innovation	30.00
Blue Economy	Set up a proper marine resource management institution	15.00
Total		**295.00**

GOVERNMENT OF SIERRA LEONE

THE ENVIRONMENT PROTECTION AGENCY SIERRA LEONE

SIERRA LEONE'S INTENDED NATIONALLY DETERMINED CONTRIBUTION (INDC)

SUMMARY

BACKGROUND AND INTRODUCTION

Sierra Leone has been ranked as the third most vulnerable nation after Bangladesh and Guinea Bissau to adverse effects of climate change. Our vulnerable population has low capacity to adapt to climate change and the rural populations will be the most affected because of their high dependence on rain-fed agriculture and natural resource-based livelihoods. According to the science of climate change, these impacts are likely to continue to affect Sierra Leone in the future, despite the country being least responsible for the problem since Sierra Leone's contribution to global emissions of greenhouse gases is negligible. The Sierra Leone National Development Plan – **the Agenda for Prosperity 2013 -2018** indicates that Sierra Leone is committed to mainstreaming inclusive green growth in her development process. Thus, the implementation of the INDC will support the transition to low-emission development involving decoupling carbon emissions from economic growth through a series of measures across all economic sectors.

This document presents Sierra Leone's Intended Nationally Determined Contribution (INDC) in response to decisions adopted at the 19th and 20th 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. The national circumstances of Sierra Leone have been fully taken into consideration during the development of the INDC. This includes national and sectoral strategies which already exist in the **National Development Plan–the Agenda for Prosperity.**A review of the current status of implementation of the cross-cutting issues of the Climate Convention at the national level has been documented. These include (a) research and systematic observation systems; (b) technology transfer; and (c) education, training and public awareness. The process is also built on the participatory multi-stakeholder and cross-sectoral consultative processes at national and district levels.

Since the year 2000, Sierra Leone has published three National Strategies on Climate Change and in 2009 adopted its first Special Program on Climate Change. In addition, Sierra Leone has presented two National Communications with their respective greenhouse gas inventories to the United Nations Framework Convention on Climate Change.

NATIONAL CIRCUMSTANCES OF SIERRA LEONE:

Geographical location and main physical features/regions:

Sierra Leone is located on the west coast of Africa, between the 7th and 10th parallels north of the equator. Sierra Leone is bordered by Guinea to the north and northeast, Liberia to the south and southeast, and the Atlantic Ocean to the west. The country has a total area of 71,740 km^2, divided into a land area of 71,620 km^2 and water of 120 km^2. The country has four distinct geographical regions: coastal Guinean mangroves, the wooded hill country, an upland plateau, and the eastern mountains. Eastern Sierra Leone is an interior region of large plateaus interspersed with high mountains, where Mount Bintumani rises to 1,948 meters. Sierra Leone can be split into three geological areas, in the east is part of the West African craton, the western area consists of the Rokelides, an orogenic belt, and a 20- to 30-km coastal strip of sediments (*SchlüterandTrauth, 2008).*

Major social and developmental setbacks

Due to the outbreak of the Ebola Virus Disease (EVD) in Sierra Leone which claimed 3,461 lives by February 2015 (WHO, 2015),the development gains made by Sierra Leone after the country's emergence from a ten-year civil war in 2000 were rudely reversed. Notwithstanding these setbacks, Sierra Leone recently developed and adopted it's National Climate Change Policy (NCCP) and National Climate Change Strategy and Action Plan (NCCS&AP) around which this INDC revolves. The INDC of Sierra Leone has three components, one for Mitigation, one related to Adaptation and the third for Loss and Damage. This INDC is consistent with Sierra Leone´s green growth pathway to development.

Greenhouse Gas Emissions status

According to the Second National Communication of Sierra Leone to the UNFCCC, total carbon dioxide emission (CO2) for the year 2000 was 574.061Gg CO2. The carbon dioxide emissions from energy generation amounted to 529.287Gg of CO2 as Sierra Leone energy generation is based on diesel powered generators. The Land Use, Land Use Change and forestry (LULUCF) sector was the least significant source of CO2 emissions by up taking 752,748Gg of CO2, followed by the waste sector emitting 11.8Gg CO2. The industrial processes are however marginal amounting to 39.55 Gg of CO2 and these emissions came mostly from cement production.

In 2000, the total Methane (CH4) emissions were 32,312.53 Gg CH4. Agriculture was the most important source of CH4 emissions (86.67%), followed by the LULUCF sector (5.631) and finally the waste sector (11.83). The other sectors were not sources of CH4 emissions.
Nitrogen dioxide **(**N2O) emissions were estimated at 13.91 Gg N2O with 8.54Gg N2O coming almost exclusively from the agricultural sector. The waste sector was also a source of emission and emitted 31.29Gg N2O.

Projected Greenhouse Gas Emissions for Sierra Leone

Sierra Leone is yet to produce her Nationally Appropriate Mitigation Action (NAMA) and the National Communications have not produced projections of greenhouse gas emissions for the country. Although it's historical contribution is low at 0.1% of the total global emissions. Since Sierra Leone gained her independence in 1961 i.e. fifty four (54) years ago, her per capita emissions has not exceeded 0.6 $tC0_2e$.

Table 2 below shows the projections of greenhouse emissions developed for Sierra Leone by the US Environmental Protection Agency. According to these projections total emissions from all sources and sectors and for all gases, GHG emissions are projected to increase to about 4.8MtCO2Eq in 2015 and to about 6.6MtCO2 Eq in 2030. The major greenhouse gas emitted is Methane (CH4) with projected emissions of 3.7MtCO2Eq in 2015 and about 5.0MtCO2Eq in 2030. The largest emitting sectors are Agriculture and Waste and between them, they are projected to emit between 95 to 98% of the projected national emissions from 2015 to 2030. The largest emitting category is Waste Management and will be responsible for about 54% of the total projected emissions in 2015 and 56% in 2030. Waste Management is projected to emit 2.6MtCO2Eq in 2015 and 3.7MtCO2Eq in 2030.

Table 2: Projected GHG Emissions ($MtCO_2e$) from Sierra Leone from 2015 to 2030				
Sierra Leone	**2015**	**2020**	**2025**	**2030**
All Sources, Gases, Sectors	4.765	5.239	5.851	6.551
CH4	3.670	4.029	4.458	4.970
N2O	0.997	1.069	1.156	1.271
Agriculture	2.107	2.224	2.374	2.575
Energy	0.001	0.001	0.001	0.001
Industrial Processes	0.097	0.142	0.238	0.311
Waste	2.559	2.872	3.239	3.664
Source: *http://www.epa.gov/climatechange/EPAactivities/economics/nonco2projections.html*				

This INDC is consistent with Sierra Leone's Green Growth pathway to low emissions carbon development strategy by the year 2018.

CONTRIBUTIONS

Sierra Leone's INDC includes both conditional mitigation and adaptation components based on her national circumstances and in line with decisions1/CP.19 and 1/CP.20

The VISION of the Sierra Leone INDC is to create a new era for a harmonious relationship between the economy, environment, social and long term sustainability; shifts to a green economy and provides for the identification and implementation of various mitigation and adaptation measures.

The GOAL of the INDC and the accompanying action plan is to prepare the government and people of Sierra Leone to limit their carbon footprint; reduce or minimize risks by improving adaptive capacity, reducing vulnerability to climate change impacts and increasing the resilience and sustainable wellbeing of all citizens; and to leverage new opportunities and facilitate collaboration in-country and with regional and global communities..

Planning processes:

Sierra Leone's planning process on mitigation and adaptation hinges on the NCCP, NCCS&AP and the NAPA. The result shall be reviewed every five years to inform the Medium Term Plan. The adaptation and mitigation actions will further amplified in the NAP and NAMA which Sierra Leone hopes to develop.

The planning process also takes cognizance of the absence of a Climate Change law that may propose several institutional reforms to enhance coordination of climate change adaptation and mitigation. These reforms may include:

- Review, revise the already adopted (by cabinet concurrence) current Draft Climate Policy into a comprehensive Climate Act;
- Establish the enabling legislative framework to implement the NCCS&AP actions:
- Establish and/or strengthen the high-level National Climate Change Council (NCCC), in the Office of the President; and
- Support the already established National Climate Change Secretariat as the primary national government agency for climate change response.

- Establish a Sierra Leone Climate Fund to be a financing mechanism for priority climate change actions and interventions.

Gender perspective
Pillar eight (8) of Sierra Leone's five year development plan considers Gender and Women's Empowerment.Therefore, in addressing climate change issues, public entities are required to undertake public awareness and consultations, and ensure gender mainstreaming.

National implementation:
Sierra Leone elaborated a draft for consultation at national level of its national climate policy. It will include measures that allow emission reductions by 2035 to be achieved mainly domestically. The proposed measures to achieve the commitments will build on existing measures and strategies. The existing legal frameworks will have to be revised accordingly. These revisions are subject to approval by Parliament.

Assumptions and methodological approaches
Sierra Leone's supports internationally agreed rules for accounting and reporting of greenhouse gas emissions. As they are yet to be agreed, Sierra Leone's INDC is based on the following assumptions and methodological approaches:

The IPCC Revised 1996 Guidelines for National Greenhouse Gas Inventories and the Good Practice Guidance 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 and the mining/extractive sector has not been included in the accounting.

Information to facilitate clarity, transparency and understanding

***Geographic coverage*:** The geographic coverage is complete. No region in Sierra Leone has been left uncovered by the inventory.

Sectors (sources and sinks): All sources or removals of direct GHG gases included in the IPCC Guidelines (Energy, Industrial Processes, Agriculture, Forestry and other Land Use (AFOLU) and waste sector). In particular, Sierra Leone target covers all greenhouse gases included in the 1990 and 2000 inventories under INC and SNC. The general gaps in the completeness are mainly due to lack of activity data and the non-occurrence of the activity in Sierra Leone.

Gases covered: Carbon dioxide (CO2), Methane (CH4) and Nitrous Oxide (N2O) are prioritized.

Base year for gases covered: all 2000/1990(not relevant where reference level is applied)
Time frames/period for implementation: 2030-2050

Fairness and ambition
Sierra Leone is of the view that the key factors in determining the fairness of a contribution should include historical responsibility and respective capability to address climate change. In light of this the country considers the following points:

i) The country's capability to implement this contribution is subject to limitations.
ii) The country has a very small emissions profile (<0.1% of global emissions and per capita emissions less than 0.2t$CO_{2/}$ year.
iii) The country does not have absolute emission reduction targets, but has chosen the option of green growth and low emission pathway as elucidate in the NCCS&AP.

These gives a clear stand that the country is determined to continue playing its own part in addressing climate change by communicating a fair and ambitious contribution.

Global warming potentials

The carbon dioxide equivalent was calculated using the 100 year global warming potentials in accordance with the IPCC 2nd Assessment Report.

Mitigation Component of the INDC

Mitigation perspectives of Sierra Leone are presented based on strategic documents developed in and for Sierra Leone which include the National Communications, the NAPA and other strategic documents. This INDC is a strategic document concretizing Sierra Leone's shift in its development path from brown to green economy and to achieve sustainable development, based on its own socio-economic and development priorities.

Present GHG emission contribution

Already, in a bid to significantly contribute towards the reduction of the sources and potential sources of GHG emissions or enhancing carbon sinks, Sierra Leone, following a mitigation assessment, and drawing upon the strategic direction of Vision 2035, Sierra Leone, proposed to undertake the following appropriate which were it's Internationally communicated pre-2020 GHG emissions reduction plans under the Copenhagen Accord (GoSL, 2012):

Thus Sierra Leone is already mitigating GHG emission which has not yet been quantified for CERs.

1. Establishment of the national secretariat for climate change (NSCC) to ensure coordination and assessment of climate change initiatives.
2. Expanding clean energy utilization (e.g. solar, mini-hydro electric power, LPG, biomass stoves etc).
3. Development of energy efficiency programmes through sensitization and awareness raising campaigns. Sustainable production of charcoal a reduce dependence on firewood.
4. Development of alternative energy sources such as bio-fuels from sugarcane, corn, rice husk, etc.
5. Developing agricultural and urban waste incineration programmes for energy production.
6. Improved waste management through composting and recycling of waste.
7. Development and enforcement of regulations on regular maintenance of vehicles (vehicle emission testing): formulation of transport plans.
8. Improved and promoting use of public transport (e.g. road, rail and water) for passengers and cargo to reduce traffic congestion and GHG's emissions.
9. Setting/developing air, water and soil quality standards, and ensure regular assessments and monitoring through control programs.

As reported to the 2009 COP 15 meeting in Copenhagen, Sierra Leone, through its relevant Ministries, will put modalities into place to fully exploit the Carbon Trading and Payment systems. For instance the use of REDD and REDD+ initiatives.

Conditional Contribution

Sierra Leone's INDCs is framed **in terms of desired outcomes**. Through this INDC, Sierra Leone is committed to implementing specific emissions-reduction actions, such as policies or mitigation actions like advancing a feed-in tariff for renewable energy technologies, phasing out fossil fuel subsidies, or converting to no-tillage agricultural practices. As a country whose **emission levels are relatively low already**, Sierra Leone could not commit to a certain outcome or result—for example, reducing emissions to a specific level (a greenhouse gas outcome). The domestic situation Sierra Leone faces i.e being solely dependent on fuel imports to meet its minimum energy needs, reducing emissions further than BAU can only be achieved through country wide LEDs which the country has already adopted.

It is against this backdrop, that this INDC intends to maintain the emission levels of Sierra Leone relatively Low (close to the world average of 7.58 $MtCO_2e$) by 2035 or neutral by 2050 by reducing her carbon footprint and by following green growth pathways in all economic sectors.

This target will only be achieve by Sierra Leone with the availability of international support that will come in the form of finance, investment, technology development and transfer, and capacity building. This would require substantial donor support estimated to about $ 900 million.

Long term global contribution:

Sierra Leone intends to also present an intensity based reduction target by 25 to 35 percent, by 2050 in phases (2020-2030, 2030-2050) compared to 1990 including use of international credits well as the vision to hold per capita emissions in Sierra Leone's average world level in the longer term. These unavoidable emissions will have to be eventually compensated through sinks or removals.

Priority climate change response strategies have been identified and included in the INDC. The following strategies are in the area of mitigation of greenhouse gas emissions.
These strategies include:

Strategy 1: Institutionalization of coordination, monitoring, reporting and verification of climate change issues by strengthening the Environment Protection Agency for effective and efficient provision of technical policy advice to the Government and people of Sierra Leone for relevant decision making in transitioning to green economic growth.

Strategy 2: Transformation of the National Meteorological Services of Sierra Leone and strengthening of Climate Change Early Warning System of Sierra Leone

Strategy 4: Promotion of energy efficiency, enhanced management and expansion of the energy mix through uptake of renewable energy sources (Solar, Wind, Hydro, Biomass) particularly in the rural areas of Sierra Leone.

Strategy 5: Enhancement of waste management systems at all levels to reduce pollution and greenhouse gas emissions under the category so as to improve health of both humans and animals and reduce global warming.

Strategy 6: Diversification of economic growth through strengthened transport sub-sector, particularly the infrastructure to contribute to the reduction of regional and global emissions of greenhouses and build a stable economy.

Strategy 7: Adoption and application of climate-smart and conservation agriculture through best agricultural practices that enhance soil fertility and improve crop yield

Contribution by land sector emissions

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 Agency Sierra Leone were used. A global land -use data approach was used, as described in the 2003 IPCC Good Practice Guidance for LULUCF. A state and transition model consistent with the 1996 Revised IPCC Guidelines was used to calculate fluxes of CO_2 to (or from)the atmosphere and biomass carbon pools is the same as outlined in the1996 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.

Contribution of international market based mechanisms

Sierra Leone supports the inclusion of the international Carbon Markets such as CDM in a post 2020 agreement on climate change and proposes that such instrument be tied to an appropriate MRV system to be used to help finance low carbon and climate resilient infrastructure investments.

Sierra Leone considers that certain low emission development options mentioned in the INDC or additional actions could be entirely or partially be funded by the transfer of international carbon assets while taking into account environmental integrity and transparency.

Avoidance of double counting

Sierra Leone intends to include the above mentioned carbon assets in accounting for its emission reduction commitment. For the CDM under its current use and operation it is assumed that only the acquiring Party will account for the emission reductions covered by the credits acquired from the host Party. For new market mechanisms, Sierra Leone supports the elaboration of UNFCCC rules for avoiding double counting of emission reductions, or otherwise appropriate.

Reference Point

BAU emissions in the target year

Business as usual (BAU) emissions is estimated to be 6.6 **$MtCO_2e$** by 2030. This excludes downstream exploitation in the mining/extractive sector.

BAU projection methodology

The BAU projection methodology is detailed within the NCCS& AP and the Second National Communication (SNC), including key assumptions, drivers and methodologies for each sector. The base year is 1990.

Sierra Leone has over 20 hydro potential sites of which the Bumbuna Dam is the only one that has been tapped. This dam, which has been completed, has a capacity of 50MW. This was considered as the most **viable mitigation option** for the electricity sector. If five of these hydro potentials including Bumbuna are utilized, it may result in almost zero emission for the electricity sector.

The Adaptation Component of the INDC

The INDC is developed to take the efforts (adaptation) needed to respond to climate change in Sierra Leone to another stage beyond identification to implementation. Under the INDC the strategies identified have been translated into adaptation actions to enable Sierra Leone to take decisive and sustainable actions in addressing the adverse impacts of climate change on the national economy and move the country into a green and resilient economy. The Action Plan includes (a) prioritised activities that will support Sierra Leone to transition to a low-carbon and climate-resilient economy; (b) information on financing the INDC; (c) mobilisation of resources and (d) monitoring, reporting and verification of impacts on the citizens and economy of Sierra Leone due to the implementation of the strategy and action plan.

Priority climate change response strategies have been identified and included in the INDC. These strategies are in the area of adaptation to the impacts of climate change.

Strategy 1: Estimation,in a sustainable manner, of Sierra Leone's contribution to global warming and climate change.
Strategy 2: Management of rangelands and pastures by managing grazing systems and grazing intensity, fire management and pasture rehabilitation.
Strategy 3: Integrated management of crops and Livestock management.
Strategy 4: Restoration of degraded lands with high production potential
Strategy 5: Management of coastal and fisheries resources through promotion of non-destructive fishing techniques to maintain resilience of marine ecosystems.
Strategy 6: Promotion and facilitation of early warning and disaster preparedness system.
Strategy 7: Strengthen integration of climate change adaptation into the health Sector.

Strategy 8: Strengthen the adaptive capacity of the most vulnerable groups and communities through social safety nets and insurance schemes.
Strategy 9: Enhance the resilience of the tourism value chain.
Strategy10: Create enabling environment for the resilience of private sector investment, demonstrate an operational business case.
Strategy 11: Integrate climate change adaptation into the mining/extractive sector
Strategy 12: Mainstream climate change adaptation in land reforms.

The Loss and Damage Component of the INDC

These priority actions include:

1. Adopt the current Disaster risks reduction Policy into a comprehensive Climate Policy;
2. Establish the enabling legislative framework to implement the DMD policy and action plan:
3. Establish and/or strengthen the high-level National DMD Council (NCCC), in the Office of the Vice President; and

4. Establish a National DMD agency as the primary national government agency for climate change response.

Jointly implemented, these actions constitute a comprehensive package that facilitates preparedness and response to disasters and effective INDC implementation.

RESOURCE MOBILIZATION STRATEGY FOR INDC

Means of implementation

The realisation of the bold ambitions and actions identified in the Sierra Leone INDC will require substantial financial resources, investment, technology development and transfer, and capacity-building to fully realize her intended contribution.

To succeed in this ambitious intention, Sierra Leone will need to access both public and private sources and from both within Sierra Leone and overseas. The cumulative expenditure commitment estimates in the INDC is about **900 Million US Dollars**. Further analysis will be necessary to refine the required investment cost and determine the domestic support.

Barriers to Raising the necessary capital

Raising the necessary capital is currently impeded by a number of barriers some of which include policy and regulatory weaknesses, difficulties in accessing commercial finance and technical capacity. For sustainability, it is recommended to create a stand-alone dedicated Sierra Leone Climate Fund (SLCF) and the resources should be mobilized both domestically and internationally. For this reason, the SLCF should be designed to have three (3) windows: (1) Domestic Climate Finance; (2) International (Bilateral and Multilateral) Climate Finance; and (3) Private and Market Climate Finance.

International cooperation is an important and necessary prerequisite for leveraging of inputs for the implementation of the INDC. Capacity building needs for the implementation of the INDC of Sierra Leone have been identified as (a) for gathering, processing, and providing and communicating meteorological and socio-economic data and information; (b) improving National GHG Inventories and Assessments of GHG Mitigation and Climate Change Adaptation Technologies; and improving climate Vulnerability (impacts and adaptation) Assessment

MONITORING, REPORTING AND VERIFICATION OF THE IMPLEMENTATION OF INDC

Finally, the monitoring, reporting and verification of the implementation of the INDC of Sierra Leone have been articulated with the objective of tracking the transition of Sierra Leone to a low carbon and climate resilient economy. It will be necessary to develop and apply an integrated framework for measuring, monitoring, evaluating, verifying and reporting results of response (mitigation and adaptation) actions and the synergies between them. Effective implementation of the INDC is highly dependent on the internal “feedback” generated through monitoring, reporting and verification (MRV) processes.

In this INDC Sierra Leone will choose to consider what emissions reductions can be achieved with available resources and those to be undertaken if additional resources were available.

SINGAPORE'S INTENDED NATIONALLY DETERMINED CONTRIBUTION (INDC) AND ACCOMPANYING INFORMATION

In accordance with Decisions 1/CP.19 and 1/CP.20, Singapore communicates that it intends to reduce its Emissions Intensity by 36% from 2005 levels by 2030, and stabilise its emissions with the aim of peaking around 2030.

<table>
<tr><th colspan="2">Quantifiable information on the reference point (including as appropriate, a base year)</th></tr>
<tr><td colspan="2">Emissions Intensity in 2005: Singapore's greenhouse gas (GHG) emissions per S$GDP (at 2010 prices) in 2005 is 0.176 kgCO_2e/S$.
Projected Emissions Intensity in 2030: Singapore's GHG emissions per S$GDP (at 2010 prices) in 2030 is projected to be 0.113 kgCO_2e/S$.</td></tr>
<tr><td colspan="2">Time frames and/or periods for implementation: Beginning 2021 to end 2030</td></tr>
<tr><td rowspan="3">Scope and coverage</td><td>Sectors covered: Energy, Industrial Processes and Product Use, Agriculture, Land Use, Land-Use Change and Forestry, Waste.</td></tr>
<tr><td>Greenhouse gases covered: Carbon Dioxide (CO_2), Methane (CH_4), Nitrous Oxide (N_2O), Hydrofluorocarbons (HFCs), Perfluorocarbons (PFCs), Sulphur Hexafluoride (SF_6).</td></tr>
<tr><td>Percentage of national emissions covered: 100%</td></tr>
<tr><td>Planning processes</td><td>Singapore's Inter-Ministerial Committee on Climate Change (IMCCC) drives the whole-of-government effort to develop Singapore's climate change mitigation measures. These take into account Singapore's national circumstances and challenges. Studies and technology roadmaps developed in collaboration with industry stakeholders, academic experts and technical consultants, served as additional inputs on the potential of future technologies for long-term mitigation in Singapore. Public consultations were also carried out to obtain feedback on possible measures to reduce carbon emissions, and to promote green growth.
Singapore's broad strategies are reflected, inter alia, in the National Climate Change Strategy 2012 and the Sustainable Singapore Blueprint 2015. Legislation and regulations are also regularly reviewed to respond to new developments.</td></tr>
<tr><th colspan="2">Assumptions and methodological approaches including those for estimating and accounting for anthropogenic greenhouse gas emissions and, as appropriate, removals</th></tr>
<tr><td colspan="2">Inventory methodology: Singapore's emissions for carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O) were derived using the Revised 1996 Intergovernmental Panel on Climate Change (IPCC) Guidelines for National Greenhouse Gas Inventories and based on the Sectoral approach. The Tier 1 methodology was used for most emission calculations.
The emissions of hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF_6) from industrial processes were derived using the Tier 2 methodology from the 2006 IPCC Guidelines.</td></tr>
<tr><td colspan="2">Metric Applied: Global Warming Potential on a 100 year timescale in accordance with the IPCC's 2nd Assessment Report.</td></tr>
<tr><td colspan="2">GDP (2005) at 2010 prices: S$232.77 billion (Source: Department of Statistics, Singapore)</td></tr>
<tr><td colspan="2">GHG emissions (2005): 40.9MTCO_2e
(Source: Singapore's 3rd National Communications and 1st Biennial Update Report, 2014)</td></tr>
<tr><td colspan="2">International market mechanisms: Singapore intends to achieve the mitigation objectives under its INDC through domestic efforts, but will continue to study the potential of international market mechanisms.</td></tr>
</table>

Accounting for emissions and removals from the land sector: Singapore has begun a long-term programme to monitor and report carbon storage and carbon fluxes related to land use change and forestry. As there are no commercial forestry or plantations in Singapore, emissions or carbon storage from land use change and forestry are expected to be small.

Consideration of fairness and ambition, in light of national circumstances and how it contributes to the ultimate objective of the Convention (Article 2)

Singapore's National Circumstances and Challenges. Singapore currently accounts for around 0.11% of global emissions. Its mitigation contributions must be viewed within the context of its national circumstances, limited access to renewable energy, and early actions. As a low-lying island state of 716 km² with no natural resources, Singapore has to accommodate not only housing and commercial centres, but also power plants, reservoirs, air/seaports and industries within city boundaries. Singapore has one of the highest population densities in the world (7,540 persons per km^2).

Singapore's urban density and limited land area, relatively flat land, low wind speeds and lack of geothermal resources present serious difficulties in pursuing alternative energy options such as nuclear, hydro-electric, wind or geothermal power. Harnessing solar energy in a significant way is a challenge due to competing uses for limited land. These serious difficulties which severely limit the use of alternative energy sources mean that Singapore is dependent on fossil fuels. Such circumstances are recognised in Article 4.10 of the UNFCCC.

Singapore's Efforts. While Singapore is heavily dependent on fossil fuels, given its severe limitations on using alternative energy, Singapore had made early policy choices to reduce its GHG footprint by switching from fuel oil to natural gas, the cleanest form of fossil fuel, for electricity generation, even though it meant higher cost. Today, over 90% of electricity is generated from natural gas. Singapore prices energy at market cost, without any subsidy, to reflect resource scarcity and promote judicious usage. On top of this, and despite the challenges, the government is significantly increasing the deployment of solar photovoltaic (PV) systems.

Singapore had in 2009 pledged unconditionally to reduce emissions to 7% to 11% below its business-as-usual (BAU) level by 2020. Contingent on the conclusion of a universal legally binding agreement in 2015, Singapore will further reduce emissions to BAU-16% by 2020. As a result of continued mitigation efforts, Singapore's emissions are expected to grow at a lower rate compared to GDP growth for 2005-2020. For the 2021-2030 period, Singapore intends to build on its previous mitigation efforts to stabilise its emissions with the aim of peaking around 2030. In 2012, Singapore's Emissions Intensity (EI) ranked favourably at 113 out of 140 countries[1] despite Singapore's limitations in using alternative energy. Singapore's EI is projected to decline further by around 2.5% annually from 2021-2030, compared to the already planned reduction of around 1.5% annually from 2005-2020.[2]

Alongside efforts to reduce emissions and achieve sustainable development, Singapore is also implementing measures to address sea-level rise and above-average warming temperatures.

(See Annex for details)

ANNEX

ACCOMPANYING INFORMATION ON SINGAPORE'S NATIONAL CIRCUMSTANCES AND ADAPTATION EFFORTS

SINGAPORE'S NATIONAL CIRCUMSTANCES

1) Singapore is Alternative Energy-Disadvantaged

Singapore is a small island city-state with relatively flat land, low wind speeds and lack of geothermal resources. These limit access to alternative energy options such as hydro-electric, wind or geothermal power. Given Singapore's small land area and high population density, the risks of nuclear energy currently outweigh the potential benefits.

Although Singapore is located in the tropics, there are challenges to harnessing solar energy in a significant way, given its small size and dense urban landscape. Despite the limited surface area for deploying solar PV, the Government of Singapore is pressing ahead to promote solar PV deployment through the provision of an enabling environment which: (a) facilitates system integration of intermittent sources to ensure grid stability and security; (b) addresses non-market barriers to entry without subsidising the consumption of any form of energy; and (c) supports continued investment in research, development, and demonstration (RD&D) to reduce the cost of solar PV modules and improve their efficiency. By 2030, it is estimated that renewable energy could potentially contribute up to 8% of Singapore's peak electricity demand.

2) Singapore is Carbon Efficient

Singapore is an advanced manufacturing hub, and more than 60% of its manufacturing output is exported to meet the needs of the region and the world.[3] Energy efficiency is a key strategy for carbon emissions reduction and Singapore aims to produce goods in an energy- and carbon-efficient manner. As energy costs are not subsidised in Singapore, companies use energy judiciously and embrace new energy efficient technologies. Strong pollution control laws also encourage industries to switch to cleaner fuel sources such as natural gas. The Government facilitates the adoption of energy efficient technologies through grants and other policy tools to overcome high upfront capital investments and other non-market barriers. As a result, Singapore contributes to 2.2% of global trade, but only accounts for around 0.11% of global emissions.

3) Singapore's INDC is a Stretch Goal

Singapore's aim to reduce its Emissions Intensity by 36% from 2005 levels, and to stabilise its emissions with the aim of peaking around 2030 is a stretch goal. As one of the most globalised economies and a trading nation with no indigenous resources, Singapore is heavily dependent on the global supply chain for its food and energy security. Its economic activity and emissions are also highly sensitive to the volatility of regional and global developments. Even so, Singapore's early actions to reduce emissions, despite its lack of alternative energy options, have allowed it to achieve one of the lowest emissions

intensities globally while still maintaining economic growth. Singapore ranks favourably at 113th out of 140 countries. Singapore's mitigation efforts include a green growth strategy, promoting low carbon trajectories, and pursuing new energy efficiency measures over and above those already extensively deployed. Singapore will continue to invest significantly in research and development to explore new innovations in low carbon technologies. These efforts entail economic and social opportunity costs[4], but nevertheless will be funded domestically.

4) Singapore Collaborates Internationally

Singapore recognises its responsibility to contribute to international collaborations to address climate change. Singapore hosts regular international forums such as the World Cities Summit, Singapore International Water Week, Singapore International Energy Week, and the Singapore Green Building Week/International Green Building Conference, for the sharing of experiences in city planning, climate change adaptation, transport, as well as waste and water management. Singapore also actively shares its developmental experiences as an island city-state in the C40 Cities Climate Leadership group (C40)[5]. Partnering the United Nations Environmental Programme (UNEP), the Building and Construction Authority (BCA) of Singapore established the Centre for Sustainable Buildings – a first in Asia – to support regional efforts to develop green building policies and actions.

Singapore also works closely with many partners including the UNFCCC Secretariat, ASEAN member states, the United Nations Development Programme (UNDP), the World Meteorological Organisation, the US Government, the UK Government, UK Carbon Trust, the Australian Department of Foreign Affairs and Trade and Germany's Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH to provide platforms to share experiences, best practices and technical knowledge on climate change and green growth issues. Singapore has also broadened and deepened its own technical cooperation programmes to share experiences with other developing countries. To date, Singapore has conducted programmes for over 10,700 officials from other countries in climate change and sustainable development issues alone.

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SINGAPORE'S ADAPTATION EFFORTS

1) Adaptation Challenges

As a small country without natural resources, Singapore has developed as an open economy that imports the bulk of its food supply, making it sensitive to disruptions to global supply chains. Domestically, Singapore has experienced changes in rainfall patterns and temperature. The annual maximum rainfall intensity in an hour increased from 80 mm in 1980 to 107 mm in 2012. National projections also reflect an upward trend in seasonal mean rainfall during the wet season, and greater dryness during months that are already drier. For temperature, the rate of warming over Singapore from 1951 to 2012 was 0.26°C per decade, more than double the global rate over the same period (0.12°C). Similar to other members of the Alliance of Small Island States (AOSIS), as a low-lying country, Singapore is exposed to rising sea levels (the mean rate of global averaged sea level rise was 1.7 mm per year between 1901 and 2010; the global mean sea level is projected to continue to rise during the 21st century[6]). Singapore's location within Southeast Asia, where there is a lack of observational climate data, is also a challenge to local climate modelling work in projecting climate change impacts. These characteristics make adaptation planning in Singapore both complex and challenging.

2) Singapore's Longstanding and Future Actions to Increase Resilience

Recognising that adaptation solutions cannot be implemented overnight, Singapore started early to integrate long-term adaptation planning into national policies. Listed below are some key adaptation measures Singapore is undertaking:

a. **Food Security:** As a country that imports over 90% of its food supply, Singapore is exposed to a variety of risks. Climate change could potentially result in fluctuations in food supply and prices. Singapore's main strategy is to diversify sources for food supply resilience. This is supplemented by limited local production of key food items and rice stockpiling. The Singapore Government encourages food security research and development, and incentivises the adoption of technology to increase productivity and resilience of local farms.

b. **Infrastructure resilience:** Singapore's Building Control Act requires buildings to undergo periodic structural inspections to ensure structural resiliency. All road and rail structures also undergo regular inspections by registered professional engineers. To protect critical transport infrastructure from flood risks, flood barriers have been installed at subway stations that may be affected, with ongoing work to do so for the remaining ones. For energy and telecommunication services, private operators are required to meet performance standards and ensure network resilience, including through monitoring and maintenance. The Singapore Government constantly reviews and revises design codes, regulations and policies to account for new information and the latest climate projections.

c. **Public Health:** Climate change could contribute to increased risks of transmission of dengue and other vector-borne diseases in Singapore. Singapore has an integrated

regime of environmental management and intensive source reduction to suppress the mosquito vector population. A surveillance programme – anchored in human case, virus, mosquito and weather monitoring – has been established for the early warning of increased risks. Contingency plans are also in place to deal with the anticipated impacts of climate change (including during haze episodes and heat waves), which result in short-term surges in healthcare demand.

d. **Addressing flood risks:** Over 30 years, substantial investments in drainage infrastructure have been made to reduce flood-prone areas from around 3,200 hectares to 34 hectares by end-2014. For example, the S$226-million Marina Barrage project was a part of a comprehensive flood alleviation scheme, which also created Singapore's 15th reservoir in the heart of the city. Drainage improvement works are continuous, with 190 enhancements completed in the last cycle and another 154 locations being upgraded under present plans. With more intense rainfall, a holistic "source-pathway-receptor" approach was adopted. This covers the entire drainage system, addressing not just the pathway through which storm water travels (i.e. "pathway" solutions like widening and deepening drains and canals), but also where run-off is generated (i.e. "source" solutions such as on-site detention) and the areas where floods may occur (i.e. "receptor" solutions like platform levels and flood barriers). Commercial, industrial, institutional and residential developments and redevelopments greater than or equal to 0.2 hectares are required to implement on-site storm water detention measures to reduce the peak discharge into the public drainage system.

e. **Enhancing water security:** Singapore has developed a robust, diversified water supply system through "The Four National Taps": namely, local catchment water, imported water, NEWater[7] and desalinated water. Since 2011, with the completion of three reservoirs in urbanised areas, the total water catchment area has been increased from half to two-thirds of Singapore's land surface. Not being dependent on rainfall, NEWater and desalinated water can be used to supplement water from local reservoirs in extended dry spells. Singapore plans to expand NEWater and desalination capacity to meet up to 80% of its water demand in 2060. Variable salinity[8] technology can be used to help expand Singapore's water catchment to up to 90% of its land area by tapping on the streams and rivulets near the shoreline.

f. **Protecting the coastline:** 70–80% of Singapore's coastline is protected against coastal erosion by hard structures such as sea walls and stone embankments. The rest are soft coasts, such as sandy beaches and mangrove swamps. Since 1991, all new coastal lands have been reclaimed to 1.25 metres above the highest recorded tide level. In 2011, minimum reclamation levels were raised by an additional 1 metre to be more resilient to long-term sea level rise. A range of technologies are also being deployed to enhance coastal infrastructure at specific locations for the long term, while continued efforts are made to protect Singapore's critical logistics supply infrastructure (located in coastal regions) against the risk of increased flooding.

g. **Safeguarding biodiversity:** Enriching Singapore's urban biodiversity and extensive greenery is part of the national vision for a "City in a Garden". Extensive roadside tree

planting contributes to moderating temperatures in the heart of the city. Over 300 parks and a network of park connectors provide relief from the hot urban tropical climate. Large freshwater bodies surrounded by forested catchments help to ameliorate the urban island heat effect and conserve our rich natural heritage of flora and fauna. Singapore will continue efforts to safeguard its biodiversity despite an urban environment. The array of natural ecosystems (including evergreen rain forest, mangroves, freshwater streams, freshwater swamp forest, coral reefs and mudflats) will continue to be conserved, with targeted programs for habitat enhancement and species recovery where required. Singapore recognises the need to track its rich urban biodiversity in a manner which can integrate conservation and adaptation actions. Working with the Secretariat of the Convention on Biodiversity in 2009, Singapore developed the Singapore Index on Cities' Biodiversity to give international focus to biodiversity tracking in urban environments. In 2015, the SGBioAtlas smartphone application was launched to engage and allow members of the public to easily report sightings of biodiversity (e.g. birds, butterflies) in their daily lives. The data collected will help Singapore monitor its biodiversity and develop biodiversity management plans.

h. **Regional Climate Modelling:** Singapore has developed essential climate science capabilities within the Meteorological Service Singapore (MSS), through the establishment of the Centre for Climate Research Singapore (CCRS). CCRS focuses on tropical climate and weather research, including work to improve prediction of convective thunderstorms (responsible for some extremes of weather in the tropics), understand the behaviour of the monsoons in Southeast Asia, and to better describe the drivers behind other complex climate system processes.

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[1] Source: IEA Key World Energy Statistics, 2014. Comparisons based on available carbon emissions per US$GDP data.

[2] To achieve the 2030 Emissions Intensity level, Singapore's emissions are expected to stabilise at around 65 $MTCO_2e$ based on current projected growth.

[3] Singapore's total trade (in goods and services) is 350% of its GDP.

[4] For example, more than 90% of Singapore's electricity today is generated by natural gas, even though there are far cheaper options such as coal. If Singapore had used coal instead of natural gas for power generation, energy costs could have been potentially reduced by over S$2 billion a year.

[5] Singapore is an observer city in the C40.

[6] Source: Fifth Assessment Report of the Intergovernmental Panel on Climate Change

[7] NEWater is high-grade reclaimed water produced from treated used water that is further purified using advanced membrane technologies (microfiltration, reverse osmosis and ultraviolet disinfection), making the water ultra-clean and safe to drink. NEWater exceeds the Environmental Public Health (EPH) and United States Environmental Protection Agency (USEPA) drinking water standards as well as the drinking water guidelines established by World Health Organisation (WHO).

[8] Through careful design of the Variable Salinity Plant, the same set of membranes and equipment can be used to treat water of varying salinity. The plant is thus able to process water from different sources of varying salinity (e.g. stream or sea water) without stopping production.

Solomon Islands Government

INTENDED NATIONALLY DETERMINED CONTRIBUTION

Contents

INTRODUCTION

Solomon Islands comprises a scattered archipelago of 994 islands combining mountainous islands as well as low lying coral atolls within a tuna-rich and potentially mineral-rich maritime Economic Exclusive Zone (EEZ) of 1.34 million square kilometres. The land area of 28,000 square kilometres with 4,023 kilometres of coastline is the second largest in the Pacific after Papua New Guinea. The highest point in the country, Mt Makarakomburu is 2,447m above sea level and is the highest peak in the insular Pacific. There are six main islands, Choiseul, New Georgia, Santa Isabel, Malaita, Guadalcanal and Makira, which are characterized by a rugged and mountainous landscape of volcanic origin. Between and beyond the bigger islands are hundreds of smaller volcanic islands and low lying coral atolls. All of the mountainous islands of volcanic origin are forested with many coastal areas surrounded by fringing reefs and lagoons.

Figure 1: Map of Solomon Islands

The islands are grouped into three different major “geological provinces“; the Pacific Geological Province (including Malaita, Ulawa and North Eastern part of Santa Isabel island); Central Geological Province (Makira, Guadalcanal and the Florida Islands, South-Western part of Isabel and Choiseul) and; the Volcanic Geological Province (New Georgia, Russell Islands, Shortland Islands and North Western tip of Guadalcanal and Savo). Guadalcanal is the largest island and the only one with a significant area of grassland and rich alluvium soils. Most of the islands have highly weathered soils of low fertility with pockets of fertile areas mainly on volcanic islands and river valleys.

The country is situated within the earthquake belt or “Ring of Fire“ which makes it extremely vulnerable to the effects and impacts of earthquakes. A major earthquake measuring 8.1 on the Richter scale occurred in the Western Province in 2007 causing a major tsunami that affected the Western and Choiseul provinces and causing 52 deaths and scores missing. About 40,000 people were affected. Many islands have subsided whilst a few have been uplifted a few metres. Extensive damage was experienced throughout the two provinces costing hundreds of millions of dollars. The country and many communities and individuals

are still recovering from this double disaster event.

Climate

Solomon Islands climate is tropical, though temperatures are rarely extreme due to cooling winds blowing off the surrounding seas. Temperature is the least varied of climate parameters with daytime temperatures fluctuating between 25°C to 32°C. The rainy season occurs between November to April and the dry season from June to October during the year. Most islands have a mean annual rainfall of 3,000 to 5,500 mm with two-peak rainfalls during the year. The highest rainfall recorded in Solomon Islands is an annual average of 8,304 mm at 430 m above sea level at Koloula on Guadalcanal (Hansell and Wall 1970). Daily rainfall of over 250 mm is normal. High rainfall intensity events occur during tropical storms and often result in flooding of most river systems. The highest recorded rainfall of 281mm over a 12 hour period was recorded in 2009 resulting in destructive flooding and loss of lives. More recently the highest recorded daily rainfall of 318mm was recorded in April 2014 causing widespread flooding and damage to property, infrastructure and loss of 23 lives along the Mataniko River, Central Honiara. Rainfall trends vary across the country and are influenced by geographic differences.

Demographic characteristics

Solomon Islands has 28,400 square kilometers of land, with a population of 598,860 (September 2015 estimate). Solomon Islands has a population density of 21 people per square kilometre. The capital and largest city is Honiara, with a population estimated at 67,000. There are no other cities with a population of more than 10,000 in the country.

Most people in Solomon Islands are ethnically Melanesian (94.5%). Other large ethnic groups include Polynesian (3%) and Micronesian (1.2%), with a few thousand ethnic Chinese in the country. There are 70 living languages in Solomon Islands with Melanesian languages spoken mostly on the main islands. While English is the official language, just 1-2% of the population speaks English.

Ninety two percent of the population is Christian, with major denominations including the Anglican Church of Melanesia (35%), Roman Catholic (19%), South Seas Evangelical Church (17%), United Church in Papua New Guinea and the Solomon Islands (11%), and Seventh-day Adventist (10%). The rest of the population adheres to Islam, Jehovah's Witnesses, the Church of Jesus Christ of Latter-day Saints (Mormons), the Baha'i faith, and “Kastom”.

Around 80% of the national population live on low lying coastal areas. The capital city of Honiara is the only major area of economic activity and attracts increasing numbers of youth and adults per year from other islands seeking employment and income. Urban migration is estimated at 4% and with the current rate of growth the national population is expected to double by 2020.

The Solomon Island’s Human Development Index (HDI) was 0.510 in 2011, and is one of the lowest in the Pacific, and it ranked 142 out of 187 countries (UNDP, 2011). On the achievement of Millennium Development Goals (MDGs) a range of social indicators show that the country is likely to meet Goal 2 (Achieve universal primary education) and Goal 5 (Improve maternal health). Females still have less access than males to secondary and tertiary education while women have poor access to health and family planning services in the rural areas. According to the ADB (2010) much of the improvement in the HDI was the result of significant overseas financial and technical assistance, with aid levels increasing from 22% of GDP in 1990 to 66% of GDP in 2005. An analysis of household income and expenditure data collected in 2005/06 shows that situations of hardship and poverty is rising with 11% of the population experiencing difficulties in acquiring basic needs.

Economy

The bulk of the population depends on agriculture, fishing, and forestry for at least part of its livelihood. Most manufactured goods and petroleum products must be imported. The islands are rich in undeveloped mineral resources such as lead, zinc, nickel, and gold. Prior to the arrival of The Regional Assistance Mission to the Solomon Islands (RAMSI), severe ethnic violence, the closing of key businesses, and an empty government treasury culminated in economic collapse. RAMSI's efforts to restore law and order and economic stability have led to modest growth as the economy rebuilds.

In its 2014 annual report, the Central Bank of Solomon Islands (CBSI) reported that the Solomon Islands economy showed a lot of resilience in 2014 to recover from the negative fallouts from the April 2014 floods and the closure of Gold Ridge mine in the second quarter. Therefore growth for 2014 was revised upward from 0.9% to 2.0% but was down against pre-flood projection of 3.7% as a result of improvements in key non mineral sectors combined with the swift expenditure adjustments both from the national government and its development partners. Favourable external developments in particular rising prices for major export commodities and falling energy prices later in the second half of the year also supported the economic recovery.

Domestic economic activities performed much better than previously anticipated in April 2014. Preliminary estimates from the CBSI pointed to an overall growth of 2.0% for 2014, 1.1 percentage points higher than the 0.9% that CBSI projected in April 2014. All sectors except for mineral, manufacturing and utilities sectors recorded positive growths during the year. Surprisingly, logging activities jumped up significantly to a new unprecedented level during the year. This to a great extent temporarily cushioned the contraction in the mineral sector and boosted overall growth for the year supported by positive developments in agriculture, fisheries, communication, construction, and finance sectors.

Leading indicators in the labour market showed modest growth in employment even though some industries found the year challenging. The mineral sector was the hardest hit with about 720 workers driven out of jobs after the closure of Gold Ridge Mining Limited in the second quarter. Industry consultations the Central Bank conducted earlier this year revealed most companies in the non-mineral sectors either retained their staff or employed a few more people despite the economic shocks in the second quarter. This is consistent with trends in the number of superannuation contributors that rose by 12% over the year to 53,796 people even considering the redundancy exercise in the mineral sector.

Production of key export commodities in the economy weakened further in 2014 owing in large part to the closure of the only gold mine in the country. As measured by the CBSI production index, the commodity sector fell by 4% against the previous year. The overall decline was driven by gold which plunged by 15.3% to outweigh the combined gains in the non-mineral index (see Figure 1b). The fall would have been more drastic if logging activities remained low at the same level as in the first half of 2014. Log production increased dramatically to 2,128,000 cubic meters from 1,897,000 cubic meters in 2013, a jump of 5.3 points over the year to 51.3 in the log index. Re-entry into previously logged areas, clear felling activities, and issuance of additional logging licenses contributed to the sharp escalation in the exported log volumes.

The Government suffered a major setback in 2014 following the devastation caused by the April floods and the closure of the Gold Ridge mine. Fortunately, development partners were quick to respond and the government with available fiscal space have cushioned the revenue shortfall and accommodated high unplanned expenditure pressures. These quickly restored affected infrastructures and minimised economic downtime. The Government

recorded a fiscal surplus of $129 million during the year from revenue collections of $3.1 billion and $3.0 billion in expenditures. The surplus was attributed to unexpected increases in revenue particularly from fishing licenses, increased budget support, and expenditure savings most notably in the capital budget.

Despite the cessation of gold production in the Solomon Islands, total exports rose by 5.3% in the first half of 2015 over the same period in 2014, largely reflecting higher exports of bauxite and agricultural commodities.

After parliamentary elections in November 2014, passage of the 2015 budget was delayed to April to give the new coalition government time to incorporate its spending priorities. The resulting 2015 budget provides for total expenditures that is 11.8% higher than the revised 2014 budget, mostly because of higher expenditure on flood recovery. Total revenues and grants are also projected to rise, but by only 3.3%. Fishing license revenue is seen to increase but not enough to offset revenue declines from suspended operations at the gold mine. The government expects to incur a deficit, equivalent to 4.9% of Gross Domestic Product (GDP), for a second consecutive year and plans to draw down cash reserves to finance the deficit.

Consumer prices have been declining in 2015 following large flood-related price rises last year. Softening international food and fuel prices have contributed. Between January and July 2015, consumer prices were 2.4% lower than in the same period in 2014 driven by reductions in prices for food, drinks and tobacco, and housing and utilities declined. However, core inflation remains positive suggesting that headline inflation will rise in the latter part of the year.

The forecast for 2016 remains unchanged as growth is expected to benefit from planned fiscal expansion.

The domestic economy is expected to be more buoyant in 2015 than the previous year. The interplay between key domestic sectors and global price trends is anticipated to support further recovery. Economic growth is anticipated to increase in 2015 to 3.3% from 2.0% in 2014. In the primary sector, the key drivers are fisheries and agriculture while logging is expected to subside after the significant jump in 2014. The mineral sector, in spite of positive contributions from bauxite exports, would still see a decline in 2015 with the absence of gold. External conditions are expected to improve slightly over the previous year despite expectations that the structural current account imbalance would remain in 2015. Budget support and donor capital inflows are expected to outstrip the current account deficit and boost gross foreign reserves. The export sector however could worsen on the back of anticipated declines from gold and log export receipts while imports are expected to rise modestly. Persistent falling oil prices gives temporary reprieve for the economy in terms of lower fuel import bills at least for 2015.

MITIGATION

INFORMATION ON INTENDED NATIONALLY DETERMINED CONTRIBUTION		
PARTY: Solomon Islands		**DATE: September 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		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. Solomon Islands is a LDC SIDS, that will nonetheless commit to reduce emissions by: **12% below 2015 level by 2025** and **30% below 2015 level by 2030** compared to a BaU projection. On the understanding that a global agreement addresses international assistance to access financial and technical resources, Solomon Islands can with international assistance, contribute a further: **27%** reduction in GHG emissions by 2025; and **45%** reduction in GHG emissions by 2030, compared to a BaU projection. **With appropriate international assistance, Solomon Islands can reduce its emissions by more than 50% by 2050.**
Reference year or period		2015. The BaU projection is based on an extrapolation of historic data covering the period 1994-2010.
Estimated, quantified emissions impact		In addition to the carbon storage in the forest and ocean ecosystem, Solomon Islands unconditional contribution will reduce 8,300 tCO_2e annually Solomon Islands' conditional contribution (with international assistance) will reduce emissions by 18,800 tCO_2e annually by 2025, and by 31,125 tCO_2e annually by 2030
Coverage	% of National emissions	INDC covers fossil fuels and forest sequestration. Fossil-fuel use covers more than 95% of the reported national inventory
	Sectors	Energy sector: Power (39%) Transport (61%) Renewable and EE Land use, Land Use Change and Forestry
	Gases	Carbon dioxide only (estimated > 95% of inventory)

INFORMATION ON INTENDED NATIONALLY DETERMINED CONTRIBUTION		
PARTY: Solomon Islands		**DATE: September 2015**
Parameter		**Information**
	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 1994-2010, with line of best fit extrapolation to 2030. The projection will be revised to include more accurate information with the Third National Communication and Biennial Update Report.
Intention to use market based mechanisms to meet commitments		Solomon Islands will consider other avenues as well as market based mechanisms to support establishment and operation of a National Climate Change Trust Fund
Land sector accounting approach		Appropriate methodologies drawn from international best practice to quantify sequestration from above 400m contour and forest plantations.
Estimated macro-economic impact and marginal cost of abatement		NE
Narrative supporting the fair-share assessment of the contribution		Solomon Islands is a double chain archipelago of small islands with more than 900 volcanic and coral islands and atolls with a 600,000 inhabitants, small land mass, limited technological, technical, financial and human resources and a small economy. Solomon Islands is a LDC SIDS that is in no way responsible for the unfolding climate change catastrophe, yet it is highly vulnerable to adverse impacts of climate change. Current (2015) greenhouse gas emissions from Solomon Islands are approximately 20 $MtCO_2e$/year. This is extremely small: representing approximately just 0.01 % of global emissions. Solomon Islands has very low per capita emissions, at just: 1.2 tCO_2 per person in 2015 based on projected emissions for 2015. This is fourteen times less than the average per capita emissions of Australia (16.5tCO_2/capita), and less than the estimated level required to stay below 1.5 ^oC (as compared to 2^oC) of warming, of around 1.5tCO_2e/capita[1]. Thus, any contribution from Solomon Islands is more than fair, and must be considered ambitious, given Solomon Islands national circumstances. With high vulnerability to climate change impacts Solomon Islands has placed equal importance on mitigation of and adaptation to climate change and recognises the need for developing low carbon economy to achieve its sustainable development objectives.

[1] Using 2011 ddata from World Bank, http://databank.worldbank.org/data/home.aspx.

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;

Actions

Solomon Islands has considered mitigation actions that were currently planned and funded (as the Solomon Islands Contribution), and those that have been identified as technically viable with current technology suitable to the Solomon Islands context (as the Contribution conditional on adequate and timely international assistance), are included in the Table below.

Sector	Mitigation option	INDC type	Mitigation in 2025 (tCO_2e)	% of 2025 projected inventory	Mitigation in 2030 (tCO_2e)	% of 2030 projected inventory
Energy	Fiu Hydropower	RE	12,220.2	14.7%	24,440.40	11.52%
	Solar Farm	RE	2,036.7	2.5 %	4,073.40	1.92%
	Tina Hydropower	RE	91,244.2	109.9%	319,354.56	150.48%
	Solar Homes	RE	1697.3	2.0%	3,394.60	1.60%
	Mini Hydropower	RE	1303.5	1.5%	4,562.25	2.15%
	Energy Usage	EE	1629.4	2.0%	3258.8	1.54%

Keys: **RE** - Renewable Energy
EE – Energy Efficiency

The conditional Mitigation Actions will 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 USD).

	Renewable	Capacity	Mitigation potentials in tCO_2e [Annually]	Cost Estimate USD	Status
	Hydropower				
1	Luembalele River	190KW	1,065.22	750,000.00	Feasibility Studies completed
2	Huro River	120KW	672.77	550,000.00	Feasibility Studies completed
3	Mase River	1.750 MW	9,811.20	4,000,000.00	Feasibility Studies completed Needs reviewing
4	Sorave River	200 kW	1,121.28	600,000.00	Prefeasibility Studies completed
5	Rori	300 kW	1,681.92	750,000.00	Feasibility Studies completed
6	Vila River	1.210 MW	6,783.74	4,000.000.00	Prefeasibility Studies needed
	Solar				
7	Taro	100 to 200kW	280.32	300,000.00	diesel/solar pv hybrid system
8	Seghe	100 to 200 kW	280.32	300,000.00	diesel/solar pv hybrid system
9	Afio	100 to 200KW	280.32	300,000.00	diesel/solar pv hybrid system
10	Selwyn College	100KW	140.16	150,000.00	diesel/solar pv hybrid system
11	Kakabona Solar Farm	1 MW	1,401.60	4,000,000.00	solar PV grid-connected plant
12	Solar Farm Honiara	1.5 MW	2,102.40	5,000,000.00	solar PV/grid connected system
13	Savo Geothermal	20 – 40 MW	224,256.00	150,000,000.00	Preliminary assessment done

ADAPTATION

Solomon Islands 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 Solomon Islands as a small island developing States (SIDS) and Least Developed Country (LDC). For Solomon Islands, as with other small islands developing States and Least Developed Countries, where climate change threatens the very existence of the people and the nation, adaptation is not an option – but rather a matter of survival.

Current climate, projected climate change and related assumptions

The interannual climate of Solomon Islands is basically driven by natural drivers such as the Inter-Tropical Convergence Zone (ITCZ), the South Pacific Convergence Zone (SPCZ), the West Monsoon and the El Nino Southern Oscillation (ENSO). The wet season is generally driven by the ITCZ and the West Monsoon resulting in strong north-westerly winds and seas affecting mostly the northern part of the country. Associated heavy and long rainfall periods usually influence agriculture activities in the northern parts of the country during this time. The SPCZ typically drives the weather and the climate of the southern part of Solomon Islands during the dry season where strong southeast trades brings onshore heavy rainfall that disturbs agricultural activities as well.

During an El Nino ocean surface waters over the western Pacific (including Solomon Islands) are usually cooler than normal and warmer than normal from central to eastern of the Pacific. Hence, in most cases, prolonged dry periods could escalate from meteorological drought to agricultural drought in the western Pacific. Solomon Islands experiences drought conditions during El Nino events such as that occurring in 1997 causing water shortages on many islands. The divergence results in nutrient rich waters rising to the ocean surface in the eastern Pacific causing outbreaks in plankton growth which is followed by tuna stocks.

During a La Nina event the opposite seems to happen, where waters over the western Pacific (including Solomon Islands) are warmer than normal hence causing more cloud formation resulting in prolonged and high rainfall periods. Cyclones and high rainfall events are associated with the La Nina periods in the western Pacific. The future of ENSO events is still not clear but it is expected that it will continue to be an important driver of Pacific Islands climate into the future.

Observed temperature data by the Solomon Islands Meteorological Services show that annual surface temperature for the western, central and eastern regions of Solomon Islands have increased during the last 30 to 50 years. The range of increase in mean air temperature for most provinces is between 0.14^{o}C and 0.17^{o}C/decade.

A study carried out by the Pacific Climate Change Scientific Programme (PCCSP, 2011) under Australian Government showed that for three emission scenarios (low, medium and high) using 18 Global Circulation Models the temperature in the Solomon islands will increase by 0.2^{o}C (low) in 2030 to 3.3 ^{o}C (high) in 2090. The sea surface temperature (SST) is projected to increase in the next 30 -70 years in Solomon Islands.

Rainfall data analysed to date show that annual rainfall in the three regions (western, eastern and western Solomon Islands) is mostly varied due to the geography of the different islands, their relative position with each other, the direction and duration of prevailing winds and drivers of climate in the Pacific. However, it can be clearly seen that there were sharp declines around mid-1990s for all the three regions. These declines correlated with the severe El Nino event between 1997 and 1998 that affected most parts of the country. The general trends however show that in the central region there was a decrease in rainfall and a slight increase for the western and eastern regions in the past 30-50 years. The rainfall trends show that:

- In the area around the capital city of Honiara a general decline per decade is occurring while the population is growing at a rate of approximately 6% per annum. To ensure adequate water supply for the growing population of the city a robust and well enforced Integrated Water Resource Management strategy and programme needs to be put in place. Conservation and effective management of the forests surrounding Honiara is essential and increasing numbers of bore holes will need to be established over the coming years to supplement the Kongulae water source in the longer term. The proportion of annual rainfall from extreme rainfall has increased significantly which could result in longer drought periods in the dry season and more severe flooding.
- In Auki town, Malaita Province, a decline in rainfall for both the dry and wet seasons is being experienced.
- In Taro Island, Choiseul Province, a similar trend as Auki is emerging. The plan to relocate the provincial headquarters and town from Taro Island to the mainland area of Choiseul Bay is also a good adaptation strategy that needs to be complemented with an Integrated Water Resource Management strategy and programme.

Tropical cyclones pose a serious threat to the people, economy and environment and result in flooding and wind damage in the Solomon Islands. There have been severe floods on Guadalcanal, Malaita, Makira and Santa Isabel in recent years with a number of lives lost, and severe damage to agriculture and Infrastructure. In 2002 the remote island of Tikopia was hit by a Category 5 cyclone Zoe.

In the Solomon Islands' region, projections tend to show a decrease in the frequency of tropical cyclones by the late 21st century and an increase in the proportion of the more intense storms. As per Pacific Climate Change Science Program (Australian Government), by the end of this century projections suggest decreasing numbers of tropical cyclones but a possible shift towards more intense categories.

Solomon Islands is highly vulnerable to droughts, extreme rainfall, floods, king tides and sea level rise. Droughts are usually associated with the El Nino phenomenon. The 1997/98 El Nino caused severe drought conditions in many parts of the country and one of the major prolonged droughts occurred in the eastern part of the country in the Temotu province in 2004 causing food and water shortages. Another major problem associated with extremely high rainfall or prolonged rainfall is the big decline in the yields of sweet potato, the main staple crop in rural areas, due to increased vegetative growth and decline in the growth of tuber. Flooding can also occur as a result of a combination of factors, including king tides, areas associated with low atmospheric pressure, and rising sea levels. In 2008 king tides struck northern Choiseul, Ontong Java and other parts of the country. These came in the form of high swells never before experienced in the islands. The tides caused more coastal erosion, considerable damage to coral reefs, coastal inundation, pollution of water sources and damage to coastal infrastructures.

Statement of current and near-term adaptation planning and action

The Climate Change Policy (2012-2017) which is linked to National Development Strategy (2011-2020) provides a policy framework for developing and describing ongoing and planned actions (changes in institutions, modified policies and measures, major projects/programs, planning processes, and financial investments) using international and country resources .

Statement of adaptation gaps, barriers and needs

Institutional challenges relating to high staff turnover rates in senior executive positions, limited sector specific training, and a lack of clarity on internal roles and responsibilities in some sectors hampers national efforts on adaptation. Adaptation knowledge sharing, coordination and collaboration among ministries as well as with non-governmental organisations (NGOs), the private sector, faith-based organisations and development partners is less than adequate in the Solomon Islands. There needs to be a focus on development of knowledge, skill levels to address capacity gaps with regards to climate change adaptation and disaster risk reduction throughout Solomon Islands society, particularly in the outer islands and among marginalised populations.

There is need to translate the climate science and predicted impacts into messages that support action by Solomon Islanders. “Kastom” barriers also hamper awareness and action as with very limited capacity at the community level to undertake local level vulnerability mapping, adaptation planning and the implementation of priority adaptation interventions.

Financing needs for priority adaptation interventions

Some adaptation projects have been grouped into thematic areas linked to the priority sectors established in the National Adaptation Programme of Action (NAPA) as well as some recently identified priorities. The total adaptation cost would be US$126,650,000; NAPA would cost US$17,250,000 covering agriculture and food security, water and sanitation, human settlements and human health, education awareness and information; low-lying and artificially built-up islands; waste management; coastal protection; fisheries and marine resources, infrastructure development and tourism. However the total cost of NAPA will have changed considerably upward and therefore will require further evaluation and costing. Other priorities identified through the national communication process would cost additional US$109,400,000. It is expected that a considerable portion of the necessary financing will be provided in the forms of grants from the Green Climate Fund, 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

It is the intention of the Solomon Islands Government that a community-based vulnerability mapping, adaptation planning and management approach (tied to direct 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 localised adaptation actions which represents a critical contribution to the implementation of adaptation.

The Solomon Islands Government 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 direct access to financing for such measures.

Innovative financing approaches and operations

Based on lessons learned and best practices from Small Island Developing Sates (SIDS), the Government will investigate the viability of, amongst other measures: (i) setting aside the valued added tax charged for fuel; (ii) charging carbon levies; and (iii) charging fees for climate change research undertaken in the country. Such fees and charges will be used to establish and finance a national climate change trust fund for priority climate change measures**.**

The Solomon Islands Government 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 and mitigation measures.

Based upon lessons learned from other SIDS, Solomon Islands 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 and mitigation interventions.

The Solomon Islands Government will strengthen measures to improve donor collaboration on climate change adaptation and mitigation programming, and will establish the mechanisms for improved coordination amongst government agencies in the design and implementation of priority adaptation and mitigation programs and projects as defined under NAPA and the national communications.

The Ministry of Environment, Climate Change, Disaster Management and Meteorology (MECDM), as the coordinator and entry point, for climate change programming engagement with all development partners, will ensure that all projects funded by external sources support the implementation of NAPA, community adaptation programmes and mitigation measures. In the exercise of this function and responsibility, MECDM shall ensure that international climate change programming supports the implementation of NAPA and community-based adaptation programmes and mitigation measures.

MEANS OF IMPLEMENTATION

The effective implementation of the adaptation and mitigation measures in Solomon Islands' INDC is conditional upon and will depend on the accessibility, availability and timely provision of financial resources, technology and capacity building support.

EQUITY

The Solomon Islands is a small 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. Solomon Islands has a right to develop its economy and improve the well-being of its population. Thus Solomon Islands contribution towards limiting the global temperature to below 1.5^0C 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, improving energy security and reduction of GHG emissions. However, the main focus for long term sustainable development still remains the issue of addressing the adverse impacts of climate change and its consequent sea-level rise.

SOMALIA'S INTENDED NATIONALLY DETERMINED CONTRIBUTIONS (INDCs)

State Minister for Environment,

Office of the Prime Minister and Line Ministries and Ministry of Planning

Federal Government of Somalia

November, 2015

Contents

1. Introduction

Somalia has prepared its INDCs in line with UN Framework Convention on Climate Change (UNFCCC) and the decision of the "Lima Call for Action" to formulate its policy, plans and mitigation and adaptation projects intended to achieve the objectives of the INDCs. Such policies and planed projects proposed are based on the status of environment of the country, existing and planned policies for sustainable sector based developments and Somalia's Compact and New Deal, which was adopted in 2013 by the Federal Government of Somalia (Federal Republic of Somalia, 2013).

1.1. Climate, Ecology and the Status of the Environment

Somalia is generally arid and semi-arid with two seasonal rainfall. The rainfall is influenced by the Inter-Tropical Convergence Zone (ITCZ), the north-south movement, which results in two rainy seasons and two dry seasons a year. January to March are the longest dry "Jilaal" season, resulting from ITCZ coming from the dry Arabian Peninsula. This is followed by the "Gu" a major rainy season from April to June. Then the dry "Jilaal" dry season from July to September, which is associated with cool sea breezes from the Indian Ocean that result in light coastal "Hagaaya" rains in July and August. There is also the "Deyr" light rainy season in October and November. Total annual average rainfall is 280 mm and the highest annual rainfall is about in about 500-600 mm in high rainfall years (UNEP, 2005)

Somalia has limited forest of about 10.5 percent of the area of the country, because most of the tropical forest along the Shabelle and Jubba Rivers and the inter-riverine areas, have been cleared for agricultural use (World Bank, 2012). In addition, after the civil war, the production of charcoal for local cooking use and mostly for export to Saudi Arabia and the United Arab Emirate (UAE) solely for tobacco smoking using "Shisha" had a negative deforestation impact. There is also some charcoal export to Yemen and India. Aerial survey reveals drastic clearing of forest throughout the southern Somalia (UNDP and World Bank, 2007). Therefore, the production and export of charcoal resulted in a colossal deforestation that resulted in desertification (Hamza, Buri M., 2012).

The lack of alternative source of energy for domestic cooking and the inefficient process of making charcoal was already contributing to deforestation. However, the greatest damage resulted from the huge export of charcoal to the Gulf Countries. The Acacia species, were originally source of grazing for goats and camels, nitrogen fixation to enhance soil fertility, fencing of livestock in night enclosures and the traditional use of only dead trees for cooking. Such local use was sustainable, but logging of living trees for charcoal export resulted in extreme deforestation and is leading to desertification. In addition, the acacia trees do not grow fast enough to replace the felled trees. Therefore rangeland which consisted of forest trees of mostly Acacia species, shrubs and grassland are denuded and

results in soil erosion. These factors lead to the reduction of land use for agriculture and pastoral livestock production (UNDP and World Bank, 2007).

Most charcoal is today produced in Southern Somalia and illegal exports (about 80 percent of production) constitute a large share of all exports from the South. There has been a rapid expansion in the production of charcoal in recent years, with much of it being exported to meet demand of the above mentioned importing countries. The incentives for charcoal exports are clear: charcoal prices in Southern Somali regions are in the vicinity of US$3–4 per bag, while in the Gulf States the same bags sell for US$10 each (UNDP and World Bank, 2007).

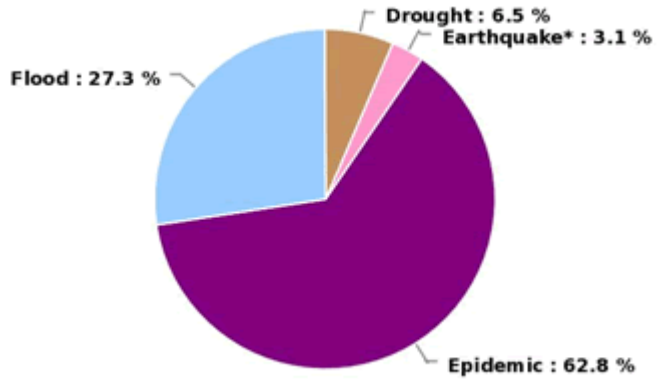
1.2. Disasters in Somalia and the Needed Policies and Actions

Somalia is experiencing a number of recurring disasters as it is reported in a number of disasters data bases such as Emdat as indicated in Table 1 (Abdiweli Sulaiman Abdi, 2013):

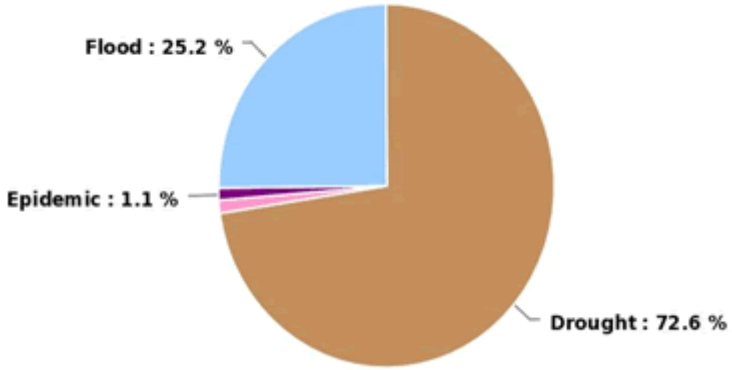
Table 1: Top natural Disasters Report

Disaster	**Date**	**Affected People**
Drought	2008	3,300,000
Drought	2010	1,400,000
Flood	1997	1,230,000
Drought	2000	1,200,000
Drought	1987	500,000
Flood	2006	299,000
Flood	2000	220,000
Drought	2004	200,000
Flood	2006	155,500
Flood	2000	150,000

Percentage of reported people killed by disaster type



Percentage of reported people affected by disaster type



The data presented above is reasonably clear and shows the fact that there is an enormous challenge ahead as to what should be done to mitigate and adapt to those recurring disasters and why are we trapped in this cycle? It is also worth to remember that Somalia's long coastline, the longest coastline of Africa is about 3,333 km long and about 55 per cent of its population lives along this coastline. 0n 26 December 2004, Somalia was hit by the tsunami that killed more than 300 people and destroyed homes, boats and fishing equipment and about 18,000 households were estimated to be directly affected.

The recent tropical cyclones as recent Chapola and Megh Cyclones (November, 2015) that threatened Somalia are amongst the most powerful and destructive meteorological systems on earth that Somalia should be aware of. With the current global warming, Somalia is at risk and has all the six main requirements to suffer from this types of tropical cyclones again and again; and those requirements are: sufficiently warm sea surface temperatures, atmospheric instability, high humidity in the lower to middle levels of the troposphere, enough causes to sustain a low pressure center, a preexisting low level focus or disturbance, and low vertical wind shear.

The combination of the disasters Somalia is prone to and the disasters occurrence predictions from scientists clearly show that the worst is yet to come. At this era, Somalia cannot afford to lose so many lives again. Therefore an effective disaster management, a well warned and informed population and a coordinated joint government inter-ministerial plans are needed to achieve mitigation and adaption measures.

1.3. Importance of Livestock, Crop, Fisheries and Wildlife

The mainstay of the Somali economy has traditionally been dominated by pastorals and crop production, followed by fisheries and forestry and these four sectors are supporting over 80% of the population. The *Boswella criteria* and *sacra* trees are highly-prized for producing frankincense, however, their natural regeneration is threatened by overgrazing. Somalia is also a large producer of myrrh and gum Arabic. The *Cordeauxia edulis* plant which produces yeeb nuts in the central regions is now thought to be endangered. The level of agricultural production, including bananas, cotton, rice, mango trees, and citrus, is generally far below its peaks of the late 1980s. Notably, at least 151 plants in Somalia have known medicinal values. Livestock continues to dominate exports, followed by sesame, dry lemon, charcoal, fish, hides and skins. Prior to the civil war, livestock and livestock products accounted for 65% of the country's exports, which was followed by banana with an export of 116,000 metric tons in 1989. Although, goats and sheep which constituted a population of about 35 million in 1988 have been slightly reduced to 30.5 million, still their export is substantial and mostly to Arabian countries. In addition, Somalia is number one in camel population in the world.

There is also evidence of a decline in rangelands biodiversity (grass and herbs, trees and bush lands shrubs), affecting certain parts of the country, particularly those close to urban areas, and areas such as the Sool Plateau in the northern part of the country. An IUCN survey (2006) found Somali's northern ranges to be most seriously degraded (as much as 50%) owing to steep topography, large numbers of livestock, and proximity to ports for livestock export. In addition, over much of the country, many areas around water boreholes and wells are degraded.

Somalia has the longest coast in Africa, which is about 3,333 kilometers and is endowed with diverse and high fisheries and other marine resources. It is estimated to have the capacity of 200,000-300,000 tons of sustainable fish production per annum, however, prior to the civil war only about 15,000 tons were harvested per annum. At present, marine resources have been in great decline due to the current trend of unregulated, uncontrolled and illegal fishing. The consequences of these activities are illustrated by the fact that the once substantial and valuable lobster export trade is suffering, and artisan fishermen are finding it increasingly difficult to sustain an adequate livelihood from lobster harvesting

because of the decline in stocks. Illegal inshore fishing by foreign commercial boats has also caused destruction to coral reefs. In addition, the world's main oil transport tankers pass through the Gulf of Aden. With no surveillance mechanism in place, this movement of tankers results in the constant threat of oil spillage and toxic waste dumping off the Somali coastline.

In terms of wildlife, only small remnant pockets of wildlife now exist, with many species approaching extinction. The elephant (*Lexodonta Africana*), black rhino (*Deceros bicornis*), lion (*Panthera Leo*), and Swayne's hartebeest (*Alcelaphus buselaphus swaynei*) have been wiped out from most of the country, while the wild ass (*Equus asinus somalicus*) that once numbered in the thousands has been reduced to just a few dozen.

1.4. Environmental Challenges Resulting from Charcoal Production and Export

The most rapid degradation has been of forest and range resources that provide the raw material production of charcoal in Somalia - extracted predominantly from slow growing dry deciduous bush land and thicket species of *Acacia* and *Commiphora.*

Charcoal Ready for Export

Degraded rangelands due to tree felling to meet the increasing charcoal demand are a common sight across Somalia. The north-east and north-west regions are impacted most due to steep topography and occurrence of frequent flash floods leading to the formation of deep gullies. Land degradation is most advanced around the main roads leading to the ports, water holes and wells, where the diminished carrying capacity of the rangeland no longer supports the feeding requirements of the animal populations. As such, the capacity of denuded rangelands to sustain the pastoral economy is already under irreversible loss threatening the medium to long-term sustainability of pastoral systems. A recent study by Food Agriculture Organisation (FAO) / Somalia Water and Land Management Information System (SWALIM) for Puntland estimates the annual rate of *Acacia bussei* decline at about 5% in Puntland, and this rate seem also to be applicable across Somalia. According to a WFP report, the charcoal output of north-east Somalia in 1996 was estimated to be in the order of 4.8 million sacks [each weighing 25-30 kg]. Producing such a volume, required cutting approximately 2.1 million *Acacia bussei* trees. At an average density of 60 trees per hectare, this translates into a deforestation rate of 35 000 hectares of land per year[1]. Extrapolating the above figures for production of the 10 million sacks of charcoal produced in the South Somalia during 2011 [only export], means felling 4.375 million trees or clearing 72 916 hectares of land. Considering the above mentioned extent of *Acacia bussei* tree felling in Somalia and no re-plantation, this species was placed on the Red List of threatened species in 2009[2] by the International Union for the Conservation of Nature (IUCN).

The increasing loss of the natural resource base throughout Somalia is a key contributing factor in determining the severity of Humanitarian Crises– as evidenced during the most recent drought event to hit the region in 2010, the impacts of which are still in effect today. The centuries old coping strategies employed during periods of drought in the arid/semi-arid climate of Somalia are increasingly becoming impractical as resource depletion removes the natural resource assets which are heavily relied upon during drought events. The evergreen drought-tolerant indigenous vegetation species, that provides feedstock to the pastoralists during drought years, has been lost to the demands for charcoal. The resilience and coping mechanisms of communities and their livestock are currently reduced to a level where even a low-intensity drought cycle forces them to face huge losses and depend on external assistance. The shocks from such natural disasters are unprecedented and the 2010 drought provides the evidence of the severity and magnitude of such events when over 4 million Somalis (40% to 50% of total population) and millions of unaccounted for livestock population were impacted. With Somalia ranked at number 7

[1]Somalia Report, 2011.Charcoal Trade Stripping Somalia of Trees. www.somaliareport.com.
[2]http://threatenedplants.myspecies.info/sites/threatenedplants.myspecies.info/files/Acacia%20bussei.pdf

out of 233 countries and regions in global ranking[3] to the impacts of the climate change - the losses due to such recurring shocks will only increase in the future unless determined efforts are made to enhance the coping capacities of the large vulnerable population.

1.5. Renewable Energy Potential Mitigation and Adaptation

Somalia is rich in renewable energy resources, untapped hydropower, extensive geothermal energy resources, many promising wind sites, and abundant sunshine, which can produce solar power. The major obstacles to development of these potentially available energy resources are political, financial and institutional. Traditional biomass fuels such as firewood and charcoal, primarily used in rural and poor communities, account for 82% of the country's total energy consumption.

Somalia, despite the prolonged civil conflict and least development status, has a great potential to achieve sustainable development and to contribute in the reduction of Green House Gases (GHG). There are already signs of recovery that could utilize renewable energy, including solar, wind, hydropower and geothermal energy resources. There are some development initiatives in solar energy utilization in the capital Mogadishu and some cities in Puntland and Somaliland. Wind energy was in use prior to the civil war, but the infrastructures, which were mainly in Mogadishu were destroyed. The Fanoole Dam in Middle Jubba, which was constructed with assistance from China, from1977 to 1982 at a cost of about US $ 50 million, currently needs rehabilitation for irrigation and hydroelectricity generation. In addition, there was a plan to construct the Bardheere Dam upstream of the Fanoole Dam, which was interrupted by the civil conflict. In addition, there are considerable renewable energy potential throughout Somalia as indicated by a recent report of Federal Government of Somalia (FGS) and the African Development Bank (AfDB), (FGS, AfDB, 2015). The solar energy potential ranges from 5 to 7 kWh/day with over 310 sunny days in a year, which amounts to 2500 to 3000 hours of sunshine per annum.

1.6. Solar Energy

Average solar potential stands at 5-7 kWh/ m2/day. With over 3,000 hours of high and constant sunlight annually, Somalia is ideally placed to utilize solar energy. Solar resources have been utilized for off-grid generation in the country, as well as for water heating for municipal buildings. Solar cooking has also seen some uptake in the country, and solar power is seen as the energy source of choice for the rehabilitation of many municipal buildings in the country, particularly health centers.

[3] Center for Global Development; 2011-12 Rankings of the impacts of Climate Change.

The Norwegian *Nordic International Support Foundation* (NIS) donated 700 solar powered lights to Mogadishu City. An estimated 3,300 solar powered lights were also donated to Mogadishu Council by the Turkish government and other donor agencies. The Benadir Electric Company (BECO), which is the dominant private agency that provide electricity for Mogadishu, is expected to mount soon solar equipment that will generate 5 Megawatts. Solar equipment for other 10 Megawatts (for two sites) are expected to arrive in Mogadishu in the near future. Numerous, new standby generators (diesel) that support power generation will also arrive with the solar equipment. In addition, in the town of Qardho, Puntland in North East Somalia, the water wells are powered by solar energy. In addition, a private company call "Be Safe" in Mogadishu, is advertising: the selling and installing solar power for homes, schools, health centers and businesses.

Existing power generation in Mogadishu by BECO is predominantly by diesel generators. Therefore the introduction of 15 MW of solar power would avoid the emission of greenhouse gasses by 75,000 tCO2.

The European Union (EU) in collaboration with the Adventist Development and Relief Agency (ADRA) launched the 3 year "Somali Energy Transformation (SET) Project, which is intended to provide 100,000 households in Somaliland, Puntland and South Central Somalia with sustainable and affordable solar energy service that would contribute, also, to a low carbon development (Warka and Mareeg.com-Hargeisa, 04/03/2015).

The United Nations Children's Fund (UNICEF) with funding from the Government of Japan, installed solar powered water system in the village of Las Dacawo, in Somaliland. The water system includes: 10 solar panels with generation capacity of 1,500 Watts, a storage tank with a capacity of 25,000 liters and 7 km pipeline providing water to a school, a health center and 5 sheltered taps water kiosks (UNICEF, Somalia, Water and Sanitation Hygiene, March 5, 2013)

1.7. Hydroelectric

The Fanoole Dam in Middle Jubba, was constructed with assistance from China, from1977 to 1982 at a cost of about US $ 50 million. The dam had the potential to irrigate 13,000 ha and generate 4,600 KW of electricity. Although the dam had the capacity to irrigate about 13,000, however, only 1,800 ha were developed prior to the civil conflict. In addition, the 1998 El Nino rains changed the path of the river flow, but the dam still stands and needs extensive rehabilitation and directing the river to go through it. In addition, there was a plan to construct the Bardheere Dam, upstream with a generating capacity of 493 MW, but the onset of the civil war interrupted the project funding and implementation.

1.8. Wind

Wind speeds vary from 3-11.4 m/s. Four 50 kW turbines were installed in Mogadishu in 1988. Wind energy has also been utilized for water pumping, with installations made by the UN Trusteeship Administration of Somalia from as early as the 1940s. However, these facilities no long exist due time and the civil war. The country has large areas of shallow sea along its coastline, particularly suitable for off-shore wind power, with the added benefit that this resource is close to a number of major urban centers, including Mogadishu and Berbera. Studies estimate that approximately 50% of the land area of the country has suitable wind speeds for power generation and 95% could benefit, and profit, from replacing diesel-powered water pumps with wind systems.

1.9. Stakeholders' Engagement in the INDCs Process

The participation of key stakeholders in the formulation and implementation of INDCs is beneficial in terms of awareness, strengthening, validating and creating acceptance of the policy makers, civil society, academic institutions, private sector and development partners. Therefore, in order to achieve high level commitment from all stakeholders, there is a need for a well planned stakeholders dialogues based on: (i) information sharing and awareness raising for advocacy; (ii) arranging consultation meetings with key stakeholders; and (iii) setting long term planning for the implementation of INDCs process.

1.10. Feasible Mitigation and Adaptation Policies and Actions for INDCs

The potential remedial actions to overcome the deforestation and rangeland degradation are: (1) sustainable land management and food security through enhanced productivity; (2) integrated water management; (3) reducing risk among of vulnerable populations from natural disasters; (4) the utilization of renewable energy resources such as solar, hydroelectric and wind. These sources were used in the past or are in use in Somalia and their potentials are well known; (5) the implementation of the UN Security Council Resolution 2036 (2012) that calls for international cooperation to ban illegal export of charcoal from Somalia and the various laws passed by the Somalia's authorities both federal and some states; (6) the introduction and advocating the use of more efficient kilns for charcoal making and efficient stoves for local use, in order to reduce trees filling for local use; (7) reforestation using regional nurseries and forest plantation using indigenous and introduced suitable tree species. Such initiatives could reverse the deforestation and land degradation.

Some of these remedial actions are indicated in the National Adaptation Programme of Action (NAPA) (2013) formulated by UNDP and UNFCCC with funding from the Global Environment Facility (GEF) and the Somalia: Energy Sector Needs Assessment and Action/Investment Programme (2015) formulated by the Federal Government of Somalia and the African Development Bank (AfDB).

2. Ready for Implementation and Planned Adaptation and Mitigation INDCs Projects

2.1. Project Profile 1: Adoption of Sustainable Land Management to Build Resilient Rural Livelihoods and Enable National Food Security

RATIONALE

Around 65% of the Somali population are rural and engaged in pastoral, agro-pastoral, subsistence agriculture, and charcoal production, as livelihood options. All of these livelihoods are heavily reliant on - and severely deplete in the case of charcoal - the natural resource base and provision of ecosystem services. The sustainability of ecosystems to support pastoralist and agricultural livelihoods, are under threat from a combination of loss of vegetation and grazing land, deforestation due to charcoal production, loss of soil fertility, poor cultivation practices of productive land, insufficient dry season water supply, lack of alternative livelihoods, lack of alternative energy sources others than charcoal, physical access constraints, conflict over natural resources[4], land tenure disputes, underinvestment in supporting activities such as rotational grazing and livestock production systems, and a lack of agricultural extension services.

The NAPA consultations underlined the vulnerability of Somalia's traditional rural livelihoods systems to increasing climatic variability, particularly pastoralist activities across all of the country and agriculture activities in the south of the country. Concerns were raised over increases in the occurrence and severity of natural disasters, including extended drought events and flash flooding. Too little water is captured and stored during the wet season for use in the dry season.

With existing pastoralist and farming systems and methods already under threat from poor land management, it was universally felt that existing climatic variability combined with longer term impacts of climate change would inevitably undermine the entire sector and result in increased rural to urban migration, increased conflict over natural resources and the continued loss of lives and livelihoods. For these reasons the need for comprehensive measures to reduce vulnerabilities of pastoralists to climatic variability while simultaneously increasing investment into sustainable agriculture and farming practices - both clearly linked by the provision of a strong natural resource base and ecosystem

[4] UNDSS recorded 61 known conflicts to have occurred over natural resources in Somalia during 2012

services with a sustainable land management approach- was ranked 1 in the list of NAPA priorities.

DESCRIPTION

Component	Short-term Outputs	Potential Long-term Outcomes
Policy and Planning	• Engage climate vulnerable pastoralists and farmers and other key stakeholders (i.e. clan elders) in the formulation of local and district development plans focused on tenure, governance and land use management. • Introduce integrated land use management (rangeland, reforestation, agro-forestry and watershed management) planning principles to district and community stakeholders. • Strengthen national and sub national capacity to engage with community and integrate climate risk analysis into community level development planning processes.	• Climate risks integrated into national sectoral strategies and district planning for rural development, food security and livestock and agricultural management
Physical Investment and Demonstration	• Rehabilitation and reinstatement of degraded ecosystems, in particular rangeland areas, forests and areas with a high potential for cultivation, to provide sustainable grazing, forestry products, and agriculturally productive zones. • Demonstrate, through localized interventions, sustainable land management measures (reduce erosion, increase soil fertility, reduce crop losses, reduce burning, enhanced forest, shrub and grazing vegetation) to increase resilience to climate risks.	• Rural stakeholders able to develop and apply adaptive practices to enhance food and livelihood security and promote economic diversification in rural livelihoods.

	• Demonstrate models to diversify rural household income, including agro-forestry based livelihoods models, rangeland and wildlife protection schemes, and investment into production of sustainable household energy appliances such as fuel efficient stoves.	
Awareness and Information Sharing	• Community based (with a focus on pastoralists and farmers) education and awareness measures on climate risks, land management and food production. • Provision of seasonal early warning system (easily accessible and understandable) and forecasting for pastoral livelihood security and farmers food security.	• Effective climate risk information supplied, understood and adopted by end users at the appropriate scale to protect rural livelihoods form the impacts of climate change.

DEVELOPMENT CONTEXT

The programmatic focus of this project profile supports the Federal Government of Somalia's Six Pillar Policy: in particular, Pillar 2 – Economic Recovery for Livelihoods; Pillar 3 – Peace building and Social Reconciliation; and Pillar 4 – Service Delivery for Environment. It also supports the existing EC funded programme in the Puntland region aimed at strengthening livelihoods through improvements in rangelands and natural resources. It also supports all thirteen components of the Somalialnd 5 year development plan related to livelihoods, rangelands, the environment and management of natural resources.

The primary target of this programme is pastoralists and farming communities with limited access to assets and resources, including an emphasis on women and youth among these communities.

IMPLEMENTATION

Project Duration: 4 years

Lead Agency: Somalia Federal Government (SFG) Ministry of State for Environment, in the Office of the Prime Minister.

Other *Potential* Key Stakeholders: SFG Department of Agriculture and Livestock; State Ministry of Environment; SFG Department of Water, Minerals and Energy; Ministry of Planning Puntland; Ministry of Environment Puntland; Ministry of Planning Somalnd; Ministry of Environment Somaliland; State Authorities; UN agencies, INGOs, Development Banks; NGOs; Academic and Research Institutions.

FINANCIAL RESOURCES

Indicative Budget: 6.45 USD million

Component	Cost (USD)
Policy and Planning	0.75 million
Physical investment and demonstration	3.75 million
Awareness and information sharing	0.75 million
Project management	1.20 million
Total	6.45 million

2.2. Project Profile 2: Adaptation Using Integrated Water Resources Management to Ensure Water Access and Supply to Vulnerable Populations and Sectors

RATIONALE

As set out in section 2 of the Somalia NAPA document, climate change could result in a slight increase in the amount of rain received each year. However, the variability of rainfall patterns is also set to increase from an existing very high variable range. Because of this high variability in rainfall patterns, it is not clear how seasonal rainfall (both wet and dry seasons alike) will change. El Nino events, which results in delayed onset of rainfall and less rainfall at certain times of the year, may also become more frequent and severe in effect. This may have far reaching implications on the incidents of drought, floods and water quality within the context of a sector, which in Somalia, remains largely under-developed. Progressive climate change is also likely to affect the yield of ground water and shallow water reservoirs, from year to year. In coastal areas sea level rise is likely to increasingly affect groundwater through coastal erosion, surface inundation and seawater intrusion into coastal aquifers.

In relation to water resources management and protection, the NAPA consultations revealed a number of specific concerns, notably the inability to capture and contain rainfall - particularly intense rainfall events that lead to flash flooding creating damage to land, gullying, soil erosion and loss of soil fertility, existing water supply schemes and damage to infrastructure. This trend is combined with frequent and persistent water scarcity events across the whole of the country resulting from delays in rainfall onset and an extension in the dry season, sometimes lasting for many months. Consequently, the need for the protection of water resources through integrated and strategic approaches was ranked second in the list of NAPA priorities.

Priority adaptation measures that emerged from the consultation included the need for protection of critical water resources through the construction of medium to large-scale water storage infrastructure (e.g. reservoirs) including diversions for irrigation, livestock watering points and boreholes. Also community level infrastructure including berkeds, shallow wells, and ponds were prioritized. Water resources protection, harvesting and storage is needed during extreme events to reduce vulnerability during dry season water shortages.

DESCRIPTION

Component	Short-term Outputs	Potential Long-term Outcomes
Policy and Planning	• National, regional and community level water resources management policies and plans. • Climate risk and vulnerability assessments with a specific focus on drought prone areas and conflict sensitive areas. • Groundwater and surface water resource data collection and monitoring	• Integrated Water Resource Management policy based on climate risk information and approaches
Institutional Development	• Establishment of a government-led participatory mechanism for water sector coordination based on IWRM principles, with a specific focus on supporting the livestock and agricultural sectors and provision of reliable clean drinking water at the community level • Capacity development in climate induced impacts on water resources for policy makers and planners at national and district level	• Institutions strengthened for cross sectoral formulation and implementation of climate resilient integrated water resources management, plans, policies and strategies
Physical Investment and Demonstration	• Construction of large scale water capture and storage facilities and equitable distribution and access systems. • Construction and rehabilitation of community level infrastructure including berkeds, shallow wells, ponds and other appropriate	• Improved access to safe water and sanitation under the conditions of changing climate by adoption of new technologies and participatory water management at

Component	Short-term Outputs	Potential Long-term Outcomes
	technologies, ensuring that a mechanism for maintenance of the schemes is in place • Construction of embankments/gabions and check-dams to protect flood-prone areas • Physical protection of critical water resources (rivers, springs, wells, groundwater) to provide safe water supply during climate change extreme events.	household and community level.

DEVELOPMENT CONTEXT

Water is a scarce and critical resource that is under-developed in Somalia. At the community level water is primarily supplied through shallow dug wells or through boreholes. Among the nomadic pastoralist communities, ensuring access to watering points is a matter of survival. During the dry season water sources sometimes reduce significantly in flow and can lead to communities needing to travel far to reach alternative sources. Watering points have an inherent potential to act as conflict triggers between nomadic peoples, particularly during times of drought.

The south of Somalia hosts the country's only two permanent rivers, the Juba and Shabelle, which supply water for irrigation of the country's most promising cultivatable land, and to urban centers including the capital Mogadishu. During intense rainfall events water is quickly lost to through gullying, while also removing valuable topsoil in the process. Groundwater resources (aquifers) are believed to exist though deep water aquifers are not currently accessed. Shallow water aquifers and wells are accessed ad-hoc with little understanding of downstream hydrological impacts. Often during periods of drought water is transported to areas of need.

There is currently no coordinated oversight and understanding of Somalia's water resources, access and supply. This proposed project profile intends to initiate a comprehensive approach to managing water resources in Somalia, through developing and implementing an integrated water resources management approach using participatory and community based decision making.

IMPLEMENTATION

Project Duration: 5 years

Lead Agency: Somalia Federal Government (SFG) State Ministry of Environment.

Other *Potential* Key Stakeholders: SFG Department of Water, Minerals and Energy; SFG Department of Agriculture and Livestock; SFG Department of Environment and Wildlife; Ministry of Planning Puntland; Ministry of Environment Puntland; Ministry of Planning Somaliland; Ministry of Environment Somaliland; State Authorities; UN agencies, INGOs, Development Banks; NGOs; Academic and Research Institutions.

FINANCIAL RESOURCES

Indicative Budget: 8.1 USD million

Component	Cost (USD)
Policy and Planning	0.75 million
Institutional Development	0.50 million
Physical investment and demonstration	5.50 million
Project management	1.35 million
Total	8.10 million

2.3. Project Profile 3: Adaptation by Reducing Risks among Vulnerable Populations from Natural Disasters

RATIONALE

The NAPA process has highlighted significant concerns that natural disasters (in particular severe drought events and flash flooding) already constitute a development risk that are becoming more frequent, widespread and intense across the country, with the potential to cause significant further loss of livelihoods and lives. Some 14 major drought events have been recorded in the last 50 years adversely affecting over 6 million people. Specific issues raised during consultations include the potential for increases in injury and death as a result of drought, increase in incidence of conflict over diminishing natural resources such as water and grazing land, significant migration and displacement of people, and loss of primary assets such as livestock.

To address the risks faced by vulnerable populations during natural disasters, a climate risk management approach needs to be put in place that focuses not just on recovery and response measures, but also at prevention measures though improved management of natural resources such as water, forests, grazing pasture and land. Specific measures are required to development and implement an early warning system and put in place a combination of planning engineering and design measures to reduce risk. This broader 'preventative' as well as responsive DRR approach will require strengthening national disaster management authority so that is also able to coordinate and direct cross-sectoral ministries and institutions to deliver joint planning activities. This approach both reinforces and adds value to the project outputs of NAPA project profiles 1 and 2 for Somalia.

DESCRIPTION

Component	Short-term Outputs	Potential Long-term Outcomes
Policy and Planning	• Strengthen the National and Regional Disaster Risk Management Authorities with a preventive as well as responsive remit • Integrate the National Disaster Risk Management Policy	• Improved disaster prevention through expanded DRM within key sector policies, plans and budgets that incorporate climate risks and provide

Component	Short-term Outputs	Potential Long-term Outcomes
	principles into key GFS sectoral policies with a specific focus on climate risks • Awareness raising for senior officials and policy makers in key sectors for linkages between disaster risk management and climate related risks • Develop government strategies in responding to drought and flash flood events	incentives for lower risk development
Climate Risk Planning and Management	Data collection and analysis on incidence of key climate related disaster events (droughts, floods, dusts storms, strong winds). Institutional establishment of national early warning system with a focus on climate related risks in areas of high vulnerability. Community level mapping of high vulnerability areas to risks of drought and flooding, dusts storms and strong winds, and integration into local disaster risk management plans and responses.	Early warning systems for droughts (and floods) strengthened by incorporating and communicating climate risk information.
Investment and Demonstration	• Identification, field demonstration and appraisal of targeted climate risk reduction measures including, *inter alia*: improved land and water management practices; livelihoods protection; improved settlement construction and physical infrastructure.	• National, district and community planners aware of and putting into practice improved and cost effective climate related disaster prevention measures through

Component	Short-term Outputs	Potential Long-term Outcomes
	• Training programme for national, district, and community level professionals to support strengthened planning competencies for climate risk reduction.	local level demonstration.
Institutional Development	• Promote National Disaster Management Authority (NDMA)-led coordination and information sharing and disaster risk management and climate risk reduction with key ministries and at a district level, including early warning response. • Build capacity at regional and district level to enable building of community level awareness, disaster preparedness and response capacity. • Establish relations with regional (east Africa) institutions to promote information exchange and joint action at national and district levels in Somalia.	• National and district institutions are able to provide a coordinated response in disaster risk reduction through the integration of climate risk information.

DEVELOPMENT CONTEXT

The frequency of occurrence and the severity of impacts from natural disasters, such as drought, is apparent across all Somalia and its significance is acknowledged throughout government. The programmatic focus of this project profile supports the Federal Government of Somalia's Six Pillar Policy: in particular, Pillar 2 – Economic Recovery for Livelihoods; Pillar 3 – Peace building and Social Reconciliation; and Pillar 4 – Service Delivery for Environment. However the government currently has neither the institution itself - in the form of a national disaster risks management authority - or the human resource or intuitional capacity to address reducing risks to populations. Developing and implementing an early warning system will be a core component of this project.

IMPLEMENTATION

Project Duration: 4 years

Lead Agency: Somalia Federal Government (SFG) Ministry of State for Environment, at the Office of the Prime Minister.

Other *Potential* Key Stakeholders: SFG Department of Water, Minerals and Energy; SFG Department of Agriculture and Livestock; SFG Department of Environment and Wildlife; Ministry of Planning Puntland; Ministry of Environment Puntland; Ministry of Planning Somaliland; Ministry of Environment Somaliland; State Authorities; UN agencies, INGOs, Development Banks; NGOs; Academic and Research Institutions.

FINANCIAL RESOURCES

Indicative Budget: 4.1 USD million

Component	Cost (USD)
Policy and Planning	0.75 million
Climate Risk Planning	0.50 million
Investment and demonstration	1.50 million
Institutional Development	0.75 million
Project management	0.60 million
Total	4.10 million

2.4. Project Profile 4: UN Joint Programme on Sustainable Charcoal Production and Alternative Livelihoods (PROSCAL) to Mitigate Against Deforestation.

Programme timeframe: July 2015-June 2017 Project budget: US$ 23,671,610

PSG alignment	PSG 4 Economic Foundations Priority 3 Promote the Sustainable Development and Management of Natural Resources by developing legal and regulatory frameworks and building capacity in key National Resources Management (NRM) Institutions.
Sector context	The breakdown of state institutions, protracted conflict, weakening of traditional systems of decision-making on access to resources, absence of alternative sources of energy and limited livelihoods options have led to unsustainable production and trade of charcoal, fuelled by constant demand for charcoal on the international market. The UN Security Council resolution (2036)2012 seeks international support to ban charcoal export from Somalia since charcoal exports fuel the war economy, generating revenue in excess of USD 15 million per annum for the benefit of militia groups and brokers/intermediaries who act as gatekeepers for exports. To address the challenges surrounding charcoal, the Federal Government of Somalia requested UN in 2013 to extend support for the implementation of comprehensive set of activities to curb illegal trade of charcoal, promote alternative sources of energy to reduce local consumption and provide alternative livelihoods to the charcoal value chain beneficiaries (CVCBs). The need for implementation of these interventions has been reiterated at the highest levels of the Federal and Regional Governments. Working Group of PSG 4 flagged unsustainable charcoal production as the root cause of environmental degradation with negative consequences for the largely natural resources based economy of Somalia. The Working Group unanimously recommended the Joint Programme on Charcoal as priority flagship initiative under PSG4.

Objectives	The specific objectives of the Joint Programme are: 1) Support government in Somalia as well as countries in the region to produce pertinent legal instruments and strengthen enforcement mechanisms at national, regional and local levels; 2) Promote alternative sources of energy to reduce local charcoal consumption; 3) provide alternative livelihood options to households and communities dependent on charcoal production and trade; and, 4) reforestation and afforestation for the rehabilitation of degraded lands.
Beneficiaries	Somali population dependent on natural resources for their livelihoods and economic development
Government counterparts	Federal Government: Office of the Prime Minister – State Minister for Environmental Affairs, Ministry of Livestock, Rangeland and Forest; Ministry of Energy and Water; Relevant Institutions in the Member States
Implementing partners	Government; UN Agencies (UNEP, UNDP, FAO), NGOs and local communities
Geographic coverage	National
Programme description	The Joint Programme structure rests on three main components with mutually supporting and organically allied interventions. All the interventions address either the demand or supply side of the charcoal value chain. The main activities under each component are: Component 1 - Capacity Building and Regional Cooperation ✓ Formulation and adoption of Regional Charcoal Policy Framework, Legally Binding Instrument and Rules of Business for Reducing Charcoal Production ✓ Establishment of Monitoring Systems of Charcoal Production, Reporting and Movement in Somalia ✓ Support to the development of enabling policies on Energy, Forestry and Natural Resources Management ✓ Establishment of Charcoal Trade Regulatory Committee at the Regional Level ✓ Capacity building of government institutions, communities and local governments

- ✓ Mass awareness on the impacts of charcoal on environment, livelihoods and national economy

Component 2 - Promotion of Alternative Energy Sources

- ✓ Accelerated diffusion of energy efficient cook-stoves for reduction in charcoal consumption
- ✓ Sustainable and efficient production of charcoal (green charcoal) for local consumption
- ✓ Energy Plantations managed sustainably to meet the local demand of charcoal and fuel wood
- ✓ Establishment of Liquefied Petroleum Gas (LPG) market and its accelerated diffusion to shift from charcoal to LPG in main urban centers
- ✓ Introduction of Biogas as an alternative source of energy in areas with heavy loads of biodegradable feedstock
- ✓ Establishment of Solar energy market and accelerated diffusion of solar energy equipment to reduce local charcoal production

Component 3 – Alternative Livelihoods for Charcoal Value Chain Beneficiaries

- ✓ Support for community organisations and traditional decision-making structures in drafting Community Action Plans (CAPs) to strengthen Natural Resources Management (NRM) in charcoal production areas
- ✓ Diversification of income and asset building for vulnerable households dependent on charcoal business in order to facilitate transition to more resilient and sustainable livelihoods
- ✓ Improved local and export-oriented value chains in agriculture, horticulture, poultry, livestock and fisheries in target communities
- ✓ Reforestation and rehabilitation of degraded lands for environmental conservation and sustainable production of food, fuel and fodder

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2.5. Project Profile 5: Rehabilitation of Fanoole Hydro-Electric Dam and Irrigation Infrastructure

INTRODUCTION

The Fanoole Hydro-Electric Dam and its supportive infrastructures were constructed with the assistance of China from 1977 to 1982 at a cost of about US $ 50 million. The dam and its canal system provided irrigation for to government owned rice and sesame farms. The developed irrigated pre-war area was 1,800 ha of which 700 ha was in use for rice and sesame production. In addition, the project included the construction of a rice mill with an annual capacity of 10,000 tons and a main canal of 52 which were completed, while the construction of two other primary canals of 30 and 25 km were interrupted by the onset of the civil war.

The potential and planned development area for the Fanoole project alone was 8,200 ha. In addition, the dam generated electricity and has a potential command capacity to eventually irrigate 8,000 ha of sugar cane and 5,000 ha of paddy rice. In addition, the area downstream of the Fanoole Dam, has one of the most fertile soils in the country.

The dam provided electricity to the towns of Jilib and Marerey. The plan was to extend the electricity to Jamame and other towns downstream, including Kismayo. However, the onset of the civil war interrupted the initiative. Also, the path of the river flow was changed after 1998 El Nino rains as shown in the cover page photograph. Therefore, the rehabilitation of the Fanoole Dam is priority for the reconstruction and development of Middle and Lower Jubba regions. At the downstream of Fanoole, there were the important projects of Marerey Sugar, Mogambo Rice Project and the banana plantations in Lower Jubba. In addition, the Kismayo Port is the economic outlet for the Jubba Valley. The Fanoole project had 1,500 Somali staff and workers and 42 Chinese experts and technicians. The employee had living quarters of 70 houses and in addition, the project had 20 storage facilities for inputs and rice.

PROJECT DEVELOPMENT OBJECTIVES

The Fanoole Dam and agriculture land were one of the most important projects in the Jubba valley. The key objectives of its rehabilitation are:

1. Rehabilitation of the Fanoole Dam's hydroelectric infrastructures;
2. Provision of electricity to towns downstream of the dam and re-establishment of 2 standby generators with a capacity of 1,600 kw and a rice de-hulling machine with a daily capacity of 250 tons;
3. Rehabilitation of canals and irrigated farms;
4. Repairing and reversing the path of the river flow to its origin prior to damage done by El Nino in 1989;
5. Re-building of offices, stores and residential houses of about 50; and
6. Leasing of 90% the farm land to a joint company of potential foreign and local investors and 10% for farmers from the area who are currently utilizing small areas of the farms.

Rehabilitation of the power plant would reestablish the generation of hydropower of 4.6 MW. The plant would provide electricity for communities in Middle and Lower Juba Valley. Currently all electricity in this region is generated by diesel-fueled generators. Expected emission reductions from replacing this electricity by clean hydropower is therefore estimated to be around 23,000 t CO_2/year.

PROJECT COMPONENTS AND SUB-COMPONENTS

The rehabilitation of the Fanoole Dam shall have the following components:

Component 1: Rehabilitation of the Dam and its Hydroelectric Network.

Sub-Component 1.1: Rehabilitation of the Dam and its hydroelectric equipment.

The sub-component shall rehabilitate the major structure of the dam, the gates, and the turbines for hydroelectric generation, in order to regain its irrigation and electric generation capacity. The dam had a capacity to generate 4,600 kw of electricity, which was back-stopped by standby 2 generators during low level river flows.

Sub-Component 1.2: Provision of Electricity to Towns Downstream of the Dam.

This sub-component is intended for the re-establishment of the electric network to provide electricity to the towns downstream of the dam. In the completed 1st phase the network reached close to Jamame and the plan was to reach to reach it, the banana plantations and the towns downstream, ending in Kismayo. In addition, two standby generators with 1,600 kw, shall be re-established.

Component 2: Rehabilitation of Primary and Secondary Canals and Reversing of the Flow of River to its Origin, Prior the Damage Caused by El-Nino in 1998.

Sub-Component 2.1: Rehabilitation of the Primary and Secondary Canals.

This sub-component is intended for the repair and rehabilitation of the canal infrastructures of about 52 kms, to facilitate the irrigation of rice and sesame farms and to regain their productive capacity.

Sub-Component 2.2: Reversing the Path of the River to its Course, Going Through the Dam to its Prior to the El-Nino of 1989.

Once the dam is rehabilitate, the course of the river shall be re-directed to it course prior to the damage cause by the El Nino of 1989. Therefore, this sub-component shall restore the capacity of the dam for controlled irrigation and the supply of electricity as it did prior to the civil war.

Component 3: Rebuilding of Offices and Residential Houses and Allocation of Land to Investors and Local Farming Community.

Sub-Component 3.1: Rebuilding of Offices and Residential Houses.

There is a need for the rebuilding of offices and residential area for the management and the staff of the project. This shall facilitate the task of regaining the productivity of the project.

Sub-Component 3.2: The Rice Mill, Farm Machinery and Vehicles for the Implementation of the Project.

The crop production machinery and equipment, transport vehicles and processing of rice shall be acquired to facilitate production of processing rice and other products.

PROJECT COSTING SUMMARY

The cost estimates of the components and sub-components for the rehabilitation of the Fanoole Hydroelectric Dam, farms, housing and storage are indicated in Table 1.

Table 1: Project Costs Summary in USD million

Activity	Year 1	Year 2	Total
Component 1: Rehabilitation of the dam and the hydroelectric network.			
Sub-Component 1.1: Rehabilitation of Dam and its hydroelectric equipment.	10.0	5.0	15.0
Sub-Component 1.2: Provision of electricity to towns downstream of the dam.	1.0	1.0	2.0
Component 2: Component 2: Rehabilitation of Primary and Secondary Canals and Reversing of the Flow of River to its Origin, Prior the Damage Caused by El-Nino in 1998.			
Sub-Component 2.1: Rehabilitation of the Primary and Secondary Canals.	0.5	0.5	1.0
Sub-Component 2.2: Reversing the Path of the River to its Course, Going Through the Dam to its Prior to the El-Nino of 1989.	……	1.0	1.0
Component 3: Rebuilding of Offices and Residential Houses and Allocation of Land to Investors and Local Farming Community.			
Sub-Component 3.1: Rebuilding of Offices and Residential Houses.	2.0	0.5	2.5
Sub-Component 3.2: The Rice Mill, Farm Machinery and Vehicles for the Implementation of the Project.	2.0	1.0	3.0
Sub-Total	15.5	9.0	24.5
Contingency 5% & Admin. Cost 10% = 15%	2.325	1.35	3.675
Grand Total	17.825	10.35	28.175

PROJECT MANAGEMENT AND IMPLEMENTATION ARRANGEMENTS

The Ministry of Agriculture (MOA), shall establish a Project Management Unit (PMU) headed by a General Manager (GM) with education and experience in agriculture and

equally qualified lean staff and technicians, with main office on site and small office at MOA in Mogadishu. The donor agency may also have representative in the PMU. The PMU shall be supervised by the Ministry and the donor. The PMU in close consultation with the MOA and the donor shall carry out competitive bidding of the major components of the project.

The PMU shall produce quarterly and annual progress report to be submitted to the MOA and donor. The annual report shall reflect the detail budgetary expenditure and audit report. In addition, an annual supervision mission can be carried out by the donor and MOA to assess the status of implementation and lesson learned.

Upon the completion of the construction phase of the project, the MOA shall engage foreign and local investors and lease the land and the electrical network to manage. Once the land is leased to a joint company of both foreign and local investors, such company shall manage the farms and electricity, while the PMU shall continue to manage the dam and the major irrigation infrastructures.

MONITORING AND EVALUATION PLAN

The MOA and the donor shall assess the status of the target project components at the initiation of the project and through periodic supervision shall evaluate the progress made. Such monitoring and evaluation shall be kept up by the MOA once the project is completed and the land and the electricity are leased to the private companies to maintain the proper functioning of the facilities for both private and public good.

2.6. Project Profile 6: Project for Domestication of Indigenous and the Introduction of Economically Important Plant Species

EXECUTIVE SUMMARY

The project is intended to help with the domestication and introduction of economically important plant species as well as enable the communities to maximize the benefit through the planting, harvesting of commercial products from these species as well as processing and marketing. The initiative will also mitigate against land degradation and desertification which is wide spread in the country as indicated by numerous assessments and studies as indicate by the References section of this proposal (1-19). The project will also have positive environmental impact through (i) the reduction of the need for shifting cultivation; (ii) and the fact that most species under consideration are perennial shrubs and trees. The information of these species and their possible utilization are outlined in the proposal.

INTRODUCTION

The Somali inhabited areas of the Horn of Africa, has several economically important plant species that have products that are utilized for export or domestic use for human or livestock consumption. However, most of these species are endangered due to over grazing, charcoal production and export and desertification resulting from erratic rainfall, possibly, due to climate change. In addition, there are economically important plant species that are suitable for the local environment that can be introduced to reap their benefit for the farming community as well as the entire population.

The objective of this proposal is to initiate the domestication of economically important indigenous species and to introduce, test and disseminate equally important species from areas with similar agro-ecological conditions. This initiative would enable the farming communities in different ecological zones to cultivate, use and market the products of these species.

Domestication of Economically Important Indigenous Plant Species

Forests and woodlands can play a central role in the fight against poverty and the quest for sustainable development. They provide a range of economic, social, cultural and environmental functions and services, ranging from biomass energy, timber and non-timber forest products that support livelihoods and trade, to the ecological role they play in mitigating land degradation and climate change among others.

They also could play a critical role for pastoralist range management particularly during dry and drought time. Wood is the main sources of household energy and construction

materials for most people, and as a revenue sources. The importance of tree based products include:- frankincense from Boswellia species, which are naturally growing in the north-east, *Commiphora myrrha* which produces myrrh resins, Gum Arabic from *Acacia Senegal* and *Cordeauxia edulis* (now endangered) which produces *yicib* nuts in the central regions .

In 1985 Somalia was the world's largest producer of myrrh (over 2,000 tonnes) Frankincense used to be Somalia's 4th largest foreign currency export earner with an annual production of 12,000 tonnes. Due to their value, *Boswella careteri, B. frereana* and B. *sacra* (the preferred species) are highly prized trees with associate tenure and management systems. In recent years some Somali private sector companies initiated the extraction of essential oils from frankincense and myrrha resins through steam distillation in Nairobi, Kenya. However, the natural regeneration of these species is threatened by over grazing and land degradation. Other tree based products of potential economic value include henna (Lawsonia), various fruits (e.g.Tamarind) as well as many trees which produce important medical products.

The other economically important indigenous and introduced plants that grow in the forests and woodlands, but are not adequately utilized include:

- Azadirachta indica (neem/geed hendi)
- Acacia nilotica (maraa)
- Juniper – Juniperus carica (dayib)
- Fig, *Ficus carica* (berde)
- Aloe vera (dacar)
- Acacia tortilis (qurac)
- Acacia Senegal (galool)?
- Casuariana equisetifolia (shawri)
- Conocarpus lancifolius (damas, ghalab)
- Dobera glabra (garas)
- Tamarindus inidica (raqai)
- Leucaena leucophila
- Cadaba mirabilis and Cadaba heterotricha (higlo)

Since the planting materials for these indigenous and introduced species is available in the country and their potential benefits are recognized, their domestication and dissemination could be achieved easily, because each has important uses. However, there is a need for a preliminary survey of the sources of the indigenous species, the location of nurseries and to determine key farming communities that could benefit from the initiative.

Introduction and Adaptation of Suitable Species

Pyrethrum: The pyrethrum daisy, which includes the two species of *Tanacetum cinerarifolium* and *T. cucineum,* has flowers that are used for the extraction of the safe organic insecticide called pyrethrin. The natural insecticide is made from the dried flower heads and it was used for centuries as insecticide and lice remedy. The flowers are dried and pulverized and the active component of pyrethrins contained in the seed cases, are extracted in the form of oleoresin. It can be applied as insecticide as suspension in water or oil or as powder. Pyrthrins attack the nervous system of insects and inhibit female mosquitoes from biting. It has also an insect repellent effect. They are less toxic to mammals and birds and are also biodegradable and breaks down. Kenya is a major producer of pyrethrum and the product is export. However, meeting the local need alone could be adequate justification for introduction and dissemination to farmers.

Moringa Tree: The moringa tree or *Moringa olefera* is a rapid growing with long tap roots and few lateral roots, minimal shade and large production of high protein biomass. In addition , it can grow in dry sandy soil and is drought resistant. Therefore, the tree is well suited for use in alley cropping. Moringa leaves, flowers, pods and seeds are highly nutritious. The leaves have 7 times the vitamin C in orange, 4 times the calcium in milk, 4 times vitamin A in carrots, 2 times the protein in milk and 3 times the potassium in bananas. All the parts of the tree has beneficial uses as shown in Table 1.

Table 1. The Uses of the Various Parts of Moringa Tree

Plant Part	Uses
Leaves	Being high in vitamins A, B, calcium, iron, and protein, the leaves boost the immune system, increase metabolism, nourishment of eyes and brain, regulates cholesterol and blood pressure and improve liver and kidney functions.
Flowers	The flowers are rich in calcium and potassium and juices from the flowers improve the production of and the value of breast milk. The juices also improve urination and are beneficial to urinary track disorders
Pods	The immature pods can be consumed raw or cooked as green bean and has an oil similar to olive oil. When consumed raw the pods act as de-wormer. They are also rich in protein and fiber, which alleviates diarrhea.
Seeds	Crushed seeds plus coconut oil make topical ointment and has useful medical properties including: antibiotic, anti-inflammatory which can be used for arthritis, rheumatism and gout, promote urination, calming effect on seizers and can be used for the purification of water.
Roots and Bark	The roots and the bark contain all nutrients that are in the seeds,

	but with higher quantities. They could be utilized in small quantities for: cardiac and circulatory ailments, inflammation, digestive disorders, promotion of appetite and ointment for rheumatism, lower back pain and kidney pain.

Karkade: *Hibiscus sabdariffa:* The red hibiscus flower is dried and made into Kerkade, a red drink, which can be consumed as cold or hot. Karkade contains about 15-30% organic acids such as cyaniding, delphinidin and citric acid, which gives it pleasant taste with the addition of sugar. The entire plant, except the roots are edible. Fresh leaves and young shoots are rich in vitamins. The leaves can be added to salads or soup. The flowers are the most important commercial product and are usually prepared as tea, jellies and sauces. Karkade tea is very useful, because it has anthocyanine with high vitamin content and strengthens the walls of blood vessels and regulates blood pressure. It also has flavonoids – kvertsitin that help clean the body and protects the liver and improves metabolism in general. Sudan is the major producer of karkade and it is locally as well as exported to Europe.

Napier Grass – *Pennisetum purpureum*: Is a perennial grass that has high herbage yield throughout the year, it controls maize stock borer by trapping the moth that lays the eggs on maize plant if the Napier grass is planted around the maize field. In addition, it can protect maize and companion crops from wend. However, its main importance is its high forage production, which can be sold as green or dried fodder that could be used for milk producing livestock as well as export animal at holding grounds and at sea. In combination with protein rich Leucaena leucophila, Napier grass can provide a valuable feed for livestock.

Sudan Grass and Sorghum: *Sorghum Sudanense* and *Sorghum bicolor:* These two species can be grown as forage in association with *Leucaena leucophila,* a legume with high protein and which is now produced mainly in the country as ornamental tree. These could be grown in areas where Napier grass is not grown.

Sisal: *Agave sisalana:* is a fiber crop, which is a renewable source of fiber that can contribute to the mitigation of climate change. It can be used for robes, baskets to replace plastic bags, pulp and paper, building materials, etc. It has a life cycle of 7-10 years each plant may produce 200-250 useable leafs that are 1.5-2.0 meter long and a hardy plant that can grow in most parts of Somalia

Establishment of Nurseries in Key Location

In order to achieve successful introduction and testing of both the indigenous and imported species, there is a need for reasonably equipped and staffed nurseries in key locations that

are close to the target farming communities and the sources of the indigenous plants in North West, and Puntland as well as have permanent water sources in Shabelle and Juba rivers. The suggested locations would be in the areas of Shiekh, Erigavo, Qardho, Balad, Afgoi and Jilib.

In order to achieve sustainability and reduce cost, for each nursery of approximate area of (0.2-0.5) hectare, an agreement will be reached with progressive farmers or institutions that are working in crop production or forestry in the target area. In addition, horticultural technicians in the private or institutional facilities will be given an allowance to top-up their payment. This will also reduce the running cost, use existing expertise and the host farmer or the institution that own the facility, would be among some of the primary beneficiaries.

The establishment of the nurseries will take into consideration: the agro-climatic condition of the target area, soil type, the availability of perennial irrigation facilities, area of land needed based on the estimated demand for seedlings and closeness to the target farming community in order to reduce the cost of transport and damage to seedlings. There is also a need for wind breaks and shade.

Involvement of Local Communities in the Production and Marketing

In order to assure success and sustainability, the local farmers and communities will be involved in the planning and the selection of priority species in their area. In addition, an attempt would be made to study the environmental and economic impact of the domestication of given species. An attempt would be made to determine the marketing and the potential for processing of the marketable products of the selected species.

SUMMARY OF FIVE YEARS PROJECT COSTS

No.	Cost Item	Year 1	Year 2	Year 3	Year 4	Year 5	Total
1	Preliminary Survey	5.000	----------	----------	----------	----------	5,000
2	Establishment of Nurseries	25,800	25,800	----------	----------	----------	51,600
3	6 Nurseries Technicians	21,600	21,600	21,600	21,600	21,600	108,000
4	3 Drivers	9,000	9,000	9,000	9,000	9,000	45,000
5	Skilled laborers	36,000	36,000	36,000	36,000	36,000	180,000
6	2 Area Managers	12,000	12,000	12,000	12,000	12,000	60,000

7	Nursery Equipment	6,000	4,000	4,000	4,000	4,000	22,000
8	Project Manager	24,000	24,000	24,000	24,000	24,000	120,000
9	Fencing of Nurseries	1,200	1,200	--------	--------	--------	2,400
10	Transport -3 Vehicles and Maintenance	39,000	3,000	3,000	3,000	3,000	51,000
	Fuel for 3 Vehicles	18,780	18,780	18,780	18,780	18,780	93,900
11	Farmer Training and Extension	24,000	24,000	24,000	12,000	12,000	96,000
12	Administratio n Cost	24,000	24,000	22,000	22,000	20,000	112,000
13	Sub-total	246,380	202,580	176,780	162,380	160,380	948,500
14	Contingency 10%	24,638	20,258	17,678	16,238	16,038	94,850
15	Grand Total	271,018	222,838	194,458	178,618	176,418	1,043,350

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2.7. Project Profile 7: Project Proposal Charcoal Production from Prosopis and Replacement with Crop Production

INTRODUCTION

Prosopis juliflora is noxious and invasive plant species. It denies other plants water and sunlight. It is highly competitive due to the following factors: (i) it is fast growing and nitrogen-fixing; (ii) it is tolerant to arid conditions and saline soils; (iii) it is deep rooted and was found to reach a depth of 53.3 meters (175 feet); (iv) it contains chemicals that inhibits the germination and the spread of other plant species where it grows; and (v) its seeds are spread by animals that feed on its pods, although the leaves are not palatable. Due to its high competitiveness it has taken over farmland, rangeland and forests. It also reduces the access to land because of its thick vegetation and thorns. Its thorns also wound animals. Therefore, there is a need to control it and use it for the benefit of affected communities. In several countries, starting in India, Prosopis juliflora was successfully use for charcoal production and the land under it can be recovered and used for agriculture (Reddy, 2007).

Prosopis juliflora in Somalia

The year of introduction into Somalia is not yet clear, however, there is little documentation that might give some ideas about the introduction. For example AFRICARE (1983) reported the introduction of *Prosopis juliflora* in Somalia as part of a reforestation project for sand dune stabilization in a refugee impacted areas in the Hiran region of central Somalia. In this study, eighteen tree/shrub species were planted and have become established. Among the tree species, *Prosopis juliflora* out-performed all other tree species. The testing of *Prosopis chilences* as part a reforestation project in southern Somalia was reported by Leslie (1989). The introduction of the *Prosopis juliflora* in Somaliland was reported in 1959 by Mooney, the first forest officer to the protectorate. Mooney (1959) noted small experimental planting at Sheikh, Gaan Libah, Lafarug, Berbera and Manjassah. The species listed are *Eucalyptus camaldulensis, Pinus halepensis,* ***Prosopis sp.*** *and Acacia sp.* Sand dunes stabilization program started in Marka and Shalanbood in 1973. Up to 1980 about 5,900 ha were claimed as stabilized (FAO,1984). The species used in the stabilization included *Commiphora spp*., and *Anacardium occidental*. No mention on *Prosopis juliflora*. The Somalis call the plant; "**Keligii Noole" or "sole survivor" and "Gran Waa", "the Unknown"**, because of its aggressive take-over of range and forest lands.

Charcoal Production

This aggressive weed species can be cut with mechanical sow or sprayed with round-up herbicide, which will kill it completely. However, the round-up herbicide has some negative health factor and mechanical sows are better option. The dry residual wood can be made into charcoal and be replaced by useful plants or crops, depending on the ecology of the target area. Communities in the affected area could be assisted to initiate the charcoal making and marketing as was done in some areas of India (Reddy, 2007). The communities could be provided with the mechanical sows at the initial stage, however, the system will become sustainable once the charcoal production become successful. Project costing and components need to be determined.

PROJECT IMPLEMENTATION AND COSTING

The project implementation and costing are yet to be determine and shall be finalized in consultation with the target communities and line ministries.

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2.8. Project Profile 8: Up scaling the Use of Solar Energy

Solar energy including: street lighting, private homes use and plans of Benadir Electric Company (BECO) to add three solar sub-stations into its Mogadishu grid, are good beginning. In addition, in Somaliland and Puntland, the use of solar energy in private residences is on the increase. Therefore, given the high potential of solar energy in Somalia, with estimated capacity of 2,163,991,069 MWh/year, the government in partnership with the private sector should formulate policies and projects to extend the technology to rural towns and communities. Samples of the solar street lights, in Mogadishu, which could be replicated, are indicated below and costing need to be determined once project scope is known.

Solar Street Lights in Mogadishu

The solar panels installed on a high ground provide power to pump water distributed through a pipeline to the community, school and a health centre in Lasa-Dacawo Village.

PROJECT COMPONENTS, IMPLEMENTATION AND COSTING

The project components, implementation and costing require further studies and consultation with government agencies and private sector involving more in depth studies of needs and potential.

2.9. Project Profile 9: Marine and Coastal Environmental Governance and Management of Somalia

Somalia is located on the Horn of Africa; its Coastal line is 3,333 km long. The country has the potential for sustainable fish harvesting of about 200,000-300,000 tons per annum, however, prior to the civil war only 15,000 ton per annum were produced. In addition, as a result of the civil war the country experienced marine and coastal environmental degradation. Coastal and marine habitats and resources of Somalia suffered from habitat destruction, pollution resulting from oil spillage, dumping waste and resource over exploitation by illegal foreign fishing vessels, rapid urbanization and coastal population growth. Climate change is further exacerbating pressures on marine and coastal areas.

Therefore, taking into account to the above stated pressures, the Office of State Minister for the Environment in the Office of the Prime Minister of the Federal Republic of Somalia will focus on:

1. Defining national research assessment in order to plan for coastal and marine environment management;
2. More effective and targeted dissemination of research findings;
3. Improving the accessibility of scientific data and information;
4. Promoting indigenous knowledge for management in order enhance the involvement of the coastal communities;
5. Improving the generation of knowledge through direct research programs and projects;
6. Support the development and consistency of periodic reporting of coastal and marine bordering State to the Federal and Regional Administrations levels;
7. Promoting the participation of experts, scientists, managers, decision and policy makers at Federal and Regional Administrations levels
8. Arranging National Environment on Marine and Coastal management symposia or conferences;

POTENTIAL IMPACT OF CLIMATE CHANGE ON SEA LEVEL RICE

A rise of sea level occurs when the volume of water in ocean basin increases. For instance, an increase in atmospheric temperatures results in warming and expansion of oceans, which results in a sea level rise. Sea level rise is therefore threatening coastal communities, through (a) flooding of low lying coastal lands, estuaries, deltas and salt marches; and (b) affecting fish nesting and fishing grounds, e.g wetlands, and coral reefs, mangrove forests and marshes.

ACTIONS TO CONTRIBUTE TO THE REDUCTION OF CLIMATE CHANGE

Climate change is becoming a global problem that calls for a global solution. International meetings have been held to discuss the phenomena and ways to address it. In case of Somalia to address these matters, it is necessary to take following measures:

1. Raising awareness among ordinary people would greatly minimize greenhouse gas emitting activities;
2. Saving energy- Turning off lights when not needed;
3. Recycling for wastes like paper, organic (food), plastic, battery, electronics, glass, metals;
4. Reforestation, and using trees to provide shade that helps keep the soil and local environment cooler; and
5. Enhancing agricultural productivity in order to reduce the expansion of inefficient farming.

INVESTMENT COST FOR IMPROVEMENT AND SUSTAINABLE MANAGEMENT OF COASTAL AND MARINE RESOURCES

In order to restore the Marine and Coastal Environment of Somalia, including the re-planting of mangroves, protecting marine species, preventing and halting coastal mining stones for urban construction through environmental policy, legal and regulatory actions, mass media awareness, arranging workshops, seminars and meetings to build up the capacity of the coastal communities to contribute to sustainable development of coastal and marine resources and to through remedial action regain depleted resources .

PROJECT COSTING

Project Components	Cost Million US $
Studies of the Status of the Marine Environment	3.0
Environmental Policies and Legal Framework Formulation and Implementation	1.0
Establishment of 10 Coastal Nurseries	2.5
Protection and Replanting of Coastal Mangroves and Protection of Coral Reefs	4.0
Media Awareness	0.5
Training Workshops and Seminars	0.5
Protection Against Illegal Fishing and Dumping of Waste and Oil Spill	5.0
Coastal Infrastructural Development	12.0
Sub-Total	28.5
10% Administrative Cost	2.85
Grand Total	31.35

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South Africa's Intended Nationally Determined Contribution (INDC)

Introduction

In accordance with decision 1/CP.19 and 1/CP.20 of the Conference of the Parties to the United Nations Framework on Climate Change, South Africa hereby submits its intended nationally determined contribution (INDC) on adaptation, mitigation as well as finance and investment requirements for both. This INDC has been developed on the understanding that the Paris Agreement will be binding, fair, effective and incorporate a "no-backsliding" and a "progressive" approach to enhance climate change mitigation and adaptation implementation and ambition. This implementation and ambition will be enabled by finance and technology and capacity building support. In this context, South Africa has transitioned its international mitigation commitment from a relative "deviation from Business-as-usual" to an absolute peak, plateau and decline greenhouse gas emissions trajectory range.

South Africa is committed to addressing climate change based on science and equity. Climate change is already a measurable reality, and is primarily as a result of the rising concentration due to human induced cumulative emissions of long-lived greenhouse gases (GHG) in the atmosphere since the industrial revolution in the mid 1800's. South Africa has observed and is projecting further trends of marked temperature increases, rainfall variation and rising sea levels as well as an increased frequency of severe weather events. South Africa's response is informed by the findings of the Intergovernmental Panel on Climate Change (IPCC) that warming of the climate system is unequivocal, and the understanding that further mitigation efforts by all are needed to avoid high to very high risk of severe, widespread, and irreversible impacts globally. However, irrespective of any adequate mitigation efforts, the IPCC also concludes that, due to the inertia and long response time lags in the global climate system, adverse impacts of climate change are inevitable. Given that poor countries and communities have the least responsibility for the challenge of global climate change but are the most vulnerable to its impacts, adaptation to the adverse effects of climate change is also a global responsibility and concern.

The nature of the climate change challenge is one characterised by the overuse of a global commons in an unequal world. Along with other developing countries, South Africa is especially vulnerable to its impacts, particularly in respect of water and food security, as well as impacts on health, human settlements, and infrastructure and ecosystem services. In this regard, South Africa is committed to cooperative efforts to adapt to the unavoidable adverse impacts of climate change. With regard to an ultimate solution to the global challenge of climate change, South Africa is firmly committed to working with others to ensure temperature increases are kept well below 2°C above pre-industrial levels, which could include a further revision of the temperature goal to below 1.5°C in light of emerging science, noting that global average temperature increase of 2°C translates to up to 4°C for South Africa by the end of the century.

This temperature goal is an essential starting point for our INDC, and we believe this goal should inform all countries' contributions – in relation to both adaptation and mitigation. More and earlier mitigation means fewer unavoidable impacts, lessening the requirement for adaptation investment. Near zero emissions of CO_2 and other long-lived GHGs are needed in the second half of the century to avoid even greater impacts that are beyond adaptation capability. The solution must lie in collective action.

Context: National Priorities and Circumstances

South Africa's national response considers both development needs and climate change imperatives. South Africa faces the challenge of climate change as a developing country, with overriding priorities to eliminate poverty and eradicate inequality. Eliminating poverty and eradicating inequality requires addressing major challenges in creating decent employment, which in turn requires sustainable economic development, improving basic education, health and social welfare and many other basic needs such as access to food, shelter and modern energy services. In addition, South Africa is presently facing acute energy challenges that hamper economic development. As a result of the historical development pathway of its energy sector, South Africa is currently heavily dependent on coal, with a fleet of old and inefficient coal-fired power plants that are nearing, but not yet at, the end of their design life-cycles as well as being reliant on a significant proportion of its liquid fuels being generated from coal.

Therefore, in the short-term (up to 2025), South Africa faces significant rigidity in its economy and any policy-driven transition to a low carbon and climate resilient society must take into account and emphasise its overriding priority to address poverty and inequality. South Africa's INDC should be understood in the context of these and other national circumstances.

South Africa's INDC was formulated in the context of, *inter alia,* the environmental right set out in section 24 of the Constitution, and its National Development Plan (NDP) (NPC, 2012), which provides a '2030 vision' to guide the country's sustainable development trajectory where poverty is eliminated and inequalities are reduced by 2030. The implementation of the 2030 NDP vision is further elaborated in its climate policy (the 2011 National Climate Change Response Policy (NCCRP)), climate-compatible sectoral plans and its National Sustainable Development Strategy. Good progress has been made in implementing climate-compatible sectoral plans, such as the integrated energy and electricity plans (IEP and IRP), industrial policy action plans (IPAP) and the new growth path (NGP).

The full implementation of these policies and plans will bend the curve of South Africa's GHG emissions towards a peak, plateau and decline trajectory range. South Africa is putting in place a mitigation system to realise the opportunities of a low-carbon economy while being mindful that an inclusive and just transition requires time and well planned low-carbon and climate resilient development. In order to ramp up implementation of these policies and plans over time, South Africa is investing heavily in transforming its energy sector. At the heart of this part of the transition to a low-carbon energy sector is a complete transformation of the future energy mix, which is designed to replace an inefficient fleet of ageing coal-fired power plants with clean and high efficiency technology going forward. To date, we have facilitated substantial investment in renewable energy and two new high-efficiency coal-fired power stations are nearing completion as part of the ageing plant replacement programme. In addition, programmes to increase efficiency and reduce emissions intensity across the economy are being rolled out.

South Africa is developing a National Climate Change Adaptation Strategy and Plan to be integrated into all relevant sector plans, and upon which its UNFCCC National Adaptation Plan (NAP) will be based. This plan is informed by an assessment of sectoral, cross-sectoral and geographical vulnerabilities to the adverse impacts of climate change, and it will quantify and present pathways for adaptation, towards an inclusive and just transition to a climate resilient economy and society, taking into account local and indigenous knowledge, gender considerations, as well as social, economic and environmental implications. South

Africa considers its adaptation component of its INDC to be an important contribution to the global response to climate change.

Assumptions

South Africa's INDC is premised on the adoption of a comprehensive, ambitious, fair, effective and binding multilateral rules-based agreement under the UNFCCC at the 21st Conference of the Parties (COP21) in Paris. It is assumed that this agreement will attract the full participation of all Parties to the Convention and, consistent with scientific requirements in the short, medium and long term, deliver the necessary ambitious mitigation and adaptation commitments, enabled and supported by significant climate finance and investment, accessible and affordable technology and substantial capacity building commitments. South Africa expects the Agreement will include effective arrangements for transparency of action and support. It is further assumed that all of these commitments will give effect to the principles of equity and common but differentiated responsibilities and respective capabilities.

It is assumed that this agreement will provide the multilateral rule-based infrastructure, mechanisms and tools to enhance international and regional cooperation on mitigation. Further, that this cooperative effort enables and supports Parties' capability to transition to low carbon economies and societies in a manner that addresses the social, economic and environmental dimensions of their sustainable development.

The adverse effects of climate change have been a stark reality for South Africa for many years. The evidence clearly emphasises the need for Parties to build resilience and adaptive capacity to understand and respond to climate change risk and vulnerability, through developing and optimising climate change adaptation policy, planning, technology, practice and implementation coherence of developmental programmes and actions. It is assumed that the agreement will enhance international and regional cooperation on adaptation that enables and supports Parties capability to increasingly integrate adaptation into their climate resilient sustainable development planning and implementation processes, as well as to support their climate risk management, emergency and recovery responses to unavoidable climate and weather related adverse impacts.

Adaptation component of the INDC (A-INDC)

The adaptation component of South Africa's INDC will address adaptation through six goals, underpinned by key elements of adaptation planning, costing of adaptation investment requirements, equity, and means of implementation. The table below outlines information on the adaptation component of South Africa's INDC, based on the commitments of Parties provided for in Article 4 and the provisions of Article 12 of the Convention. This information enables Parties to meet commitments under Article 4.4 and the provisions of Article 12 of the Convention in relation to adaptation

Element	Undertaking for the period 2020-2030	Assumptions / Methodologies	Adaptation investment (2020 – 2030)
Adaptation objectives and	**Goal 1:** Develop a National Adaptation	National Development Plan Vision 2030, sector plans and any	$US 0.17[1]bn per annum

[1] Currency exchange rate used is 10 South African Rand to 1 US dollar

Element	Undertaking for the period 2020-2030	Assumptions / Methodologies	Adaptation investment (2020 – 2030)
planning for implementation	Plan, and begin operationalisation as part of implementing the NCCRP for the period from 2020 to 2025 and for the period 2025 to 2030	future variants thereof are the underpinning foundation for sustainable development planning in South Africa. The NCCRP provides guiding principles and will form the basis for the integrative NAP focused on vulnerable sectors and geographic vulnerabilities.	
	Goal 2: Take into account climate considerations in national development, sub-national and sector policy frameworks for the period 2020 to 2030	Integrate flexible adaptation sector policies and measures into national and sub-national policy frameworks to enable implementation of climate change adaptation programmes and projects. Sector adaptation plans will be integrated into broader sector plans consistent with relevant sector planning or regulatory legislation.	
	Goal 3: Build the necessary institutional capacity for climate change response planning and implementation for the period 2020 to 2030	National and sub-national policy and legislation development and budget reprioritisation to enable institutional capability to plan and implement catalytic adaptation programmes and projects. Comprehensive adaptation related training of development planners, regulators and practitioners. Specific adaptation planning at sub-national level, taking into account specific or unique geographical circumstances, will be integrated into sub-national development frameworks, land use schemes and the planning authorisation system in terms of provisions of and standards set in the Spatial Land Use Management Act (SPLUMA).	
	Goal 4: Develop an early warning, vulnerability and adaptation monitoring system for key climate	Development of national framework for early warning, vulnerability and needs assessment well before 2020. Develop and support a climate	

Element	Undertaking for the period 2020-2030	Assumptions / Methodologies	Adaptation investment (2020 – 2030)
	vulnerable sectors and geographic areas for the period 2020 to 2030, and reporting in terms of the National Adaptation Plan with rolling five-year implementation periods	change early warning and vulnerability network with the involvement of relevant stakeholders, e.g. SA Weather Services, SA Earth Observation Network, the downscaling modelling and adaptation academic community etc.	
Adaptation needs and costs	**Goal 5:** Development of a vulnerability assessment and adaptation needs framework by 2020 to support a continuous presentation of adaptation needs	Biennial study of climate related impacts and responses detect through the early warning, vulnerability and adaptation monitoring system, with a view to determine cost effectiveness of responses and recommend improved or alternative responses. Damage costs associated with severe climate related events (wild fires, storms, droughts and floods), including both direct and downstream costs were estimated for the present-day climate and for the near future under low and moderate-high mitigation scenarios. Emission scenarios considered are RCP 8.5 (low mitigation) and RCP 4.5 (moderate-high mitigation). The cost estimates provided are in terms of the 10th and 90th percentiles of annual costs occurring within the periods of interest. Annual costs were estimated for 2020-2030 and 2020-2050. Sectors covered; Water, Agriculture, Forestry, Energy, Settlements, Biodiversity, Disaster Risk Reduction (DRR)	**Estimated annual costs range(s):** **From 1971-2000:** $US 0.4 bn to $US 22.8 bn with a median value of $US2.8 bn **From 2020-2030:** Low mitigation scenario: $US 0.42 bn - $US 30.8 bn with a median value of $US2.9bn; Moderate-High mitigation scenario: $US 3.4 bn - $US 29.8 bn with a median value of $2.8bn **From 2020-2050:** Low mitigation scenario: US$ 0.2 bn - $US 53.1 bn with a median value of $US3bn High mitigation scenario: $US 0.2 bn– $US 50.0 bn with a median value of $US50 bn
Adaptation investments	**Goal 6:** Communication of past investments in adaptation for education and awareness as well as for international recognition	Development & implementation of a climate change adaptation communication, education and awareness framework, with a view to drive behaviour change based on the early warning and vulnerability assessments and studies of response effectiveness. Specific indicators for tracking outcomes and scale of domestic	Domestic investment into capacity to facilitate climate change adaptation increased from $US 0.29 million to $US 1.4 million from 2011 to 2015

Element	Undertaking for the period 2020-2030	Assumptions / Methodologies	Adaptation investment (2020 – 2030)
		investment and any international support will be developed and reported. Adaptation investments were gleaned from official annual reports. The years covered are 2010 – 2015.	Implementation investment in adaptation programmes increased from $US 0.71 bn to $US 1.88 bn from 2010 to 2015. Support from the international financial mechanisms: Adaptation fund: $10 Million; UNEP: $3.5 Million
Equity considerations in adaptation	South Africa views adaptation as a global responsibility in the light of Article 2 of the Convention as further codified in the UNFCCC as a temperature goal. Further understanding climate impacts as being driven by global inaction / action on mitigation, the adaptation burden is therefore a global responsibility. It is in that light that South Africa considers its investments in adaptation as a contribution to the global effort, which should be recognised as such. Further information is provided in the equity section of the INDC.		

Mitigation component of the INDC (M-INDC)

In keeping with South Africa's commitment to progress its contribution to the global effort to mitigate climate change in line with the principle of common but differentiated responsibilities and respective capabilities, South Africa's mitigation component of its INDC moves from a "deviation from business-as-usual" form of commitment and takes the form of a peak, plateau and decline GHG emissions trajectory range. South Africa's emissions by 2025 and 2030 will be in a range between 398 and 614 Mt CO2–eq, as defined in national policy. This is the benchmark against which the efficacy of mitigation actions will be measured. The table below outlines elements in para 14 of 1/CP.20, further specifying the mitigation component of South Africa's INDC:

Reference point (including, as appropriate, a base year)	Peak, plateau and decline (PPD) is a GHG emissions trajectory range after mitigation. The starting point for PPD considered here is 2020 year-end.
Time frames and / or periods for implementation	The time-frames within the PPD trajectory range that are communicated in South Africa's INDC are 2025 and 2030, in which emissions will be in a range between 398 and 614 Mt CO2–eq. The INDC reflects SA's full mitigation potential as assessed in 2014. The policy instruments under development include a carbon tax, desired emission reduction outcomes (DEROs) for sectors, company-level carbon budgets, as well as regulatory standards and controls for specifically identified GHG pollutants and emitters. South Africa will use five-year periods of implementation at the national level, specifically, 2016-2020 focused on developing and demonstrating the above mix of policies and measures in order to meet South Africa's

	Cancun pledge, and the periods 2021-2025 and 2026-2030 for this INDC. This level of effort will enable South Africa's greenhouse gas emissions to peak between 2020 and 2025, plateau for approximately a decade and decline in absolute terms thereafter. Periodic domestic reviews will ensure a dynamic system, in which the stringency of short-term carbon budgets can be adjusted in successive implementation periods to ensure that South Africa remains within the overall carbon budget, which is the area under the PPD trajectory range. Depending on the latest available science, the success of this mix of mitigation policies and measures, new accessible and affordable technology, increased capability and emerging mitigation opportunities the PPD trajectory range may also be adjusted, without compromising the overall ambition of South Africa's long-term contribution to the global mitigation effort.
Scope and coverage	Economy-wide, all sectors, six greenhouse gases (GHGs), with a material focus on three GHGs: carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O). Sources considered are the ones in the latest GHG inventory (see below). IPCC major categories: energy, IPPU, waste and AFOLU (agriculture, forestry and other land use). Increased disaggregation over time will be enabled through the introduction of mandatory GHG reporting domestically, no later than 2016, with regular reporting to the UNFCCC as multi-laterally agreed.
Planning processes, assumptions and methodological approaches including those for estimating and accounting for anthropogenic greenhouse gas emissions and, as appropriate, removals	*Planning processes*: The approach to the current INDC is based on national climate policy (NCCRP) and the national development plan (NDP), and will be given effect through energy, industrial and other plans and legislation. *Assumptions*: In accordance with the Convention, it is assumed that the extent to which developing country Parties will effectively implement their commitments will depend on the effective implementation by developed country Parties of their commitments under the Convention relating to financial resources, development and transfer of technology, and capacity building. The INDC is put forward within the context of equitable access to sustainable development and will take fully into account that equity, economic and social development and poverty eradication are the first and overriding priorities. In this context, South Africa's INDC assumes the finalisation of an ambitious, fair, effective and binding multilateral agreement under the UNFCCC at COP 21 in Paris that further elaborates these commitments. *PPD trajectory range*: South Africa's NCCRP "details the 'peak, plateau and decline trajectory' used as the initial benchmark against which the efficacy of mitigation actions will be measured". This is the PPD trajectory range in the INDC. Values for key years are specified in the NCCRP. *Mitigation potential*: Initial detailed studies of mitigation potential (2007) informed the aforegoing, with a base year 2003 for projections; these have been updated (2014; base year 2010), with the intention of on-going updating and improvement. *Methodologies for Estimating Emissions*: 2006 IPCC guidelines *Metric applied*: 100-year Global Warming Potential, as in the IPCC's 4th Assessment Report (AR4). Note that the current GHG inventory, consistent with the 2006 IPCC guideline reporting requirements, used GWPs from the Third Assessment Report (TAR) and indicated that future inventories will use GWP values from AR4.

	Approach to AFOLU: Agriculture, forestry and other land use (AFOLU) are included as one of the major IPCC categories. The greater uncertainty in AFOLU emissions should be noted, as well as the intention to reduce uncertainty over time.
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	A relative fair share of aggregate commitments required to limit temperature increase to well below 2°C above pre-industrial levels requires understanding of what others will do, and an equitable effort-sharing paradigm, such as the proposal for the Paris agreement to elaborate an equity reference framework. In the absence of a multi-laterally agreed equity reference framework, South African experts, applying Convention principles of responsibility, capability and access to equitable sustainable development, determined a carbon budget that is larger than the PPD trajectory range outlined in this INDC. South Africa has used this evidence base to evaluate whether its INDC is a relative fair effort. In the context of this objective assessment of South Africa is of the view that its contribution is both fair and ambitious. The PPD trajectory range is an ambitious and fair effort in the context of national circumstances, and priorities to eliminate poverty and inequality, promote inclusive economic growth and reduce unemployment. It presents a trajectory that is consistent with a just transition to a low carbon and climate-resilient future. South Africa is committed to a response to climate change based on science and equity, which has informed this INDC and will continue to inform our climate change response. We consider that equity applies to mitigation, adaptation and support for both. Hence further details on equitable access to sustainable development are outlined below. IPCC AR5 has provided relevant scientific information on the limited remaining future global carbon budget consistent with achieving the objective of the Convention as set out in its Article 2. Within the context of the Convention principles of equity and common but differentiated responsibility South Africa's shift from a "deviation from business-as-usual" commitment to a peak, plateau and decline GHG emissions trajectory range in its INDC fully aligns with the IPPC AR5 future global carbon budget. Carbon budgets are an important form of flexibility at the national level; if emissions are below the benchmark trajectory range in a given year, they can exceed it in another year.

Support component of INDC (S-INDC)

The key challenge for South Africa is to catalyse, at an economy-wide scale, financing of and investment in the transition to a low carbon and climate resilient economy and society. In this context, South Africa's S-INDC comprises indicative scales of finance and investment required for both adaptation and mitigation, based on analyses of specific sectors and initiatives. The finance and investments are required to enable and support the deployment of low carbon and adaptation technology as well as building the capacity to govern, regulate, install and operate these technologies.

South Africa has already investing about 6% of what would be the upper end of the costs of its adaptation per annum for the period 2021 to 2030. Since 2010 South Africa has invested

in adaptation, with an increasing national capacity building expenditure over time from US$0.28m in 2010 to US$1.2m in 2015 per year. Over the same period, the total annual investment in implementation increased from US$0.18 to US$0.59 bn per year in the Agriculture and Forestry sectors; from US$ 0.23bn to US$0.36 bn in the Energy sector, from US$0.01 bn to $US 0.02 bn in Human Settlements sector; from US$ 0.03 bn to US$ 0.05 bn in Biodiversity sector; from US$ 0.17 bn to US$ 0.59 bn in the Water sector; and from US$0.02 bn to US$ 0.7 bn in the disaster risk reduction and emergency response sector. The total investment in adaptation therefore increased from US$ 1.64 bn in 2010 to US$ 2.31 bn in 2015.

Some of the key programmes that will have to be scaled up further, include:

1. Working for Water (WfW) and Working on Fire estimated at US$1.2 bn per year.
2. Working on Wetlands estimated at US$0.12 bn per year.
3. Water Conservation and Demand Management estimated at US$5.3 bn per year.
4. Land restoration estimated at US$0.07 bn per year.

South Africa seeks recognition of its national investments in adaptation as part of its relative fair global effort and analysis of future scenarios indicate a significant increase in requirements. For the period 2021-2030 relative to 1971-2000, under RCP8.5 (low mitigation), an increase of 4% in the median of costs is projected, with a 35% increase in the 90th percentile of costs (that is, extreme years are already significantly more expensive). The corresponding figures are similar for RCP4.5 (medium-high mitigation): no change is projected in terms of the median of costs, but a 31% increase is projected in terms of the 90th percentile. For the period 2021-2050, the median of year-costs is projected to be 12% more expensive than the 1971-2000 value under low mitigation, with a 132% increase in the cost of extreme years (90th percentiles). For the case of medium-high mitigation these values are projected to be a 2% decrease in the cost of median-years, but with a similar increase of 119% in terms of the costs of extreme years.

South Africa has already made significant investments in mitigation. As part of a Renewable Energy Independent Power Producer Procurement Programme (REI4P) has approved 79 renewable energy IPP projects, total 5 243MW, with private investment totalling ZAR 192 billion (approx. US$ 16 billion). Another 6300 MW are under consideration. Investment in public transport infrastructure was US$ 0.5 billion in 2012, and is expected to continue growing at 5% per year. South Africa established a South African Green Fund with an allocated US$ 0.11 billion in the 2011 to 2013 budgets to support catalytic and demonstration green economy initiatives. Resources for the Fund will have to be increased in future to enable and support the scaling up of viable and successful initiatives, including contributions from domestic, private sector and international sources.

Analysis of the incremental costs of mitigation actions indicates that significant finance and investment will be required in the long-term. The following estimates are of total incremental costs required:

1. Estimated incremental cost to expand REI4P in next ten years: US$3 billion per year.
2. Decarbonised electricity by 2050 - estimated total of US$349 billion from 2010.
3. CCS: 23 Mt CO2 from the coal-to-liquid plant - US$0.45 billion.
4. Electric vehicles - US$513 billion from 2010 till 2050.
5. Hybrid electric vehicles: 20% by 2030 - US$488 billion

These costs are derived from energy systems and economic modelling. Further work is needed to prepare detailed business plans for finance and investment in mitigation. These numbers are presented for information to clarify the order of magnitude of mitigation finance and investment requirements.

Some technologies that could help South Africa to further reduce emissions that have been identified include: Energy efficient lighting; variable speed drives and efficient motors; energy efficient appliances; solar water heaters; electric and hybrid electric vehicles; solar PV; wind power; carbon capture and sequestration; and advanced bio-energy.

South Africa is implementing a mitigation system to move from analysis of mitigation potential to full implementation, however, human and institutional capacity needs to be further enhanced. The information on investments estimated in energy and economic models indicate relatively small impacts on GDP. Other socio-economic implications, notably any negative impacts on employment, need to be avoided and will be studied empirically as further mitigation measures are put in place. Current analysis of investments in renewable energy projects shows that these have a positive impact on the economy. Such analysis should further provide enhanced information through financial analysis and specific investment proposals. South Africa proposes that the COP should consider a process for improvement of information on finance and investments required, and how this can be integrated into existing reporting by developed and developing countries. The international frameworks should also effectively operationalize support for the enhancement of existing human, intellectual and institutional capacity, at the domestic and regional levels.

Equitable access to sustainable development

The core principles of equity, responsibility, capability and sustainable development are the basis of South Africa's INDC. Equity relates to adaptation, mitigation and all forms of investment and support.

Equity does not only relate to Parties' respective mitigation actions, as those least responsible for the problem of global climate change, namely poor countries and communities, are most vulnerable to its impacts. Those countries therefore need to take urgent and costly adaptation actions. If insufficient mitigation is implemented globally, and average global temperatures exceed 2 °C, even more adaptation will be required, effectively shifting the burden of climate action onto developing countries. Those who have a greater responsibility for cumulative emissions that have driven up GHG concentrations in the atmosphere should, as a matter of fairness, assist those less responsible. Furthermore, investments in adaptation represent a significant opportunity cost with respect to investments required to reduce poverty and inequality, create employment, improve education and address other development challenges.

Regarding mitigation, as noted in the table above, analysis by South African experts reports that a fairly apportioned overall carbon budget for South Africa for the period from 2015 to 2050 would exceed the budget implied by the upper limit of the PPD trajectory range, although other approaches to equity report a much lower number.[2] South Africa considers the PPD range to be an equitable contribution to the global mitigation effort, given South Africa's current and historical emissions and its national circumstances (especially its development challenges). The PPD emissions trajectory range focuses on the trend in emissions over time. Additionally, defining a carbon budget or space over time provides

[2] The carbon budget approach of Chinese (CASS / DRC joint project team 2011) and Indian researchers (Jayaraman , Kanitkar & dsouza 2011) allocates 7-11 Gt CO_2 –eq to South Africa for the period 2000–2049, and a meta-analysis of different approaches shows that the analysis of different effort-sharing approaches yields carbon budgets for South Africa that are significantly smaller than the PPD trajectory range. Only the lower PPD is within the range calculated using the PRIMAP tool in 2020. In 2025 and 2030, none of the PPD values overlap with the calculated ranges.

flexibility in emissions for a given year. The national carbon budget range for the period 2021-2025 is 1.99 -3.01 Gt CO_2-eq and for 2026-2030 is in the range of 1.99 to 3.07 Gt CO_2-eq.

An assessment of equity also needs to take into account means of implementation. Generally, South Africa needs time for development, which is necessary to eliminate poverty, reduce inequality, increase employment and promote inclusive economic growth, while simultaneously seeking to contribute to mitigation and assist our vulnerable communities in adapting to climate impacts. Some specific finance and investment requirements for both adaptation and mitigation have been initially quantified above.

Uncertainties

Uncertainty should be noted in two respects. Firstly, the greater uncertainty in AFOLU emissions (relative to other sectors) has been noted above. South Africa's current understanding is that our land sector is estimated to be a net sink. The intention is to reduce uncertainty in data over time, with a view to a comprehensive accounting approach for land-based emissions and removals. Secondly, trace gases are less material and data is more uncertain than for the three major gases. For the current GHG inventory, submitted to the UNFCCC as part of SA's first biennial update report (2014), data was gathered for CO_2, CH_4 and N_2O. Certain HFCs and PFCs were reported on in the IPPU (industrial processes and product use) sectors. Fluorinated gases are estimated to have contributed less than 0.3% to the total GHG budget over the period 2000 – 2010. A process is under way to estimate SF_6 emissions from power generation. Uncertainties such as the above are to be bounded over time. In the on-going process of implementing the mitigation system, methodologies will be improved.[3]

Uncertainties exist in the adaptation methodology used to estimate costs. These methodologies can be further improved and will benefit from exchanges with others using similar methodologies.

[3] National policy indicates that the national GHG Emissions Trajectory Range may be reviewed in the light of monitoring and evaluation results, technological advances or new science, evidence and information.

Republic of South Sudan

Intended Nationally Determined Contribution (Draft)

Introduction

1. The Republic of South Sudan gained its independence from Sudan on 9 July 2011 after more than 50 years of a protracted war that claimed over 3 million lives and displaced over a million people. The long conflict destroyed the little infrastructure and governance structures that existed prior to the conflict. Thus, South Sudan is the one of the least developed countries in Africa, and as such is highly vulnerable to climate change.

2. South Sudan is vulnerable to climate change and associated socio-economic losses and damages due to the dependence of its population on climate-sensitive natural resources for their livelihoods. Furthermore, there is currently limited institutional and technical capacity, appropriate technologies and financial resources to support the implementation of interventions for adaptation to climate change.

3. The Ministry of Environment has developed an Environment Policy Framework and Environmental Bill that will regulate the exploitation of natural resources and all forms of socio-economic development in the country. The Policy and Bill, when operationalized, will address the drivers of environmental degradation and contribute towards the mitigation of climate change while ushering the country towards a path of environmentally sustainable development.

4. To respond to the negative impacts of climate change, the Ministry of Environment, other line ministries and civil society stakeholders – with the support of UNEP – is currently developing a National Adaptation Program of Actions (NAPA, 2015). This will form the basis for adapting to the new realities of climate change impacts.

5. Within the context of these national circumstances, South Sudan's Intended Nationally Determined Contributions (INDCs) are based on a cross-sectoral consultative process involving multiple stakeholders that was conducted in parallel to the NAPA preparatory work and associated meetings. The INDCs will also contribute towards the attainment of South Sudan Vision 2040 and the South Sudan Development Plan, both of which aim to, amongst other objectives, ensure that economic development is environmentally sustainable.

National Circumstances

6. South Sudan, the world's newest nation, is a landlocked country located in north-eastern Africa, with a total area of 619,745 km^2 and a population of approximately 12,340,000 (2015 estimates). South Sudan is highly vulnerable to the impacts of climate change. The country's population is highly dependent on climate-sensitive sectors such as agriculture (that is mainly rain-fed) for their

livelihoods. Moreover, climate change is expected to have impacts on the energy, tourism, water and health sectors. Climate hazards have caused considerable losses across the country's sectors over the years. The most frequently occurring climate hazards include droughts and floods, which cause economic losses to the country. For example, the East African drought of 2011 resulted in famine, loss of life and loss of livelihoods in South Sudan. In addition, flooding in July–August 2014 resulted in deaths, displacement of over 40,000 people, destruction of property and a widespread malaria epidemic. In September 2015, flooding displaced 2,000–3,000 households.

7. South Sudan is vulnerable to the impacts of climate change due to its poor infrastructure and a range of development challenges resulting from over 50 years of conflict. While the export of oil is the main economic sector accounting for over 98% of the GDP, 95% of the population depend on climate-sensitive natural resources, particularly rain-fed, subsistence agriculture and total dependence on forests as a source of energy (fuel wood and charcoal) and other environmental goods and services.

8. Climate change has impacted these socio-economic activities, particularly as unpredictable rain patterns, recurrent droughts, flash flooding and excessive heat have resulted to crop failures causing food insecurity and famine.

9. South Sudan has the among the largest livestock populations in Africa. Climate change threatens the existence of these livestock as well as the livelihoods of pastoralist communities due to the loss of pasture lands and reduced access to water resources. This has further resulted in deadly conflicts among the pastoralist communities that have claimed many lives. The impacts of climate change thus also cause national security issues.

10. There are limited data on GHG emissions available in South Sudan, due to the history of conflict, limited capacity and a lack of financial resources. However, as an under-developed country with limited industrial activities, South Sudan's total GHG emissions are estimated to be relatively low. Emissions are mainly from the land use, land-use change and forestry (LULUCF) and agriculture sectors. This may be explained by the reliance on wood fuel by an estimated 96% of the population (National Baseline Household Survey, 2009) coupled with the increasing demand for agricultural land and urban development. In the energy sector, emissions are mainly from diesel generators. The other significant emissions are from the transport sector, with the waste and industrial processes contributing negligible amounts. South Sudan strives to be a newly-industrialised, middle-income country by 2040. This development trajectory is expected to result in increased emissions from the energy sector. However, South Sudan intends to develop clean energy whenever possible, with deliberate efforts by the Government towards enhancing hydroelectric, geothermal, wind, solar and other clean energy development. Climate change impacts continue to slow down the attainment of its national development goals. South Sudan will continue making investments with both domestic and international resources to adapt to climate change and realise its abatement potentials.

Scope of Contributions

11. The climate vulnerability of South Sudan's abundant, unexploited natural resources makes it pertinent for the country's INDC to comprise both Mitigation and Adaptation components, based on its national circumstances and in alignment with decisions 1/CP 19 and 1/CP20.

Mitigation

12. As a post-conflict nation and one of the least developed countries, South Sudan is embarking on a sustainable development path and would like to employ the latest clean technologies to realize a low carbon, climate-resilient development outcome.

13. South Sudan commits to undertake a national GHG inventory, as part of it's Initial National Communication, in 2016. This will allow a better assessment of potential for mitigation and quantify the emission reductions possible through actions listed here.

14. South Sudan aims to undertake the policies and actions in following sectors: energy generation and use; Land Use and Land use Change; and Transport, to address its future emissions that are likely to result from growth strategies. These efforts are contingent on availability of technical assistance to develop the necessary regulations, policies, and standards as well as financial support for investing in low carbon options.

15. *Energy generation and Energy Use*:
    i. Increase the use of clean and carbon-neutral energy:
    ii. Construction of a hydroelectricity plant at the Fulla rapids.
    iii. Increase the use country's high potential for solar and wind energy to meet energy demand.
    iv. Increase the efficiency of biomass use (particularly fuel wood and charcoal) in the traditional energy sector.
    v. Increase efficiency of electricity usage in the formal energy sector and ensuring the best use of hydropower by careful management of the water resources.

16. *Reforestation and Deforestation*:
    i. With its abundant natural forests, South Sudan aims to declare approximately 20% of its natural forests as reserve forests to protect it from deforestation.
    ii. It also aims on an ambitious reforestation and afforestation project to plant 20 million trees over a period of ten years (2 million trees in each of its 10 states) as outlined in the National Environmental Policy. This will contribute towards restoring watershed and water catchment areas during the post-2020 period as well as sequestering carbon and reducing emissions from deforestation and forest degradation.

17. *Transport Sector*:
    i. Establish emissions standards for vehicles
    ii. Establish exhaust testing centers and cars that fail the tests by emitting fumes above allowable emissions levels will be subjected to mandatory repairs or scrapped.
    iii. Consider measures to restrict importation of vehicles that do not adhere to allowable emissions levels.

18. To maintain a clean and green environment, South Sudan will encourage payment for ecosystem services, access to resources and benefit sharing to avoid depletion of important natural resources. This would contribute towards the

sustainability and viability of initiatives to reduce emissions from deforestation and forest degradation.

19. Summary information on Mitigation contribution is provided below:

1. Timeframe	2016 – 2030
2. Type of Contribution	Policies and actions in identified sectors of economy. The mitigation contribution is contingent upon availability of international support for means of implementation.
3. GHG reductions	In absence of detailed analysis the assessment of BAU emissions and impacts of identified policies and actions of GHG emissions reductions below shall be presented at a later date.
4. Sectors	Energy generation and energy end use; Transport; and Land Use and Land Use Change
5. Gases	CO2

Adaptation

20. With the effects of climate change already being felt in South Sudan in the form of erratic and reduced rainfall periods and consequent increased frequency of droughts and floods, the country is currently in an advanced stage of developing its National Adaptation Plan of Action. The NAPA document will be launched on 12 November 2015. The NAPA and the INDC will form the basis of South Sudan's adaptation strategy.

21. A sectoral approach has been adopted in this INDC, though in South Sudan, the technical assessments on vulnerabilities, hazards, and priority sectors is limited. Priority actions are based on observed adverse effects of climate change on the sectors. Further assessments into specific actions and needs is required. INDC includes priority actions in the following sectors:

Agriculture and livestock

22. Agriculture and livestock are the main livelihood of the majority of the population. South Sudan will thus embark on promoting sustainable, climate-smart agriculture and livestock production and management. The country will prioritise the enhancement of climate resilience in the agricultural sector (crop production, livestock, fisheries) through the promotion of climate-smart agriculture, livestock improvement, enhancement of fisheries productivity and soil erosion control. This will be achieved by building upon traditional knowledge and supporting community- based adaptation strategies.

23. Given the frequent droughts experienced in the country, a major priority is promoting the harvesting and retention of water for different uses. This will be implemented through community-based watershed management with a focus on maintaining the quality and quantity of water resources for multiple uses and stakeholders.

Health:

24. To accurately identify climate change impacts in the health sector, South Sudan will conduct comprehensive vulnerability assessments concerning human health and well-being under current and future climate scenarios. This will inform actions to improve early warning systems for climate-related disease outbreaks (e.g. malaria) and establishing contingency plans to develop climate change-resilient health systems. Public health systems will be strengthened by building hospitals (including regional referral hospitals) and supplying them with medicine, equipment and personnel trained on treating climate-related diseases.

Adapting Vulnerable Communities to Climate Change

25. Poverty is a determining factor of climate change vulnerability in South Sudan. Poverty is widespread, particularly in the rural areas – which are home to more than 6.9 million people. Approximately 51% of South Sudan's population lives below the national consumption poverty line. People living in poverty do not have the financial capacity to cope with climate change. Furthermore, these people are often compelled to live in high-risk areas that are prone to floods and droughts. This also has to take into account gender equality and human rights.

26. Actions to reduce vulnerability of the population to climate induced hazards are the following:
    i. Enhance access to water in light of growing climate threats through integrated watershed management, wetland management and improved waste management.
    ii. Enhance food security under a changing climate through the introduction of climate-smart agricultural techniques and irrigated agriculture.
    iii. 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.
    iv. Establish/rehabilitate the hydro-meteorological monitoring network to collect climatic information and provide flood and drought early warning.
    v. Strengthen the adaptive capacity of the population through transparent and inclusive mechanisms of social participation in the implementation of adaptation interventions, designed with a gender and human rights approach.
    vi. Reduce vulnerability of population by integrating climate change considerations into land use planning.
    vii. Increase investments in disaster prevention mechanisms, such as early warning systems, rather than disaster response mechanisms.
    viii. Improve environmental health-related infrastructure to reduce the spread of water-borne diseases which will be exacerbated by climate change.
    ix. Create buffer zones and relocate vulnerable communities away from flood-prone areas.

Forests, Biodiversity and Ecosystems

27. In South Sudan, there is a large diversity of ecosystems that provide society with a wide range of environmental services such as carbon sequestration, provision and maintenance of water resources, flood mitigation, provision of food and NTFPs, and the formation and maintenance of soils. These ecosystem services are seriously threatened by human activities and by the effects of climate change.

28. South Sudan is home to the largest designated Ramsar wetland of environmental importance, the Sudd, which is pivotal in regulating the weather patterns in the Sahel, the Horn of Africa and the greater East Africa region. The Sudd acts as a barrier to the southward encroachment of the Sahara desert and its preservation and management is consequently expected to be South Sudan's most significant contribution toward buffering against the impacts of climate change at the regional level.

29. Ecosystem-based adaptation consists of the conservation of biodiversity and ecosystem services as part of an integrated adaptation strategy to assist human communities to adapt to the adverse effects of climate change.

30. Given the reliance of the majority of the population on forest resources, adaptation priorities in this sector include supporting forest governance, reducing over reliance on forest products by providing alternative income-generating activities and encouraging planting of climate-resilient tree species. This will be further supported by the development of mechanisms to ensure equitable sharing of benefits accrued from the forest resources.

31. Actions for the sector:
    i. Promote agro-forestry practices as a way of diversifying land production systems and promoting alternative livelihood options.
    ii. Promote afforestation of degraded landscapes/watersheds using multi-use forest species to increase community safety-nets and diversify livelihoods.
    iii. Develop forest reserves and management plans to protect watersheds and improve future water availability.
    iv. Promote alternative sources of energy to reduce deforestation and the consequent loss of livelihood options.
    v. Improve the enforcement of environmental regulations.
    vi. Establish conservancies and protected areas to buffer local communities and biodiversity against climate change impacts.
    vii. Establish water points for wildlife in protected areas to reduce the negative effects of droughts on animal populations.
    viii. Increase awareness of local communities on climate change and environmental protection.
    ix. Introduce fire management plans to prevent the spread of wildfires during periods of drought.
    x. Introduce an integrated natural resource management approach.

Infrastructure

32. 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 increase its resilience.

33. To address potential impacts related to damages to infrastructure, South Sudan will invest in making existing and new buildings more climate resilient. This will be achieved through *inter alia* ensuring that land-use plans and building codes reflect the expected impacts of climate change and the need to make public and private buildings more climate-resilient.

34. Actions for infrastructure:

i. Improve urban and industrial waste water treatment, ensuring quantity and good quality of water in human settlements.
ii. Incorporate adaptation criteria for public investment projects, particularly those to be carried out under the Comprehensive Agriculture Development Plan and the Irrigation Development Master Plan.
iii. Ensure that land-use plans and building codes reflect the expected impacts of climate change.

Institutional and policy actions

35. At the institutional and policy level, there is a need to coordinate climate change actions and mainstream climate change concerns into all sectors through capacity building and the development of policies, strategies and action plans to adapt to climate change.

36. To support decision-making for climate change adaptation, South Sudan will implement actions to assemble, analyze, predict and disseminate climate information through improve climate monitoring and data management systems. Based on this, the relevant data and information will be used to develop early warning systems and inform appropriate responses to extreme climatic events.

Capacity Building and Transfer of Technology

37. South Sudan will encourage innovations in technologies which are appropriate to climate change at all levels and the inclusion of climate change issues in the national curriculum. This will be complemented by the development of climate change awareness programmes for dissemination to the wider public.

38. The Government of South Sudan has identified a number of areas where technology transfer could be of benefit of the country for mitigation and adaptation, including through:
    i. Renewable energy technologies.
    ii. Access to climate information systems in order to monitor hydro-meteorological events in real time and establish early warning systems.
    iii. Water technologies for water savings, recycling, harvesting, irrigation and sustainable management for agricultural purposes.
    iv. Availability of methods and tools to assess climate impacts, vulnerability and adaptation in specific sectors and regions.
    v. Transportation technologies that are resilient to the adverse effects of climate change in particular for roads and large-scale transportation of goods. Technologies for the protection of infrastructure, particularly infrastructure in flood-prone areas.

39. Capacity building of this nature would require cooperation between developed countries and developing countries as well as south-south cooperation. This international support would facilitate the development of South Sudan's own technologies as well as enable technology transfer and innovation to increase adaptive capacity within the country.

40. Capacity-building priorities relate largely to planning and implementation of climate change actions at all levels, i.e. national, state and local/community. This needs to involve *inter alia* government officials, private sector agents, civil society, NGOs and local communities. Capacity needs across all levels include:

i. Conducting vulnerability assessments and identifying climate risks and adaptation options.
ii. Mainstreaming climate change into policies, strategies and action plans.
iii. Developing and implementing community-based adaptation plans.
iv. Enhancing cross-sectoral and inter-ministerial coordination of climate change actions.
v. Sharing of best practices and lessons learned to inform the selection of adaptation interventions to address specific climate threats.
vi. Conducting cost-benefit analyses of adaptation options to prioritise implementation of interventions.
vii. Collecting, analyzing and applying hydro-meteorological and climate data for decision-making and dissemination of early warnings.

Summary of Needs

41. As a post-conflict country, it is imperative for South Sudan to ensure sustainable and climate-resilient development across all sectors. South Sudan is one of the least developed countries of the world and the development policies have to go hand in hand with the climate change initiatives for a more resilient population. Therefore, it is imperative to consolidate platforms for the exchange of knowledge and information related to mitigation and adaptation, as well as to strengthen 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 groups in order to reduce social inequality. Within the context of the current economic circumstances, low levels of capacity and limited availability of climate technologies, South Sudan will only be able to embark on achieving its INDCs with the financial, capacity building and technical support from the international community in its efforts at all levels. The implementation of the above mentioned mitigation and adaptation actions for the period 2016 – 2030 requires the continuous development and strengthening of South Sudan's capacities.

42. Regarding climate finance, South Sudan has yet to access the same level of financial resources as other least developed countries owing to its recent existence. It is therefore of utmost importance that South Sudan is extended the opportunity to obtain support from the international donor community and other sources of climate finance to design and implement initiatives aimed at addressing the mitigation and adaptation priorities outlined here within the country's INDCs. South Sudan has begun the process of unlocking access to climate finance through the initiation of the NAPA process that is due to conclude in November 2015. South Sudan also aims to access finance through international carbon markets, and will pursue CDM and REDD+ activities, including the establishment is a Designated National Authority. Subsequent to this, it will require concerted and coordinated effort between the Government of South Sudan and their international development partners to accelerate the process of designing and implementing climate change projects to address both immediate and urgent priorities as well as medium- and long-term climate change risks.

43. It is estimated that investment of over USD 50 billion is required for mitigation and adaptation actions across sectors up to 2030. These are approximate estimates and further analysis is planned to identify support requirements for implementing the policies and actions listed above.

Implementation arrangements, including monitoring and reporting progress

44. Planning Processes: The INDC was developed through a consultative process. Stakeholders from various institutions, including line ministries, NGOs, academia and civil society, attended a series of national workshops in Juba to discuss and develop the INDC. The process was led by the Ministry of Environment.
45. Institutional Arrangements: The INDC was endorsed by the Minister of Environment and various stakeholders at a validation workshop in Juba. The Ministry of Environment will lead the implementation of the INDC. Cross-sectoral contributions will be discussed and implemented through the National Council of Ministers.
46. Monitoring and reporting: South Sudan, through the Ministry of Environment, has the full responsibility to monitor and evaluate the implementation of INDCs through regular stakeholder consultative engagement. This will ensure the effective updating and implementation of both mitigation and adaption plans.

Intended Nationally Determined Contributions

Ministry of Mahaweli Development and Environment

Sri Lanka

October 2015

1. Introduction

The Ministry of Mahaweli Development and Environment in Sri Lanka as the National Focal Point to the United Nations Framework Convention on Climate Change (UNFCCC) is pleased to submit its Intended Nationally Determined Contributions (INDCs) in accordance with Decisions 1/CP.19 and 1/CP.20 of the Conference of Parties of the UNFCCC. We believe the INDCs will support the process of reaching a fair and ambitious global agreement at the COP21 of the UNFCCC. Sri Lanka is confident that a fair and ambitious Agreement is an imperative for countries to reach the Sustainable Development Goals.

Sri Lanka is pleased to take part in the efforts of tackling current and projected climate change challenges by preparing Intended Nationally Determined Contributions (INDCs). The INDCs have been formulated based on the principle of common but differentiated responsibilities and respective capabilities. The information presented in this submission is based on the date available at the time of formulation of the country's INDCs. The INDCs will be updated by Sri Lanka as and when more recent and updated data is available.

2. National Context

Sri Lanka, a country highly vulnerable to climate change impacts presents the INDCs to strengthen the global efforts of both mitigation and adaptation. In response to challenges posed by climate change, Sri Lanka has taken positive steps by introducing national policies, strategies and actions in order to address climate change induced impacts, amongst which are the *National Climate Change Policy of Sri Lanka, National Climate Change Adaptation Strategy for Sri Lanka 2011-2016,* the *Climate Change Vulnerability Profiles; Water, Health, Agriculture and Fisheries, Urban Development, Human Settlements and Economic Infrastructure in 2010,* the *Technology Needs Assessment and Technology Action Plans for Climate Change Adaptation and Mitigation in 2014,* the *National Action Plan for Haritha Lanka Programme in 2009 and Urban Transport Master Plan 2032* based on the *National Transport Policy in 2009.*

Further, *National Adaptation Plan (NAP) for Climate Change Impacts in Sri Lanka* is expected to be finalized before the end of 2015, Nationally Appropriate Mitigation Action (NAMA) on Energy Generation and End Use Sectors is being implemented, and the NAMA on Transportation is being prepared, in addition to the afore mentioned, the Long Term Electricity Generation Expansion Plan 2015-2032 and the *National Solid Waste Management Strategy 2000*, the *Corporate Plan 2014-2018* by the Central Environmental Authority and various legal amendments made by government entities related to environment are being implemented.

As a small island in the Indian Ocean, the coastal region of Sri Lanka is susceptible to changes in sea level. The 2004 tsunami has indicated that low-lying plains in the coastal zone will be vulnerable to any future rise in sea level. Important sectors of the economy such as tourism and fisheries could be affected due to impacts of sea level rise. A significant population of the

country is dependent on livelihoods connected to agriculture. Studies show that the food security of the nation can also be adversely affected due to adverse impacts of climate change. Besides, a substantial share of the foreign income is generated through export crops which are highly sensitive to fluctuations of weather. Emerging evidence from various sources suggest that climate change could alter natural systems connected to the water cycle, the ecosystems and the bio-diversity of the country. This could lead to decline of various ecosystem services that are indispensable for the welfare of human population. In addition, impacts of climate change appear to have significant repercussions on health of the citizens and human settlements of the country.

Sri Lanka has taken several steps to strengthen the country's capabilities to face the challenges of climate change, especially by the formulation of overarching policies, national level plans and strategies. In order to address the issues related in climate change a separate dedicated institution titled the Climate Change Secretariat (CCS) for handling was established under the Ministry of Mahaweli Development and Environment in 2008.

3. Intended Nationally Determined Contributions (INDCs) of Sri Lanka

As per the outcome of the 19th Conference of Parties (COP19) in Warsaw in 2013, all Parties were invited to prepare INDCs. This is as part of the work of the Ad Hoc Working Group on the Durban Platform for Enhanced Action (ADP) that was established at COP 17 in Durban to "Develop a protocol, another legal instrument or an agreed outcome with legal force under the Convention applicable to all Parties".

These INDCs will play a vital role in the post 2020 global climate agreement, which shall aim to limit adverse impacts of climate change and prevent irreversible consequences that would be faced by the world.

3.1 Timeframe and Periods of Implementation

Base year 2010
Target period 2021 – 2030

3.2 Scope and coverage

Sri Lanka submits its INDCs under four areas;

- **Mitigation** - Reducing the GHG emissions against the Business As Usual Scenarios in the sectors of Energy, Transportation, Industry, Waste and Forestry. The key contributors to GHG are Carbon Dioxide (CO_2), Methane (CH_4) and Nitrous Oxide (N_2O).
- **Adaptation** - Mainstreaming climate change adaptation into main economic drives with attention to economic and livelihood diversification. Adaptation will focus on as

the key the sectors those of Food security, Health, Water, Coastal and Marine resources, Biodiversity and Ecosystems, Infrastructure and Human Settlements. Adaptation initiatives that derive mitigation co-benefits will be given due priority.

- **Loss and Damage** - In order to contribute to the Warsaw International Mechanism for Loss and Damage a local mechanism will be developed.
- **Means of Implementation** External support for Finance, Technology Transfer and Capacity Building for the above sectors are considered in the implementation process of the INDCs of Sri Lanka.

4. Fairness and ambition

Sri Lanka is a developing country, highly vulnerable to the adverse impacts of climate change as indicated by the IPCC. However despite its vulnerabilities Sri Lanka is committed to address global climate change and aims to channel the development into a low carbon pathway. The country's total GHG emission represents less than 0.1% of global emissions and the per capita emission is 0.6 tCO_2e. Through the INDCs, Sri Lanka puts forwards ambitious and progressive delinking of GHG emissions in its efforts for economic growth. Sri Lanka puts forward fair and ambitious mitigation strategies through, while facing the challenges of progressively increasing adaptation demands, and climate induced loss and damages.

Sri Lanka intends to launch an ambitious strategy of mainstreaming climate change adaptation across all economic drives where capacity building and locally appropriate institutional mechanisms will be crucial. The finance and human resource development to implement the strategy will be challenging for these ambitious targets, and the domestic contribution to this end will be very high.

Sri Lanka will also take steps to ensure internal equity by maintaining inclusivity. Inclusivity will be focused through the factors and groups such as gender, youth, vulnerable communities, and providing opportunities to these groups to engage, benefit from the ambitious targets.

5. Mitigation Strategies

Sri Lanka being a developing country, anticipates achieving development objectives while moving in a low carbon development pathway. It intends to reduce the GHG emissions against Business-As-Usual scenario unconditionally by 7% (Energy sector 4%, and 3% from other sectors) and conditionally 23% (Energy sector 16% and 7% from other sectors) by 2030.

5.1. Energy Sector

Sri Lanka meets 50% of its primary energy demand through biomass, 40% through imported petroleum sources while the balance is met through indigenous renewable sources. BAU annual

energy demand growth rate is 2.3% which will double the overall demand by year 2046. A detailed energy sector plan has already been developed by Sri Lanka to meet the energy demand while moving away from BAU emission scenarios.

5.1.1. Unconditional emission reduction from Energy sector:

Emission reduction from existing hydro, Non-Conventional Renewable Energy (NCRC) and future hydro developments is expected to be 4.88 million tCO_2 by 2030, a 4% reduction against the 2010 baseline. Therefore, the cumulative emission reduction for the period of 2015-2030 will be the 74.56 million tCO_2 from the energy sector.

5.1.2. Conditional emission reduction from Energy sector:

Conditional Emission reduction through future NCRE developments (amounts to 3.33 million tCO_2 in 2030 and cumulatively 30.21 million tCO_2 for the period of 2015-2030. Emission reduction from external support is 16% in 2030, when compared to the likely demand in 2030 following the reductions of the national commitment.

5.2. Emission Reduction from Other Sectors

Sri Lanka intends to reduce its GHG emissions from the sectors of Transport, Waste, Industries and Forest. A total emission reduction of 3% unconditional and 7% conditional against BAU is planned. Detailed plans for these sectors are yet to be completed but some initiatives have already been made by Sri Lanka such as the NAMA being developed for the transport sector.

- Transport Sector: The sector accounts for 49% of total GHG emissions of the energy sector. It is targeted to establish energy efficient and environmentally sustainable transport systems by 2030 while 25%-40% of public transport is green fuelled. Reducing unproductive transport systems, shifting of passengers from private to public transport modes, introducing electric railway system, enhancing the efficiency and quality of public transport and economic instruments to environmentally friendly transport modes are some of the intended actions to achieve the target.

- Industrial sector: – The sector contribution to the GDP is 28.7% while the GHG emission is only 8% of the energy sector. It is expected to reduce the sector emissions through modernization and facilitate those to follow recognised standards. Fuel switching, industrial energy efficiency and tax structures to promote sustainable technologies are intended actions to achieve the target.

- Waste Sector: - Total waste generated in Sri Lanka is between 6500-7000Mt per annum while only 39% is collected. Approximately 60% of total generated waste is biodegradable. It is expected to promote source separation, recycling, composting and waste-to-energy actions while the collection rate is to be increased to 50-65% by 2030.

- Forestry Sector: Current forest cover in Sri Lanka is 29.6% and is planned to be increased to 32%. This includes management of mangrove and wetland ecosystems, management and conservation of natural forests, restoration of degraded forests in underutilized lands and urban forestry. Measures to prevent deforestation and forest degradation will also be taken.

Sri Lanka reserves the right to revise its intended national contributions and targets at any point of time and consider its INDCs to be a living document that should be integrated with changed/modified national development goals and targets.

6. Adaptation Strategies

Sri Lanka intends to contribute to the global adaptation goal by enhancing local climate change adaptation. Proper adaptation can prevent losses and damages while creating a conducive environment for low carbon development. The adaptation INDCs of Sri Lanka have been developed based on the *National Climate Change Adaptation Strategy (NCCAS*) and the *National Adaptation Plan (NAP*). The broader adaptation targets are:

- Mainstreaming climate change adaptation into national planning and development
- Enabling climate resilient and healthy human settlements
- Minimizing climate change impacts on food security
- Improving climate resilience of key economic drives
- Safeguarding natural resources and biodiversity from climate change impacts

Water sector is the most crucial sector where immediate adaptation measures are required that cuts across all the other sectors including health, food security and renewable energy generation (hydro power). In the process of meeting these adaptation commitments Sri Lanka will make extra efforts to build synergies between adaptation and mitigation while capitalising on mitigation co-benefits of adaptation actions. Based on the NCCAS and the NAP, the total finance requirement for adaptation actions for the period of 2016-2025 is SLR 58,571 million (US$420 million).

7. Loss and Damage

Sri Lanka is largely affected with climate induced extreme weather events and slow onset disasters. During these situations Sri Lankan government bears the responsibility of taking care of disaster victims, providing food and other necessary relief services and other supporting to recover early. Losses and damages (L&D) due to these disaster events are heavy creating a huge pressure on the economy and public spending. According to the National Disaster Relief Centre

the total relief expenditure for the period of 2007-2011 was SLR1786 million (US$129.4million) and that money borne by the government funds. Nevertheless, this calculation has been done with-out considering of infrastructure and other physical damages. According to the *An Integrated post flood Assessment-May 2010*, Disaster Management Centre, Ministry of Disaster Management Sri Lanka, carried out after the floods in the Western and Southern provinces, the total flood damages and losses amounted over US$ 38.46 million .This means the Government of Sri Lanka is currently handling the losses and damages unconditionally.

Sri Lanka intends to join hands to develop a fully-fledged Warsaw International Mechanism on Loss and Damage to address the loss and damage issues and in parallel develop an appropriate local mechanism.

8. Means of Implementation

The means of implementation of INDCs of Sri Lanka requires three pre-conditions.

- **Finance** – Finance is a crucial factor in achieving the set targets. The Sri Lanka government is willing to contribute its finances to achieve the target but the level of ambition will always high with supported actions. As a developing nation, the enhanced finance for adaptation and low carbon development will be a necessity to achieve the set intended conditional targets.

- **Technology** – Predominantly mitigation technology transfer and scaling up adaptation technologies are required without burdening the country's economic status. The INDCs can be attained with the right mix of access, affordability and scale of technologies.

- **Capacity Building** – (Human Resource Development and Institutional mechanism)
  Sri Lanka needs to develop appropriate institutional mechanisms to ensure climate change is mainstreamed into development process. This will ensure higher degree of deviation from the BAU emission projections while resilience that will reduce loss and damage. Proper institutional mechanisms will help to execute the integrated plans and utilize the finances effectively and efficiently. The institutional mechanisms encompass coordination bodies, engagement platforms and communication channels. Lack of capacities in terms of data acted as a barrier for Sri Lanka as of many other developing country parties in the INDC development process.

Integrated planning is the key means of implementation. Sri Lanka has already taken initiatives of integrated planning through the NAP and Energy Planning processes which should be extended to other sectors vertically and horizontally.

REPUBLIC OF SUDAN

INTENDED NATIONALLY DETERMINED CONTRIBUTIONS (INDCs)

REPUBLIC OF SUDAN

INTENDED NATIONALLY DETERMINED CONTRIBUTIONS (INDCs)

Introduction

The Government of the Republic of Sudan (hereafter referred to as Sudan) hereby submits its Intended Nationally Determined Contributions (INDCs) in line with Decisions 1/CP.19 and 1/CP.20 of the Conference of the Parties (COP) to the United Nations Framework on Climate Change (UNFCCC) to communicate INDCs "towards achieving the objective of the Convention as set out in its Article 2" (Decision 1/CP.20), i.e., "to achieve stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. Such a level should be achieved within a time frame sufficient to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened and to enable economic development to proceed in a sustainable manner" (UNFCCC, 1992, Article 2).

Sudan's INDC is also based on its commitments under Article 4.1 and Article 12 of the Convention which requires all Parties, taking into account their common but differentiated responsibilities and their specific national and regional development priorities, objectives and circumstances, to formulate, implement, publish and regularly update national and, where appropriate, regional programmes containing measures to mitigate climate change by addressing anthropogenic emissions by sources and removals by sinks of all greenhouse gases (GHG) not controlled by the Montreal Protocol, and measures to facilitate adequate adaptation to climate change. As such, Sudan's INDC contains both mitigation and adaptation aspects that Sudan aims to undertake towards achieving the objective of the Convention and its national development priorities.

Being classified as a least developed country (LDC) Sudan is not obliged to pursue a GHG emission reduction target. Nevertheless, Sudan views the planning process to reduce GHG emissions, or rather pursue low-carbon development, as an opportunity to strengthen national capacity, promote sustainable resource management, facilitate technology transfer, and identify synergies between national economic objectives and sustainable development.

National Circumstances

Sudan is highly vulnerable to climate change and climate variability, predominantly a result of

climatic and non-climatic factors (NAPA, 2007) (see table 1). These factors in addition to the interaction of other multiple stresses such as ecosystem degradation, complex disasters and conflicts, and limited access to capital, markets, infrastructure and technology have all weakened people's ability to adapt to changes in climate (AIACC WP No. 42, 2005; Zakieldeen, 2009).

Climatic factors constitute, above all, temperature increases and infrequent precipitation. Sudan's Second National Communication (SNC, 2013) illustrated that air temperatures have been steadily increasing over the period 1960 – 2009, with temperature increases between 0.2°C and 0.4°C per decade for the periods March – June and June – September. When averaged across all seasons, temperatures in the 2000-2009 periods are roughly between 0.8°C and 1.6°C warmer than they were in the 1960 – 1969 period. Rainfall is also very variable, and is becoming increasingly unpredictable. During the period 1981 – 2012 the rainfall in the whole country was significantly decreased compared to 1971 – 2000.

Both the SNC (2013) and the National Adaptation Plan (NAP, 2014) illustrated that the frequency of extreme climatic shocks is increasing, particularly drought and floods. Frequent drought threatens about 19 million hectares of rain-fed mechanized and traditional farms, as well as the livelihoods of many pastoral and nomadic groups; more than 70% of Sudan's population's livelihood depends on this sectors. Floods in Sudan can either be localized caused by exceptionally heavy rainfall or more widespread, caused by the overflow of the River Nile and its tributaries (NAPA, 2007).

Non-climatic factors that contribute to the vulnerability of communities in different parts of Sudan include unsustainable management of natural resources, and socio-economic factors such as poverty, lack of income diversity, unequal distribution of income, urbanization, population growth, and lack of adequate infrastructure, and lack of international support and investments.

Assumptions

Sudan submits its INDC under the assumption that the Paris outcome to be agreed at COP 21, December 2015.

- Is comprehensive, ambitious, fair, effective and binding for all Parties to the Convention;
- Strengthens the multilateral rules-based regime to enhance international and regional cooperation;
- Is under the Convention and hence guided by its principles and provisions including common but differentiated responsibilities and respective capabilities and equity;
- Covers all elements including mitigation, adaptation, finance, technology, capacity-building and transparency in a balanced manner;
- Is consistent with science reflecting the short, medium and long term;
- Includes effective arrangements for transparency of action and support; and
- Funding is available from different sources, particularly through the finance mechanism under the UNFCCC.

Being one of the most vulnerable countries to the adverse effects of climate change and given Sudan's status as LDC, the implementation of the envisaged undertakings communicated in Sudan's INDCs is depended on various conditions, including

- The full implementation by developed countries of their commitments relating to finance, technology development and transfer and capacity-building pursuant to Article 4 of the Convention;
- Reaching the long-term temperature goal that is currently set at below 2°C and subject to be revised at COP 21; and
- Sudan's access to adequate, predictable and sustainable financial resources, including technology transfer and capacity-building.

Mitigation Contribution

Sudan intends to pursue implementing low carbon development interventions in three sectors of energy, forestry and waste inline with Sudan's national development priorities, objectives and circumstances. Sudan's intended nationally determined contribution on mitigation as shown in Table (2) below aims at contribution to the global mitigation efforts in the post-2020 period, these contributions are planned to ensure deviation from the current development trajectory to a low carbon development. Sudan's communication of a mitigation component within its INDC (M-INDC) is informed by and premised on the current commitments under Article 4 and particularly Articles 4.1, 4.3, 4.5, 4.7 and 4.9 of the Convention.

Sudan intended mitigation INDC contributions towards the 2015 Agreement are considered fair and ambition given its current national circumstances, development objectives and priorities. These intended contributions are also in line with Sudan's strategy to integrate climate mitigation and adaptation into its national sustainable development process (INC 2003) to achieve low-carbon and resilience development objectives.

Intended Contributions

Table 1: Sudan's Intended mitigation Contributions:

Sector	Program of Action	Description	Objectives of Actions	Cost, million USD
Energy	Integration of renewable energy in the power system	**Objective:** Integration of renewable energy in the power system of the Sudan, target of 20% by 2030 1.**Wind energy**: 1000 MW (grid connected) will be applicable in strong wind regime areas. 2.**Solar PV energy:** 1000 MW (on - and off - grid) will be applicable in different states within Sudan.	1. Utilization of the different renewable energy resources potential in Sudan to avail the electric energy all over the country; 2. To achieve a competitive price of energy from renewable sources which will lead to fuel saving; 3. Diversify the energy	4,300

		3.**Solar CSP technology:** 100 MW (grid connected) will be applicable, especially in the northern part of Sudan 4.**Waste to Energy:** 80 MW (grid connected) will be applicable in several intended sites 5.**Biomass Potential:** 80 MW (grid connected); e.g. the sugar industry. 6.**Geothermal Potential:** 300 MW in different states of Sudan. 7.**Small Hydro Plants:** 50 MW (grid connected)/ especially in combination with irrigation-sites, small hydro plant projects; 8. Solar rural electrification through installation of 1.1 million Solar Home Systems (SHSs) up to 2030.	supply sources and ensuring the energy security and saving the environment; 4. To be part of the global energy development which is expected to lower the prices in the future; 5. Supporting the national economy by technology and knowledge transfer and capacities building and promoting local Renewable energy industry; 5. Contribute to the development of the different regions of the Sudan; 6. Provides access to electric energy supply to rural areas far from the national or the isolated grids for which the grid extension is not a feasible solution.	
	Energy efficiency	GHG mitigation is achieved through energy efficiency according to: 1. Reduction of loss in transmission and distribution networks; 2. Rehabilitation of the cooling system in Hydroelectric stations; 3.Increase the readiness of the power station – matrix turbines. 4. Reduction of the costs of producing electricity and auxiliary consumption from thermal power plants; 5. Improvement of specific fuel consumption in thermal power plants; 6. Replacement of incandescent lamps by CFL and LED lamps in residential sector; 7. Establishment of the labeling system for electrical appliances.	The indicative target of the energy efficiency reflecting the rate or the value of savings in electrical energy consumed in 2016 up to 2030, which resulted from measures to improve electric power efficiency and the rationalization of electricity consumption. These contributions are estimated to result in energy saving in the order of 6500 GWh.	350
	Electricity thermal generation using Natural Gas	Production of 2300 MW using natural gas in different areas in the country	GHG emission reduction, fuel cost reduction and enhancement of social and economic development in the country.	2900
Forestry	Afforestation and reforestation	Afforestation/reforestation through official planting. Community planting and Planting in irrigated agricultural areas. To meet the main goal of 25% forest coverage from the total area of the Sudan by 2030 an area of 790795 hectares needs to be planted annually if	Afforestation/reforestation supports climate mitigation (emission reduction - carbon sequestration) by increasing the forest cover in the country.	1500

		international financial support is provided.		
	National REDD+ strategy	1.The carbon balance and incentives for energy substitution to LPG; 2.Incentives for using sustainable charcoal, firewood efficiency, increased gum Arabic production, forest conservation and sustainable forest management, Reforestation, Forest Plantations and more balanced livestock production; 3. 4. Reconciliation of conflicting policies of rival economic sectors and streamlining of activities of supporting sectors such as education and research.	Reducing emissions from deforestation and forest degradation enhance carbon sequestration and livelihoods. Decreasing the high rate of deforestation and forest degradation for biomass energy, crop cultivation and other important livelihood needs.	1,700
Waste	Collection	Collection is the major problem for solid waste management in Sudan. More than 83% of waste, i.e.6 million tons of municipal waste is left without collection, which is five times the estimated impact as set out in Sudan's Second National Communication report (1.3 million tons). Proper waste collection is expected to eliminate the hazard of this huge amount.	The objective is to treat the whole generated waste and ensure that no waste is sent to the landfill. This will lead to GHGs emission reduction, pollution control; land used saving and income generation. It could be achieved through recycling, composting and energy recovery.	930
	Sanitary landfill:	Landfills are also a real challenge to the environment. Adoption of sanitary landfill with treatment facilities, gas collection and capture system will lead to mitigate GHG as such sanitary landfill is an essential and important solution for the land fill gas.		
	Zero waste concept	This is most recent and efficient system for GHG mitigation method. It includes: 1. Composting of organic component in municipal waste; 2. Sorting and recycling of recyclable items such as plastic and paper; 3. Use of non-recyclable items as a fuel for cement factories; 4. Energy Recovery by generation of electricity or gas from waste.		

Table2: Information to Facilitate Clarity, Transparency and Understanding

Time frame	The timeframe for implementing Sudan's INDC is 2025-2030
Gases Covered	Carbon dioxide (CO2), methane (CH4) and nitrous oxide (N2O)
Sectors Covered	1- Energy (Electrical power) 2- Forestry sector 3- Waste sector Geographic coverage for energy and forest sectors include contributions to be implemented in most of the (18) states of Sudan, however, for the waste sector it includes only Khartoum state
BAU Scenario	Currently, Sudan has neither an overall baseline emission scenario for all sources of emissions and removals in the three sectors covered in this contribution, nor sectoral baselines that can be used to define quantitative mitigation actions and assess their overall effects. As such, Sudan is planning to establish a baseline as part of its proposal for a low-carbon development strategy, of which its preparation is still pending availability of financial and technical support. Sudan is currently embarking on the implementation of its Readiness Preparation Proposal for REDD+, which will also enable Sudan to establish reference emissions levels / forest reference levels (ERL/FRL) for the forestry sector. For the implementation of the intended contribution included in this INDC, Sudan foresees that sectoral or project level specific baselines should be established to enable a robust assessment of the effect of these mitigation contributions. The trend in Sudan's total GHG emissions indicates an increase by about 8%; from 72,014 Gg of carbon dioxide-equivalent (CO2e) in 1995 to 77,650 Gg CO2e in 2000. In 2000, the total GHG emissions in the three sectors that are covered in Sudan's INDC are estimated at 8,539Gg from energy, 9,392 Gg from LUCF1 and 2,015 Gg from waste. The major drivers for these changes in GHG emission levels are attributed to, among others, changes in emissions from the energy sector, which increased by roughly 10%, mainly due to increased fossil fuel consumption. Regarding the waste sector, emissions from waste management have more than doubled, mainly due to greater amounts of municipal solid waste sent to landfill sites. There are a number of limitations and shortcomings affecting the GHG estimations in the three sectors, mainly related to serious problems of data availability and quality, and partly related to technical capacity and application of methods. Energy consumption in Sudan is expected to reach over 13 million tons of oil-equivalent (TOE) by 2030. Diesel and gasoline, used primarily in the transport sector, dominate future growth in fossil fuels and account for over 70% of energy use by 2030. GHG emissions associated with this energy use trajectory are expected to reach just over 24 million tons of CO2-equivalent by 2030, a 6-fold increase from year 2000 levels (see Figure 4-2). The transport and electricity sectors together account for most of the growth in GHG emissions in Sudan, with these two sectors responsible for around 70% of projected GHG emissions

[1] Land Use, Land-Use Change and Forestry

	by 2030 (SNC 2013). The current source of electrical power in Sudan is a mix of hydropower and thermal power generation plants. The thermal power generation is composed of steam turbines, diesel engine, and steam turbines which have lower-efficiency of about 14% compared with gas high efficiency diesel-fired combined cycle unit up to 45 %. Therefore, there is a need to shift to the high efficiency diesel-fired combined cycle unit but the initial cost is high, predominantly due to the lack of available infrastructure for LNG importation and as well as the necessary high and long-term investments. Sustainable land use management faces great challenges in Sudan mainly due to poor policy coordination across sectors (i.e., forestry, agriculture, range and protected lands). Additional factors include the absence of unified legislation, absence of high-resolution land use maps, inadequate consideration of the socio-economic factors, and weak implementation of the existing legislation and policies by the sectors. This land use context has led to serious environmental problems such as overgrazing, over cultivation and reduced land productivity which in turn have led to rural poverty, and rural-urban migration patterns that cannot be sustained in the long-term. In the absence of concerted efforts to address these issues, land degradation is expected to worsen over the next 30 years. Factors such as unsustainable wood fuel use, increasing demand for agriculture and grazing resources, and mismanaged of forests and land use has led to the current deforestation rate, which is estimated at 2.2 of the total land area.
Methodology for Estimating Emissions	The methodology used is the Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories (IPCC, 1996). In addition, the Good Practice Guidance 2000 (IPCC, 2000) and the Good Practice Guidance for Land Use, Land–Use Change and Forestry (IPCC, 2003). The GWP values of the IPCC Second Assessment Report.
Contribution of International Market Based Mechanisms	Sudan does not exclude using market-based-mechanisms in implementing its contributions if access to market mechanism is granted.

Adaptation

Introduction

Sudan's communication of an adaptation component within its INDC (A-INDC) is based on Decision 1/CP.20 of the "Lima Call for Climate Action" which "*Invites all Parties to consider communicating their undertakings in adaptation planning or consider including an adaptation component in their intended nationally determined contributions"* (Lima Call for Climate Action, Decision 1/CP.20, paragraph 12). As an LDC and African country, Sudan is amongst the most vulnerable countries to the adverse effects of climate change. As such, adaptation is the first and overriding priority of Sudan's climate actions and hence constitutes a major part of Sudan's INDC. Sudan's A-INDC is informed by and builds on its current commitments under Article 4.1 of the Convention, with the understanding that provisions, particularly Articles 4.3, 4.4 and 4.7 are being applied, i.e. full incremental costs being provided by Annex II Parties, as well as provisions under Article 12 in relation to adaptation. It also builds on the various adaptation-related mechanisms and processes under the Convention, including, above all, Sudan's NAPA (2007), Sudan's INC and SNC (2003; 2012), TNA (2013), and particularly Sudan's NAP.

Aim/Objective

The overall aim of Sudan's INDC is based on the objective of Sudan's NAP, i.e. to contribute to sustainable development and reduce poverty by reducing the long-term negative impacts of climate change. Having recognized the implications climate change can have on national development the need for climate change adaptation in the context of sustainabledevelopment was identified as an area of major concern. As such Sudan's A-INDC is being prepared with the view and in the context of achieving economic and sustainable development and poverty reduction in line with Sudan's 25-year development strategy, the Millennium Development Goals (MDGs) and the Sustainable Development Goals (SDGs). It, thereby, comprises of Sudan's assessment of needs, priorities, capabilities and benefits to develop nationally-determined priorities and plans for adaptation.

Scope

The scope of Sudan's A-INDC is focused on a sector – and state -level based approach to reduce vulnerability. The sectors include water, agriculture (both livestock and crop production systems), coastal zone and human health. With the development of Sudan's NAP each of Sudan's 18 states undertook vulnerability assessments of these sectors and identified adaptation priorities that are informed by and build upon state-level development. These will serve the basis of information for Sudan's A-INDC.

In addition, Sudan's A-INDC will entail intended contributions around

1. Adaptation policies and measures, and planning (e.g. NAPA, NAP), including prioritizing interventions for implementation and integrating adaptation into development planning;
2. Strengthening institutional capacity at the state and federal level;
3. Implementation of adaptation initiatives

- Continued implementation of urgent and immediate needs as identified in Sudan's NAPA;
- Implementation of adaptation programmes and projects in the most vulnerable sectors and states as identified in the NAP;

4. Enhancing research, observation systems and climate modeling to better focus targeted A-action across sectors and state level; and
5. Increasing public awareness.

Baseline

The baseline serving the development of Sudan's A-INDC is based on assumptions as well as sector- and state-based vulnerability assessments undertaken in Sudan's NAP, NAPA as well as national communications and other national studies and research. Sudan's NAP undertook state-level vulnerability assessments to 1) characterize vulnerability to climate change in the sectors of agriculture, water and health and 2) identify adaptation strategies to reduce these vulnerabilities (NAP, 2014).

The approach for conducting the vulnerability and adaptation assessments is based on a bottom-up approach and consists of four main steps:

1. Capacity Building of actors and institutions at the state level including training programmes on vulnerability assessments;
2. Vulnerability assessments in each state, including taking stock of all relevant research and studies, and stakeholder consultations taking into account both climatic and non-climatic factors determining vulnerability of the key vulnerable sectors;
3. Adaptation assessments, including identifying adaptation needs to reduce vulnerabilities at the state and sectorial level, predominantly through stakeholder consultations;
4. Public awareness through regional and state level workshops to 1) validate the vulnerability and adaptation assessments, 2) identify areas of synergies with national and state-level development planning, and 3) develop implementation strategies and discuss ways forward.

The impacts of climate change for Sudan's most vulnerable sectors are as follows:

Agriculture:Traditional subsistence agriculture dominates the Sudanese economy with over 70% of the population dependent upon crop production and/or livestock husbandry to support their livelihoods.Combined with growing socioeconomic pressures, the imposition of climate variability and climate change is intensifying the ongoing process of desertification of arable areas. Humid agro climatic zones areshifting southward, rendering vast arable lands increasingly unsuitable for agriculture production. Crop production is declining and predicted to decline substantially for millet and sorghum as well as other cash crops. The area of arable land as well as the Gum Arabic belt and its traditional livelihoods production and pastoral systems are all degrading and decreasing in ability to support livelihoods of dependent communities, with attendant impacts on both local incomes and food security, which is further expected to drop;

Water Resources:Reduced groundwater recharge – either through decreased precipitation or increased temperature and evaporation – has grave repercussions for Sudan. National studies have shown that soil moisture would further decline under future climate change. When

coupled with increased water consumption, population growth, high variation in rainfall and the high rate of evaporation, a looming water crisis appears likely. Regarding the river Nile there is a clear finding that under many climatic scenarios, water flow in the Nile River will decrease considerably, between 20% and 30% over the next 40 years.

CoastalZone

Sudan's coastal zone faces several major climate-related hazards, namely sea level rise, increase of seawater temperature and salinity changes in addition to storm surgeintensification. Evidence shows that these climatic changes might resulted in more frequent coral bleachingevents and widespread mortality decline in mangroves, remobilizing the fine sediments of salt marshes, increasing coastal turbidity which in turn affecting sea grasses, coral reefs and other marine biota.

Public Health: Communities in Sudan are exposed to significantly increased risk of malaria under climate change. Studies in Kordofan State, for example, have shown that the risk of transmission potential could increase substantially by 2060. This is already being realized, and further expected not only to overburdened health care systems,which is under extreme stress, but the disease would exact a heavy toll on local communities.

Table 3: Sudan's Vulnerability to Climate Change

Climate Change Impacts and Variability	Key vulnerabilities
Variable Rains(INC 2003, Sudan NAPA, 2007)**:** • A decrease of annual rainfall of about 0.5% per year. • Co efficient of variability increased by 2.0 % per year • More frequent and intense drought trend • Changes in precipitation are more uncertain results showing both wetter and drier conditions (NAP 2013)	• Shifting agro-climatic zones southwards • Water deficit • Declining, and failure of, crop production • Loss of range resources and livestock • Desertification • Poverty • Food insecurity and famines • Loss of livelihoods • Competition over resources and conflicts • Human displacement and suffering
Temperature (Sudan INC, 2003): • By 2060, projected warming ranges from 1.5 - 3.1 C0 during August to between 1.1o - 2.1 C0 during January. • Climate scenario for Kordofan indicates an increase in average temperature • Temperature clearly show substantial warming (climate scenarios, NAP 2013)	• Increased water loss • Negative impact on the winter season crops • Decline wheat production • Increases weeds, pests and diseases (e.g. white fly, root rottenness) • increase risk of malaria and diseases
Floods (Sudan NAPA, 2007): • Floods caused by torrential rains with overflow of the Nile River and its tributaries • Flash flooding due to heavy localized	• Damage crops production systems • Damage human settlements and properties • Increase risk of malaria and other diseases • Loss of livelihoods

rainfall	
River Flow (SNC, 2013): • Peak River Nile and Blue Nile flow is 20% and 30% respectively less than usual in 2090.	• Exacerbate water management challenges • Declined production in irrigated sector • Decrease water availability and quality
Coastal Zone (SNC 2013): • Sudan sea-level is already rising in the Red Sea about 10-20 cm during the past century • Warmer sea surface temperatures and • increasing water salinity	• Coral reef bleaching • Loss of mangrove areas • Decline fish production • Loss of other marine resources • Inundation of coastal resources and infrastructure

Table 4: Sudan's Intended Adaptation Contributions

Sector	Intended Contributions
Agriculture	**Crop Production** • Crop diversification and introduction of improved drought-resistant varieties/early maturing varieties (both field and horticultural crops) in areas affected by rainfall decease/ variability • Rehabilitation of the meteorological networks to enhance early warning system activities • Diversification of income generating activities in order to increase adaptive capacity of vulnerable farmers' communities in order to achieve food security/reduce poverty • Strengthening of enabling environment/activities to empower vulnerable communities including through: establishment of markets in vulnerable areas, awareness and access to information by vulnerable groups/communities etc. • Introduction of agroforestry in areas vulnerable to climate change to enhance agriculture production as well as empower vulnerable communities through their involvement in community forests activities/products. • Establishment of women cooperative societies in order to empower them and increase their resilience • Enhancing the participation of women and youth in activities related to adaptation and environmental conservation in order to empower them and enhance their adaptive capacity including through establishment rural women development programme • Climate-proofing of some of the existing developmental project to increase their resilience for current and future climatic changes • Planting shelterbelts, introduction of high economic value trees and rehabilitation of the Gum Arabic gardens to increase the resilience of vulnerable communities through engagement in a range of forestry activities **Rangeland and livestock** • Regular surveillance of animal diseases through improved monitoring • Establishment of range's enclosures/ranches to increase resilience of vulnerable communities • Advance research on various areas related to climate change impacts on rangelands (e.g. plants and animals species, communities etc.) and measures to address that • Joint management of the natural resources for comprehensive consideration of climate change impacts • Management of the grazing areas and rangelands in a sustainable manner • Enhancement of enabling environment in order to empower vulnerable communities including through: Improving marketing/markets, supplementary feeding, increase awareness and access to information by vulnerable groups/communities, etc.

	• Restocking animal herds in areas affected by climate change • Improving animal productivity and animal breeds to increase resilience to climate change • Replanting and rehabilitating of vulnerable areas with palatable range species and management of animal routes • Improving veterinary services (including, mobile clinics provision of vaccines etc.) to enhance the adaptive capacity in vulnerable areas
Water	• Integrated Management of the water resources to meet the current and future challenges/needs • Water harvesting (dams, hafirs, terraces, etc.) to assist vulnerable communities to adapt and build their resilience facing increasing vulnerability of water sources/resources • Establishment and rehabilitation of hand pumps and construction of water-networks in rural areas for provisions of drinking-water and achieving water security in order to discourage communities' migration from vulnerable areas • Advance research related to climate change impacts on water sector e.g. Undertaking geophysical studies of the aquifers for sustainable ground water utilization • Establishment of rain gauge stations to monitor and provide hydrological information • Introduction of a revolving micro-credit fund to support implementation of small water harvesting projects
Coastal Zone	• New information systems: Enhancing monitoring programs in natural and urban settings to detect biological, physical, and chemical changes and responses due to direct and indirect effects of climate change • Implement integrated coastal zone management: an integrated approach to land use planning, creation of ecological buffer zones, establishing protected inland zones to accommodate salt marsh, mangrove and sea grass • Building awareness: This involves enhancing the awareness of coastal developers through national and international activities, technical assistance, and capacity-building
Health	• Introduction of early disease diagnosis and treatment programmes for malaria, meningitis, and leishmaniasis • Raising the health awareness of communities in vulnerable areas to climate change related diseases in order to increase their adaptive capacities • Building the capacities of the health cadres and improvement of health services to meet the evolving and increasing challenges of climate change • Increasing health resilience to climate change related diseases and reducing the associated mortality by Supporting family's and school's health programmes • Control of Endemic and epidemic diseases induced by Climate Change through Combating vectors and insects borne diseases • Controlling of diseases shared between humans and animals • Improve community sanitation and medical services, including capacities for diagnosis and treatment

Planning Process

Mitigation and adaptation actions are implemented across the various sectors at both the national and states administrative levels. The Framework of National Appropriate Mitigation Actions and the National Adaptation Planning process being undertaken by Government provides a good basis for long- term adaptation and mitigation programming and mainstreaming of climate change adaptation/mitigation into the existing national planning processes.

Sudan has taken concrete actions and showed political will to address and minimize the risks posed by climate change to its communities, natural resources and economy by identifying and implementing adaptation measures while pursing low-carbon development strategies to spur its local and national economy in a sustainable manner. Sudan's Initial National Communication (INC) to the UNFCCC identified agriculture, water resources and public health as most vulnerable sectors to climate change and climate variability. SSNC (2012) further identified coastal zones as an increasingly vulnerable sector that needs to be considered in climate change adaptation actions.

With the National Adaptation Programme of Action (NAPA) Sudan's adaptation engagement was brought to a different level (2007) as it initiated building a solid base to take systematic adaptation planning and implementation, including through stakeholder engagement, raising public awareness, and building individual and institutional capacities in the Sudanese context that set the basis for further adaptation action. Sudan's NAPA is the first adaptation plan prepared to enable Sudan to access funds made available through the Least Developed Countries Fund (LDCF) to implement real adaptation actions on ground. The overall goal of the NAPA preparation process was to identify urgent and immediate activities to address climate variability and climate change within the context of the country's economic development priorities. Sudan's NAPA identified 32 urgent and immediate adaptation initiatives in the four states River Nile, Gedarif, South Darfur and North Kordofan, representing five different ecological zones.

In addition, in response to the Cancun Adaptation Framework (CAF, 2010), Sudan launched a process for a NAP in line with its National Implementation Strategy (INC, 2003). Sudan is currently in the final stage of developing its NAP which is currently subject to Ministerial endorsement. Sudan's NAP aims to integrate climate risks into all national development planning processes and reduce vulnerability to the impacts of climate change, by building adaptive capacity and resilience. As such, Sudan's NAP process includes assessment of vulnerability and adaptation in all Sudan's States, covering the main development sectors, such as water, agriculture, health and coastal zone.

Sudan has conducted its Technology Needs Assessment (TNA) for adaption and mitigation in 2013. For mitigation the TNAs covers energy, industry and forestry sectors while two priority sectors have been covered with regard to technology for adaptation, namely agriculture and water sectors. The TNAs resulted in a Technology Action Plan (TAP), which includes some priorities with regard to technology transfer for enhancing national actions on adaptation and mitigation

At national level line ministries developed climate change related polices such as the Agricultural Revival Program (ARP) of 2008 –2011 and the five year economic reform programme 2015-2019. The Forest Policy, (2006) supports climate resilient livelihoods via encouraging income diversification, facilitating microfinance and providing access to land (Ministry of Agriculture and Irrigation, 2012). The Natural Resource Management policy is part of the development plan

of the state, which is in line with Sudan's national policy. The policy provides clear guidelines for local rehabilitation. This made local communities becoming more aware of the importance of sustainable resources management. Mainstreaming adaptation and enhancing adaptive capacity could be increased by encouraging partnerships between informal processes and formal interventions to facilitate adaptation.

In terms of mitigation, Sudan aims towards achieving quicker economic growth rates in a sustainable manner. In line with this Sudan intends to undertake measures across a number of sectors of its economy to pursue low-carbon development, guided by the long-term national development policies, plans and strategies, which are clearly stated in different national development planning documents such as the Strategic Plan document 2007-2033. In addition, it incorporates the outcome of further analysis and consultation to enhance Sudan's existing plans, in particular the assessment of the potential economic sectors that lead towards a low carbon development strategy. Sudan has also prepared a proposal for a low-carbon development strategy, how its implementation still pending access to international climate funding.

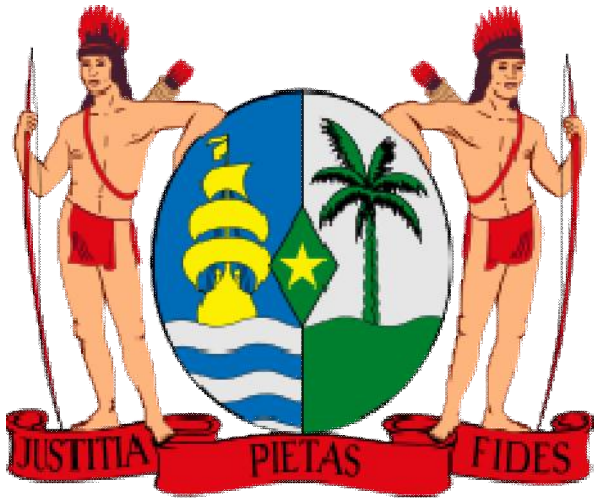
Means of Implementation

Despite being committed to and meeting its obligations under the Convention, however due to some political and unilateral sanctions by some developed countries Sudan was not successful in accessing bilateral sources of climate finance, which is currently the major source for funding climate action in developing countries. This situation leaves Sudan even more vulnerable to the devastating consequences of climate change impacts on its people and natural systems upon which their livelihoods depend. Sudan is currently implementing some key urgent and immediate adaptation initiatives as identified based on the NAPA only in six states out 18 vulnerable states, based on resources from the LDCF and substantial local contributions from the participating states and the national government. However, these are far from match the magnitude of Sudan's vulnerability to the impacts of climate change. Sudan also implementing some mitigation priorities on renewable energy (solar, wind) as will as forestry mitigation projects using its STAR GEF allocation, which is limited funding to create an ambition contribution to required global climate mitigation efforts.

Implementing the communicated intended contributions requires an overall investment estimated up to 2025 for adaptation and up to 2030 for mitigation based on current sectoral plans. The required resources to be mobilized through climate finance mechanisms under the UNFCCC such as the Green Climate Fund (GCF), GEF and other climate related bilateral, multilateral and domestic financing including the private sector investment.

The international support required to implement the intended contribution in terms of finance, technology and capacity building, over a cycle of contributions of 5-10 years, amount to a total of 12.88 USD billions, of which 1.2 billions USD$ for adaptation and 11.68 billions for mitigation. This amount is required to be met from all possible and accessible international climate finance sources. In addition the national and states' government will provide local contributions within their regular and development budgets, national resources and priorities permitting as demonstrated in the case of the current GEF (LDCF/STAR) funded adaptation and mitigation projects. Further development and elaboration of contributions and assessment of costs will be necessary to refine the required investment for implementing such programmes and actions.

Republic of Suriname



Intended Nationally Determined Contribution

Under UNFCCC

30 September 2015

1. INTRODUCTION

The Republic of Suriname is committed to addressing the issues associated with climate change both nationally and globally. As such, and in accordance with the Conference of the Parties (COP) Decisions 1/CP19 (Warsaw) and 1/CP20 (Lima), Suriname hereby submits its Intended Nationally Determined Contributions (INDCs) prior to COP21 scheduled for Paris, to be organized in December 2015.

2. NATIONAL CONTEXT

The Republic of Suriname is committed to playing its part in the global fight against climate change. As a developing country with a total population of 541,638 and abundant natural resources, Suriname has remained carbon negative. Surinameôs contribution to the global fight against climate change commenced long before countries of the world came together in 1972 at the United National Conference on the Human Environment in Stockholm to agree on a common outlook for environmental protection and poverty alleviation and where climate change was given recognition for the first time.

Historically, the Republic of Suriname has been maintaining and protecting its pristine forests and ecosystems. Consequently, approximately 15 million hectares or about 94% of Surinameôs territory remains forested resulting in 12.9 hectares per capita or net carbon capture per capita of 3.3 tons. The tropical rainforest of Suriname stores about 11 gigatons and absorbs more than 8.8 million tons of forest carbon annually. This represents approximately over 350 million tons of carbon absorbed since 1972. As a result of its forest carbon sequestration and avoided deforestation, Suriname has been providing a key ecosystem benefit to the world long before the issue of climate change was widely recognized and accepted. A service for which Suriname has not been paid.

Despite this significant mitigation function, as a country with a low lying coast where over 80% of the population resides, and where the major economic activities and infrastructure are concentrated, Suriname is highly vulnerable to the effects of climate change. Suriname has already suffered extensive losses and damages from the effects of climate change. Current projections for sea level rise will result in severe damage to coastal ecosystems, in particular, the mangrove forests and large expanse of arable

lands. Impacts are projected to affect over 40% of the countryôs GDP and the well-being of more than 80% of the population and Surinameôs capital, Paramaribo, a UNESCO Heritage City. Amongst the most vulnerable and who stand to be significantly impacted include those living in the coastal zone, along the coastal rivers as well as Indigenous and forest-dependent people living along the rivers and shores.

Based on current trends, climate departure for Suriname will take place in 2028 at which point the country will experience, inevitably, huge losses and irreversible damage. This will impact the very way of life of the Surinamese people.

Thus far, Suriname has had to deal with the losses and damages, undertake adaptation interventions and build climate resilience mainly from its small national budget. Moreover, recognizing the vulnerability of the coast and ever increasing impacts on a significant percentage of the population, Surinameôs dilemma is whether to continue to invest heavily in adaptation or relocate and rebuild its entire economy away from the threat of the rising sea. This would mean shifting inland, a massive costly venture which would also have the effect of placing pressure on the countryôs forest resources and which could jeopardizing Surinameôs contribution of maintaining 15 million ha forest as both a huge carbon sink and the lungs of the earth for the global community.

Notwithstanding these challenges, Suriname has over the years taken steps with limited resources to prevent, reduce and cope with the effects of climate change. Suriname continues to advance its efforts towards climate resilient and compatible development through a number of green policies and initiatives and in particular, actions to protect and sustainably use its forests. Moreover, Suriname has been implementing adaptation measures to guard against sea level rise and reduce the impact associated with extreme weather events. In addition, Suriname has one of the lowest reliance upon fossil fuels for the generation of electricity. Furthermore, the most significant source of energy is from hydropower which supplies the majority of the countryôs electricity generation requirements.

While Suriname reaffirms its commitment to addressing climate change and in particular, maintaining its forest and freshwater resources, it recognizes the need for the

international community to work collectively, responsibly and with urgency to address this issue. In this regard, there are four critical elements necessary for international collaboration:

(i) Direct access to climate finance;
(ii) Compensation for loss and damage;
(iii) Technology transfer to engender large scale adaptation and mitigation; and
(iv) Compensation for the forest climate services that forest countries have been and continue to provide.

Suriname remains committed to playing its part in the fight against climate change and recognizes the significant role its forests can play. In this regard, Suriname is keen to pursue a green economy through a climate compatible development approach and with REDD+ as a key mechanism. In addition, Suriname strongly supports the UN sustainable development priorities regarding ôRenewable Energyô Suriname is therefore prepared to deploy its forests, as part of a global mitigation contribution as well as continue promoting and introducing the use of renewable energy, specifically in remote areas, provided adequate financing is made available to support these transitions.

3. PROPOSED CONTRIBUTIONS

TYPE OF COMMITMENT	At the onset, the Republic of Suriname recognized the importance of preparing its INDC and secured high level political endorsement. Through the INDC preparation process Suriname has demonstrated its political commitment to the global fight against climate change through its contributions to the UNFCCC. Although Surinameôs contribution to the global Green House Gas (GHG) emission is negligible, the government is intended to continue contributing to the global reduction of these gases under the Convention. Suriname has taken the initiative to move away from business as usual and to chart a course towards climate compatible development through an enabling framework which has included the preparation and approval of a National Climate Change Policy, Strategy and Action Plan (NCCPSAP). The Republic of Suriname intends to implement the NCCPSAP

	and will be seeking adequate resources to support this. In this regard, Surinameôs commitment is one that is unconditional as well as conditional through proposed measures of policies, strategies and actions.
PREPARATION OUTLINE	The following is an outline of the steps taken in the preparation of the INDC. 1. **Planning process:** key stakeholders were engaged on September 10th 2015. A National Team was the driver. This team consisted of representatives of the Office of the President of the Republic of Suriname, the National Institute for Environment and Development in Suriname (NIMOS), Anton de Kom University of Suriname, the Foundation for Forest Management and Forest Control in Suriname, and the ministry of Foreign Affairs. The forum sought to sensitize participants on the background, nature and need for an INDC, the preparation and information required, and key issues to consider. The forum also elicited stakeholdersôperspectives on issues and priorities for inclusion. 2. **Stocktaking:** the National Team undertook a stocktaking exercise to collect required information to prepare the INDC. This exercise identified and assembled relevant national information, data and analysis, including official information from the Government sources. 3. **Desktop Review:** an analysis was made of documents such as the Development Plan 2012-2016 of the Republic of Suriname, the National Plan for Forest Cover Monitoring, Surinameôs Readiness Preparation Proposal, the NCCPSAP as well as Surinameôs National Reports to the UNFCCC. In addition, use was made of the reports from the Intergovernmental Panel on Climate change (IPCC), Surinameôs Energy Policy Plan 2013-2033, data from the ministry of Natural Resources, reports from the Suriname Statistics Bureau, and the guide by WRI and UNDP on ôHow to write an INDCô

	4. **Drafting phase:** consistent with guidance provided by the UNFCCC through its literature and the outputs of the desktop review, a draft INDC was prepared. The methodology and metrics used are consistent with IPCC guidance under the UNFCCC, particularly, the estimation of GHGs emissions. 5. **Stakeholders review:** the draft INDC was reviewed by the National Team, provided to key stakeholders for review and feedback, and updated accordingly. 6. **Review and Approval by the Office of the President's National Environmental Policy Coordination department**: the updated draft of the INDC was submitted to the Office of the President for consideration, approval and submission to the UNFCCC.
TIME FRAME	The period covered by Surinameôs INDC, as proposed, is up to 2025.
COVERAGE	Surinameôs INDC is based on national-scale coverage.
SCOPE OF GASES	The GHGs to be accounted for in this INDC are carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O).
METHODOLOGY	The methodology and metrics are generally consistent with the guidance provided by the IPCC.
USE OF MARKETS	As part of this INDC Suriname has not given consideration to the use of markets though such markets could become a feature for the future.
MITIGATION **A. FORESTS**	The sectors covered in this INDC are ôForestsôand ôRenewable Energyô Approximately 94% of the Republic of Suriname consists of forests covering approximately 15 million ha of the land surface. Suriname has one of the worldôs lowest rate of deforestation which is estimated at 0.02% annually.
Unconditional	Suriname has taken a comprehensive approach to the

Contributions	management of its forests through the Forest Management Act (1992), National Forest Policy (2003) and Interim Strategic Action Plan for the Forest Sector (2008) and has been able to maintain its high forest cover and low deforestation rate through stringent management of forests by adopting and implementing sustainable forest management practices. Enhanced efforts at forest monitoring to address illegal logging as well as the adoption of tools such as Reduced Impact logging (RIL) in the logging sector has helped to maintain a low environmental and carbon footprint. However, much more detailed information on forest resources is needed and in this regard Suriname is currently piloting a national forest inventory. Suriname intends to increase efforts at sustainable forest and ecosystem management and stabilizing and minimizing deforestation and forest degradation unconditionally. Additionally, to support its efforts at maintaining the integrity of forest ecosystems and keeping with its obligations regarding the United Nations Convention on Biological Diversity, Suriname has established 13% of its total land area under a national protection system and will continue to pursue the expansion of this system by increasing the percentage of forests and wetlands under preservation.
Conditional Contribution	Suriname intends to continue to practice sustainable forestry management in an effort to promote multiple use of its forest resources while at the same time exploring options for the payment of forest climate services that its forest provide. Through this approach, and with adequate financial incentives and support, Suriname intends to maintain its high forest cover and low deforestation rate. As part of this approach, Suriname is keen to strengthen forest governance institutions and collaboration with the private sector and other stakeholders and to expand its program of awareness, monitoring and enforcement while also promoting research and a

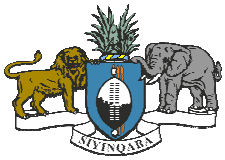
	comprehensive forest inventory to provide detailed information on forests. Suriname is currently undertaking a process of REDD+ Readiness at the national level and initial steps are being taken to assess the drivers of deforestation and to develop strategy, approaches, and options among the key sectors including agriculture, logging, and mining. Also, estimation of national carbon stocks and the development of a Monitoring, Reporting and Verification (MRV) System are underway. A draft law for the protection of the mangrove forest along the North Atlantic coast of Suriname was prepared by the government. In addition, coastline stabilization by means of ówave breakersô to reduce wave force, promote sedimentation and subsequent mangrove regeneration, will increase mangrove forest stock and carbon sequestration. Considering that the tropical rainforests of the Republic of Suriname stores approximately 11 gigatons of carbon and absorbs more than 8.8 million tons of forest carbon annually, Suriname is keen to maintain its high forest cover and low deforestation rate if adequate incentives are provided over the long term. In this regard, applying carbon pricing and proxies from avoided deforestation models for similar ecosystems in rainforest countries, Suriname has estimated its mitigation contribution from carbon sequestration and avoided deforestation for the period up to 2025 at US$630 Million.
B. <u>RENEWABLE ENERGY</u>	According to the statistics 85% of Surinameôs population has access to energy. The energy demand of Surinameôs population is between 150MW and 250MW and is met from diesel generation (51.6MW), hydropower (115MW), and small diesel generators with capacity in the range of 10-60kW servicing rural

	villages. The projected energy demand by 2022 is estimated to be 500MW.
Unconditional Contribution	Suriname has drafted a *National Energy Plan 2013-2033* outlining a long-term vision and strategy to establish a modern, efficient, affordable energy sector that offers long-term energy security and at the same time advances international competitiveness. An Electricity Bill has been prepared which outlines the formulation of an energy sector plan and the establishment of an energy authority. Several initiatives are already in an advanced stage such as solar energy for communities in the hinterland, a study on waste-to-energy at the national landfill, and micro-hydro power projects in the Interior. Other forms of renewable energy to be explored are wind energy as well as biomass-to-energy. A nation-wide energy efficiency program has commenced aimed at consumer awareness and usage of energy-saving light bulbs as well as promoting energy efficient designs for buildings. In addition, there has been the removal of tariffs on renewable energy products.
Conditional Contribution	Several renewable energy resources are technically feasible. Further studies are required to also explore the potentials of biofuels with rice husk, various grass species, and micro algae as the biological source. In consideration are a hydropower project with a potential output of 168MW; a biofuel project that could realize the introduction of ethanol in gasoline with 60% of vehicles utilizing the blend and at the same time produce 25MW of power; and 62MW from thermal energy. While Suriname has not yet been able to attribute costs to these major renewable energy initiatives, utilizing costs estimations from the International Renewable Energy Agency (IRENA), a 168MW hydropower project could cost between US$189Million and US$1.377Million. In addition, to aggressively pursue renewable energy, Suriname has already considered measures over short, medium and long-term, to upgrade efficiency. This would require

	financing estimated at approximately US$485 Million. Implementation of these conditional contributions to energy, is conservatively estimated at up to US$1.862Million (considering only hydropower and energy efficiency infrastructure). Through existing efforts and with funding for implementation, Suriname is keen to continue to transition its energy sector to ensure it stays above 25% renewable by 2025.
ADAPTATION	The Republic of Suriname is most vulnerable to the effects of climate change due to its low-lying coastal nature and threats of increased sea level rise and the frequency of extreme weather events. Adaptation therefore occupies prominence in Surinameôs approach to climate change. Suriname has outlined climate resilience measures as part of the 2012-2016 National Development Plan and is currently undertaking projects and actions as a direct response to climate change.
Unconditional contribution	At the strategic level, Suriname has outlined in the 2012-2016 National Development Plan, several critical mitigation measures to be implemented which include the rehabilitation and enhancement of infrastructure such as dikes to protect the coastal zone; drainage for urban and non-urban areas; improvements to water resources management; protection of freshwater resources in ground aquifers and rivers; promotion of sustainable land management; applying innovative technologies in the use of land; and instituting measures towards increasing ecosystem resilience to ensure these naturally adapt to the changing climate. Within the limitations of its own domestic financial resources, work has already commenced in integrating climate resilience in infrastructure programs as well as in the social and productive sectors such as in agriculture, coastal zone, education, health, and tourism. Furthermore, adaptation measures to building climate resilience

	include improving natural and mechanical infrastructure such as dikes and river defenses; mangrove protection, restoration and expansion, and water management. These efforts have been guided by preliminary vulnerability assessments for key sectors including agriculture, the coastal zone, health, socio-economy and tourism. These assessments also supported the identification of critical adaptation measures of which some are under implementation such as the drafted law for protecting the unprotected parts of the mangrove forests along the coast. The reasons for this measure are to increase natural protection of the vulnerable coastline; protect the mangrove ecosystems on the coast; sequester carbon and reduce GHG emissions caused by uprooting of plants during coastal erosion; to promote natural mangrove regeneration leading to increased fish production and reduced poverty levels.
Conditional Contribution	Further research and vulnerability assessments, infrastructure programs, and mainstreaming climate change in the social and productive sectors are critical actions to be taken in increasing resilience to climate change in the coastal zone as well as in the Interior. In addition, the introduction and implementation of various types of renewable energy requires, for instance, the installation of solar panel parks as well as micro-hydro power units in river systems; application of biomass-to-energy technology; installation of wind mills; and implementation of waste-to-energy technology. These, in turn, require human and institutional capacity building and financing. Financing is a key requirement to support these actions and determining in a comprehensive way the future costs of adaptation. Building climate resiliency is viewed as an immediate priority. Notwithstanding this, to be able to make minimum level adaptation interventions the Republic of Suriname requires an estimated US$1 Billion to support its climate resilience program of activities in the period up to 2025.
ASSUMPTIONS AND	A key assumption made in this INDC is that support from the

RISKS	international community, and in particular the ANNEX 1 countries, will be forthcoming in a timely manner in areas such as finance, technology transfer, renewable energy and training, and capacity building. It is also assumed that financial mechanisms under the UNFCCC including the Green Climate Fund will become fully operational and easily accessible for SIDS and low lying coastal countries. Also, that a special financing mechanism will be established to support action on forests which could evolve into a mechanism for payment of forest climate services. Considering these assumptions, the risk therefore is that implementation of actions outlined in the INDC could be affected by sloth, insufficient and limited financial resources.
FAIRNESS, EQUITY AND AMBITION	The Republic of Suriname is a carbon negative society, absorbing much more carbon than it generates. GHG emissions are negligible at approximately 7 million tons of carbon. And, with approximately 94% of land area under tropical rainforests, Suriname performs a key function as a global carbon sink absorbing more than 8.8Mt CO_2 annually. As such, Suriname's proposed contributions are ambitious, fair and equitable and represent a commitment towards climate compatible development and global climate change mitigation.
MEANS OF IMPLEMENTATION AND TOTAL COSTS	The implementation of the INDC of the Republic of Suriname will require financial support. Several actions have been identified in the energy and forestry sectors that would contribute to mitigation. An estimate of these costs is US$2.492 Billion. For critical adaptation needs, however, Suriname requires an estimated US$ 1Billion to support its climate resilience program of activities. The total costs for the implementation of the INDC of the Republic of Suriname are therefore estimated at US$3.492 Billion.



Swaziland's INDC

Introduction

The Kingdom of Swaziland is a landlocked, culturally-rich country situated in Southern Africa, and home to 1.25 million Swazi people. As a developing, lower-middle income country, Swaziland's ultimate vision is to improve its world standing in terms of measureable indices of human development. Underlying this vision is a focus on sustainable economic development [1], social justice, political stability, poverty eradication, employment creation, gender equity, social integration and environmental protection[2].

Swaziland recognises that climate change can severely impact on the achievement of the ultimate vision for the country. As such, climate change is considered a priority development concern, and the country is committed to taking urgent and long-term actions to reduce the vulnerability of its people and risks to national development[3]. Since ratifying the Convention[4] in 1996, Swaziland has developed a series of notable climate actions which include (amongst others) the establishment of a multi-stakeholder National Climate Change Steering Committee in 2011. This Committee spearheaded the development of Swaziland's 2014 National Climate Change Strategy and Action Plan and 2015 National Climate Change Policy. The goal of this Policy is to support the development of a sustainable, climate resilient and inclusive low-carbon green growth economy in line with vision 2022 outlined in the national development strategy.

Swaziland is pleased to submit its Intended Nationally Determined Contribution (INDC) to the Convention. This INDC presents yet another step that the country is taking towards the development of an effective climate change response, both in terms of reducing GHG emissions and adapting to the impacts of climate change. The INDC supports the achievement of Swaziland's developmental objectives of sustainable development, poverty eradication and enhanced adaptive capacity.

Swaziland has contributed little to greenhouse gas (GHG) concentrations in the atmosphere. Estimates put Swaziland's 2010 emission inventory at 0.8 $MtCO_2e$ (including the Land Use Land Use Change and Forestry (LULUCF) sector), meaning that Swaziland's emissions represent less than 0.002% of global emissions. Despite not emitting large quantities of GHGs, Swaziland is facing severe climate change impacts. Variable precipitation patterns, droughts, desertification, higher temperatures and increased storm intensities have already affected the country's key economic sectors. As a developing, lower-middle income country, with 69% of the population living below the poverty line, Swaziland has little capacity to cope with these impacts. Adaptation action within the country is crucial, and this forms the basis of Swaziland's climate change response and INDC.

The full implementation of Swaziland's INDC is contingent upon continuous strengthening of the country's technical capacities, technology transfer and development, as well as financial support received.

[1] With regards to economic development, Swaziland's 2014 gross domestic product was USD 3,400 million, with 2.5% annual growth rates anticipated over the next five years (World Bank (2014)).
[2] Ministry of Economic Planning and Development, Government of Swaziland (1997): The National Development Strategy.
[3] This is undertaken within the context of Swaziland's national and regional development priorities, objectives and circumstances.
[4] United Nations Framework Convention on Climate Change.

Adaptation

Evidence of climate change is already visible in Swaziland through the dwindling crop yields, violent storms and persistent drought. This is exacerbating the country's existing challenges which include chronic poverty, food insecurity[5], the ability to attain the United Nations Sustainable Development Goals, and the highest prevalence of HIV/AIDS in an adult population in the world[6]. Adaptation to the impacts of climate change is of utmost importance in Swaziland, particularly in four key sectors of the economy that will form the foundation of the adaptation contribution of Swaziland's INDC:

- **The biodiversity and ecosystems sector** provides a range of services for the Swazi people. Swaziland is heavily dependent on these services; the country's rural poor are especially vulnerable to the degradation of healthy ecosystems through climate change.
- **The water sector** will likely be impacted by a (projected) 40% reduction in the country's river flows, which will impact on the achievement of Swaziland's developmental objectives, particularly food security and human health.
- **The agriculture sector** contributes approximately 9.5% to the country's gross domestic product. This sector forms the critical foundation of Swaziland's population as more than 70% of the rural population is dependent on subsistence agriculture. Variable precipitation patterns, droughts, higher temperatures and increased storm intensities have already significantly impacted this sector.
- **The health sector** will be affected by climate change impacts, with groups such as households with members living with HIV expected to be particularly vulnerable. The health sector is a cross-cutting sector and is dependent on the climate resilience of the agriculture, water, and biodiversity and ecosystems sectors.

The adaptation contribution of Swaziland's INDC is presented in Table 1 below:

Table 1: Adaptation contribution

Coverage	Actions
National level	Swaziland's contribution is to develop a National Adaptation Plan (NAP) by 2020. This NAP has three primary objectives: ▪ Identify the level of climate risk given the economic, social and environmental constraints of the country. ▪ Reduce vulnerability to the impacts of climate change by building adaptive capacity and resilience. This will be achieved through integrated water resource management, climate smart agriculture, cross-cutting themes of early warning systems, disaster risk management, improving emergency preparedness and response capacities, energy efficiency and energy security, biodiversity conservation and sustainable land management. ▪ Facilitate the integration of climate change adaptation, in a coherent manner, into relevant new and existing policies, programmes and activities, in particular through development planning and budgeting processes within relevant sectors and at different levels. It is envisaged that the NAP will also develop Swaziland's institutional and regulatory framework which will enhance and enable investments in adaptation for vulnerable sectors.

[5] 25 – 50% of the population are currently dependent on food aid.
[6] 26% of Swaziland's adult population is currently living with HIV.

Coverage	Actions
Biodiversity and ecosystems sector	Swaziland's contribution is to: ▪ Scale up investments in restoring and maintaining ecological infrastructure, with a focus on the priority ecological assets. ▪ Establish effective long-term biodiversity conservation, landscape management and natural resource management programmes. ▪ Strategically plan and manage the ecological infrastructure, which includes healthy grasslands, rivers, wetlands, woodlands and natural forests. ▪ Enhance biodiversity and promote ecotourism with benefit sharing for the surrounding communities. The possible actions that have been identified to achieve these contributions include: agro-forestry; ecological pest management; flood mapping; grazing land management; degraded land rehabilitation; fire management; and erosion control through terracing.
Water sector	Swaziland's contribution is to: ▪ Align the climate change policy and strategy components of the National Water Policy with the 2003 Water Act. ▪ Develop water pricing structures to encourage efficient water use. ▪ Implement measures to reduce water consumption throughout the value chain. ▪ Strengthen the capacity of early warning centres, for improved emergency preparedness, disaster risks and response capacities. ▪ Develop systems to integrate water resource management across all the sectors of human endeavour, land use and the environment. The possible actions that have been identified to achieve these contributions include: artificial groundwater recharge; integrated river basin management; leakage detection; rainwater harvesting; sand dams; solar pumps borehole water pumping; water recycling and reuse; and wetland restoration.
Agriculture sector	Swaziland's contribution is to: ▪ Increase the contribution of agriculture to economic development, to support both food security and exports. ▪ Reduce poverty and improve food and nutrition security through sustainable use of natural resources, improved access to markets, and improved disaster and risk management systems. The possible actions that have been identified to achieve these contributions include: conservation tillage; crop diversification; greenhouse farming; hydroponics; livestock selective breeding; micro irrigation; organic farming; and solar dryers.
Conditionality	The extent to which Swaziland's adaptation contribution can be achieved is dependent on the level of support received – in the form of appropriate capacity building, technical assistance, technology transfer, skills training and finance.
Unconditional contribution	Swaziland will focus human capital on adaptation as a response to climate change. Swaziland will participate in research, pilot projects and planning and implementation of adaptation actions.

Mitigation

Though Swaziland is not a high GHG emitter – neither in absolute terms nor per capita terms – the country recognises that it still has an important role to play in global GHG mitigation efforts.

Swaziland has experienced various challenges in the compilation of its national GHG inventories. Challenges include data collection and archiving, quality assurance and control, and uncertainties in the estimation of emissions from all IPCC[7] sectors. Due to these uncertainties, there is no clear departure point for Swaziland's emission trajectory and therefore Swaziland's mitigation contribution is framed on an action-based approach that is strongly dependant on financial and technical support as well as capacity building.

The mitigation contribution of Swaziland's INDC is presented in Table 2 below:

Table 2: Mitigation contribution

Coverage	Actions
National level	Swaziland's contribution is to develop a robust national GHG inventory, a credible baseline and emissions trajectory, and a comprehensive measurement, reporting and verification (MRV) system. This will provide the framework on which to develop a mitigation goal and associated action plan by 2020.
Energy sector	Swaziland's contribution is to double the share of renewable energy in the national energy mix[8] by 2030, relative to 2010 levels[9]. Swaziland recognises that access to renewable forms of energy plays a significant role in improving livelihoods of its people – both in terms of increasing social equity and improving economic growth. This contribution will also reduce the energy sector's GHG emissions. The contribution covers grid and off-grid applications where Swaziland will: ▪ Implement small scale, decentralized renewable energy technologies to improve energy access in rural areas. This will also reduce the unsustainable wood harvesting practices that are currently undertaken. ▪ Increasing the use of grid-connected renewable technologies with fuel sources such as waste, solar, bagasse (from the sugar industry) and wood chips. This contribution has further co-benefits of improving universal energy access and security, particularly relevant in the context of the current challenges experienced in the regional electricity system.

[7] Intergovernmental Panel on Climate Change
[8] Swaziland Government Ministry of Tourism and Environmental Affairs 2014: Sustainable Energy for All Country Action Plan
[9] The share of renewable energy in the national energy mix in 2010 was 16%, this includes both grid connected renewable energy and sustainable/renewable biomass.

Coverage	Actions
Transport sector	Swaziland's contribution is to introduce the commercial use of a 10%[10] ethanol blend in petrol by 2030. This is additional to the energy sector contribution discussed above. This contribution will reduce the transport sector's GHG emissions, which accounted for 9% of the nation's inventory in 2010. These emissions are anticipated to exponentially increase as more vehicles are purchased. Currently the average growth rate of the number of vehicles, of all types, in Swaziland is 7% per year. Swaziland does not currently blend ethanol in petrol, though successful pilot projects have been undertaken. This commitment is also likely to have a positive influence on Swaziland's agricultural sector, particularly in the sugar industry. Bagasse and molasses are by-products from this mature industry and can be used as feedstock for the production of ethanol.
Substitutes for ozone depleting substances	Swaziland's contribution is to phase out the use of HFCs, PFCs and SF_6 gases. This contribution will be achieved by developing the value chain for alternative zero-GWP gases, and enhancing the skill level for these conversions. In 2010, emissions from HFCs and SF_6 accounted for more than 20% of the national inventory. As a ratifying partner to the Montreal Protocol on Substances that Deplete the Ozone Layer, Swaziland has already phased out its HCFCs production (which was replaced with HCs which have no global warming potential). As a progression beyond this current undertaking, this contribution will see Swaziland phasing out the consumption of ozone depleting gases as well as substitutes with GWP.

The specifics of Swaziland's mitigation contribution, as required by the Lima Call for Climate Action, is presented in Table 3 below.

Table 3: Specifics of Swaziland's mitigation contribution

Mitigation actions	Swaziland's four mitigation actions, based on technology, financial and capacity building support are: ▪ Developing a robust national GHG inventory, a credible baseline and emissions trajectory, and a comprehensive MRV system. ▪ Doubling the share of renewable energy in the national energy mix. This includes electricity generation and reduced consumption of non-sustainable biomass. ▪ Introducing the use of a 10% ethanol blend in petrol for use in all vehicles. This is additional to the contribution of doubling the share of renewable energy. ▪ Phasing out the use of HFCs, PFCs and SF_6 gases.
The reference point (including, as appropriate, a base year)	The base year for Swaziland's INDC is 2010.
Time frames and/or periods for implementation	The development of a robust national GHG inventory, credible baseline and emissions trajectory and a comprehensive MRV system for Swaziland will commence from the submission of the INDC. The mitigation actions will be implemented between 2020 and 2030.
Scope and coverage	*Sectors covered:* The development of a robust national GHG inventory covers all IPCC sectors. Whilst additional actions specific to the energy, transport and industrial processes sector are also covered by Swaziland's INDC.

[10] Swaziland Government Ministry of Natural Resources and Energy (2009): National Biofuel Development Action Plan

	Greenhouse gases covered: Emissions of CO_2, CH_4 and N_2O will be avoided by increasing the share of renewable energy in the mix and ethanol blending in petrol. The consumption of HFCs, PFCs and SF_6 gases will be phased out. *Geographical coverage:* The contribution applies to the entire country.
Assumptions and methodological approaches for estimating and accounting for anthropogenic greenhouse gas emissions and, as appropriate, removals	The emission reductions associated with the mitigation actions were calculated by: ▪ Determining the share of renewable energy in the national electricity mix in 2010. The additional grid connected renewable energy that will be generated between 2010 and 2030 was multiplied by the Southern Africa Power Pool's grid emission factor for 2010. The additional non-grid connected renewable energy that will be used between 2010 and 2030 was multiplied by the 2006 IPCC Guidelines' emission factor for wood combustion and used global warming potentials for CH_4 and N_2O from the IPCC's fourth assessment report over a 100-year time series. This contribution is estimated to reduce emissions by 0.94 $MtCO_2e$. ▪ Determining the emissions associated with petrol combustion in 2010 and assuming that ethanol has a net zero emission factor. It is estimated that this could reduce emissions by 0.03 $MtCO_2e$. ▪ Estimating the country's HFC, PFC and SF_6 related emissions in 2010 using the 2006 IPCC Guidelines for National Greenhouse Gas Inventories and global warming potentials from the IPCC's fourth assessment report over a 100-year time series. Conversion to alternative zero-GWP gases will be monitored throughout the implementation phase.
Conditionality	The implementation of Swaziland's INDC is conditional upon appropriate support in the form of finance, technical assistance and capacity building. Depending on the level of support received, Swaziland will update its INDC accordingly. These mitigation actions have clear GHG reduction potential and could be converted to carbon credits. Swaziland intends to sell emission reductions units through international and regional carbon markets and/or carbon pricing mechanisms that may be established under the new agreement. To ensure environmental integrity of the emission reduction units and to avoid double-counting, Swaziland suggests the use of internationally recognized accounting principles and MRV standards such as under the Clean Development Mechanism or similar types of baseline-and-crediting mechanisms. .
Unconditional contribution	Swaziland will focus human capital on mitigation as a response to climate change. Swaziland will participate in research, pilot projects and planning and implementation of mitigation actions.
Planning process	Swaziland's INDC was developed through several iterations of stakeholder consultation, along with an assessment of priority emitting sectors and key vulnerabilities. The INDC is aligned with the country's National Development Strategy and the National Climate Change Policy.

Fairness and ambitiousness of Swaziland's INDC

Swaziland is a small, developing country and is vulnerable to the impacts of climate change. Though not a large GHG emitter – with per capita emissions of 0.6 tCO2e/year in 2010 – Swaziland remains committed in contributing to the transition towards a low carbon and climate resilient future.

This contribution is reflected in a fair and ambitious INDC that will see Swaziland improving the share of renewable energy in the nation's energy mix, increasing the ethanol blend in petrol, and phasing out the consumption of HFCs, PFCs and SF_6 gases. Further ambition is reflected in Swaziland's efforts to develop

synergies and co-benefits between climate change mitigation and adaptation. These actions not only help to tackle global warming, but will assist the country in reducing poverty, strengthening ecological infrastructure, and improving water and food security. As Jabulani Mabuza, Swaziland's Minister of Tourism and Environmental Affairs, noted when speaking at World Environment Day in June 2014: *"Swaziland may not have contributed significantly to the causes of climate change, but needs to start looking for options to 'climate proof' its economy since it would not be spared from its effects."*

Switzerland's intended nationally determined contribution (INDC) and clarifying information

Switzerland is pleased to communicate its intended nationally determined contribution (INDC) and clarifying information as per decisions 1/CP.19 and 1/CP.20.

Switzerland's INDC

Switzerland commits to reduce its greenhouse gas emissions by 50 percent by 2030 compared to 1990 levels, corresponding to an average reduction of greenhouse gas emissions by 35 percent over the period 2021-2030. By 2025, a reduction of greenhouse gases by 35 percent compared to 1990 levels is anticipated. Carbon credits from international mechanisms will partly be used. The INDC is subject to approval by Parliament. The methodological approaches underlying the Swiss INDC are included in this communication.

A.) Up-front Information

1. Quantifiable information on the reference point (including, as appropriate, a base year):

Base year: 1990

Emissions in base year: 53.3 Mt per year (provisional, will be defined through the inventory submissions). Base year emissions from non-forest land (cropland, grassland, wetlands, settlements, other land) will be included, as necessary, after completion of a current study on these emissions[1].

Emissions/removals from forest land are not included in the base year, since only the net change in emissions is accounted for this sector.

2. Time frames and/or periods for implementation:

Time frame of the commitment is until end 2030.

This quantified commitment by 2030 is translated into an average commitment over the period from beginning 2021 to end 2030. Its achievement will be tracked through the information in Switzerland's national inventories (accounting methodology for land sector explained below) and the addition/subtraction of emission reductions transferred internationally (carbon credits) in light of a budget approach.

Information on the anticipated level of emissions for 2025 is given for international comparability.

3. Scope and coverage:

Gases covered: CO_2, CH_4, N_2O, HFCs, PFCs, SF_6, NF_3

Base year for gases covered: all 1990 (not relevant where reference level is applied)

Sectors covered: energy; industrial processes and product use; agriculture; land-use, land-use change and forestry; waste

Switzerland supports the inclusion of international aviation and shipping on the basis of future internationally agreed rules applicable to all Parties (currently not included in Switzerland's INDC).

4. Planning processes:

National implementation: Until mid-2016, Switzerland will elaborate a draft for consultation at national level of its national climate policy for the period 2021-2030. It will include measures that allow emission reductions of its target of minus 50 percent by 2030 to be achieved mainly domestically. The proposed measures to achieve the commitments will build on existing measures and strategies. The existing legal frameworks will have to be revised accordingly. These revisions are subject to approval by Parliament.

[1] Emissions from non-forest land use and land use change are estimated to be in the order of 2 per cent of base year emissions.

6.21/2004-00010/01/04/25/02/O023-0637

Long term: Switzerland plans its climate policy in 10-year-steps, continuously strengthening its reduction targets. The Government of Switzerland has formulated an indicative goal to reduce emissions by 2050 by 70 to 85 percent compared to 1990 including use of international credits as well as the vision to reduce per capita emissions in Switzerland to 1 – 1.5 t CO_2eq in the longer term. These unavoidable emissions will have to be eventually compensated through sinks or removals.

5. Assumptions and methodological approaches:

Switzerland supports internationally agreed rules for accounting and reporting of greenhouse gas emissions. As they are yet to be agreed, Switzerland's INDC is based on the following assumptions and methodological approaches:

Credits from market mechanisms: Switzerland will realize its INDC mainly domestically and will partly use carbon credits from international mechanisms.

- **Use of carbon credits with high environmental standards:** Switzerland will use carbon credits from international mechanisms that deliver real, permanent, additional and verified mitigation outcomes and meet high environmental standards. Quality criteria which are at least in line with those of Switzerland's current national legislation will be applied. Switzerland intends to use the CDM. In this context, Switzerland supports the revision of its modalities and procedures to fit in the new climate regime. Switzerland also intends to use, as appropriate, the new market mechanisms under the Convention (NMM, activities under the FVA).
- **Avoidance of double counting:** Switzerland intends to include the above-mentioned carbon credits in accounting for its emission reduction commitment. For the CDM under its current use and operation, it is assumed that only the acquiring Party will account for the emission reductions covered by the credits acquired from the host Party. Beyond this, Switzerland supports the reform of the CDM in the context of host country Parties having also emission reduction commitments/contributions. For new market mechanisms, Switzerland supports the elaboration of UNFCCC rules for avoiding double counting of emission reductions, or otherwise appropriate arrangements will be necessary.

Forest land:

- **Land based approach with reference level:** The same IPCC methodology as used to account for forest management in the second commitment period under the Kyoto Protocol will be applied. The reference level for forest land will include living and dead biomass and harvested wood products (HWP). Anticipated accountable emissions/removals from forest land in target year: 0

  Switzerland supports that reference levels, when based on a projection, are subject to a technical assessment or review process.
- **Natural disturbances:** Extraordinary events in forest land will be excluded from the accounting.

Non-forest land (cropland, grassland, wetland, settlements, other land)[1]**:** Switzerland plans to include non-forest land from 2020 and anticipates to switch to a comprehensive land based approach. However, for the period 2021-2030, accounting is yet to be defined (currently a study on non-forest land reporting is on-going). The submitted INDC assumes 0 emissions from the non-forest lands.

Inventory methodology used:
IPCC 2006 guidelines, as per UNFCCC decision 24/CP.19
IPCC 2013 Revised Supplementary Methods and Good Practice Guidance Arising from the Kyoto Protocol, as per UNFCCC decisions 2/CMP.6 and 2/CMP.7

Global Warming Potential Values used: as per UNFCCC decision 24/CP.19

Given the assumed approaches in methodologies and assumptions outlined above, Switzerland intends to account for all significant anthropogenic emissions by sources and removals by sinks and does not regress regarding the comprehensiveness in accounting. Switzerland further will continue to follow existing guidance under the Convention and IPCC methodologies in accounting and reporting.

6. Consideration on fairness & ambition:

It is important to Switzerland that the global community shares the required efforts to combat global climate change in a fair and equitable manner. The same legal form and rules must apply to all Parties, while the effort to reduce greenhouse gas emissions must be differentiated according to a Party's responsibility and capability.

It is to note that Switzerland's commitment to reduce greenhouse gas emissions by 50 percent by 2030 relative to 1990 levels puts Switzerland on an emission development pathway in line with the recommendations by science.

It is further to note that Switzerland's emission reductions by 2030 will mainly be achieved domestically, thereby further strengthening Switzerland's transition to a low carbon economy. Given the low greenhouse gas intensity of Switzerland today, a high level of ambition is underlying Switzerland's INDC for 2030.

Switzerland's understanding of a fair share includes consideration of the aspects below. It is to note that fairness considerations include various aspects and that no single indicator on its own can accurately reflect fairness or a globally equitable distribution of countries' efforts. It is further to note that the evolving nature of a country's circumstances is to be reflected in fairness considerations.

- Responsibility is reflected in a country's past, current and future greenhouse gas emissions. Total emissions as well as per capita emissions are to be considered.

  Switzerland's responsibility in terms of greenhouse gas emissions is low: Today, Switzerland emits around 0.1% of world's emissions and per capita emissions are at world's average. Through climate policies implemented domestically, Switzerland's total share in global emissions as well as per capita emissions are further decreasing despite a substantial growth in industrial production (1990 – today: +54%) and population (1990 – today: +18%). Also, Switzerland has a low level of historic emissions of around 0.2% since 1990.[2]
- Capacity to contribute to solving the climate problem is closely related to the ability to invest in appropriate mitigation measures, such as carbon-efficient technologies. Hence, one aspect of capacity is to take into account GDP per capita in fairness considerations.
- Cost-efficient mitigation potential and abatement costs are a core aspect in considering a fair contribution of a country. Abatement costs vary strongly across countries. It is also to note, that marginal abatement costs increase if a country has undertaken ambitious mitigation actions in the past. In fairness considerations, it is important to merit past efforts and reward early movers.

  In Switzerland, abatement costs are high due to the limited availability of short term cost-efficient mitigation potential: Switzerland's energy production is nearly carbon free and there is little heavy industry. Emission reduction potential mostly remains in the housing and transport sectors. This remaining potential has long transformation periods.

Switzerland is committed to continue to contribute its fair share in reducing greenhouse gas emissions in view of holding the increase in global average temperature below 2 degrees Celsius and to continue to act on the forefront of climate change.

7. How the INDC contributes to achieving the ultimate objective of the Convention (Article 2):

Switzerland's commitment to reduce emissions by 50 percent by 2030 relative to 1990 levels puts Switzerland on an emission development pathway that corresponds with the recommendations of the IPCC AR5 to reduce global emissions by minus 40 to 70 percent by 2050 below 2010 levels. The formulated commitment by 2030 is further consistent with the longer term vision of the Government of Switzerland to reduce per capita emissions to 1 – 1.5 t CO_2eq in Switzerland. These unavoidable emissions will have to be eventually compensated through sinks or removals. It is to note that Switzerland's per capita emissions were already at world average levels in 2010.

[2] CAIT 2.0 WIR's climate data explorer (http://cait2.wri.org); Carbon Dioxide Information Analysis Center (http://cdiac.ornl.gov/ftp/ndp030/nation.1751_2010.ems).

B.) Information on Switzerland

Switzerland's share in global greenhouse gas emissions is around 0.1 percent. In 2012, total greenhouse gas emissions of Switzerland equaled 51.4 million tCO_2eq and per capita emissions were at world's average (6.4 tCO_2eq). The biggest share of greenhouse gas emissions arises from the transport and building sectors, followed by the industry, agriculture and waste sectors (see figure 1).

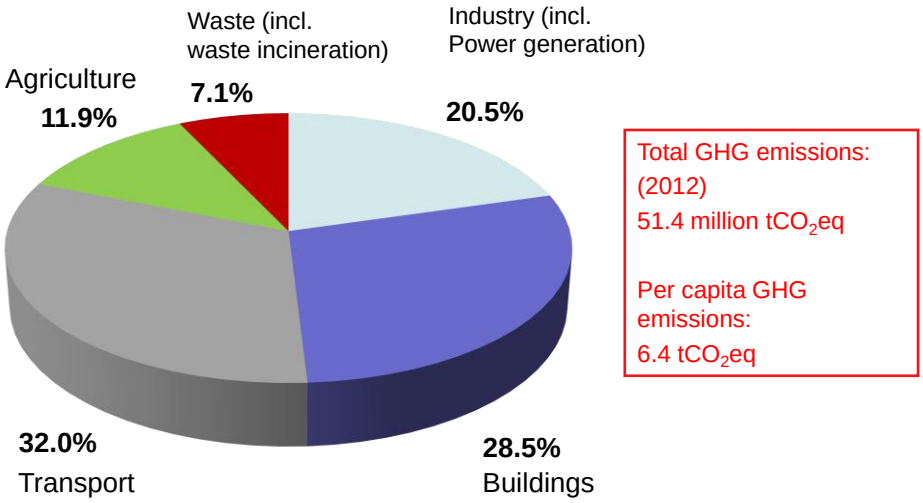


Figure 1. Switzerland's greenhouse gas emissions by sectors in 2012.

Over the last 25 years, Switzerland has experienced substantial economic and population growth. These two parameters influence the consumption and production of energy, traffic volumes and the number and volumes of heated buildings, which strongly impact greenhouse gas emissions in almost all sectors. Compared to 1990, in 2012, Switzerland's real gross domestic product (GDP) as a measure of economic output had risen by 36 percent, the building space that had to be heated increased by 31 percent, over 36 percent more passenger cars were in circulation on Swiss roads and 19 percent more people lived in Switzerland. Greenhouse gas emissions in this period nevertheless decreased slightly: new buildings are better insulated than in the past, cars have become more fuel efficient, heating oil is increasingly replaced by natural gas and electricity (e.g. for heat pumps) and the trend away from petrol- to diesel-powered passenger cars also contributed to a reduction in CO_2 emissions. Figures 2 and 3 show the respective reduction over the period 1990 to 2012 in per capita emissions by approximately 20%, in emissions per GDP by close to 30% as well as the decoupling of economic growth from the rise in greenhouse gas emissions.

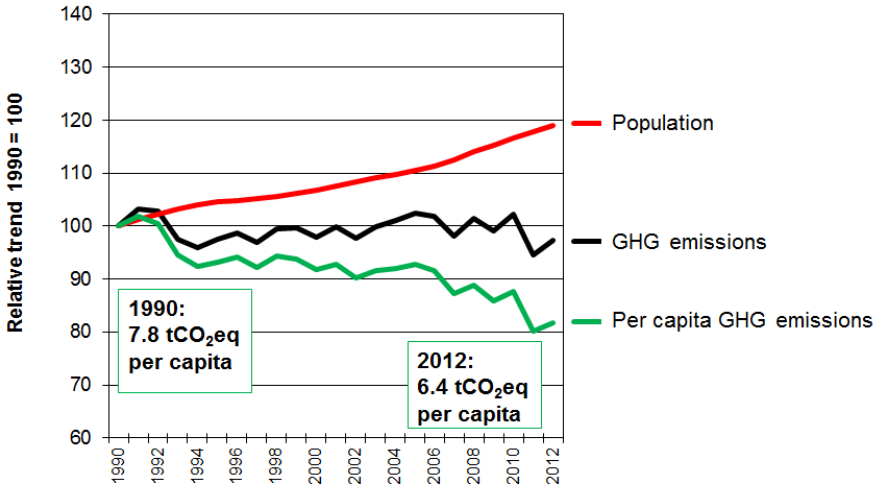


Figure 2. Per capita greenhouse gas emissions 1990 - 2012

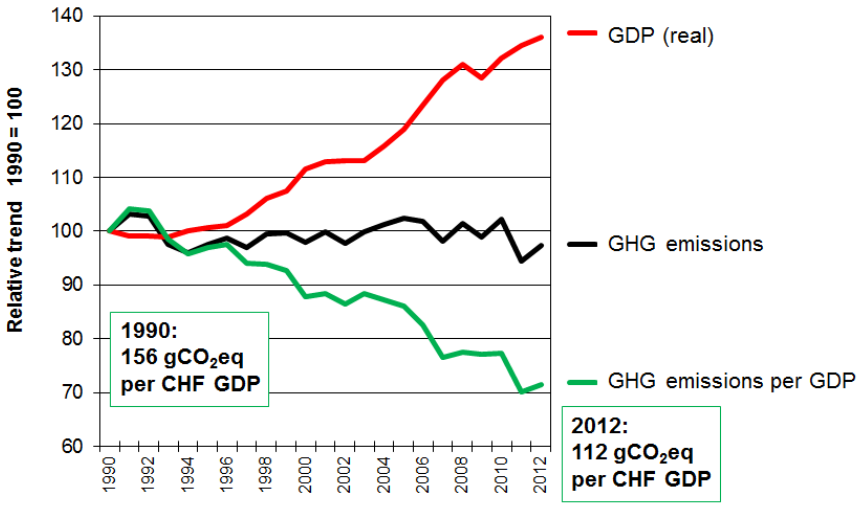


Figure 3. Per GDP greenhouse gas emissions 1990 - 2012

Switzerland has long standing climate policies and since 2000 a specific CO_2 Act has been established. Switzerland has committed itself under the first commitment period of the Kyoto Protocol (2008-2012) and reached its target to reduce greenhouse gas emissions by 8 percent compared to 1990, including through the use of carbon credits. At the beginning of 2013, the CO_2 Act and the CO_2 Ordinance entered into force in revised form. They form the framework of the current Swiss climate policy for the period from 2013 to 2020. The desired reduction of emissions by 2020 of 20 % below 1990 levels requires decisive action. Ratification of Switzerland's commitment from 2013 till 2020 under the second commitment period of the Kyoto Protocol is currently under consideration by the Parliament. For the period from 2021 to 2030, the existing legal frameworks will have to be revised. These revisions are envisaged in the next few years and subject to approval by Parliament.

Climate change has already left many marks in Switzerland. Both, the economy and society are affected. Since the beginning of temperature measurements in Switzerland in 1864, the average annual temperature has risen by 1.75 °C. In the Alps, the glaciers have been retreating at an accelerating pace since 1980. Since 1999 alone, glaciers have lost over 12 percent of their volume. If the warming continues, only a fraction of the current glacier cover will be left by the end of the 21st century with large impacts on the seasonal availability of water for drinking water, agriculture and power generation. Parallel to the retreat of glaciers, the permanently frozen subsoil in the high mountains also continues to thaw. More frequent mountain and rock falls as well as debris slides that can endanger transport links and infrastructure in the high mountains are a result of this. Already today, large investments are necessary to secure infrastructures at higher elevations. People are also directly affected. Only recently has it also been recognized that even the slow but steady increase in daily temperatures has a demonstrable impact on the well-being of people. Daily maximum temperatures in Switzerland have risen steadily since 1960. Hotter than usual summers have already led to higher mortalities.

Switzerland remains committed to and striving for an ambitious international agreement on climate change in line with recommendations by science to hold average global temperature increase below two degrees Celsius.

Intended Nationally Determined Contribution (INDC) towards the achievement of the global goal of the UN Framework Convention on Climate Change (UNFCCC) by the Republic of Tajikistan

The Republic of Tajikistan, pursuant to the relevant decisions of the Conference of the Parties (COP) to the UNFCCC, COP-19 and COP-20 of the UNFCCC, including the Lima Call for Action to Combat Climate Change (Lima, Peru, December 2014), submits herewith its **Intended Nationally Determined Contribution (INDC) and the explanations concerned.**

The final decision concerning the INDC of the Republic of Tajikistan within the framework of a new global climate change agreement, which will be proposed for signing during the COP-21 (Paris, France, December 2015), is expected to be taken with due account for the outcomes of the negotiating process at this meeting.

The Republic of Tajikistan, as a mountainous and landlocked country with a developing economy and low per capita GDP, is characterized by the low level of gross and specific greenhouse gas emissions and an extreme vulnerability to climate change, including frequent natural disasters. More than 60% of the water resources of the Central Asia Region, which originate from the high mountain glaciers, are generated in the country. Tajikistan adheres to the policy of sustainable development. Since independence, fundamental regulatory and legal instruments, national strategies and programmes have been adopted and the key environmental international conventions and agreements have been ratified, serving on a global scale as a safeguard towards preservation of the natural environment and preventing ecological disasters. With the assistance of the international institutions, measures are being developed and implemented to fulfil the commitments which have been made in accordance with the UN environmental conventions, and the relevant institutional structures are established.

The Republic of Tajikistan is a participating country of the international Pilot Programme for Climate Resilience (PRCR). At the time of preparation of the INDC, the main efforts of the PPCR in the Republic of Tajikistan are focused on hydraulic power industry, development of other renewable sources of energy, agriculture and forestry, adequate response to and risk reduction against natural disasters, provision of hydrometerological services, as well as measures to raise public awareness.

The INDC of the Republic of Tajikistan with respect to the reduction of greenhouse gas emissions and the impact on the climate system, without attracting new substantial international funding	A flexible target, not exceeding **80-90% of the 1990 level by 2030**, which amounts to **1.7-2.2 tons in CO_2 equivalent** per capita, has been determined as the country's contribution to anthropogenic greenhouse gas emission reductions. Systematic reforestation in accordance with the adopted State programmes is a considerable contribution of the country to the reduction of negative impacts on the climate system.
The INDC of the Republic of Tajikistan with respect to the reduction of greenhouse gas emissions and the impact on the climate system, subject to new substantial international funding and technology transfer	The potential for reducing greenhouse gas emissions in the Republic of Tajikistan to achieve a **target of 65-75% of the 1990 level by 2030**, which amounts to **1.2-1.7 tons in CO_2 equivalent** per capita. It will be possible in case of implementation of investment projects and national programmes in the sphere of power industry, transport, agriculture and forestry and water resources management, risk reduction of natural disasters, promotion and diversification of renewable energy sources and reduction of energy losses; modernization, introduction of new technologies and development of the sectors of the

	economy.
Reference year and volume of emissions	**1990, 25.5 million tons in CO_2 equivalent.**
Timeframe	**2021-2030.**
Scope and coverage	Basic spheres of economic activity, included in the INDC the Republic of Tajikistan: • Power industry and water resources; • Industry and construction; • Land use, agriculture and gardening and grazing; • Forestry and biodiversity; • Transportation and infrastructure.
Greenhouse gases	• Carbon dioxide (CO_2); • Methane (CH_4); • Nitrous oxide (N_2O).
The INDC of the Republic of Tajikistan with respect to climate adaptation, without attracting new substantial international funding	Reduction of the adverse impacts of the dangerous weather events and climate change will be ensured by: modernization of the hydrometeorological services and improvement of the process of serving the needs of the economy and of the citizens; implementation of the Medium-Term Development Programme of the Republic of Tajikistan for the period 2016-2020; Agriculture Reform Programme of the Republic of Tajikistan for 2012-2020; State Programme for Study and Preservation of Glaciers of the Republic of Tajikistan for 2010-2030; State Development Programme of Geology Industry of the Republic of Tajikistan for 2012-2020; National Strategy for Disaster Risk Management of the Republic of Tajikistan for 2009-2015; National Plan for Emergency Preparedness and Response of the Republic of Tajikistan and other sectoral programmes. . It is important to bear in mind that for several reasons the planned and approved State programmes and strategies are not fully implemented due to the lack of financial resources. In the future it will be important to ensure mobilization of additional external resources and enhancement of scientific and technical assistance to ensure the full-fledged implementation of these and other important programmes.
The INDC of the Republic of Tajikistan with respect to climate adaptation, subject to new substantial international funding and technology transfer	The reduction of vulnerability to the impacts of climate change by means of full-scale integration of the climate resilience and adaptation measures into the planning and development of the green infrastructure in the following sectors: • agriculture, irrigation and water systems, • power engineering and industrial facilities,

- transport and housing infrastructures,

as well as in the following areas:

- resilience to the hydrometeorological hazards and climate changes;
- disaster risk reduction;
- promotion of adaptation of globally significant biological species and natural ecosystems to climate change;
- monitoring and preservation of the glaciers and water resources in the runoff formation zones under the conditions of climate warming;
- improvement of occupational safety, life-sustaining activity and health of the population, maternity and childhood protection in the context of climate warming.

The introduction of climate change adaptation measures will be carried out by means of:

- new methods and planning for water resources management;
- monitoring and hydrometeorological survey;
- ensuring food security and improving well-being of the population;
- infrastructure development;
- active role of women and civil society on the issues of climate change and disaster risk reduction;
- dissemination of knowledge and experience on climate change at various levels.

Involvement of different stakeholders in the process of preparation and discussion of the INDC and the legal framework to support implementation of the INDC

The representatives of all key ministries and agencies, branches of the economy and the general public took part in the process of preparation and discussion of the INDC. In the Republic of Tajikistan, the programmes, strategies and legislative instruments are in place or being elaborated, aimed at developing renewable sources of energy, energysaving and energy efficiency, reforming agriculture, modernizing industry and transport, developing forestry and land use planning. In 2003, the National Action Plan of the Republic of Tajikistan on Climate Change Mitigation was adopted. At present, the National Development Strategy of the Republic of Tajikistan until 2015 is being implemented. At the time of preparation of the INDC, the National Development Strategy of the Republic of Tajikistan (2030), National Climate Change Adaptation Strategy and other sectoral strategies are being developed.

Taking into account the results of the negotiations and the decisions of COP-21 to the UNFCCC in Paris, December 2015, the Republic of Tajikistan may review or develop legislative and regulatory instruments; specify and complement sectoral

strategies and action plans to reflect adequately the priority issues of climate change, as well as develop projects and programmes for 'climate-sensitive' investment and fulfillment of the intentions of the Republic of Tajikistan with respect to greenhouse gas emissions and climate adaptation, as outlined in this INDC. The system of making regular biennial inventory of greenhouse gas emissions and sinks should be created, and the organizational arrangements on the issues of climate change should be improved.

Methodological approaches, used for assessment and accounting of anthropogenic greenhouse gas emissions and sinks and for forecasting

The methodological approaches are based on the following international techniques:

- IPCC Good Practice Guidance, 2003;
- IPCC Guidance, 2006.

The post-2015 statistics, macroeconomic forecasts and the indicative development goals.

Starting from 2016, it is expected that regular biennial inventory and reporting for greenhouse gas emissions will be introduced and the progressive establishment of systems for monitoring and verification measures will be carried out.

The following global warming potentials are used, recommended by the decision 24 (COP-19 to the UNFCCC):

- Carbon dioxide (CO_2): 1;
- Methane (CH_4): 25;
- Nitrous oxide (N_2O): 298.

Why the INDC is fair and ambitious, taking into account national peculiarities

The Republic of Tajikistan has one of the lowest levels of greenhouse gas emissions but, in spite of a high share of renewable power generation, it faces acute power shortages against the background of the economy and population growth. Since 1991, at the initial stage of the period of state independence, and especially during the period 1992-2000, the Republic of Tajikistan had experienced grave consequences resulting from civil war and of the transition from a centrally planned to a market-based economy, with a sharp increase in poverty. During the period 2008-2015, the socio-economic indicators of the Republic of Tajikistan have improved. For the Republic of Tajikistan, the basic priority of climate measures lies in adaptation because of high dependence of the considerable part of the population and of the branches of the economy on climatic conditions, also taking into account the key role of the country's mountain ecosystems in water resources generation and biological diversity for Central Asia. The existing assessed contribution of the Republic of Tajikistan to global greenhouse gas emissions is less than 0.02%. In view of a low level of greenhouse gas emissions

and a very high share of hydro-power (more than 90%), the level of greenhouse gas emissions of the Republic of Tajikistan will amount to 80-90% by 2030, as compared to 1990 (as stated in the INDC); this will ensure the achievement of socially acceptable and scientifically grounded indicators, both in absolute and per capita terms. By doing so, the Republic of Tajikistan adheres to the basic principle of the UNFCCC – common but differentiated responsibility – and expects an adequate level of reducing greenhouse gas emissions from economically developed countries and the largest countries-emitters of greenhouse gases in accordance with the IPCC scientific recommendations to prevent global warming of more than 2°C. The international support of the intentions of the Republic of Tajikistan with respect to reduction of greenhouse gas emissions and a full-scale implementation of climate adaptation and resilience measures will enable the country to be strongly on track to green economy and climate-resilient development. The forests and gardens in Tajikistan are of critical importance for the preservation of mountain ecosystems and biodiversity, improvement of the state of lands and prevention of their further degradation, protection of vulnerable infrastructure, protection of water resources and carbon absorption from the atmosphere. That is why they play a specific role both in terms of mitigating the impact of anthropogenic activity on the climate and reducing negative consequences.

How do the INDCs promote the achievement of the goal of the Convention, indicated in the Article 2

The reduction of greenhouse gas emissions by 2030, as compared to 1990, by its own and ongoing joint efforts, as well as at the expense of additional new funding and technology transfer on the part of the international community, will enable the country to take the path towards sustainable "green" development which is consistent with the Convention's goal – to prevent global warming of more than 2°C. The achievement of such an ambitious goal is only possible by means of substantial and differentiated efforts of all countries that are in support of a new and ambitious climate agreement within the UNFCCC.

No 1006.3/ 11812

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1 October B.E. 2558 (2015)

Dear Executive Secretary,

Subject: Thailand's Intended Nationally Determined Contribution (INDC)

The Office of Natural Resources and Environmental Policy and Planning (ONEP), in its capacity as Thailand's national focal point to the United Nations Framework Convention on Climate Change, is pleased to communicate Thailand's Intended Nationally Determined Contribution (INDC), as attached.

Please accept the assurances of my highest consideration.

Yours sincerely,

Raweewan Bhumidej
Secretary - General

Ms. Christiana Figueres
Executive Secretary
UNFCCC secretariat
P.O. Box 260124
D-53153 Bonn
Germany

Submission by Thailand
Intended Nationally Determined Contribution and Relevant Information

As a developing country highly vulnerable to the impacts of climate change, Thailand attaches great importance to the global efforts to address this common and pressing challenge. Pursuant to decisions 1/CP.19 and 1/CP.20, Thailand hereby communicates its intended nationally determined contribution (INDC) and the relevant information.

Thailand intends to reduce its greenhouse gas emissions by 20 percent from the projected business-as-usual (BAU) level by 2030.
The level of contribution could increase up to 25 percent, subject to adequate and enhanced access to technology development and transfer, financial resources and capacity building support through a balanced and ambitious global agreement under the United Nations Framework Convention on Climate Change (UNFCCC).

Accompanying information

Baseline:	Business-as-usual projection from reference year 2005 in the absence of major climate change policies (BAU2030: approx. 555 $MtCO_2e$)
Time frame:	2021-2030
Coverage:	Economy-wide (Inclusion of land use, land-use change and forestry will be decided later)
Gases:	Carbon dioxide (CO_2), Methane (CH_4), Nitrous oxide (N_2O), Hydrofluorocarbons (HFCs), Perfluorocarbons (PFCs), Sulphur hexafluoride (SF_6)
Assumptions and methodological approaches:	- Global warming potential on a 100-year timescale in accordance with the Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Report - National statistics, including sector activity and socio-economic forecasts
Planning processes:	Thailand's INDC was developed through participatory process. Stakeholder consultations were conducted through the establishment of an inter-ministerial working group and steering committee comprising representatives from relevant sectoral agencies, academia and private sector. In addition, three national consultations were held during the technical analysis phase. Thailand's INDC was formulated based on the following plans already approved or in the pipeline for approval by the Cabinet: - National Economic and Social Development Plans - Climate Change Master Plan B.E. 2558–2593 (2015-2050)

	- Power Development Plan B.E. 2558–2579 (2015-2036) - Thailand Smart Grid Development Master Plan B.E. 2558-2579 (2015-2036) - Energy Efficiency Plan B.E. 2558–2579 (2015-2036) - Alternative Energy Development Plan B.E. 2558–2579 (2015-2036) - Environmentally Sustainable Transport System Plan B.E. 2556–2573 (2013-2030) - National Industrial Development Master Plan B.E. 2555–2574 (2012-2031) - Waste Management Roadmap
International market mechanism	Thailand recognizes the important role of market-based mechanisms to enhance the cost effectiveness of mitigation actions, and therefore will continue to explore the potentials of bilateral, regional and international market mechanisms as well as various approaches that can facilitate, expedite and enhance technology development and transfer, capacity building and access to financial resources that support Thailand's efforts towards achieving sustainable, low-carbon and climate-resilient growth, as appropriate.
Review and adjustments	Thailand reserves the right to review and adjust its INDC as necessary upon finalizing the new global agreement under the UNFCCC.

Consideration of fairness and ambition, in light of national circumstances and contribution to the ultimate objective of the Convention (Article 2)

Thailand's national greenhouse gas (GHG) emissions represent only 0.84% of global emissions in 2012. The country's share of cumulative emissions from 1990-2012 is 0.75%. In 2012, per capita GHG emissions is at 5.63 tCO_2e and emissions per GDP (US$ million) is 409.54 tCO_2e, which is lower than world average. In terms of emission profile, the Second National Communication indicates that 67% of total GHG emissions in Thailand in 2000 is from the energy sector. In 2012, CAIT data indicates 73% share is from energy. Consequently, Thailand's mitigation efforts have focused primarily on the energy, including transport sector.

At COP20 in Lima, Thailand pledged our pre-2020 contribution of 7-20% GHG emission reduction by 2020 below business-as-usual (BAU) in the energy and transport sectors. According to a preliminary analysis, Thailand has already achieved 4% of GHG emission reduction from the projected 2020 BAU and is well on track to achieving the 7% target pledged as voluntary domestic efforts by 2020. Our INDC will continue such efforts with ambitious plans in the relevant sectors while considering also our national circumstances and context, including:

❑ **Thailand has taken early actions in the field of energy and has very ambitious plans in the relevant sectors.**

Energy security has long been an issue of concern over the course of Thailand's development. In the past, power generation in Thailand relied heavily on crude oil imports. To remedy this, the Government initiated a shift to natural gas in the power generation sector as early as the 1980s. Such effort has continued throughout the 1990s. And, in 2005 about 72% of electricity in Thailand was generated using natural gas, which is already a cleaner alternative to other types of fossil fuels. These early actions imply that Thailand is left with less available choices and faced with higher marginal cost of further reducing GHG emission in the energy sector.

Despite some limitations due to our early actions, the Ministry of Energy is taking a step forward to balance three key aspects of energy planning for Thailand: security, economy and ecology, also taking into account the need to address climate change. Ambitious targets are defined in the Power Development Plan (PDP), the Alternative Energy Development Plan (AEDP) and the Energy Efficiency Plan (EEP). For example, the PDP sets a target to achieve a 20% share of power generation from renewable sources in 2036. The AEDP aims to achieve a 30% share of renewable energy in the total final energy consumption in 2036. The EEP plans to reduce the country's energy intensity by 30% below the 2010 level in 2036.

The Environmentally Sustainable Transport System Plan also proposes ambitious actions to promote road-to-rail modal shift for both freight and passenger transport, which include extensions of mass rapid transit lines, construction of double-track railways and improvement of bus transit in the Bangkok Metro areas. A vehicle tax scheme based on CO_2 emission was also approved and will become effective beginning 2016. In addition, just last year the Government adopted the Waste Management Roadmap, aiming towards more efficient and sustainable waste management and promotion of power generation from waste-to-energy technologies. The roadmap can contribute tremendous environmental benefits in terms of GHG emission and pollution reduction. Currently, the Ministry of Natural Resources and Environment is also studying the potential to reduce carbon emission in the forest sector through the REDD+ Readiness. We will continue to explore further opportunities and cooperation in this sector.

❑ **Major barriers to successful implementation include high costs and capacity constraints.**

It is important to incorporate concerns that several of the proposed measures and actions in these ambitious plans are subject to very high investment and operating costs, particularly costs of technologies and infrastructures which can become an important barrier to successful implementation of the plans. Some of the key barriers for the energy sector include, for instance, limitation of grid connection due to inadequate capacity of transmission lines, lack of support by financial institutions for energy efficiency and renewable energy investments, lack of domestic technological and technical resources and negative public perception particularly against waste-to-energy and biomass power plants. Several measures require a high level of technical capacity and effective coordination across different sectoral agencies, whereas such technical capacity and effective coordination in a developing country like Thailand is currently lacking. For renewable energy development in particular, the International Energy Agency also cited some of the above-mentioned barriers as common barriers for renewable energy deployment in developing countries. Domestically, Thailand has launched several support mechanisms such as feed-in tariffs, tax incentives and access to investment grants and venture capital to promote renewable energy. However, to achieve ambitious and more rapid renewable energy deployment, incentives have to be created for technology developers to cooperate and

share technology knowledge to enable technology transfer on a larger scale. International financial support mechanisms such as technical assistance and technology transfer funds for purchasing intellectual property rights for a free distribution of clean energy technologies would be very valuable to accelerate diffusion of renewable energy technologies for developing countries[1]. Furthermore, efforts are needed to inform the public, through lessons-learned and experience sharing from other countries, as well as showcasing success stories from pilot or demonstration projects, for instance. It is therefore crucial that international cooperation through the UNFCCC focus on these cooperative attempts to unlock the potentials of developing countries in their contributions towards the global solutions to climate change by addressing these important identified barriers, making technological solutions more affordable for developing countries and strengthening the capacity of developing countries to implement these solutions more effectively and more sustainably. Successful implementation of these ambitious mitigation plans in Thailand, in addition to our domestic efforts, will be subject to adequate and predictable access to enhanced means of implementation agreed under the UNFCCC.

Adaptation Efforts

Thailand is a country located in a tropical Southeast Asian peninsula and has 2,420 kilometres of coastline on the Gulf of Thailand and the Andaman Sea. According to the Fifth Assessment Report by the Intergovernmental Panel on Climate Change (IPCC), Southeast Asia is one of the two most vulnerable regions in the world to coastal flooding. In addition, this region is predicted to face with increased annual mean precipitation and extreme precipitation. Geographically therefore, Thailand is a country highly vulnerable to adverse impacts of climate change, and is ranked as the eleventh country most affected by climate-related impacts from 1994–2013.

Thailand is also considered one of the sixteen countries in the "extreme risk" category that are most vulnerable to the future climate change impacts over the next thirty years. Statistically, from 1955 to 2005, Thailand experienced an increase of 0.95°C for mean temperature, 0.86°C for maximum temperature and 1.45°C for minimum temperature. From 1955-2014, number of rain days in Thailand has significantly decreased by 0.99 day per decade while daily rainfall intensity increased. National projections indicate heavier rainfalls are expected in areas with already high precipitation level, such as the southern peninsula, whereas for the arid, inland northeastern region, precipitation level is expected to decline even further. As a result, severe flooding and drought can be expected. Severe flooding in a similar magnitude to the 2011 flood in Thailand could cost as much as US$40 billion to the economy, and led to an estimated 2.5% drop in global industrial production. The economic loss due to the recent drought can be estimated as equivalent to 0.52% of the country’s GDP in 2015, with disproportionate impacts to the agricultural sector, and in particular to subsistent farmers .

Adaptation is therefore top priority in Thailand's national response to climate change. Thailand’s adaptation efforts aim to enhance climate resilience through the guidance of the Philosophy of Sufficiency Economy, bestowed by His Majesty King Bhumibol Adulyadej. Sufficiency Economy stresses the middle path as an overriding principle for appropriate conduct by Thai people at all levels, from family to community to country. “Sufficiency” means moderation, reasonableness, and the need of self-immunity for sufficient protection from impact arising from internal and external changes. To achieve this, the application of knowledge with due consideration and prudence is essential. In particular, great care is needed at every step in the utilization of

[1] IEA (International Energy Agency) (2011), *Renewable Energy. Policy Considerations for Deploying Renewables,* OECD/IEA, Paris.

theories and methodologies for planning and implementation. In addition, a way of life based on patience, perseverance, diligence, wisdom and prudence is indispensable to create balance and be able to cope appropriately with critical challenges, arising from extensive and rapid socioeconomic, environmental, and cultural changes in the world.

Thailand's prioritized adaptation efforts include:

- Promote and strengthen Integrated Water Resources Management (IWRM) practices to achieve water security, effective water resource management to mitigate flood and drought
- Safeguard food security through the guidance of Sufficiency Economy Philosophy e.g. an application of the New Theory in agriculture and land management to promote appropriate resource allocation and economic diversification at the household level and sustainable management of community forests to promote food security at the community level, for instance
- Promote sustainable agriculture and Good Agricultural Practice (GAP)
- Increase capacity to manage climate-related health impacts - including through development of health surveillance and early warning systems, systematic climate risk assessment and effective disease prevention and response measures to climate change related health consequences
- Increase national forest cover to 40% through local community participation, including in particular headwater and mangrove forests to enhance adaptive capacities of related ecosystem
- Safeguard biodiversity and restore ecological integrity in protected areas and important landscapes from the adverse impacts of climate change, with the emphasis on vulnerable ecosystems and red list species
- Develop participatory, integrated marine conservation and coastal rehabilitation plan to protect marine ecosystem and enhance climate proofing infrastructure to strengthen coastal protection against erosion
- Promote nature-based and sustainable tourism while enhancing better understanding on risk and vulnerability of the tourism sector, especially in hotspot areas
- Strengthen disaster risk reduction and reduce population's vulnerability to climate risk and extreme weather events through enhanced awareness, coordination and adaptive capacity of local communities, especially in the disaster risk-prone areas
- Strengthen climate modeling capacity while promoting collaboration among relevant agencies
- Establish effective early warning system and enhance the adaptive capacity of national agencies through multi-hazard risk assessment, systematic observations, integrative research and development of database, model, and technology
- Build regional climate resilience by serving as a knowledge hub to foster regional cooperation and exchange experiences on adaptation

These shortlisted adaptation efforts are essential to build and enhance Thailand's resilience to climate impacts. As guided by the Philosophy of Sufficiency Economy, knowledge building and careful planning is fundamental to the efforts to raise adaptive capacity of stakeholders at different levels. This requires cautious application of local wisdoms in combination with modern knowledge, techniques and technologies. Effective implementation of such adaptation efforts therefore requires substantive and ongoing capacity building of relevant stakeholders to be able to raise the necessary adaptive capacity to respond successfully to climate variability and change. Adequate financial resources and appropriate technology development and transfer are

extremely important and can lead to improved outcomes and increased coping, thus enhancing adaptive capacity under various conditions of climate change. Thailand's Technology Needs Assessment (TNA) report formulated in 2012 has identified three highly impacted sectors in urgent need of adaptation technologies. These are:
(1) Agriculture, in need of forecasting and early warning system technologies, crop improvement technologies, and precision farming technologies
(2) Water Resource Management, in need of networking (via pipes and canals) and management of infrastructures (including zoning), seasonal climate prediction, and sensor web using observation and/or modeling data
(3) Modeling, in need of an integrated national data center, national data transfer/management process and the advanced research, weather research and forecasting (WRF - ARW) model, and an integrated model to address the need of agricultural sector and water resource management sector

During 2009-2011, budget for adaptation actions in Thailand accounted for 68% of the total budget allocated to climate change. As climate change continues, the need for adaptation finance is expected to substantially increase in the future, consequently creating extra burden on an already scarce government fiscal budget of many developing countries including Thailand. To ensure that adaptation actions can be effectively enhanced to address the distress experienced in highly vulnerable developing countries, it will be necessary to secure adequate means of implementation including finance, technology development and transfer and capacity building for adaptation in the new global agreement under the UNFCCC. Adaptation undertakings of developing countries do not provide benefits only at the local and national scales, but also contribute to the resilience of global food production system, enable ecosystem and biodiversity protection, enhance the livelihood particularly of low-income population and contribute to the achievement of the global millennium and sustainable development goals, as well as the objective of the UNFCCC set forth in its Article 2.

Finally, recognizing that long-term and continuous effort is required to address climate change, Thailand has formulated the National Strategic Plan on Climate Change B.E. 2551-2555 (2008-2012) and the Climate Change Master Plan B.E. 2558-2593 (2015-2050), providing a continuous framework for measures and actions in the long-term. The Climate Change Master Plan has laid out a vision to achieve climate-resilient and low-carbon growth in line with sustainable development path by 2050, and has recently been approved by the Cabinet. Relevant agencies in various sectors are now in the process of formulating specific sectoral plans to address climate change, based on this framework plan. Therefore, it is expected that further concrete mitigation and adaptation actions will be proposed in respective sectors.

The information provided in this INDC aims to enhance clarity and understanding, and Thailand is willing to provide additional information to further enhance its clarity. Thailand encourages other Parties with similar or more advanced national circumstances to submit their INDCs as soon as possible. As a developing country, Thailand places great importance on the global efforts in addressing climate change, and will continue to play a constructive role in the UNFCCC process.

REPUBLIC OF TOGO

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

September, 2015

EXECUTIVE SUMMARY

Level of commitment	Reduction of GHG emissions compared to a scenario of uncontrolled development.
Scope	Entire country.
Baseline year	2010
Period of commitment	2020-2030. However, efforts to set up the institutional mechanism, prepare the programmes and mobilize the resources will be beginning in 2016.
Type of contribution	Unconditional and conditional.
Sectors covered	Energy; agriculture; land use, land-use change and forestry; human settlements (buildings and cities) and health; coastal erosion.
Gases concerned	CO_2; CH_4; N_2O.
Unconditional reduction target	11.14%
Conditional reduction target	31.14%
Funding needs	**US$3.54** billion (Adaptation = 1.54; Mitigation = 1.10; Tech transfers = 0.5; Capacity-building = 0.4).
Planning process	Set-up of an MRV system (to be developed) - Periodic reviews of INDC implementation and updates.
Regional political vision	To influence and participate in establishing carbon-lean, climate-compatible development at the sub-regional and regional levels.

Table of Contents

INTRODUCTION

Togo has historically emitted little in the way of greenhouse gases and so has only had a very small part to play in the current climate crisis. However, it must already contend with the harmful consequences of climate change. Although it is one of the least developed countries and has high needs in terms of development and adaptation, Togo nonetheless wants to contribute to international efforts to limit the temperature rise to 2°C by implementing mitigation measures. Togo's commitment is fair, equitable and ambitious, while still taking the nation's reality into account. Over and above its national commitments, responding to current and future adaptation needs and embarking on a carbon-lean development path will require transparent, long term international cooperation and financial support.

Togo is aware of the need to increase its means of action and so is committed to promoting a regional development vision for the concerned populations, in a spirit of solidarity, while also participating in the international fight against climate change.

The INDC was prepared under the aegis of the Ministry of the Environment and Forest Resources (MERF), in a participatory, inclusive process that included the effective involvement of every stakeholder.

1. NATIONAL CONTEXT

1.1 Physical context

A West African country, Togo is located between 6° and 11° North latitude and between 0° and 1°40 East longitude, with a total area of 56,600 km². Average rainfall varies between 800 and 1,400 mm, with an average temperature of 27°C to 28°C. The country has 50 km of maritime coastline subject to erosion. Its arable land is estimated at close to 3.4 million hectares (64% of the country), just 55% of which were cultivated in 2010. Total irrigable land covers approximately 86,000 hectares, and the country's exploitable shallows span 175,000 hectares. Surface and groundwater are estimated at between 17 and 21 billion cubic metres of water each year, for annual consumption of some 3.4 billion m^3. Plant formations have been significantly degraded and the rate of deforestation stands at around 15,000 ha/year, compared with a pace of reforestation that barely exceeds 3,000 ha annually.

1.2 Socioeconomic context

Togo's 2010 population was 6,191,155 (4th Census, 2010), with an average annual growth rate of 2.84%. On that basis, the country can expect to reach 7,121,673 inhabitants in 2015, 60% of whom under the age of 25. As a result, Togo will need to meet the challenge of providing decent jobs to that population, once it hits the labour market. Gross domestic product (GDP) rose from FCFA 1,581.3 billion in 2010 (baseline year) to FCFA 2,076.6 billion in 2015, or a per capita GDP of FCFA 255,419 and FCFA 291,583 respectively. Despite the progress made (0.459 in 2012 (2013 HDI Report), or a 0.007 improvement over 2010), Togo's Human Development Index (HDI) remains low (ranked 159th out of the 187 countries evaluated). Poverty is still very high in Togo, affecting 58.7% of the population in 2011 (SCAPE, August 2013), compared with 61.7% in 2006. The household lighting penetration rate stands at 23%, according to the National Energy Efficiency Action Plan (NEEAP, July 2015). The 2011 QUIBB well-being indicator questionnaire showed that the main social indicators had generally improved, although their levels are still worrying: net primary schooling rate (87.8%), adult literacy rate (60.3%, with a clear disparity between the sexes: 74.0% for men and 47.9% for women), morbidity rate (20.6%), rate of access to drinking water (56.1%), proportion of households with sanitation (53.1%), rate of malnutrition (27.9%), rate of households having difficulty meeting their dietary needs (49.5%), rate of use of health services (66.2%) and unemployment rate (24.3%).

1.3 National and sectoral strategic development orientations

The national strategic orientations underlying sectoral programmes and policies can be found in the document *Togo Vision 2030*, currently under production, and in the *Strategy for Accelerated Growth and Employment Promotion* (SCAPE) 2013-2017. Togo's SCAPE defines a development framework for the medium term in order to fulfil its *General Policy Declaration* (DPG) based on the Millennium Development Goals (MDGs) covering the 2006-2015 period and to transform Togo into an emerging country within the next 15 to 20 years. The sectoral policies and strategies in effect for vulnerable economic sectors and those emitting GHGs are recorded in *Annex II, Table 1*.

1.4 Commitment to sustainable development

For several years now, Togo has been engaged in a proactive strategy for sustainable development and against global warming. Its efforts focus mainly on: bad production practices in the economic sectors; lack of population control; and the high poverty rate, which is exacerbated by the negative impacts of climate change, further reinforcing the vulnerability of the production sectors and the pressure on natural resources. This political will can be seen, amongst others, in the National Environmental Action Plan (NEAP), the National Environmental Management Programme (NEMP), the National Sustainable Development Strategy (December 2011), the National Environmental Management Capacity-building Strategy (October 2008), the National Programme for Reducing

Greenhouse Gas Emissions from Deforestation and Forest Degradation (REDD+) 2010-2050, the National Strategy for Reducing the Risk of Catastrophes in Togo (December 2009), the National Medium Term Priority Framework (NMTPF) for Togo (2010-2015), and the National Action Plan for Marine and Coastal Environmental Resources Management. Further, Togo's membership in the Climate & Clean Air Coalition (CCAC) means it could raise funds to finance its short term GHG and climate pollutant mitigation actions.

1.5 Institutional and regulatory initiatives

The fight against climate change and the implementation of sustainable development are part of the following key institutional initiatives: (i) existence of a ministry specifically dedicated to managing environmental and natural resources policies since 1987; (ii) creation of an Environmental Directorate at the Ministry of the Environment and Forest Resources (MERF), one of whose duties is to coordinate the mechanisms defined in the conventions that Togo has signed; (iii) creation of a National Climate Change Committee; and (iv) establishment of an institutional framework to prepare for the Third National Communication (TCN). In terms of international environmental commitments, Togo is a Party to the United Nations Framework Convention on Climate Change (UNFCCC), the Convention on Biological Diversity (CBD) and the United Nations Convention to Combat Desertification (UNCCD). The main national laws adopted in relation to climate change are: Law 2008-005 of 30 May 2008 enacting the framework law on the environment replacing the Environmental Code; Law 2008-009 of 19 June 2008 enacting the Forest Code; Decree 2006-058/PR of 5 July 2006 defining a list of works, activities and planning documents subject to environment impact assessments (EIAs) and its implementing orders; Law 99-003 of 18 February 1999 enacting the Hydrocarbons Code of the Republic of Togo.

2. ADAPTATION

2.1 National reality and vision

Adaptation and development are Togo's priorities, bearing in mind that its greenhouse gas (GHG) emissions in 2010 (baseline year) represented just 0.05% of total emissions worldwide. In consideration of the vulnerability of its economic sectors and of the social and environmental consequences of the effects of climate change, Togo has defined its national priority as the development and implementation of an adaptation strategy and options that would have an impact on the mitigation scenarios, in terms of co-benefits.

Togo intends to contribute to the fight against climate change by strengthening the resilience of its production systems and means by embarking on a carbon-lean development path. This vision is in line with international commitments and national strategic orientations relating to the need for fair, inclusive growth that responds to the challenges of sustainability, creates decent jobs, helps to reduce poverty, and protects natural resources. These key points are also included in the *National Adaptation Programme of Action* (NAPA) for climate change, produced in December 2008 and whose objectives relate to: (i) the protection of human lives and livelihoods, resources, infrastructure and the environment; (ii) the identification of grassroots communities' urgent, immediate needs for adaptation to the harmful impacts of climate change and variability; and (iii) the incorporation of adaptation measures and objectives into sectoral policies and national planning.

2.2 Impacts of climate change

Climate observations[1] during the period running from 1961 to 2012 reveal an unmistakable rise in temperatures, as well as a decrease in rainfall and in the number of days of rain. The linear trend in

[1]Observations of the climate system in Togo are based on direct measurements of climate parameters performed by national meteorology services.

the national average for temperature data between 1961 and 2012 indicates warming by 1°C. On the other hand, according to the baseline scenarios assessed for the Third National Communication (TCN), the simulations run using SimCLIM 2013 for the pessimistic scenario of RCP8.5 reveal an overall average annual temperature increase in Togo fluctuating between 0.60°C and 0.71°C higher than current levels in 2025, and between 3.6°C and 4.5°C higher in 2100, depending on the latitude being considered. For those same periods, annual precipitation would increase throughout the country by 4 to 8 mm over its current level in 2025 and by 18 to 39 mm of rain by 2100. The associated impacts on the main sectors considered to be sensitive are:

(i) *Energy*: a spatial analysis reveals that the savannah region, which is already facing the highest poverty rate and increasingly scarce wood resources, would have the lowest capacity to respond, with consequences that would aggravate nutritional and food insecurity and increase both monetary and non-monetary poverty. At the same time, the supply of fuel wood from Lomé and the maritime region would become virtually impossible;

(ii) *Water resources*: in consideration of current and forecast demographic growth rates, the water supply would be severely affected, with a drop in stocks due to global warming and heavy pollution of drinking water reserves as a result of flooding, salt water intrusion into coastal aquifers and water encroachment;

(iii) *Agriculture, forestry and land use*: a decline in the supply of vegetables, meats and fish and in provisions sent to the cities could lead to social tensions, or even socio-political crises, a loss of income for producers, land degradation, loss of biodiversity, pest invasions of crops, livestock and fishing yields, wood shortages, and the disappearance of wetlands;

(iv) Human settlements (buildings and cities) and health*:* an increase in State, local government and household spending to build new housing and socioeconomic infrastructure and to rehouse disaster victims, massive rural exodus, the spread of illnesses like malaria, diarrhoea, cardiovascular and respiratory disease, and others, will entail additional expenses, lead to famine and aggravate food insecurity;

(v) *Coastal zones*: erosion causing the loss of goods and physical resources and threatening the entire coastal zone, where more than 90% of the country's industrial units are located.

2.3 Togo's needs in terms of adaptation, with co-benefits on mitigation

Togo is faced with major challenges in respect of adaptation, taking account of today's climate reality and the expected effects in a more or less faraway future, as the consequences of the announced foreseeable changes. Its needs are identified below, in the form of measures: (i) reinforcing actions in favour of energy efficiency and carbon-lean technologies; (ii) promoting integrated, sustainable water resources management; (iii) strengthening the resilience of production systems and means in the agricultural sector; (iv) building the capacities of human settlements (buildings and cities) to adapt to climate change; and (v) protecting the coastal zone.

The approach selected by Togo involves the implementation of a portfolio of measures and projects in response to adaptation issues and national development priorities, bearing in mind that adaptation options that also mitigate GHG emissions will be prioritized wherever possible.

These needs are a response to national concerns expressed by all the actors. They have been quantified and approved through a consultation process and, over and above the national process instituted as part of the launch and steering of the INDC, the different actors involved also met in thematic groups on the most vulnerable sectors. This entailed a prioritization of the sectors and sub-sectors and the identification of the main priority measures, as well as the conditions of their

implementation. For each sector, the approach was to consider the degree of impact on national development priorities such as employment, poverty reduction, increased beneficiary revenue and GDP, and the positive impact on clean, carbon-lean growth and development, while taking the climate realities of today and tomorrow into consideration. Each sectoral measure was then broken down into a series of operational activities supplemented by an economic analysis to assess the need for financial support.

An analysis of the collected data made it possible to identify the priorities, measures and funding needs (Annex IV, Table 2). The priority sectors are, by order of importance: 1st: Energy; 2nd: Agriculture; 3rd: Human settlements and health; 4th: Water resources; 5th: Coastal erosion; and 6th: Land use, land-use change and forestry.

The total funding required is estimated at approximately **US$1.54 billion** between 2020 and 2030.

3. GHG EMISSIONS MITIGATION IN TOGO

3.1. Contributions

Togo plans to adopt an approach based on contributions founded on both measures to be introduced and targeted results in order to better identify any opportunities for co-benefits in terms of reducing GHG emissions that might potentially be derived from synergies between adaptation and mitigation.

Togo's contributions to global mitigation work can be characterized as follows:

- Commitments: Togo confirms its commitment to contributing to the achievement of the UNFCCC's objectives to limit temperature rises to 2°C by 2030. Togo has already implemented activities to reduce greenhouse gas emissions, especially in the energy, agriculture and LULUCF (land use, land-use change and forestry) sectors. Subject to being in possession of the necessary resources, Togo has confirmed that it is aiming for a more ambitious reduction target.

- Main data sources: national climate strategies, policies and actions plans; prior UNFCCC submissions; declarations at the United Nations Climate Summit; Nationally Appropriate Mitigation Actions (NAMA); national communications; and a new analysis performed for the purpose of producing the INDC.

- Cover: Entire economy.
  Main sectors: Energy, agriculture and LULUCF.
  Gases: CO_2, CH_4 and N_2O.

- Scenario trajectories: Togo aims to reduce its emissions as shown in the graph in Figure 1 below, which provides information on both unconditional and conditional options.

38,861.36

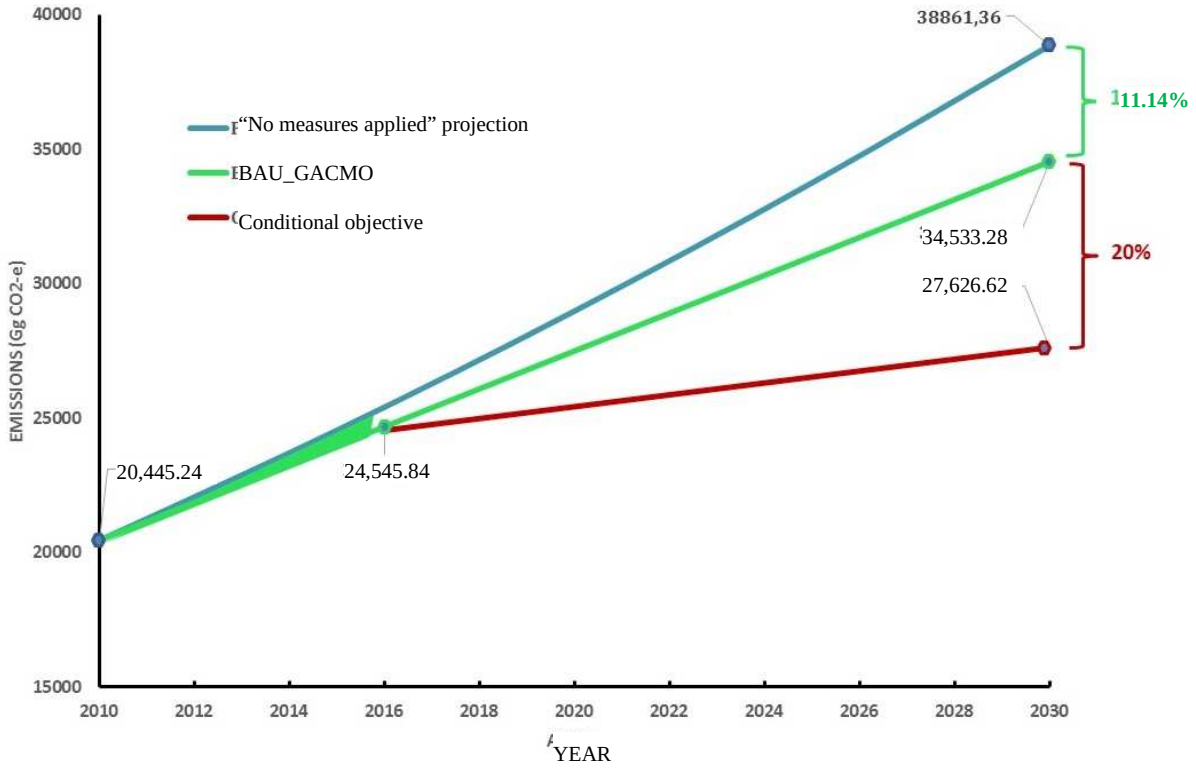


Figure 1: INDC projections for Togo

- The baseline scenario is the scenario with "no measures applied".

- Under the business-as-usual (BAU) scenario (accounting for the implementation of already programmed measures), the overall reduction rate in 2030 would be 11.14% compared with Togo's total 2030 emissions based on the baseline year (2010). This reduction in emissions is attributed to the implementation of sectoral work.

- Targets: The conditional target for additional GHG emissions reduction, according to the most ambitious scenario, is estimated at 20% compared to the dynamic BAU. The conditional target for the total reduction would therefore be 31.14% in 2030, compared to the projections if no measures were to be applied.

- Stakeholder support and engagement: The process for determining the contributions was a participatory one, with a number of consultations with the stakeholders in order to understand the realities and the concerns of key sectors like energy, agriculture and LULUCF.

3.2 GHG mitigation measures and options

Togo's GHG mitigation measures in its three priority sectors (energy, agriculture, and land use, land-use change and forestry) and the associated costs (***totalling US$1.1 billion***) are described below.

(i) *In the energy sector,* they pertain to the promotion of household use of biomass, plus solar electricity and road transport. As concerns biomass, this will entail the implementation of a proactive policy (with incentives, support and training for craftsmen, appropriate distribution channels, etc.) that can promote the roll-out of energy-efficient stoves, which can yield 50-60% savings in wood and charcoal. Emphasis will also be placed on the introduction of solar equipment in households and on capacity-building for the various actors concerned. In terms of road transport, the planned actions aim to reduce

the consumption of fossil fuels in Togo by 20% over the course of the period under review, by improving the road system, promoting the use of public transport, reducing the average age of imported vehicles (to 5-7 years) and promoting active modes of transport (bicycles, walking, bike paths). ***Cost: US$460 million.***

(ii) *For the agricultural sector,* mitigation options have been identified in the fields of livestock farming, rice growing, farmland and the burning of the savannahs. Concerning livestock, the actions will involve the introduction of fodder to improve animal digestion, support in the promotion of local breeds, and extensive livestock farming. In terms of the rice industry, the actions will target the identification and promotion of varieties of rain-fed rice, and support and guidance in the better use of organic matter (for faster decomposition) in the paddy fields. For farmland, a study will be conducted to characterize it into agro-ecological zones, as well as a research and support programme on organic and synthetic enriching agents that release less GHG, the study and promotion of optimal waste management for livestock and harvest remnants, and the promotion of land use planning practices that boost carbon's binding to farmland and agroforestry. In respect of the burning of the savannahs, the planned actions target a participatory fight against bush fires. ***Cost: US$140 million.***

(iii) *In the land use, land-use change and forestry sector,* the priority actions relate to: (i) the promotion of private, community and State reforestation through the creation of plantations and the promotion of agroforestry on cultivated land; (ii) sustainable forest planning and protection (by managing brush fires, regenerating degraded sites, and demarcating and developing protected areas and tourist sites); and (iii) the cartographic study of geographic areas with a strong potential for the development of biofuels in conjunction with food security issues. ***Cost: US$500 million.***

3.3 Information provided in the interest of clarity, transparency and comprehension

Calendar and/or implementation period	
Implementation calendar	Start year of the contribution: 2020. However, efforts to set up the institutional mechanism, prepare the programmes and mobilize the resources will be beginning in 2016. End year: 2030.
Scope and reach	
Greenhouse gases covered in the contribution	Carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O).
Sectors/sources covered by the contribution	Energy, agriculture, and land use, land-use change and forestry.
Geographic areas covered by the contribution	Entire national territory.
Assumptions and methodological approaches	
Methodology for calculating emissions	The method used to count the inventory of GHGs in each sector was the one set out in the UNFCCC's directives and the IPCC's guidelines for national greenhouse gas inventories: 1996 Revised, GPG 2000, GPG LULUCF 2003 and GL 2006.
Global warming potential	The values used to calculate the global warming potential (GWP) of the different greenhouse gases are those recommended by the UNFCCC: CO_2: 1; CH_4: 21; and N_2O: 310.
Approaches to emissions relating to land use, land-use change and forestry	The net emissions associated with land use, land-use change and forestry are all included in the contribution.
Net contribution from international market mechanisms	Togo is a Non-Annex 1 Party to the United Nations Framework Convention on Climate Change (UNFCCC) and is also a least developed country (LDP). In accordance with the declaration of the African Ministers in Marrakesh in April 2015, the country wants to encourage investments in mitigation projects on its own soil, thanks in particular to the Clean Development Mechanism (CDM) and the REDD+ Programme.

3.4 Equity and Ambition

Equity and Ambition

Equity

Togo is a small country that emits almost no GHGs and so has virtually no responsibility in terms of global warming. Through its INDC, Togo proposes to focus its efforts on carbon-lean sustainable development, by encouraging sustainable practices, whereas the easy solution would simply be to continue using fossil fuels while they are still available.

According to the IPCC, the estimated worldwide GHG emissions for 2010 totalled roughly 40,000 Mt of CO_2e. The emissions from the Republic of Togo for that same year were estimated at approximately 20.45 Mt of CO_2e, representing about 0.05% of the total volume. In other words, those emissions are non-significant compared with worldwide emissions. Nonetheless, with this contribution, Togo is reaffirming its adherence to the principle of common but differentiated responsibilities and has committed to implementing ambitious measures to contribute to the goal of +2°C.

This contribution guarantees an equitable commitment.

Ambition

Thanks to measures already in progress, Togo will unconditionally reduce its emissions by 11.14% compared to the baseline scenario in 2030.

Togo undertakes to back its adaptation capacity-building strategy and its development imperatives against a carbon-lean growth trajectory that will translate into a conditional reduction of its GHG emissions by 20%. This ambitious contribution will support the commitments made by the international community.

Togo's contribution is also ambitious, because it will lead to long term transformations in the key sectors of energy, agriculture, and land use, land-use change and forestry that will decrease the future vulnerability of the concerned populations and territories.

4. PLANNING PROCESS

The Ministry of the Environment and Forest Resources (MERF) intends to organize regular consultations to re-examine the implementation of the adaptation and mitigation measures set out in the INDC. This will be a recurring process, to ensure that the INDC is indeed being implemented and is updated regularly. The process put in place for this purpose will make use of existing frameworks:

The Strategy for Accelerated Growth and Employment Promotion (SCAPE) 2013-2017 takes account of climate change, namely via the actions listed in its paragraph 2.3.5.3, "Environment, sustainable natural resources management and living conditions", for area 5. These relate to the:

(a) Maintenance of the ecosystems' environmental services and the preservation of biodiversity;

(b) Sustainable management of land, catastrophes and natural resources;

(c) Fight against climate change, which the Government recognizes as a major preoccupation, particularly:
    (i) the reinforcement of the institutional framework for implementation of the United Nations Framework Convention on Climate Change and the adaptation and mitigation measures for the main development sectors,
    (ii) the strengthening of the national multi-sector, multi-actor dialogue,
    (iii) the updating and implementation of the National Adaptation Programme of Action for climate change, and
    (iv) the definition and implementation of a low carbon emissions development strategy to engage the country in long term mitigation actions;

(d) Sustainable management of the coastal zone; and

(e) Sustainable management of living conditions, including housing and waste.

It should also be noted that climate change has been targeted as one of the five risks identified for the implementation of SCAPE. However, provisions have also been introduced to account for mitigation actions on the said risks. The INDC provides a response to that concern.

All the national programmes, strategies and plans have prepared planning, monitoring and evaluation mechanisms. These different documents include the National Environmental Action Plan (NEAP) process, the National Environmental Policy, the final NEAP document, the National Environmental Management Programme, the National Sustainable Development Strategy (NSDS), the National Strategy for Reducing the Risk of Catastrophes in Togo, the National Programme for Reducing Greenhouse Gas Emissions from Deforestation and Forest Degradation (REDD+) (2010-2050), the National Medium Term Priority Framework (NMTPF) for Togo (2010-2015), and Adapting Agriculture in Togo to Climate Change (ADAPT).

Togo has a number of national committees: the National Climate Change Committee, the National NAPA Committee, the National NAMA Committee and the Designated National CDM Authority. All of these have monitoring and evaluation bodies that the INDC will be able to utilize.

Further, in the context of the institutionalization of its process of developing national communications, Togo will be relying on certain institutions that have quality assurance (QA) and quality control (QC) systems, and with which the Ministry of the Environment has established a partnership. This involves the following structures responsible for GHG inventories and mitigation measures in the concerned sectors:

- National Graduate School of Engineering (ENSI) for the energy sector;
- Graduate School of Agricultural Engineering (ESA) for the agricultural sector;
- Laboratory of Botany and Plant Ecology (LBEV) for the agriculture, forestry and other land use sector;
- Laboratory of Atmospheric Chemistry (LCA), which is responsible for compiling the GHG inventories and producing the TCN document; and
- Laboratory for the Management, Treatment and Recovery of Waste (GTVD).

All this will be supplemented by the development of a monitoring, reporting and verification (MRV) system that will include the adaptation and mitigation indicators defined in existing legislation, policies, strategies, programmes and plans, in order to better monitor the INDC's implementation.

The implementation calendar is included in Annex V.

5. IMPLEMENTATION METHODS

This section describes the necessary support in the form of financing, capacity-building, technology transfers and others, linked to the implementation of the INDC. The provided information covers adaptation and mitigation and could help international partners to better understand the needs in order to target their support for Togo.

All of this information is contained in the technology needs assessment documents, the national climate strategies and actions plans, the communication strategy for climate change and the transition to the green economy, capacity-building needs assessments, investment needs assessments, national communications, NAMAs, the NAPA, and the PNIERN (National Investment Programme for the Environment and Natural Resources), in addition to being summarized in the first part of this document.

a) Capacity-building

Satisfaction of the identified needs will be decisive in reinforcing the effectiveness of implementation of the INDC. Real efforts have been made to build both personal and institutional capacities during the First, Second and Third National Communications. However, many needs will still have to be met before achieving the national skills and expertise that will be necessary in order to carry out climate change initiatives successively and for the long term.

In order to meet its development and adaptation challenges and to implement its roadmap, Togo must first build up its capacities. This will need to remedy the following, in particular:

- Insufficient reliable climate data for a realistic analysis and interpretation of climate change;
- Weak technical, institutional and legal capacities required to support the development of the horizontal integration of adaptation at the national, sub-national and local levels; and
- Shortage of financial resources to support the implementation of the adaptation and mitigation initiatives.

Cost: US $0.4 billion.

The institutionalization process that is now under way will make it possible to train a larger number of experts and to reinforce and provide tools to research and excellence centres on climate change. Further, the national INDC committee will become a standing committee, endowed with appropriate means so that it can fulfil its role effectively. A long term coordination team will also be created to monitor and evaluate the INDC activities.

b) Technology transfers

The technology transfer needs were identified and can essentially be summarized as follows:

- Produce and popularise energy-efficient stoves using wood, charcoal and gas among all of the country's social strata (a process that will need to begin with subsidies or appropriate tax benefits);
- Promote renewable energies (thermal solar, photovoltaic, micro-hydraulic, wind, etc.) by facilitating access to those technologies and training the populations on how to use and manage them; and
- Promote internal expertise and good practices for safeguarding the forest cover and fighting bush fires.

Cost: US $0.5 billion.

c) Financial support

To implement its INDC, Togo will need **three point five four(3.54) billion US dollars**, **one point five four (1.54) billion** of which for adaptation, **one point ten (1.10) billion** of which for mitigation, **zero point five (0.5) billion** for technology transfers and **zero point four (0.4) billion** for capacity-building**.**

These estimates represent additional financing needs over and above the cost of any national decisions that would have been implemented in any case, in view of the defined national priorities.

6. REGIONAL POLITICAL VISION

Togo hosts a number of regional and sub-regional institutions like BOAD, EBID and SABER, which have set up mitigation initiatives. Additionally, BOAD also houses the Regional Collaboration Centre (RCC) for the UNFCCC's sustainable development mechanisms. The BOAD and the RCC have initiated a support process for INDCs, as channels that provide access to funding, technology and capacity-building, but also to perform monitoring, reporting and verification (MRV) on the results of mitigation actions.

Togo, being aware of its geographic location, the regional and international institutions that it hosts, as well as the sub-region's economic issues, intends to play a unique regional role, uniting, mobilizing and sharing a common vision and common action resources with its neighbouring countries. It also plans to take a leadership role in the sub-region and the region, and perhaps even across the continent, in favour of climate-compatible, carbon-lean development.

ANNEXES

ANNEX I - ACRONYMS

ADAPT:	*Project to Adapt Agriculture in Togo to Climate Change*
BAU:	*Business-as-Usual*
BOAD:	*West African Development Bank (known under its French acronym)*
CDM:	*Clean Development Mechanism*
CO_2:	*Carbon dioxide*
CO_2-e:	*CO2 equivalent (unit of measurement of direct GHG emissions taking account of the global warming potential of these gases)*
CH_4:	*Methane*
GDP:	*Gross Domestic Product*
GWP:	*Global Warming Potential*
EBID:	*ECOWAS Bank for Investment and Development*
ECOWAS:	*Economic Community of West African States*
ENSI	*National Graduate School of Engineering*
ESA	*Graduate School of Agricultural Engineering*
INDC:	*Intended Nationally Determined Contribution*
FCFA:	*Francs of the African Financial Community*
GHG:	*Greenhouse gas*
Gg:	*Gigagram*
GPG:	*Good Practice Guidance*
IPCC:	*Intergovernmental Panel on Climate Change*
ISFM:	*Integrated Soil Fertility Management*
LULUCF:	*Land Use, Land-Use Change and Forestry*
MRV:	*Monitoring, Reporting and Verification*
N_2O :	*Nitrous oxide*
NAMAs:	*Nationally Appropriate Mitigation Actions*
NAPA:	*National Adaptation Programme of Action*
NEEAP:	*National Energy Efficiency Action Plan*
NREAP:	*National Renewable Energy Action Plan*
REDD:	*Reducing Emissions from Deforestation and Forest Degradation*
SCAPE:	*Strategy for Accelerated Growth and Employment Promotion*
TCN:	*Third National Communication*
UNFCCC:	*United Nations Framework Convention on Climate Change*
WAEMU:	*West African Economic and Monetary Union*

ANNEX II

Table 1: Current policies and strategies by sector

Sector	Current policy documents and strategies	Action to be taken
Energy	Strategic plan for the electricity sub-sector, adopted in December 2010. Draft National Energy Policy (POLEN), drawn up in October 2011. Togo's National Energy Efficiency Action Plan (NEEAP), 2015-2020-2030; July 2015. The National Renewable Energy Action Plan (NREAP) Togo, 2015-2020-2030; August 2015.	Adoption of a national energy policy; establishment of incentives for renewable energy use; revision of the electricity law and creation of a national rural electrification agency.
Transport	Declaration of General Governmental Policy on the Restructuring of the Transport Sectorof 29 May 1996, made operational in 2013 through the definition of theNational Strategy for the Development of Transport in Togo (not yet adopted).	Revision of current national transport policy; adoption and application of the measures within the national strategy, especially the sections limiting the age and setting standards for the quality of imported used vehicles.
Land Use and Forestry	National Forest Action Plan (PAFN) 1994, updated in November 2011. Togo's Forest Policy (PFT), defined in November 2011.	Preparation of structuring programmes and mobilisation of adequate funding through public/private partnerships.
Agriculture	Commitment to the Climate-Smart Agriculture process in the framework of the implementation of the agricultural policy laid out by ECOWAS and NEPAD. National Policy for the Agricultural Development of Togo (PNDAT) 2013-2022, approved at a national workshop on 22 and 23 November 2012. The existence of the National Programme for Agricultural Investment and Food Security (PNIASA).	Initiation of specific adaptation programmes along the lines of the ADAPT project currently being implemented, as well as mitigation programmes.
Water Resources	National Policy on Drinking Water Supply and Sanitation in Rural and Semi-Urban Areas, prepared in April 2006. National Action Plan for the Water and Sanitation Sector(PANSEA). Integrated Water Resource Management(IWRM) Strategy. Water Code (law 2010/004 laying down the water code).	Implementation of pilot programmes based on IWRM and measures to increase water resource availability, in both quantity and quality.
Health and Human Services	Existence of a National Health Policy; Preparation of a draft National Hygiene/Sanitation Policy for Togo (PNHAT), accompanied by a Strategic Plan. Existence of a National Urban Planning and Housing Policy. Preparation of a national housing strategy.	Revision of urban planning and housing policy, including energy efficiency measures and taking into account disaster risks. Improvement of efficiency, both in managing other policies and in the service offer for human settlements (buildings and cities), to build the resilience of populations facing the effects of climate change.

ANNEX III

Gases included in the contribution:

- ✓ Carbon dioxide (CO_2)
- ✓ Methane (CH_4)
- ✓ Nitrous oxide (N_2O)

Sectors covered by the contribution:

- ✓ Energy sector
- ✓ Agriculture sector
- ✓ LULUCF sector

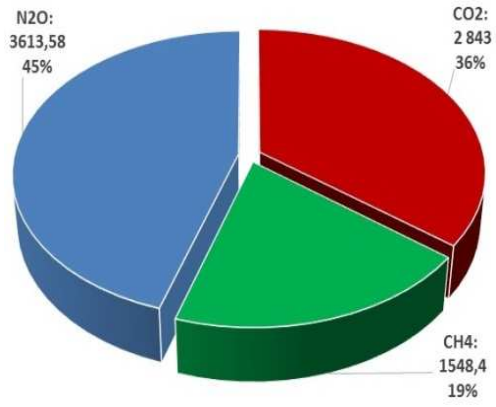


Figure 2: Emissions by GHG (Gg CO_2-e): Baseline year: 2010

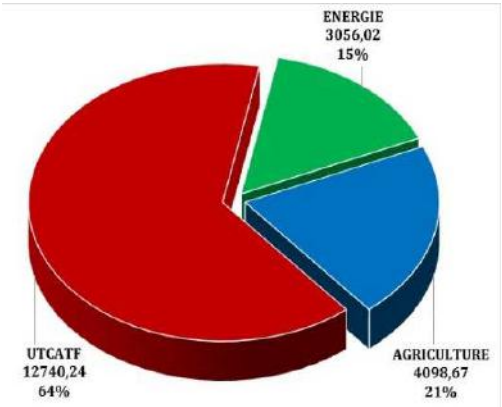


Figure 3: Emissions by key sector (Gg CO_2-e) Baseline year: 2010

ANNEX IV

Table 2: Measures by sector

Priority adaptation measures/projects	Cost in million USD
Energy Sector	**176**
Development of renewable energies (target of 4% of the energy mix): promotion of bio-fuels and reclamation of degraded land; training and seeking out technical and financial partners for the production of new and renewable energies; tax remission on imports of equipment for solar and other renewable energies	40
Sustainable management of traditional energy sources (firewood and charcoal)	7
Implementation of electricity-saving strategies	9
Development of mini hybrid networks for rural electrification	30
Promotion of low-carbon transport modes	40
Promotion of new, clean technologies in the building sector	50
Agriculture Sector	**186**
Promotion of efficient varieties resistant to climate change	10
Strengthening of Integrated Soil Fertility Management (ISFM)	25
Mapping out and establishing transhumance zones and corridors	20
Construction and/or improvement of reservoirs for micro-irrigation and livestock watering in rural areas throughout all regions	50
Support for the mapping of areas vulnerable to climate change	6
Support for the dissemination of good agro-ecological practices	45
Promotion of rice production systems with very low water consumption and low GHG emissions (SRI: System of Rice Intensification).	30
Human Settlements Sector: cities and buildings, including waste	**540**
Improved sanitation and drainage of rainwater in the main urban centres	40
Development and improvement of roads in the main urban centres	150
Promotion of urban forestry	80
Rational and sustainable management of waste in urban areas	160
Harmonious and balanced spatial development of urban centres: development and implementation of urban planning tools	50
Strengthening of the institutional and regulatory framework concerning health and the environment	15
Establishment of adapted surveillance, partnership, financing and monitoring/evaluation mechanisms	10
Protection against disaster risks	35
Water Resource Sector	**191.3**
Improvement of knowledge on water resources	16
Protection of water resources	50
Improvement of agricultural water management	20
Conservation of rainwater and reuse of wastewater	35
Improvement of groundwater management	70
Study of the potential of the coastal sedimentary basin, and of its resilience to climate change.	0.3
Coastal Erosion Sector	**214**
Improvement of the regulatory framework and of knowledge management on the phenomenon of coastal erosion	14
Making structural investments in coastal protection	200
Land Use, Land-Use Change and Forestry Sector	**236.5**
Mapping and orientation towards areas of human activity adapted to each environment and natural context	16
Capacity building (technical and physical) of meteorological services for good forecasting and planning of activities.	30
Reforestation and protection of zones with fragile ecosystems (mountainsides, river banks) in the fight against floods, violent winds and erosion.	120
Promotion of the Ecological Awareness (*Ecologie et Conscience*) Programme in the schools of Togo	0.5
Preparation of the national regional development plan and implementation of pilot operations.	70
TOTAL	**1 543.8**

ANNEX V
SEVERAL PROGRAMMES DEMONSTRATING TOGO'S COMMITMENT

The programmes described here bear witness to Togo's proven commitment to implement operational projects whose goal is to decrease the vulnerability of the concerned territories and their inhabitants, while working to reduce GHG emissions.

(i) *Sector of agriculture, poverty reduction and strengthening the resilience of rural spaces*: National Programme for Agricultural Investment and Food Security (PNIASA); Project to support agricultural development in Togo (PADAT); Project for the adaptation of agriculture to climate change (ADAPT); Agricultural sector support project (PASA); West Africa Agricultural Productivity Programme (WAAPP); Project for the development and rehabilitation of land in the Mission-Torve zone (PARTAM); Rice production development project in the Kara region (PDPR-K); Hydro-agricultural development project in the Lower Mono Valley (PBVM); Project for the integrated rural development of the Mô Plain; Project for sustainable and resilient family farming in the savannah region.

(ii) *Sector of forestry and the fight against land degradation*: National Programme for Decentralised Operations in Environmental Management (PNADE); National Programme for Investments in the Environment and Natural Resources (PNIE-RN); Project to strengthen the role of conservation of the national system of protected areas in Togo; Tcp/tog/3403 – Support for the development and community-based restoration of gallery forests and forests of village lands in the plateau region; Support for the formulation and implementation of Togo's National Reforestation Programme (PRO); Support for reducing emissions linked to deforestation and the degradation of forests (REDD+-readiness) and the rehabilitation of forests in Togo (ProREDD+); PRODRA, the Programme for Rural Development and Agriculture; and the Project for integrated disaster and land management (PGICT).

(iii) *Energy saving sector*: In the energy sector, strategies, programmes and plans are primarily geared towards low-carbon development based on new and renewable energy (NRE) sources. The goal is to redirect investment away from fossil fuels towards NRE as soon as possible. The following is a non-exhaustive list of initiatives: hydro-electric construction at the Adjrarala Dam (start-up is imminent); pilot programme for the electrification of 22 villages equipped with solar photo-voltaic kits; distribution of 13,000 solar street lights, project for the construction of a 5 MW solar power plant by the CEB (*Communauté électrique du Benin*) at Kara; project for the construction of a 20 MW solar plant at Mango, with financing by the WAEMU; project for connecting a 2*5 MW photo-voltaic solar array to the network (offers being considered as at June 2015); a 24 MW wind power project by Delta Wind; drafting of the NREAP and the NEEAP with support from the ECOWAS Centre for Renewable Energy and Energy Efficiency (ECREEE); distribution of 400,000 low-cost lamps; rural electrification of 65 villages (phase 1) with Indian financing; project for the rural electrification of 20 locales funded by BIE; project for the creation of a rural electrification agency.

(iv) *Coastal zone sector*: Fighting coastal erosion from PK 11 to PK 45; strengthening infrastructure resistance to climate change in coastal zones; erosion and adaptation in the coastal zones of West Africa; strengthening community resilience to climate change in the coastal zone.

(v) *Drinking water supply sector*: To date, most major investments are concentrated in the city of Lomé, with the assistance of the AFD and the World Bank.

(vi) *Human settlement sector (buildings and city)*: urban development of Togo, phase II.

ANNEX VI

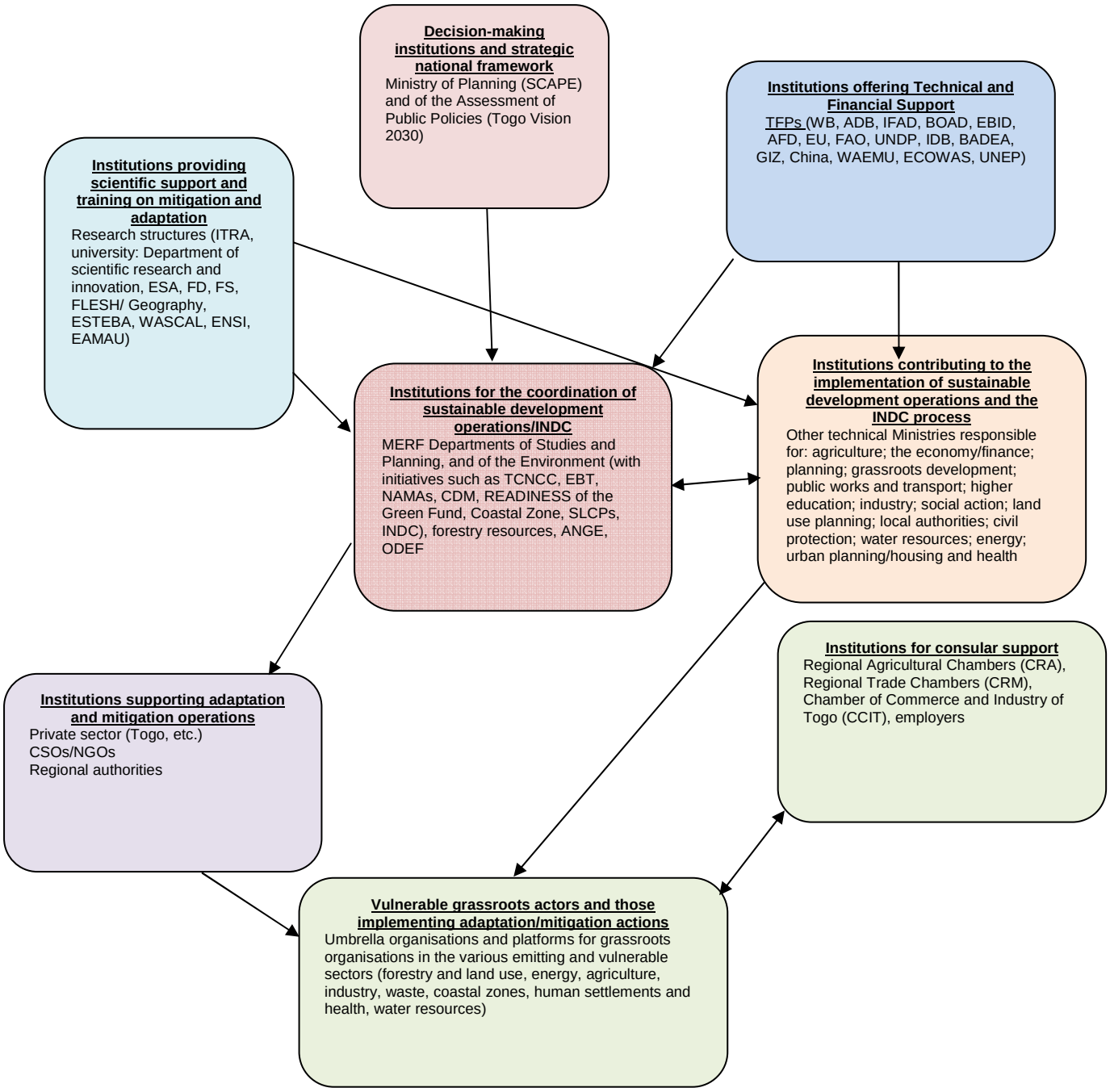


Figure 4: Mapping of the Stakeholders in Togo's INDC Process

ANNEX VII

Table 3: Timetable of Activities for the INDC Project

1. Products/Activities	2016-2020					2021-2025					2026-2030				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
2. Establishment of the institutional, legal, and regulatory framework															
3. INDC launch workshop															
4. Communication, information, extension and awareness campaign															
5. Strengthening of national and sector capacities															
6. Establishment of an MRV system															
7. Workshops by sector															
8. Finalisation of the priority projects															
9. Advocacy among the private sector															
10. Preparation for climate financing															
11. Catalysing climate financing															
12. INDC pilot phase															
13. Acquisition of adaptation and/or mitigation technology															
14. Implementation of the first, priority adaptation and/or mitigation projects															
15. Evaluation of the first INDC reductions															
16. Verification															
17. Certification															
18. Drafting of the implementation report															
19. Validation workshop															

KINGDOM OF TONGA

INTENDED NATIONALLY DETERMINED CONTRIBUTIONS

Towards achieving the objective of the United Nations Framework Convention on Climate Change.

4 December 2015

Contents

Key Messages

Climate Change continues to pose irreversible threat to the people of Tonga, its society, livelihoods, and its national environment. The interference to the climate system from human-caused climate change is already affecting Tonga's development, livelihood of its people and future. The World Risk Report has ranked Tonga as one of the world most at-risk country for natural hazards, and sea level rising.

Tonga makes a negligible contribution to global greenhouse gas emissions, with low per capita emissions of 2.95 tCO_2e whilst notably; the increasing frequency of strong destructive tropical cyclones has affected Tonga's development with damages on average costing 20 percent of GDP. Extensive coastal erosions across the Kingdom has prompted Government to direct over 30 percent of mobilized development assistance to address it during the last six years, and lack of climate proofing investments further risks Government's poverty alleviation commitments and national development.

Irreversible loss and damage from extreme weather events and coastal erosions are critical areas whereby national response are limited influencing the designed national contributions through reducing emission and also on creative smart resilience investments.

Taking into account its negligible emission and limited capability, Tonga's intended contributions are designed to be quantified at the national level cascaded to the sector level as follows:

- 50% of electricity generation from renewable sources by 2020. In 2015 renewable energy accounts for approximately 9% of total electricity generation, with confirmed and funded investments taking this to 13% in 2016.
- 70% of electricity generation from renewable sources by 2030
- Improve Energy efficiency through reduction of electricity line losses to 9 percent by 2020 (from a baseline of 18 percent in 2010)
- To double the 2015 number of Marine Protected Areas by 2030
- Sector Emission Reduction Targets: Transport, Agriculture, Environment Friendly Waste Management and Reforestation
- Other Sectors Climate Resilience: Public Infrastructures, foreshore protection, buildings and houses.

INDC is designed for both reduced emission and increased investing in climate resilience, Tonga makes an explicit call for a more cost-effective national response and avoids the much bigger costs caused by climate inaction. To facilitate this high level commitment, Government has raised climate change to Ministerial level, establishment of the Legislative Assembly Standing Committee for Climate Change, developing of National Climate Change Policy, revision of the Joint National Action Plan to Integrate Climate Change and Disaster Risk Reduction, and development of the third Climate Change National Communication.

Tonga's INDC will also require basic information and data so that they can be understood clearly by key stakeholders to achieve consensus in setting realistic emission reduction targets and smart resilience investments. The intended contribution also include adaptation, mitigation and means of implementation: TSDF national planning framework with its national goal to achieve a more inclusive, sustainable and effective land administration, environment management, and resilience to climate and risk, finance initiatives and capacity building.

Overall, Tonga's INDCs should raise the Kingdom ambition to contribute towards a robust and ambitious legally binding COP21 climate change agreement.

Section 1: Introduction

This island Kingdom of Tonga is located in the Central South Pacific. It lies between 15° and 23° 30' South and 173° and 177° West. Tonga consists of four clusters of islands extended over a north-south axis: Tongatapu (260sqkm) and 'Eua (87sqkm) in the south, Ha'apai (109sqkm) in the middle, Vava'u (121sqkm) in the north and Niuafo'ou and Niuatoputapu (72sqkm) in the far north. Nuku'alofa, the capital is situated in Tongatapu, the largest island.

Tonga's archipelago is situated within 200km of the subduction zone of the Indian- Australian and the Pacific tectonic plates which is part of the Pacific Ring of Fire where intense seismic activities occur and a potential source of tsunami. Most of its atoll islands including the main island are very flat with an average altitude of 2–5 meters and hence Tonga is highly vulnerable to sea level rise, storm surges and tsunami inundation.

In June 2012, the population of Tonga was estimated at 103,219 which is five times higher than 1901, with most of this growth existed between the 1930s and 1970s. Tongatapu is the most populous island and has the highest population density. Increased population, along with urbanisation and development has resulted in substantial pressure on, and degradation of, land and marine resources. This in turn has reduced the resilience of Tonga's environment and its people to climate change impacts and disaster risks.

Since June 2013, Tonga moved from a lower middle to upper middle-income bracket, with a nominal GDP per capita for 2013/14 of about $7,636 or about US$3,800. Because of Tonga's large receipts of remittances, running at over 20% of GDP, Gross National Income (GNI) per capita (about US$4,500 in 2013) is a better measure of the actual income going to Tongans. Since 2005 Tonga's GNI per capita has grown considerably faster than the average for the region, increasing from about the same as the regional average to 35 percent greater. However, these figures are average figures for Tonga and do not give a clear indication of distribution or inequality. The latest Household Income Expenditure Survey (HIES) of 2009 indicates an increase in the percentage of the population living below the poverty line increasing to 22.5 percent compared to 16.2 percent in the 2001 HIES. The increase was greatest on the outer islands increasing from 11.8 to 22.9 percent.

The current anthropogenic greenhouse gases and warming of the atmosphere have negatively impacted Tonga's environment, its people and their livelihoods. The most recent report from the Pacific-Australia Climate Change Science and Adaptation Planning Program (PACCSAP) provided the following future projections to 2100 for Tonga:

1. 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;
2. It is not clear whether mean annual rainfall will increase or decrease and the model average indicates little change (*low confidence in this model average*), with more extreme rain events *(high confidence*);
3. Drought frequency is projected to decrease slightly (*low confidence*);
4. Ocean acidification is expected to continue *(very high confidence);*
5. The risk of coral bleaching will increase in the future (*very high confidence);*
6. Sea level will continue to rise *(very high confidence).*

Recent climate and weather events in Tonga, particularly in Ha'apai (a sequence of drought, Cyclone Ian, and further drought), are a window to a future that will increasingly involve multiple stresses from the above (1-6) along with the pre-existing environmental, social, and economic stresses. Building greater resilience to existing extreme natural events and the threat of climate change is essential to ensure the sustainable progress that is desired. These and other potential threats require Tonga to become better equipped to plan and respond o the unexpected. This requires considerable foresight in planning and improved monitoring and evaluation of progress.

Section 2: National Response

The INDC recognises that Climate Change is the single biggest issue that will determine the future of Tonga over the coming decades and will require a 'whole of Tonga' level of cooperation and coordination.

The Tongan Strategic Development Framework 2015-2025: A more progressive Tonga: Enhancing Our Inheritance (TSDF 2015-2025), presents the country's new development framework. TSDF sets one of its seven Goal to commit the Kingdom to 'a more inclusive, sustainable and effective land administration, environment management, and resilience to climate and risk' and identifies the high level societal results required to improve the quality of life of Tongan citizens which include *inter alia*:

1. Informing all national stakeholders and development partners of the broad Organisational Outcomes that are needed to support the country's National Outcomes and Impact;
2. Guides the formulation of sector plans, MDA corporate plans and the medium term budgetary framework (MTBF) through which resources are allocated;
3. Guides the development of Government external economic relations and the country strategies and assistance programs of development partners;
4. Provides indicators, with targets, to facilitate monitoring and measurement our high level progress.

The TSDF 2015-2025 is designed to achieve the desired national impact of a ***"A more progressive Tonga supporting a higher quality of life for all."*** The achievement of this is supported by seven National Outcomes:

A. a more inclusive, sustainable and dynamic knowledge-based economy
B. a more inclusive, sustainable and balanced urban and rural development across island groups
C. a more inclusive, sustainable and empowering human development with gender equality
D. a more inclusive, sustainable and responsive good-governance with law and order
E. a more inclusive, sustainable and successful provision and maintenance of infrastructure and technology
F. a more inclusive, sustainable and effective land administration, environment management, and resilience to climate and risk
G. a more inclusive, sustainable and consistent advancement of our external interests, security and sovereignty

While resilience to climate and risk is an explicit component of Outcome F it is essentially a cross-cutting issue that is of relevance to all seven National Outcomes. In support of the TSDF the INDC response to support Tonga's nationally determined contributions are approached in two national process and two contributing clusters:

1. National Process;
   a. Political and national drivers: strong national political leadership led by Government with cascaded governance reporting to Cabinet and to a Parliament Standing Committee required and supported by strong governance and national implementation
   b. Sectoral and technical drivers: provide the national process to facilitate bottom-up engagement of sectors, private sector and economy wide process to identify and analyse options required for reduced emission. It is important for this driver to ensure sufficient time is needed for establishing emissions pathways by sectors.
2. Contributing Clusters to build a Resilience Tonga;
   a. Reduce emissions
   b. Investment in resilience

Section 3: Approach to Building Resilience to Climate Change

Within the national response context adopting the TSDF 2015-2025 the framework for building resilience to climate change in Tonga will use the new Climate Change Policy (2015-2020).

The purpose of the new Tonga Climate Change Policy is to provide a clear vision, goal, and objectives to direct responses to climate change and disaster risk reduction over the next five years. The policy, and the associated, soon to be revised, Joint National Action Plan for Climate Change Adaptation and Disaster Risk Management (JNAP). The Climate Change Policy is not intended to replace or duplicate sector specific policies and plans. Rather, it is intended to provide an overarching context and guiding framework with policy objectives that for the most part will require multi-sectoral coordination.

The overall focus is towards the goal of **'A Resilient Tonga'**, aimed at achieving outcomes that are realised more widely than can be achieved through a more conventional, compartmentalised approach. Rather than address climate change adaptation, mitigation and disaster risk reduction in a fragmented manner, a holistic approach is taken to build resilience. There are five action areas:

1. Mainstreaming for a Resilient Tonga – To fully mainstream the goal of a Resilient Tonga into government legislation, policies, and planning at all levels;
2. Research, Monitoring, Management of Data, and Information – To implement a coordinated approach to the collection, monitoring, management and use of all relevant data and information; and to develop a coordinated, multi-sectoral approach to research for building a Resilient Tonga;
3. Resilience Building Response Capability – To develop the capability for resilience building responses throughout government, the private sector, and civil society;
4. Resilience Building Actions – To implement actions that are designed towards the building of a Resilient Tonga by 2035 at national, island, and community level;
5. Finance – To implement actions that are designed towards the building of a Resilient Tonga by 2035 at national, island, and community level.

Table 1. Approach to Building Tonga's Resilience.

INDC Action Areas	**National Process**		**Contributing Clusters**	
	National	**Sectoral**	**Emissions Reduction**	**Investing in Resilience**
1. Mainstreaming for a Resilient Tonga	TSDF, Cabinet, LA Standing Committee	Legislations, regulations, NIPS, MEIDECC, JNAP,	Mitigation, adaptation, RE 50 Percent Target, Forestry Targets,	Technology transfer, capacity building
2. Research, Monitoring, Management of Data, and Information	Census, Sectoral Assessments, Scientific Assessments	Energy, Transport, Building Infrastructures, Agriculture, Forestry, Water, Waste, Environment	Determine scientific targets for the Sectors	New innovation, high technology, energy efficient appliances and disincentive for inefficient appliance
3. Resilience Building Response Capability	Mainstream TSDF M&E, Climate Change Policy	Finalize Sector Pathways	Revised JNAP Climate Change Policy Actions Recommended options	New initiatives to invest resilience economy wide infrastructure, buildings, sea wall and foreshore protection, Incentives to invest resilience energy efficient appliances
4. Resilience Building Actions	Annex 1	Sectoral targets	Reduced Emission Pathways	Smart Investments,

				climate proofing public infrastructure, housing, communities, region and islands
5. Resourcing and finance: To implement designed actions towards the building of a Resilient Tonga by 2035	Costed options targeting to mobilize finance sourced from recurrent (local), national (economy wide) and international and global facilities	Costed Policy options	Costed Pathways and Implementation Plans	Costed Options and Implementation Plans

Integral to the policy is the planning process which links national, island, and community planning (under Objective 1: Mainstreaming) with action (under Objective 4: Resilience Building Actions).

The mechanism for implementation will be through a new Joint National Action Plan for Climate Change Adaptation and Disaster Risk Reduction (JNAP), along with all other plans (at sector, island, and community level) that are fully aligned with the goal and targets of the policy. The new JNAP, to be finalised by mid-2016 at the latest, will be fully aligned with the climate change policy objectives. Specific activities will be identified, with measureable indicators to align with the TSDF 2015-2025, and also be fully costed. This will be indeed crucial for negotiating and securing of funding from donors for implementation of this plan.

The achievement of the climate change policy objectives will be heavily reliant on donor support to develop or revise policies for all relevant sectors to ensure full alignment with the goal of a Resilient Tonga.

A new climate change policy and JNAP with further identified costed activities will be prepared by 2020. Funding to implement this policy and plan will be strongly dependent on donors support.

Section 4: Sector Policies and Plans

Annex 1 provides an outline of the sector legislation, policies, and plans aligned with the goal of a Resilient Tonga. Focusing on sector policies and plans in particular it is clear that there are significant gaps that need to be addressed. Climate resilience is addressed as a cross-cutting issue with both adaptation and mitigation benefits whereby key resilience building statements cover:

1. Halting deforestation and degradation of indigenous forests;
2. Maintaining national parks, reserves and protected areas;
3. Establishing and managing forest reserves;
4. Promoting reforestation and rehabilitation of cleared and degraded forests with climate change resilient, and ecologically and socially appropriate tree species;
5. Promoting integrated agroforestry in areas earmarked for agriculture;
6. Discouraging tree removal on tax allotments;
7. Encouraging tax allotment holders to plant and manage trees on their properties.

In addition the importance of trees for protection of coastal areas is identified. All of the above are important adaptation measures which will provide significant mitigation co-benefits. The latter are discussed more fully in the mitigation section.

There are also significant gaps with sector plans. Aside from the current, and soon to be revised, JNAP the most important recent plan is the Tonga Agriculture Sector Plan (TASP). The goal of the TASP is to "increase and sustain resilient agriculture livelihoods". There are four strategic objectives aimed at meeting this goal:

1. To develop a climate resilient environment;
2. To improve the enabling environment;
3. To develop diverse, resilient farming systems for the Kingdom's islands;
4. To increase and sustain rural incomes across the Kingdom.

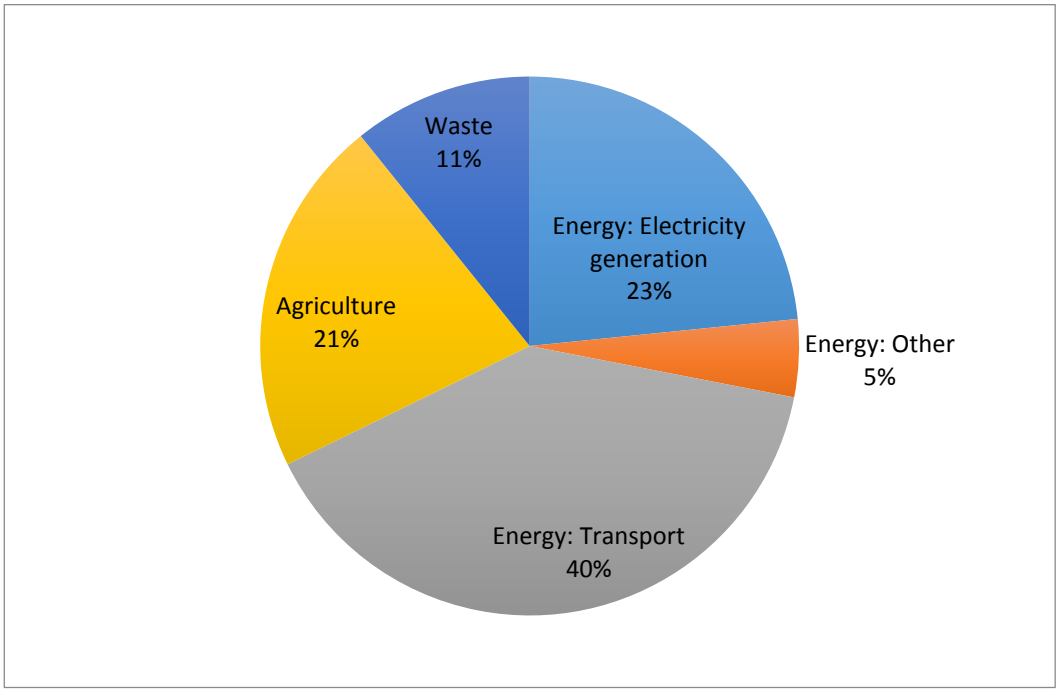
The TASP recognises the importance of, and includes strategies to support, climate-resilient agricultural production systems which are driven by healthy soils, secure and sustainable water supplies, diverse farming systems, and adaptive rural communities. The TASP contains fully costed programmes and activities covering a five year timeframe, and includes a results framework which includes specific indicators and targets.

Section 5: Mitigation context

Tonga, like other SIDS, makes a negligible contribution to global greenhouse gas emissions, with low per capita emissions of 2.95 tCO_2e, and total emissions of 300.54Gg CO_2e (2006 data). When land use and forestry is taken into account, Tonga is a net carbon sink, with its forests absorbing substantially more greenhouse gas emissions than is emitted through all other sources. Nonetheless, as a country with much at stake in regard to climate change and variability and natural hazards, Tonga is strongly committed to climate change mitigation. Its primary focus on poverty alleviation and climate resilient development has many co-benefits in the area of mitigation.

The sectoral breakdown in Figure 1 shows the energy sector, with transport (primarily land based transport) then electricity generation as the highest sources of emissions, followed by the agriculture and waste sectors.

Figure 1: Breakdown of Tonga's GHG emissions, excluding land use change and forestry (LUCF) (2006 GHG Inventory)



Within land use change and forestry, forest and grassland conversion of biomass represents a source of slightly larger magnitude than energy industries and transport combined. However this is offset by removals from forests, making Tonga a net carbon sink overall, in the order of 1691.97 Gg CO_2e.

Thus the reduction of emissions from the energy sector, and the maintenance of Tonga's forest resources and preservation of forest ecosystem services for a climate resilient future should be the primary focus of mitigation actions into the future.

Energy: Electricity Generation

The dominance of energy as a GHG emitting sector underscores Tonga's current reliance on imported oil for its development needs, which supplies all transport fuel, much of the energy for water pumping, and over 90% of grid-supplied electricity. As a consequence, the Tongan economy and electricity consumers in particular have been exposed to high and volatile electricity prices linked to oil prices over the last fifteen years. This is more acute than some other larger Pacific Island countries, as Tonga does not have hydropower potential.

Energy is a fundamental building block for the Kingdom in its social and economic development and in enhancing the livelihood and wellbeing of all Tongans. Accessible and affordable electricity that is environmentally responsible and commercially viable is considered a key catalyst for sustainable economic growth. Further, accessible, affordable and sustainable electricity is crucial to achieve the Government's primary target of 'poverty alleviation' including increasing access to electricity from 89 to 100%. Increased access to electricity, along with additional growth in commercial and residential demand was forecast in 2010 to lead to a 50% increase in electricity consumption by 2020 in the absence of action on renewable energy and energy efficiency.

This reliance on oil imports is incompatible with the aspirational goal of the Tonga Climate Change Policy, to achieve a resilient Tonga by 2035. Recognising the issue as a matter of national significance, in 2010 the Tongan Government released the *Tonga Energy Road Map (TERM) 2010-2020* a "ten year road map to reduce Tonga's vulnerability to oil price shocks and to achieve an increase in quality access to modern energy services in an environmentally sustainable manner".

Under the Roadmap, Tonga's initial target was to supply 50% of electricity generation through renewable resources by 2020. Furthermore, reducing the level of electricity network losses to reach at most 10% of total electricity generation in the country. While the targets was ambitious, it represented a clear direction and indication from the Government that reducing the vulnerability of the country to future oil price shocks is a key objective, and that renewable energy is expected to be a major element of a strategy to enhance energy security and reduce climate change for the Kingdom. There is already a plan to increase from 50% to 100% of RE in total electricity production by 2030. The Government has been proactively working towards the RE target, with over a million litres of diesel fuel oil projected to be saved per annum from March 2015. The Government also aims to replace all diesel-based water pumping engines by 2017 using solar power.

Implementation of the Tonga Energy Road Map will help Tonga to achieve its energy strategic objectives of accessible to affordable energy prices, improve accessible to clean energy and reliable power supply. That will lead to increased economic growth, which improve quality of life for all Tongans.

Energy: Transport

While transport fuel (primarily for land transport) is the largest component of energy sector emissions and the biggest driver of oil imports, it is not currently covered by the Roadmap. Due to the lack of available technological solutions for the transport sector and limited national focus on this area to date, the ability to quantify the mitigation potential or cost associated with the transport sector opportunities is limited. However, the Government of Tonga is in the process of developing transport sector measures to include in the TERM strategies, and has undertaken training and public awareness actions on vehicle maintenance, public transport and bicycle usage. The Kingdom is particularly interested in biofuels for both transport and electricity generation, developed in alignment with Tonga's resilience focus, ensuring sustainable production and replanting. Tonga is participating in regional transport sector mitigation

efforts being developed by the Secretariat of the Pacific Community, and welcomes international assistance in the development of meaningful and wide ranging mitigation opportunities to reduce Tonga's oil dependence and GHG emissions in this sector. This is crucial for a resilient Tonga, especially the plan to include diesel engines efficiency services training to help reduce fossil fuel consumption in the country. Furthermore, the identified private sector interest on solar car public transport campaign for tourists would help add values to reducing petroleum consumption in the sector. Refer to transport actions included in Annex 2.

Land Use Change and Forestry

As identified in Section 4, the National Forest Policy (2010) is of particular importance in terms of adaptation and mitigation co-benefits. A suite of activities regarding forest preservation, forest management and regulation are planned, in alignment with Tonga's resilient development strategy. These will form part of an unquantified mitigation contribution, as mentioned in Section 6.

Agriculture

Emissions in the agriculture sector are principally a function of livestock numbers. Some mitigation co-benefits may result from plans to enhance the climate resilience of the agriculture sector (e.g. through improved soil management practices, development of agro-forestry systems, and increased use of biogas systems that also provide organic fertilizers). Additionally, improvements in animal welfare through greater water availability to stock and improvements in feed quality could likely lead to reduced methane emissions.

Section 6: Mitigation contribution

Information on Tonga's mitigation contribution is provided in the following tableaux form.

COUNTRY: Tonga	**DATE: October 2015**
Parameter	**Information**
Period for defining contribution (outcomes)	Contribution year/s: 2020, 2030 Implementation period: 2015 – 2030.
Type and level of contribution	Tonga's contribution is **50% of electricity generation from renewable sources by 2020**. In 2015 renewable energy accounts for approximately 9% of total electricity generation, with confirmed and funded investments taking this to 13% in 2016. Tonga's contributions will also include the following:. · **70% of electricity generation from renewable sources by 2030** · **Improve Energy efficiency through reduction of electricity Line losses to 9 percent by 2020 (from a baseline of 18 percent in 2010)** · **To double the 2015 number of Marine Protected Areas by 2030** · **Sector Emission Reduction Targets: Transport, Agriculture, Environment Friendly Waste Management and Reforestation** · **Other Sectors Climate Resilience: Public Infrastructures,**

COUNTRY: Tonga		DATE: October 2015
Parameter		**Information**
		foreshore protection, buildings and houses. Emissions reduction benefits of these activities have not yet been estimated; however additional emissions reductions delivered through these activities may be substituted for electricity sector contributions.
Data sources and methods		Estimates of GHG emissions are based on methodologies used in 3rd GHG Inventory, and Draft Third National Communication (both in development, using 2006 data) and IPCC 2006 Guidelines.
Estimated quantified emissions impact		In 2006 electricity generation contributed 40 Gg CO_2e as an emissions source. The Tonga Energy Roadmap Business as Usual forecast predicts a 35% increase in diesel consumption for electricity generation from 2006-2020, assuming continued economic and population growth, increasing electricity access to 100%, and no GHG abatement measures. A 50% renewable energy contribution in 2020 would equate to a reduction of 9.4 million litres of diesel per annum, or approximately 27 Gg CO_2e.
Coverage	Sectors	Energy - Electricity (23% of 2006 emissions) Transport Agriculture Waste
	Gases	Carbon dioxide (CO_2); Methane (CH_4); Nitrous oxide (N_2O)
	Geography	Whole country
Planning Processes		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 Tonga's Climate Change Technical Group, including representation of all key relevant agencies/Government Ministries, before formal Cabinet endorsement.

Section 7: Climate Financing and Resourcing the INDC

Prior to COP21, Tonga's commitment over the past six years recorded over 30 percent of development assistance supported Tonga's climate change. In addition to Government's ex-ante funding, Tonga does not have any dominant funding source for climate change but instead rely on the range of international and bilateral sources.

Government has consolidated MEIDECC as the vehicle to step up its ambition and mobilizing climate financing and resourcing including recurrent (local), national (economy wide) or transnational financing The INDC framework provides the strategy towards low emission and scaled up investment in climate resilient development of Tonga. The INDC can serve as a key component Tonga's climate action plans, financing and resource mobilization by adopting the following short to medium initiatives recommended by the 2015 Climate Financing and Risk Governance Assessment;

1. Open to access climate financing through multiple channels;

2. Explore multi-pronged approach to accessing climate funds but not limited to the Green Climate Fund, Adaptation Fund, Climate Technology Centre and Network Global Environment Facility;
3. Open Processes for Climate Financing Options
4. Commit appropriate recurrent budget to maintain stable, permanent, well trained cadre of climate financing staff to monitor and evaluate climate financing opportunities;

Section 8: Stakeholder Engagement

In preparation for COP21, Tonga has agreed to table its INDC under the TSDF framework where key stakeholder engagements at local, regional and national level, to the climate change are facilitated by the TSDF institutional arrangements for monitoring and evaluation on an annual basis.

In light of this IDNC, in partnership with economy wide counterparts, MEIDECC will host a broader set of stakeholder consultations post COP 21 after December 2015. The consultations will provide an opportunity to discuss Tonga's position, fill gaps and build a common understanding and approach towards the agreed Paris COP21 and Tonga's INDC. These stakeholder engagements will provide an opportunity to raise awareness, mobilize, inform and engage with key stakeholder groups and the general public around climate change issues, and climate change approach and response efforts at all levels.

Section 9: Statement on "Fair and Ambitious"

As noted, Tonga is classified as one of the most at-risk countries in the world in terms of its exposure to the unfolding effects of climate change. The current need for Tonga to invest large portions of its public service capacity in the ambitious quest to achieve our climate resilience objectives is a consequence of the emissions of other large countries over many generations as they developed and became wealthy.

Achieving the contributions set out in Tonga's INDC will require considerable support for capacity and technology investment.

Section 10: General caveats statement

The preparation of this INDC came at a time when Tonga is finalising its Third National Greenhouse Gas Inventory Report, a major component of its Third National Communication on Climate Change Project. This has meant that data on GHG emissions and emission projections are still provisional. Data provided in this INDC is therefore subject to revision. The Third National Greenhouse Gas Inventory Report, once completed, will provide a more comprehensive presentation of Tonga's circumstance, plans and needs.

Annex 1

Table 2: Extent to which current Legislation, Policies and Plans are aligned with a Resilient Tonga

	Legislation	Policy	Plan
Sector/focal area	Fully aligned with a Resilient Tonga		
	Partially aligned with a Resilient Tonga		
	Not aligned with a Resilient Tonga		
	A priority for completion/development; and to be fully aligned with A Resilient Tonga		
	Needs to be reviewed		
Finance and Planning	TSDF		
	Public Financial Management Act		National Infrastructure and Investment Plan
			CFRGA
Climate Change	Climate Change Fund Bill Ozone Layer Protection Act	Climate Change Policy	Revised JNAP
Environment	Environment Management Act and EIA Act		Revised National Biodiversity Strategy and Action Plan
Energy	Renewable Energy Act	Renewable Energy Policy	Tonga Energy Roadmap
	Energy Bill		
Meteorology	National Emergency Management Act		
DRM	National Emergency Management Act		JNAP, National Emergency Management Plan
Internal Affairs	District & Town Officers Act Fono's Act		Community Development Plans and Island Strategic Development Plans
Infrastructure	National Spatial Management Act Building Control and Standards Act		Building Code Urban Infrastructure Development Plan
Lands & Natural Resources	Land Act	Land Use Policy	Land Use Plan
Women	Family Protection Act	National Policy on Gender and Development	Strategic Plan
Culture and Youth	Parks and Reserves Act Polynesian Heritage Trust Act Preservation of Objects of Archealogical Interests Act	National Youth Policy	Tonga National Youth Strategy and Action Plan
		National Cultural Policy	National Cultural Plan
Health	Public Health Act 2008 Health Services Act 1991 Health Promotion Act 2007		Tonga National Strategy to Prevent and Control Non Communicable Diseases
Agriculture		Agriculture Policy	Agriculture Sector Plan
Fisheries	Fisheries Management Act SMA Act		Fisheries Sector Plan
Forestry	Forests Bill 2015	Forestry Policy	Forestry Plan
Tourism	Tourism Act 2012		Tonga Tourism Roadmap 2013-17
Water	Water Resources Bill	National Water Policy	Water Plan
Education	Education Act 2014	Education Policies	

Annex 2

Specific strategies, policies, plans and actions, including timing and support needs

The table below provides a summary of current priority items that Tonga wishes to highlight as needing support or that are significant initiatives that the government will take from their own budget resources.

These relate principally to mitigation actions, due to the current availability of information. This table does not provide details on general resilience building and adaptation. For this to be properly done would require a detailed facilitated process. This has not been possible to do given time and budget constraints. As an important general point, the investments required to deliver a resilient future for Tonga in the face of climate change will be very significantly larger than just those addressing investments in the energy sector.

Item	Planned period of implementation	Conditional on additional support? Y	N	Support partner(s) identified? Y	N	Notes
Priority enabling activities:						
Smart Grid (SCADA Upgrade | Central Control | GIS Enhancement)	2016-2017		√	√		Smart Prepay Metering already funded to $4.2m TOP
Ring Distribution Network Topology	2016-2017		√	√		World Bank have seed funds to start transformation.
Fourth feeder	2016-2017		√	√		
Energy Policy and development of Energy Bill						
Other Energy Sector Reforms/Regulatory Development (Electricity Tariff Review, Petroleum Supply Assessment, Data Repository Updating and Networking, Capacity Development)	2015-2020				√	SPC and UNEP
Priority near-term investments:						
Solar Data Collection	2016-2018	√			√	OIREP. Current funding $6m TOP.
Large 3rd Party Solar Generation | Medium 3rd Party Solar Generation | Small 3rd Party Solar Generation	2016-2020	√			√	US$ 30m in investment required to contribute to 50% RE goal.
Wind Farm |Ha'apai Micro Wind | Outer Island Wind Data Collection	2016-2018	√			√	MFAT/JICA. Current funding $40m TOP.
3rd Party Wind Generation	2017-2019	√			√	
'Eua Biomass | Tongatapu Biomass	ASAP	√			√	Current funding $4.6m TOP.
Vava'u Biomass	2020-2022	√			√	
Development of new RE sources: Coconut Oil |	2020 – 2025	√			√	

Heat Recovery | Bio-gas | Tidal						
Solar water pumping (Phase I, II and IIIa)	2014-2015		√	√		Current funding $2.85m TOP.
Solar water pumping (Phase IIIb, Tourism and Agricultural Sectors)	2016-2025	√			√	
Solar Freezer System (Phase I Vava'u and Ha'apai Outer Islands)	2016		√	√		Current funding $2m TOP.
Solar Freezer System (Phase II Tongatapu and Niuas)	2017-2020	√			√	
Solar Home System Phase 1 [Off Grid]	2016		√	√		Current funding $0.6m TOP.
Solar Home System Phase 2 [Off Grid, main islands]	2019-2020	√			√	
PV Mini-Grid System (Phase 1) for Ha'ano, 'Uiha, Ha'afeva, Nomuka, Niuatoputapu islands	2016		√	√		Current funding $2.4m TOP.
PV Mini-Grid System (Phase 2) for Hunga, Falevai, Niuafo'ou islands	2018-2025	√			√	
Development of energy storage strategy	2016 – 2017	√			√	OIREP Ha'apai will be a lighthouse project.
Energy Efficiency strategy	2016-2017				√	Building on PEEP and PEEP2
Enforcement of Minimum Energy Performance Standards Regulation [Cooling Equipment]	2013-2017				√	SPC AusAid. (AUD 2.7m)
Additional activities to achieve 50% renewable electricity generation by 2020:						
Network Efficiency: & Power System Monitoring: Village Electricity Network Upgrade	2014-2016		□	□		Funded by NZ (40m NZD)
Diesel Engines Fuel Efficiency Services Training	2016-2020	□			□	
Solar Vehicle Public awareness Tour Project	2015-2020	□			□	Identified Private Sector Investment Interest
Additional activities to achieve 100% renewable electricity generation by 2030:						
Geothermal Power Generation	2020-2030	□			□	JICA interest
Biomass and Waste Power Generation	2020-2030	□			□	China interest
Investment in Resilience:						
Scientific and technology transfer	2015-2030	□			□	JICA interest
Disaster Resilience	2015-2030	□			□	World Bank
Sea Wall and Foreshore Protection	2015-2030					ADB and EU
Climate Proofing						
Public Infrastructure	2015-2030					World Bank
Housing	2015-2030					TBC

TRINIDAD AND TOBAGO

INTENDED NATIONALLY DETERMINED CONTRIBUTION (iNDC) UNDER THE UNITED NATIONS FRAMEWORK CONVENTION ON CLIMATE CHANGE

Executive Summary

Trinidad and Tobago's intended nationally determined contribution (iNDC) is based on its Carbon Reduction Strategy developed for its power generation, transportation and industrial sectors, these being the major emitting sectors of the economy, and consistent with implementing the provisions of the National Climate Change Policy. The process of developing the Strategy and hence the iNDC involved wide stakeholder consultation and participation, including through its Climate Change Focal Point Network consisting of over 175 representatives of government ministries, agencies and institutions, academia, the private and industrial sectors, non-governmental organisations, civil society organisations, and fiduciary organisations. This process was finalised in 2014 and lasted for three (3) years during which business-as-usual scenarios were developed for each sector to the year 2040 although the iNDC presented goes to the year 2030, involving a conservative (lower economic growth) and optimistic (higher economic growth).

Mitigation options were identified which underwent cost-benefit analyses and socio-economic impact assessment and includes policy instruments, knowledge and awareness approaches to elicit behavioural changes and direct technology intervention options such as clean technology, fuel switching and renewable energy and energy efficiency technologies. Due to a lack of sufficient data sets, the methodology to estimate projected emissions was developed as an ad hoc model based on the BIOS model.

Trinidad and Tobago's aim is to achieve a reduction objective in overall emissions from the three sectors by 15% by 2030 from BAU, which in absolute terms is an equivalent of one hundred and three million tonnes (103,000,000) of CO_2e. The estimated cost of meeting this objective is USD 2 billion, which is expected to be met partly through domestic funding and conditional on international financing including through the Green Climate Fund. In this regard, Trinidad and Tobago will commit to unconditionally reduce its public transportation emissions by 30% or one million, seven hundred thousand tonnes (1,700,000) CO_2e compared to 2013 levels by December 31, 2030.

Trinidad and Tobago's National Circumstances

Trinidad and Tobago is the most industrialized economy in the English-speaking Caribbean. It is the leading Caribbean producer of oil and gas, and its economy is mainly based upon these resources. Trinidad and Tobago also supplies manufactured goods, mainly food products and beverages, as well as cement, to the Caribbean region. Even though other products are also manufactured, oil and gas is the leading economic sector and accounts for 40% of Gross Domestic Product (GDP) and 80% of exports. Trinidad and Tobago does not contribute largely to the total worldwide GHG emissions. In fact, as of 2013, Trinidad and Tobago was ranked 62nd of all the countries if they were classified by total national GHG emissions.

There are several studies that found evidence of recent changes in the climate in Trinidad and Tobago. It has been shown that, over the last three (3) decades, there has been an upward trend in temperatures. The Trinidad and Tobago Meteorological Service (TTMS) found that the annual mean air temperature has warmed over the period 1981-2010 by 0.8 and 0.5 ºC relative to 1961-1990 and 1971-1990, for Trinidad and Tobago respectively. That anomalous warming per decade is consistent with those observed by the Intergovernmental Panel on Climate Change (IPCC) (2007) for the Caribbean region.

In terms of vulnerability to the effects of climate change, Trinidad and Tobago's exposure to possible impacts has been well documented. As a Small Island Developing State (SIDS), the country is vulnerable to temperature increases, changes in precipitation and sea level rise. Other vulnerabilities include increased flooding, increased frequency and intensity of hurricanes, hillside erosion and loss of coastal habitats. In fact, even though Trinidad and Tobago is not in the main Atlantic hurricane belt, one of the new natural hazards scenarios considered for the country is the increased potential to be hit by tropical storms.

In light of the expected climate change impacts for Trinidad and Tobago and, taking into account its fossil fuel based economy, taking action to implement climate change mitigation policies in the country is deemed as a necessity to reduce climate change impacts and assume responsibility for the country's GHG emissions. The Government of Trinidad and Tobago has recognised the importance of addressing climate change both from a mitigation and adaptation perspective and is committed to playing its part as a responsible member of the global community, and as a signatory to the UNFCCC, to making efforts to achieve the objective of the UNFCCC, regardless of the quantum of emissions on a global scale.

Accordingly the Government has defined the policy framework for a low carbon development plan through the National Climate Change Policy, and developed a Carbon Reduction Strategy for the power generation, transportation and industrial sectors which forms the basis of Trinidad and Tobago's iNDC. **Trinidad and Tobago already produces all of its electricity from natural gas and is working towards achieving greater efficiency through combined cycle generation at all its power plants. This sector would therefore be at the edge of low carbon emissions with renewable energy being the next stage for reducing emissions even further. The objective therefore is to achieve the optimal energy mix with the lowest greenhouse gas emissions in order to achieve sustainable development, including the decoupling of emissions and economic growth.**

Therefore, implementing the provisions of the National Climate Change Policy is critical and necessary to ensure a sustainable development path that will redound to the benefits of society as a whole in the short, medium and long terms. Building climate resilience through the reduction of carbon emissions and reducing climate vulnerability in all sectors will create green jobs and have significant co-benefits from an air quality and associated public health costs perspective, as well as enhance the coping ability and capacity to the adverse impacts of climate change.

The following sections provide further details.

Trinidad and Tobago's Mitigation Contribution

Mitigation Objectives

Unconditional:	**30%** reduction in GHG emissions by December 31, 2030 in the public transportation sector compared to a business as usual (BAU) scenario (reference year 2013).[1]
Conditional:	Additional reduction achievable under certain conditions which would bring the total GHG reduction to **15%** below BAU emission levels by December 31, 2030.
Financial Requirements:	The estimated cost of achieving the reduction objectives is USD 2 billion, which is expected to be met partly through domestic funding and conditional on international climate financing including through the Green Climate Fund.
Methodological Approaches:	The BAU baseline was developed using an ad hoc model based on the BIOS tool, rather than the wholesale application of prefabricated models. This decision was taken as a result of various criteria applied to the Trinidad and Tobago situation as summarised in the table below.

Evaluation criteria	Prefabricated model	Ad-hoc model	Situation of Trinidad and Tobago
Transparency	Black box	High	Needed for a better understanding of the situation
Data requirement	High	Adaptable	Data available ,with some gaps
Flexibility/adaptability	None	High	Necessary to cover the data gaps
Legitimacy	Generally high	Depending on its strengths	Both types could be used for the situation of Trinidad and Tobago

Therefore, the model could be described as a simulation model, designed to develop the GHG emissions projections based on some specific sectoral assumptions and other, more general, economic assumptions which link the three (3) sectors.

The main features of the model are:

1. The economic module, which forecasts the general economic growth of Trinidad and Tobago and that of the sectors, according to some assumptions and scenarios generated.
2. The sectoral submodels, which develop the technical specificities of every sector, according to the forecasts of the economic module.

[1] Trinidad and Tobago will continue to revise the BAU projections as more data becomes available to better track emission reduction efforts.

3. The emissions module, which converts the activity data into GHG emissions, according to the Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories.

The development of the future scenarios is based on projections of the World Bank for Trinidad and Tobago and the Caribbean[2]. The scenario developed shows a lower economic growth and is therefore defined as the conservative scenario, while the growth expected for the Caribbean is higher, so it was used as the baseline for the optimistic scenario. The scenarios have an important influence on the GHG emissions. Firstly, it is due to the relationship between the demand growth and the GHG emissions. And secondly, because in a long term projection, structural transformations of the economy take place, reflecting the differences between the relative weights of the economic sectors, and affecting the GHG emissions.

Type of Emissions Reductions:	Emission reduction from projected emissions based a business as usual scenario to the year 2030.
Sectors:	Transportation, power generation and industry.
Gases:	Carbon dioxide, methane, nitrous oxide
Fairness and Ambition:	Trinidad and Tobago is a small island developing state with the attendant limitations of small size, limited technological, technical, financial and human resources, relatively small economy, accounting for less than 1% of global greenhouse gas emissions and more critically, acutely vulnerable to the adverse impacts of climate change. Notwithstanding, the Government of Trinidad and Tobago has placed equal importance on mitigation and adaptation because it recognises the need for developing a low carbon economy in order to assist in the achievement of sustainable development objectives. To this end, Trinidad and Tobago has begun to put in place the necessary policy and legislative framework and has committed to unconditional mitigation action consistent with the implementation of the National Climate Change Policy.

[2] "Real Projected Gross Domestic Product (GDP) and Growth Rates of GDP for Baseline Countries/Regions (in billions of 2005 dollars) 2000-2030". World Bank World Development Indicators, International Financial Statistics of the IMF, IHS Global Insight, and Oxford Economic Forecasting, as well as estimated and projected values developed by the Economic Research Service all converted to a 2005 base year.

Additionally, robust policy measures for forest, land use and natural resources management are underway that will result in greater mitigation of greenhouse gases but which are not included as part of the iNDC. Trinidad and Tobago's iNDC therefore goes beyond the requirements of the provisions made for SIDS in Paragraph 11 of Decision 1/CP.20. Furthermore, the Energy Chamber of Trinidad and Tobago is developing a feasible carbon trading scheme that will also result in reduced emissions in the industrial sector.

Contribution to achieving the objective of the UNFCCC:	The Government of Trinidad and Tobago recognises the legally binding commitment of all Parties to achieving the objective of the UNFCCC as articulated in its Article 2 and the need for mitigation action by all Parties regardless of their quantum of emissions. The mitigation efforts of Trinidad and Tobago along with those of all Parties will collectively contribute to the reduction of global atmospheric concentration of greenhouse gases and the achievement of the objective of the UNFCCC.

Explanatory Notes

BAU Scenario*:* The estimated emissions to 2030 are based on the Business-As-Usual (BAU) projections modeled, and ***calculated as the average*** of the emissions projected of both the optimistic scenario and the conservative scenarios.

1. **Emissions Reduction by 2030:** The emissions reduction objective is intended to be a reduction of the ***cumulative emissions of the three sectors*** (power generation, industry and transport) ***between 2013 and 2030***, and aimed to be achieved by 31 December 2030. These cumulative emissions are referenced against a ***2013 baseline*** in which the total emissions from these sectors amounted to an estimated ***34,234,032 tCO2-e***.

2. **Sectors:** The sectors covered are the three major emitting sectors (power generation, industry and transportation) as the emissions from the other sectors are considered relatively negligible. For example, in 2010, the land use and agriculture sector accounted for 2% of total economy-wide emissions, while the waste sector accounted for 7% of the total economy-wide emissions.

3. **Global Warming Potential (GWP):** GWP used were consistent with the 1996 IPCC Guidelines and applied in estimating projected emissions.

REPUBLIC OF TUNISIA

Ministry of Environment and Sustainable Development

UNITED NATIONS FRAMEWORK CONVENTION ON CLIMATE CHANGE

INTENDED NATIONALLY DETERMINED CONTRIBUTION

TUNISIA

AUGUST 2015

Table of contents

Introduction

This document summarizes the intended nationally determined contributions (INDC) of Tunisia for the purposes of its submission to the Conference of the Parties to the United Nations Framework Convention on Climate Change (UNFCCC). The report has been drawn up in accordance with decision 1/CP.20 (Lima call for climate action), which specifically draws attention, in paragraph 14, to the **clarity, transparency and understanding** of the INDC reports. It is based on important models and calculations of emissions reductions in various sectors, as well as ways of identifying and evaluating adaptation measures.

The document was drafted through broad cooperation between the main stakeholders involved in the topic of climate change in Tunisia, including public institutions, the private sector and civil society. Tunisia's contributions were also by and large developed on the basis of existing sectoral and horizontal strategies, such as the national climate change strategy, drawn up in 2012; the energy efficiency strategy; the Tunisian Solar Plan and the adaptation strategies of a range of sectors and fields (coast, agriculture, water resources, health, tourism, and so on).

In its contribution, Tunisia proposes reducing its greenhouse gas emissions across all sectors (energy; industrial processes; agriculture, forestry and other land use; waste) in order to **lower its carbon intensity by 41 per cent in 2030, relative to the base year 2010.** Mitigation efforts will particularly centre on the energy sector, which alone accounts for 75 per cent of the emissions reductions contributing to this decrease in carbon intensity. As part of the energy transition policy advocated by the State, it is estimated that the energy sector will reduce its carbon intensity in 2030 **by 46 per cent** compared with 2010.

Tunisia, which has already made significant strides towards mitigation in its baseline, is looking to reduce its carbon intensity unconditionally and through its own efforts by 13 per cent compared to 2010, i.e. by around 1/3 of its INDC. To achieve the rest of its objective, i.e. an additional drop in carbon intensity of 28 per cent in 2030 compared to 2010, Tunisia is relying on the support of the international community for funding, capacity building and technology transfer.

The reduction in emissions compared to the baseline scenario would be in the order of 26 million tCO_2eq in 2030, and **207 million tCO_2eq** for the period 2015-2030.

Implementation of the **Tunisian contribution towards mitigation** requires substantial funds to be mobilized – an estimated **18 billion US dollars** – to cover investment needs and finance capacity building programmes.

The national effort required to achieve Tunisia's unconditional contribution is estimated at nearly 10 per cent of the total mitigation investment needs. The national effort exclusively concerns the energy sector, which accounts for the most significant part of the investment needs.

In terms of adaptation, Tunisia remains very vulnerable to the global warming anticipated in the region and the corresponding implications of major increases in temperature, reduced precipitation and rising sea levels. The socio-economic and environmental impact will particularly affect water resources, agriculture, natural and artificial ecosystems, the coastline, health and tourism.

The **additional costs** of the necessary **adaptation** measures for these sectors and fields will come to some **2 billion dollars** and should be borne completely by the international community as part of the global fight against climate change.

Altogether, the total additional financing required for mitigation and adaptation would be around 20 billion US dollars to fund investment requirements and capacity building.

1 National situation

Tunisia is situated in North Africa, covering an area of some 164,000 km² and with a 1,300 km coastline on the Mediterranean Sea. The climate is particularly arid and variable, with precipitation ranging from 800 mm per year in the north to 150 mm per year in the south.

The population growth rate has steadily been dropping, reaching 1 per cent per year during the past decade. Tunisia had some 11 million inhabitants in 2014, whereas it had 9.9 million in 2004.

Tunisia is considered to be one of the countries most exposed to climate change in the Mediterranean. The main risks which it is likely to confront are temperature increases, reduced precipitation, rising sea levels and escalating extreme weather phenomena (floods and droughts). These risks are likely to result in major environmental and socio-economic vulnerability.

Tunisia is aware of these challenges and has adopted a proactive policy of fighting climate change, both in terms of mitigation and adaptation.

Moreover, as Tunisia actively supports international efforts to combat climate change, it has delivered on all of its commitments to the UNFCCC, the last of which was the submission of the first biennial report in December 2014.

In addition, in the wake of the political changes triggered in December 2010, Tunisia adopted a new constitution on 26 January 2014, which incorporated the fight against climate change as a permanent feature. Under Article 44 of the new constitution, the State shall *"provide the means necessary to guarantee a healthy and balanced environment and contribute to the climate's integrity"*.

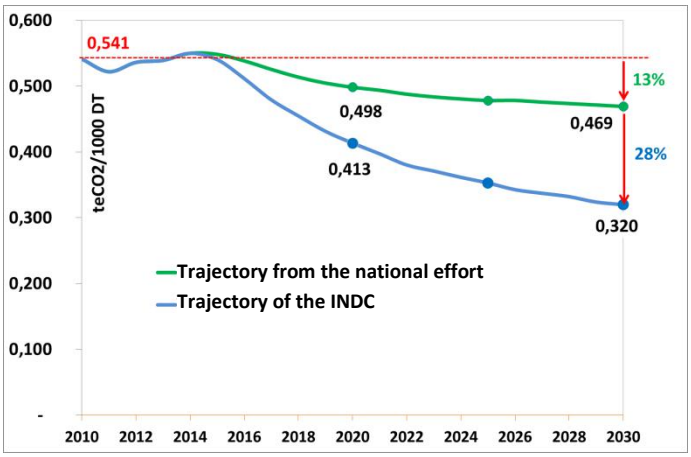
The policy of fighting climate change is particularly emphasized in the energy sector. It is the case that, despite Tunisia's efforts to manage its energy over the past three decades, the energy system is today facing significant challenges:

- Energy supply security issues due to the growing energy balance deficit and the heavy reliance on conventional energy;
- Economic sustainability issues associated with fluctuations in global energy prices and their implications regarding the balance of payments and public finances.

To meet these challenges, the Tunisian authorities have decided, since 2013, to forge ahead with an energy transition process based on an unprecedented strengthening of the energy management agenda and its two pillars of energy efficiency and renewable energies. This transition agenda aims for a reduction in primary energy demand of 30 per cent by 2030 compared to the baseline scenario, and a penetration rate of 30 per cent for renewable energies in electricity production.

2 The Tunisian contribution towards mitigation

2.1 Objective

Type of objective	% decrease in carbon intensity compared to the base year
Target year	2030
Implementation period	2015-2030
Base year	2010
Overall INDC objective	The aim of Tunisia's contribution in the area of mitigation is to **reduce its carbon intensity by 41 per cent** compared to 2010. Carbon intensity is calculated as the relationship between the total amount of greenhouse gas emissions (expressed in tons of CO_2 equivalent) and the GDP, with 2005 set as a continuous baseline. In the specific sector of energy, Tunisia aims to **reduce its carbon intensity by 46 per cent** compared to 2010 levels.
Unconditional and conditional mitigation objectives	Tunisia's unconditional contribution corresponds to **a 13 per cent reduction in carbon intensity**, with 2010 as the base year, or around 1/3 of the overall objective. The conditional contribution allows for **an additional decrease of 28 per cent** in carbon intensity, with 2010 as the base year. The graph below represents the trajectory of Tunisia's conditional and unconditional contribution for the period 2015-2030: **Trajectory of Tunisia's conditional and unconditional contribution for the period 2015-2030** 
Equity and ambition	Tunisia, as a Non-Annex I Party to the UNFCCC, shall actively contribute to the planetary effort to mitigate greenhouse gas emissions. Tunisia considers its contribution to be fair and ambitious on three fundamental grounds: - Through its total contribution (both unconditional and conditional), Tunisia aims to reduce its carbon intensity by 41 per cent compared to 2010. The national effort (equivalent to the unconditional contribution) would lead to a reduction of 13 per cent of the carbon intensity by 2030 compared to 2010 levels, i.e. almost 1/3 of the objective.

- Tunisia is committed to reducing its carbon intensity to below 2010 levels, although it contributed to only 0.07 per cent of global emissions in 2010.
- Thanks to its overall contribution, by 2030, emissions per capita would reach 3.4 tCO_2eq per capita, whereas global emissions in 2010 had already reached 7 tCO_2eq per capita.

2.2 Coverage and scope

Geographical coverage	The entire country
% of national emissions covered by mitigation efforts	100 per cent of the emissions of 2010
Target sectors	Energy; industrial processes; agriculture, forestry and other land use (AFOLU); waste
Target gases	CO_2, CH_4 and N_2O

2.3 Funding needs for mitigation

Investment needs

The mitigation objective would require a large total investment amount to be mobilized – around 17.5 billion US dollars over the period 2015-2030 – distributed among the following sectors:

Funding needs to support the INDC scenario for mitigating greenhouse gas emissions (millions of US dollars)

SECTORS/FIELDS	Total
Energy	**14,917**
Energy efficiency	6,991
Renewable energy	7,926
Agriculture, forestry and other land use (AFOLU)	**1,533**
Agriculture	967
Forestry and other land use	566
Waste	**972**
Solid waste	70
Sanitation	902
TOTAL	**17,422**

Around 85 per cent of the funding needs would have to be mobilized for the energy sector: 40 per cent for energy efficiency and 45 per cent for renewable energies.

Capacity building and technology transfer needs

The capacity-building measures required to facilitate achievement of the INDC objective include, inter alia, training stakeholders, institutional development, technical assistance for sectoral mitigation programmes and support for R&D and innovation.

The total cost of covering capacity-building needs is estimated at about 523 million US dollars for the period 2015-2030, the majority of which will be earmarked for the energy sector (about 450 million US dollars).

In addition, technology transfer programmes will be required to allow Tunisia to gain access to know-how and appropriate industrial means in order to ensure the sustainability of its contribution. These transfers may

	take the form, for example, of industrial partnerships with parties holding the technologies. The Conference of the Parties to the Convention should also develop appropriate mechanisms to facilitate these transfers, depending on the specific needs for each mitigation measure adopted.
The national effort and support from international financing	▪ **The national effort** required to achieve Tunisia's unconditional contribution is estimated at **around 10 per cent of the total mitigation investment needs**. The national effort exclusively concerns the energy sector, which accounts for the most significant part of the mitigation objective. ▪ **International support** should focus on funding the various remaining types of investment needs (concessional lines of credit, donations, direct investment, integration into carbon markets, etc.). In the energy sector, some of the international financial support should serve to bolster the Energy Transition Fund (FTE).[1] This fund was established by the Tunisian State in 2014 as a central instrument for implementing its energy transition agenda. Finally, the international effort will also focus on the funding of capacity building and technology transfer programmes.
Usage of carbon market mechanisms	To support the financing needs of its mitigation objective, Tunisia would like to use carbon market mechanisms in addition to the direct financial supports listed above, particularly for the following programmes: - Tunisian Solar Plan - Mitigation in the cement industry and in any other sector which tends to be involved in carbon markets - Energy efficiency and renewable energies in the building sector

2.4 Planning process

INDC preparation	The preparatory phases for the INDC were already under way in July 2014 with the launch of a series of consultation workshops bringing together the main stakeholders involved in the climate change process (public administration, civil society, private sector and industry experts). This process has gathered momentum since publication of the Lima COP20 decisions defining the rules for achieving the INDCs and for their content. The consultation process continued until validation.
INDC implementation	In its standard development agenda, Tunisia is already striving to mitigate its greenhouse gas emissions in all of the key sectors which generate them: (i) The country has continuously pursued a proactive energy management policy for some 30 years and has one of the lowest energy intensities in the Middle East/ North Africa region, (ii) It has achieved major accomplishments in the reforestation and preservation of forested ecosystems, which are confirmed by the finding in the 2010 greenhouse gas inventory that the entire Agriculture, forestry and other land use (AFOLU) sector is a net CO_2 absorber, (iii) It has

[1] The Energy Transition Fund replaces the National Energy Management Fund (FNME), increasing its resources through a tax on energy consumption, diversifying its intervention strategies and extending the range of eligible actions.

always set store by improvement of agricultural productivity(including livestock) and optimization of the use of inputs, (iv) It has established the systematic introduction of controlled landfills and has, since 2006, launched Ministry of Sustainable Development projects for degasification and gas flaring across the country's eight main landfills.

Tunisia was one of the pioneering countries in the drafting of several nationally appropriate mitigation actions (NAMAs)[2], thereby standing ready to sign a new climate agreement, and was one of the first non-Annex I countries to submit its first biennial report (31 December 2014).

These numerous initiatives prove Tunisia's determination to advance swiftly beyond the already proactive baseline which it has adopted for a number of years and to set out on a virtuous and ambitious path towards mitigating its emissions of greenhouse gases, drawing both on its own resources and on those of the international community.

As part of its contribution to tackling climate change issues, Tunisia will step up its efforts to mitigate greenhouse gas emissions in several sectors:

The energy sector: The aim of the mitigation plan is to intensify the promotion of energy efficiency in all consumer sectors and for all energy usages. Around 20 energy efficiency actions have been included in the calculation of avoidable emissions, covering the entire industrial, building, transport and agricultural sectors. This should allow **primary energy demand to decrease** by some **30 per cent by 2030 ,compared to the baseline**.

The plan also advocates increasing the use of renewable energies, not least through the Tunisian Solar Plan (PST). This will raise the **share of renewable energies** in **electricity production** to 14 per cent in 2020 and to **30 per cent in 2030**, whereas it stood at only 4 per cent in 2015.

To achieve this, the plan will aim to achieve an installed renewable energy capacity of 3,815 MW in 2030, including 1,755 MW for wind power, 1,610 MW for solar photovoltaic (PV) and 450 MW for concentrated solar power (CSP).

With regard to solar heating, Tunisia intends to triple the solar water heater distribution rate, which will exceed 220 m² of collectors per 1,000 inhabitants in 2030, compared to 73 in 2015.

Industrial processes sector: The mitigation plan includes the use of a NAMA in the cement industry from 2016 onwards and access of this sector to carbon markets from 2021 onwards.

Agriculture, Forestry and Changes in Land Use: The mitigation plan aims to intensify the CO_2 absorption capacities of forestry and arboriculture by stepping up reforestation and by consolidating and increasing carbon reserves in forest and pastoral environments. The carbon footprint for agriculture will also be improved by using practices that generate fewer emissions, such as optimizing the diets of domestic animals, promoting biological agriculture or conservation-oriented agricultural practices, or recovering energy from animal waste.

Waste: The mitigation plan provides for the implementation, from 2016, of a plan to install facilities to transform **solid waste** into RDF (refuse derived fuel)

[2] Five NAMA proposals have already been developed: (i) NAMA Cement, (ii) NAMA Buildings (iii) NAMA Electricity Sector, (iv) NAMA Forests, and (v) NAMA Sanitation.

	intended for cement facilities, as well as a programme for introducing degasification systems in controlled landfills. It is planned to recover electricity from captured gases, at least at the main landfills. This energy option is covered in the low-carbon scenario for the energy sector. The mitigation plan in the **sanitation** sector provides in particular for the installation of solar PV capacity at water treatment plants (STEPs), biogas digesters for electricity production and a reduction in the chemical oxygen demand (COD) of industrial wastewater.
Monitoring INDC implementation	To ensure the success and efficiency of the actions which make up its contribution, Tunisia will establish a rigorous system for monitoring and evaluating the actions and results achieved.[3] This system will also enable the actions to be adjusted and potentially redirected. This system will be based on a comprehensive approach of Measurement, Notification and Verification (MRV)[4] and will apply to all elements of the national strategy for mitigating greenhouse gas emissions. The Tunisian MRV system will revolve around three major elements of greenhouse gas emissions, namely: - MRV of greenhouse gas national emissions, which will be responsible for the preparation each year of inventory data for greenhouse gases and for distributing and checking this data. - MRV of mitigation measures, which will be responsible for monitoring, notifying and checking the impacts (emission reductions, carbon intensity, co-beneficiaries, etc.) of all mitigation measures, especially those developed under NAMA, in accordance with national and international regulations. - MRV of support, which will be responsible for monitoring, notifying and checking greenhouse gas emission mitigation support and adaptation actions for which support has been received (funding, technology transfer and capacity building).

2.5 Methodological approaches

Inventory methodology	Inventory carried out in accordance with the 2006 IPCC guidelines.
Global warming potential	GWP values used from the document "IPCC Fourth Assessment Report- AR4 - Climate Change 2007": ▪ CH_4 = 25 ▪ N_2O = 298
Baseline scenario	The approaches for calculating greenhouse gas emissions derive directly from the 2006 IPCC guidelines. The emissions calculation is based on estimated activity data, which is deduced from a simulation model using the following approaches: ▪ **Energy sector:** Emissions are assessed in the baseline scenario, mainly using a bottom-up approach based on modelling the final energy demand by sector and by type of energy using the MEDPRO prediction model. This then allows primary energy demand to be predicted per energy type on the basis of hypothetical parameter changes in the electricity sector (specific consumption, losses and mix).

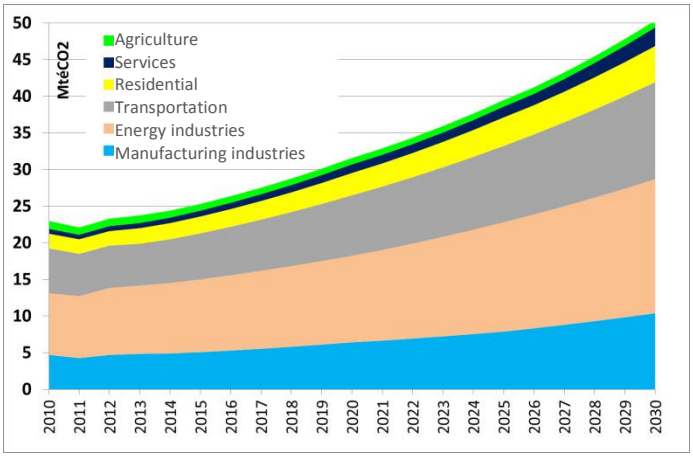
[3] See detailed description in the First Biennial Report of Tunisia – December 2014.

[4] Measurement - Reporting - Verification (MRV).

The baseline scenario already includes a mitigation component since it corresponds to an average decrease in primary energy intensity in the order of 1 per cent per year for the period 2010-2030.

The baseline emissions are being evaluated, year by year, from 2010 to 2030, by applying the sectoral approach of the 2006 IPCC guidelines very carefully (activity data and emission factors by sector and by energy product). This sectoral approach covers CO_2, CH_4 and N_2O. Annual baseline emissions are then expressed in tons of CO_2 equivalent. This approach should make it easier to cross-check the results of this baseline against future greenhouse gas inventories which will be carried out under the MRV system in Tunisia.

The following graph shows the breakdown of the energy baseline by sector:



Breakdown of the energy baseline by sector

- **Industrial processes:** Emissions assessments for the baseline scenario mainly draw on the results of the cement sector NAMA.[5] For other process sources, the simulations are based either on the relationship with GDP or on the principle of a fixed production value.[6]
- **Forestry and other land use**: The baseline assumes continuation of the reforestation trend and conservation measures typically pursued by the Directorate-General for Forestry, as well as the same rate of progress in arboriculture. This trend scenario will therefore consolidate the status of this source of emissions/absorptions as a net absorber.
- **Agriculture:** The baseline assumes that current trends in given agricultural practices will continue, while including four mitigation actions depending on the current or planned rate (including poultry dung in composting processes, biological agriculture, stepping up the role of legumes in arable crops and optimizing the use of synthetic mineral fertilizers).
- **Waste:**

  Solid waste: The baseline assumes that current waste management practices will continue, with waste being buried in controlled landfills. The

[5] The cement sector represents ¾ of national emissions relating to industrial processes.
[6] Example of the nitric acid facility whose production capacity will remain stable throughout the simulation period.

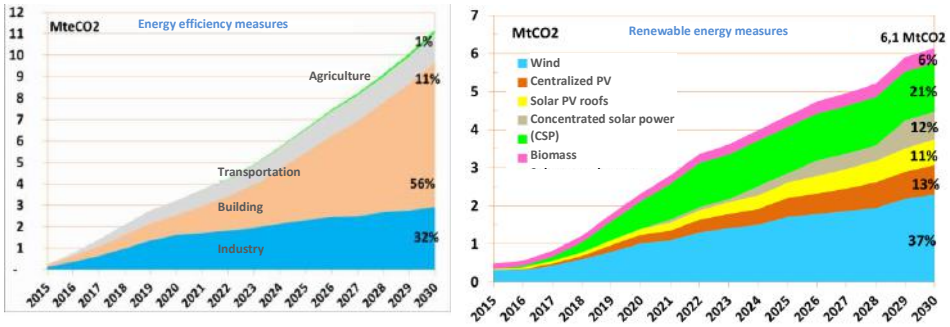
baseline incorporates the emission reductions of the two Ministry of Sustainable Development degasification projects.[7]

Waste water treatment: The baseline assumes that current sanitation practices will continue until 2030, but with particular efforts made towards energy efficiency.

Mitigation scenario

- **Energy sector:** The mitigation scenario is proactive and incorporates ambitious programmes for developing energy efficiency and renewable energies. Two methods have been used to calculate emissions for this scenario:
  - *A modelling method using the MEDPRO predictive tool,* identical to that used in the baseline case. In this case, the decrease in primary energy intensity is estimated at an average of about 2.5 per cent per year between 2010 and 2030.
  - *A bottom-up* method consisting of: (1) identifying the energy efficiency and renewable energy actions one by one, (2) calculating the final energy savings expected for each form of energy, (3) calculating the primary energy savings for each of the actions on the basis of assumptions for the electricity sector (specific consumption, losses to the network and the mix), (4) calculating emissions avoided on the basis of emissions factors for each form of energy, (5) aggregating emissions avoided as a result of all of the actions, (6) subtracting these emissions from those of the baseline.

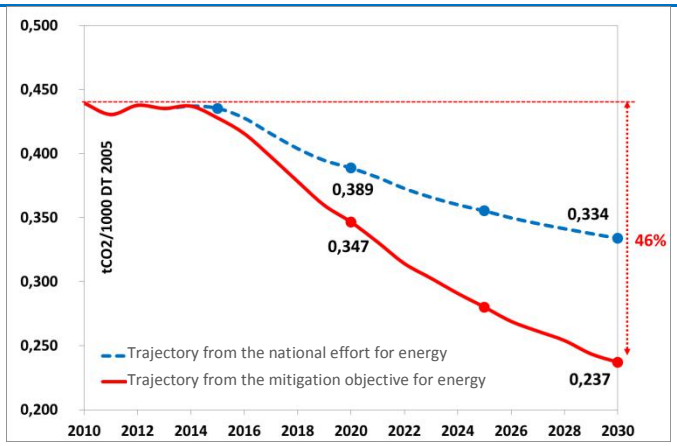
The two graphs below respectively show the reductions in greenhouse gas emissions due to energy efficiency measures (by sector) and due to renewable energies (by type).



Reductions in greenhouse gas emissions due to energy efficiency and renewable energies

This reduction thus makes it possible to reduce carbon intensity in the energy sector by approximately 46 per cent compared to 2010. About half of this reduction is due to the national effort, as shown in the following graph:

[7] These two projects will be closed in 2018 but it is assumed that the degasification systems will be maintained until 2025. Beyond that point it will be assumed that the Tunisian State will be unable to modernize, maintain, or generally manage the degasification equipment.



Trajectory for the decrease in carbon intensity in the energy sector

- **Industrial processes**: The mitigation scenario for the processes sector covers the launch of NAMA Cement, which is a mitigation programme with four focuses: (i) Energy efficiency, (ii) Renewable energies, (iii) Co-incineration of solid waste, (iv) Segmentation of the cement market to reduce emissions deriving from processes.

  The results of the first three actions are included in the mitigation scenario for the energy sector. The impact of segmentation of the cement market on emissions related to the clinkering process is also included here, however, the energy impact of this segmentation is included in the low-carbon scenario for the energy sector.

- **Forestry and other land usage**: The mitigation scenario for the FAT sector assumes the strengthening of reforestation and conservation actions already considered in the baseline and the addition of three new actions. As with the baseline, the calculation method is based on the 2006 IPCC guidelines.

- **Agriculture:** The mitigation scenario for the agricultural sector assumes the strengthening of actions already considered in the baseline and the addition of four new specific actions. Estimates of avoidable emissions are based firstly on the 2006 IPCC guidelines and secondly on international literature concerning certain mitigation actions. Mitigation actions regarding energy recovery from waste are listed in this sector, but the results of these actions are included in the low-carbon scenario for the energy sector.

- **Waste**

  Solid waste: this involves a bottom-up approach combining two actions:

  - Introduction of the option to produce RDF to be used for combustion in the cement industry. NAMA Cement assumes the recovery of 3 million tons of solid waste (i.e. only 35 per cent of solid waste generated) for RDF production by 2030.
  - Introduction of degasification systems for 50 per cent of the quantities of waste which will be buried in controlled landfills in the future, amounting to about 1.5 million tons of solid waste by 2030. The low-carbon scenario also covers degasification projects for the two Ministry of Sustainable Development projects beyond 2025.

  Estimates of avoidable emissions are based on the calculation method

from the 2006 IPCC approach. Emission reductions as a result of co-incineration are estimated on the basis of the quantity of waste which it is no longer necessary to put into landfill due to the usage of mechanical and biological processing for the production of RDF.

Emission reductions as a result of degasification systems on controlled landfills are estimated by using the most recent degasification indicators generated by Clean Development Mechanism (CDM) landfills in Tunisia.

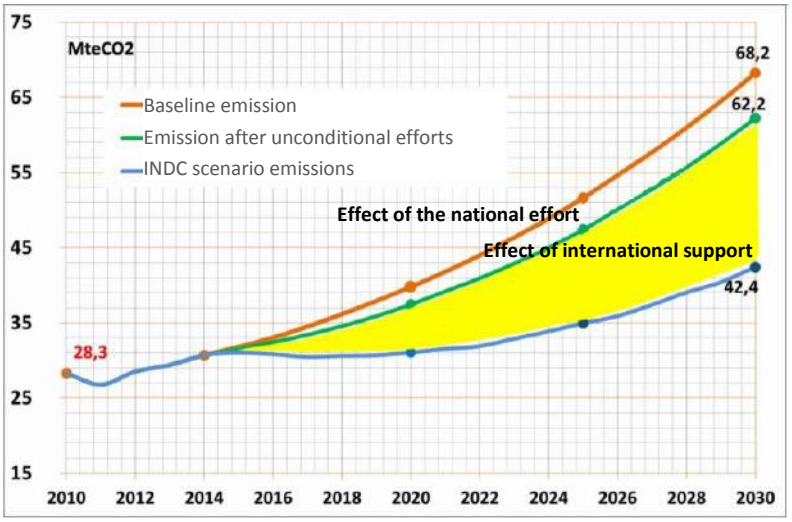
The impact of potential projects to recover energy from landfills is included in the low-carbon scenario for the energy sector.

Wastewater treatment: this involves a bottom-up approach combining two renewable energy actions and one action to improve treatment processes in the industry. The approach for estimating avoidable emissions is derived from the method of calculating emissions for renewable electricity generation, based on an assumed COD reduction of about 15 per cent in industrial wastewater. Mitigation actions relating to renewable energies are listed in this sector, but the results of these actions are included in the mitigation scenario for the energy sector.

2.6 Expected emissions

Baseline emissions and those of the INDC scenario ($MtCO_2eq$)

The following graph shows the respective trajectories of greenhouse gas emissions for the baseline, the unconditional national effort and the INDC scenario.



Trajectories of greenhouse gas emissions for the baseline, unconditional effort and INDC scenarios

The following table shows greenhouse gas emissions for the three scenarios up to 2020, 2025 and 2030.

	2010	2020	2025	2030
Baseline emissions	28.3	39.8	51.6	68.2
Emissions after unconditional efforts	28.3	37.4	47.4	62.2
Emissions including both conditional and unconditional efforts	28.3	31.1	35.0	42.4

Emission **reductions** ($MtCO_2eq$)

The following table shows the conditional and unconditional reductions in greenhouse gas emissions.

	2020	2025	2030	Cumulative 2015-2030
Unconditional	2.4	4.3	6.0	51.6
Conditional	6.3	12.4	19.8	155.2
Total	8.7	16.7	25.8	206.8

Sectoral contribution to emissions reductions (up to 2030)

The constant decline in carbon intensity in Tunisia until 2030 stems from significant reductions in greenhouse gas emissions across all sectors. The energy sector remains the main contributor to the Tunisian objective in 2030, with 75 per cent of the reductions in emissions. Waste comes in second place, followed by forestry and other land use, and agriculture.

2.7 Other information: sustainable development impacts

Energy sector

- Primary energy savings: 7.6 Mtoe in 2030, and cumulatively 51 Mtoe over the period 2015-2030, 2/3 of which is in energy efficiency and 1/3 in renewable energies.
- Job creation: Approximately 58,000 job equivalents over the 2015-2030 period, 75 per cent of which would come from energy efficiency measures in the building sector.
- Combating energy insecurity: reducing consumers' energy bills, especially for the poorest strata of the population.

Forestry and other land usages

- Balance of ecosystems and preservation of the fertility of soils
- Improvement of the balance of fodder for feeding livestock
- Job creation and income-generating activities in rural zones
- Population stabilization and prevention of rural depopulation

Agriculture

- Improvements in the quality of livestock fodder and increases in the productivity of livestock farming
- Preservation of the quality and fertility of soils
- Promotion of biological agriculture and reduction of pollution from agricultural areas due to chemical fertilizers
- Improvements in the quality of manure and organic recovery of animal waste

3 The Tunisian contribution towards adaptation

Climate studies on Tunisia have shown that the country is very exposed to climate change and that its economy, population and ecosystems are therefore very vulnerable.

3.1 Tunisia's exposure to climate change

Temperature	Average annual temperature increase across the entire country of +2.1°C until 2050.
Precipitation	By 2050, a drop of between 10 and 30 per cent – depending on the region – in the annual precipitation rate compared to the current situation. Alongside these falling values, there will be an increase in the frequency and intensity of the extreme weather phenomena: droughts and floods.
Rising sea levels	Heightened sensitivity of the 1,300 km coastline due to rising sea levels. By 2050, the sea level is expected to have risen on average by 30 to 50 cm, causing the beaches to shrink by 20 to 135 cm per year, depending on the coastline and the region.

3.2 Tunisia's vulnerability to climate change

Water resources	With some 385 m^3 of renewable blue water resources available per year and per capita, Tunisia is already experiencing water scarcity. This situation is due to be exacerbated by climate change over the coming years, with the decrease in conventional water resources estimated at about 28 per cent by 2030. The decline in surface waters would be approaching 5 per cent by the same year. Furthermore, following the expected rise in the sea level, losses through the salinization of coastal aquifers due to this rise in sea level would account for about 50 per cent of the current resources of these aquifers by 2030, amounting to almost 150 million m^3.
Coastline	The physical vulnerability of the Tunisian coastline to rising sea levels has various direct and indirect socio-economic consequences: - Loss by submersion of approximately 16,000 hectares of agricultural land in low-lying coastal areas, - Loss by submersion of approximately 700,000 hectares of built-up areas, - Loss by salinization of approximately 50 per cent of the resources currently available in coastal aquifers, - Indirect loss of the potential for approximately 38,000 ha of irrigable land by 2050, i.e. 10 per cent of currently irrigated land, - Decline in the activities of seafront hotels, which have a total capacity of approximately 30,000 beds, owing to retreating beaches, - Decline in port and shore infrastructure. The loss of productive capital caused by this damage is in the order of 2 billion US dollars. Losses in annual production are estimated at approximately 0.5 per cent of current GDP, mainly in the areas of tourism (55 per cent) and agriculture (45 per cent). An estimated 36,000 job losses, mainly in agriculture and tourism.
Agriculture	Droughts caused by climate change will particularly affect rainfed cereal farming interests, which would decrease from a current average land area of

	1.5 million hectares to about 1 million hectares in 2030, i.e. a reduction of approximately 30 per cent. Agricultural GDP following the reduction in land area, given yields identical to the reference situation, would fall by 5 to 10 per cent by 2030. In the event of successive extreme droughts, the land area used for cereal crops and arboriculture (mainly regions in the centre and the south) will decrease by 200,000 and 800,000 hectares respectively. Lastly, the livestock population would decrease by about 80 per cent in the centre and the south, and 20 per cent in the north, owing to the loss of rough grazing areas.
Ecosystems	Concerning ecosystems, as well as water resources, the major effects may be observed in forests and pastoral ecosystems. As temperatures and the inflammability of the biomass rise, the risk of large forest and bush fires also increases. It is estimated that 180,000 hectares of forest will have been lost by 2030. In the north of the country, such a risk will have an impact on the availability of water resources, and on the population and its heritage. The steppe ecosystems of the centre and south of the country will see their pastoral functions decline in central Tunisia, and even cease in the south. The herds will fall back to the rough grazing areas in the north, burdening these further and thereby increasing the extent of overgrazing. In the event of climate change, if no action is taken to improve the production of rough grazing areas, the contribution of steppe ecosystems is likely to have ceased by 2050.
Health	The effects of climate change on health in Tunisia will take the form of: - The resurgence and proliferation of certain vector-borne diseases, such as malaria, leishmaniasis or dengue, - Respiratory diseases caused by the rise in temperature, - Water-borne diseases caused by degradation of the bacteriological, physical and chemical quality of water resources.
Tourism	Tourism in Tunisia essentially revolves around its image as a beach and seaside resort, which means that it is particularly sensitive to the summer climate, rising sea levels and coastal erosion. The rise in temperature will make the heat in summer more severe, affecting humans' climate comfort and making heatwaves unbearable for the human body. The water stress already experienced by Tunisia will intensify, which will have repercussions on tourist facilities in terms of operating costs and health and safety. Concerning coastal erosion, the annual losses to the tourist sector resulting from the retreat of the beaches due to the rising sea level are estimated at around 5 per cent of the sector's added value.

3.3 Measures planned by Tunisia to adapt to climate change

Tunisia is aware of these challenges and has striven for several years to include adaptation to climate change in the development planning process at global and sectoral levels. Tunisia has therefore prepared a raft of measures focusing on the adaptation of six key sectors and ecosystems which are among the most vulnerable to the adverse effects of climate change.

Water resources	The adaptation measures proposed for water resources essentially consist in projects to transfer and reuse treated wastewater and to improve and secure the water supplies of large urban centres, especially Greater Tunis, Cap-bon, Sahel and Sfax.
Coastline	The projects planned essentially concern the rehabilitation of coasts and the prevention of coastal erosion: redeveloping and displacing coastal industrial zones; rehabilitating and protecting existing infrastructure against the risks of climatic impacts and developing farms and agricultural infrastructure.
Agriculture	The actions planned are essentially capacity-building and institutional development measures: - Adapting irrigated crops in the central regions, - Adapting mixed farming-livestock production to climate change in vulnerable regions, - Updating the agricultural map to take into account the impacts of climate change, - Introducing a climate monitoring and early warning system, as well as an insurance mechanism against climatic hazards due to climate change, - Conserving and exploiting genetic heritage to adapt cereal crops to climate change, developing innovative systems for arable crops.
Ecosystems	A number of measures are planned for adapting ecosystems, which may be summarized as follows: - Rehabilitation of forest nurseries and the expansion of indigenous and multi-use species, - Holistic management of cork oak forests in zones at high risk of fire in the north-west of the country, - Management of the degraded rough grazing and esparto areas in the central and southern regions, - Conservation of the ecological functions of low-lying coastal areas, - Integrated rural development of vulnerable drainage basins, sub-drainage basins and flood control, - Biological consolidation of work to combat silting in the south of Tunisia and support the implementation of regional action plans to counter desertification.
Tourism	The main measures planned in the area of tourism can essentially be summarized as: - Restoration of the Tunisian touristic sea coast and protection of tourist areas against the advance of the sea, - Definition of climatic and touristic regions and adaptation of the division of eco-touristic circuits, - Development of a range of services that are at once alternative and complementary to seaside tourism, particularly in terms of health, culture, sport and environment. - Launch and promotion of the concept of ecological hotels, - Optimization of the management of water resources by the tourist sector and installation of mini seawater desalination plants using renewable energies.

Health	This too essentially consists in measures for capacity-building and institutional support: - Risk assessment and prevention of a proliferation of respiratory pathologies linked to climate change, - Introduction of a network to monitor epidemics of the principle vector-borne diseases, - Implementation and strengthening of the entomological monitoring network and efforts to fight mosquitoes and sand flies, - Introduction of a programme to adapt the health system to climate change, especially through protection against water-borne diseases.

3.4 Needs for adaptation funding

Investment needs

The total funding needs for adaptation to climate change would stand at about 1.9 billion US dollars for the period 2015-2030. Besides a number of physical investments, **these are mostly intangible investments** to support and popularize new practices (institutional support, capacity building, research and development, etc.).

Funding needs to support the INDC adaptation effort

SECTORS/FIELDS	TOTAL
Water resources	533
Coastline	556
Agriculture	21
Ecosystems	782
Health	7
Tourism	17
TOTAL	**1,916**

International support required for adaptation

Tunisia is appealing for international support to cover all of the additional costs for the adaptation of these sectors and fields.

REPUBLIC OF TURKEY

INTENDED NATIONALLY DETERMINED CONTRIBUTION

In accordance with decisions 1/CP.19 and 1/CP.20, the Republic of Turkey hereby presents its Intended Nationally Determined Contribution (INDC) towards achieving the ultimate objective of the United Nations Framework Convention on Climate Change which is set out in its Article 2 and clarifying information.

National Circumstances

Turkey achieved 230 per cent increase in GDP between 1990 and 2012. Its population has increased more than 30 per cent since 1990. Turkey's energy demand increases by 6-7 percent every year.

Turkey is an upper-middle income developing country according to the World Bank classification. Turkey remains eligible to official development assistance (ODA).

Turkey is listed in Annex I to the UNFCCC. However, Decision 1/CP.16 recognized the special circumstances of Turkey and placed Turkey in a different situation than the other Parties included in Annex I.

Turkey aims to contribute to the collective efforts to combat climate change in line with its national circumstances and capabilities.

With this perspective, National Strategy on Climate Change and National Climate Change Action Plan were adopted in 2010 and 2011 respectively.

National Climate Change Action Plan consists of emission control and adaptation policies and measures which are being implemented in all relevant sectors.

The greenhouse gas inventory of the year 2012 revealed that the total emissions in 2012 expressed in CO_2 equivalent were 440 million tons in Turkey. The energy sector had the largest share with 70.2 percent. Industrial processes with 14.3 percent, waste sector with 8.2 percent and agriculture with 7.3 percent followed the energy sector. Turkey's per capita greenhouse gas (GHG) emission for the same year was 5.9 ton CO_2 equivalent, which is much lower than the EU and OECD average.

Information on INDC

INDC	**Up to 21 percent reduction in GHG emissions from the Business as Usual (BAU) level by 2030.**
Period for Implementation or Contribution	2021-2030
Scope and Coverage	Economy-wide. Energy, industrial processes and products use, agriculture, land use land-use change and forestry, and waste sectors.
GHGs	All greenhouse gases included in the national inventory: • Carbon dioxide (CO2); • Methane (CH4); • Nitrous oxide (N2O); • Hydrofluorocarbons (HFCs); • Perfluorocarbons (PFCs); • Sulfur hexafluoride (SF6); • Nitrous trifluoride (NF3).
Methodological approaches	Methodological approaches are based on using the IPCC 2006 Guidelines and IPCC 2013 KP Supplement. Global warming potential on a 100 year timescale in accordance with the IPCC's 4th Assessment Report.
Use of International Market Mechanisms	Turkey aims to use carbon credits from international market mechanisms to achieve its 2030 mitigation target in a cost effective manner and in accordance with the relevant rules and standards.
Consideration of fairness and ambition based on national conditions	Turkey has to continue its sustainable development process. Rapid industrialization and urbanization have been taking place in Turkey over the last 30 years. Turkey is responsible for only 0.7 percent of the global emissions since the industrial revolution. Energy imports have a significant share in Turkey's account deficit. Turkey has to use its limited energy resources. Turkey experiences financial and technological constraints in combating climate change. This INDC provides additional policies, plans and measures in many sectors.
How the INDC contributes to achieving the ultimate objective of the Convention (Article 2)	Up to 21 percent reduction in GHG emissions from the BAU level by 2030 will enable Turkey to step on low-carbon development pathways compatible with the long-term objective of limiting the increase in global temperature below 2^{o}C.

Planning Process	**Turkey may revise this INDC in accordance with changing circumstances.** Turkey supports its INDC through a national climate change policy which includes; - 10th National Development Plan - National Strategy on Climate Change - National Climate Change Action Plan - National Strategy on Industry - Strategy on Energy Efficiency - National Strategy and Action Plan on Recycling - National Legislation on Monitoring, Reporting and Verification of GHG emissions - National Smart Transportation Systems Strategy Document (2014-2023) and its Action Plan (2014-2016) Turkey's INDC was prepared in a participatory approach through multiple stakeholder meetings and by analytical studies conducted for 1 year. Times-MACRO model is used for energy related modeling and other national models and studies are used for non-energy sectors.
Financial Needs	Recalling the decisions 26/CP.7, 1/CP.16, 2/CP.17, 1/CP.18 and 21/CP.20, in view of successfully implementing this INDC, Turkey will use domestic sources and receive international financial, technological, technical and capacity building support, including finance from the Green Climate Fund.

<u>Plans and policies to be implemented for this INDC</u>

Energy

- Increasing capacity of production of electricity from solar power to 10 GW until 2030
- Increasing capacity of production of electricity from wind power to 16 GW until 2030
- Tapping the full hydroelectric potential
- Commissioning of a nuclear power plant until 2030
- Reducing electricity transmission and distribution losses to 15 percent at 2030
- Rehabilitation of public electricity generation power plants
- Establishment of micro-generation, co-generation systems and production on site at electricity production

Industry

- Reducing emission intensity with the implementation of National Strategy and Action Plan on Energy Efficiency
- Increasing energy efficiency in industrial installations and providing financial support to energy efficiency projects
- Making studies to increase use of waste as an alternative fuel at the appropriate sectors

Transport

- Ensuring balanced utilization of transport modes in freight and passenger transport by reducing the share of road transport and increasing the share of maritime and rail transport
- Enhancing combined transport
- Implementing sustainable transport approaches in urban areas
- Promoting alternative fuels and clean vehicles
- Reducing fuel consumption and emissions of road transport with National Intelligent Transport Systems Strategy Document (2014-2023) and its Action Plan (2014-2016)
- Realizing high speed railway projects
- Increasing urban railway systems
- Achieving fuel savings by tunnel projects
- Scraping of old vehicles from traffic
- Implementing green port and green airport projects to ensure energy efficiency
- Implementing special consumption tax exemptions for maritime transport

Buildings and Urban Transformation

- Constructing new residential buildings and service buildings as energy efficient in accordance with the Energy Performance of Buildings Regulations
- Creating Energy Performance Certificates for new and existing buildings so as to control energy consumption and greenhouse gas emissions and to reduce energy consumption per square meter
- Reducing the consumption of primary energy sources of new and existing buildings by means of design, technological equipment, building materials, development of channels that promote the use of renewable energy sources (loans, tax reduction, etc.)
- Dissemination of Green Building, passive energy, zero-energy house design in order to minimize the energy demand and to ensure local production of energy

Agriculture

- Fuel savings by land consolidation in agricultural areas
- Rehabilitation of grazing lands
- Controlling the use of fertilizers and implementing modern agricultural practices
- Supporting the minimum tillage methods

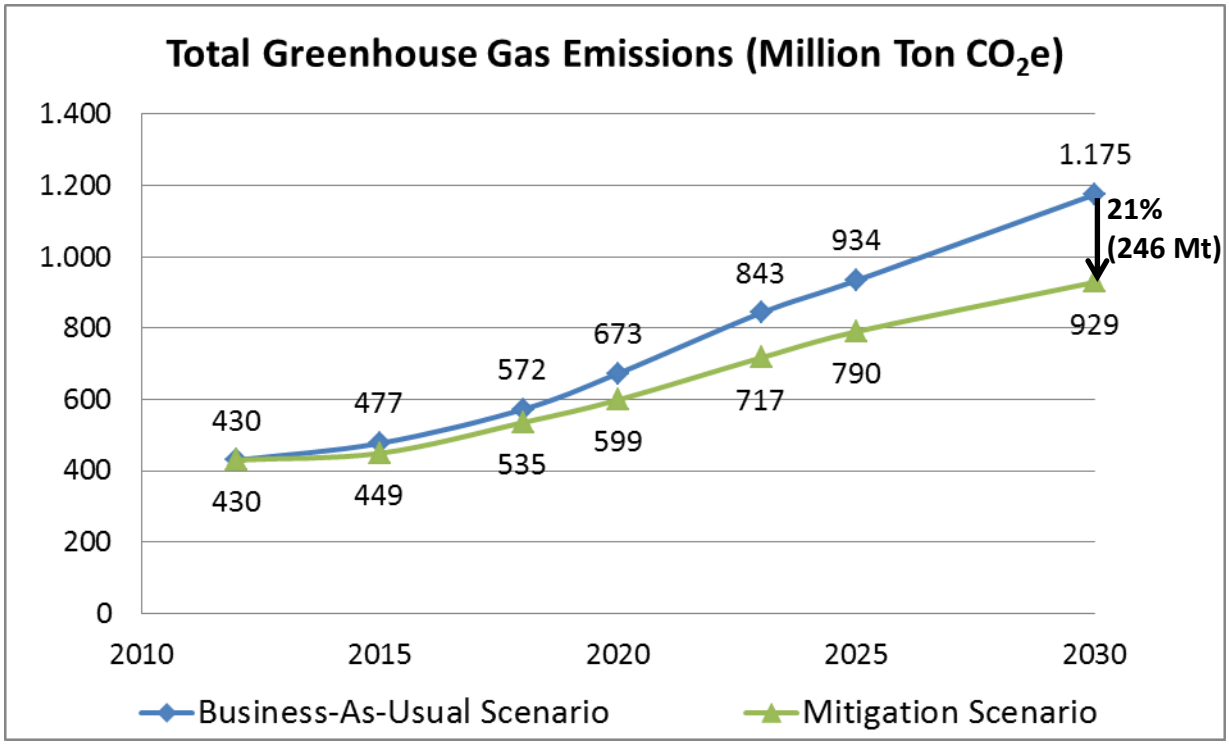
Waste

- Sending solid wastes to managed landfill sites
- Reuse, recycle and use of other processes to recover secondary raw materials, to utilize as energy source or to remove wastes
- Recovering energy from waste by using processes such as material recycling of wastes, bio-drying, bio-methanization, composting, advanced thermal processes or incineration
- Recovery of methane gas from landfill gas from managed and unmanaged landfill sites
- Utilization of industrial wastes as an alternative raw material or alternative fuel in other industrial sectors, through industrial symbiosis approach
- Conducting relevant studies to utilize wastes generated from breeding farms and poultry farms
- Rehabilitation of unmanaged waste sites and ensuring wastes to be deposited at managed landfill sites.

Forestry

- Increasing sink areas and preventing land degradation
- Implementing Action Plan on Forestry Rehabilitation and National Afforestation Campaign

The emission reductions to be achieved by these policies and plans compared to the business-as-usual scenario are presented in the figure below.



Intended nationally determined contribution of Turkmenistan in accordance with decision 1/CP. 20 UNFCCC

Turkmenistan presents its Intended Nationally Determined Contribution (INDC) in accordance with decision 1/CP.20 UNFCCC "Lima call for action to address climate change", which calls Parties to communicate in advance their INDC to facilitate adoption of the new international agreement on climate change before the 21st Conference of Parties (COP 21), which will take place in Paris in December 2015.

INDC is not an obligation, but it reflects the intention of the country to make an appropriate contribution towards reducing or restraining increase of greenhouse gas emissions and prevent increase of global average temperature by more than 2 ° C and thereby prevent global climate change.

National development objectives and priorities on climate change

Acknowledging the dynamic economic development as a primary objective, Turkmenistan pays particular attention to optimizing the structure of energy, protection and restoration of the environment and ecological systems. Turkmenistan actively participates in international efforts and international cooperation to address climate change and implement the provisions of UNFCCC and the Kyoto Protocol. Realizing the importance and assuming the responsibility, Turkmenistan intends to make its adequate contribution to international efforts in addressing climate change. Turkmenistan is committed to limiting greenhouse gas emissions and improving the country's capacity to respond to climate change. In designing low-carbon development policy, Turkmenistan takes into account the level of its economic and technological development and social consequences of emission reductions. The country should pass to the "zero-risk" development, that is, contribute to global efforts to mitigate climate change, which should lead to the country's economic growth and improving of living standards.

The indicator of growth stabilization or beginning of reducing emissions by 2030 under favorable economic circumstances could be a long-term goal of low-carbon development, providing gradual reduction of GHG emissions in Turkmenistan and compatible with global objective - not exceeding the 2-degree rise in temperature levels.

Turkmenistan is taking significant measures to address climate change. Primarily, this is carried out in the context of implementation of the National Strategy for socio-economic development up to 2030 and in conjunction with accelerated formation of resource-saving and environmentally friendly society and innovation-oriented economy and the National Strategy of Turkmenistan on Climate Change representing the national doctrine of transition to the low-carbon development.

Turkmenistan is one of the most vulnerable countries to climate change in Central Asia. Since the beginning of the 1950s, the average growth of the temperature in Turkmenistan was about 0.2^{o}C for a decade. According to the forecast data, under unfavorable climate change the country may experience shortage of water resources, increased desertification and land degradation, drought and increase in number of hazards leading to instability of agricultural production and threatening food security and social well-being of the population. Considering the above, the section "Adaptation" has been included in INDC Turkmenistan coupled with the section "Mitigation".

MITIGATION

Base year: 2000.
The time frame/implementation period: 2020-2030 years.
The scale and coverage:
The economy-wide; INDC includes GHG Inventory results in the following sectors:

- Energy;
- Industrial processes;
- Agriculture;
- Waste

Greenhouse gases (GHGs)
INDC includes information on the following greenhouse gases:
• Carbon dioxide (CO_2);
• Methane (CH4);
• Nitrous oxide (N2O);

Planning process and forecasts
Turkmenistan has adopted the National Strategy on Climate Change. National Plans for Mitigation and Adaptation (NAPA and NAMA) are in the process of development. These documents reflect actions ensuring reduction of greenhouse gas emissions by 2030 on national scale and in some sectors corresponding to declared contribution in INDC Turkmenistan.

Methodological approaches

Methodological approaches are based on using the following techniques:

1. Revised Guidelines for National Greenhouse Gas Inventories. // IPCC Workbook. V.2. 1996

2. Revised Guidelines for National Greenhouse Gas Inventories. // The IPCC Reference Manual. V.3. 1996

3. Guide to Good Practice and accounting factors of uncertainty in national greenhouse gas inventories. IPCC, 2000

4. Good Practice Guidance for Land Use, Land-Use Change and Forestry. IPCC 2003

5. The IPCC Guidelines for National Greenhouse Gas Inventories, 2006

Global warming potentials (GWP) adopted by the UNFCCC will be applied.

Key sources

Analysis of results of GHG inventory reveals that the main sources of greenhouse gas emissions in Turkmenistan are the enterprises of oil and gas, energy, agriculture and transport industries, as well as housing and communal services. The largest emissions are generated from fuel combustion, mining, transportation and storage of oil and gas. Increasing of greenhouse gas emissions depend first of all on growth of energy consumption. The intensive economic growth, accompanied by the growth of production and consumption of energy resources will inevitably lead to further increases in greenhouse gas emissions. In order to prevent the climate change Turkmenistan's National Strategy on Climate Change has identified the main directions of the

policy for consistent transition to the economy with minimal greenhouse gas emissions without prejudice to the socio-economic development. Energy efficiency and conservation, sustainable use of natural gas and petroleum products, increased use of alternative energy sources are the main priorities of the policy for limiting GHG emissions envisaged in the Strategy. In order to implement this policy, tools and measures limiting GHG emissions will be used in key sectors of the economy. These are industry, transport, housing and communal services, which are simultaneously able to maintain high rates of economic growth in general.

Turkmenistan considering all acceptable development options and submission of INDC and taking into account national interests and capabilities of the country, as well as analyzing developed by countries INDCs choose the contribution Type 3 (GHG goal/target), which uses a target indicator attached to per unit of GDP. Specific greenhouse gas emissions per unit of GDP are the indicator that can reflect the country's potential to reduce greenhouse gas emissions.

Current trends of energy consumption and GHG emissions

Dynamic development of economic sectors of Turkmenistan, as well as improving the demographic indicators formed the tendency of growth of production and consumption of energy resources. Turkmenistan with its enormous reserves of oil and gas resources fully meets demands of the country for energy, which in 2012 amounted to 76.7 million toe (tone of oil equivalent). Thus, the GDP energy intensity of production was 0.69 toe/US $ at PPP and compared to 2000 it was decreased by 65%. Despite the absolute increase in consumption of energy resources, the indicator of energy intensity of GDP at PPP on consumption was decreased by 57% in 2012 compared to 2000 and amounted to 0.32 toe/US $ at PPP. This result was based on increased dynamics of growth of GDP at PPP - by 4.2 times.

Figure 1 shows the dynamics of actual and anticipated economic indicators and greenhouse gas emissions in Turkmenistan for the period of 2000-2030 in %. The level of 2000 is taken as 100%. The process of growth of energy consumption in the country was accompanied by natural increase in GHG emissions. Thus, due to the high economic growth there was a tendency of decreasing the carbon intensity indicator. Compared to 2000, the index carbon intensity was 0.47 in 2012 based on actual data, which is for 53% less than the level of 2000.

Forecasted assessment of energy consumption and GHG emissions in the long term until 2030

Forecast of the volume of energy consumption in Turkmenistan until 2030 is calculated on the basis of the baseline scenario of economic development. The baseline scenario takes into consideration measures envisaged in the National Program for social-economic development of Turkmenistan for the period 2011-2030 in compliance with needs of the economy, its active modernization and transition to industrial-innovative type of development, targeted programs, laws and regulations adopted in 2007 – 2014. Under this scenario, in 2030 the total volume of production of primary and secondary energy resources will reach 288 740.4 thousand toe. The production volume of energy resources will increase at 3.76 times as compared to 2012. In 2030, consumption of primary and secondary energy resources will amount to 81 475.9 thousand toe, which is 2.3 times more than in 2012.

According to forecasts, by 2030 greenhouse gas emissions will increase 4 times compared to the level of emissions in 2000, and approximately 2 times compared to 2012 and due to a decrease of growth rate of emissions it will reach in all 135 833 Gg CO_2 equivalent. Moreover, the planned large-scale measures on reduction the GHG emissions will lead to further reduction of emissions. Also, due to the high growth of the national economy carbon

intensity will decline and by the end of the forecast period it'll amount to 0.0004 tons of CO_2 equivalent/thousand US $ GDP in PPP, which is 1.7 times less than the level of 2000.

Thus, according to preliminary assessments, a significant increase in the rate of emissions particularly in 2020 are not observed and the faster growth of energy efficiency contributes to lower GHG emissions and improving quality indicators, such as the emission intensity and carbon intensity.

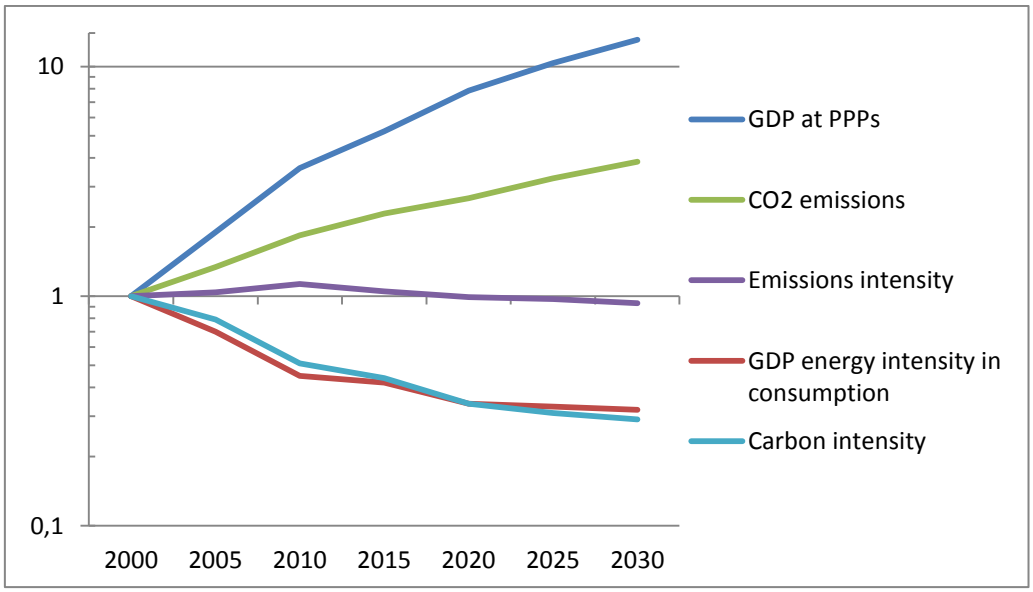


Fig.1. Dynamics of actual (2000-2012) and forecast (2014-2030) economic indicators and greenhouse gas emissions

The baseline scenario of economic development ensures sustainable average annual growth of the economy for the period of 2015 – 2030. During this period, the growth rate of GHG emissions will be far behind on the rate of GDP growth. Thereupon the energy intensity and carbon intensity of the economy, as well as the intensity of the GHG emissions will be reduced. So it can be noted that the growth rate of GHG emissions will significantly lag behind the GDP growth. Such a result would be achieved by the country at the expense of its own financial resources and require limited support from the developed countries to carry out preparatory work for developing legislative and regulatory documents and plans, as well as for implementation of actions to improve institutional, administrative and expertise potential on problems for reducing emissions. If financial and technological support is provided by developed countries, Turkmenistan could achieve zero growth in emissions and even reduce them up to 2030.

Why INDC are fair and ambitious, taking into account the national circumstances?

Based on the achievements of the claimed INDC for 2030, there may be a bond breakage (gap of linkage) between the economic growth and greenhouse gas emissions. There will be a reduction in greenhouse gas emissions per unit of GDP. At the same time stabilization of emissions by 2030 is not an obstacle for the economic and social development of the country and it is consistent with the overall objectives of economic development, increasing energy efficiency, reducing energy intensity and increasing the share of renewables in the energy balance of Turkmenistan.

How INDC contributes to achieving the objectives of the Convention?

Stabilization or beginning of reducing GHG emissions by 2030 will allow Turkmenistan to enter the trajectory of low-carbon development, compatible with long-term global goal - not exceeding the 2-degree rise in temperature levels.

Means of implementation of the contribution

Means of implementation is primarily the state budget of Turkmenistan. Project proposals and measures providing the necessary level of reduction of GHG emissions were designed in the framework of preparation of the Third National Communication and National Action Plan to reduce greenhouse gases. The country's economy has the potential to further reduce emissions of greenhouse gases, but in this case, the country will need additional financial resources and technological support. At a certain international support, Turkmenistan could achieve zero growth in emissions and even their decrease until 2030.

Monitoring and evaluation

The process of monitoring and evaluation of INDC at the international level will be developed taking into account decisions taken at the COP 21.

At the national level the progress of implementation of the envisaged activities to reduce GHG emissions are controlled by the government and relevant ministries and agencies. Regularly 2 times a year, all ministries, departments prepare reports for higher instances on implementation of the National Strategy on Climate Change of Turkmenistan and the national mitigation plans.

ADAPTATION

The climate of Turkmenistan is sharply continental and extremely dry desert of moderate type. Daytime temperatures of the summer season often exceed 40 ° C. The absolute maximum of it 50, 1ºC +, and the absolute minimum is -36, 0ºC. Turkmenistan belongs to the zone of insufficient humidity. Mean annual precipitation varies from 76 to 380 mm. The results of analysis of climatic data for the last 60 years demonstrate an increase of surface air temperature by 1% to 2.5% (an average of 2 degrees), and minor changes in annual precipitation. Modeling of the future climate in Turkmenistan until 2100 also indicates further increase in air temperature. However, the annual precipitation will decrease over time, especially in the second half of the century.

Climate risks

Climate change in Turkmenistan appears in strengthening and acceleration of such phenomena like as droughts, heat waves, strong hot and dry winds, high dustiness, increase in the number of dry years, dust storms, heavy rains and floods, low winter temperatures, prolonged frost and others. The negative effects of the climate change mainly affect such sectors as agriculture, water management, health, soil and land resources, ecosystems (flora and fauna) and forestry. Calculations showed that the projected increase in temperature and decrease in rainfall first of all would adversely affect all available water resources. The agriculture is the main consumer of

water in Turkmenistan, and therefore the problem of changing the flow of rivers and hydrography, namely its reduction during the vegetation period may worsen. This problem is even more aggravated because of the necessity of increasing irrigation norms due to rising temperatures and the transpiration. As a whole, the need for additional water resources will be around 5.5 billion m3 by 2030 without taking into account the growth of irrigated area. Assuming failure of timely adaptation measures, less received volume of production could reach 20% by 2030, and the loss of value of crop production only for the 15-year period (2016-2030 years) will amount to 58 777 billion manat (20.5 billion dollars). The Government of Turkmenistan warning these losses prepared the list of adaptation measures early in advance for preventing damages. According to preliminary estimates, the cost for implementing planned adaptation measures will amount to 10.5 billion dollars.

The drought is a significant risk for social and economic welfare of the country, which appears due to high temperatures and water scarcity. Currently, there is a noticeable tendency of increase in frequency of low water years in Turkmenistan's major rivers - the Amu Darya and Murghab. Global warming will be an additional risk factor for the development of hydrological drought and desertification negatively affecting water resources and naturally agriculture. Large destruction and significant economic damage are caused by **floods and mudslides**. In Turkmenistan mudflows are observed at 229 permanent and temporary watercourses/channels. The most dangerous months are April and May, which account for 54% of all recorded landslides**.** In winter there were observed **ice phenomena,** especially in the middle flow of the Amu Darya in Turkmenistan. In certain years as a result of lowering the temperature to -25-30ºC, Amu Darya is fettered by ice forming a powerful hanging ice dams, resulting in sharply raise of water levels in it and its surrounding areas. The list of adaptation measures has been prepared in all priority sectors in the framework of preparation of TNC and the National Action Plan on Adaptation. Currently, costs for these activities are foreseen within the state budget.

National commitments

Policy of Turkmenistan to mitigate climate change is reflected in main government programs, especially in the "National Strategy of social and economic transformation of Turkmenistan until 2030" and the "National Strategy of Turkmenistan on Climate Change." Adaptation to climate change is a major focus of the National Strategy of Turkmenistan on Climate Change. The Strategy will be implemented through the National Action Plans for Adaptation and Mitigation, which in future should become an integral part of national programs and plans for socio-economic development.

Report on planned adaptation activities

In order to ensure the sustainable development of the country in response to climate change, it is important to prepare a detailed national action plan for adapting to climate change, including the list of specific actions, timelines for their implementation and assessment of implementation costs. In elaboration of the National Action Plan for Adaptation to climate change an important role is given to measures for developing preventive programs to reduce impact of adverse effects of climate change and development of specific recommendations on various aspects of adaptation to extreme changes of weather conditions**.** National Action Plan on Adaptation will include adaptation measures for sectors of water, agriculture, soil and land resources,

ecosystems. Construction of the Turkmen Lake of «Golden Century» occupies a special focus among other activities carried out in Turkmenistan on adaptation to climate change. Among the ongoing adaptation measures in the region this important project is currently unique and beneficial not only for Turkmenistan but for the rest of the Central Asia. Collection of drainage water into the lake in the Karakum Desert, and their further use after desalination demonstrate large-scale implementation of measures to adapt to climate change in the sector of water resources of the country.

Monitoring and evaluation

At the national level, the progress of implementation of adaptation measures is under control of the government and relevant ministries and agencies. Regularly 2 times a year all ministries, departments prepare reports for the higher instances on implementation of the National Strategy of Turkmenistan on Climate Change and national adaptation plans.

Government of Tuvalu

Intended Nationally Determined Contributions

Communicated to the UNFCCC on 27 November 2015

Introduction

In accordance with the relevant paragraphs of Decisions 1/CP.19 and 1/CP.20, Tuvalu hereby communicates its Intended Nationally Determined Contributions (INDC) towards meeting the ultimate goal of the UNFCCC, and provides up-front information in tabular format to facilitate the clarity, transparency and understanding of the INDC. Additional accompanying information, relating to mitigation actions and support for implementation, is provided.

Intended Nationally Determined Contributions (INDC)

Tuvalu commits to reduction of emissions of green-house gases from the **electricity generation** (power) sector, **by 100%, ie almost zero emissions by 2025**.

Tuvalu's indicative quantified economy-wide target for a reduction in total emissions of GHGs from the entire **energy sector** to **60% below 2010 levels by 2025**.

These emissions will be further reduced from the other key sectors, agriculture and waste, conditional upon the necessary technology and finance.

These targets go beyond the targets enunciated in Tuvalu's National Energy Policy (NEP) and the Majuro Declaration on Climate Leadership (2013). Currently, 50% of electricity is derived from renewables, mainly solar, and this figure will rise to 75% by 2020 and 100% by 2025. This would mean almost zero use of fossil fuel for power generation. This is also in line with our ambition to keep the warming to less than 1.5^0C, if there is a chance to save atoll nations like Tuvalu.

Tuvalu considers that the focus of INDCs should primarily be mitigation. Notwithstanding the invitation to Parties in Decisions 1/CP.20, par. 12 to "consider communicating their undertakings in adaptation planning or consider including an adaptation component in their INDCs", Tuvalu's vulnerability and the adaptation actions continue to be comprehensively articulated in other national documents such as NAPA, National Communications, National Strategic Action Plan for Climate Change and Disaster Risk Management, National Climate Change Policy. The government plans to develop its National Action Plan in 2016.

Information to Facilitate Clarity, Transparency and Understanding

Tuvalu		**27 November 2015**	
Parameter		**Information**	
Period for defining actions		Start year: 2020	End year: 2025
Type and level of Commitment		Electricity (power) sector and energy sector	
Reference year or period		Base year, 2010, emissions ≅ 20 Gg C02 eq	
Estimated, quantified emissions impact		Reduce GHG emissions by 100% from the electricity sector by 2025 Reduce GHG emissions from energy sector by 60% below 2010 level by 2025	
Coverage	% National emissions (as at 2015)	Approximately 100%	
	Sectors	Energy -Electricity generation -Transport -Other (cooking) Agriculture Waste	
	Gases	Carbon dioxide (CO_2) and methane (CH_4). Others are negligible	
	Geographical	Whole of country (includes all outer islands)	

Tuvalu		27 November 2015
Parameter		**Information**
	boundaries	
Further information, relevant to commitment type, required for the purpose of providing Clarity, Transparency and Understanding		Eg. Annual estimated reductions, methodologies and assumptions for determining BAU or intensity baseline, peaking year
Intention to use market based mechanisms to meet commitments		**NO**
Land sector accounting approach		N/A
Metrics and Methodology		Consistent with methodologies used in Tuvalu's Second National Communications (currently being finalised) using the 1996 IPCC Guidelines for GHG Inventory.
Planning Process		Tuvalu adopted an all-inclusive process of engaging relevant stakeholders through bilateral consultations and workshops. The first workshop involving key Departments and Ministries provided much needed awareness about INDCs and the provision of additional data/information. It strengthened the whole-of-government process by providing national ownership of the INDC, as well as helped realise the synergies between other processes, including National Communications, National Energy Policy, National Strategic Action Plan for Climate Change and Disaster Risk Management (2012-2016), Master Plan for Renewable Energy and Energy Efficiency in Tuvalu (2012-2020), National Strategic Plan and externally funded development projects in related areas. The second national consultation was used for the validation of the proposed targets contained in Tuvalu's INDC, before it was presented for approval by National Advisory Council on Climate Change (NACCC) and endorsement by Cabinet prior to its

Tuvalu	27 November 2015
Parameter	**Information**
	submission to UNFCCC.
Fair and Ambitious	Tuvalu's emissions are **less than 0.000005%** of global emissions, one of the lowest from any Parties, negligible in the global context. The import of fossil fuels into the country is used as proxy for the GHG emissions. The total fuel imports remained almost constant at around 3500 kL, from 2001 – 2012. It declined by about 14% in 2013, but increased by approximately 23% in 2014 mainly due to the increase in the number of ships servicing the outer atolls. However, the figures for 2015 are showing significant decline in emissions due to the installation of new solar PV systems. Tuvalu is the world's second lowest-lying country and sea level rise poses a fundamental risk to its very existence. Climate change through rising temperatures and irregular rainfall are already impacting on income from fish and crops. In this context, the target of zero dependence on important fossil fuels for electricity generation by 2025, cannot be more ambitious. Moreover, its targets to reduce emissions from the other energy sectors, mainly transport, are significant given that this is one of the most rapidly growing sources of carbon emissions.

Background Information on Tuvalu's INDC

General

Tuvalu archipelago comprises nine small islands, six of them being atoll islands (with ponding lagoons) namely Nanumea, Nui, Vaitupu, Nukufetau, Funafuti and Nukulaelae. The remaining three islands, Nanumaga, Niutao, and Niulakita are raised limestone reef islands. All the islands are less than five metres above sea level, with the biggest island,

Vaitupu, having a land area of just over 524 hectares. The total area is approximately 26 km^2 with an EEZ of 719,174 km^2.

Tuvalu is a Least Developing Country with a per capita income of less than USD4000, and is the smallest of any independent state. According to a World Bank (2013) report, Tuvalu's gross domestic product (GDP) was estimated at USD 39.7 million in 2013 and was the smallest of any independent state. GDP growth in the past was volatile and this is expected to continue into the future due to Tuvalu's dependence on fishing and internet domain licensing fees, remittances, and trust fund returns, all of which are dependent on exogenous factors beyond the government's control. Due to the small population and lack of land area and resources, the scope for economic diversification, including exports, is minimal. Nearly everything, including skilled services, is imported. Fuel and food constitute nearly half of total imports of goods.

Mitigation

Greenhouse Gas Emissions

According to Tuvalu's draft Second National Communications, the Energy sector is the major contributor to CO_2 emissions (100%). The Waste sector is the main contributor of CH_4 emissions (74.7%) followed respectively by the Agriculture sector (24.7%). On a mass basis, emissions of CO_2 are the most important. This is largely due to the importance of fossil fuel combustion as a source of CO_2. Land-use change and forestry, is not an important CO_2 source in Tuvalu. In terms of carbon dioxide equivalent, Tuvalu's gross aggregated GHG emissions (not including the LUCF sector), across all sectors, totaled 16.95 Gg CO_2-e in 2002 and the net GHG emissions (including the LUCF sector) were practically the same figure (16.92 Gg CO_2-e).

Within the energy sector, emissions from electricity generation contribute to 41%, transport sector 40% and the remaining 18% from other sectors.

One of the many constraints to development is Tuvalu's high dependency on imported energy resources, primarily petroleum products. Tuvalu has no conventional energy resources and is heavily reliant on imported oil fuels for transport, electricity generation and household use. High fuel prices and fluctuations have a destabilizing effect on businesses and households, limiting growth and reducing food security, especially in the most isolated outer islands.

Renewable energy resources such as solar, wind, biomass and ocean energy are recognized as potential energy alternatives in the country. In response to the world oil market and to ensure enhanced energy security, the Government of Tuvalu (GOT)

committed to get 100% of its electricity from renewable energy sources by 2020. The Tuvalu National Energy Policy (TNEP), formulated in 2009, and the Energy Strategic Action Plan defines and directs current and future energy developments so that Tuvalu can achieve the ambitious target of 100% RE for power generation by 2020.

Tuvalu's Master Plan for Renewable Energy and Energy Efficiency (TMPREEE), 2012-2020, outlines the way forward to generate electricity from renewable energy and to develop an energy efficiency programme.

It has two stated goals:

1. To generate electricity with 100% renewable energy by 2020, and
2. To increase energy efficiency on Funafuti by 30%.

According to TMPREE, Tuvalu must develop 6 MW renewable energy electricity generation capacity in the next eight years. The initial capital cost of solar arrays, wind turbines and batteries to replace the current energy demand is estimated to be A$52 million.

By the end of 2012, the output capacity of renewable energy electricity generation using PV technology totaled a mere 146 kW (peak). There has been a steady increase in installations over the last three years and the country is tracking well in terms of meeting most of its target by 2020. The remaining time will be used to make any shortfall due to production efficiencies, weather conditions (that will affect available renewable resources) and other demands from the consumers.

Large scale implementation of energy efficiency improvements will also help reduce the electricity demand. Given the steady and continuing increase in the price of diesel oil, the renewable electricity and energy efficiency programme will not only be cost effective but will ensure that affordable electricity is available to the people of Tuvalu.

It is estimated that following the completion of the renewable electricity and energy efficiency programme, the use of the diesel generator plant will reduce by up to 95% with a consequent reduction in diesel fuel consumption. Savings in diesel fuel over the 30 year life of the overall programme are estimated to be A$152 million (2011 dollars) assuming oil prices continue to increase at the current long term trend. After allowing for battery replacements and other maintenance, which are estimated to cost A$115 million, the net saving over the 30 year programme will be A$37 million.

Whilst the focus in renewable energy has largely been the solar through PVs, Tuvalu is ready to embrace other technologies, for example harnessing ocean energy, once these become available and affordable.

Planned Mitigation Actions

1. Renewable Energy

To meet the above objectives, electricity will be generated using renewable energy in all the nine islands of Tuvalu. The Outer Islands are being developed as a priority because fuel transportation from Funafuti increases the cost of generation and has environmental risks associated with potential fuel spill. Furthermore, the Outer Islands generate 18 hours a day (rather than 24 hours) and the power systems are less reliable.

On Fogafale, the main island of Funafuti atoll, due to the high population density, available land is scarce and ground-mounting of the proposed photovoltaic (PV) arrays that will form the major component of the renewable electricity system, is not considered practicable. In order to provide the required area for the PV arrays, in 2011 the Tuvalu Electricity Corporation (TEC) announced the "1000 Solar Roof Programme". In this programme, about half of the current roof space of the buildings in Funafuti will be occupied by PV arrays. In the case of the Outer Islands where more ground space is available, it is likely that a mix of roof mounted and ground mounted arrays will be adopted.

Initially the renewable electricity programme in Funafuti will comprise of the installation of PV arrays with battery storage because this technology is well proven in Tuvalu. In the early stages of the programme, a detailed investigation examined the feasibility of wind turbine generation in Funafuti as wind generation could offer significant technical and economic benefits. Wind measurements in several parts of Funafuti, show good potential for wind energy. Under a World Bank project proposal (described below) wind turbines will be installed from 2016 onwards. A wind-solar mix will optimise the level of battery storage required and the level of diesel generation required.

The system will require standby diesel generation to provide a back-up to the renewable energy when prolonged weather conditions limit renewable energy generation. Conversion or replacement of the existing diesel generators to run on bio-diesel fuel was proposed to take place in the last stage of the renewable electricity programme. It is estimated that 5% of the annual electricity production will be supplied from bio-diesel generation. This, however, is incumbent upon the development of a master plan for the coconut industry.

The following Tables summarises the status of the various Renewable Energy Installations

Table: Summary of Power systems in Tuvalu

Stations	Diesel Capacity (kW)	Solar Capacity (kW)	Comments
Nanumea	144	195	actual output approx. 90%
Nanumaga	144	205	actual output approx. 90%
Niutao	144	230	to be online by end 2015
Nui	120	60	actual output approx. 60%
Vaitupu	144	400	to be online by end 2015
Nukufetau	120	77	actual output approx. 60%
Nukulaelae	60	45	actual output approx. 60%
Funafuti	1200	735	connected to grid, no storage
Total	**2076**	**1947**	
Proposed World Bank Project 2015/2017			
Solar		925	
Wind		200	
	2076	**3072**	**5148**

2. Energy Efficiency

Energy efficiency improvements will be initially targeted on Funafuti. Funafuti has a higher power demand per capita than the outer islands and also consumes 85% of the electricity generated by the Tuvalu Electricity Corporation (TEC). Meeting the 30% target will allow Tuvalu to maintain current generation levels over the next eight years at 2% annual growth of GDP. The energy efficiency programme will include public education, energy audits and technology improvements.

A proposed **World Bank project** is aimed at providing additional energy generation from solar PV and will include investment in modest wind-power capacity. Even if, for various reasons, the role of wind in Tuvalu's future power mix is likely to be smaller than solar PV, it will serve as an important capacity building in this technology for TEC. The solar PV investment will provide sufficient battery storage and a power-conditioning system to ensure grid stability, as intermittent RE sources become an increasingly dominant portion of Fogafale's power mix.

In addition, the project will finance strategic EE investments in the largest electricity-consuming sectors. These investments could significantly reduce the need for future investments on the generation side. Moreover, the project will bring a longer-term perspective on RE investments from all sources by including battery storage and grid-forming inverters that represent major investments but are critical for long-term grid stability. Thus, this project will facilitate the planned and other future incremental RE additions without leading to grid instability and other system problems that would seriously set back the country's plans toward achieving the goal of 100 percent penetration of RE in the future.

3. Plans, Policies and Regulations

Under a proposed Energy Efficiency Act, The Government of Tuvalu will introduce legislation to promote energy efficiency, and control the importation, use and sale of inefficient electrical appliances into the country. Under the Energy Efficiency Regulations, 2015, which will come into effect on 1 January 2016, Minimum Energy and Performance Standards and Labelling (MESPL) will determine importation and use of appliances and goods. This is in line with GOT's objective to promote energy efficiency, energy conservation and the use of renewable sources of energy as part of Tuvalu's obligations under the UNFCCC and related conventions.

Means of Implementation

The Government of Tuvalu believes that climate change is real and is the greatest threat to its low lying atolls and people. Negative effects are already taking place and these will gravely undermine efforts towards sustainable development and threaten the survival and the sovereignty of the nation and her people. While longer term impacts such as sea level rise could result in the unavoidable out-migration of some of her people, they have a right to pursue any and all means to ensure their nation survives and the legacy remains, with future generations living productive lives on these islands.

Climate change is a cross-cutting development issue as it affects every aspect of the Tuvaluan way of life and livelihoods. Climate change impacts exacerbate existing cultural and socio-economic vulnerabilities. These impacts threaten the security of the nation. To this end, the people of Tuvalu must collectively build and strengthen the nation's resilience to combat climate change. However, this cannot be done alone and in isolation; regional and global cooperation is imperative to put Tuvalu on a pathway to climate change resilience and sustainable development.

Tuvalu is of the view that the scientific underpinnings of the discussions on climate change are clear in defining impact thresholds. Therefore, international cooperation is required. Any failure to reach an agreement to radically cut emissions would jeopardize Tuvalu's development and survivability.

Tuvalu continues to revise its policies in energy, climate change and the electricity sector in line with its sustainable development as contained in the National Strategic Development Plan. The significant costs of imported fossil fuels are a major factor in Tuvalu's balance of payments. Whilst Tuvalu continues to take actions to reduce its fossil fuel import bill, thereby reducing its carbon footprint, it will underscore the need for support to assist in its ambition for transforming the energy sector to non-carbon sources through greater use of renewables such as solar and wind and use of transformational technology.

Tuvalu's INDC includes unconditional, conditional and aspirational contribution to reducing emissions. The unconditional contribution includes actions that Tuvalu has already undertaken through renewable energy programmes to reduce, significantly, its reliance on imported fossil fuels for electricity generation. It will continue to push, through other measures such as conservation, education and energy efficiency and other measures, recognizing its extreme vulnerability to the impacts of fossil fuel prices. These comprise approximately a quarter of the total imports, and any reduction in the energy bills would assist in diverting development funds to other priority areas such as poverty reduction.

International support is crucial to enable Tuvalu implement further actions enshrined in its Policies and Plans, including at sectorial level. For example, the growing emissions in the transport sector, as evidenced from the increased numbers of vehicles on land and vessel for sea transport, needs to be addressed through technological innovations. The goal to pursue a zero carbon development pathway by 2050 is dependent on availability of finance and technology.

SUBMISSION BY THE UNITED ARAB EMIRATES

22 October 2015

Intended Nationally Determined Contribution of the United Arab Emirates

In the post-2020 period the United Arab Emirates will continue to expand its ambitious actions to limit emissions and improve resilience through economic diversification, in accordance with Decisions 1/CP.19 and 1/CP.20. The UAE's actions are based on a strategy of economic diversification that will yield mitigation and adaptation co-benefits, consistent with the approach adopted under Decision 24/CP.18.

To this end, the UAE will pursue a portfolio of actions, including an increase of clean energy to 24% of the total energy mix by 2021.

Accompanying information

General Approach

The Government of the United Arab Emirates is fully committed to the United Nations Framework Convention on Climate Change negotiating process, with a view of finalising a protocol, another legal instrument or an agreed outcome with legal force under the Convention applicable to all Parties by the 21st Conference of the Parties (COP 21), in line with achieving the ultimate objective of the Convention as stated in Article 2.

The UAE welcomes the inclusive structure of the INDC model, which is consistent with a recognition of the special circumstances of developing countries with high dependence on fossil fuel production – an issue which was recognized by the COP in Decision 24/CP.18 on economic diversification. The UAE's actions are based on a strategy for economic diversification that will yield co-benefits in terms of both mitigation and adaptation.

The proposed approach shall not modify the objectives of the Convention, or the mobilization of climate finance, technology transfer and capacity building, which support action by developing countries on adaptation and mitigation.

National Circumstances, and Implementing Policies and Frameworks

The UAE was established in 1971. In the 44 years since, the country has undergone significant societal and economic transformation.

Hydrocarbon production has made a significant contribution to the country's social and economic prosperity. However, government strategy has focused on the diversification of the national economy and increased investment in other sectors, including clean energy, advanced manufacturing industries, tourism, information technology, transportation, ports, freight, aviation and space technology.

The UAE has set a series of goals for national development in its Vision 2021. In line with Vision 2021, the government has set forth the 'Green Growth Strategy', which is a roadmap for economic growth and social development rooted in sustainable initiatives.

Vision 2021 is also complemented by the National Innovation Strategy, which aims to place innovation, science and technology at the center of a knowledge-based, highly productive and competitive economy.

Abu Dhabi's Economic Vision 2030, as well as Dubai's Plan 2021 and the Dubai Integrated Energy Strategy 2030 (including the Demand Side Management Strategy), lead the drive towards economic diversification and sustainable development in their respective emirates.

Economic Diversification with Mitigation Co-benefits

The UAE's population has more than tripled since 1995, and will continue to grow, putting increased pressure on the supply of energy and water. The UAE has therefore made the strategic decision to diversify its energy mix, increase efficiency, and continue to use world-class performance standards and the best available technologies in its energy intensive industries and its oil and gas sectors.

Clean Energy Target

The UAE set the region's first renewable energy targets, at a time when there was widespread doubt about renewable energy's viability and value. Since then, the country's deployment of renewable energy has had a significant normalizing effect for the technology in the region. This is now joined by a compelling financial case, with recent results in the UAE recording the lowest cost for solar globally.

The UAE has set a target of increasing clean energy contribution to the total energy mix from 0.2% in 2014, to 24% by 2021. This will be achieved through renewable and nuclear energy, and is underpinned by detailed emirate level targets and policies.

Improvements in Energy Intensive Industries and the Oil and Gas Sector

The UAE's energy intensive industries and oil and gas sectors will continue to use innovative technologies to improve efficiency and reduce emissions.

The UAE's oil companies are among the most efficient globally. The UAE's national oil company was the first in the region to promote the reduction of gas flaring, in order to reduce greenhouse gas emissions. In energy intensive industries, overall performance indicators will be improved through carbon abatement measures and increased resource efficiency.

The UAE is also developing the region's first commercial-scale network for carbon capture, usage and storage. The project notably captures and compresses emissions at a steel manufacturing facility, which will be compressed and transported to oil fields, where it will be used to enhance oil recovery and ultimately be stored underground providing one of the first viable mechanisms to decarbonize essential energy intensive industries.

Energy and Water Efficiency

In addition to supply side targets, the UAE is undertaking comprehensive policies to reduce energy and water demand and promote the prudent use of resources, through the following actions:

- **Tariff reform:** The UAE recognizes the value of energy and water tariff reform in reducing inefficiencies and promoting low-carbon development, as well as addressing energy security concerns. To this end, utility authorities in

the UAE have introduced a number of initiatives and policies, and revised the country's tariffs over the years and gradually adjust the tariffs for commercial and industrial customers, so as to reflect the cost of generation by 2021.

- **Building and efficiency standards:** the UAE is comprehensively targeting emissions from its building sector, which account for a significant percentage of the country's electricity and water consumption, through green building regulations, efficiency standards, retrofit programs and support structures for energy service companies across the UAE.
- **Demand side management:** the UAE has launched a number of initiatives based on consumer awareness and demand management, including new formats for water and electricity bills, which give residents detailed consumption and subsidy information.
- **District cooling:** air-conditioning accounts for a significant share of energy consumption, given the UAE's harsh climate. Comprehensive infrastructure investments are being undertaken to move towards district cooling and improve efficiency as compared to decentralized cooling.
- **Appliance efficiency standards:** the UAE introduced the region's first efficiency standards for air-conditioning units, eliminating the lowest-performing 20% of units on the market, and is introducing efficiency standards for refrigeration and other appliances. The UAE has also established an indoor lighting standard that introduces energy efficient lighting products and phases-out inefficient lighting products in the UAE market.

Transport and Infrastructure

Infrastructure development is critical to the UAE's plans for economic diversification and the country has made infrastructure development a key priority area. The government is investing heavily in world-class traffic and transport systems. For example, the Emirate of Abu Dhabi has adopted a comprehensive urban structure framework plan, to optimize the city's development up to 2030.

The UAE is undertaking the following investments and initiatives, which will have significant mitigation co-benefits in addressing the transport sector's greenhouse gas emissions, including:

- the introduction of a new fuel pricing policy, which will put the UAE in line with global prices. This reform aims to support the national economy, lower fuel consumption, and protect the environment;
- a federal freight rail network crossing the country and eventually integrated into the GCC network;
- the Emirate of Abu Dhabi has also set targets to shift 25% of government vehicle fleets to compressed natural gas; and
- the Emirate of Dubai has invested in a multi-billion dollar light-rail and metro system, which will continue to add new lines.

The UAE continues to improve the emission standards for new motor vehicles, in accordance with European emission standards, as well as through the introduction of standard labels. These initiatives target both improvements in fuel economy and reduction in local air pollution.

The UAE will also introduce comprehensive regulations for electric vehicles, so as to facilitate their uptake domestically.

Waste Sector

The UAE will increase the amount of treated waste, and waste diverted from landfill, through a number of key initiatives, including:

- developing a federal law to regulate and oversee waste management;
- defining a federal roadmap for integrated waste; and,
- developing a federal database to gather and collect information regarding waste.

Adaptation Actions with Mitigation Co-benefits

The UAE, along with other countries in the region, will be affected severely by a changing climate. For these reasons, the UAE sees adaptation as equally important as mitigation.

The UAE aims to mainstream climate change adaptation in its environment management activities through initiatives such as the National Biodiversity Strategy Action Plan, as well as through developing a national policy on climate change adaptation.

Water Management

Possibly the most threatening impact of climate change to the UAE will be stress on water resources. Even small long-term variations in temperature and precipitation are expected to have adverse effects, due to the fragile nature of the country's natural resources. In the absence of fresh water supply, desalination and waste water reclamation are some of the critical means to ensure water availability in the UAE.

The UAE is undertaking the following key initiatives in relation to water management:

- **Water Conservation:** the UAE is in the process of establishing a strategic federal framework for the sustainable management of all water resources in the country. The strategy is based on an integrated approach that aims to meet future water demand through a mix of new water infrastructure and improving the efficiency of existing water supplies.
- **Desalination:** the UAE is moving towards more efficient forms of desalination, and is investing in research and development of new technologies, including renewable energy to power desalination plants

Wetlands, Coastal and Marine Environment Conservation (Blue Carbon)

The coastal and marine environments of the UAE are diverse and include mangrove forests, saltmarshes, sabkha, intertidal mudflats with cyanobacterial mats and extensive sub-tidal sea grass meadows.

The UAE has developed and implemented a number of strategies and plans, which aim to improve understanding of wetlands, including coastal carbon systems, and will also assist in minimizing anthropogenic impacts. The UAE is also undergoing significant restoration and plantation efforts of both mangroves and sea-grass, supporting ecosystem-based adaptation as well.

In 2013, the UAE initiated the Blue Carbon Demonstration Project, which provided decision-makers with a stronger understanding of the carbon sequestration potential in the Emirate of Abu Dhabi. In 2014, the project's scope was expanded to cover the entire country, and is known as the UAE's National Blue Carbon Project.

Food Security

The UAE imports more than 90 per cent of its food. With continuing population growth, and an environment with scarce renewable-water and agriculture potential, the UAE's food imports are expected to more than double by 2030. This reliance represents a major challenge for the UAE. In an effort to improve food security, the UAE has been diversifying its sources of food and investing in agriculture projects and technologies. The UAE has also developed a National Biodiversity Strategy and Action Plan, as well as the UAE Sustainable Fisheries Programme, which aims to rebuild fish stocks.

The UAE welcomes and encourages food security research and development, such as modeling to assess the impact of climate change on the agricultural productivity of the major food exporting countries on which the UAE currently relies, and incentivizes technology to increase productivity and resilience.

Innovation and Research & Development

The UAE has invested heavily in world-class graduate education for sustainable energy development, establishing Masdar Institute for Science and Technology in partnership with the Massachusetts Institute of Technology, the Dubai Centre of Excellence for Innovative Energy and Water Solutions and the Solar Innovation Center under Sheikh Mohammed bin Rashid al Maktoum Solar Park in Dubai.

Moreover, the UAE has established the Local, National, Regional Climate Change Assessment Programme, which contributes to addressing the data challenges across the wider region, as relating to climate change adaptation and vulnerability issues.

The Zayed Future Energy Prize further supports innovation, and is one of the most prestigious recognitions in the field of clean energy development.

Education, Training and Public Awareness

The UAE has developed and implemented a National Environmental Education & Awareness Strategy, which sets six strategic objectives that aim to strengthen education, empowerment and engagement of stakeholders and major groups.

The UAE has also begun reforming school curriculums to improve science and training, including around climate change. Outside of academics, UAE government entities have launched public awareness campaigns, including "Waterwise" and "Powerwise", "Heroes of the UAE", the "Sustainable Schools" and "Sustainable Campus" initiatives as well as the "Ecological Footprint Initiative".

Monitoring, reporting and verification

Monitoring, reporting and verification will proceed as per the arrangements agreed at COP 16 in Cancun and COP 17 in Durban.

The UAE has launched a process to develop a full national inventory of greenhouse gas emissions. The UAE is also undertaking a process to improve its air quality measuring and reporting, in terms of pollution and the negative effects it may have on human health.

The domestic actions communication in this INDC are voluntary and will be implemented in accordance with the principles and provisions of the Convention, in particular Article 4 paragraph 1, Article 4 paragraph 7, Article 10 paragraph 2(a), Article 12 paragraph 1(b) and Article 12 paragraph 4.

MINISTRY OF WATER AND ENVIRONMENT

UGANDA'S INTENDED NATIONALLY DETERMINED CONTRIBUTION (INDC)

OCTOBER 2015

FOREWORD

Uganda, is a signatory to the United Nations Framework Convention on Climate Change (UNFCCC) and is one of the Least Developed Countries. Through regular participation in the meetings of the Conference of Parties to the UNFCCC, Uganda is keenly following the events leading to the new Climate Change Agreement to be negotiated in Paris, France during the UN Climate Conference in December 2015.

Uganda has contributed least to the potentially catastrophic build up of the human-derived greenhouse gases (GHGs) in the atmosphere and yet the country is most vulnerable to global warming and climate change impacts. (Uganda has one of the lowest green-house gas emissions per capita in the world, estimated at 1.39 tons carbon dioxide, far below the global average of approximately 7.99 tons of carbon dioxide. Furthermore, Uganda's contribution to world's total green-house emission is estimated at 0.099%).

Consequently Uganda recognizes the importance of fulfilling the commitments under the respective article of the Convention on Climate Change, particularly the Principle of "common but differentiated responsibilities and respective capacities".

The actions reflected in this Intended Nationally Determined Contribution (INDC) have been derived through a consultative process and reflect a national resolve to respond to the call by the global community to initiate domestic preparations for nationally determined contributions towards curbing temperature rise to below 2°C by the end of the century.

I am pleased to convey to the International Community this fulfilment from the Government and the People of Uganda.

Prof. Ephraim Kamuntu
MINISTER OF WATER AND ENVIRONMENT
October 14, 2015

SUMMARY

a) Uganda is submitting its Intended Nationally Determined Contribution in compliance with Decision 1/CP.19 (Further advancing the Durban Platform: and in particular Paragraph 1 (b & c)) and as elaborated in Decision 1/CP.20 (Lima Call for Climate Action and in particular paragraph 11) premised on the Convention and guided by its principles.

b) The livelihood of the people of Uganda is highly dependent on the exploitation of her natural resources, including climate. In submitting this INDC, Uganda's priority is adaptation. The country will continue to work on reducing vulnerability and addressing adaptation in agriculture and livestock, forestry, infrastructure (with an emphasis on human settlements, social infrastructure and transport), water, energy, health and disaster risk management. Sustainable Land Management (SLM) and Climate Smart Agriculture (CSA) will be scaled up to increase resilience at the grassroots level.

c) For mitigation, Uganda is to focus on implementation of a series of policies and measures in the energy supply, forestry and wetland sectors. In the business-as-usual (BAU) scenario the estimated emissions in 2030 will be 77.3 Million tons of carbon dioxide equivalent per year ($MtCO_{2eq}$/yr).The estimated potential cumulative impact of the policies and measures could result in approximately 22% reduction of national green house gas emissions in 2030 compared to business-as-usual. Uganda proposes to implement the identified policies and measures, and their impact may be higher or lower than these estimations illustrate.

d) Contributions under this Intended Nationally Determined Contribution include crosscutting respect for human rights and gender-responsive climate change actions. The protection of vulnerable groups, including women, is a crosscutting priority.

e) The Government of Uganda will continue to commit resources to climate change-relevant strategies. However, the full implementation of these actions is conditional on the support of international community coming from both climate finance instruments and international market mechanisms. As set out in the Uganda National Climate Change Policy and its Costed Implementation Strategy, national sources are assumed to cover approximately 30% of incremental costs of the activities in the next 15 years, with 70% assumed to originate from international sources.

1. National Circumstances

Uganda, one of the Least Developed Countries (LDCs) in East Africa, occupies an area of 241,038 square kilometres, with water bodies and wetlands covering about a third of it, and standing astride the equator. Its tropical climate has an average temperature ranging from 18 to 28 degrees centigrade, and this provides the country with a rich natural resource base. With an average total fertility rate of 6 children per woman, Uganda has an annual growth rate of 3.2 per cent; and the population is

expected to grow from 34.8 million people in 2014 to 93.4 million people in the 2040s. In terms of capacity, as a Least Developed Country, Uganda has a low *per capita* income of United States dollars 584, coming from economic development that depends largely on natural resource.

Uganda has diverse socio-economic concerns embedded in a multi-cultural society with a multi-party political system and a diversity of religious practices. Outlined in Uganda's Vision 2040, Uganda's aspirations hinge on uplifting the quality of life through transformation of Ugandan society from "a peasant to a modern and prosperous nation". Along that path Uganda not only fulfils national obligations enshrined in its Constitution, but also responds to the agendas of a global instrument, the United Nations Framework Convention on Climate Change, to which the country, like other signatories, is a Party.

Uganda's priority is to reduce the vulnerability of its population, environment and economy by implementing adaptation actions. Uganda also intends to "implement strategies, plans and actions for low greenhouse gas emission development" in the context of its development goals. These mitigation and adaptation intentions are based on the country's National Climate Change Policy (NCCP) (2015), which is derived from the Constitution of the Republic of Uganda (1995, as amended in 2005 and 2015) and reflects Uganda Vision 2040 (2012). The priorities in the National Climate Change Policy have been integrated in the Second National Development Plan (NDP II) 2015/16 - 2019/2020 (2015). In the long term, Uganda intends to follow a climate-resilient and low-carbon development path linked to green growth and broader sustainable development goals.

The economy of Uganda is highly depended on her natural resources, making the country vulnerable to the impacts of climate change. Uganda is experiencing significant impacts of climate change, which include which include changing weather patterns, drop in water levels, and increased frequency of extreme weather events. The emissions of greenhouse gases resulting from human activities drives climate change. Even though Uganda's emissions are low the country is fulfilling her obligations to contribute to the emission reductions, as reflected in goal 13 of the United Nations Sustainable Development Goals.

Uganda's contribution to emission reduction is multidimensional, through tree planting, afforestation and reforestation programmes, and all these contribute to emission reduction through carbon sequestration, and other benefits, such as biodiversity conservation, as reflected in goal 15 of the United Nations Sustainable Development Goals.

Uganda's response to submit her Intended Nationally Determined Contribution has various benefits across sectors. In the Energy sector, for example, the deficit experienced in the past decade drove the country into using unsustainable, expensive and polluting thermal generators (diesel and heavy-fuel oil). Uganda's Intended Nationally Determined Contribution opens the door to affordable and modern energy as inscribed in goal seven of the United Nations Sustainable Development Goals (UNSDGs). Since 1960 mean annual temperatures have risen

by 1.3ºC and annual and seasonal rainfall has decreased significantly across Uganda. Rainfall has also become more unpredictable and evenly distributed over the year. Extreme events such as droughts, floods and landslides are increasing in frequency and intensity.

Climate change is affecting a wide variety of sectors. Agriculture, water, health and human settlements have been particularly affected. In the 2007-08 fiscal year, climate change damages were equivalent to 4.4% of the national budget, exceeding the budget allocation for the Environment and Natural Resource Sector.

Climate projections developed for the country using the models used in the IPCC Fifth Assessment Report (IPCC AR5) indicate an increase in near-surface temperature for the country in the order of +2°C in the next 50 years, and in the order of +2.5°C in the next 80 years under Representative Concentration Pathway (RCP) 4.5; and in the order of +2.5°C in the next 50 years, and in the order of +4.5°C in the next 80 years under RCP 8.5. They also predict a slight decrease in total annual rainfall in most of the country, with slightly wetter conditions over the west and north-west under both RCP 4.5 and RCP 8.5. Rainfall totals might drop significantly over Lake Victoria (-20% from present).

Recent studies, which require further refinement, have estimated that, in the absence of adaptation actions, the cost of the impacts of climate variability and change in Uganda would range between United States dollars 270 and 332 billion over the 40 year period 2010-2050, for the agriculture, water, infrastructure, and energy sectors. Annual costs could be in the range of United States dollars 3.2 billion to United States dollars $5.6 billion within a decade in these four sectors alone.

The rural poor and those living in slums are especially vulnerable as they have lower capacity to cope with and adapt to the impacts of climate change. Women are especially vulnerable in terms of food insecurity, water shortage and fuel wood scarcity. Children, the elderly, and persons with disabilities or sick are also particularly vulnerable.

Current and future impacts of climate change make adaptation urgent. As illustrated above, Uganda will continue to undertake adaptation initiatives. Uganda also intends to reduce greenhouse gas emissions, improving climate change resilience and moving to a low-carbon future, and will rely on the cooperation between the Government of Uganda and other stakeholders. As explained above, the full implementation of the priority adaptation and mitigation strategies is conditional on accessing significant external support (70% of the additional financial resources required for the full implementation of this INDC are dependent on external support).

So far international climate funds have played a very small role in climate change adaptation and mitigation in Uganda. Although a number of them have been active in the country over the last few years, levels of committed funding are not significant and they appear not to have been disbursed in many cases. Only around US$ 160,000 was disbursed over the period 2008/9 – 2011/12. Most of it has been directed at mitigation actions.

In contrast, traditional development partners have committed substantial funds towards climate change-related activities in Uganda. The seventeen major adaptation projects that have been implemented since 2001 in partnership with the Government of Uganda add up to approximately US$ 59 million.

Climate change-related initiatives will continue to be monitored. The effectiveness and efficiency of the implementation of the NCCP is to be monitored against its approved outcomes and outputs on an annual basis. Information from ministries, departments and agencies will be reported to the Ministry of Finance, Planning an Economic Development and copied to the National Planning Authority and the Climate Change Department, which will prepare a consolidated annual progress report. An independent evaluation is planned after the first five years of implementation of the NCCP. The recommendations will feed into the revision of the climate change policy, which should be informed by a thorough public consultation process.

2. Adaptation to climate change

2.1 Long-term goals

Uganda has the overarching objective of ensuring that all stakeholders address climate change impacts and their causes through appropriate measures, while promoting sustainable development and green growth. The country will continue to work on reducing vulnerability in the following priority sectors: agriculture and livestock, forestry, infrastructure (with an emphasis on human settlements, social infrastructure and transport), water, energy and health. Disaster risk management is crosscutting for adaptation.

Table 1: Uganda's priority sectors and actions for adaptation

Priority Sectors	Priority Adaptation Actions
Agriculture	Expanding extension services
	Expanding climate information and early warning systems
	Expanding Climate Smart Agriculture (CSA)
	Expanding diversification of crops and livestock
	Expanding value addition, post-harvest handling and storage and access to markets, including micro-finances
	Expanding rangeland management
	Expanding small scale water infrastructure
	Expanding research on climate resilient crops and animal breeds

	Extend electricity to the rural areas or expanding the use of off-grid solar system to support value addition and irrigation.
Forestry	Promoting intensified and sustained forest restoration efforts (afforestation and reforestation programmes, including in urban areas)
	Promoting biodiversity & watershed conservation (including re-establishment of wildlife corridors)
	Encouraging agro-forestry
	Encouraging efficient biomass energy production and utilization technologies
Water	Improving water efficiency
	Ensuring water supply to key economic sectors, especially agriculture, and domestic use, including water harvesting and storage
	Managing water resource systems, including wetlands, particularly in cities, in such a way that floods are prevented and existing resources conserved (through the establishment of an Integrated Water Resources Management system)
	Extending electricity or expanding use of off-grid solar system to support water supply
Infrastructure (including human settlements, social infrastructure and transport)	Ensuring that land use plans and building codes reflect the need to make public and private buildings more climate-resilient
	Investing in making existing and new buildings more resilient
	Updating transport codes and regulations and implementing measures to ensure compliance with them
	Updating of risk assessment guidelines
	Improving water catchment protection
Energy	Increasing the efficiency in the use of biomass in the traditional energy sector
	Promoting renewable energy and other energy sources
	Increasing the efficiency in the modern energy sector, mainly of electricity
	Ensuring the best use of hydropower by careful management of the water resources
	Climate proofing investments in electricity power sector
Health	Conducting vulnerability assessments of the health sector to climate change impacts
	Assessing the impacts of climate change on human health and well-being
	Improving early warning systems for disease outbreaks

	Putting in place contingency plans to develop climate change-resilient health systems
	Strengthening public health systems by building hospitals (including regional referral hospitals) and supplying them with medicine, equipment and well-trained personnel
	Making provision for a safe water chain and sanitation facilities to limit outbreaks of water-borne diseases and implement strong public awareness programmes to promote better hygiene
Risk management (particularly in urban areas)	Mainstreaming climate resilience in all sectors
	Developing vulnerability risk mapping based on better data on climate change impacts at sectoral and regional level
	Identifying better drainage plans
	Building more effective early warning systems
	Improving emergency related institutions and establishing a contingency fund to take care of emergency needs following an extreme climate event

2.2 Current and near-term action

Uganda has made notable progress in adaptation in recent years:

- Uganda's National Adaptation Programme of Action (NAPA) was submitted to the Secretariat of the United Nations Framework Convention on Climate Change in 2007;
- Approved a National Policy for Disaster Preparedness and Management in 2010;
- Developed her National Climate Change Policy and its Costed Implementation Strategy in 2012/13;
- Has taken steps to integrate climate change into the National Development Plans, as well as in sectoral policies, plans and programmes;
- Has produced climate change mainstreaming guidelines.
- Some efforts have also been made in research, systematic observation, education, training, public awareness and institutional strengthening.
- Specific activities have been developed on the ground to increase resilience, regarding, among others, agriculture, water and urban planning.
- Developed a 10-year Climate Smart Agriculture Program (2015-2025)
- A road map for the development of the National Adaptation Plan (NAP) was submitted to the Secretariat of the United Nations Framework Convention on Climate Change at the beginning of 2015. The agricultural sector Natioanl Adaptation Plans process was launched in June 2015.
- The country will lay the ground for the National Adaptation Plans preparation during 2015, and will finalize it ready for implementation by mid 2016.The

process will also include the analysis of current and future climate variables, the assessment of vulnerabilities and the appraisal of adaptation options, refining the priority sectors and actions mentioned above. The National Adaptation Plan process will compile and communicate priority national adaptation plans by December 2016.

3. Mitigation of climate change

3.1 Mitigation contribution

- Uganda aims to build on existing Clean Development Mechanism (CDM) projects and Programmes of Activities pipeline, such as Bujagali Hydropower Project and Improved Cook Stove for East Africa.
- Uganda commits to undertaking a number of policies and measures to support low-carbon development in key priority sectors (Table 2).
- The implementation of these policies and measures assumes the continuation of ongoing and planned international financial, technology transfer and capacity building support to complement domestic efforts as set out in the 2015 National Climate Change Policy.
- The estimated impact on greenhouse gas emissions for these policies and measures are presented in Table 4 in section 3.3 below, under: *Potential mitigation impact*.

Table 2: Policies and measures of Uganda's mitigation contribution

Sector	Measure
Energy (power supply)	Construction of enabling infrastructure for electricity sector development, including power lines, substations and transmission facilities. (Development of the electricity sector holds great mitigation potential for Uganda due to the potential offsetting of wood and charcoal burning, and the consequential deforestation)
	Achieve a total of at least 3,200 Mega Watts renewable electricity generation capacity by 2030, up from 729 Mega Watts in 2013.
Forestry	Development of enabling environment for forestry management, including: – Community forest management groups – Forest law enforcement and governance – Strengthening forest institutions responsible for forest management and development
	Reverse deforestation trend to increase forest cover to 21% in 2030, from approximately 14% in 2013, through forest protection, afforestation and sustainable biomass production measures.
Wetland	Development of enabling environment for wetland management,

s	including: – Creation of national information database through re-inventory and assessment of all wetlands. – Design and implementation of 11 RAMSAR site wetland research, eco-tourism and education centres. The RAMSAR convention is an intergovernmental treaty adopted in the Iranean city of Ramsar, and which provides the framework for wise use of wetland and other resources. – Design and implementation of 111 District wetland action plans, with carbon sink potential. – Design and implementation of 15 RAMSAR sites and Framework wetland management plans – Demarcation and gazettement of 20 critical and vital wetland systems and their maintenance country wide as carbon sink. – Wetlands law enforcement and governance. – Strengthening wetland management institutions responsible for wetlands management and conservation.
	Increase wetland coverage to 12% by 2030, from approximately 10.9% in 2014, through demarcation, gazettement and restoration of degraded wetlands.

3.2 Additional mitigation ambition

- In addition to the prioritised mitigation efforts outlined above, Uganda is prepared to undertake additional mitigation activities (Table 3).

The implementation of these additional activities is contingent upon receipt of sufficient international support, provided in the form of finance, technology and capacity building. Possible support could be accessed through various climate finance instruments and international market mechanisms.

Table 3: Policies and measures for Uganda's additional mitigation ambition

Sector	Measure	Emissions reduction potential in 2030
Energy (demand)	Sustainable energy solutions in public buildings: – Energy efficiency in hospitals – National Appropriate Mitigation Action for Integrated Sustainable Energy Solutions for Schools in off-grid areas	 – Unknown – 82 $ktCO_2e/a$ from 1,000 schools in pilot
	Promotion and wider uptake of energy efficient cooking stoves or induction cookers. (Residential biomass burning: ~30 $MtCO_2e$ in	Approx. 40% efficiency saving over traditional cooking

	2000)	stoves.
	Promotion and wider solar uptake of solar energy systems.	Emission reduction potential of about 1.5 million tons carbon dioxide equivalent by 2030
	Development and enforcement of building codes for energy efficient construction and renovation.	Unknown
Energy (transport)	Development and implementation of a long-term transport policy accounting for climate change mitigation concerns.	Unknown
	Fuel Efficiency Initiative National Appropriate Mitigation Action: Policies and regulations to promote cleaner fuels, and more fuel efficient vehicle technology. (Approximate investment cost USD 5.8m over 6 years)	~2 Million tons of carbon dioxide equivalent per year ($MtCO_{2eq}$/yr). in 2030 (Reductions of between 24% and 34% of Business As Usual projections for road transport)
Agriculture	Climate Smart Agriculture techniques for cropping (Agricultural soils: 36% of national GHG emissions (13.5 Million tons of carbon dioxide equivalent per year ($MtCO_{2eq}$/yr).) in 2000)	~2.7 Million tons of carbon dioxide equivalent per year ($MtCO_{2eq}$/yr). in 2030 (0.33-0.35 tons carbon dioxide equivalent per hectare) (Smith et al 2008)
	Livestock breeding research and manure management practices (Enteric fermentation: 19% of national GHG emissions (7 Million tons of carbon dioxide equivalent per year ($MtCO_{2eq}$/yr).) in 2000.Projected to increase by 4 times by 2030)	4% economic potential for emission reduction in East Africa, rising to 20% in other regions. (Smith et al 2008).

3.3 Information provided to improve clarity, transparency and understanding

Table 4: Information to improve clarity, transparency and understanding of Uganda's INDC

Issue	Explanation

Reference Point	• The major targets from the policies and measures of energy supply, forestry and wetlands in the mitigation contribution are not based on a comparison to a reference point but rather presented in absolute terms. • National emissions in 2000, including Land Use Land Use Change and Forestry, were estimated at 36.5 Million tons of carbon dioxide equivalent per year ($MtCO_{2eq}$/yr). Million tons of carbon dioxide equivalent per year ($MtCO_{2eq}$/yr). , and emissions are projected to rise to approximately 77.3 MtCO2e/a in 2030.
Timeframes or Periods of Implementation	• The proposed priority measures for 2030 build upon ongoing policies and plans, whose implementation will be accelerated in the period between 2016 and 2030. • The period of implementation for the additional measures will be 2021 to 2030, or earlier if feasible and if the provision of sufficient support is expedited.
Potential Mitigation Impact	Estimations of potential mitigation impact are approximate, and are presented for indicative purposes only. Uganda proposes to implement the aforementioned policies and measures, and their impact may be higher or lower than these estimations illustrate. Further details are given in Annex I. • The cumulative impact of the policies and measures from the mitigation contribution (section 3.1) could result in approximately 22% reduction of overall national GHG emissions in 2030, including Land Use Land Use Change and Forestry, compared to the business-as-usual (BAU) projection (see Figure 1). • The Business As Usual emissions projection for Uganda, including Land Use Land Use Change and Forestry, is 77.3 Million tons of carbon dioxide equivalent per year ($MtCO_{2eq}$/yr in 2030. Total emissions in 2000 were 36.5 Million tons of carbon dioxide equivalent per year ($MtCO_{2eq}$/yr.
Scope and Coverage of Contribution	• The mitigation contribution (section 3.1) covers the energy (excluding transport) and Land Use Land Use Change and Forestry sectors, in particular forestry and wetlands. • Combined, the energy (excluding transport) and Land Use Land Use Change and Forestry sectors account for approximately 36% of national emissions in 2000, and 26% of emissions in 2030 under Businee As Usual. Under the Business As Usual case, the Land Use Land Use Change and

	Forestry sector continues to be a net emitter. • The additional mitigation ambition (section 3.2) also covers agriculture and transport. • Combined, the transport and agriculture sectors represent a further 62% of national emissions in 2000, and 70% of emissions in 2030 under Business As Usual. • All Greenhouse Gases s are considered within Greenhouse Gas emission estimates, and expressed in terms of their tons carbon dioxide equivalents (tCO2e) throughout this document.
Planning Processes	• Uganda's contribution is based upon the priority actions of the Second National Development Plan, the 2015 National Climate Change Policy and its Costed Implementation Strategy, all of which were approved by Government. The renewable energy targets are based on energy sector investment plans of the Ugandan Ministry of Energy and Mineral Development. • The prioritisation of policies and actions has undergone extensive consultation with stakeholders at the national and sub-national level and represents the priorities of the Ugandan government. • The implementation of the specific policies and measures is institutionalised through the National Climate Change Policy led by the authorities of the relevant sectors.
Assumptions and Methodology	• Uganda's national greenhouse gas inventory for 2000, as outlined in the 2014 Second National Communication, uses the 2006 Inter-governmental Panel on Climate Chang (IPCC) Guidelines for National Greenhouse Gas inventories, and global warming potential values from the Inter-governmental Panel on Climate Change's Second Assessment Report (SAR). • Projections for Business As Usual emissions in 2025 and 2030 are estimated through the use of the learning, evaluation and planning (LEAP) model according to projected growth rates and demographic trends, as highlighted in the 2014 Second National Communication. Due to the relative uncertainties of these factors for Uganda, references to these projections in this Intended Nationally Determined Contribution document are indicative, and included for illustration purposes only. • Net emissions of Land Use Land Use Change and Forestry are included in all emission statistics in the Intended Nationally Determined Contribution and the 2014 Second National Communication unless stated otherwise. • Net emissions from Land Use, Land Use Change and Forestry

	including REDD+ in 2000 were 10.6 Million tons Carbon dioxide equivalent, including removals of approximately 80 Million tons carbon dioxide . • The calculations of the estimated mitigation potential for the renewable energy and forestry sectors are based on Clean Development Mechanism (CDM) methodologies of registered CDM projects in the sectors in Uganda. • The estimation of the Greenhouse Gas reduction in the wetlands sector is based on international benchmarks. • The mitigation measures outlined in this intended contribution share significant interactions with the national development priorities of Uganda, including the improvement in access to energy and in access to natural ecosystem services. The measures are relevant to future revisions of the Energy Policy, the Renewable Energy Policy, the National Land Use Policy, and the National Climate Change Policy.

3.4 Interaction with international market mechanisms

- Uganda intends to meet its commitments and/or increase the level of its contribution through the use of international market mechanisms where appropriate, building upon the experience of the Clean Development Mechanism and other existing market mechanisms.

4. Fairness, ambition and contribution towards achieving the objective of the Convention

To develop a fair and ambitious contribution that helps achieve the objective of the Convention but recognises Uganda's national circumstances as a Least Developed Country, Uganda has considered how it can prioritise those actions and measures that achieve emissions reductions while ensuring increased resilience and development outcomes for Uganda.

As a Least Developed Country with low emissions and high vulnerability to climate impacts, Uganda's ability to undertake climate action without external support is extremely low when compared to other countries.

- Uganda has one of the lowest greenhouse gas emissions per capita in the world, at approximately 1.39 Tons Carbon dioxide equivalent in 2011 (well below the global average of approximately 7.99 Tons Carbon dioxide

equivalent and even below the average of Least Developed Countries of 3 tons Carbon dioxide equivalent);

- Uganda has contributed only 0.099% of the world's total Greenhouse Gas emissions in 2011 (based on Climate Analysis Indicators Tool (CAIT) data); and
- Uganda's capacity to undertake action is constrained by its national circumstances and development priorities. It has a human development index (HDI) Value of 0.477(compared to the global average of 0.698) and gross domestic product (GDP) per capita of only 1,607 (2011 PPP $) (compared to the global average of 12,600 (2011 PPP $)).

In light of these factors, Uganda's contribution is both fair and ambitious. It prioritises specific measures in energy supply, forestry and wetlands to provide both Greenhouse Gas emission reductions as well as development benefits. As of 2011, only 15% of Uganda's population had access to electricity. By committing to increase Uganda's renewable energy generation capacity by 2030 and prioritising the construction of enabling infrastructure for the electricity sector, Uganda is not only reducing its emissions by approximately 3.2 Million tons Carbon dioxide equivalent per year , but also enabling greater access to reliable and sustainable energy for the 85% of Uganda's population that live in rural areas, in turn, improving the livelihoods and health of rural populations.

Uganda's greatest mitigation potential is in the land use, land-use change and forestry sectors. Reversing the current deforestation trend (of approximately 14% in 2013) to increase forest cover to 21% in 2030 is highly ambitious considering that 89.5% of the country's energy needs are currently met by charcoal and firewood. This commitment further highlights the holistic nature of Uganda's contribution – recognising that the development of the electricity sector is key to achieving the reduction in wood and charcoal burning necessary to reduce deforestation.

In addition, by focusing on these policies and measures, Uganda will also ensure alignment with its long-term adaptation goals in terms of forest protection, reduction of the energy deficit and resilient energy infrastructure. By structuring its contribution in this way, Uganda is able to contribute to the global efforts to reduce Greenhouse Gas emissions and contribute to the achievement of the objective of the Convention, while at the same time addressing domestic development needs and priorities.

Despite the ambition of Uganda's proposed contribution, additional assistance would enable Uganda to increase its resilience and realise greater Greenhouse Gas emissions reductions. Uganda's contribution therefore includes a range of additional measures in key priority sectors based on the potential to reduce GHG emissions, provide development benefits and adaptation co-benefits. An example of one of these key sectors is agriculture. Approximately 80% of the population is directly reliant on the agricultural sector for their livelihood. It is also one of the most vulnerable to climate impacts, and represents significant additional mitigation potential.

Accessing additional support to achieve the measures outlined in this Intended Nationally Determined Contribution would significantly increase the ability of Uganda to achieve more ambitious action in this and other key sectors.

5. Means of implementation

In order to fully implement the aforementioned adaptation and mitigation priority actions, some cross-cutting initiatives must be undertaken. Capacity building, technology transfer and finance are the most important needs in Uganda. Specific national needs are:

- Access to and diffusion of appropriate clean technologies;
- Promotion of renewable energies and energy efficiency, including the involvement of the private sector;
- Research into climate smart and sustainable agricultural practices, including dissemination of good practices;
- Scaling up Climate Smart Agriculture
- Improving national policies and legislation; enhancing climate change education, training and public awareness;
- Building of climate information systems;
- Setting up of public-private partnerships; and
- Mainstreaming gender into development policies, plans and strategies as well as observance of human rights in all climate change adaptation and mitigation actions

In this context, in addition to the specific adaptation and mitigation strategies included above, the Government of Uganda plans to:

- Promote and enhance climate change education, public awareness and capacity development through communication, training, information and knowledge management;
- Provide adequate support for policies and programmes that take into account the interactions between population dynamics, climate change and development, including the link between the national and sub-national governments;
- Promote climate change research and development and information exchange in all sectors impacted on by climate change;
- Promote and encourage the development, transfer and diffusion of climate technology; and
- Promote and encourage the mainstreaming of gender considerations in climate change issues.

The Government of Uganda will continue to commit significant resources to climate change-relevant strategies. Ugandan communities, private sector and NGOs can also contribute significantly to these climate change-related activities, for instance through public-private partnerships and payment for ecosystem services schemes.

However, the full implementation of the priority adaptation and mitigation actions is conditional on the support of international stakeholders. The implementation of the prioritised policies and actions assume the continued use of existing and planned national and international financial sources. As set out in the National Climate Change Policy and Costed Implementation Strategy, national sources are assumed to cover approximately 30% of incremental costs of the activities in the next 15 years, with 70% assumed to originate from international sources.

The National Climate Change Policy and Costed Implementation Strategy estimated that Uganda will require United States dollars 2.9 billion over the next 15 years to address the impacts of climate change in addition to the existing interventions. This represents approximately 1.2% of the country's Gross Domestic Product (GDP) per annum over the next 15 years (GDP at market prices as of 2011).

For adaptation:

- The total adaptation cost in the adaptation priority sectors is estimated at around United States dollars 2.4 billion over the next 15 years.
- During the next five years (short term) the cost of adaptation in these eight sectors is estimated at around United States dollar 537.1 million.
- On an annual basis this amounts to $107.4 million, which is around 6.6% of net Overseas Development Assistance received by the country in 2013 and 4.2% of total government revenues (excluding grants) in 2012.
- In the future, the adaptation budgets in these sectors rise significantly: to United States dollars 936.8 million for 2021-2025 and United States dollars 932.1 million for 2026-2030.
- Climate Smart Agriculture Programme (2015-2025) is estimated at United States 476.0 million

For mitigation:

- The total costs of the activities in the priority mitigation sectors are uncertain.
- The upfront capital investment for the renewable energy installations has been estimated at United States dollars 5.4 billion over the next 10 years.
- The initial costed plan for the National Climate Change Policy indicates costs of around United States dollars 36 million over the next ten years for the implementation of measures in the forestry sector.
- These costs will be adjusted as more evidence-based information is obtained (mainly from the costed national Reducing Emissions from Deforestation and Forest Degradation Plus (REDD+) Strategy).
- The achievement of the target in the forestry sector assumes continuation of existing supported measures in the sector and in particular financial flows through the implementation of REDD+.
- The costs of the additional policies and measures are included in the above information where available, but will largely need to be assessed at a later stage.

- Uganda intends to meet its commitments and/or increase the level of its contribution through the use of international market mechanisms where appropriate, building upon the experience of the Clean Development Mechanism and other existing market mechanisms.

Annex I: Potential impact of the mitigation contribution

This Annex provides further details for the emission reduction potential of Uganda's prioritized measures in energy supply, forestry and wetlands.

The estimations are approximate, and are presented for indicative purposes only. Uganda proposes to implement the aforementioned policies and measures and their impact may be higher or lower than these estimations illustrate.

As shown in Figure 2, the cumulative impact of these measures could result in approximately 22% reduction of overall national emissions in 2030, including Land Use Land Use Change and Forestry, compared to the business-as-usual (BAU) projection. The BAU emissions baseline for Uganda, including LULUCF, is 77.3 Million tons Carbon dioxide equivalent per year in 2030, according to projections in the Background Paper for the 2012 Climate Change Policy. Total emissions in 2000 were 36.5 per annum MtCO2e.

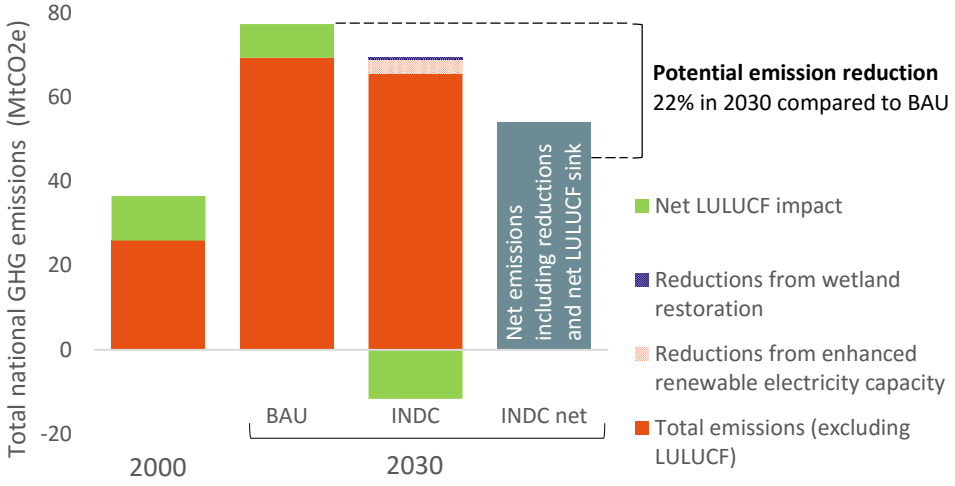


Figure 1: Illustration of mitigation potential from prioritized policies and measures

Energy sector (supply)

The Intended Nationally Determined Contribution energy sector measures will increase the amount of renewable energy capacity by at least 1,100 Mega Watts compared to business- as- usual by 2030, generating an estimated 4.6 - 5.2 Tera watts (TWh) (million watts) more than in the business-as-usual scenario case. Technologies include hydro, solar, biomass and geothermal. The mitigation impact is

forecast to be between 2.7 Million tons Carbon dioxide equivalent per year (MtCO2e/a) and 3.7 MtCO2e/a. The mid-point is taken as 3.2 MtCO2e/a.

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Forestry

The proposed afforestation measures will reverse the trend of deforestation and convert the Land Use Land Use Change and Forestry sector from a source of net emissions (approximately. 8 Million tons Carbon dioxide equivalent per in 2030 under business-as-usual to a source of net removals (approximately. -11.7 Million tons carbon dioxide equivalent per year in 2030 under the Intended Nationally Determined Contribution). The estimated range of net emission reductions compared to business-as-usual in 2030 is between 16.9 Million tons Carbon dioxide equivalent per year and 22.2 Million tons Carbon dioxide equivalent per year. .

Wetland restoration

The proposed measures for wetland restoration will result in approximately 260,000 hectares of new or restored wetlands. Due to the uncertainty about the potential methane emissions, the annual mitigation impact could be between 0.8 MtCO2e, and net zero. For the aggregated indication, a mid-point value of 0.4 MtCO2e is taken.

<u>Додаток 2:</u> Переклад ОНВВ України

Intended Nationally-Determined Contribution (INDC) of Ukraine to a New Global Climate Agreement

1. Introduction	Over the years of independence since 1991, Ukraine has contributed greatly, with 10.2 billion t to reduction of global greenhouse gas emissions. Greenhouse gas (GHG) emissions in Ukraine amounted to 944.4 Mt CO_2eq in 1990, and 402.7 Mt CO_2eq (excluding LULUCF) in 2012, i.e. 42.6% of the 1990 level. GHG emissions including LULUCF amounted to 874.6 Mt CO_2eq in 1990 and 375.4 Mt CO_2eq in 2012, i.e. 42.9% of the 1990 level. This reduction resulted mainly from a GDP decrease and a decline in the population and social living standards, which are expected to be recovered and improved to reach the EU level. In 2014-2015, the temporary annexation of the Autonomous Republic of Crimea and Sevastopol city by the Russian Federation as well as the anti-terrorist operation in some areas of Donetsk and Lugansk oblasts have radically changed Ukraine's development course. The need has arisen to defend the nation, to build defense fortifications along thousands of kilometers, including those on the border, and to increase the production of weapons, ammunition and other means of defense, which requires upgrowth in output of heavy industry products, metals, cement, etc. Due to the military aggression 20% of the country's economic potential has been destroyed. After restoration of territorial integrity and state sovereignty over the whole territory of Ukraine, the need will arise to reconstruct ruined industrial facilities and infrastructural networks, including railway infrastructure, gas and oil pipelines, water supply systems, sewerage networks, and to repair and build new residential houses and social facilities. All this will cause increase in the production of metals, non-metal construction items, food products, etc. Ukraine will acutely need multi-billion capital

	investments. Ukraine's INDC will be revised after the restoration of its territorial integrity and state sovereignty as well as after the approval of post-2020 socio-economic development strategies with account of investment mobilization.
2. Greenhouse gas emissions level	Ukraine defines ambitious, but at the same time substantiated and fair target with regard to the level of GHG emissions. **It will not exceed 60% of 1990 GHG emissions level in 2030.**
3. Base year	1990
4. Implementation period	1 January 2021 – 31 December 2030
5. Scope and coverage:	
5.1. Greenhouse gases	• carbon dioxide (CO_2); • methane (CH_4); • nitrous oxide (N_2O); • perfluorocarbons (HFCs); • hydrofluorocarbons (PFCs); • sulphur hexafluoride (SF_6); • nitrogen trifluoride (NF_3).
5.2. Economic sectors / source categories	• energy; • industrial processes and product use; • agriculture, land use, land-use change and forestry; • waste.
5.3. Percentage of GHG emissions covered	100 %
5.4. Land use, land-use-change and forestry	An approach to including the land use, land-use and forestry in the climate change mitigation structure will be defined as soon as technical opportunities emerge, but no later than 2020
6. Planning processes:	
National legislation	• Law of Ukraine "On the Ratification of the United Nations Framework Convention on Climate Change" dated 29.10.1996 № 435/96-BP; • Law of Ukraine "On the Ratification of the Kyoto Protocol to the United Nations Framework Convention on Climate Change" dated 04.02.2004 № 1430 - IV; • Law of Ukraine "On the Ratification of the Association Agreement between the European Union and the European Atomic Energy Community and

	their member states, of the one part, and Ukraine, of the other part" dated 16.09.2014 № 1678 – VII; • Law of Ukraine "On the Basic Principles (Strategy) of the State Environmental Policy of Ukraine through 2020" dated 21.12.2010 № 2818-VI; • Decree of the President of Ukraine "On the "Ukraine-2020" Sustainable Development Strategy dated 12.01.2015 № 5/2015; • The Energy Strategy of Ukraine through 2035 (draft); • Decree of the Cabinet of Ministries of Ukraine "On approval of the Concept of the State-wide Target Economic Programme for Development of Industry through 2020" dated 17.07.2013 № 603-p; • Decree of the Cabinet of Ministries of Ukraine "On approval of the Transport Strategy of Ukraine through 2020" dated 20.10.2010 № 2174-p; • Decree of the Cabinet of Ministries of Ukraine "On approval of the Concept of the Development Strategy for the Agricultural Sector through 2020" dated 17.10.2013 № 806-p; • Decree of the Cabinet of Ministries of Ukraine "On approval of the State Target Programme of Energy Efficiency and the Development of Energy Carriers Generation from Renewable Energy Sources and Alternative Fuels for 2010-2015" dated 01.03.2010 № 243; • Decree of the Cabinet of Ministries of Ukraine "On approval of the National Action Plan on Renewable Energy through 2020" dated 01.10.2014 № 902-p.; • The National Action Plan on Energy Efficiency through 2020 (draft).
7. Methodological approaches:	
7.1. Metric	Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC)
7.2. Methodological approaches to GHG emissions and removals estimation and accounting	• IPCC 2006 Guidelines as per UNFCCC decision 24/CP.19; • IPCC 2013 Revised Supplementary Methods and Good Practice Guidance Arising from the Kyoto Protocol as per UNFCCC decisions 2/CMP.6 and 2/CMP.7;

	• IPCC 2013 Wetlands Supplement.
7.3. International market mechanisms	• Ukraine will participate actively in the development of existing international market mechanisms and implementation of new ones. • The declared GHG emissions level does not account for the participation of Ukraine in international market mechanisms.
8. Substantiation of the INDC fairness and ambition	The economy of Ukraine requires significant structural changes, infrastructural development, technological modernization and recovery after military operations in eastern Ukraine. Consideration of climate protection factor in their planning and implementation provides for addressing new policies. Ambitiousness of stated target envisages making efforts to substantially prevent increase of GHG emissions under conditions of the significant planned structural changes, restoration and development of infrastructure, post-war reconstruction. All these actions will require development and implementation of efficient and effective policies and imposing of limitations of GHG emissions which are beyond current international obligations of Ukraine; as well as require significant financial investments. Pursuant to Annex B to the Doha Amendment to the Kyoto Protocol, Ukraine has allowed greenhouse gas emissions for 2020 equal to 76% of the 1990 level. Presented in section 2 ambitious target on the level of greenhouse gas emissions for 2030 in reference to the base year in amount of 60% is much lower than both the allowed GHG emission level for 2020 and the base 1990 year level.
9. Next steps	1. Adoption of relevant legislative acts for the INDC implementation. 2. Implementation of the Association Agreement between the European Union, the European Atomic Energy Community and their Member States, of the one part, and Ukraine, of the other part, ratified by the Law of Ukraine dated 16.09.2014 № 1678 – VII: • Directive 2003/87/EC of the European Parliament and of the Council establishing a scheme for greenhouse gas emission allowance trading within the Community and amending Council Directive

	96/61/EC; • Regulation 842/2006/EC of the European Parliament and of the Council on certain fluorinated greenhouse gases; • Implementation by Ukraine of the 1997 Kyoto Protocol to the United Nations Framework Convention on Climate Change, considering all compliance criteria for full implementation of the Kyoto mechanisms; • Development of a long-term action plan for climate change mitigation and adaptation; • Designing and implementation of long-term actions aimed at reducing greenhouse gas emissions. 3. Development and implementation of measures aimed at increasing absorption of greenhouse gases.
10. Adaptation issue	Ukraine will support national adaptation processes in the context of the international commitments in this field. For a medium-term outlook, the adaptation activities will be considered with the same priority as mitigation activates.

URUGUAY

Intended Nationally Determined Contribution

(unofficial translation)

Based on the assumption that there will be no structural transformations of the current production mix, Uruguay expects to make the following contributions to international mitigation efforts:

Gas	Sector/Activity		2030 Targets Percentage emission reduction targets from **base year 1990**	
			With domestic resources	**With additional means of implementation**
CO_2	***Net CO_2 removal by 2030 with domestic resources*** by means of the targets listed to the right	**LULUCF**	Remove 13200 Gg annually	Remove 19200 Gg annually
		Energy (Accounts for 94% of CO_2 emissions in 2010)	Reduce emission intensity per unit of GDP by 25%	Reduce emission intensity per unit of GDP by 40%
			Keep power generation emissions below 40 gCO_2/kWh	Keep power generation emissions below 20 gCO_2/kWh
		Industrial Processes (Accounts for 6% of CO_2 emissions in 2010)	Keep the intensity of emissions per unit of GDP at the reference value	Reduce emission intensity per unit of GDP by 40%
CH_4	**Beef Production** (Accounts for 78% of CH_4 emissions by 2010)		Reduce emission intensity per kilogram of beef by 33%	Reduce emission intensity per kilogram of beef by 46%
	Waste (Accounts for 7% of CH_4 emissions by 2010)		Reduce emission intensity per unit of GDP by 44%	Reduce emission intensity per unit of GDP by 68%
	Other sectors and activities (Accounts for 15% of CH_4 emissions by 2010)		Reduce emission intensity per unit of GDP by 45%	Reduce emission intensity per unit of GDP by 60%
N_2O	**Beef Production** (Accounts for 61% of N_2O emissions by 2010)		Reduce emission intensity per kilogram of beef by 31%	Reduce emission intensity per kilogram of beef by 41%
	Other sectors and activities (Accounts for 39% of N_2O emissions by 2010)		Reduce emission intensity per unit of GDP by 40%	Reduce emission intensity per unit of GDP by 55%

The ambition levels associated to each of these targets, as well as the undertakings necessary to achieve them, are explained in the accompanying information. An Annex is also submitted regarding Uruguay's total emissions and removals estimate by 2030, based on the above mentioned targets, for the UNFCCC Secretariat to prepare the synthesis report on the iNDCs.

Uruguay will communicate its definitive Nationally Determined Contribution once the UNFCCC has set forth the rules to apply and implementation agreements have been finalized.

On the presentation of Uruguay´s iNDC

Uruguay is a developing country, whose economy should continue to grow to ensure higher equity levels in its society. Therefore, the country's contribution to the ultimate objective of the Convention focuses on continuing its development with the lowest emission intensity possible while, at the same time, building resilience.

With regard to the main activities (power generation and beef production), Uruguay presents specific indicators that show the desired efficiency level for the development of the activity. These indicators are presented as emission intensity per product unit, as detailed below.

Uruguay sets forth specific targets for power generation, since it is considered the main emitting sector worldwide. These targets are presented as emission intensity per kWh produced.

Additionally, since Uruguay cannot mitigate climate change at the expense of food production, but rather work on improving the efficiency of the emissions per product in the sector, the country sets forth specific targets for beef production. This activity accounts for 78% of domestic CH_4 emissions (due to enteric fermentation) and 63% of domestic N_2O emissions (due to manure left on pasture by grazing animals). These targets are presented as emission intensity per kilogram of beef (liveweight).

For all the other emitting sectors and economic activities, Uruguay presents aggregate indicators that show the desired efficiency level per GDP, except for the LULUCF sector, for which the iNDC presents the absolute annual CO_2 removal value by 2030.

Uruguay presents both the targets that could be achieved by means of the country's domestic resources, as well as those that could be achieved if additional means of implementation were to be provided by external sources, which would allow for an increase of mitigation capacities. Further on, the iNDC outlines the additional mitigation actions the country would like to undertake if granted access to the necessary means of implementation. There is also a list of the main adaptation actions the country has undertaken, and will continue to do so in parallel with mitigation actions, promoting synergy between the two. Having the necessary means of implementation to support adaptation actions will prove essential to meet the proposed mitigation targets.

Finally, in 2014 the IPCC pointed out[I] that *"the GWP metric is not directly related to a temperature limit, as the 2°C target, whereas some economic metrics and physical end-point metrics like the GTP may be more suitable for this purpose",* thus calling upon further dialogue on the implications of the different metrics and to *"provide metrics that can be useful to the users and policymakers".* Due to the significant impact this discussion could have on priority assignment concerning mitigation policies, especially with regard to the agriculture sector, Uruguay has decided to submit its contribution sorted by gases.

[I] IPCC, AR5, 8.7.I.6.

National circumstances, global ambition and ambition levels by sector

For the past 10 years Uruguay has grown at an average annual rate of 5.4%. During this period, energy demands from the industrial sector increased threefold and food production was three and a half times greater. This growth brought along a significant decline in poverty rates, from 39.9% to 9.7%, while extreme poverty was virtually eradicated, dropping from 4.7% to 0.3%, reaching a Gini Index of 0.38.

Uruguay's production is heavily dependent on food production, and this sector accounts for 70% of national exports. Uruguay's total agricultural sector currently produces food for 28 million people, while the country has a population of 3.3 million.

Uruguay's food production is expected to continue growing in the future, since the country has particularly fertile soils, global demand is on the increase and the country is to contribute to global food security. This means that Uruguay's GHG inventory is, and will continue to be, heavily influenced by the emissions from the agriculture sector: following the GWP_{100} metric, this sector accounts for 76% of current emissions, and beef production accounts for three quarters of it.

The country was able to undergo such a dynamic growth while reducing emissions intensity in all sectors, and for some of those it has even reduced absolute emissions, thanks to strong public policies on climate change, a new institutional framework, both at national and departmental level and thanks to the design of a National Climate Change Response Plan (in 2009) and sector-specific policies.

Below the iNDC provides a brief description of the recent evolution of the GHG emitting and removing sectors and activities, following the implementation of early mitigation measures, as well as 2030 ambition levels for each of the targets mentioned above.

CO_2 Removal - LULUCF

Uruguay is a country with no net deforestation; this is quite a unique attribute among developing countries. The total coverage of native forests has, actually, increased in the past 30 years, and it is now 752000 hectares. Carbon stocks in these forests have increased due to the expansion of the area and due to secondary growth, in about one third of the surface. This responds to legal regulations that ban native forest logging and to tax exemption incentives provided to registered areas with native forests, which amounts to approximately USD 5 million a year. By 2030 annual CO_2 removals from native forests by means of domestic resources are expected to be around 1300 Gg and up to 2500 Gg with additional means of implementation. Furthermore, between 1990 and 2010 Uruguay afforested 689000 effective hectares with tree plantations, which accounts for a 430% increase of the total surface planted in the period. Carbon sequestration levels in tree plantations and in growing native forests have determined that Uruguay, at the beginning of this century, behaved as a net CO_2 sink. Uruguay expects to contribute, from 2010 to 2030, by means of domestic resources, with an additional expansion of the total tree plantation area of about 300000 hectares, which will account for total annual removals of 11200 Gg of CO_2 in 2030.

In addition, within the REDD+ framework, Uruguay will be able to contribute by removing carbon and preventing emissions that could primarily be estimated in a further 2100 Gg of CO_2 in 2030.

The aggregate result for forestry removals supported by domestic resources amounts to

12500 Gg of CO_2 in 2030, which could, reach 15800 Gg if provided with additional means of implementation.

Additionally, Uruguay has a great carbon sequestration potential through soils under degraded grasslands and eroded croplands. With regard to degraded grasslands, removals by 2030 are estimated to be 600 Gg by means of domestic resources and a total of 3300 Gg with additional means of implementation. With regard to carbon in cropland soils, Uruguay has broadly introduced no till agriculture, and has recently implemented mandatory conservation policies that reduce erosion and will promote an increase in biomass supply to the soil. Moreover, it is fostering the use of irrigation. The net impact of these measures can initially be estimated at about 100 Gg CO_2 captured by 2030.

Uruguay would then remove, through carbon sequestration in soils, 700 Gg CO_2 annually in 2030 by means of domestic resources and a total of 3400 Gg CO_2 with additional means of implementation.

CO_2 Emissions - Energy (94% of CO_2 emissions in 2010)

Uruguay has made great efforts within the framework of the "National Energy Policy 2005-2030", to achieve a clean energy mix: 59% of the global primary energy mix is currently renewable, which amounts to 83% for the total energy consumption of the industrial sector and 93% for power generation (2014). With regard to transport, the use of biodiesel accounts for 7% and bioethanol 10% of the total vehicle fleet, both with entire domestic production. Even though a lot of progress has been made in the past years, there are still many opportunities for action in this sector.

As a result, the total emissions of the country's energy sector per GDP are very low: the emission intensity of Uruguay's energy sector in 2014 was 111 g CO_2/USD, one third of total global intensity (global CO_2 emissions of the energy sector vs. aggregate global GDP) and significantly lower than the average for OECD countries. Moreover, there is still an important reduction potential, especially in the transport sector (see below for list of additional mitigation measures), that the country is willing to implement if means of implementation were to be made available. Uruguay will continue to develop maintaining the currently low emission intensity level in the energy sector, and even achieving an intensity reduction of 25% from 1990 values by 2030, by means of domestic resources, and a potential 40% total reduction with additional means of implementation.

Power Generation

Thanks to the ongoing structural transformation of the power generation mix, by 2017 Uruguay will achieve an absolute emissions reduction of 88% within this subsector compared to the annual average for the period 2005-2009, with a higher consumption. By 2017, emissions from the domestic power generation system will be 17 g CO_2/kWh, which accounts for 3% of the global average. This will be achieved with 40% of non-conventional renewable energy sources (mainly wind, but also photovoltaic and biomass waste), in addition to 55% hydropower (estimating an average annual rainfall).

Although this figure would increase in the following decades after reaching the hydro-wind complementation threshold, it could remain close to 2017 value, if storage systems were to be incorporated through additional means of implementation (see below for list of additional mitigation measures).

CO_2 Emissions - Industrial Processes (6% of CO_2 emissions in 2010)
Uruguay produces CO_2 in industrial processes, mainly related to cement production. The emissions are low, even when compared to the energy sector's low emission levels. It is possible to maintain emission intensity close to 1990 values using the country's own resources, but it would be possible to reduce it by up to 40% with additional means of implementation.

Net CO_2 Emissions
Thanks to the removal increase by LULUCF and to low emissions by the energy sector **in 2030 Uruguay will be a net CO_2 remover**. (See Annex)

CH_4 Emissions - Beef production (78% of CH_4 emissions in 2010)
The singular biological origin of these emissions, in addition to the fact that the country cannot mitigate climate change at the expense of food production, poses a challenge to focus on emissions intensity reduction per product unit of food produced.
For the past 20 years Uruguay has significantly reduced such emission intensity. In particular, as a result of the 2010 Climate-Smart Agriculture Policy, Uruguay has made, and will continue to make, efforts to build a more efficient, resilient and low-carbon cattle farming sector, by introducing new technologies and incorporating successful experiences undertaken by other countries with similar characteristics.
As a result of these policies, by 2030 Uruguay expects to continue reducing emission intensity in beef production, expecting to reduce CH_4 emissions intensity per kilogram of beef (liveweight) by 33% from 1990 values, by means of domestic resources and a potential total reduction of 46% if adequate additional means of implementation were to be made available (see below for list of additional mitigation measures).

CH_4 Emissions - Waste (7% of CH_4 emissions in 2010)
With regard to the waste sector, even though different methane capture and flaring measures have been implemented in landfills (in some cases with power generation) and cogeneration from agroindustrial and forest waste, there is still an additional potential for mitigation. The continuation of these policies will allow for a reduction of the emission intensity of the sector per unit of GDP of 44%, from 1990 levels, by means of domestic resources, and a total 68% with additional means of implementation (see below for list of additional mitigation measures).

CH_4 Emissions - Other sectors and activities (15% of CH_4 emissions in 2010)
Even though the vast majority of CH_4 emissions from the agriculture sector in Uruguay respond to beef production, about 9% of domestic CH_4 emissions respond to other livestock and diary productions, 5% to rice production and less than 1% are originated in the energy sector. It is possible to reduce aggregate emissions intensity in these sectors per unit of GDP by 45%, from 1990 levels, by means of domestic resources, and a total 60% with additional means of implementation (see below for list of additional mitigation measures).

N_2O Emissions - Beef production (61% of N_2O emissions in 2010)
For the same reasons set out above relating to CH_4 emissions in beef production, the efforts regarding N_2O emissions generated by this activity have focused on the reduction of emissions intensity per kilogram of liveweight produced. Based on the actions already taken, and those which will be further developed, by 2030 Uruguay expects to continue reducing its emissions intensity levels in beef production, expecting to reduce N_2O emission intensity per kilogram of beef (liveweight) by 31% from 1990 values, by means of domestic resources and a total potential reduction of 41% if adequate additional means of implementation were to be made available (see below for list of additional mitigation measures).

N_2O Emissions - Other sectors and activities (39% of N_2O emissions in 2010)
Even though the majority of N_2O emissions in Uruguay come from cattle farming, a significant part is originated in other activities connected to food production. It is possible to reduce aggregate emissions intensity in these sectors per unit of GDP by 40%, from 1990 levels, by means of domestic resources, and a total 55% with additional means of implementation (see below for list of additional mitigation measures).

Uruguay understands that the targets proposed in this Intended Nationally Determined Contribution are ambitious according to its national circumstances, early mitigation efforts already undertaken and the characteristics of its economy.

Additional mitigation measures

As can be seen from the above, in order to contribute to the implementation of a new model of resilient and low-carbon development, Uruguay has enforced in the past few years an ambitious set of early actions, particularly in several key sectors.

This was possible thanks to a large volume of investments promoted by public policies. For example, with regard to the energy sector, the transformation of the sector was possible through a public-private investment accumulated for several years which reached, on average, 3% of the GDP per year. The State also contributed to reducing the emissions of the economy by granting tax benefits to investments on low-carbon production capacities, particularly to promote afforestation. In the sector, half the plantation costs were subsidized for almost 15 years. In addition, in the cattle farming sector, dairy farming and rice production, public policies fostered large investments and technical change, which allowed for an increase in productivity and a reduction in emission intensity.

Additionally to the early actions already undertaken and the ones that will be implemented by means of the country's own resources, Uruguay is still willing and committed to developing and executing innovative approaches, especially in the transport, waste and land sectors, to continue making progress towards a low-carbon economy. However, in addition to what has been stated above, the country needs to take on a significant number of actions to adapt to the strong impacts that climate change and variability are having on our territory, economy and population, as described below. Therefore, in order to be able to implement the additional set of mitigation actions that have been identified, Uruguay needs further means of implementation to be provided by external sources.

Additional mitigation actions the country would like to undertake:

- Reduce emissions intensity by enhancing productivity and efficiency in beef, dairy and rice production.
- Reduce emissions intensity from manure left on pasture by grazing animals.
- Increase the total coverage of tree plantations.
- Increase the total coverage of native forests and reduce degradation.
- Increase carbon stocks in soils under natural grasslands.
- Increase land surface under irrigation.
- Reduce methane emission in rice production through flood management and other practices.
- Efficient use of nitrogen fertilizers.
- Incorporate energy storage systems to manage the wind power surplus.
- Implement BRT corridors for metropolitan public transport.
- Introduce electric and hybrid private and public vehicles.
- Increase the percentage of biofuels in gasoline and diesel oil blends.
- Introduce public and private vehicles that support a higher percentage of biofuel blends.

- Enhancement of the vehicle fleet through higher power efficiency standards and lower emissions.

- Improve cargo transport, through the incorporation of new multimodal systems, and increased use of railroad and inland waterway transport

- Introduce new technologies for emission reduction from cement manufacture.

- Improve treatment and final disposal systems of solid urban waste.

- Improve industrial wastewater treatment systems and effluent management in intensive animal farming establishments.

- Improve industrial and agroindustrial solid waste management

Adaptation actions required

Uruguay's 2009 National Climate Change Response Plan states that adaptation is a strategic priority for the country. This is essential to be able to effectively respond to climate change and increased climate variability, especially, to reduce risks and damage from increasingly intense changes. Uruguay is highly sensitive to droughts, it has low-lying coastal areas, as well as areas which are prone to climate related disasters, such as floods. Adaptation becomes particularly important when it comes to food production, which is a core activity for the domestic economy and is highly sensitive to climate.

Within this context, Uruguay has, through the implementation of public policies, been addressing adaptation to climate change and variability and climate risk management for the different sectors, both at national and subnational levels of government by means of domestic and external resources.

In sectors such as cattle farming, agriculture and energy there has been a lot of progress in the implementation of specific adaptation measures. This makes it possible to begin the design of sector-specific National Adaptation Plans (NAPs) to identify adaptation needs in the medium and long term, and allowing for the development and implementation of strategies and programs, within the planning and development frameworks of these sectors.

The main adaptation actions undertaken were:

- Energy mix diversification to reduce vulnerability and cost overruns of the power system in case of hydropower generation deficits.

- Development of climate index insurances and other financial instruments for risk reduction in the power sector.

- Design and implementation of adaptation measures in cattle production, including water sources, feed and rangeland management measures.

- Development of soil use and management plans to reduce erosion and preservation of organic matter in croplands.

- Resettlement of population living in urban areas vulnerable to floods, and land-use planning

measures to reduce the risk of floods.

- Monitoring program and eradication campaigns for the Aedes Aegypti mosquito, strengthening of the National Immunization Program against diseases caused by climate sensitive vectors and other health communication and awareness raising activities.

- Development and strengthening of the National Protected Areas System, which contributes to the protection of climate change and variability vulnerable biodiversity and ecosystems.

- Restoration and maintenance of coastal ecosystems services that provide protection against extreme events and of ecosystems services that protect drinking water sources.

- Overhaul and maintenance of road infrastructure, especially in coastal/ flood sensitive areas, taking into account climate change and variability.

- Development of research and data collection programs and networks on the impacts and adaptation to climate change and variability.

- Development of information systems, climate services and monitoring programs, particularly for the environmental, agriculture and emergency sectors, and development of early warning systems, to support decision-making.

- Development, strengthening and decentralization of the National Emergency System.

- Strengthening of weather, climate and water services.

- Design and implementation of the National Climate Change Response Plan; the Metropolitan Climate Plan; Climate Change Adaptation and Development Project for the agriculture sector; Integrated Water Resources Management National Plan within the climate change and variability framework, Land-use Planning programs for vulnerable regions and Stormwater Management Plans; Emergency and Sudden-impact Disasters Response Protocol; identification of adaptation measures in the tourism sector and development of a National Adaptation Plan for the coastal sector.

Building on the experience and results of these undertakings, and incorporating new elements, by 2030 Uruguay expects to have accomplished the following adaptation actions, with the support of external means of implementation, which are necessary to ensure the fulfillment of mitigation targets:

- Development and implementation of national, regional and sector-specific participatory climate change and variability adaptation plans, and incorporation of monitoring and reporting systems on adaptation and loss and damage.

- Development of new early warning systems and new hydrometeorological insurances, within the disaster risk reduction framework for the agricultural, coastal and health sectors, and for flood sensitive urban areas, infrastructure and other vulnerable regions.

- Strengthen climate risk management against floods, through the enhancement of vulnerable population resettlement processes and the implementation of new land-use planning measures. Moreover, with regard to drought management, identification of new water sources, promote the construction of associative works, such as large reservoirs to serve various users, and improve efficiency in water use.

- Improve the protection of surface and underground water sources, such as aquifer recharge areas, through the promotion of good drilling practices, point source and non-point sources pollution control and the implementation of conservation and restoration measures for gallery forests.

- Promote ecosystem-based adaptation, strengthening ecosystem and biodiversity conservation strategies.

- Design, adapt and maintain a resilient infrastructure, considering the impact of climate change and variability.

- Articulate and develop new integrated climate services and information systems, for continuous monitoring, risk mapping and loss and damage evaluation, by strengthening academic, monitoring and observation institutions, such as The Uruguayan Institute of Meteorology and the National Water Management Service.

- Build research, development and innovation capacities to enhance domestic response to climate change and variability.

- Enhance visibility of climate change adaptation measures within the allocations of the national budget, including the development of a national system of environmental indicators.

- Implement education, training and awareness programs that address climate change response needs.

Information to facilitate clarity, transparency and understanding

Scope and coverage: The contributions target all emitting sectors as acknowledged by IPCC inventory guidelines and are nationwide. They cover CO_2, CH_4 and N_2O gases, which collectively account for 99.7% of Uruguay's current CO_2eq emissions, calculated as per GWP_{100} metric.

Methodological approach for estimating emissions and removals: This Intended Nationally Determined Contribution was prepared using the Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories, 2000 Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories, 2003 Good Practice Guidance for LULUCF, as well as 2006 IPCC Guidelines for National Greenhouse Gas Inventories for the waste sector.

Time frame for the contributions: Targets are set by 2030, thus considering for this purpose the annual average of the 2028-2030 timeframe.

Base year: Except for the LULUCF and power generation, the remaining targets take 1990 as reference values.

Economic Data: The current work was undertaken based on a country development model that does not entail significant structural transformations from the current productive mix, under the assumption of an average inter annual growth of 3% from 2014 to 2030.

Annex for the UNFCCC Secretariat:

Total estimated emissions and removals per gas by 2030

To facilitate the work of the Secretariat we communicate that, based on the assumptions considered for the development of this Intended Nationally Determined Contribution, it may be estimated that Uruguay's maximum emission levels in 2030, including only mitigation actions to be developed by means of domestic resources, would be:

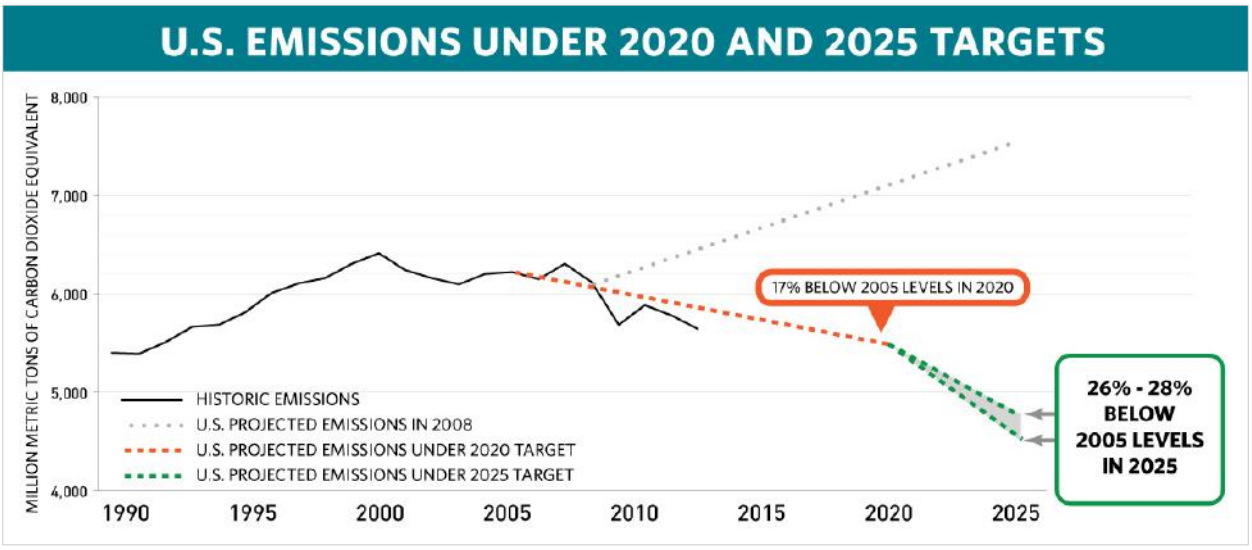
Gas	(in Gg)
CO_2 emissions	10900
CO_2 removals	-13200
Net CO_2 removals	-2300
CH_4 Emissions	840
N_2O Emissions	39

As can be observed, Uruguay expects to be a net CO_2 sink by 2030. In addition, based on these estimates, we expect to maintain relatively stable levels of non-CO_2 gases emissions by 2030 compared to current values, despite an expected growth in the economy for the period of 60%.

The figures in this Annex are presented as non-binding estimates, therefore, they shall not be construed as part of Uruguay's iNDC. These are only presented to facilitate the work of the UNFCCC Secretariat in the preparation of the synthesis report on the aggregate effect of Intended Nationally Determined Contributions.

The United States is pleased to communicate its intended nationally determined contribution, as well as information to facilitate the clarity, transparency, and understanding of the contribution.

The United States is strongly committed to reducing greenhouse gas pollution, thereby contributing to the objective of the Convention. In response to the request in Lima to communicate to the secretariat its intended nationally determined contribution towards achieving the objective of the Convention as set out in its Article 2—the stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system—the United States intends to achieve an economy-wide target of reducing its greenhouse gas emissions by 26-28 per cent below its 2005 level in 2025 and to make best efforts to reduce its emissions by 28%.



The target is fair and ambitious. The United States has already undertaken substantial policy action to reduce its emissions, taking the necessary steps to place us on a path to achieve the 2020 target of reducing emissions in the range of 17 percent below the 2005 level in 2020. Additional action to achieve the 2025 target represents a substantial acceleration of the current pace of greenhouse gas emission reductions. Achieving the 2025 target will require a further emission reduction of 9-11% beyond our 2020 target compared to the 2005 baseline and a substantial acceleration of the 2005-2020 annual pace of reduction, to 2.3-2.8 percent per year, or an approximate doubling.

Substantial global emission reductions are needed to keep the global temperature rise below 2 degrees Celsius, and the 2025 target is consistent with a path to deep

decarbonization. This target is consistent with a straight line emission reduction pathway from 2020 to deep, economy-wide emission reductions of 80% or more by 2050. The target is part of a longer range, collective effort to transition to a low-carbon global economy as rapidly as possible.

The target reflects a planning process that examined opportunities under existing regulatory authorities to reduce emissions in 2025 of all greenhouse gases from all sources in every economic sector. A number of existing laws, regulations, and other domestically mandatory measures are relevant to the implementation of the target, which we detail in the information provided.

Party: United States of America

Intended nationally determined contribution
The United States intends to achieve an economy-wide target of reducing its greenhouse gas emissions by 26%-28% below its 2005 level in 2025 and to make best efforts to reduce its emissions by 28%.

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Information provided in order to facilitate clarity, transparency, and understanding
Scope and coverage: *Gases*: The U.S. target covers all greenhouse gases included in the 2014 Inventory of United States Greenhouse Gas Emissions and Sinks: carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), perfluorocarbons (PFCs), hydrofluorocarbons (HFCs), sulfur hexafluoride (SF_6), and nitrogen trifluoride (NF_3). *Sectors*: The U.S. target covers all IPCC sectors. *Percentage of total greenhouse gas emissions:* The United States intends to account for 100 percent of U.S. greenhouse gas emissions and removals for the base year 2005 as published in the Inventory of United States Greenhouse Gas Emissions and Sinks, on a net-net basis.
Quantifiable information on the reference point, time frames, assumptions and methodological approaches including those for estimating and accounting for anthropogenic greenhouse gas emissions and removals: *Timeframe and reference point:* The U.S. target is for a single year: 2025. The base year against which the target is measured is 2005.

Accounting approach for land sector:

The United States intends to include all categories of emissions by sources and removals by sinks, and all pools and gases, as reported in the Inventory of United States Greenhouse Gas Emissions and Sinks; to account for the land sector using a net-net approach; and to use a "production approach" to account for harvested wood products consistent with IPCC guidance. The United States may also exclude emissions from natural disturbances, consistent with available IPCC guidance.

There are material data collection and methodological challenges to estimating emissions and removals in the land sector. Consistent with IPCC Good Practice, the United States has continued to improve its land sector greenhouse gas reporting, which involves updating its methodologies. The base year and target for the U.S. INDC were established on the basis of the methodologies used for the land sector in the 2014 Inventory of United States Greenhouse Gas Emissions and Sinks and the United States 2014 Biennial Report.

Metric:

The United States intends to use 100-year global warming potential (GWP) values to calculate CO_2 equivalent totals. The United States intends to report emissions totals using Fourth Assessment Report values, and will consider future updates to GWP values from the IPCC.

Use of markets:

At this time, the United States does not intend to utilize international market mechanisms to implement its 2025 target.

Domestic laws, regulations, and measures relevant to implementation:

Several U.S. laws, as well as existing and proposed regulations thereunder, are relevant to the implementation of the U.S. target, including the Clean Air Act (42 U.S.C. §7401 et seq.), the Energy Policy Act (42 U.S.C. §13201 et seq.), and the Energy Independence and Security Act (42 U.S.C. § 17001 et seq.).

Since 2009, the United States has completed the following regulatory actions:

- Under the Clean Air Act, the United States Department of Transportation and the United States Environmental Protection Agency adopted fuel economy standards for light-duty vehicles for model years 2012-2025 and for heavy-duty vehicles for model years 2014-2018.
- Under the Energy Policy Act and the Energy Independence and Security Act, the United States Department of Energy has finalized multiple measures addressing buildings sector emissions including energy conservation standards for 29 categories

of appliances and equipment as well as a building code determination for commercial buildings.

- Under the Clean Air Act, the United States Environmental Protection Agency has approved the use of specific alternatives to high-GWP HFCs in certain applications through the Significant New Alternatives Policy program.

At this time:

- Under the Clean Air Act, the United States Environmental Protection Agency is moving to finalize by summer 2015 regulations to cut carbon pollution from new and existing power plants.
- Under the Clean Air Act, the United States Department of Transportation and the United States Environmental Protection Agency are moving to promulgate post-2018 fuel economy standards for heavy-duty vehicles.
- Under the Clean Air Act, the United States Environmental Protection Agency is developing standards to address methane emissions from landfills and the oil and gas sector.
- Under the Clean Air Act, the United States Environmental Protection Agency is moving to reduce the use and emissions of high-GWP HFCs through the Significant New Alternatives Policy program.
- Under the Energy Policy Act and the Energy Independence and Security Act, the United States Department of Energy is continuing to reduce buildings sector emissions including by promulgating energy conservation standards for a broad range of appliances and equipment, as well as a building code determination for residential buildings.

In addition, since 2008 the United States has reduced greenhouse gas emissions from Federal Government operations by 17 percent and, under Executive Order 13693 issued on March 25th 2015, has set a new target to reduce these emissions 40 percent below 2005 levels by 2025.

Relationship with inventory:

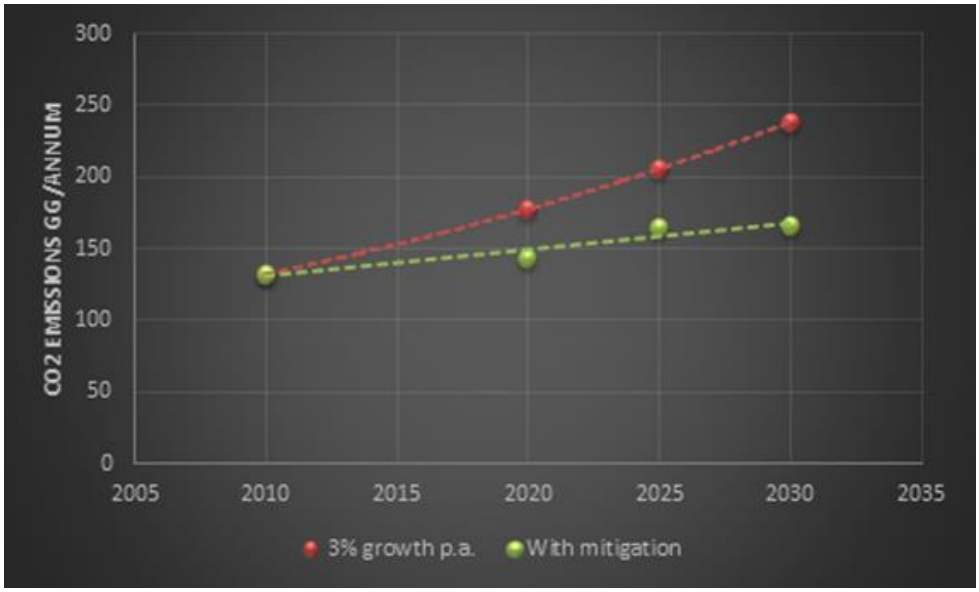
This approach, and the definitions and metrics used, are fully consistent with our greenhouse gas inventory. The United States intends to continue to improve its greenhouse gas inventory over time, and may incorporate these improvements into its intended nationally determined contribution accordingly. Additional information on the greenhouse gas inventory, including calculations, models, data sources, and references can be found here:

www.epa.gov/climatechange/ghgemissions/usinventoryreport.html#about

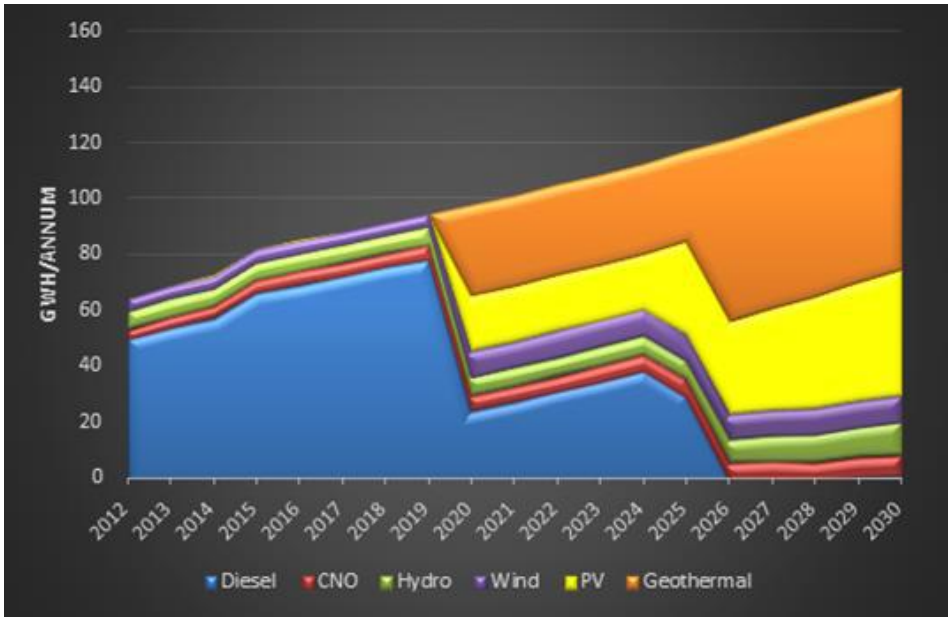
REPUBLIC OF VANUATU

INTENDED NATIONALLY DETERMINED CONTRIBUTION (INDC)

The main mitigation contribution is to achieve the outcomes and targets under the National Energy Road Map (NERM) and Second National Communication (SNC) extended to 2030. The mitigation contribution for the Vanuatu INDC submission is a sector specific target of transitioning to close to 100% renewable energy in the electricity sector by 2030. This target would replace nearly all fossil fuel requirements for electricity generation in the country and be consistent with the National Energy Road Map (NERM) target of 65% renewable energy by 2020. This contribution would reduce emissions in the energy sector by 72Gg by 2030. Emissions in this sector were around 130 Gg in 2010 but are expected to rise to 240 Gg by 2030 (3% per annum).



The mitigation would thus reduce BAU emissions in the electricity sub-sector by 100% and in the energy sector as a whole by 30%. The target would be conditional, depending on funding commensurate with putting the transition in place being made available from external sources. In addition, Vanuatu will pursue the other mitigation measures in the Vanuatu National Energy Roadmap (2013- 2020), the Scaling Up Renewable Energy in Low Income Countries (SREP) report and Vanuatu's Renewables Readiness Assessment (RRA) report undertaken by IRENA. These measures would include a vigorous program of energy efficiency to reduce emissions in all sectors except agriculture and forestry by 15%. The transition to renewable energy based electricity could be accelerated through review and revision of agricultural (coconut oil sector) national policy. Opportunities for reducing the high emissions levels in agriculture will simultaneously be pursued with cooperative programs with nations having similarly high emissions in this sector. The forestry sector mitigation will be attended to as part of the existing REDD+ program. The Government is also aware that waste management is an other area that need attention.



The adaptation component of the INDC does not seek to set adaptation targets for Vanuatu however it provides an opportunity to reiterate the adaptation priorities as identified and prioritised in key national documents such as the National Adaptation Programme of Action (NAPA) and the National Climate Change and Disaster Risk Reduction Policy.

The NAPA process identified and prioritised adaptation priority needs that were urgent and immediate - those needs for which further delay could increase vulnerability or lead to increased costs at a later stage. The five NAPA priorities include: Agriculture and food security; Sustaiable tourism development; Community based marine resource management; Sustaiable forest management and Integrated water resource management. The National Climate Change and Disaster Risk Reduction Policy identifies five key adaptation strategic priorities and associated actions to further enhance the national adaptation efforts and build resilience across sectors which include the need for: Climate Change vulnerability and multi sector impact assessments; Integrated climate change and disaster risk reduction; Community based adaptation; Loss and damage and Ecosystem based approaches.

National Circumstances

The Republic of Vanuatu is an island nation located in the Western Pacific Ocean. The country is an archipelago of over 80 islands stretching 1,300 kilometres from North to South. Vanuatu's terrain is mostly mountainous, with narrow coastal plains where larger islands are characterised by rugged volcanic peaks and tropical rainforests. Vanuatu is located in a seismically and volcanically active region and has high exposure to geologic hazards, including volcanic eruptions, earthquakes, tsunamis and landslides.

Vanuatu's national vision as per the Government's Priority and Action Agenda (PAA) 2006-2015 is "An Educated, Healthy and Wealthy Vanuatu". The goal of the Government of Vanuatu (GoV) is to raise the welfare of its people, and main agendas for action include growing the productive sector, especially agriculture and tourism, maintaining macroeconomic balance, raising public service performance, cutting costs associated with transport and utilities, and improving access to basic services such as health and education. Government of Vanuatu is also committed to achieving MDG goals and targets and significant progress has been made towards achieving the MDG Goals.

Climate change and changing weather patterns are already having a negative impact on all the priority sectors in Vanuatu and most evidence points to the fact that they will be exacerbated by climate change related events in the future. Climate related disasters are one of the main hindrances to economic development in Vanuatu and this will certainly continue.

Vanuatu is one of the countries most vulnerable to climate change among the other Pacific island nations. The effects of climate change on agriculture production, fisheries, human health, tourism and well-being will have the consequences of decreasing national income while increasing key social and infrastructure costs. Climate change may affect all areas of life for Ni-Vanuatu people and impact women, men and young people in different ways.

Vanuatu has positioned itself as a regional leader in the fields of Climate Change (CC) and Disaster Risk Reduction (DRR) and has been widely applauded for its initiative to establish a National Advisory Board for Climate Change and Disaster Risk Reduction (NAB) as a means of improving coordination and governance around the two issues. Vanuatu's implementation of the UNFCCC has progressed exponentially in recent years as government sector agencies become more organized and civil society, academic, the private sector, development partners and regional agencies have stepped up their activities in Vanuatu.

Vanuatu is committed to formulating strategies, national policies and best practices for addressing GHG emissions and making a practical contribution to the global mitigation efforts. While at the same time the country is also pursuing its national and regional development priorities and sustainable development objectives. The development objectives are planned to be achieved by integrating GHG abatement efforts with other social, environmental and economic priorities.

Mitigation Contribution	
Time Frame	2020 - 2030
Type of Contribution	Sectoral commitment focussed on a transition to renewable energy in the electricity generation sub-sector under energy generation.
Target Level	To approach 100% renewable energy in the electricity sub-sector contingent upon appropriate financial and technical support made available
GHG Reductions	100% below BAU emissions for electricity sub-sector and 30% for energy sector as a whole.
Sectors	Mainly electricity generation sub-sector but with ancillary mitigation possible in forestry, agriculture, transport and energy efficiency sector wide. The key planned mitigation interventions include: • Doubling of the wind installed capacity to 5.5 MW by 2025 • Installing 10 MW grid connected solar PV by 2025 • Commissioning the proposed first stage 4 MW Geothermal plant by 2025 • Adding 10 MW grid connected solar PV by 2030 • Commissioning the second stage 4 MW Geothermal plant by 2030 • Substituting and/or replacement of fossil fuels with coconut oil based electricity generation The proposed interventions would need substantial external funding of around US$180 million to proceed at the time frame needed. In addition, substantial technology transfer would be required including institutional support and training. Additional planned mitigation interventions include: • National Energy Road Map (US$ 210.5 million indicative - with some overlap) • Rural Electrification Nationally Appropriate Mitigation Action (NAMA) (US$ 5 million indicative) • Off grid renewable energy projects under Scaling Up Renewable Energy in Low Income Countries Program (US $34.2 million) • Energy efficiency measures to be pursued across the board to enable 15% savings in the energy sector. • Forestry sector measures to reduce deforestation and promote good land care to accepted mitigation practices according to REDD+ • Planned cooperation with New Zealand and other nations interested in mitigating methane (CH_4) and associated emissions for ruminant and pasture management

Gases	Carbon Dioxide (CO_2)
Methodology	The electricity sector emissions were analysed using data from the utilities, customs department and relevant assessments, studies and reports from development partners and civil society organizations. The data for electricity generation were entered into the GHG emission estimation model and converted to CO_2 emissions using standard conversion factors. The extrapolated data from the above sources suggests the kWh consumption in the electricity sector will rise at 3.6% per annum until 2020 after which a slightly lower growth rate is used to give an average increase of 3% until 2030. Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories and UNFCCC software "Non Annex 1 National Greenhouse Gas Inventory Software, Version 1.3.3 was used for the GHG inventory. Sectoral data for GHG estimation compiled from various sources primarily using national data collected from annual reports, statistical reports, studies and brochures of related department/institutions. The projections of emissions data to 2010 was reported in the SNC from similar data sources as the 2000 data and has a similar uncertainty analysis.
Planning Process	Vanuatu's INDCs is well aligned with the Government's Priority Action Agenda Policy Objective 4.5 which is most relevant to Climate Change and states, "to ensure the protection and conservation of Vanuatu's natural resources and biodiversity, taking climate change issues in consideration." The contribution is also based on the research undertaken for a number of national initiatives including the Vanuatu National Energy Roadmap (2013- 2020), the Scaling Up Renewable Energy in Low Income Countries (SREP) report, Rural electrification NAMA design document by UNDP MDG Carbon and Vanuatu's Renewables Readiness Assessment (RRA) report undertaken by IRENA . In addition, relevant data and information has been used from the Government of Vanuatu and various private and civil society organizations. Extensive consultations with all relevant stakeholders were held during the preparation of Vanuatu's INDC.
Adaptation Priorities and Goals	
Priorities	For Vanuatu, as an LDC, the National Adaptation Programme of Action (NAPA) process identified and prioritised adaptation priority needs that were urgent and immediate - those needs for which further delay could increase vulnerability or lead to increased costs at a later stage. The Vanuatu NAPA identified 11 top adaptation priorities through a national consultation process. These adaptation priorities were further refined to include 5 top priorities for support and implementation. The 5 NAPA priorities include: 1. Agriculture and food security 2. Sustaiable tourism development 3. Community based marine resource management 4. Sustaiable forest management

	5. Integrated water resource management Out of the 5 top priorities, Least Developed Countries Fund (LDCF) financing has been sourced to further elaborate and implement priorities 1 and 5 while a concepts for 2 is being developed. Health, which is among the 6 priorities was not selected for concept development however given interest from key implementing agencies, financing from the LDCF has been secured for concept development and implementation. The NAPA further recognised that the following core issues were relevant to all priorities and should be an integral part of any proposed activities; a. Awareness raising at all levels b. Capcity building including institutional capacity c. Research and development d. Promotion of appropriate traditional knowledge and pracitces e. Technology Transfer f. Education and training g. Mainstreaming of climate change and disdaster risk reduction h. Consideration of marine and terrestrial Biodiversity issues The National Climate Change and Disaster Risk Reduction Policy identifies 5 key adaptation strategic priorities and associated actions to further enhance the national adaptation efforts and build resilience across sectors. These strategic priorities from 2015 to 2020 include the need for: 1. Climate Change vulnerability and multi sector impact assessments 2. Integrated climate change and disaster risk reduction 3. Community based adaptation 4. Loss and damage 5. Ecosystem based approaches Please see annex for detailed information.
Support Needed	<u>Financial</u> The Climate Public Expenditure and Institutional Review (CPEIR) report for Vanuatu states that Vanuatu has been receiving a lower share of adaptation funding than most other Pacific island countries. To adequately adapt to the impacts of climate change, starting now, the annual cost is estimated to be 1.5% of a country's GDP. For Vanuatu, this equates to an investment of US$9.5million per year. This is substantially higher than the amount of development funding currently being spent on projects that have Adaptation as their principal objective. In coming years, greater levels of donor funding are likely to be available for climate change adaptation as the economies and budgets of Developed Countries recover from the Global Financial Crisis. As well, as a Least Developed Country, Vanuatu is likely to benefit from the United Nations goal of promoting at least half of these countries to 'Developing Country' status by 2019.

	To be in a better position to take advantage of CC/DRR funding that will become available, Vanuatu is establishing strong, efficient and sustainable governance arrangements, and demonstrating a track record in maintaining these arrangements. Ministry of Climate Change is also targeting National Implementing Entity (NIE) accreditation, which will also give it direct access to funding from the Adaptation Fund and potentially other sources of funding for climate change such as the Green Climate Fund. <u>Technical</u> A Technology Needs Assessment (TNA) for Vanuatu is needed as a matter of priority to look at implementing a country driven process for identifying and analysing the priority technology needs for mitigating and adapting to climate change. Carrying out the TNA could provide an opportunity to realize the need for new techniques, equipment, knowledge and skills for mitigating greenhouse gas (GHGs) emissions and reducing vulnerability to climate change. <u>Capacity</u> At the policy and legislative levels a number of legislative changes are required to reflect the current climate and disaster governance arrangements and clarify the full range of climate and disaster risk responsibilities. Among these are the National Disaster Management Act and the Vanuatu Meteorology Act. At the corporate level the Ministry of Climate Change needs to develop a long term cooperate plan to guide the implementation of its responsibility and also to further guide the agencies under its remit. Agency level cooperate plans are already in existence but lack strong links between the various departments. At the institutional level the need to streamline and strengthen the NAB and its Secretariat is a priority. At the human resource level, no systematic assessment has been carried out to understand the required skills set, existing skills set and the gaps for implementing CC/DRR initiatives. No human resource development plan has been developed. Most training is ad hoc in nature and not linked to a formal professional development strategy. At the information and knowledge management level, systems exist but are not fully utilised. This makes information sharing and learning of lessons difficult. Further, Vanuatu continues to face several barriers as it strives to meet its UNFCCC and the Kyoto Protocol obligations. The various obstacles include insufficient institutional and financial resources; lack of research data; information management problems and; inadequate human resources and infrastructure. More must be done to build awareness both within the Government and the community about Vanuatu's vulnerability to climate change. There is also an apparent need to feed information, knowledge and technologies to enable improved decision-making and environmental management.
Monitoring and Evaluation	The monitoring and reporting on the adaptation activities of the INDC will be conducted at the Ministry level by the CCDRR PMU in close collaboration with the M&E unit of the Prime Minister's Office, as is

	the current practice with projects being implemented under the oversight of the NAB. This will ensure that achievements in the implementation of the INDC priorities are appropriately captured and reported on in the Government's Annual Development Report prepared by the Prime Minister's Office.
Fairness, Equity and Ambition	
Fairness, Equity and Ambition	Small Island Developing States (SIDS) has been recognised by the United Nations Framework Convention on Climate Change (UNFCCC) and Intergovernmental Panel on Climate Change (IPCC) as the most vulnerable countries to face the effects of climate change. Vanuatu being a part of SIDS share similar challenges. Vanuatu anticipates many impacts from climate change on its society, economy, environment and human health and Vanuatu through the Ministry of Climate Change is actively cooperating with United Nations agencies and international partners to assess these effects and develop appropriate plans through climate change adaptation and mitigation. Vanuatu's adaptation plans and programmes intends to support progress towards the country's national development priorities and the goal of environmental sustainability, by ensuring that a focus on reducing vulnerabilities and risks is incorporated into planning and activities across all sectors of the economy and society. Vanuatu is also keen to reduce its reliance on fossil fuels for the energy needs. The National Energy Road Map, which sets out a clear strategy and action plan for the development and use of alternative and sustainable energy sources, has an ambitious goal of reducing the country's high reliance on imported fossil fuel by meeting 65% of its electricity needs from renewable energy sources. Vanuatu's past emissions have been miniscule and have only become locally significant in the past decade or two. In general development issues dominate rather than climate change mitigation. Vanuatu is a small developing nation with absolute levels of CO_2 eq emissions very small at under 0.0016% of world emissions. The country is also one of the most vulnerable to the effects of climate change and has much to lose should the worst predictions from increased temperature levels eventuate. As such the country will do its best to mitigate but would require financial, technical and capacity building support to do so.

Annex

National Adaptation Programme of Action - Priorities
• Agriculture and food security • Development of resilient crop species including traditional varieties • Land use planning and management • Water resource management • Sustainable forest management • Marine resource management and aqua culture • Climate change and infrastructure • Sustainable livestock farming and management • Integrated coastal zone management • Sustainable tourism development • Vector and water borne disease management

Strategic Priority – Climate Change Adaptation and Disaster Risk Reduction	
Strategy	**Actions**
Climate Vulnerability and Multi- Sector Impact Assessment	Enhance efficiency and effectiveness of adaptation action and design action to address explicit climate impacts in specific sites through: • Vulnerably assessments and risk mapping using multi-hazard approaches as the basis of all adaptation action, conducted prior to implementation with communities and in a participatory, free and informed way • Adaptation, appropriate to local communities, being a research priority for all actors, including scientific research, farmer-based trials, traditional indicators and observation systems and demonstration sites • Selecting and prioritizing actions based on criteria including effectiveness, efficiency, efficacy, and cost effectiveness using internationally recognized tools (e.g. environmental impact assessment, cost benefit analysis) and locally utilized processes • Adaptation decisions being based on relevant data and information using already available data, statistics and processes • Data and information on adaptation being shared with and incorporated into centralized systems (eg NAB portal) Adopt multi-sectoral approaches and address complex impacts through: • Considering adaptation information from multiple sectors and knowledge systems to avoid maladaptation that may result from a narrow, single sector adaptation focus • Considering urban and rural adaptation issues equally and fairly in national adaptation planning and action based on vulnerability criteria

Integrated Climate Change Adaptation and Disaster Risk Reduction	Relevant initiatives and programs must include an integrated climate change adaptation and disaster risk reduction approach through: • Strategic documents at all levels including both climate change and disaster risk elements in an integrated and compatible way (e.g. government policies, provincial plans, community strategies, municipal plans, donor project designs, budget frameworks) • Government agencies, CSOs, private sector and academia taking responsibility for identifying their adaptation priorities and incorporating these into their policy, strategic documents, and budgets to implement adaptation and disaster risk reduction action • Initiatives endorsed by NAB adhering to an integrated approach • Formal and non-formal education programs and curriculums incorporating an integrated approach
Community Based Adaptation	Adaptation action in communities addresses real, current and priority vulnerabilities through: • Community vulnerability assessments and comprehensive profiles being undertaken prior to project implementation • The community being fully engaged in, participate in and lead vulnerability assessment process in an appropriate language (e.g. colloquial languages, Bislama) Build on and strengthen traditional and customary systems by: • Building on and working within traditional knowledge and values so that these systems become more robust, with linkages and synergies with scientific knowledge, thereby avoiding maladaptation Adaptation is owned and driven by communities through: • Adaptation implementation plans and actions being developed and driven by the community itself, following its own planning processes that are context specific • Existing community engagement, governance and implementation structures and traditional systems being adhered to and strengthened through adaptation initiatives
Ecosystem Based Approaches	Support ecosystem function and services through action and planning by: • Embedding action and planning within an ecosystem, strengthening all interrelated parts and components (social, biological, economic) • Prioritizing action incorporating threats and solutions from the ridge to the reef of island communities (e.g. waste management) • Adaptation action building on and incorporating taboos, conservation areas and locally managed

	areas and protects vulnerable habitats and ecosystems and carbon sinks will be prioritized • Quantifying and building into adaptation planning and budgeting the value and benefit of ecosystem services • Identifying and minimizing negative impacts on the environment from adaptation activities under Vanuatu's legislation and international practices • Developing advocacy and educational programs for all stakeholders at all levels around the value of ecosystem based adaptation • Implementing sound land use planning approaches and policy documents (eg Land Use Planning Policy, Foreshore Development Act, Physical Planning Act)

Contribuciones Previstas Nacionalmente Determinadas de la República Bolivariana de Venezuela para la lucha contra el Cambio Climático y sus efectos

Noviembre 2015

A.- Presentación

- Desde su fundación nuestro país creció sobre los ideales de libertad, justicia e independencia, democracia e inclusión, orientado a la reducción de inequidades y el empoderamiento de los pueblos. La lucha de Venezuela por la independencia de los poderes coloniales se extendió a cinco países, bajo la convicción del derecho y deber de los pueblos de elegir su propio destino desde la justicia y convivencia solidaria. Ese lucha aun continua.
- Simón Bolívar, reconocido como el padre de la patria venezolana, definió una geopolítica americana anticolonialista y antiimperialista; dejó trazados los elementos conceptuales fundamentales, las categorías de lo que es una tesis geopolítica que reivindicamos 200 años después: la necesidad de construir el equilibrio de las naciones, un mundo de justicia, un mundo de paz.
- Estamos convencidos de que los valores capitalistas como el consumismo, el individualismo y el crecimiento ilimitado son la base de la enorme crisis social, política y ambiental que atraviesa nuestra civilización. En palabras del comandante Chávez, “El capitalismo, la economía capitalista, termina destrozando el ambiente, destrozando la sociedad, destrozando el planeta. Es la economía capitalista la causa fundamental de los destrozos que hay hoy sobre el planeta, de los grandes desequilibrios naturales, climáticos, que han roto el equilibrio en la Tierra”. “Es práctica y éticamente inadmisible sacrificar a la especie humana invocando de manera demencial la vigencia de un modelo socioeconómico con una galopante capacidad destructiva. Es suicida insistir en diseminarlo e imponerlo como remedio infalible para los males de los cuales es, precisamente, el principal causante”.
- Los valores capitalistas deben ser reemplazados por valores basados en la justicia, la solidaridad, la vida comunitaria, la armonía con la naturaleza y el respeto de sus ciclos, el respeto de la espiritualidad de los pueblos, el respeto por los valores y saberes indígenas y campesinos. En otras palabras, deben ser reemplazados por valores ecosocialistas. Creemos que nuestras sociedades deben cambiar y que esa transformación solo puede ocurrir desde las raíces, desde la participación, acciones y saberes de grupos y

organizaciones sociales de base, desde la justicia, la equidad, el respeto y la inclusión.

- Venezuela ha asumido el reto de la transformación. Somos ecosocialistas, por convicción de espíritu y razón. Afirmamos nuestro compromiso con la construcción de un modelo alternativo de desarrollo y nuestra voluntad inquebrantable de trabajar hombro a hombro con todos los que quieran aceptar la responsabilidad que los pueblos del mundo nos han dado. Como afirmó recientemente el presidente Nicolás Maduro en la Asamblea de las Naciones Unidas, creemos necesario un nuevo concepto, un nuevo mundo como necesidad de la humanidad; una geopolítica de respeto de los pueblos, de la identidad; una política de convivencia; una política de paz con justicia, con igualdad; una política que rechace todo intento de imponer la voluntad de un país sobre otro; sea por la vía de la amenaza y el uso de la fuerza, o por la vía financiera, económica, cultural y política.

- Nuestra Constitución, aprobada en referéndum popular en 1999, consagra los Derechos Ambientales y es pionera en establecer que “es un derecho y un deber de cada generación proteger y mantener el ambiente en beneficio de sí misma y del mundo futuro. Toda persona tiene derecho individual y colectivamente a disfrutar de una vida y de un ambiente seguro, sano y ecológicamente equilibrado. El Estado protegerá el ambiente, la diversidad biológica, los recursos genéticos, los procesos ecológicos, los parques nacionales y monumentos naturales y demás áreas de especial importancia ecológica. El genoma de los seres vivos no podrá ser patentado, y la ley que se refiera a los principios bioéticos regulará la materia. Es una obligación fundamental del Estado, con la activa participación de la sociedad, garantizar que la población se desenvuelva en un ambiente libre de contaminación, en donde el aire, el agua, los suelos, las costas, el clima, la capa de ozono, las especies vivas, sean especialmente protegidos, de conformidad con la ley.”

- El Plan de Desarrollo Económico y Social de la Nación, aprobado como Ley Nacional en 2013, hace manifiesta nuestra voluntad de transformar el país y contribuir a salvar la vida en el planeta hacia un mundo justo y sustentable; organizado sobre bases e instituciones internacionales verdaderamente democráticas; y orientado a la suprema felicidad social perdurable y el Buen Vivir.

- El Cambio Climático es uno de los mayores problemas que afecta actualmente al planeta. Es un problema que transciende lo ambiental y debe

ser considerado en sus dimensiones ética, económica, social y política. Es, de hecho, una de las manifestaciones más claras de la crisis del capitalismo como sistema depredador que hace imposible una vida sana, plena, solidaria y en paz sobre la tierra.

- La lucha contra el Cambio Climático materializa en efecto el enfrentamiento entre dos modelos y visiones de mundo. Los países desarrollados buscan perpetuar los esquemas hegemónicos que los favorecen, fortaleciendo los patrones de consumo, producción, control, dominación y mercados que enriquecen a sus élites dominantes. Los países en desarrollo exigen el derecho a erradicar la pobreza y elegir sus propias formas de desarrollo sin sufrir las consecuencias y cargar el lastre generado por los niveles de consumo insostenibles de los países llamados desarrollados.

- Esta lucha tiene muchas facetas, una de ellas es la que está desarrollándose bajo la Convención Marco de las Naciones Unidades sobre el Cambio Climático. Lo que se está negociando allí va mucho más allá de las acciones para la mitigación o adaptación: se están negociando las futuras relaciones de poder basadas en el uso y distribución de la energía y los elementos naturales que marcarán las estructuras hegemónicas del futuro.

- La estrategia para combatir el Cambio Climático debe ser efectiva pero también justa y equitativa. Esto es, debe considerar las responsabilidades históricas y contribuir a disminuir las inequidades que afectan negativamente a numerosos países y grupos sociales, no a profundizarlas. Los principios y compromisos que reconocieron todos los países firmantes de las Convención Marco de Naciones Unidades sobre Cambio Climático establecen bases éticas y prácticas en este sentido, en particular en lo referente a las responsabilidades comunes pero diferenciadas y a las prioridades que debe tener el desarrollo y la erradicación de la pobreza para los países en desarrollo. A esto debe añadirse, tal como se acordó en Rio+20, el derecho de cada país de decidir libremente sus propias formas y vías de desarrollo sustentable. La lucha de los países en desarrollo contra el Cambio Climático es la lucha por la defensa de la Convención, sus principios y disposiciones, es la lucha por la vida.

- Son los pueblos, representados por sus gobiernos, los que tienen el deber y la responsabilidad de mediar y equilibrar los intereses de los distintos actores que hacen vida dentro de sus países. No es posible ni aceptable delegar responsabilidades de Estado en el sector privado. La Convención Marco de

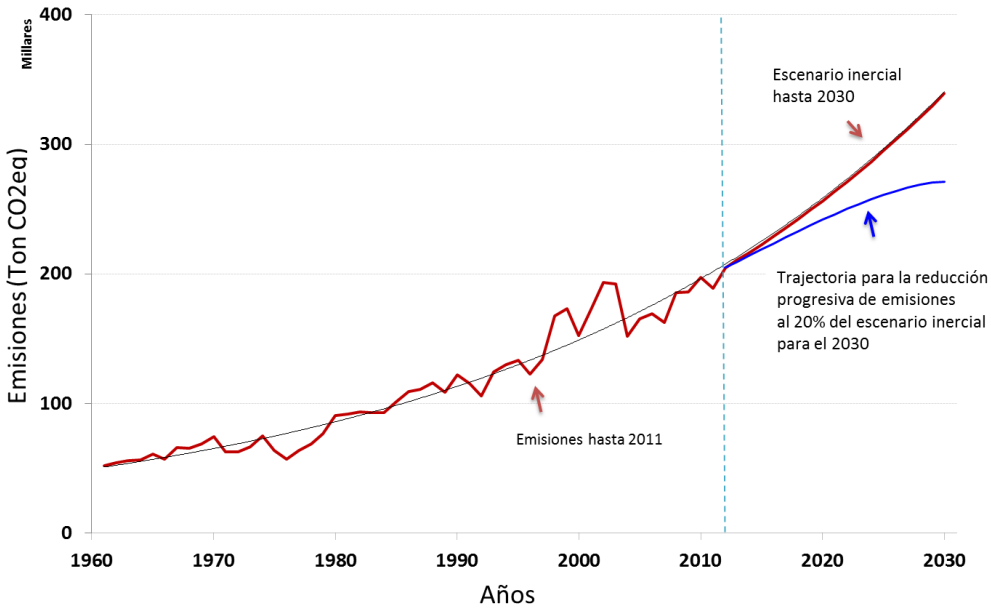
Naciones Unidades sobre Cambio Climático es y debe ser una Convención guiada por los países, no una ronda de negocios enfocada hacia cuestionados mecanismos de mercado o un espacio para el enriquecimiento de la empresa privada. Cada país debe decidir internamente, de acuerdo a sus necesidades, prioridades y modelo de desarrollo, como se articularán esfuerzos con los sectores no gubernamentales o subnacionales, pretender imponer un esquema uniforme para todas las naciones es contrario al respecto de la soberanía nacional.

- No hay solución sin justicia y sólo puede haber justicia si los errores y atropellos del pasado son corregidos ahora, en este presente que nos ha tocado vivir y que dejará su marca en el futuro. Cualquier acuerdo a espaldas de la justicia y el pasado es una estafa a los pueblos del mundo que tienen su mirada puesta en nosotros. Debemos mirar con optimismo, compromiso y dignidad el futuro, con los pies plantados firmemente en el presente, desde una clara consciencia de la justicia y de la historia.

- El Cambio Climático es una de las facetas de la crisis ambiental global generada por patrones de producción y consumo excesivos e insostenibles, particularmente en los países desarrollados. Por consiguiente, sólo la modificación de estos patrones constituye una solución verdadera y perdurable a la crisis ambiental y por consiguiente al Cambio Climático.

- Venezuela, siendo un país con zonas de baja altitud, zonas insulares, zonas costeras bajas, zonas áridas y semiáridas, zonas expuestas a inundaciones, sequía y desertificación, y zonas con ecosistemas montañosos frágiles; además de ser un país en desarrollo cuya economía depende particularmente de la producción, uso y exportación de combustibles fósiles, categorías todas establecidas en la Convención Marco de Naciones Unidades sobre Cambio Climático como de alta vulnerabilidad; es un país particularmente sensible a los efectos adversos del Cambio Climático y a los efectos secundarios de potenciales medidas de respuesta. Esta vulnerabilidad se ha hecho patente en una serie de emergencias y desastres naturales con efectos severos en viviendas, producción de alimentos, generación de electricidad y diversidad biológica, entre otras. Frente a esta situación Venezuela ha tomado medidas a gran escala que han permitido atender y proteger a la población afectada, reducir los daños y disminuir la vulnerabilidad a un alto costo para la nación.

- A pesar de que Venezuela no es un país con responsabilidades históricas en Cambio Climático, ha emprendido una ambiciosa serie de acciones financiadas nacionalmente con gran incidencia en reparación de pérdidas y daños, adaptación y mitigación. En el marco de lo acordado bajo la Convención Marco de Naciones Unidades sobre Cambio Climático en relación a las Contribuciones Previstas Nacionalmente Determinadas (INDC), Venezuela, comprometida en la construcción de un modelo económico productivo ecosocialista, presenta aquí algunas de sus contribuciones en esta materia. Estas acciones se articulan en el marco del plan de desarrollo de la nación, en el cual se plantea la profundización de políticas ecosocialistas con un alto impacto social, económico y ambiental en materia de Cambio Climático. Venezuela presenta ambiciosas contribuciones en adaptación y mitigación, abarcando acciones y políticas hacia un desarrollo justo y sustentable. Estas contribuciones se han adelantado de forma voluntaria y con financiamiento propio. Las mismas no han sido presentadas formalmente hasta ahora en el marco de la lucha contra el Cambio Climático. El Plan de Desarrollo Económico y Social de la Nación establece la prioridad de la lucha contra el Cambio Climático en el marco de un desarrollo integral, humanista y ecosocialista orientado al Buen Vivir en armonía con la Madre Tierra.
- La emisiones de Venezuela (0.18Gton CO2eq/año) solo representan alrededor del 0.48% de la emisiones mundiales de gases de efecto invernadero. Sin embargo, como parte de las políticas establecidas en el plan de desarrollo económico y social del país, Venezuela se propone implementar un Plan Nacional de Mitigación en conjunto con un Plan Nacional de Adaptación. El Plan Nacional de Mitigación apuntará a la reducción de las emisiones del país en al menos un 20% para 2030 en relación al escenario inercial, entendido este como un escenario hipotético en el cual no se implementa el plan. El grado en que se alcance esta meta dependerá del cumplimiento de los compromisos de los países desarrollados en cuanto a provisión de financiamiento, transferencia de tecnología y formación de capacidades de acuerdo al Artículo 4.7 de la Convención.



Fuentes de información base: http://www.worldbank.org/ (Emisiones de dióxido de carbono derivadas de la quema de combustibles fósiles y de la fabricación de cemento. Incluyen el dióxido de carbono producido por el consumo de combustibles sólidos, líquidos, gases combustibles y la quema de gas).

- Está claro, sin embargo, que las acciones y políticas de un solo país no son suficientes. Solo si los países que tienen responsabilidades históricas asumen a cabalidad dichas responsabilidades mediante ambiciosas metas de mitigación (entre 50 y 70 % de reducción de las emisiones actuales según el IPCC en su 5to informe, estimado que probablemente aumente a medida que se mejora el conocimiento) y la provisión confiable, suficiente y predecible de medios de implementación (financiamiento, transferencia tecnológica y formación de capacidades) a los países en desarrollo; podemos aspirar a una solución real, justa y perdurable al problema del Cambio Climático. Esto pasa por el establecimiento de metas globales para todos los medios de implementación, y sistemas de monitoreo, reporte y verificación para el cumplimiento de las mismas por parte de los países desarrollados. Los medios de financiamiento deben provenir de fondos

públicos y ser administrados bajo la Convención de acuerdo a las prioridades y necesidades establecidas nacionalmente por cada país. La transferencia tecnológica debe estar orientada al "desarrollo y el mejoramiento de las capacidades y tecnologías endógenas de las Partes que son países en desarrollo" (Art. 4.5, CMNUCC) considerando mecanismos para la flexibilización de los derechos de propiedad intelectual que hagan esto posible. El nuevo acuerdo a ser firmado en París debe ser un acuerdo basado en la justicia y orientado a profundizar la implementación de la Convención bajo sus principios y disposiciones; que establezca vías para saldar la deuda climática de los países desarrollados, y facilitar el ejercicio del derecho al desarrollo y la erradicación de la pobreza en los países en desarrollo, un acuerdo que potencie el desarrollo sustentable, justo, equitativo y solidario del planeta.

- De acuerdo a 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, la República Bolivariana de Venezuela presenta aquí su Contribuciones Previstas Nacionalmente Determinadas para la lucha contra el Cambio Climático y sus efectos. Es importante sin embargo destacar que lo que se acuerde en la COP21-MOP11 en París es un componente crítico del escenario futuro del Cambio Climático en el que estas contribuciones continuarán siendo implementadas, por lo que Venezuela se reserva el derecho de reconsiderar sus estrategias y metas en función de lo acordado en la COP21-MOP11 y las prioridades de desarrollo nacional.

B.- Acciones y programas con impacto en adaptación o mitigación del Cambio Climático y sus efectos

Venezuela ha emprendido una serie de acciones y programas con importantes repercusiones en el combate del Cambio Climático y sus efectos desde una perspectiva de justicia e inclusión social. Estos programas podrían profundizarse y multiplicarse mediante el cumplimiento de los compromisos de provisión de medios de implementación por parte los países desarrollados bajo la Convención. Se enumeran algunos a continuación:

INDUSTRIA

Industria Petrolera

- Como medidas compensatorias asociadas a los proyectos de PDVSA y ordenadas en la legislación ambiental, la industria petrolera ha llevado a cabo el establecimiento y mantenimiento de bosques compensatorios en un área total de 14.423 hectáreas. Estos sistemas agroforestales (bosques compensatorios, de producción y de protección) funcionan como sumideros de carbono. Actualmente se lleva a cabo la validación de las variables de campo para realizar la estimación de fijación de CO_2. Se tiene previsto para el periodo 2016-2019 el establecimiento de 2.184 hectáreas adicionales de Sistemas Agroforestales.
- La industria desarrolla actualmente un importante número de Proyectos para la minimización o aprovechamiento del gas quemado y/o venteado por PDVSA en sus operaciones de exploración y producción; esto implica la adecuación de las operaciones y las instalaciones en términos de infraestructura y facilidades para el aprovechamiento del gas natural. Se estima que en un periodo de dos años se han dejado de emitir a la atmósfera, por el aprovechamiento del gas natural, un total acumulado de 516 KTon de CO_2Eq. Para el periodo 2016-2019 se tiene previsto culminar los proyectos futuros, y se estima que gracias a la ejecución de estos proyectos se dejará de emitir a la atmósfera la cantidad de 538,2 KTon CO_2Eq/año.

Industrias Básicas e Intermedias

- **Plan 200 fábricas Socialistas**: Creación y repotenciación de empresas de reciclaje; Pulpaca (empresa con capacidad de reciclaje de madera y papel para la fabricación de bobinas de papel), línea de reciclaje de INVEPAL, VENEVIDRIO (Utilización hasta un 90% de vidrio para reciclaje en su proceso productivo), Complejo Siderúrgico y SIDOR utilización hasta un 100% de chatarra en su proceso productivo, proyecto de instalación de líneas de producción en las empresas de la corporación del plástico, alianzas estratégicas con el sector privado para el suministro de materia prima secundaria para la industria y propuesta de ley de Gestión y Recuperación de Residuos como Materia Prima Secundaria para su Incorporación en la Industria Nacional. Todas estas iniciativas generan un aumento en la eficiencia energética y una disminución en la necesidad de extracción de materia prima, lo que se traduce en disminución de emisiones asociada a procesos industriales.
- **Proyecto nacional de eliminación progresiva de las sustancias agotadoras de la capa de ozono:** La eliminación progresiva del uso de las sustancias que agotan la capa de ozono e inciden en el cambio climático, en cumplimiento con el Protocolo de Montreal, busca la reducción del consumo país en un 10% para el año 2015 con respecto a su línea base de consumo país establecidas en 207 toneladas de potencial agotador de ozono, asociados al uso de hidroclorofluorocarbonos (HCFC), principalmente en refrigeración, aire acondicionado y espumas de poliuretano. mediante el plan de formación y sensibilización de los actores involucrados sobre el peligro ambiental que representa el uso indebido de los refrigerantes halogenados, así como la adecuación de la norma legal correspondiente. Esto ha significado la reducción de 2.5 MTon CO_2Eq.

ENERGIA ELÉCTRICA

Eficiencia energética, uso racional de la energía y energías complementarias

- Cerca del 70% de la energía en Venezuela es hidroeléctrica, esto implica que el país es excepcionalmente limpio en su matriz energética pero a la vez altamente vulnerable a sequias.

- La eficiencia energética y el uso racional de la energía y el impulso de energías complementarias se ha fortalecido como política con la creación del Despacho de Viceministro de Nuevas Fuentes y Uso Racional de la Energía Eléctrica.
- Con el objetivo de disminuir esta vulnerabilidad nacional en cuanto a generación eléctrica frente a la sequía, se han construido centrales termoeléctricas, generándose una reducción de 4,38% de la dependencia de producción de energía a través de grandes Centrales Hidroeléctricas, con respecto a la matriz energética del año 2010. Por otra parte, se inició la substitución de tecnología de generación termoeléctrica basada en combustibles líquidos (diésel y fuel-oíl) por gas natural en tecnologías de ciclo combinado en plantas generadoras del país, registrándose a la fecha un incremento de 6,92% en la generación con turbinas a gas con respecto a la matriz energética nacional del 2010.
- Mediante el *Programa de Sustitución de Bombillos Incandescentes por Bombillos Ahorradores* desde 2006 hasta el 1er semestre de 2015 se han instalado 206.000.000 (206 millones) de Lámparas Fluorescentes Compactas (LFC).
- Otras medidas incluyen:
  - Programa de reemplazo de equipos acondicionadores de aire (A/A) y refrigeradores por equipos eficientes. Se sustituyeron 42.504 A/A (entre los años 2011-2013) y 3.077 refrigeradores durante el año 2012.
  - Construcción de dos parques de generación eólica de alta capacidad (Paraguaná y la Guajira).
  - Implementación del Programa *Sembrando Luz* que permite dotar de servicio eléctrico a comunidades aisladas, a través de sistemas híbridos de energía eólica y solar. El manejo de las instalaciones asociadas ha implicado 1.327 acciones de capacitación con 14.617 beneficiados.
  - Promulgación de normativa legal sobre Eficiencia Energética: Ley de uso racional y eficiente de la energía; Resoluciones sobre Eficiencia Energética para el Sector Público y Privado; Reglamentos Técnicos sobre parámetros de eficiencia energética en artefactos eléctricos: A/A, Refrigeradores, LFC; Prohibición gradual de importación de

bombillos incandescentes. Normas de etiquetado de eficiencia energética; tarifas eléctricas escalonadas de acuerdo a consumo, prohibición de importación de dispositivos ineficientes.

- Implementación del *Plan Banda Verde* dirigido al sector residencial. Mediante este plan los hogares que se mantienen dentro de las bandas de consumo energético establecidas para cada región del país reciben un subsidio en la tarifa eléctrica
- Resoluciones ministeriales para reducción de consumo eléctrico en el sector público y privado. Obteniéndose a la fecha una reducción de 12% en el consumo de energía eléctrica para el sector público y de 8% para el sector privado.

Educación Energética y Campaña comunicacional

- Conformación de 3.000 Brigadas Educativas Integrales Comunitarias a nivel nacional, encuentros de saberes y experiencias, municipales estadales y nacionales.
- Inclusión de contenidos sobre el Uso Racional y Eficiente de la Energía Eléctrica (UREE) en la Colección de Libros Bicentenario y en las computadoras del programa masivo de computadoras para estudiantes de educación básica y bachillerato “Canaimitas”.
- Acciones de formación dirigidas al Poder Popular: Organizaciones, Comunas, Consejos Comunales, Instituciones.
- Realización de doce Diplomados en eficiencia energética dirigidos a los trabajadores del sector público y privados a nivel nacional.
- Inclusión de contenidos sobre uso racional de la energía, eficiencia energética y energías renovables, en estudios de pregrados, especializaciones, estudios no conducentes a grado y otros.
- Inclusión de contenidos relativos a la energía y su impacto en el ambiente dentro de los planes de estudio escolares.
- Encuentros escolares estadales y nacionales con niños y niñas de educación primaria sobre uso racional y eficiente de la energía.
- Campañas comunicacionales masivas de ahorro energético: "Ahorrar energía es tarea de todos", "Soy Consciente, Consumo Eficiente".

VIVIENDA

Gran Misión Vivienda Venezuela

- La Misión Vivienda surge en 2010 como respuesta a la emergencia generada por lluvias torrenciales que afectaron a cientos de miles de habitantes de las zonas más pobres del país. A través de esta Gran Misión se han construido y entregado más de 800 mil viviendas hasta Noviembre de 2015 y se plantea la construcción de tres millones de viviendas como meta acumulada para 2019. Esta misión significa una respuesta a pérdidas y daños por lluvias extremas para cerca de 150 mil personas afectadas y una reducción de vulnerabilidad frente a los efectos de Cambio Climático para más de 12 millones de personas.

TRANSPORTE

Misión Transporte

- Bajo el lema de "Movilidad colectiva para el buen vivir", el Ministerio del Poder Popular para el Transporte Terrestre y Obras Publicas desarrolla la Misión Transporte, creada el 27 de Marzo de 2014. La Misión transporte se estructura en vértices de acción: Registro Nacional, Cobertura Territorial, Servicios, Financiamiento, Educación, Infraestructura y Movilidad Urbana. Su implementación implican el uso más eficiente de los medios de transporte y la mejora y actualización del parque automotor resultando en mayor eficiencia y menores emisiones. La misma comprende:

  - Masificación de las Proveedurías de Repuestos e Insumos.
  - Seguridad de Usuarios y Transportistas en el Marco de la Misión A Toda Vida Venezuela.
  - Financiamiento a través de la Banca Pública para la Renovación de Flota.
  - Refugios para Gandolas y Autobuses Extraurbanos.
  - Refugios de Motorizados.
  - Escuela de conductores.
  - Construcción y acondicionamiento de Terminales de Pasajeros.
  - Asfaltado en el trazado de las rutas de transporte urbano.
  - Construcción de soluciones viales en ciudades.
  - Constitución de Nuevos Sistemas de Transporte.

Principales Logros de la Misión Transporte

- *Censo Nacional de Transportistas:* Permite actualizar el registro de Transportistas: condición laboral, situación de flota, rutas, paradas y estado de las unidades. Involucra también el registro de las necesidades insatisfechas de transporte de todas las comunidades. A la fecha se han censado 96.500 Transportistas y han sido registradas 3000 comunidades. Se contempla la instalación de las *Mesas técnicas de Movilidad*: la cuales reunirán a todas las fuerzas vivas de cada estado a fin de estudiar los problemas de tráfico y plantear sus posibles soluciones. Este diagnóstico permitirá además establecer un mapa de movilidad en cada ciudad.
- Se ha desarrollado un plan de construcción, reconstrucción y mantenimiento de vialidades en todo el territorio nacional, por lo que 51 soluciones viales habrán sido habilitadas antes de terminar el año 2015. Estas soluciones permiten la descongestión del tráfico y considerables reducciones de tiempo en los tiempos de movilización vehicular, logrando disminuir el impacto ambiental del parque vehicular del país.
- Han sido creados nuevos sistemas BRT (Bus de Transito Rápido) en las ciudades de Maracay, Barquisimeto, Barcelona, Maracaibo, Puerto La Cruz, Mérida y Caracas. Estos sistemas especiales de Transporte poseen canales exclusivos, paradas inteligentes y sistemas de seguridad con ubicación satelital.
- Han sido creados 45 nuevos sistemas de transporte público superficial con unidades de última generación que recorren 329 nuevas rutas operativas atendiendo a más de 3 millones de personas en 120 ciudades del país.
- Inauguración de la Planta de Autobuses Yutong, que forma parte del convenio China – Venezuela, con una capacidad de ensamblaje de 14 modernas unidades por día.
- Creación del Banco del Transportista y entrega de créditos del estado para el sector transporte a través de la banca pública, lo que ha permitido la renovación de la flota mediante la entrega de 715 Unidades a 405 líneas beneficiadas.

Construcción y expansión de Sistemas de Transporte Masivo con la consecuente disminución en el uso de vehículos.

- En la actualidad, la C.A. Metro de Caracas ejecuta un conjunto de proyectos de expansión de Líneas, tal es el caso de la Línea 5 (12,5 Km y 10 estaciones) y el Sistema Caracas - Guarenas – Guatire (30 Km y 7 estaciones). Además, se lleva a cabo la renovación y reacondicionamiento de la Línea 1. Estos trabajos son complementados por dos proyectos, que constituyen soluciones de transporte auxiliares al sistema Metro, como lo es el Metrocable Mariche y el Cabletren Bolivariano.
- Actualmente está en construcción la Línea II del Sistema Metro Los Teques, que irá desde la Estación Alí Primera, ubicada en el sector El Tambor, hasta San Antonio de los Altos, tendrá una longitud de 12 kilómetros y estará distribuida por seis (06) estaciones, las cuales recorrerán los municipios Guaicaipuro, Carrizal y Los Salias.
- Se encuentra en construcción la Línea 2 del Sistema Metro de Valencia, en la capital del estado Carabobo, la cual tendrá una extensión de 4,3 Km y beneficiará aproximadamente a más de 1.800.000 personas.
- Se encuentra en construcción el Ferrocarril Puerto Cabello – La Encrucijada, el cual posee una longitud 108,8 kilómetros y está enfocado al desarrollo del eje Norte – Costero del país, mediante un sistema de transporte intermodal, moderno, rápido y económico capaz movilizar más de 14 millones de usuarios al año y transportar más de 11 millones de toneladas de carga anuales. Tendrá seis estaciones: Puerto Cabello, Naguanagua, Guacara, San Joaquín, Mariara y Maracay. Además de San Diego y La Encrucijada que servirán para la colocación de mercancía ganadera, agrícola, pecuaria e industrial, y su posterior distribución en todo el territorio nacional. Gracias a este ramal ferroviario se disminuirá significativamente la circulación del transporte de carga. Esta obra generará 5 mil 422 plazas de trabajo entre directas e indirectas.

SALUD

Aumento de la cobertura en atención médica

- Antes de la Revolución Bolivariana en 1999, más del 60% de las personas que vivían en sectores populares nunca habían acudido a un

médico para una consulta de chequeo general. En 2015 se cumplen 12 años desde la creación de Barrio Adentro, misión sin precedentes que permite el acceso a los servicios de salud de alta tecnología de forma gratuita a sectores significativos de la población. Barrio Adentro es responsable de al menos 704 millones 958 mil consultas médicas gratuitas en los últimos 12 años.

- Barrio Adentro es creado en 2003 con la ayuda del gobierno de Cuba, para ofrecer servicios de salud a la población venezolana en ambulatorios pequeños construidos y dotados de insumos médicos en zonas anteriormente desatendidas. Más adelante se creó Barrio Adentro II para ampliar los servicios médicos, con la construcción de ambulatorios más grandes, y luego en 2005 Barrio Adentro III mediante el cual de construyeron 600 Centros Diagnósticos integrales y 600 Salas de Rehabilitación integral. En 2006 se inicia Barrio Adentro IV con la inauguración de centros especializados como el Hospital Cardiológico Infantil en Caracas.
- La creación de estos programas de salud implican una disminución de la vulnerabilidad frente a enfermedades, incluyendo aquellas cuya incidencia y distribución geográfica aumentará como consecuencia de Cambio Climático

ORGANIZACIÓN POPULAR Y PARTICIPACIÓN

- El fortalecimiento de la organización social en Venezuela es determinante para la reducción de la vulnerabilidad frente al Cambio Climático. El Censo Comunal 2013 permitió cuantificar en todo el país 40.035 Consejos Comunales, 1.401 Comunas, 1.294 Salas de Batalla Social y 28.791 Movimientos Sociales, que suman 71.521 organizaciones sociales. Actualmente se han registrado 1377 comunas y 45333 consejos comunales (Fuente: Ministerio del Poder Popular para las Comunas (2015) estadísticas. Consultado el 2/11/2015. Disponible en http://www.mpcomunas.gob.ve/). Las Comunas y los Consejos Comunales son formas de organización social que a través de procesos de territorialización generan acciones de reducción de la vulnerabilidad a través de la autoconstrucción, la organización para la producción sustentable y la organización para la vida en comunidades donde el transporte y el consumo se reducen por la territorialización y ubicación accesible de servicios e insumos para la vida: escuelas locales, mercados, centros de salud, entre otros.

DIVERSIDAD BIOLÓGICA

Estrategia Nacional de Diversidad Biológica

- Desde 2010, la República Bolivariana de Venezuela cuenta con la Estrategia Nacional para la Conservación de la Diversidad Biológica 2010-2020 (ENCDB) y su Plan de Acción Nacional (PAN), adelantándonos cinco años a la Meta 17 para el 2015 del Plan Estratégico para la Diversidad Biológica (Aichi) del Convenio sobre Diversidad Biológica. La ENCDB y su PAN, como parte del Segundo Plan Socialista de Desarrollo Económico y Social de la Nación, dicta los lineamientos fundamentales que permitirán, durante este decenio, la articulación nacional para la construcción colectiva de un modelo de vida alternativo fundamentado en la sustentabilidad. Estos instrumentos, representan el marco metodológico, conceptual y político alineado al proyecto de país, para el ejercicio soberano de la conservación y aprovechamiento sustentable de la Diversidad Biológica, disminuyendo así la vulnerabilidad frente a los múltiples efectos adversos del Cambio Climático.
- La ENCDB y su PAN fueron construidos con la participación simultánea de comunidades organizadas, estudiantes, colectivos, profesores, funcionarios y militantes, organizados en mesas de trabajo en numerosos talleres, los cuales contaron con la participación de más de 5.000 personas a nivel nacional. Durante estos encuentros se generaron debates que permitieron la inclusión de las distintas visiones de mundo presentes en nuestro territorio, promoviendo la planificación estratégica desde las realidades locales y aprovechando las fortalezas de las diferentes regiones del país.

Congreso Venezolano de Diversidad Biológica

- El Congreso Venezolano de Diversidad Biológica es un espacio para el encuentro de saberes y el intercambio de experiencias. Seis años consecutivos han permitido consolidar formas anti-coloniales y soberanas de circulación de conocimiento, haciendo posible la emergencia de nuevos actores y actoras productoras de saberes en diálogo. El diálogo entre distintas matrices de racionalidad, la complementariedad de la vida misma, el reconocimiento de la diversidad y el intercambio de experiencias son las premisas sobre las que se sostienen estos congresos.

- A su vez, este espacio funciona como un mecanismo de socialización del conocimiento acerca de la diversidad biológica desde distintos enfoques y perspectivas. El congreso se enmarca en la Estrategia Nacional para la Conservación de la Diversidad Biológica 2010-2020, con el objetivo de socializar el conocimiento y promover la inclusión y la justicia social. Este congreso, funciona también como un mecanismo de seguimiento de la propia estrategia y su plan y se viene consolidando como un espacio anual para el intercambio de saberes y experiencias sobre conservación de la Diversidad Biológica con compromiso social.
- Este evento periódico se encuentra respaldado por una resolución ministerial, que busca garantizar su continuidad. Este evento nacional se ha convertido en un espacio de encuentro entre instituciones, colectivos, productores, productoras, cultores de la ciencia, comuneros, comuneras, militantes, aficionados, aficionadas y todos los distintos actores vinculados con la preservación de la vida y el buen vivir, incluyendo la adaptación al Cambio Climático. Hasta la fecha han participado aproximadamente 11919 personas.

SOBERANÍA ALIMENTARIA Y AGRICULTURA SOSTENIBLE

Uno de los sectores que son más fuertemente impactados por el Cambio Climático es el sector de producción de alimentos. La promoción de sistemas agroecológicos basados en la sustentabilidad y el respeto de los procesos ecosistémicos naturales, sistemas agrícolas urbanos y periurgabanos y la prevención de riesgos climáticos, constituyen medidas muy efectivas de adaptación al Cambio Climático. Se enumeran a continuación algunas acciones y programas en este sentido:

Red de laboratorios de insumos biológicos:

- Existen 28 laboratorios de producción de insumos biológicos (biocontroladores y biofertilzantes) a nivel nacional para sustituir el uso de agrotóxicos. Se han desarrollo protocolos de manejo de insumos biológicos para producción de semillas, así como para planes de siembra de maíz, leguminosas y hortalizas. Esta red de laboratorios está bajo responsabilidad del Instituto Nacional de Salud Agrícola Integral (INSAI).

Conservación de la agrobiodiversidad:

- Se han realizado seis Congresos anuales sobre Diversidad Biológica, que se realizan bajo decreto ministerial, en donde se discuten temas asociados a la diversidad cultural y biológica. Es una contribución relevante la discusión para el fortalecimiento de la organización de los movimientos sociales en torno a la valoración, conservación, reproducción y distribución de las semillas campesinas, indígenas y afrodescendientes. En este mismo orden de ideas, se ha fortalecido un movimiento campesino, indígena, intelectual y cultural que tiene como eje articulador la protección de la diversidad biológica y cultural asociada a las semillas, como defensa contra el cambio climático, y que desarrolla actividades de organización, difusión de material audiovisual, formación y producción de alimentos y semillas con altos saldos organizativos, en espacios rurales y urbanos apoyados por la institucionalidad venezolana.
- Se han llevado a cabo experiencias de rescate de papas y otros rubros andinos nativos e incorporado estas variedades a los planes nacionales y políticas públicas sobre de semilla.

Agroecología

- Programa todas las manos a la siembra: Se creó el por resolución del Ministerio de Poder Popular para la Educación (Resolución Nº 024, de fecha 15 de abril de 2009) el programa Nacional Todas las Manos a la Siembra, que establece la incorporación de los contenidos referentes a la agroecología en el desarrollo curricular, dentro del eje de integrador Ambiente y Salud Integral, donde la agroecología debe formar parte de los procesos de aprendizaje en el Sistema Educativo Venezolano, desde la educación inicial hasta la secundaria.
- Creación de programas de formación de Licenciatura y Diplomado en Agroecología (Universidad Bolivariana de Venezuela e Instituto de Estudios Avanzados). Creación del Instituto Universitario Latinoamericano de Agroecología Paulo Freire (IALA). Programa de huertos urbanos y periurbanos.

Programa de agricultura urbana y periurbana "Agrociudad"

- En 2009 se creó este programa a nivel nacional para fomentar y consolidar la agricultura urbana y periurbana, como un sistema de organización e integración familiar y comunal, que garantice la

sustentabilidad en cuanto al mejoramiento de la disponibilidad de los alimentos. Estuvo bajo responsabilidad de la fundación CIARA y ahora FONDAS (Fondo Nacional de Desarrollo Agrario Socialista del Ministerio del Poder Popular para Agricultura y Tierras). En el caso del Distrito Capital, este año se creó la secretaría de Caracas Productiva en el Gobierno de Distrito Capital llamada a impulsar las experiencias productivas en la ciudad con enfoque agroecológico. Articula a 550 experiencias productivas en la ciudad disminuyendo la vulnerabilidad frente al Cambio Climático en el área de agricultura y producción de alimentos.

Reducción de los riesgos climáticos en las actividades agropecuarias

- Establecimiento de Calendarios de Siembra por el Instituto Nacional de Meteorología e Hidrología (INAMEH), para minimizar los riesgos en la producción agrícola y el manejo adecuado de agua y de insumos en general, como factores clave en el logro de la plena soberanía alimentaria. Entre otras cosas implica realizar Zonificaciones Agrometeorológicas. Algunos beneficios esperados son:
  - Reducción de los impactos de veranillos y sequías meteorológicas.
  - Escogencia de pastos resistentes a sequías y de zonas de aguachinamiento.
  - Selección de Zonas Aptas para el desarrollo de Cultivos con un Manejo Integral de los Recursos Hídricos.
  - Mapas de Calendarios de Siembra para todas las zonas agrícolas del país.
  - Mapa de Tipos Climáticos a nivel nacional.
  - Zonificación Agroclimática al menos para 15 cultivos que demanda la patria como prioritarios.
  - Monitoreo permanente de eventos extremos climáticos como sequías y excesos de lluvias que afecten la productividad.
  - Disponer de una unidad ó gerencia de Agrometeorológia encargada de dar respuesta oportuna a los productores del campo, seguros agrícolas y decisores.

CONSERVACIÓN Y MANEJO DEL AGUA

- En 1999 el Gobierno Bolivariano inició un proceso de incorporación del pueblo a la gestión del agua a través de las Mesas Técnicas de Agua como

espacios periódicos, públicos y permanentes donde el pueblo organizado ejerce el derecho a la soberanía, la democracia participativa protagónica y la corresponsabilidad en materia del servicio de agua potable y saneamiento ambiental. Estas organizaciones comunitarias permiten potenciar las capacidades del Poder Popular para el diagnóstico, atención de sus necesidades, formulación y acompañamiento en la ejecución de proyectos comunitarios con gestión directa del recurso, así como la creación de cultura y valores ambientales para la concientización sobre la conservación y uso eficiente del agua.

- En 2015, nacen las Salas de Gestión Comunitaria del Agua que permiten la articulación de todos los entes involucrados en la gestión del agua, incluyendo las mesas técnicas de aguas y otras formas de organización popular, aumentando la eficiencia en la gestión de las redes de distribución de agua potable y de recolección aguas servidas de su territorio.
- En la actualidad existen 7454 mesas técnicas de agua en todo el territorio nacional. Esta organización es parte de los logros que han permitido que más del 96% de la población venezolana tenga acceso al servicio de agua potable sea participante protagónico de la gestión del servicio, aumentando la eficiencia y disminuyendo la vulnerabilidad a los efectos del Cambio Climático sobre la disponibilidad y calidad del agua.

CONSERVACIÓN Y USO SOSTENIBLE DE LOS BOSQUES

La conservación y el manejo sustentable de los bosques es una medida de gran incidencia tanto en adaptación, disminuyendo la vulnerabilidad de los bosques, como en mitigación, debido a la protección de sumideros y al aumento de la captura de CO2 por los mismos.

Generación de instrumentos legales para la preservación del patrimonio forestal y el aprovechamiento sustentable de bosques:

Resolución 86 del 27/10/2008

Cálculo de volumen de madera extraída del bosque por una nueva fórmula (Smalian), que sincera en un 95% el volumen real; se han reducido los impactos de explotación y permite la modernización de los procesos de aserrío e industrialización.

Resolución 30 del 10/06/2009

Regula el aprovechamiento de especies forestales, considerando los diámetros mínimos de cortabilidad, garantiza los procesos de

sucesión ecológica, estructura del bosque y biodiversidad. Implica la adopción de prácticas de gestión forestal sustentable como el mapeo de árboles aprovechables para la optimización del trazado de las vías de extracción.

Resolución 29 del 10/06/2009

Selección y Registro de Árboles Semilleros, preservando bancos de germoplasma y como fuentes de semillas, a objeto de garantizar la megadiversidad del Bosque Tropical. Utilización de técnicas de impacto reducido para el aprovechamiento forestal, disminuyendo en un 70 % el impacto sobre el Bosque con relación a las Técnicas de Extracción aplicadas tradicionalmente.

Empresa Nacional Forestal Socialista (ENAFOR)

La empresa se crea con un nuevo enfoque de manejo de bajo impacto, en el cual prevalece lo ambiental y social sobre los intereses económico; impulsa proyectos de manejo forestal sustentable, en lo ambiental, social y económico, bajo el principio de usos múltiples, promoviendo la participación directa de comunidades locales y otras organizaciones sociales en la producción, procesamiento y distribución de bienes y servicios derivados del bosque. Esta empresa ha implementado en la Reserva Forestal Imataca el **Plan de Manejo Forestal Sustentable Reserva Forestal Imataca (RFI), Unidad de Manejo Imataca V**, cuyos resultados se resumen a continuación:

- Implantación del nuevo modelo de producción forestal en una superficie de 166350 ha, con posibilidad de expandirse a un millón de hectáreas.
- De acuerdo con Estimaciones realizadas por ENAFOR, para un área de 200.000 ha de bosques intervenidos y no intervenidos en la RFI (Unidades III y V), el carbono almacenado en los mismos equivale a 159 ton/ha, lo que da como resultado para esa superficie un total de 31.800.000 ton de C (116.388.000 t CO2eq), como línea base. Con la aplicación del nuevo Modelo de Manejo Forestal aplicando la Normas Técnicas y Legales, es estimó como Emisiones evitadas directas: 1.136.759,35 tCO2eq para los 5 años del proyecto en 25.000 ha (227.351 tCO2eq para 5.000 ha/año) y emisiones evitadas indirectas: 18.188.149 tCO2eq para los 5 años del proyecto (3.637.629CO2eq por año en 80.000 ha). Como línea base se

estima una pérdida de 453.135 ton/año CO2eq por uso de técnicas forestales convencionales para un área de aprovechamiento de 5.000 ha/año.

- ENAFOR, ha producido 200.000 plantas de las cuales el 60% (120.000) han sido donadas para su plantación por las misiones Arból y Vivienda, esto equivale a una superficie cercana 100 ha. Las restantes (80,000) han sido plantadas por ENAFOR para una superficie equivalente de 50 ha. Se han incorporado comunidades a las diferentes actividades del Manejo Forestal Sustentable. Estas actividades Involucran: Agroforestería, mediciones de árboles, Piqueros, Viveristas, y desarrollo Social
- Establecimiento de Banco de Germoplasma para la preservación de especies forestales.

Inventario Nacional Forestal

Proyecto cuyo objetivo general es suministrar información estadística y cartográfica homogénea, detallada, confiable y continua sobre el estado y la evolución de los recursos forestales. 133 parcelas inventariadas que representan una superficie de 6.992.953 ha, equivales al 7,62% de todo el territorio nacional. Cálculo de Potencial de carbono y CO_2eq de todos los tipos de bosques a nivel nacional.

- **Proyecto monitoreo de cambios de cobertura en la Región amazónica de Venezuela.**

Mapas de deforestación años 2000-2010-2013-2014. Plan Nacional de Monitoreo de cambios de cobertura en tiempo real. Estudio de Línea Base que permita planificar la reducción de las fuentes de GEI.

Prevención y Control de Incendios Forestales

El país ha desarrollado una política de resguardo de los Parques Nacionales y Monumentos Naturales, principalmente de las especies forestales que se encuentran dentro de dichas áreas. Se han combatido de manera oportuna más de 2.883 eventos dentro de las áreas protegidas administradas por el Instituto Nacional de Parques (INPARQUES) en el periodo 2011-2015. La toma de acciones efectivas permitió el resguardo del 98.47% de las zonas boscosas ubicadas dentro de las áreas protegidas.

Misión Árbol

- La Misión Árbol es un ambicioso plan nacional de reforestación impulsado por el Estado desde 2006 donde participan las comunidades (Consejos Comunales, Comités Conservacionistas, Escuelas, etc.) y las instituciones públicas. La reforestación se hace con fines de educación, conservación, agroforestales e industriales basada en el manejo integral y sustentable orientado al Buen Vivir. Contempla la recolección de semillas, producción de plantas en viveros institucionales, escolares o comunitarios, plantación y mantenimiento por cuatro años continuos. A la fecha se han establecido más de 30 millones de plantas.

INVESTIGACIÓN, MONITOREO Y OBERVACIÓN SISTEMÁTICA

Investigación en Cambio Climático

- Desde 2011 el Ministerio del Poder Popular para Educación Universitaria Ciencia y Tecnología ha financiado 128 proyectos de investigación en el área de Cambio Climático. Estos proyectos fueron seleccionados en convocatorias abiertas a comunidades organizadas, fundaciones, universidades y centros de investigación en todo el territorio nacional. Se enfocan en la mitigación y adaptación en una amplia gama de temas que incluyen energías complementarias, producción agrícola sustentable, educación, vivienda, inventario de emisiones, información básica, modelos predictivos y conservación y uso sustentable de la diversidad biológica.

Incremento de capacidades nacionales para el monitoreo hidrometeorológico y la predicción del clima en el país

- **Densificación de la red existente de estaciones hidrometeorológicas automáticas a nivel nacional**

  Actualmente el Instituto Nacional de Meteorología e Hidrología (INAMEH) desarrolla el proyecto de automatizar la red hidrometeorológica del país a tiempo cuasi real, con el fin de recuperar la continuidad de los registros históricos y obtener mayor cobertura espacial en función de los tipos climáticos y la hidrología nacional. A la fecha se han instalado cerca de 300 estaciones hidrometeorológicas, sin embargo se desarrollan proyectos y convenios para densificar aún más la red existente.

- **Predicción del clima futuro**

  Los Modelos Climáticos regionales permitirán la elaboración de las líneas de acción a ser consideradas dentro de las estrategias de adaptación para el Cambio Climático; también permitirán el desarrollo de los estudios para el Inventario de Gases de Efecto Invernadero y entregarán precisiones técnicas para la mitigación voluntaria. Otros beneficios de desarrollar estos modelos son:

  - Reducción de los riesgos por la variabilidad Climática y el Cambio Climático, en los sectores específicos de Salud, Desastre, Agua, Agricultura y Biodiversidad en General.
  - Establecimiento de Modelos e Indicadores Climáticos e hidrológicos para el monitoreo continuo de los eventos hidrometeorológicos adversos actuales y proyectados.
  - Elaboración de índices de Evidencias de Cambio Climático y Variabilidad Climática.

EDUCACIÓN

Políticas Educativas, participación comunitaria y formación socio-ambiental para la lucha contra el Cambio Climático

- La casa matriz de las Empresas Hidrológicas de Venezuela HIDROVEN ha desarrollado una importante gestión de acompañamiento técnico-económico a las comunidades para la autoconstrucción de los servicios de Agua Potable y Saneamiento ambiental, utilizando como estructura de organización las **Mesas Técnicas de Agua**. Estas son organizaciones comunitarias de base dedicadas a mejorar la provisión, mantenimiento y operación del servicio de agua potable y saneamiento. Se han conformado 7.454 Mesas Técnicas de Agua a nivel nacional y 74 Consejos Comunitarios de Agua.
- En el marco del programa de formación y participación se han desarrollado 355 proyectos comunitarios beneficiando a 423 comunidades y 442.809 personas, se han formado maestros y maestras en relación al Cambio Climático, se han realizado Encuentros de Saberes del Agua, se han formado a los y las trabajadoras de Hidroven en relación al Cambio Climático, se han conformado 1.118

Brigadas Integrales Comunitarias en las escuelas y 594 Mesas Técnicas de Agua Escolar.

Programa de Formación Educativa Ambiental y Participación Popular del Ministerio del Poder Popular para Ecosocialismo y Aguas

- Elaboración y divulgación de publicaciones dirigidas al Subsistema de Educación básica con contenidos de calidad. “El Fichero de Educación Ambiental para Maestras y Maestros”. Desplegable: “Somos Ambiente” N°3 y N°4. Herramienta de apoyo para la educación ambiental y divulgación en diversos temas, entre ellos los relacionados al cambio climático. El fichero consta de diez tópicos; uno de ellos es: Cambio Climático. En cuanto a la publicación Somos Ambiente N°3 Cambio Climático y N°4 Capa de Ozono.
- Otras instancias de participación popular como el “Colectivo Intersectorial de Gestión Educativo Ambiental y Participación Comunitaria. 2010-2015 (CIGEA)” y la “Red de Vigilantes Voluntarios del Ambiente (REDVIVA)”: Han brindado apoyo a la gestión ambiental, fomentando la participación proactiva y corresponsable de la comunidad y las instituciones. Acciones de Formación Socioambiental sensibilizando en la temática del Cambio Climático. Se han formado 10.215 Vigilantes Voluntarios.

MANEJO DE DESECHOS

Uno de los más grandes sectores emisores a nivel mundial es el sector de desechos y residuos sólidos; por consiguiente, los planes de manejo en esta área tienen incidencia en la reducción de emisiones y en las posibilidades de implementación de sistemas de disposición y uso eficiente de los gases generados.

Plan Nacional de Saneamiento de Vertederos y Construcción de Rellenos Sanitarios. Entre los logros del Plan se encuentran:

- Saneamiento de vertederos, construcción de rellenos sanitarios, estaciones de transferencia, recuperación de sitios de disposición final. La operación adecuada de los sitios de disposición final de residuos y desechos sólidos, minimiza la ocurrencia de enfermedades infectocontagiosa (enfermedades vectoriales), permitiendo a la vez, la captura controlada del CH_4 generado, estableciendo condiciones para implantar a corto plazo un sistema para su eliminación. Informes de Gestión y diversos Informes Técnicos

Plan Estratégico Integral para la Dotación de Equipos y Maquinaria para el Manejo de los Residuos y Desechos Sólidos. Entre los logros del Plan se encuentran:

- Optimización de las actividades de recolección y transporte de los desechos y residuos en el ámbito municipal. La actividad de recolección y transporte de los Residuos y Desechos Sólidos, reduce la proliferación de vertederos clandestinos, minimizando la ocurrencia de enfermedades infectocontagiosa (enfermedades vectoriales), y la contaminación de aguas y suelos.

Reorganización y adecuación de la Autoridad Nacional Ambiental.

- Creación de un nuevo Viceministerio, con visión ecosocialista para la Gestión Integral de los Desechos y Residuos, que ejercerá la rectoría en esta materia. La gestión eficiente y eficaz de los desechos y residuos mediante una regulación progresiva y una planificación estratégica, contribuye a la minimización de la generación de desechos y residuos, por la vía de su prevención o de su aprovechamiento, desechos que en definitiva incrementarían las emisiones actuales o se convertirían en nuevas fuentes de emisión de GEI.

ORDENACIÓN AMBIENTAL

Plan de Ordenación y Gestión Integrada de las Zonas Costeras (POGIZC) de la República Bolivariana de Venezuela.

- El POGIZC está en su fase final de elaboración y establece el marco de referencia espacial y temporal que garantice la conservación, el uso y aprovechamiento sustentable de las zonas costeras y permita elevar la calidad de vida de sus pobladores. Para ello, define 10 Programas para la Gestión Integrada de las Zonas Costeras. El POGIZC ha generado y está generando una serie de documentos técnicos relevantes para la reducción de vulnerabilidad frente al Cambio Climático:
    - Implicaciones del Cambio Climático en las Zonas Costeras y el Espacio Acuático de Venezuela (2011).
    - Riesgos Socionaturales y Tecnológicos en las Zonas Costeras de Venezuela, 2014 (En Elaboración).

- Dominio Público en las Zonas Costeras de Venezuela: Criterios para su Delimitación (Documento validado con los Comités de Trabajo de las Zonas Costeras Central y Estadales).

Proyecto de Plan Nacional de Ordenación de Territorio (2010)

- Instrumento de planificación de carácter nacional que orienta el desarrollo de todos los sectores económicos, socioculturales y ambientales del país. Se estima que la implementación de este plan genera una disminución en la vulnerabilidad de la población y las actividades socioproductivas en los procesos de ocupación espacial frente al Cambio Climático en los próximos 20 años. Se han abordado cuatro (4) Planes de Ordenación Estadales considerando la variable riesgo para los análisis y asignaciones de uso (estados Táchira y Falcón, 2004; Miranda, 2011 y Vargas, 2013 sin publicar). El incorporar la variable riesgo en los Planes Estadales de Ordenación del Territorio, así como aquellos que se pudieran generar a nivel Municipal, Urbano y Comunal permitirá disminuir la vulnerabilidad de la población y sus actividades socioproductivas.

Proyecto de Plan de Ordenación del Territorio de la Faja Petrolífera del Orinoco "Hugo Chávez Frías".

- Instrumento de planificación de carácter regional que orienta el desarrollo con base a la principal industria del país que es la petrolera, en armonía con otros sectores económicos- productivos de la Nación bajo un enfoque ambientalmente responsable. Al identificar las amenazas, especialmente las de índole tecnológica, se propone en el marco del plan, programas de investigación y seguimiento de los procesos industriales, particularmente aquellos que pudieran incrementar las emisiones.

Áreas Bajo Régimen de Administración Especial (ABRAE) y sus Planes de Ordenamiento y Reglamentos de Uso (PORU)

- Instrumentos de gestión del territorio que identifican las áreas de valor estratégico de la Nación en cuanto a la Preservación, Protección, Producción y las Geoestratégicas y para las cuales se identifican unidades de ordenamiento y se establecen usos y actividades de acuerdo a sus objetivos de creación.

GESTION DE RIESGO, EMERGENCIA Y DESASTRES

Bases legales

- Creación del Despacho de Viceministro para la Gestión de Riesgo y Protección Civil y promulgación de la Ley de Gestión Integral de Riesgos Socionaturales y Tecnológicos, promulgada según Gaceta Oficial Nº 39.095 del 9 de enero de 2009. Ley que explícitamente considera los riesgos asociados al Cambio Climático.

Planes, proyectos y estrategias en curso

- **Plan Nacional de Gestión de Riesgos:** Proyecto enmarcado en el artículo 55 de la Constitución de la República Bolivariana de Venezuela y el objetivo histórico 5, objetivo nacional 5.4 y objetivo estratégico 5.4.3, del Plan de la Patria 2013 – 2019. Tiene por objeto desarrollar líneas estratégicas que permitan el estudio, identificación y delimitación del riesgo, como base en el proceso de planificación, así como el desarrollo de proyectos de mitigación de riesgo en todo el territorio nacional.
- **Atlas de Exposición ante amenazas socionaturales y Tecnológicas:** Documento Técnico concebido como un Atlas que servirá de fuente de información y consulta para el proceso de planificación y ordenación territorial, sectorial y poblacional del país sobre la base de la gestión para la minimización del riesgo.
- **Registro Nacional de Información para la Gestión Integral de Riesgo de Desastres:** Proyecto destinado a garantizar la integración y estandarización de información interinstitucional a través de la creación y el fortalecimiento de una plataforma tecnológica para la consulta, por parte de diferentes instituciones públicas y privadas en todo el territorio nacional.
- **Construcción de Indicadores de Vulnerabilidad:** Proyecto destinado a la construcción de indicadores de vulnerabilidad en el ámbito ambiental, social, físico, institucional y económico, adaptados a la realidad nacional y generadores de información relacionada a las condiciones de fragilidad, exposición y capacidades en dichos ámbitos. Tiene como meta la aplicación de los indicadores en el proceso de planificación y gestión, por parte de las instituciones públicas y privadas en el territorio nacional.

- **Gabinetes Municipales de Riesgos Socionaturales y tecnológicos:** Proyecto nacional enmarcado en el artículo 14 de la Ley de Gestión de Riesgos Socionaturales y Tecnológicos; el objeto deL mismo es dar cumplimiento a la política nacional en gestión de riesgo y lograr la coordinación las actividades en el ámbito territorial, mediante la incorporación de la variable riesgo en las gestión de los entes del desarrollo regional y local de acuerdo a lo establecido en la ley.
- **Fortalecimiento de las capacidades locales para la gestión integral de Riesgos Socionaturales y Tecnológicos en comunidades:** Tiene por objeto la planificación y ejecución de acciones integrales en comunidades del Área Metropolitana de Caracas, para el incremento en la capacidad de respuesta por parte de las comunidades ante eventos de origen natural y tecnológico.
- **Gestión integral de Riesgos Socionaturales y Tecnológicos en el Sector Salud:** Proyecto enmarcado en el desarrollo de lineamientos para la aplicación de la gestión integral de riesgo en el sector salud a nivel nacional cuyo objeto es el fortalecimiento de capacidades de respuesta, por parte del sector salud, ante eventos adversos.
- **Coordinación Regional:** A través de la UNASUR y el MERCOSUR Venezuela participa activamente en grupos de trabajo para la cooperación en la prevención de los desastres y en la lucha contra las causas y los efectos del cambio climático; estos buscan aumentar la coordinación en la prevención y respuesta ante desastres socionaturales y lograr un mecanismo de asistencia mutua en el ámbito subregional, a través de políticas, estrategias, planes y actividades en estimación, prevención, reducción del riesgo, preparación y respuesta a desastres, asistencia humanitaria, rehabilitación y reconstrucción, así como la asistencia técnica e intercambio de experiencias en la materia.

C.- Políticas nacionales para la lucha contra el Cambio Climático y sus efectos

Venezuela cuenta con un Plan de Desarrollo Económico y Social de la Nación que incluye un fuerte componente ecosocialista socioambiental cuya implementación ataca las causas principales del Cambio Climático. Si bien el Plan es un todo articulado y solo puede entenderse e implementarse desde una visión integral del mismo, a continuación se enumeran algunos de los objetivos del Plan con más relevancia este sentido:

Objetivo Histórico No 5

Contribuir con la preservación de la vida en el planeta y la salvación de la especie humana.

Objetivo Nacional

5.1 Construir e impulsar el modelo económico productivo eco-socialista, basado en una relación armónica entre el hombre y la naturaleza, que garantice el uso y aprovechamiento racional, óptimo y sostenible de los recursos naturales, respetando los procesos y ciclos de la naturaleza.

Objetivos Estratégicos y Generales

5.1.1. Impulsar de manera colectiva la construcción y consolidación del socialismo como única opción frente al modelo depredador, discriminador e insostenible capitalista.

5.1.1.1. Garantizar la soberanía y participación protagónica del Poder Popular organizado para la toma de decisiones, desde el intercambio de conocimientos, racionalidades y formas de vida, para construir el ecosocialismo.

5.1.1.2. Desarrollar una política integral de conservación, aprovechamiento sustentable, protección y divulgación científica de la diversidad biológica y de los reservorios de agua del país.

5.1.1.3. Impulsar y garantizar nuevos procesos de producción y valorización de conocimientos científicos, ancestrales, tradicionales y populares, así como nuevas relaciones entre ellos, con especial

atención a las prácticas de los grupos sociales invisibilizados y discriminados por el capitalismo y el neocolonialismo.

5.1.2. Promover, a nivel nacional e internacional, una ética ecosocialista que impulse la transformación de los patrones insostenibles de producción y de consumo propios del sistema capitalista.

5.1.2.1. Impulsar y desarrollar una visión de derechos de la Madre Tierra, como representación de los derechos de las generaciones presentes y futuras, así como de respeto a las otras formas de vida.

5.1.2.2. Priorizar los intereses comunes sobre los individuales, desde una perspectiva centrada en el equilibrio con la naturaleza y el respeto de las generaciones presentes y futuras.

5.1.2.3. Promover la igualdad sustantiva entre géneros, personas, culturas y comunidades.

5.1.2.4. Fomentar un nuevo esquema de valores, orientado al respeto y preservación de la naturaleza, que transforme la conciencia colectiva, sobre los patrones capitalistas de producción y consumo.

5.1.3. Generar alternativas socio-productivas y nuevos esquemas de cooperación social, económica y financiera para el apalancamiento del ecosocialismo y el establecimiento de un comercio justo, bajo los principios de complementariedad, cooperación, soberanía y solidaridad.

5.1.3.1 Promover la investigación, la innovación y la producción de insumos tecnológicos de bajo impacto ambiental, así como el rescate de tecnologías ancestrales para la producción y procesamiento agrícola y pecuario, entre otros, aumentando los índices de eficacia y productividad.

5.1.3.2. Promover la generación y apropiación social del conocimiento, tecnología e innovación que permitan la conservación y el aprovechamiento sustentable, justo y equitativo de la diversidad biológica, garantizando la soberanía del Estado sobre sus recursos naturales.

5.1.3.3. Crear sistemas urbanos ecológicos, con diseños arquitectónicos equilibrados con los ecosistemas naturales que reduzcan los niveles de contaminación ambiental.

5.1.3.4. Promover el desarrollo de actividades de turismo sustentable y sostenible para el disfrute de la población.

5.1.3.5. Constituir un sistema nacional, regional y local para el aprovechamiento de residuos y desechos, para la creación de insumos útiles para el vivir bien, dándole prioridad a su uso como materias primas secundarias para la industria nacional.

5.1.3.6. Preservar y manejar las áreas estratégicas para la conservación, tales como las ABRAE, por los beneficios vitales que se derivan de su conservación y su contribución a la suprema felicidad social.

5.1.3.7. Promover la conformación de redes locales, nacionales e internacionales para el impulso del modelo ecosocialista.

5.1.3.8. Promover prácticas de conservación del ambiente en la actividad socio-productiva, superando el criterio de "eficiencia económica" por ser una práctica desvinculada de la racionalidad en el uso de los recursos naturales.

5.1.3.9. Implementar políticas de financiamiento para el desarrollo de unidades productivas, promoviendo el uso de tecnologías amigables con el ambiente.

5.1.3.10. Rescatar los saberes ancestrales de los pueblos originarios sobre los procesos productivos, para el desarrollo de tecnologías sustentables que incidan en los nuevos esquemas de relacionamiento internacional.

5.1.3.11. Fomentar medios de pago alternativos que trasciendan el uso de monedas (de papel y metálicas), facilitando el establecimiento del comercio justo entre los pueblos suramericanos y países aliados, a la vez que se modifique la influencia del dólar estadounidense como patrón referencial en el comercio internacional.

5.1.3.12. Facilitar el acceso a los pequeños y medianos productores y a las formas asociativas de propiedad y de producción, para su inserción efectiva en las cadenas de valor intrarregionales, con sostenibilidad ambiental.

5.1.4. Impulsar la protección del ambiente, la eficiencia en la utilización de recursos y el logro de un desarrollo sostenible, implementando la reducción y el reúso en todas las actividades económicas públicas y privadas.

5.1.4.1. Promover el uso sustentable y sostenible de los recursos naturales en los procesos de producción, circulación y consumo de los

bienes, productos y servicios, así como la disminución de desechos, fomentando campañas permanentes de concienciación.

5.1.4.2. Fomentar el reúso de los residuos para su utilización como materias primas o bienes finales; a través de la conformación de circuitos que incluyan la clasificación de residuos por parte de toda la población, estableciendo centros de acopio y unidades productivas transformadoras.

5.1.4.3. Desarrollar normativas legales que promuevan la implementación del reúso en el país.

5.1.5. Mejorar sustancialmente las condiciones socioambientales de las ciudades.

5.1.5.1. Promover ciudades energéticamente eficientes, mediante el uso de tecnologías ahorradoras de energía, así como basadas en el uso de energías limpias (eólicas, solares, gas, entre otras).

5.1.5.2. Desarrollar sistemas de transporte público eficientes en el uso de recursos y de bajo impacto ambiental.

5.1.5.3. Aumentar la densidad de áreas verdes por habitante, mediante la construcción de parques y espacios de socialización naturales.

5.1.5.4. Promover sistemas constructivos no contaminantes y sistemas de viviendas ecoeficientes.

5.1.5.5. Establecer a la chatarra ferrosa y no ferrosa como un insumo de interés nacional para el proceso productivo, a efecto de atender la estructura de costos de los productos y el cuidado del ambiente así como eficiencia energética.

5.1.6. Impulsar la generación de energías limpias, aumentando su participación en la matriz energética nacional y promoviendo la soberanía tecnológica.

5.1.6.1. Desarrollar proyectos de generación de energía eólica, para incrementar su participación en la matriz energética.

5.1.6.2. Aumentar la generación de energía solar mediante la instalación de fábricas de paneles solares, que atiendan prioritariamente la demanda energética de las poblaciones aisladas.

5.1.6.3. Realizar estudios para el desarrollo de fuentes energéticas marinas específicamente la olamotriz y la mareomotriz; con el fin de aprovechar la potencialidad de nuestras extensas costas.

Objetivo Nacional

5.2. Proteger y defender la soberanía permanente del Estado sobre los recursos naturales para el beneficio supremo de nuestro Pueblo, que será su principal garante.

Objetivos Estratégicos y Generales

5.2.1. Promover acciones en el ámbito nacional e internacional para la protección, conservación y gestión sustentable de áreas estratégicas, tales como fuentes y reservorios de agua dulce (superficial y subterránea), cuencas hidrográficas, diversidad biológica, mares, océanos y bosques.

5.2.1.1. Mantener el liderazgo en las negociaciones internacionales multilaterales y regionales, relacionadas con los respectivos marcos jurídicos sectoriales ambientales.

5.2.1.2. Promover la conservación y el uso sustentable de la diversidad biológica, en un marco regional, continental y mundial orientado a la integración, soberanía y el vivir bien.

5.2.1.3. Profundizar, articuladamente entre instancias del Poder Público y el Poder Popular, la protección integral del agua como un deber, haciendo uso responsable de la misma e impulsando espacios nacionales e internacionales de discusión sobre su uso y democratización.

5.2.1.4. Mantener la independencia en el manejo del sistema de obtención, purificación, administración y suministro de agua potable.

5.2.1.5. Proteger las cuencas hidrográficas del país y todos los recursos naturales presentes en ellas, promoviendo su gestión integral, haciendo especial énfasis en las situadas al sur del Orinoco.

5.2.1.6. Continuar impulsando el reconocimiento del acceso al agua potable como un derecho humano en todos los ámbitos nacionales e internacionales.

5.2.1.7. Garantizar el control soberano sobre el conocimiento, extracción, distribución, comercialización y usos de los minerales

estratégicos, de manera sostenible, en función de los más altos intereses nacionales.

5.2.2. Desmontar y luchar contra los esquemas internacionales que promueven la mercantilización de la naturaleza, de los servicios ambientales y de los ecosistemas.

5.2.2.1. Activar alianzas estratégicas para la lucha contra la mercantilización de la naturaleza en todos los ámbitos nacionales e internacionales.

5.2.2.2. Impulsar el desarrollo de una visión desde el Sur que permita fortalecer la defensa de los intereses regionales en materia ambiental.

5.2.2.3. Impulsar en los organismos de integración suramericana ALBA, CELAC, UNASUR, MERCORSUR, PETROCARIBE, así como en los diversos espacios internacionales a los que asiste Venezuela, el concepto de “bajo impacto ambiental” de forma transversal en todas las acciones emprendidas.

5.2.3. Promover la cooperación, a nivel regional, para el manejo integrado de los recursos naturales transfronterizos.

5.2.3.1. Reimpulsar la cooperación con los países fronterizos en temas de gestión ambiental y zonas ecológicas de interés común conforme a los principios del derecho internacional, respetando la soberanía nacional.

5.2.3.2. Defender los derechos territoriales y la soberanía del Estado venezolano en las negociaciones relacionadas con la administración de los espacios marinos, submarinos y oceánicos, así como de la diversidad biológica presente en esos espacios.

5.2.4. Luchar contra la securitización de los problemas ambientales mundiales, para evitar la incorporación de los temas ambientales y humanos como temas de “Seguridad internacional” por parte de las potencias hegemónicas.

5.2.4.1. Mantener vigilancia del desarrollo de la agenda del Consejo de Seguridad de las Naciones Unidas para evitar la injerencia en los temas ambientales y humanos, y su tratamiento como temas de seguridad ciudadana internacional, lo cual atenta contra la soberanía de los pueblos.

5.2.4.2. Fortalecer los debates sustantivos en temas económicos, sociales y ambientales en todos los ámbitos internacionales, regionales y multilaterales, para que las decisiones se tomen de manera inclusiva y transparente, sin orientaciones de corte neo-colonial por parte de los países desarrollados, promoviendo la incorporación del Poder Popular y en particular los movimientos sociales en estos espacios.

Objetivo Nacional

5.4. Contribuir a la conformación de un gran movimiento mundial para contener las causas y reparar los efectos de cambio climático que ocurren como consecuencia del modelo capitalista depredador.

Objetivos Estratégicos y Generales

5.4.1. Continuar la lucha por la preservación, el respeto y el fortalecimiento del régimen climático conformado por la Convención Marco de Naciones Unidas para el Cambio Climático y su Protocolo de Kioto.

5.4.1.1. Desmontar los esquemas de mercados internacionales de carbono que legitiman la compra de derechos de contaminación y la impune destrucción del planeta.

5.4.1.2. Promover e impulsar el fortalecimiento del régimen jurídico climático vigente, con énfasis en las responsabilidades históricas de los países desarrollados.

5.4.1.3. Impulsar y apoyar acciones que promuevan la justicia internacional con relación al incumplimiento de los países desarrollados de sus obligaciones en el marco del Protocolo de Kioto.

5.4.1.4. Iniciar un proceso de transformación de las disposiciones legales nacionales para garantizar la administración y la protección del patrimonio natural, en la construcción del ecosocialismo.

5.4.2. Diseñar un plan de mitigación que abarque los sectores productivos emisores de gases de efecto invernadero, como una contribución voluntaria nacional a los esfuerzos para salvar el planeta.

5.4.2.1. Promover la adecuación tecnológica para una transformación del sector productivo, de manera sustentable, con especial énfasis en el sector energético, agrícola y pecuario, incorporando el principio de prevención y manejo de los desechos sólidos y peligrosos.

5.4.2.2. Impulsar a nivel regional e internacional compromisos por parte de todos los países y medidas nacionales de mitigación que contribuyan a corregir el deterioro ambiental que genera el cambio climático global.

5.4.2.3. Posicionar a Venezuela como referente mundial en la lucha por el cumplimiento de los acuerdos establecidos y de su impulso por la construcción de un nuevo sistema ecosocialista.

5.4.3. Diseñar un plan nacional de adaptación que permita al país prepararse para los escenarios e impactos climáticos que se producirán debido a la irresponsabilidad de los países industrializados, contaminadores del mundo.

5.4.3.1. Coordinar acciones con todos los entes nacionales encargados de la planificación territorial y la gestión de desastres, con una visión prospectiva del incremento de temperatura previsto para los próximos 20 años, en función de las promesas de mitigación que logren consolidarse en el marco de la Organización de las Naciones Unidas.

5.4.3.2. Calcular los costos derivados de las pérdidas y daños resultantes de situaciones extremas climáticas, incluyendo seguros y reaseguros para sectores sensibles específicos (como la agricultura), las cuales deberán sumarse a la deuda ecológica de los países industrializados.

5.4.3.3. Fomentar el desarrollo de planes municipales y locales de adaptación para escenarios de manejo de riesgo que involucren directamente la corresponsabilidad entre el Estado y el Poder Popular.

Intended Nationally Determined Contribution of Viet Nam

I. Introduction

Viet Nam is willing to respond to climate change, which is demonstrated by the range of national policies and concrete greenhouse gas (GHG) mitigation and climate change adaptation measures that have been undertaken throughout the past decade, funded primarily by domestic financial resources. Additionally, Viet Nam supports achieving a legal agreement with the participation of all Parties to the United Nations Framework Convention on Climate Change (UNFCCC) in order to keep the global average atmospheric temperature increase, since pre-industrial times, at below 2^oC.

Viet Nam signed the UNFCCC in 1992 and ratified it in 1994; signed the Kyoto Protocol (KP) in 1998 and ratified it in 2002; set up a National Steering Committee to implement the UNFCCC and KP; submitted to the UNFCCC Secretariat its Initial National Communication (2003), the Second National Communication (2010), and the Initial Biennial Update Report (2014), reflecting the latest climate change response efforts and GHG inventories.

In 2008, the Government issued the National Target Programme to Respond to Climate Change (NTP-RCC) in order to assess climate change impacts and develop adaptation and mitigation measures. Climate change was mainstreamed into the National Socio-Economic Development Strategy (2011-2020) and Socio-Economic Development Plan (2011-2015), and policies on disaster risk reduction, coastal zone management, and energy supply and use. Economic sectors and provinces have developed Action Plans to respond to climate change.

In 2011, the National Climate Change Strategy was issued, outlining the objectives for 2011-2015 and 2016-2050, and priority projects to be implemented in the period of 2011-2015. The strategy identifies climate change responses that are vital for the development of the country. Responding to climate change must be associated with sustainable development and a transition towards a low-carbon economy, take advantage of opportunities to increase competitiveness and strengthen the national position, and carry out adaptation and mitigation efforts in parallel.

In 2012, the National Green Growth Strategy was approved, which includes mitigation targets and measures; and regulations on linking with international carbon markets. In 2013, the Law on Natural Disaster Prevention and Control was enacted, aiming to address diverse natural hazards that affect the country, which are primarily climate change related. The 2014 Law on Environment includes a full chapter on climate change. The development and implementation the above-mentioned policies and activities to respond to climate change relies mainly on domestic human and financial resources.

Viet Nam's INDC includes a mitigation and an adaptation component. The mitigation

component includes both unconditional and conditional contributions. The unconditional contributions are measures that will be implemented using domestic resources, while the conditional contributions are measures that could be implemented if new and additional international financial support, technology transfer and capacity building are received.

Viet Nam's INDC identifies the GHG reduction pathway in the 2021-2030 period. With domestic resources GHG emissions will be reduced by 8% by 2030 compared to the Business as Usual scenario (BAU). The above-mentioned contribution could be increased up to 25% with international support.

The adaptation component describes the climate change adaptation actions that are currently being implemented. It also identifies adaptation gaps in terms of institutional and policy arrangements, financing, human resource capacity and technology and prioritized adaptation measures for the 2021-2030 period. It is estimated that the national budget will be able to meet approximately one third of the financial needs to implement adaptation measures in this period, and will seek international support and private sector investment for the remainder.

Viet Nam's INDC has been developed with the participation and contributions from different line ministries, non-governmental organisations, research institutions, business sector representatives as well as international development partners.

Through this INDC, Viet Nam reaffirms its willingness to respond to climate change and contribute to the objective of the UNFCCC. Viet Nam believes its contribution is fair and ambitious, feasible and achievable. It is committed to continuing to address climate change based on domestic resources and international support.

II. GHG Mitigation Component

2.1. GHG mitigation activities prior to 2020

Viet Nam is one of the first countries to ratify the UNFCCC and the KP and has actively been researching and implementing GHG mitigation measures.

As of June 2015, Viet Nam had 254 Clean Development Mechanism (CDM) projects accredited and registered by the CDM Executive Board (EB). Viet Nam is ranked number four internationally for number of projects, with a total GHG reduction amount of approximately 137.4 million tCO_2e in the credit period. Among the 254 projects, energy projects account for 87.6%, waste treatment for 10.2%, reforestation and afforestation for 0.4% and other projects for 1.8%. To date, more than 12 million Certified Emission Reductions (CERs) credits have been issued by the EB for Viet Nam, which is ranked eleventh in the world.

The Government has issued many policies on energy saving and efficiency, such as the "National Target Programme on Energy Efficiency" (2006), the Law on "Economical and Efficient use of Energy" (2010). The Government has prioritized policies, such as renewable energy development, consistent with Viet Nam's mitigation potential and conditions, in order to contribute to energy security and environmental protection. Policies encouraging energy savings and efficiencies in production and daily life, through the application of energy saving and renewable energy technologies, are also a priority.

Viet Nam has made significant efforts in forest protection, afforestation and reforestation, and is one of the countries participating in Reducing Emissions from Deforestation and Forest Degradation, sustainable management of forests, conservation of forest carbon stocks and enhancement of forest carbon stocks and enhancement of forest carbon stocks (REDD+).

Viet Nam is developing and preparing for the implementation of Nationally Appropriate Mitigation Actions (NAMAs), as well as the registration and implementation of carbon credit projects according to the Verified Carbon Standard (VCS) and the Gold Standard (GS).

Although Viet Nam has exerted great efforts in implementing mitigation actions, it still faces a variety of difficulties and challenges regarding the following issues:

- Establishment of a national GHG inventory system, and Measurement, Reporting and Verification (MRV) system at all levels;
- NAMA development and implementation;
- Application of technologies to reduce GHGs, especially in the agriculture sector;
- Access to national and foreign finance for mitigation activities.

2.2. Contribution to GHG emissions mitigation

Type of contribution	GHG emissions reduction compared to the Business-As-Usual scenario (BAU)
Coverage	The entire economy, including the following sectors: **1. Energy** *a. Fuel combustion:* - Energy industries; - Manufacturing industries and construction; - Transport; - Others: residential, agriculture and commercial services. *b. Fugitive emissions:* - Coal mining; - Natural gas and oil. **2. Agriculture** - Enteric fermentation; - Manure management; - Rice cultivation; - Agriculture soils; - Prescribed burning of savannas; - Field burning of agricultural residues. **3. Land Use, Land Use Change and Forestry (LULUCF)** - Forest land; - Cropland; - Grassland; - Wetlands; - Settlements; - Other land. **4. Waste** - Solid waste landfills; - Industrial wastewater; - Domestic wastewater; - Human waste; - Waste incineration.
Greenhouse gases	Carbon dioxide (CO_2), Methane (CH_4), Nitrous oxide (N_2O), Hydro fluorocarbons (HFCs), Perfluorocarbons (PFCs), Sulfur hexafluoride (SF_6).

Period	From 01/01/2021 to 31/12/2030
Methodologies to estimate GHG emissions and data	- IPCC guidelines; - National statistics, national Socio-Economic Development Plan and sectoral activity data.
Metric applied	GWP 100y values published in IPCC AR4 (2007): • CO_2 = 1 • CH_4 = 25 • N_2O = 298
Business-As-Usual scenario	Viet Nam's BAU scenario for GHG emissions was developed based on the assumption of economic growth in the absence of climate change policies. The BAU starts from 2010 (the latest year of the national GHG inventory) and includes the energy, agriculture, waste and LULUCF sectors. • **GHG emissions in 2010:** 246.8 million tCO_{2e} • **Projections for 2020 and 2030** (not included industrial processes): - 2020: 474.1 million tCO_{2e} - 2030: 787.4 million tCO_{2e}
Unconditional contribution	With domestic resources, by 2030 Viet Nam will reduce GHG emissions by 8% compared to BAU, in which: - Emission intensity per unit of GDP will be reduced by 20% compared to the 2010 levels; - Forest cover will increase to the level of 45%.
Conditional contribution	The above-mentioned 8% contribution could be increased to 25% if international support is received through bilateral and multilateral cooperation, as well as through the implementation of new mechanisms under the Global Climate Agreement, in which emission intensity per unit of GDP will be reduced by 30% compared to 2010 levels.

2.3. Fair and Ambitious

Given the socio-economic conditions of a developing country that is highly affected by climate change, Viet Nam's INDC represents its efforts to contribute to global climate change mitigation to reach the ultimate objective of the UNFCCC, as well as the target of maintaining the global average atmospheric temperature rise to below 2°C by the end of the 21st century.

In 2010, GHG emissions of Viet Nam accounted only for approximately 0.5% of global GHG emissions and GHG emissions per capita were relatively low at 2.84 tonnes of CO_2e. However, Viet Nam is proactively implementing climate change response activities, developing a low-carbon and green economy, strengthening the implementation of potential GHG mitigation measures in the energy, industry, transport, agriculture and waste sectors and enhancing carbon sinks in the LULUCF sector.

National efforts are also reflected in the fact that the Government considers climate change response a crucial issue, as it is the entire country's responsibility to simultaneously implement adaptation and mitigation, as well as use natural resources effectively. A roadmap with methods to implement GHG mitigation measures to achieve Viet Nam's INDC will be issued.

2.4. Policy framework to support the implementation of the goal to mitigate GHG emissions

Legal documents and policies on climate change support to INDC implementation in Viet Nam include:

- Law on Environment (6/2014);
- Law on Economical and Efficient use of Energy (6/2010);
- Resolution No. 24-NQ/TW on "Pro-actively responding to climate change, enhancing natural resource management and environmental protection" (6/2013);
- National Climate Change Strategy (12/2011);
- National Green Growth Strategy (9/2012);
- Decision 1775/QĐ-TTg on "Management of GHG emissions; management of carbon credit trading activities to the world market" (11/2012).

Viet Nam will continue to develop policies that create favourable conditions for investments in mitigation activities.

2.5. Measures to achieve the GHG emissions mitigation targets of the INDC

In order to achieve the above-mentioned mitigation targets, Viet Nam will exert efforts in implementing the following measures:

1) Strengthen the leading role of the State in responding to climate change

- Integration of climate change into development strategies, and development plans;
- Improving and strengthening institutions: (i) Study and formulate policies, mechanisms and legislation on climate change, which are consistent with each development stage of the country and in line with the global climate change agreements and treaties to which Viet Nam is a signatory state; (ii) Develop the national GHG inventory system; (iii) Establish systems for measuring, reporting and verification (MRV) at the national and sectoral levels in order to monitor and supervise GHG emissions activities by sectors, to meet the data requirement for examination and periodic reports as required by the UNFCCC and create favourable conditions for NAMA implementation.

2) Improve effectiveness and efficiency of energy use; reducing energy consumption

- Innovate technologies and apply advanced management and operation procedures for efficient and effective use of energy in production, transmission and consumption, especially in large production facilities where energy consumption is high;
- Apply energy savings and efficiency, and renewable energy applications in the residential sector, trade and services;
- Develop public passenger transport, especially fast modes of transit in large urban centres. Restructure freight towards a reduction in the share of road transport in exchange for an increase in the share of transportation via rail and inland waterways;
- Establish standards on fuel consumption, and develop a roadmap to remove obsolete and energy-consuming technologies in energy production and consumption systems.

3) Change the fuel structure in industry and transportation

- Assure national energy security by developing and exploiting different energy sources, while simultaneously using energy sources effectively;

- Change the energy structure towards a reduced share of fossil fuel, encouraging the exploitation and use of renewable and low GHG emission energy sources;
- Encourage buses and taxis to use compressed natural gas and liquefied petroleum gas (LPG); implement management solutions for fuel quality, emissions standards, and vehicle maintenance;
- Apply market instruments to promote structural change and improve energy efficiency; encourage the use of clean fuels; support the development of renewable energy; implement the roadmap to phase out subsidies for fossil fuels;
- Label energy-saving equipment and issue national standards for the quality of equipment.

4) Promote effective exploitation and increase the proportion of new and renewable energy sources in energy production and consumption

- Develop and implement financial and technical mechanisms and policies to support research and the application of appropriate advanced technologies; exploit and optimize the use of renewable energy sources, both on-grid as well as off grid;
- Develop a renewable energy technology market, domestic industries and local service providers.

5) Reduce GHG emissions through the development of sustainable agriculture; improve effectiveness and competitiveness of agricultural production

- Research and develop solutions to reduce GHG emissions in farming, livestock, fisheries and animal feed and food processing;
- Research and apply production processes and economic technologies that efficiently use seedlings, feed, agricultural materials, soil, water, and other inputs and reduce GHG emissions from agricultural production;
- Widely replicate technologies that treat and reuse by-products and waste from agricultural production to produce animal feed, mushrooms, materials for industries, biogas, and organic fertilizer.

6) Manage and develop sustainable forest, enhance carbon sequestration and environmental services; conservation of biodiversity associated with livelihood development and income generation for communities and forest-dependent people

- Review and identify the areas and objects to apply sustainable forest management, afforestation and reforestation, biodiversity conservation, including special priority for regions with large forests that are important for forestry production and livelihoods of local communities people;
- Develop and improve policies to promote sustainable forest management; mechanisms and policies to attract private sector investment for sustainable forest management, afforestation, reforestation, biodiversity conservation and livelihood development;
- Integrate and effectively use domestic and international resources for implementation of programmes and projects related to forest management and development, livelihoods and biodiversity conservation such as REDD+, the policy of payment for forest environmental services (PFES), etc.
- Strengthen and expand international cooperation for investment, technical assistance and capacity building, information and experience sharing on the sustainable forest management and development, biodiversity conservation and livelihood development.

7) Waste management

- Develop waste management planning and enhance waste management capacity; promote reducing, reusing and recycling waste;
- Research and apply advanced waste treatment technologies; deploy modern waste treatment technology in urban and rural areas; strengthen the management and treatment of industrial and household wastewater;
- Utilise landfill gas and solid waste combustion for power generation.

8) Communication and awareness raising

- Promote, educate and raise public awareness of GHG mitigation activities;
- Encourage and provide technical assistance to the people and communities to implement and enlarge production and consumption models, which are economic, safe and climate-friendly;
- Encourage and support communities to develop models of eco-cities, green rural areas, green housing, sort waste at the source through the approach of reducing-reusing-recycling (3R) and improve energy efficiency.

9) Enhance international cooperation

- Enhance cooperation in scientific research, in information exchange on the formulation and implementation of policies and in the basic content of climate change strategies and policies;
- Enlist the support of other countries and international organizations in finance, capacity building and technology in the implementation of climate change strategies and policies;
- Facilitate international cooperation to implement foreign direct investment (FDI) on climate change related projects.

2.6. Monitoring and evaluation

The monitoring and evaluation of the implementation of the GHG mitigation component to achieve the mitigation goals formulated in the INDC will be reflected in Viet Nam's "National Communications" and "Biennial Updated Reports" submitted to the UNFCCC.

III. Adaptation Component

3.1. Climate change impacts

Viet Nam is one of the countries severely affected by climate change and its related disasters. The Mekong Delta is one of the deltas in the world most susceptible and vulnerable to sea level rise. Climate change adaptation is vital for Viet Nam and is regarded by the Government as one of the priority tasks to reduce the vulnerability level.

Over the past 50 years, the average temperature in Viet Nam has increased by approximately 0.5°C and the sea level has risen by about 20cm. Extreme climate events have increased both in frequency and intensity. Climate change has made hazards, especially storms, floods and droughts, more intense.

According to Viet Nam's climate change scenario (2012), by 2100 the annual average temperature in Viet Nam is expected to increase by 2 to 3^{o}C, precipitation will increase in the rainy season and decrease in the dry season and the sea level will rise between 78 and 100cm.

The most vulnerable areas, regions and objects are: agriculture, natural ecosystems, biodiversity, water resources, public health and infrastructure; the Mekong Delta, the Red

River Delta, the Central Coast; the poor, ethnic minorities, the elderly, women, children and people with disabilities.

Viet Nam is facing losses and damages, which are beyond its resilience and capacity, even after thorough application of climate change adaptation measures and mitigation of GHG emissions. Sharing and managing risks of loss and damage must be considered at both the national and international levels.

Over the past 30 years, the average number of dead and missing people due to natural disasters totalled 500 annually; thousands of people were injured and annual economic losses accounted for approximately 1.5% of GDP.

Without implementing climate change adaptation measures, when the sea level rises by 100cm, over 10% of the Red River Delta and Quang Ninh province, more than 2.5% of the area of the central coastal provinces, and over 20% of Ho Chi Minh City will be at risk of being inundated, directly affecting 9% of the population of the Red River Delta and Quang Ninh province, nearly 9% of the population of the central coastal provinces and approximately 7% of the population of Ho Chi Minh City; up to 39% of the Mekong Delta could be submerged, affecting 35% of the population and causing the risk of losing 40.5% of the total rice production in this region.

Adaptation measures to prevent future losses are technically possible, however, many measures to protect against river floods, storm surges, saline water intrusion and drought, are needed to be implemented in the 21st century, which exceed the nation's capacity. The increasing impact of climate change on residential areas, economic zones, and ecosystems will lead to unavoidable losses.

3.2. The need to include an adaptation component in Viet Nam's INDC

The INDC is an official and important channel for conveying information and experience in adaptation, including sharing risks and damages, to the international community. The National Climate Change Strategy has identified that priorities are food security, energy security, water security, poverty reduction, gender equality, social security, public health, livelihood improvements and the protection of natural resources. These goals can only be achieved through enhancing the adaptive capacity of human and socio-economic systems as well as natural systems. Through its INDC, Viet Nam can communicate its current and future climate change response efforts implemented with national resources, and what can be done better with additional international support.

Climate change adaptation will reduce vulnerability and inequality within and among countries. Adaptation benefits go beyond the scope of each locality, community and country. Pro-active climate change adaptation is a contribution of Viet Nam to the global efforts to address climate change. Adaptation to climate change will help Viet Nam increase its resilience to climate change and can sometimes also contribute to GHG emissions mitigation.

The adaptation component of the INDC includes plans developed in accordance with the current situation and projections until 2030 and may be subject to adjustments or supplementations to suit the specific conditions of each period. The implementation of these plans depends on national resources and particularly on international support.

3.3. Climate change adaptation until 2020

Climate change adaptation until 2020 is reflected in the following strategies, programmes and action plans:

- Resolution No. 24-NQ/TW on "Pro-actively responding to climate change, enhancing natural resource management and environmental protection" (2013);

- Law on Natural Disaster Prevention and Control (2013);

- National Climate Change Strategy (2011);

- National Target Programme to Respond to Climate Change (2008, 2012);

- Action plans at the national, ministerial, sectoral and local levels on climate change response and disaster risk prevention and reduction.

Viet Nam has determined that climate change adaptation must be carried out in a focussed manner and respond to urgent, immediate impacts and long-term potential impacts. Climate change adaptation must be linked to sustainable development and the transition towards a low-carbon economy, and to ensure a systematic, joint, interdisciplinary, inter-regional approach, and incorporate gender equality, hunger eradication and poverty reduction.

Numerous climate change adaptation and disaster risk management activities have been carried out on a national scale. However, national investment resources for climate change adaptation are limited. Meanwhile, the expenses for remedying damage caused by potential climate hazards are expected to increase significantly under the impact of climate change, sea level rise and saltwater intrusion. The cost of adaptation is estimated to exceed 3-5% of GDP by 2030. Thus, it is necessary to diversify sources of investment in climate change adaptation from the public and private sectors, and from international support.

Despite great effort and initiative in implementing climate change adaptation activities, the shortage of capacities and resources for climate change adaptation measures are major challenges for Viet Nam.

Policies and institutions: The legal framework for integrating climate change issues into national Socio-Economic Development Plans is still limited; there is still ineffective coordination between line ministries, sectors and localities to address multi-sectoral and inter-regional issues; a lack of incentives to attract domestic and foreign investment and to mobilise the private sector to participate in climate change adaptation.

Capacity: There is a shortage of experts and technical staff who are specialised in climate change and the assessment of the effectiveness of adaptation measures, particularly at the local level; there are significant limitations in communication and awareness-raising on climate change; there are unmet needs in terms of forecasting disasters and early warning capacities, as well as scientific research on climate change and adaptation technology; appropriate climate change adaptation models at the community level need to be summarised comprehensively and replicated; there are limited capacities to select and decide on prioritising resources for the implementation of climate change adaptation activities.

Finance*:* While there are policies, plans and programmes climate change adaptation efforts were designed to collect funding for implementation, State resources can only meet 30% of the adaptation needs.

Technology*:* there is a shortage of advanced technologies for hydrological and meteorological monitoring and forecasting, early warning of natural disasters and hazards, and climate change adaptation.

3.4. Climate change adaptation in the period 2021 – 2030

Viet Nam aims to minimize the loss of life and property due to climate change. The climate change adaptation priority actions for the period 2021-2030 include:

1) Respond pro-actively to disasters and improve climate monitoring

- Modernise the hydro-meteorological observatory and forecasting system to ensure the timely forecasting and early warning of weather events. Develop the assessment and

monitoring system on climate change and sea level rise;

- Produce Socio-Economic Development Plans based on climate change scenarios, with a focus on key sectors and regions;
- Implement disaster prevention plans and measures, protect peoples' lives, and ensure national defence and security;
- Consolidate and develop prioritised and urgent disaster prevention projects; strengthen the capacity of search and rescue forces;
- Develop infrastructure and make plans for residential areas; relocate and resettle households and communities from areas affected frequently by, storm surges, floods, riverbank and shoreline erosion, or areas at risk of flash floods and landslides;
- Allocate and mobilise resources for community-based climate change adaptation and disaster management; raise awareness and build capacities for climate change adaptation and disaster risk management.

2) Ensure social security

- Review, adjust and develop livelihoods and production processes that are appropriate under climate change conditions and are linked to poverty reduction and social justice;
- Develop mechanisms, policies, and strengthen the insurance system, and share climate and disaster risks;
- Improve regulations and technical standards for infrastructure, public facilities and housing, that are appropriate under climate change conditions;
- Implement ecosystem-based adaptation through the development of ecosystem services and biodiversity conservation, with a focus on the preservation of genetic resources, species at risk of extinction, and important ecosystems;
- Implement community-based adaptation, including using indigenous knowledge, prioritizing the most vulnerable communities;
- Implement integrated water resources management in river basin systems; ensure reservoir safety; strengthen international cooperation in addressing transboundary water issues; ensure water security;
- Ensure food security through protecting, sustainably maintaining and managing agricultural land; restructuring of crops and livestock; create new climate change resilient varieties; complete the disease control and prevention system;
- Implement sustainable forest management; improve the quality of poor natural forests; implement afforestation and reforestation measures, focusing on large timber plantations; prevent forest deforestation and degradation;
- Protect, restore, plant and improve the quality of coastal forests, including mangroves, especially in coastal estuaries and the Mekong and Red River deltas.

3) Responding to sea level rise and urban inundation

- Implement integrated coastal zone management;
- Use sea level rise scenarios in urban and land use planning for infrastructure, industrial parks, coastal and island resettlement areas;
- Implement anti-inundation measures for large coastal cities; construct climate change resilient urban infrastructure; strengthen and build new large urban drainage infrastructure;

- Consolidate, upgrade and complete crucial sea and river dykes;
- Control saline water intrusion in the most severely affected areas.

3.5. The need for capacity building, technology transfer and finance for climate change adaptation

Viet Nam has attempted to implement climate change adaptation measures but does not have sufficient capacities to meet the demands, so there is a need for international assistance as well as cooperation with other developing countries:

- Strengthen the capacity to adapt to climate change at national and local level.
- Technology transfer: (i) technology for real-time forecasting, early warning, and sharing information system on real-time hydro-meteorological monitoring; (ii) tools to assess climate change impacts, vulnerability, exposure and climate change adaptation measures; (iii) technology for the sustainable use of water resources, prevention of water pollution, and urban water supply; (iv) technology to prevent erosion and protect the coastline and riverbanks; and (v) technology for sustainable agriculture, forestry and aquaculture production; biotechnology to develop new varieties that are more resilient to climate change.
- Finance for climate change adaptation, mainly for maintenance of existing infrastructure and building important projects aimed at prevention of natural disasters, and social-economic development in the context of climate change. Viet Nam encourages and creates favourable conditions for private sector investment in climate change adaptation activities.

3.6. Monitoring and evaluation

Climate change adaptation activities until 2030 will be evaluated based on the following key indicators:

- At least 90% of Socio-Economic Development Plans have integrated disaster risk management and climate change adaptation;
- The average national poverty rate is lowered 2%/year; in poor districts and communes it is lowered by 4%/year;
- 100% of piers and boat storm shelters are constructed, and 100% of offshore fishing boats and ships have sufficient communication equipment;
- Forest coverage increases to 45%; the area of protection forest in coastal areas is increased to 380,000 hectares, including 20,000 to 50,000ha of additional mangrove planting;
- At least 90% of city-dwellers and 80% of rural inhabitants have access to clean water; 100% of the population has access to health care services.

The monitoring and evaluation of the implementation of the adaptation component will be reflected in Viet Nam’s "National Communications" and “Biennial Updated Reports” submitted to the UNFCCC.

Republic of Yemen

INTENDED NATIONALLY DETERMINED CONTRIBUTION (INDC) UNDER THE UNFCCC

21 November 2015

Executive Summary

Yemen prepared its Intended Nationally Determined Contribution (INDC) document in very challenging situation in which the country faces precarious security situation, and political turmoil including ongoing armed-conflicts. In spite of the ongoing violent conflict and prevailing security challenges, Yemen's INDC document was drafted through a participatory process which involved consultations of key relevant stakeholders and technical agencies and based on available national climate change assessment and analysis.

The Yemen's INDC document has been prepared in accordance with decision 1/CP.20 (Lima call for climate action) which also drawn upon available national climate change reports and studies including the Second National Communication (SNC 2013), National Adaptation Programme of Action (NAPA 2008), and recent thematic technical assessments in 2015 including mitigation and adaptation. This document has also consulted, among others, key national and sectorial documents including the National Strategy for Renewable Energy and Energy Efficiency and the National Water Sector Strategy and Investment Program (NWSSIP-2009),. Adaptation to climate change across major vulnerable sectors including water, agriculture and coastal areas represents the central focus of this document which also requires international collaboration including financial support, and capacity building to assist in addressing climate induced vulnerabilities to build resilience. Nevertheless, the INDC document provides a vision of collaboration with international community including potential conditional and unconditional mitigation trajectories to reduce GHG emissions relative to business- as- usual (BAU) scenario contingent on international support.

The latest GHG inventory in Yemen is available for the year of 2000 which reveals total GHG emissions of about 24.2Mt of Carbon Dioxide- Equivalent (Mt CO2-eq). Also GHG baseline and mitigation scenarios are available up to the year 2025 which had been projected using the Long range Energy Alternatives Planning System (LEAP) modeling. In addition, projections until the year 2030 have been estimated based on two factors including: First, the average GHG emission growth rate of about 2 percent per year for the baseline scenario; Second, the mitigation potential of about 14 percent below emission projections of the baseline scenario over 15 years timeframe. In General, Yemen is a Least Developed Country (LDC), and its GHG emissions nearly negligible accounting for about 0.1 percent of the aggregate world total. Also Yemen has low GHG emission per capita of approximately 0.92 t CO2-eq in 2011 and ranks at the lowest levels relative to the world average which had already reached 7 t CO2-eq per capita in 2010.

This INDC document **proposes 14 percent GHG emission reduction target by 2030 below BAU** which represents an estimated total cumulative GHG reduction of about **35** MtCO2-eq from 2020 through 2030**;** this includes **1 percent unconditional target and 13 percent conditional target**. This document also provides an **overview of provisional adaptation and mitigation needs which require international support** as specified in Lima Accord recognizing the special circumstances of LDCs. However, due to the current situation in Yemen, further studies will be

conducted in the future to determine the projected loss and damage of climate induced disaster risks scenarios as well as various adaptation and mitigation measures which require international support to accelerate the implementation of Yemen's INDC.

1. National Circumstances

Yemen is an arid Middle Eastern country, located at the southern end of the Arabian Peninsula. Yemen is one of the poorest countries in the Arab region facing multiple challenges and crisis. The daunting political and socio-economic challenges adversely minimized human development and economic stability. Increasing poverty rates, lack of employment opportunities, inequalities, lack of justice, political participation and competition over scarce natural resources, especially water, have been among the key triggers for the social and political unrest that erupted in 2011. The humanitarian and livelihoods conditions witnessed a declining trend in the last decade, especially during the transitional period following the socio-political unrest. Since then, the economy could not recover to the pre-crisis level and the country slipped into recession achieving negative economic growth. Failure to achieve peaceful transfer of power brokered by the Gulf Cooperation Council (GCC) deal during the transition period spiraled into a full-scale war and armed-conflict covering the majority of the country.

Within a few months the humanitarian conditions further declined rapidly reaching to Level 3 (complex and severe humanitarian conditions) making over 80 percent in need for humanitarian assistance. The remarkable resilience of the Yemeni people that withstood decades of underdevelopment has overstretched beyond its remaining coping mechanisms, plunging the majority of the people into vulnerability, poverty and insecurity in an unprecedented scale of humanitarian disaster. The 2015 full-scale war has destroyed the economy across the different sectors. Basic services largely collapsed throughout much of the country. Throughout most of the country, supplies of food, fuel and medicines are dangerously low or not available.

In general, the economy of the country is dominated by the oil sector, which accounts for 27 percent of the Gross Domestic Product (GDP), 50 percent of national budget revenue and 70 percent of exports. Its population growth rate of 3 percent is one of the highest in the world and outpaces its economic growth rate. Nearly half the population is below 18 years of age and three-fourth of the population lives in rural area. Unemployment among 15 - 24 age groups is 53.7 percent of the labor force. Poverty ratio increased from 34.8 percent in 2006 to 54.4 percent in 2011. Consequently, more than half of the population is living with less than $2 a day and most of the disproportionately affected poor groups include women, children, small scale framers and sharecroppers, landless labor, nomadic herders and artisanal fishermen who are spread over 133,000 small rural settlements. Nearly 10.6 million or 41 percent of the population are food insecure, of which 5 million (19 percent) and 5.6 (22 percent) million are moderately and severely food insecure, respectively. Furthermore, Yemen ranks lowest on the

Global Gender Equality Index (GGEI). Social development indicators, such as children malnutrition, maternal mortality, and educational attainment remain discouraging.

Furthermore, water and land resources are already under chronic scarcity, and there are already a profound water and energy crises in the Yemen. The current political and security situation is expected to weaken the already ineffective governance capacities of institutions especially at the local community levels where the majority of the poor and extremely vulnerable dwellers live. With no resilience building support, the poor are expected to see greater levels of livelihood vulnerabilities particularly massive risks of deteriorating delivery of basic social services including water and energy. Environmental degradation of scarce natural resources especially water, and land compounded by climate change are among are among the key challenges the vulnerable dwellers will face in Yemen.

Agriculture, which sustains the rural poor, employs more than 50 percent of the total labor force of 6.6 million in 2009, but contributes by only 9.7 percent to the GDP while uses around 85 percent of its available water resources. Current projections on climate indicate that rising temperatures and frequent droughts will increase the incidences of land degradation and desertification. In addition, the water sector already faces formidable challenges, and water table is declining on average by about 2-7 meters annually due to groundwater over-exploitation. The increasingly growing water crisis in Yemen will have severe socio-economic and environmental consequences including, decreased agriculture productivity, reduced food security, increased conflict over resources, accelerated land degradation, and increased livelihood vulnerability.

Yemen's coastal communities and their livelihoods are currently threatened by coastal erosion and flooding of low-lying areas. Under conditions of sea level rise, these communities could face damage to assets and property, constraints on water supply and quality, as well as loss in agricultural yields. Shore coral reefs, already prone to damage by the intense wave activity of storms in the Red Sea and Gulf of Aden, may see an increase in intense wave activity and plausibly more frequent and severe storms which have drastic loss and damage costs. Cyclone Chapala is an example of climate induced disaster risks scenarios which Yemen is projected to face more frequently over the coming decades where international support will be required to help the country manage and reduce potential loss and damages involved besides building the necessary mechanisms for long-term and sustainable recovery processes.

Given the country's high levels of food import dependency, food insecurity and poverty, both global and local climate change impacts are likely to significantly influence its future development and food security. Accordingly, adaptation in the agricultural, water and coast sectors will have a substantial impact on economic growth and livelihoods. Under the current political and security situation in Yemen, poverty is expanding, and food insecurity is worsening. Increases of poverty add additional mounting pressures on the already degrading natural resources upon which the livelihoods of the most vulnerable communities and excluded groups rely. The vulnerability of the poor is further exacerbated under the looming impacts of climate

change and expanding ecological scarcities in such a way that is not only endangering the livelihood sustainability, but also triggering further social tensions and resources conflicts.

Yemen is not contributing a lot into the anthropogenic GHG emissions, but still highly vulnerable to climate change-related impacts. The largest share of the total anthropogenic CO_2 emissions in Yemen is produced in the energy sector, which is expected to dominate until 2030, followed by the agricultural, waste and industrial sectors. Consequently, mitigation measures in the energy sector represent the key opportunity for Yemen to proceed towards a low emission sustainable development.

Yemen has been party to the UN Framework Convention on Climate Change (UNFCCC) since 1996, and to the Kyoto Protocol since 2008 as non–Annex I Party. The Environmental Protection Authority (EPA) is the national focal point for the implementation of the UNFCCC Convention and Kyoto protocol. EPA played a leading role in coordinating the INDC preparations. In this context, Yemen intends to contribute to global efforts to limit greenhouse gas emissions growth contingent on support by the international community.

2. Yemen Mitigation Contributions

Table (1) Overview of Mitigation Targets

Unconditional targets	A **1 percent** reduction in GHG emissions by 2030 compared to a business as usual (BAU) scenario*
Conditional targets	An additional **13 %** reduction achievable under certain conditions, which would bring the total GHG reduction to **14 percent** below BAU emission levels by 2030 **
Financial needs	Yemen's conditional target is conditional upon: • Access to new sources of finance and enhanced support, compared to that received over the past years, to be mobilized through new climate finance mechanisms, such as the Green Climate Fund • Detailed cost estimation of required financial support will be updated in light of future circumstances by 2020

**Unconditional mitigation scenario:* It includes the mitigation measures which Yemen can implement without international support.

***Note: Data given in the table above are subject to changes and update and Yemen has the right to make necessary changes relating to the baseline and mitigation scenarios in light of any up-to-date data by 2020.*

Figure (1) BAU Mitigation Scenario

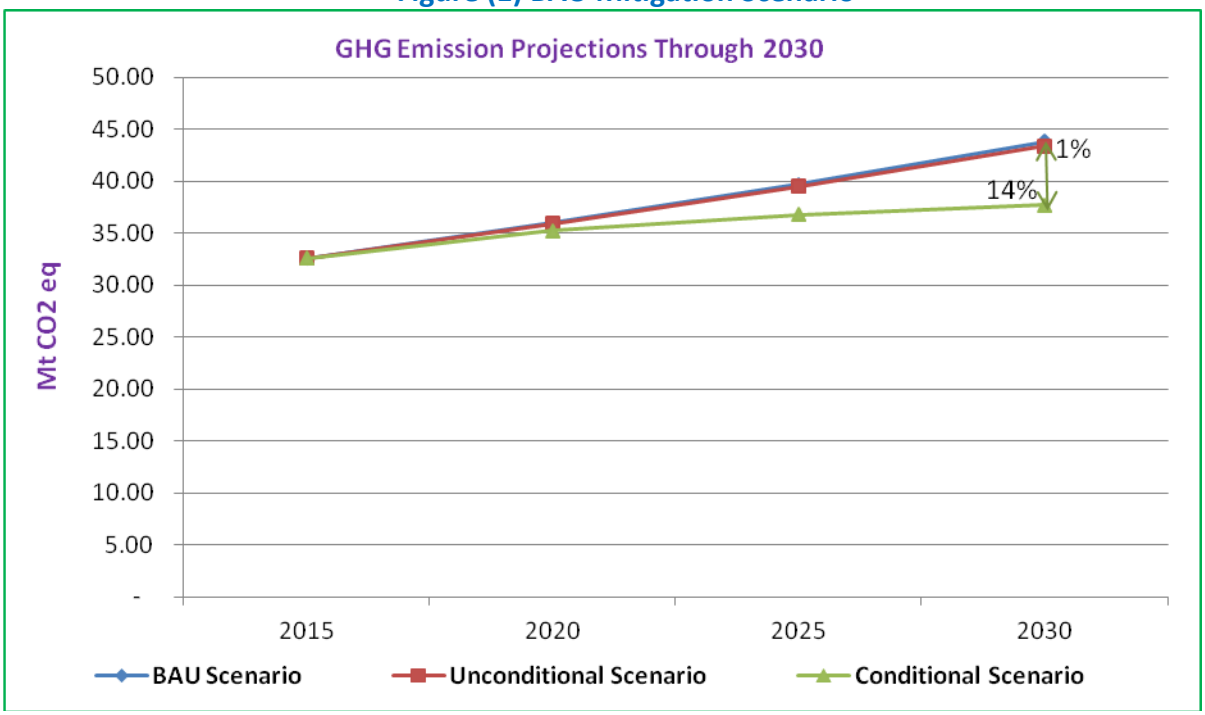


Table (2) Summary of Assumptions and Methodologies

Type of mitigation target	Emission reductions from projected emissions for the year 2030, according to a BAU scenario
Target economic sectors	**Energy:** Energy production and Energy demand (households, transport, industry, services, agriculture and fisheries) **Agriculture:** Cropping systems, Land-use for agriculture and forestry and Solar PV water pumping systems for irrigation **Wastes:** Solid wastes and Wastewater
Target greenhouse gases	The contribution of the Yemen is based on estimated carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O) emissions. Fluorinated and sulfur hexafluoride (SF_6) gases are not covered; they are rarely used in Yemen and their emissions are negligible as the products containing these gases are not produced in Yemen
Baseline scenario (BUA)	GHG emission projection for 2030, starting in 2020. Accordingly, projections do not take into account the mitigation measures and actions implemented from 2015 in the business-as-usual scenarios
Mitigation scenario	GHG emission projections for 2030, starting in 2020. The unconditional mitigation scenario is based on the implementation of the already scheduled or in-progress projects, all of whose funding has been defined, while the conditional scenario assumes the implementation of additional actions over the period 2016 - 2030

Global Warming Potential (GWP)	The GWP values used were those identified by the Intergovernmental Panel on Climate Change (IPCC) for the preparation of national emissions inventories in accordance with UNFCCC Decision 17/CP.8., for the preparation of national emissions inventories: GWP CO2 = 1 (by convention), GWP CH4 = 21 and GWP N2O = 310
Methodology for estimating Emissions	GHG baseline and mitigation scenarios are available up to the year 2025 which were projected using LEAP modeling. In addition, projections until the year 2030 have been estimated based on two factors including: First, the average GHG emission growth rate of about 2 percent per year for the baseline scenario; Second, the mitigation potential of about 14 percent below emission projections of the baseline scenario over 15 years timeframe. In this regard, considering that this report was built on old and poor data, under an exceptional situation, Yemen reserves the right to update its INDC according to the availability of new effective data and conditions

Table (3) Summary of Key Mitigation Data

	Years				Total (2010-2030)
	2010	2020	2025	2030	
Emissions- BAU (Mt Carbon Dioxide equivalent)	**24.18**	**35.94**	**39.68**	**43.81**	**437.30**
Emissions Unconditional Scenario (Mt CO_2eq)	**24.18**	**35.90**	**39.50**	**43.35**	**434.97**
Emissions Conditional Scenario (Mt CO_2eq)	**24.18**	**35.25**	**36.74**	**37.67**	**402.33**
Expected Emission Reduction- Unconditional Scenario	**0.00**	**0.04**	**0.18**	**0.46**	**2.33**
Expected Emission Reduction- Conditional Scenario	**0.00**	**0.68**	**2.94**	**6.13**	**34.97**

2.1 Unconditional Mitigation Measures

Unconditional mitigation measures are scheduled or in-progress projects, all of whose funding has been defined including those under implementation. Some mitigation measures under implementation are summarized in table (4).

Table (4) Mitigation Measures under Implementation

Sector	Measures
Energy	1. Mocha Wind farm Project, 2014-2019, (MUS$ 144.00) - Government funding: (US$ 19 Million) 2. Rural Energy Access Project, 2009-2017, (MUS$ 121.40) - Government funding: (US$ 12.20 Million)

	3. Marib Gas Turbine Power Station 400 MW- phase 2 (Total Cost = US$ 400 Million) - Government funding: (US$ 49 Million$) 4. The Expansion of Solar Power Technology in Yemen (US$ 50 Million) The project is being implemented nationally, with a particular focus on piloting solar technologies in government buildings, schools, hospitals and the agricultural sector (solar water pumping).

2.2 Conditional Mitigation Measures

The proposed conditional measures to reduce GHG emissions are summarized in Tables (5).

Table (5) Conditional Mitigation Measures

Sector/Sub-sector	Mitigation Measures
Energy - Power Generation	**Efficient power generation, transmission and distribution. (15 percent increase in energy efficiency in the power sector until 2025)**
	Switch to efficient power generation for new generation capacities that are to be installed, these include: - Combined-cycle gas turbine (CCGT) plants with overall efficiencies approaching to 60 percent for central (interconnected) power supply - Combined heat and power (CHP) generation systems with overall efficiencies of more than 80 percent appropriate for decentralized power supply for rural electrification, in industrial, commercial and residential sectors
	a) Promoting the use of renewable energy sources for electricity generation. - Off-grid electrification (electrification of individual rural Households-HH): 110.000 rural HH (45 percent of identified market potential) to be electrified Solar Home Systems until 2025 (installed capacity around 5.5 MWp)) - Rural electrification based on renewable energy (photovoltaic (PV) systems, solar home systems (SHS), wind energy converters, where feasible, and biomass, both in stand-alone and hybrid schemes) - Large-scale power generation from renewable energy sources (grid-connected), including solar thermal power plants, solar PV plants, and wind farms including : ▪ Grid electricity (large scale electricity generation): 15 percent of generation mix in 2025 (2600 GWh). This translates into an overall installed capacity in 2025 of: • 400 MW from wind farms • 160 MW from geothermal power stations ▪ 6 MW from power stations using landfill gas

Fuel switching to natural gas.	Promoting the wide use of natural gas for power generation, industry and other economic sectors
Residential and Commercial	- Launch energy-efficiency programs through establishing energy efficiency standards, energy use regulations and labeling and public awareness. - Promote active use of solar energy through use of solar water heaters instead of electric water heaters and use of solar-driven air-conditioning and solar refrigeration. (*Solar Water Heaters: 40 percent of market potential in 2025 (200,000 units) representing a saving potential of 457 GWh*)
Transport	- Improving energy use efficiency in transportation sector.
Industrial	- Introduction of renewable energy sources in the industrial energy supplies concepts (solar water heaters, solar based process heat/steam, photovoltaic and wind systems)
Agriculture	- Introduction of solar photovoltaic (PV) water pumping systems for irrigation - Proper land management to reduce methane from soil
Water	- Methane captures from wastewater treatment plants - Encouraging and expanding renewable energy-based water desalination
Wastes	- Landfill gas capturing for flaring or using for power generation

2.3 Fairness and Ambition

Yemen, as a Least Developed Country (LDC) whose emissions are less than 0.1 percent of global emissions, is not contributing a lot into the anthropogenic GHG emissions (0.92 Metric Tons per capita in 2011) but stands highly vulnerable to climate change-related impacts because of its fragile socioeconomic development and inadequate adaptive capacity. However, Yemen recognizes that in order to meet the 2 degree objective all countries will need to undertake mitigation. In view of that, Yemen's approach focuses on avoiding an increase of emissions per capita beyond this level, while pursuing its development goals.

In addition, Yemen account for a small share of past global greenhouse gases, it is therefore putting forward actions that align with a low carbon development pathway, which to be fully implemented would require additional international support in the form of finance, technology transfer and capacity building. In addition, Yemen's INDC represents its 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 Yemeni people. This represents a high level of fairness and ambition in light of Yemen's national circumstances.

3. Yemen Adaptation Measures

3.1 Climate change scenarios and vulnerability:

The Inter-governmental Panel on Climate Change (IPCC) Fifth Assessment Report (AR5) shows that climate change will have impact on world weather patterns, and that some regions and sectors are likely to be particularly affected. Although patterns of change in precipitation under climate change are not fully certain, agriculture and water are evidently the region's top sectoral vulnerabilities. The average temperature rise in the region is faster than the global average and is likely to persist in the future. Currently developing countries situated in arid and semi-arid zones, which Yemen is one of them, are dealing with myriads of environmental and socio-economic challenges including poverty, resource degradation, alarming population growth, and low agricultural productivity. Yemen encompasses an area of about 45.5 million hectares, the majority of which is arid lands and desert.

Several studies were conducted to assess the impacts of climate change in Yemen including Yemen's Initial National Communication (INC 2001); National Adaptation Programme of Action (NAPA 2008); and Yemen's Second National Communication (SNC 2013). The three studies found that agriculture, water and coast are among the top vulnerable sectors in Yemen which is consistent with findings of the mentioned regional climatic projections. In 2010, the World Bank conducted a study entitled "Assessing the Impact of Climate Change and Variability on the Water and Agriculture Sectors, and the Policy Implications" which projected climate change impacts on agriculture and water sectors in Yemen under a range of assumptions about future emissions.

The impact of climate change in Yemen is expected to be particularly significant due to historical patterns of climatic variability, high levels of water scarcity and the country's reliance on climate-vulnerable sectors, such as water, agriculture, and coastal sectors. Average annual precipitation in the country is very low, ranging from less than 50 millimeters (mm) in the coastal plains and desert plateau regions to around 800 mm in the mountainous highland region in the west. To make matters worse, the precipitation distribution of Yemen is characterized by seasonally intense and short-lived heavy storms that produce flash floods interspersed with long dry periods leading to widespread drought.

The following provides a summary of major impacts of climate change in Yemen which represents priority areas of interventions for building resilience:

- Increased water scarcity and reduced water quality – leading to increased hardship on rural livelihoods;
- Increased drought frequency, increased temperatures, and changes in precipitation patterns – leading to degradation of agricultural lands, soils and terraces;
- Deterioration of habitats and biodiversity – leading to expansion of desertification;

- Reduced agricultural productivity – leading to increased food insecurity and reduced income generating activities;
- Increased sea levels – leading to deterioration of wetlands, coastal mangrove migration, erosion, infrastructure damage, and seawater groundwater intrusion;
- Increased climatic variability – leading to the possibility of spread and growth of vector borne and water borne diseases; and
- Impacts on coastal zones – leading to a loss of tourism activity due to sea level rise including loss of beaches.

In 2008, the flash flood of a severe tropical cyclone had caused one of the most serious natural disasters in Yemen over the past decades leading to loss of lives, and damages of houses, infrastructure, and agricultural sector. The flooding resulted in estimated damage and losses of $1.64 billion. An estimated 700,000 persons were internally displaced as a result of the severe flooding affected low-lying Wadie of Hadhramout and Al-Mahra in Yemen in 2008 which is said to be attributed to climate change induced tropical cyclone. More frequent and severe disaster risks are projected under climate change scenarios. Cyclone Chapala of this year is another recent example of climate induced disaster risks scenarios which have significant loss and damage costs in Yemen

On the other hand, considerable losses in grain production and husbandry have already been experienced in 2008/2009; when aggregate production was lower by 24 percent compared to 2007. This dramatic fall in food production was largely due to increasingly prolonged drought conditions, when most of water sources in valleys producing grain dried up. These changes in temperature and rainfall patterns are likely to worsen existing water scarcity conditions, loss of land productivity and desertification processes as well as frequency and intensity of climate induced drought and flood related disaster risks, which have been increasing over the past decade in all parts of the country including the latest Chapala tropical cyclone of November 2015. The involved loss and damage of such extreme weather events are significant but further studies will be conducted in the future to determine the estimated costs associated with the climate induced disaster risks scenarios.

Thus, climate change represents a major threat to Yemen's economy and food security, which are overwhelmingly dependant on rain-fed agricultural production. Some of the critical underlying causes of current vulnerability relate to heavy reliance on agriculture, high population growth and poverty rates, with increasing inequalities. The agricultural sector currently uses over 90 percent of all freshwater resources. In addition, a combination of rural economic growth and demographic pressures is driving up demand for water, especially those extracted from the groundwater reserves.

Consequently, Yemen's aquifers are being mined at such a rate that groundwater levels have been falling by 2 to 7 meters annually. Climate change will clearly exert additional pressure on recharge rates through rainfall decline and lead to accelerated depletion. As such, modeling results predict groundwater reserves will be exhausted by about 2025-2030. Climate models which had been deployed based on regional scenarios indicates that Yemen is projected to

witness greater variability, with an increased frequency of intense rainfall events and therefore possibly an increased risk of drought and floods- see three projected climate scenarios below as shown in Figure (2). Also, the marginal impact of climate change scenarios on rainfall and crop production is shown in Table (6). The common factors in the predictions are:

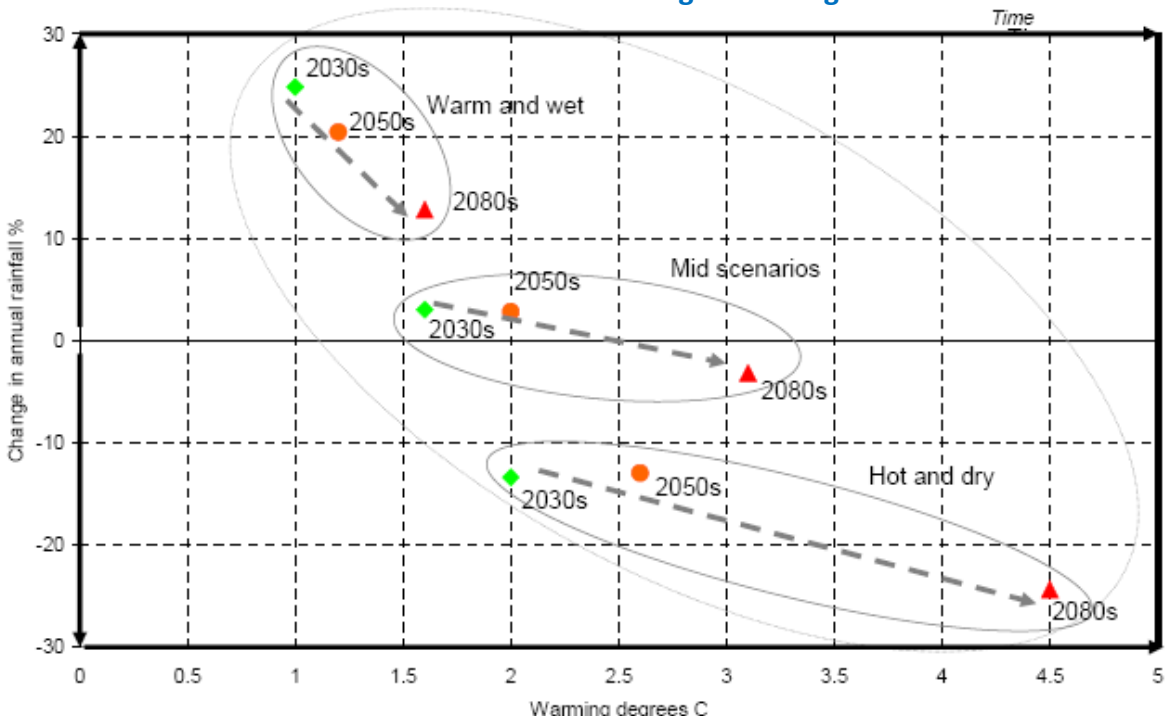
- Yemen will be getting warmer, most likely at a faster rate than the global average (by between 1 and 4.5^{o}C towards the end of century) and more arid.
- It is likely that there will be more variability of rainfall patterns within years.
- There will be an increased frequency of intense rainfall events and therefore an increased risk of floods and drought.

In a nutshell, Yemen is anticipated to experience steadily rise in temperatures, and an increase in variability of rainfall and in heavy precipitation events under climate change. Rainfall changes will be accompanied by changes in the intensity of wind and frequency of high temperatures and changed cloudiness. Less predictable rainfall and a hotter and possibly drier climate would place Yemen's people and economy under further stress. Climate change could also badly affect 52 percent of Yemen's workforce working in the agricultural field.

Table (6) Marginal Impact of Climate Change Scenarios on Rainfall and Crop Production

Scenario	Mid			Hot and Dry			Hot and Wet		
Year	**2030**	**2050**	**2080**	**2030**	**2050**	**2080**	**2030**	**2050**	**2080**
Temperature (C^{o})	+1.6	+2	+3.1	+2	+2.6	+4.5	+1	+1.2	+1.6
Rainfall	+3%	+3%	-3%	-13	-13	-24	25%	20%	13%
Crop Production	+1%	+1.1%	-6.3%	-10.7%	-11.2%	-27.2%	14.1%	11.7%	6.5%

Figure (2) Simplified Climate Scenarios Showing Changes in Annual Average Precipitation and Annual Average Warming



3.2 Adaptation Measures

Owing to the multidimensional nature of vulnerability in Yemen, adaptation is centered around multi-sectoral and stakeholder consultations to build up resilience of the major priority sectors being affected by climate change. In addition to the already planned and implemented short-term adaptation measures and actions, Yemen intends to plan and implement medium- and long-term resilience building measures to address the impacts of climate changes, given that these changes has already significantly affected most sectors relevant to economic, food and water security of Yemeni citizens.

Yemen's water scarcity represents a direct pressing factor and threat to its economy and directly affects the food security of the Yemeni citizens. However, Yemen spares no effort to play a positive role in this international orientation in accordance with its national interests and the rights of Yemeni people in the provision of decent living conditions.

It is expected that Yemen will witness a noticeable increase in the annual temperature as well as a steady decrease in the annual rainfall. As mentioned above, Yemen is highly vulnerable to climate change and it is therefore expected that the effects of climate change would obviously affect water, agriculture, health and bio-diversity sectors due to their structural fragility as well as the lack of institutional and technical capacities including other necessary means to cope with the effects and minimize the risks of climate change. This document therefore provides a vision for adaptation which would set the ground to build resilience under the identified climate risk scenarios, which represent the cornerstone for achieving sustainable development.

Such a vision will also set the ground for enabling actions which include preparation of National Adaptation Plan (NAP). NAP will provide the necessary information including on medium- and long terms climate vulnerabilities, and investment programmes to build resilience under the projected climate risks scenarios. Building of resilience will necessarily require international support to enable Yemen to adapt to the effects of climate change.

Yemen's Future Plan to address the effects of climate change will require measures to reduce the risks and enhance adaptation especially of already fragile and most vulnerable sectors, in particular, the unprecedented droughts, land degradation, sea level rise and coastal storm surges which recently have caused widespread devastation of coastal communities, as evidenced by most recently Chapala Cyclone in November 2015. These can be realized through a range of actions aimed at promoting resilience to the effects of and disaster risks associated with local and global climate change scenarios.

3.2.1 Presentation of current adaptation measures

A number of institutional actions are being carried out in Yemen, many of which are set to offer significant insights and experiences on current and potential mitigation and adaptation strategies for addressing climate change. A selection of the main programmes under implementation includes:

1- Many key programs identified in NAPA are either planned or under implementation such as the national early warning system for natural disasters and climate change vulnerability assessment of key sectors;
2- Yemen is a pilot country for CIF's Pilot Project for Climate Resilience (PPCR). As the poorest country in the Middle East, the Yemen PPCR strategic programme is designed to reduce the vulnerability of coastal populations and integrate climate resilience and adaptation planning and capacity into the water and agricultural sectors with investments in three focus areas:
   (i) Climate Information System and Pilot Program for Climate Resilience (CISPPCR) - Climate Services - (budget:US$19 Million);
   (ii) Integrated Coastal Zone Management (budget: US$ 20 Million); and
   (iii) Natural Resource Management and Rural Livelihoods (budget: US$ 11 Million).
3- The "Small Holder Agricultural Productivity Enhancement Program (SAPEP) under Global Agriculture and Food Security Program (GAFSP), (budget: US$ 36 Million);
4- Rural Growth Program (budget: US$ 167 Million);
5- Rain-fed Agriculture and Livestock Project (budget: US$ 12.9 Million);
6- Conservation and Sustainable Use of Biodiversity;
7- Climate Resilience of Rural Communities (CRRC) Project;
8- Third National Communication and First Biennial Update Report to the UNFCCC (budget: US$ 0.852 Million);
9- The 'Small Holder Agricultural Productivity Enhancement Program (SAPEP) under Global Agriculture and Food Security Program (GAFSP), (budget: US$ 36 Million).

3.2.2 Presentation of planned adaptation measures:

The implementation of adaptation measures will be based on related national frameworks and sectoral strategies such as the National Water Sector Strategy and Investment Plan (NWSSIP), the National Agriculture Sector Strategy (NASS) and the National Biodiversity Strategy and Action Plan (NBSAP), among others. A wide-ranging of measures is proposed to address climate vulnerabilities of priority sectors and thematic areas and this includes:

1- Promotion and scale-up of rainwater harvesting to reduce climate induced water shortage;
2- Promoting agriculture drought management as well as sustainable crop and livestock management;
3- Plan and implement proper land resources management programs.
4- Llivelihood approaches for integrating natural resources management and preservation of sensitive ecosystems;
5- Disaster risk management including flood and drought management.
6- Capacity Building for integrated coastal zones and marine resources management.
7- Capacity building and awareness raising; and
8- Institutional capacity for building resilience climate change including planning, programing, monitoring and resources mobilization.

Also there are a number of pipelined projects with support from United Nations Development Programme (UNDP), and Global Environmental Facility (GEF) with the aim of building climate resilience of vulnerable local communities in Yemen which include:

- Promote and build climate resilience to reduce vulnerability in Wadis and coastal areas;
- Enhance livelihood approach for integrating natural resources management and preservation of sensitive ecosystems.
- Introduce and scale-up renewable energy applications to reduce rural communities' vulnerability.

The implementation of Yemen's INDC relating to adaptation will largely depends on financial support by the UNFCCC climate financing mechanisms including on the Green Climate Fund (GCF). Also Yemen needs international support for preparation and implementation of NAP to address the effects of climate change in a sustainable manner. In this context, Yemen will need support in terms of finance, capacity building and technology transfer.

Equally important, support should also include focus on building medium- and long-term resilience capacity needs of the poor, and excluded groups, while at the same time responding to the emerging vulnerabilities being largely amplified by the escalating political-security economic consequences through a set of urgent but scalable livelihood strengthening interventions (i.e. labor-intensive terrace rehabilitation, community-based natural resource conflict-sensitive management, and income-generating livelihoods) that reinforce short-term resilience capacity needs at the grassroots levels.

4. Issues and Needs

As a LDC, Yemen is a resource-constrained country with limited capacities but still experiencing tremendous development challenges, and pressing priorities. Yemen also has the lowest Official Development Assistance (ODA) of per capita at US$12.7 or just 2.2 percent of GDP, compared to US$33.4 per capita (18.7 percent of GDP) for other least developed countries in the world.

A range of factors pose challenges to addressing climate in Yemen. These include weak governance and institutional structures, lack of long-term reliable data or technical capacity to analyze the data, uncertainties in regional and local climate scenarios as well as socio-economic scenarios, generally low awareness levels regarding climate change, low institutional or technical capacity to interpret, modify, or develop existing models or methodologies, and a dearth of research on applicable policy measures to address climate change.

With the current weak adaptive and institutional capacity, it is unlikely for Yemen to build up adequate climate change resilience, and ensure low-emission development trajectories unless

sufficient support has been provided to enable Yemen implement its ambitious GHG emissions reduction targets as well as adapt to the impacts of climate change.

Yemen is geographically divided up by five major land and eco-climatic systems in addition to the different socio-economic rural-urban settings, and geographical and topographical characteristics, and localities across the various governorates, and districts of the country. Each and every specific locality would probably have its own locality specific adaptation needs. However, it can be noted that each of the aforementioned studies has only covered a limited number of sectors through scattered and selected pilot areas. Different areas have not been covered, and new emerging climate change associated impacts including spread of diseases such as Dengue have not yet been explored In addition, these studies have only provided a generic outlook rather than location-specific information which sounds to have very low applicability across the diverse geographic, topographic landscapes of the country.

Therefore, more studies will be conducted under the NAP process which will provide up-to-date analysis with economy-wide adaptation needs including on costing of investments covering the various medium- and long-term adaptation measures, as well as loss and damage associated with climate induced disaster risk scenarios. Therefore, it is important to note that this INDC document has drawn on available reports and studies while other national-wide and locality-specific vulnerabilities, and adaption needs have not been reflected owing to lack of sufficient information at this stage when the INDC is drafted.

Additional ssupport will also needed on issues relating to Climate Change Adaptation (CCA) and Disaster Risk Reduction (DRR) as well as Ecosystem-Based Adaptation (EBA) including on sustainable management of natural resource, and disaster risk management (DRM) to help the country reduce potential loss and damages associated with climate induced disaster risk scenarios such as the already occurring extreme hydrological weather events including more frequent and severe droughts and floods..

Consequently the implementation of Yemen’s INDC will need significant support in terms of capacity building and technology development and transfer. Without such support under such a fragile situation, the looming environmental scarcity threats, and climate change impacts and potential risks will further compound the mounting political-security effects on the poor in general and the most vulnerable in particular.

ZAMBIA'S INTENDED NATIONALLY DETERMINED CONTRIBUTION (INDC) TO THE 2015 AGREEMENT ON CLIMATE CHANGE

1. INTRODUCTION

1.1 Background

This document presents Zambia's Intended Nationally Determined Contribution (INDC) to the 2015 Agreement on climate change in response to decisions adopted at the 19th and 20th sessions of the Conference of the Parties to the United Nations Framework Convention on Climate Change (UNFCCC).

Zambia's INDC includes both mitigation and adaptation components based on her national circumstances and is in line with decisions 1/CP.19 and 1/CP.20. The successful implementation of Zambia's INDC will result in an estimated total emission reduction of 38,000GgCO_2eq which translates to 47% (internationally supported efforts) against 2010 as a base year. This emission reduction is conditional and subject to the availability of international support in form of finance, technology and capacity building. The total budget for implementing both components is estimated at US$ 50 billion by the year 2030, out of this USD 35 billion is expected to come from external sources while $15 billion will be mobilized from domestic sources.

1.2 National Circumstances

Climate variability and change has become a major threat to sustainable development in Zambia. The country is already experiencing climate induced hazards which include drought and dry spells, seasonal and flash floods and extreme temperatures. Some of these hazards, especially the droughts and floods have increased in frequency and intensity over the past few decades and have adversely impacted food and water security, water quality, energy and livelihoods of the people, especially in rural communities.

Recent climate trends based on records from 1960 to 2003 indicate that mean annual temperature has increased by 1.3ºC, since 1960, an average rate of 0.34ºC per decade. On the other hand, the mean rainfall over Zambia has decreased by an average rate of 1.9 mm/month (2.3%) per decade since 1960. The future trends in the country are towards a higher average temperature, a possible decrease in total rainfall, and some indication of heavy events of rainfall. An assessment of potential climate impacts shows that they will seriously undermine the efforts to improve the livelihoods of Zambians if left unaddressed[1]. The assessment[2] further analyzed the negative impacts of climate change on key economic sectors including water, agriculture, forestry, wildlife, tourism, mining, energy, infrastructure and health. Further studies have estimated GDP loss over a 10-20 year mid-term planning horizon for agriculture productivity and its associated effects on poverty levels[3], the potential impact of an energy crisis, the higher cost of treating climate related diseases such as malaria and malnutrition, and the loss of natural resources which provide critical ecosystem services to urban, peri-urban and rural communities[4].

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[1] Ministry of Tourism, Environment and Natural Resources (MTENR). 2007. Formulation of the National Adaptation Plan of Action (NAPA) on Climate Change. Final Report. MTENR, 58 pp.

[2] *Ibid.*

[3] Jain, S. 2007. An empirical economic assessment of impacts of climate change on agriculture in Zambia", Policy Research Working Paper No. 4291, The World Bank Development Research Group, Washington D.C.

[4] Ministry of Tourism, Environment and Natural Resources (MTENR). 2011. The Economics of Climate Change in Zambia. MTENR, February 2011.

The aggregated estimated total GDP loss by sector was in the range of USD 4,330-5,440 million with the following sector GDP losses: Agriculture (2,200 – 3,130), Energy related (270 – 450), Health (460), and Natural Resources (1,400). In view of these challenges, Zambia has in the recent past developed various climate change-related policies, strategies, projects and programs in response to climate change impacts. These include: the National Policy on Environment (NPE, 2007); the National Climate Change Response Strategy (NCCRS, 2010); National Forestry Policy of 2014; National Energy Policy of 2008, The National Agriculture Policy of 2014 and Transport Policy of 2002; National Strategy for Reducing Emissions from Deforestation and Forest Degradation (REDD+, 2015); Second National Biodiversity Strategy and Action Plan (NBSAP2); the National Adaptation Plan of Action on Climate Change (NAPA, 2007); Technology Needs Assessment (TNA, 2013); Nationally Appropriate Mitigation Actions (NAMAs, 2014); Second National Communication (SNC, 2015).

These policies, strategies, programmes and projects are aligned with the Revised Sixth National Development Plan (RSDNP) and the Vision 2030 which promotes "A prosperous middle income country by 2030", both of which support development of a low carbon and climate-resilient development pathway. In addition, Government ratified the Kyoto Protocol in 2006 among other things to facilitate implementation of the Clean Development Mechanism. The country is also in the process of developing its National Adaptation Plan (NAP) for long term adaptation planning and mainstreaming of climate change into national development planning process. The development of the Seventh National Development Plan (SeNDP, 2017-2021) is also underway which will take into account climate change issues

An assessment undertaken as part of the INDC preparation for the mitigation component revealed that mitigation policies/actions/programs converge into three programs which have mitigation and adaptation effects: Sustainable Forest Management, Sustainable Agriculture and Renewable Energy and Energy Efficiency.

Similarly, adaptation measures identified based on vulnerability assessment of seven key economic sectors (agriculture, water, forestry, energy, wildlife, infrastructure and health) comprise three goals/programs that have strong synergies with mitigation. These are: Adaptation of strategic productive systems (agriculture, forests, wildlife and water); Adaptation of strategic infrastructure and health systems; and Enhanced capacity building, research, technology transfer and finance.

2. MITIGATION

2.1 Contribution

Zambia intends to reduce its CO_{2eq} emissions by implementing three (3) programs driven by the country's Climate Response Strategy and supported by national development policies including energy, forestry, agriculture, water, Town and Country Planning, sanitation, and transport. Further, these programs have been developed based on Zambia's plans and actions and supported by various climate-related activities such as REDD+, NAMAs and Technology Needs Assessment (TNA), among others (Table 1).

Table 1: Zambia's Programs Contribution to its National Mitigation Goal

Name of Programme	Description	Objectives of the Programme	Co-benefits [5]
Sustainable Forest Management	Program involves implementing - Forest enhancement including natural regeneration and afforestation/reforestation - Sustainable charcoal production to include improved kilns - Improved cooking devices to include improved biomass stoves, use of ethanol and LPG stoves, and switch to electric stoves - Participatory forest management (CFM, JFM, PFM) - Forest fire management	To promote natural regeneration, afforestation/ reforestation, sustainable charcoal production and utilization practices, and generation of electricity from forest waste and residues.	- Creation of job opportunities and alternative livelihoods contributing to rural poverty reduction - Enhanced information awareness on forest management - Increased biodiversity preservation - Restored hydrological balance in the river basin - Increased resource productivity leading to watershed services, and ecosystem protection restoration of natural habitats - Increased rural household incomes from SMEs - Local community empowerment and capacity building, - Reduced GHG emissions - Improved air quality
Sustainable Agriculture	Program involves implementing - Conservation/ Smart agriculture - Rural biogas plants - Rural biomass electricity generating facilities	To promote conservation/ smart agriculture activities leading to adaptation benefits and enhancing climate resilience, especially in rural areas, and generation of electricity from agriculture waste.	- Rural poverty reduction particularly among women and the youth - Creation of job opportunities and alternative livelihoods contributing to reduced rural poverty - Reduced GHG emissions due to reduced fertilizer use and less turning of soil - Biodiversity preservation due to reduced tillage - Improved soil productivity leading to improved crop productivity - Soil carbon sequestration - Reduced indoor air pollution due to cleaner energy use

[5] Co-benefits were assessed utilizing the Development Impact Assessment Visual Tool, available at https://www.ec-leds.org

Renewable Energy and Energy Efficiency	Program involves implementing - Fuel switch (diesel/HFO to biodiesel) - Fuel switch (coal to biomass) - Switch from existing isolated diesel to mini-hydro - Introduce and increase blending of bio-fuels with fossil fuels and where possible substitution with bio-fuels - Off grid RE to non-electrified rural – P.V and Wind - On grid expansion program to support economic growth and grid extension through inter-basin water transfer - Grid extension to non-electrified rural areas	To promote the switching from conventional and traditional energy sources to sustainable and renewable energy sources and practices, and use of off grid renewable energy technologies for rural electrification as decentralized systems.	- Improved health impacts due to child and maternal mortality and retention of medical personnel - Improved education impacts due to longer hours of study and advanced teaching methods, safety, creation of opportunity for girl child and women's education - Improved food security due to increased agriculture production resulting from use of irrigation especially for women - Increased rural development impacts due to increased economic activities through SMEs - Reduced indoor air pollution and load shedding - Reduced GHG impacts and improved air quality - Reduced energy deficits

The extent and magnitude of contribution of Zambia's GHG reduction will depend on the availability of resources from: (i) domestic efforts with limited international support and (ii) Domestic efforts with substantial International support, as shown in Figure 1.

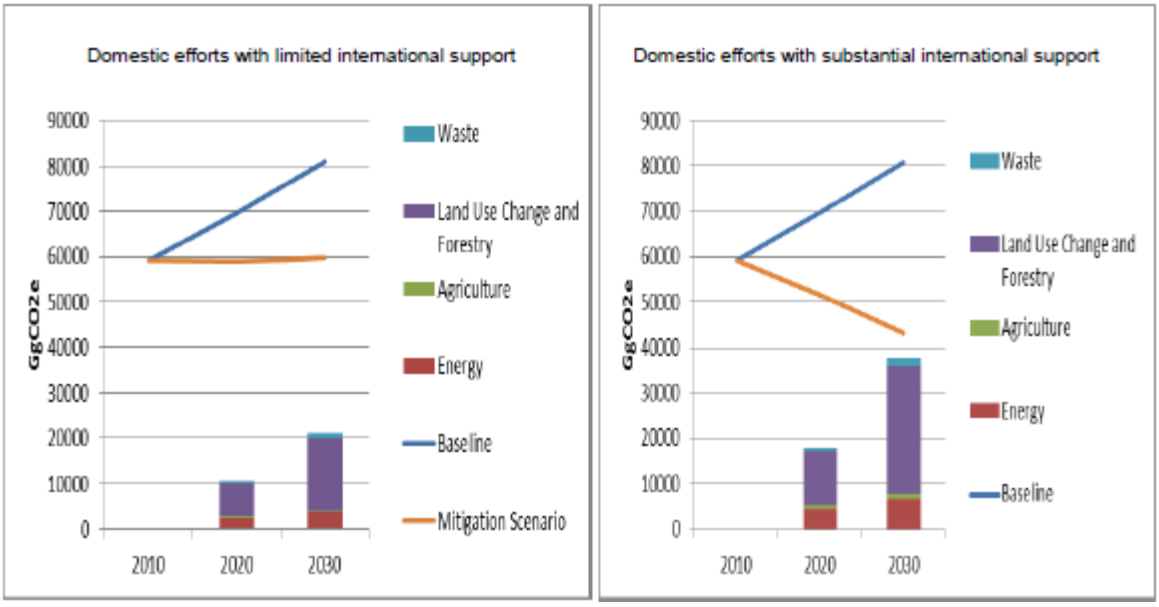


Figure 1: Extent and magnitude of contribution of Zambia's GHG reduction with scenarios for limited and substantial international support

Implementation of the domestic efforts with substantial international support is conditional upon strong commitment of international climate, bilateral and multilateral finance in addition to provision of domestic resources. It is expected from this scenario that by the end of 2030, estimated 38,000 Gg CO_2eq could be mitigated, compared to 20,000 Gg CO_2eq under the domestic efforts with limited international support. This translates into a reduction potential of 25% and 47% against 2010 as the base year for the domestic efforts with limited international support and domestic efforts with substantial international support respectively.

Financial Needs	Meeting the conditional target requires an overall investment estimated at USD 35 billion up to 2030, to be mobilized through new climate finance mechanisms such as; the Green Climate Fund (GCF) and other climate related bilateral, multilateral and domestic financing including private sector.

2.2 Assumptions and Methodological Approaches

Time Frame	The time for implementation of the INDC is up to 2030
Gases Covered	Carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O)
Sectors covered	Energy (i.e. manufacturing, commercial, residential, agriculture, transport, mining and electricity) Agriculture (i.e. Enteric Fermentation and Manure Management, Rice Methane, Agriculture Soils, Burning of Savanna and Agriculture waste) Waste (i.e. Solid waste disposal, Solid waste open burning, Domestic wastewater handling, Industrial wastewater handling and Human sewage) Land-use, Land-Use Change and Forestry (LULUCF): **Sources-** (i.e. Deforestation and forest degradation through land clearing for agriculture, uncontrolled fires, infrastructure, timber harvesting, and charcoal production. **Sinks**-Regeneration from abandoned land from disturbed forests (firewood collection, charcoal production and timber harvesting), agriculture farrow and plantations, afforestation and reforestation)
BAU Scenario	GHG emission projection for 2030, starting in 2010, and 2016 as the first year of implementation of the programs recommended.
Mitigation Scenarios	GHG emission projections for 2030, starting in 2016. The baseline and mitigation scenarios were developed for Energy Sector using the "Long-range Energy Alternatives Planning System" (LEAP) software. Scenarios for the agriculture, land use, land use change and forestry, and waste sectors were developed using standard analysis spreadsheets. Both scenarios in **Figure (1)** are based on data from the National and Sector Statistics, which included economic, demographic and sectoral information.
Global Warming Potential (GWP)	The GWP values used were: GWP CO_2 = 1 (by convention), GWP CH_4 = 21 and GWP N_2O = 310
Methodology for Estimating Emissions	The methodology used is Revised 1996 IPCC Guidelines and 2000 Good Practice Guidance.
Contribution of International Market Based Mechanisms	Zambia does not rule out the possibility of using market based mechanisms in meeting emission reduction target.

3. ADAPTATION

3.1 Adaptation measures

As a minimal contributor to global GHG emissions, Zambia places significant importance and priority on adaptation to the effects of climate change in order to enhance the resilience of its population, ecosystems, infrastructure, productive and health systems. The key socio-economic sectors identified as most vulnerable to climate change impacts include: agriculture, water, forestry, energy, wildlife, infrastructure and health. All the adaptation actions have strong synergies with mitigation actions.

Zambia's capacity to undertake and sustain strong mitigation actions is dependent upon support for the implementation of the cross-cutting adaptation actions described herein.

The intended contribution on adaptation stated here is for the purposes of information so that an overview of the range of planned climate-related actions of the country is made known; it does not constitute an international obligation to the country. The extent of implementation of the intended contribution is contingent upon the financial resources, capacity and technologies available to the country through both domestic and international support to stimulate investments and innovation.

3.2 Approach for Adaptation Measures

The adaptation measures are applicable to the following sectors: Agriculture; Water; Forestry; Energy; Wildlife; Infrastructure; and Health. These have been identified in the NAPA (2007) and subsequent assessments as the most vulnerable sectors to impacts of climate change especially droughts and floods.

In terms of implementation, Zambia will take a landscape approach at watershed level to enhance synergies between adaptation and mitigation actions. Zambia has six major watersheds: Tanganyika; Luapula; Chambeshi; Luangwa; Kafue; and Zambezi

3.3 Impacts and Vulnerability

Zambia's geographic characteristics coupled with high poverty levels (currently estimated at 60%)[6] and limited institutional capacity for adaptation, make it a highly vulnerable country to the adverse impacts of climate change especially droughts and floods

3.4 Planned Actions

The adaptation measures comprise three (3) goals/programs and 11 priority actions (Table 4):

Program 1: Adaptation of strategic productive systems (agriculture, wildlife, water

Priority Actions	Key Activities	Co-benefits
1. Guaranteed food security through diversification and promotion of Climate Smart Agricultural (CSA) practices for crop, livestock and fisheries production including conservation of germplasm for land races and their wild relatives.	1.1 Promote CSA practices through conservation agriculture, agroforestry, use of drought tolerant varieties, water use efficiency management and fertilizer use efficiency management. 1.2 Promote crop land races of cassava, maize, sorghum, finger millet, beans, cowpea and their wild relatives. 1.3 Promote livestock CSA practices through: improved feed management, improved animal health, improved rangeland management and use of drought-tolerant breeds. 1.4 Promote sustainable aquaculture practices through improved water management, improved feeding regimes and use of appropriate stocks.	- Poverty reduction - Increased food security due to improved agricultural production and diversification - Increased rural household incomes from diversified production systems - Increased soil fertility and conservation leading to improved crop productivity - Improved agro-biodiversity conservation - Improved health impacts as a result of food security and nutrition

[6] World Bank. 2015. Country Overview – Zambia. http://www.worldbank.org/en/country/zambia/overview

	1.5 Develop and implement policy incentives for farm diversification.	- Increased livestock productivity, system resilience and reduced vulnerability - Increased fisheries productivity, system resilience and reduced vulnerability.
2. Develop a National Wildlife Adaptation Strategy and ensure its implementation through supportive policies, local community, civil society and private sector participation.	2.1 Develop a National Wildlife Adaptation Strategy. 2.2 Map and protect wildlife corridors and refuges. 2.3 Promote community/public/private partnerships in the sustainable management of wildlife resources. 2.4 Enforce equitable benefit sharing arrangements among government, communities and the private sector in the management of wildlife resources.	- Improved governance of the wildlife estate - Increased wildlife system resilience and reduced vulnerability - Increased income from tourism-related activities
3. Protection and conservation of water catchment areas and enhanced investment in water capture, storage and transfer (linked to agriculture, energy, ecological, industrial and domestic use purposes) in selected watersheds.	3.1 Promote the protection of catchment forests in the Zambezi, Kafue and Luangwa watersheds. 3.2 Develop management plans for the three focal landscapes in 3.1 above. 3.3 Promote rainwater harvesting in the three focal landscapes. 3.4 Improve water storage through a network of dams and weirs. 3.5 Develop and improve water transfer infrastructure through canals and piped systems. 3.6 Adopt and promote integrated water management. 3.7 Undertake restoration projects.	- Improved water security for ecological, domestic and industrial purposes - Increased hydrological systems resilience and reduced vulnerability to climate change impacts. - Improved water quality.

Program 2: Adaptation of strategic infrastructure and health systems

Priority Actions	Key Activities	Co-benefits
4. Institutionalize integrated land use planning compatible with sustainable management of natural resources and infrastructure development	4.1 Develop National Land Use Planning Guidelines. 4.2 Integrate land use planning into official institutions and structures to facilitate legally binding land use plans. 4.3 Revise and enforce the National Construction Codes and Standards to safeguard infrastructure against climate change impacts. 4.4 Improve monitoring systems for	- Harmonized land use plans at sectoral, district, regional and national planning levels resulting in collaboration, efficiency and cost-effectiveness. - Strategic alignment of resources for implementation. - Conservation of biodiversity - Avoided land use conflicts.

	infrastructure at all administrative levels.	- Reduced GHG emissions and impacts. - Creation of employment, both high- and low-skilled jobs. - Reduced human safety hazards through disaster prevention. - Reduced maintenance costs for infrastructure. - Increased poverty reduction and more balanced national development.
5. Mainstream climate change in the National Health Policy, Environmental Health (EH) Policy, and Water and Sanitation Policy.	5.1 Identify entry points for mainstreaming climate change adaptation into the three policies (e.g., policy formation and revision, national planning processes, resource allocation processes, etc.) 5.2 Finalize the EH policy 5.3 Strengthen health surveillance at all levels 5.4 Conduct mainstreaming awareness programes. 5.5 Establish an inter-departmental and sectoral coordination mechanism.	- Coordinated/harmonized policies resulting in efficiency and cost-effectiveness at both planning and implementation levels - Effective delivery of health services - Improved human health - Increased health systems resilience and adaptive capacity to climate change impacts
6. Enhance decentralized climate information services for early warning and long-term projections on the effects of climate change to support sustainable management of the production systems, infrastructure development and public health.	6.1 Provide timely information to the end users and elicit quick emergency responses in face of adverse climate events that impact on the productive systems, infrastructure and health sectors. 6.2 Coordination of Early warning system information dissemination 6.3 Strengthen implementation of the decentralization policy.	- Enhanced preparedness to mitigate climate change impacts. - Local empowerment to make the right decision. - Local community empowerment to enforce community by-laws.

Program 3: Enhanced capacity building, research, technology transfer and finance for adaptation

Priority Actions	Key Activities	Co-benefits
7. Capacity building in Climate Smart Agriculture (CSA), Sustainable Forest Management (SFM),	8. Conduct trainings for farmers, extension and technical staff on CSA, SFM, SFA, RET, EWS and climate change planning. 9. Conduct public awareness	- Increased adaptation knowledge and skills among target groups. - Increased resilience and adaptive capacities among target groups - Increased public awareness on CSA,

Sustainable Fisheries and Aquaculture (SFA), Renewable Energy Technologies (RET), and Early Warning Systems (EWS), Change management and climate change planning.	campaigns on climate change, CSA, SFM, SFA, RET and EWS. 10. Conduct trainings for top and middle management in relevant sectors on change management. 10.1 Conduct research on locally-specific adaptation scenarios in Zambia's three Agro-ecological Regions (especially AERs I and II) (e.g., climate downscaling techniques, socio-economic scenarios, decision tools, stakeholder approaches, sector-specific tools, micro-climatic conditions and appropriate locally-specific adaptation measures, etc.). 10.2 Disseminate research results widely.	SFM, SFA, EWS and (assessed) positive action. - Improved sectoral management due to increased understanding of organizational change in face of climate change. - Improved decisions by farmers, local communities, extension staff, planners and policy-makers. - Improved early warning information systems and appropriate responses specific to certain locations. - Reduced GHG emissions and climate change impacts.
11. Water technologies for savings, recycling, irrigation and sustainable management for household, agriculture and industrial purposes.	11.1 Conduct water deficit/availability assessments in AERs I and II. 11.2 Implement the various water technologies based on the assessment results and potential. 11.3 Establish ground and surface water monitoring systems.	- Employment creation leading to increased poverty reduction. - Increased water security - Improved energy security through enhanced hydro-power generation. - Improved agricultural productivity through enhanced irrigation capacity. - Improved health impacts from clean water, easy access and sanitation - Reduced water utility bills for households and industries. - Improved local skills in various water technologies.
12. Development of an insurance market against climate change induced risks related to agriculture and infrastructure	12.1 Establish appropriate insurance schemes.	- Reduced loss and damage - Protection of developers (entrepreneurs) and consumers against loss.
13. Mainstream climate change adaptation into country development plans and strategies.	13.1 Develop guidelines for mainstreaming CC in the SeNDP. 13.2 Conduct awareness on mainstream CC in sectoral plans and strategies.	- Improved economic resilience. - Poverty reduction - Integrated approach to CC response and development. - Employment creation. - Ecosystem and biodiversity conservation.

4. PLANNING PROCESS

The mitigation and adaptation programmes elaborated in this INDC will be integrated in the Seventh National Development Plan (SeNDP) currently being developed. Planning for adaptation and mitigation programs under the Zambia's INDC will be integrated in existing planning processes and supported by national budget allocations to sectors, ministries and sub-national authorities towards implementation of both the domestic and international supported efforts.

In addition, the decentralisation process currently being undertaken in the country will enhance multi stakeholder participation in the implementation of the INDC.

The planning process also recognizes the efforts being made to establish the National Climate Change Development Council for climate change coordination in the country as stipulated in the draft National Policy on Climate Change. Furthermore, the National Adaptation Planning process being undertaken by Government provides a good basis for long term adaptation programming and mainstreaming of climate change adaptation into the existing national planning processes.

The National Designated Authority (NDA) for the Green Climate Fund has already been designated and is expected to play a key role of "clearing house or entity" for climate change projects to be funded from GCF in Zambia. The process is on-going to select a National Implementing Entity (NIE) and establishing a National Climate Change Fund (NCCF).

The effectiveness of the INDC implementation will be ensured through development and strengthening of existing Monitoring Reporting and Verification (MRV) systems to track progress of implementation of both the mitigation and adaptation programs.

5. MEANS OF IMPLEMENTATION, TIMEFRAME AND MONITORING

5.1 Means of Implementation

Zambia's contribution will be implemented with both domestic and international support. It is estimated that over USD 50 billion is required for both mitigation (USD 35 billion for Domestic efforts with substantial International support) and adaptation (USD 20 billion) actions across the programs up to 2030. Of this, USD 15 billion will be unconditional support provided by the Zambian Government and USD 35 billion will be conditional support to be sourced externally. Zambia will require international support in form of finance, investment, technology development and transfer, and capacity-building to fully realize its intended contribution. Further analysis will be necessary to refine the required investment cost and determine the domestic support as more data and results of studies become available. During implementation of these programs, Government will engage all relevant stakeholders to achieve the emission reduction target as part of the country's contribution to attainment of 2 degree goal.

5.2 Monitoring and Evaluation

Since the INDC is a part of the national development and planning process for climate change issues, it will be monitored and evaluated according to the existing monitoring and evaluation frameworks. Further, this will be done in a wide consultative and participatory manner. In addition, since INDC is a planning tool, it will be reviewed and updated as part of the national planning process.

5.3 Fairness and Ambition

Zambia considers her INDC fair and ambitious enough to contribute to low carbon and climate resilient economy by 2030 in accordance with its special national circumstance and desire to become a high middle income and prosperous Nation by 2030. Zambia is low contributor to the global greenhouse gas emission. In developing the INDC, Zambia considered the general principles and provisions of the Convention especially those related to Common But Differentiated Responsibilities and Respective Capabilities (CBDR) and equitable access to atmospheric space.

In light of above, Zambia will endeavor to make significant emission reduction through implementation of this ambitious INDC and provide leadership in the region through a set target of 47% emission reduction target, with 2010 being the base year. The country's INDC is guided by the country's desire to reduce poverty, attainment low carbon climate resilient economy, sustainable development and become a high middle income and prosperous nation by 2030 in line with its Revised Sixth National Development Plan and the country's Vision 2030.

The successful implementation of Zambia's INDC is conditional and dependent on the level of support to be provided through the Convention and other multilateral and bilateral arrangements. However, the country is committed to meeting its obligations under the Convention by implementing ambitious mitigation and adaptation programmes across the prioritized sectors. This will support the well-being of the citizens and contribute to the attainment of the objective of the Convention once adequate support is provided. This is what constitutes fairness and ambition for Zambia's INDC.

Zimbabwe's Intended Nationally Determined Contribution (INDC) Submitted to the United Nations Framework Convention on Climate Change (UNFCCC)

1.0. National Development Goals and Priorities in the Climate Change Context

1.1. Introduction

In response to the Warsaw decision and the Lima call for action, the Government of Zimbabwe presents its Intended Nationally Determined Contribution (INDC) to the United Nations Framework Convention on Climate Change (UNFCCC).

The Constitution of Zimbabwe (2013) gives every person environmental rights that include the right:

a) to an environment that is not harmful to their health or well-being; and
b) to have the environment protected for the benefit of present and future generations, through reasonable legislative and other measures that—
    i. prevent pollution and ecological degradation;
    ii. promote conservation; and
    iii. secure ecologically sustainable development and use of natural resources while promoting economic and social development.

The Constitution further stipulates that the 'State must take reasonable legislative and other measures, within the limits of the resources available to it, to achieve the progressive realisation of the rights set out in this section'.

Furthermore, the country's national economic blueprint, "Zimbabwe Agenda for Sustainable Socio-Economic Transformation (Zim Asset) was crafted to achieve sustainable development and social equity anchored on indigenization, empowerment and employment creation which will be largely propelled by the judicious exploitation of the country's abundant human and natural resources" – (HE President R.G. Mugabe, 2013). However, the country continues to face multiple environmental management challenges that include pollution, poor waste management, deforestation and land degradation, veldt fires and is susceptible to perennial floods and droughts caused by climatic changes emanating from global warming.

The country therefore seeks to build resilience to climate change whilst ensuring sustainable development in recognition of its climate change vulnerability and national circumstances. In presenting its INDC, Zimbabwe seeks to contribute to an ambitious goal of limiting temperature rise to below 1.5^{o}C. The global climate target is to prevent dangerous anthropogenic interference with the climate system so as to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened and to enable economic development to proceed in a sustainable manner.

1.2. Zimbabwe's Vulnerability to Climate Change

The country's location in the Southern subtropics makes it a particularly vulnerable country as rainfall is the key parameter determining its seasons, equivalent to how temperature determines seasons in the extra-tropics. Rainfall is, therefore, the most critical climate component for Zimbabwe as already small changes can affect ecosystems, and all key socio-economic sectors.

Zimbabwe's economy is founded on sectors vulnerable to climatic changes namely agriculture, forestry, energy, tourism, and industry, among others. The agricultural sector which constitutes between 10 and 15% of Gross Domestic Product (GDP) is largely rain-fed and hence highly sensitive to climate change. The latest census of 2012 estimated the population of Zimbabwe at 13.1million, with the majority (70%) living in rural areas. Approximately, 80% of the rural population's livelihoods are dependent on rain fed agriculture making them highly vulnerable to climate change induced weather extremes, variability and climate change impacts. This makes climate change adaptation in the agricultural sector a national priority, demanding policy direction at the highest level. At the same time, the agricultural sector also provides opportunities for climate change mitigation through initiatives such as Climate Smart Agriculture (CSA) and sustainable agro-forest-based adaptation and management practices. The sector thus has multiple benefits, and Zimbabwe foresees Greenhouse Gas (GHG) emission reductions whilst improving agricultural productivity and enhancing national food security.

1.3. National Economic Development Pathway

Zimbabwe has a total land area of approximately 390 000km^2 of which 45% of the area is under forest cover. Coupled with limited emissions from industry, the high potential sequestration capacity of its forests makes Zimbabwe a net carbon sink. Zimbabwe's Second National Communication to the UNFCCC identified the energy sector as the major greenhouse gas (GHG) contributor.

The country currently generates about 1200MW of electricity, of which approximately 40% is from thermal sources while about 60% is from hydro power plants particularly for industrial and domestic supply. National total GHG emissions in the year 2000 were 26,996Gg CO_2.eq (recalculated in 2015) which translates to 0.002Gg CO_2.eq per capita. The distribution of emissions is shown in Figure 1.

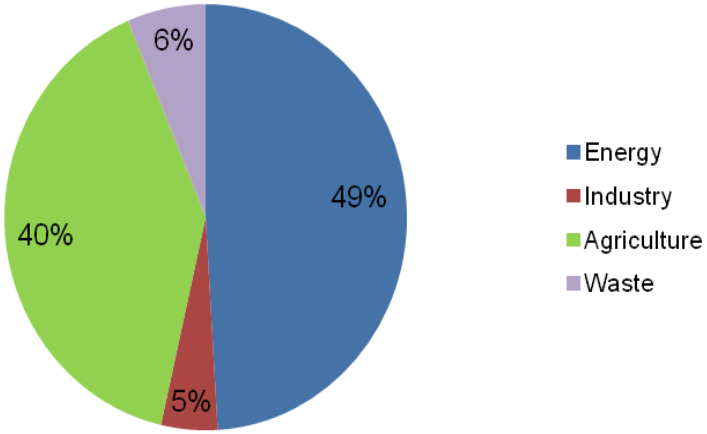


Figure 1: The distribution of Zimbabwe's emissions by sector (Source: SNC, 2012)

The country's total GHGs emissions contribute less than 0.05% of global emissions, making it a low emitter. Whilst, the majority of rural energy needs are met from firewood, candles and paraffin, the country can further reduce its GHGs and increase its sequestration capacity through scaling up the uptake and implementation of cleaner initiatives.

As part of its commitment to this global cause, Zimbabwe is committed to addressing climate change as an active party to the UNFCCC whilst recognising the founding principles which include protecting the climate system for the benefit of present and future generations on the basis of equity and Common But Differentiated Responsibilities and Respective Capabilities (CBDR-RC). The country's main climate change thrust remains adaptation and poverty reduction. However, strategically beneficial mitigation actions present a good opportunity for reducing greenhouse gas emissions and at the same time enhancing socio-economic growth and improving livelihoods, in particular when such action is supported by finance, capacity-building, technology development and transfer. The country has a vast potential for renewable energy production such as hydro-power and solar, which combined with energy efficiency and other related environmentally sound projects to constitute Zimbabwe's INDC.

1.4. Low Carbon Development Pathway

In view of the high energy sector GHG (in comparison to other sectors), the mitigation component of Zimbabwe's INDC is therefore focusing on the energy sector.
Action in this sector is supported by a number of initiatives such as National Climate Policy, Renewable Energy Policy, Bio-fuels Policy, Transport Policy and Forestry Policy and other instruments seeking to keep GHGs emissions at a minimal level and ensuring green development. These policies have enabled to develop hydro power generation and through additional dams will further strengthen Zimbabwe's mitigation actions. Since Zimbabwe is still developing, strategic mitigation initiatives and international collaboration presents an opportunity for low carbon development pathways, at the same time strengthening the economy as outlined in the national economic blue-print, Zimbabwe Agenda for Sustainable Socio-Economic Transformation (ZimAsset) and the Constitution of Zimbabwe.

Affordable sources of energy will be required to fuel Zimbabwe's economic growth and currently investments in capital intensive clean energy capacities are limited. In this regard, Zimbabwe's INDC has been structured to detail opportunities, gaps and constraints.

1.5. Zimbabwe's INDC Development Process

With the guidance of the Office of the President and Cabinet, the Ministry of Environment, Water and Climate spearheaded the development of this INDC. The INDC was developed through engaging a team of experts who carried out extensive countrywide consultations with key socio-economic sectors, geographic specific players, private and public sectors, vulnerable groups, the academia, the National Steering Committee, various experts and policy-makers. The process reviewed available literature, objective studies, collated information on planned and running projects to come up with the INDC. The findings showed that the nation has relevant legislative framework and development plans already in place, which are enunciated in various documents such as the Constitution of Zimbabwe, ZimAsset, National Climate Change Response Strategy (NCCRS), the First, Second and Third National Communication to the UNFCCC (the latter being finalized) amongst others.

1.6. Methodologies

The selection of mitigation and adaptation options was based on their economic, social and environmental benefits coupled with their existence in various plans as well as their feasibility. The key category analysis helped to identify areas with huge GHG reduction and adaptation potential.

Models used to evaluate the different mitigation options included the Zimbabwe Load Forecast (ZILF), LEAP and GACMO models. The selected options were presented to various stakeholders including Government, the business community and development agents such as UNDP, UNIDO, SNV, HIVOs, among others. The INDC development process capitalised on ongoing initiatives such as the development of the National Climate Policy to provide forward-looking contributions in cases where there were gaps. It therefore presents the latest updated status of the possible contribution and adaptation requirements to date. Needless to say, a more comprehensive process could still be done when there is sufficient time and resources. The following documents and processes also provided guidance and useful reference material where there were gaps in addition to the use of proxy data: Intergovernmental Panel on Climate Change (IPCC) Fourth and Fifth Assessment Report; National Communications to UNFCCC; National Energy Policy; National Studies and Consultations; INDC Project Management Unit; Industrial Development Policy, Comprehensive Africa Agriculture Development Programme (CADDP) and Zimbabwe Agriculture Investment Plan (ZAIP), among others.

1.7. Quality Control and Assurance

To ensure technical compliance with key stakeholders, the project identified strategic technical Government technical experts who were consulted regularly throughout the whole development process for real-time alignment of the findings with the national vision. The first draft was also subjected to an international technical peer review to check on the process and output.

After prioritisation of issues and several reviews internally and externally, the contributions were approved by the country's high level which is responsible for overall policy direction and facilitating implementation, monitoring and evaluation. The Ministry of Environment, Water and Climate with the guidance from the Office of the President and Cabinet will be responsible for developing accounting as well as the monitoring and evaluation framework for the transparent and successful implementation of the intended contributions.

2.0. Zimbabwe's Contribution

Zimbabwe's contribution towards achieving the objective of the Convention as set out in Article 2.

2.1. Adaptation Contribution

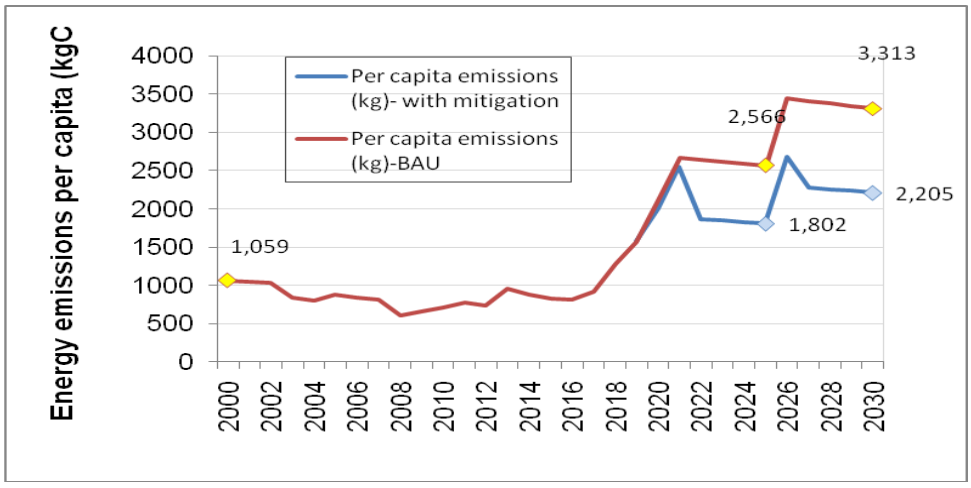
1. Rationale and process of developing the adaptation component	Zimbabwe's vulnerability of the agricultural sector to climate change effects especially water stress, flooding and other extremes such as frost and hail necessitates a focus on adaptation in order to climate proof and improve livelihoods, which will consequently eradicate poverty. The agricultural sector also provides 60 % of the raw materials required by the manufacturing industry and 40 % of total export earnings. Studies also show that even if there is deep decarbonisation, climate will continue to change for a while, thus there is need to consider adapting to the current and anticipated changes. Against this background, Zimbabwe seeks to upscale national planning and implementation of adaptation actions that enhance resilience of all sensitive socio- economic sectors to improve the national adaptive capacity.
2. Summary of vulnerabilities	Total mean annual rainfall ranges from around 300 mm in the south western to over 1000 mm in the north eastern regions of the country. Modest downward trends in total and mean summer rainfall have been observed in Zimbabwe. Intra-seasonal rainfall characteristics such as onset, duration, dry spell frequencies, and rainfall intensity have worsened. The country has experienced an increase in hot days, hot nights, and hottest days and a decrease in extreme cold days and cold nights in recent decades. Projections of mean monthly temperature show an average warming of around 2°C by 2080. Maize (the country`s staple food) yields are expected to decrease by up to 30% and even more in worst case scenarios by 2030 already. The area suitable for maize production is projected to further decrease by 2080. Probability of years in which growing season is likely to fail in future due to drought is projected to be as high as 100 % in some parts of the southern region. Overall net primary productivity is projected to decrease, as the rangelands' carrying capacities are reduced.
3. Long-term and near-term adaptation visions, goals and targets	A. Zimbabwe commits to promoting adapted crop and livestock development and climate smart agricultural practices through the following interventions: • Strengthening capacities to generate new forms of empirical knowledge, technologies (including conservation agriculture) and agricultural support services that meet climate challenges • Promoting the use of indigenous and scientific knowledge on drought tolerant crop types and varieties and indigenous livestock that are resilient to changes in temperatures and rainfall. • Developing frameworks for sustainable intensification and commercialization of agriculture at different scales across agro ecologies. B. Building resilience in managing climate related disaster risks such as droughts by: • Strengthening early warning systems on climate related agricultural risks. • Developing and sustaining an integrated approach in all sectors of the economy to reduce impacts of climate extreme events. • Promoting climate indexed insurance solutions and enabling market frameworks.

	C. Strengthening management of water resources and irrigation in the face of climate change by: • Promoting and supporting water harvesting as a climate change adaptation strategy. • Developing, rehabilitate and maintain surface and groundwater resources. • Strengthening and intensify monitoring systems for hydro-meteorological parameters. • Promoting efficient water use practices in the economy • Strengthening institutional capacity, research and extension for integrated water resources management. • Strengthening biodiversity conservation management and integrity of natural ecosystems to adapt to climate change. • Strengthening water and moisture conservation initiatives. D. Promoting practices that reduce risk of losses in crops, livestock and agricultural incomes by: • Building capacity to conduct comprehensive vulnerability assessments and develop appropriate response models. • Strengthening the capacity of the national meteorological and hydrological services to provide climate data timely. E. Cross sectoral adaptation efforts such as: • Promoting capacity building through research and development, education and awareness, and training in climate change related issues. • Mainstreaming gender responsive climate policies and emphasise special efforts to support vulnerable groups (women, youth and children) in climate change adaptation efforts within all sectors of the economy. • Promoting non-timber forest products and sustainable agro-forestry practices to enhance forest-based adaptation. • Implementing management practices that enhance capacity of power generation of hydropower stations in situations of limited water availability due to reduced rainfall. • Increasing the water-holding capacity of reservoirs in anticipation of increased abstraction and increased evaporation. • Building the capacities and support communities toward a diversification of livelihoods and shifts from agriculture into other sectors, where needed.
4. Institutional responsibilities for adaptation	The previous five years have seen several adaptation programmes and projects implemented and several plans already exist aiming to achieve the above-mentioned goals. The majority of the activities in the past were aimed at encouraging adapted crop and livestock development and farming practices such as breeding drought tolerant crop and livestock breeds, mainstreaming climate change, awareness raising, research and development and capacity building. Some programmes have provided support for the management of water resources and irrigation, crop, livestock and income loss risk reduction. The government has been largely coordinating national and long-term projects while independent civic organisations were primarily focusing on short-term programmes limited in geographical scope. The national government is the main player coordinating climate-related disaster risk reduction programmes through the Civil Protection

<table>
<tr><td></td><td colspan="2">Unit, which includes key agencies in charge of disaster early warning, response and recovery. Seasonal forecasts on crop yields and rangeland conditions are coordinated under the drought mitigation strategy framework. Preliminary findings show that an estimate of US$900 million has been utilised in implementation of adaptation actions in the previous 5 years.

The water shortages at the hydro power plants have resulted in huge reductions in electricity generation. In 2014 the mini-hydro plants were generating around 50% of their maximum ratings while the Kariba Power Station is currently (August 2015) operating at 63% because of the reduced water allocation. The power station is expected to run at such levels till the onset of the rainy season. This requires the nation to have the adaptive capacity, hence the inclusion of an adaptation amount for the energy sector to the tune of US$1.5 billion of which US$300 million is own contribution.
NB: A more comprehensive exercise such as the National Adaptation Planning (NAP) process will advance the assessment of the countries' vulnerability, adaptation needs and costs.</td></tr>
<tr><td rowspan="4">5. Actions, gaps and barriers</td><td>Action</td><td>Gaps and Barriers</td></tr>
<tr><td>Encouraging adapted crop and livestock development and farming practices</td><td>• Inadequate institutional and technological capacity to maximize germ-plasm of adapted crops and livestock
• Lack of knowledge and skills for intensive production practices
• Lack of mechanization technologies for climate smart production systems
• Inadequate research and extension
• Lack of financial resources
• Inadequate training of farmers
• Fragmented implementation of climate smart strategies</td></tr>
<tr><td>Building resilience in managing climate related disaster (drought, hail, violent storms/wings, frost heat waves, erratic rainfall and floods) risks</td><td>• Inadequate institutional capacity for providing timely early warning systems
• Insufficient capacity for grain storage facilities
• Insufficient support services for index insurance
• Incoherent institutional frameworks (policies) to coordinate disaster risk reduction
• Lack of financial resources</td></tr>
<tr><td>Strengthening management of water resources and irrigation in the face of climate change</td><td>• Inadequate infrastructure and technology for irrigation as well as institutional capacity for managing water resources
• Lack of knowledge, skills and technologies for improving water use efficiency in agriculture
• Lack of financial resources</td></tr>
</table>

6. Summary of needs	The Zimbabwe Agriculture Investment Plan (2013-2018) indicates that the sector requires investments of at least US$2 billion per year to fully utilise its production potential. Currently the sector is relying on a US$0.5 billion allocation from the national treasury. Up to US$35 billion will be cumulatively needed by 2030 under Business As Usual (BAU) for adapting to climate change in the agriculture sector. Zimbabwe aims to achieve this through joint efforts between the government, private sector, development partners and technology and funding mechanisms foreseen in context of the UNFCCC. Based on the status of current budget provisions, the total domestic support through the national government needed to build resilience of the agricultural sector is estimated at US$8.725. The required international support for adapting the agricultural sector of Zimbabwe is estimated at US$26.175 billion by 2030 under BAU. Further collation and analysis of information on support for financial investment, capacity development and technology generation and transfer in adaptation initiatives is however required. ***NB:** A more comprehensive exercise such as the National Adaptation Planning (NAP) process will advance the assessment of the countries' vulnerability, adaptation needs and costs.
7. Monitoring and reporting progress on adaptation	Monitoring tools - With the Assistance of the UNFCCC Focal Point in Zimbabwe (Ministry of Environment, Water and Climate), The Government's Results Based Management system, which is coordinated by the Office of the President and Cabinet, will be used as the principal monitoring and execution framework for the adaptation component of Zimbabwe's INDC together with other internationally agreed and relevant guidelines. - The existing INDC National Steering Committee will continue working closely with the Climate Change Management Department in facilitating the accounting and monitoring of the INDC. - International best practice guidelines for developing adaptation plans and (I)NDCs such as Guidelines for Developing Countries produced by the African Negotiators, guiding documents from the UNFCCC, UNDP or UNEP, as well as relevant documents from think-tanks such as the World Resource Institute will also be considered. - The Zimbabwe Vulnerability Assessments facilitated by the Zimbabwe Vulnerability Assessment Committee (ZIMVAC) advances the assessment of the countries' vulnerabilities. - Performance matrices from the Climate Change Response Strategy will be used. - The Drought Mitigation Strategy will provide guidance for monitoring progress toward alleviating impacts from droughts. - ZIMSTAT Surveys e.g. crop & livestock surveys will also be used - The CAADP and ZAIP monitoring frameworks will also be considered. - The Disaster Risk Management Bill - Academic research for Regional Climate Modeling, will build on climate scenarios and IPCC reports and guidelines

	Indicators: - Number of people vulnerable to climate change impacts; Access to water; Water Stress Levels; Level of awareness; Livestock productivity; Proportion of population undernourished, Inventory of adopted climate change mitigation and adaptation strategies, levels of project yields to 2030 as planned interventions are rolled out and n° of hectares with drought resistant crops under cultivation. - Various indices for the nation's resilience to climate change Reporting - National Communications to the UNFCCC. - Following any reporting standards for NDCs to establish under the new global climate agreement at COP21 or subsequent COPs. - Internal food and nutrition security reports for the cabinet under the National Early Warning Unit as well as the ZimVAC reports up to 2030. - Crop yield assessments by the Ministry of Agriculture, Mechanisation and Irrigation Development.
2.2. Mitigation Contribution	
1. Timeframe	2020-2030
2. Type of Contribution	GHGs, GHG Intensity (Emissions per capita)
3. Sectors	Energy
4. Gases	CO_2, CH_4, NO_2
5. Target level	The Mitigation Contribution for Zimbabwe is given as 33%* below the projected Business As Usual energy emissions per capita by 2030.  Figure 2. Emissions per capita trends with and without mitigation projects. *This is a contribution target subject to the following conditions as a minimum: 1. "full implementation by developed countries of their commitments relating to finance, technology and capacity pursuant to Article 4 of the Convention";

2. full, effective and sustained implementation of the Convention;
3. a post-2020 agreement addressing all elements set out in paragraph 5 of decision 1/CP.17 in a balanced and comprehensive manner;
4. receiving contributions by developed countries on "all elements set out in paragraph 5 of decision 1/CP.17" relating to mitigation, adaptation, finance, technology development and transfer, and capacity-building in the context of a global and comprehensive agreement for the period beyond 2020".

This mitigation goal is set to be achieved by implementation of the following actions as well as related enablers amongst others:

	Project	$GgCO_2eq$ in 2030	Indicative cost (US$ mil)
1	Ethanol blending	202	100
2	Solar water heaters	179	1230
3	Energy efficiency improvement	1278	60
4	Increasing hydro in our energy mix	15 316	5 000
5	Refurbishment and Electrification of the rail system	341	1,106
	Sub Total 1	**17 316**	**7 246**

Other key mitigation actions include the following with the estimated costs:

6	Coal-bed methane (CBM) power.	1000
7	Solar powered off-grids	3 000
8	Integrated Waste Management	500
9	Changing thermal power station technologies	5 000
10	Reviewing the Transport system	37 000
11	REDD+ implementation	1 000
12	Sustainable Energy Alternatives of curing tobacco	1 050
	Sub Total 2	**48 550**
	TOTAL FOR MITIGATION	**55 796**

6. Accounting Methodologies	The accounting of Zimbabwe's mitigation contribution will be done regularly using the IPCC and any other approved methodologies. The population, energy balance and energy intensities will be updated periodically. *GWP: The CO_2, CH_4 and N_2O emissions will be calculated based on the adopted methodologies or any internationally agreed locally relevant guidelines.
7. Equitability and adequacy	According to the National Inventory Report (NIR, 2015) the national emissions were 26,996 Gg CO_2eq in 2000 which constitute 0.045% of global emissions. The country is a net carbon sink with a high potential sequestration capacity owing to its forests that cover 45% of the total land area. The IPCC Special Report on Emissions Scenarios (SRES) projected that the average per capita energy CO_2 emissions for the Non-Annex I regions will vary from 2.8 to 5.1 tCO_2eq per capita by 2030 (*IPCC, 2007*). The Zimbabwean per capita emissions is projected to be 3.0 and 2.3t CO_2eq in 2030 for the BAU and with mitigation respectively. Zimbabwe has a low *per* capita emission because of its low energy *per* capita consumption. The electricity consumption per capita of 944 kWh in 2000 dropped to 666 kWh in 2012 and is projected to be around 1,271 kWh in 2030. This means that the national energy consumption has to increase.

Despite its low emissions and high carbon sequestration potential, Zimbabwe is already working towards universal access to cleaner energy by 2030. Below are some of the clean energy initiatives under consideration:

- Replacing more than a million incandescent bulbs with compact fluorescent lamps (CFLs) to more than 164,654 houses saving 42 MW.
- Recognising and rewarding companies making efforts in the area of energy efficiency and carbon footprint as a way of promoting good behaviour.
- Stepwise increase in Kariba Power Station (hydro power plant) from 666 to 750 MW and then 1050MW. Work on this plant is underway (Figure 3a).
- Promoting the use of liquefied petroleum gas (LPG) as the substitute for or alternative to grid electricity. This has several economic, social and economic benefits to people of Zimbabwe especially in rural areas where population is spaced, Figure 3b.
- Constructing institutional biogas digesters (50 to 80m3 in size) in all provinces with a target of at least 1,250 digesters by 2030.

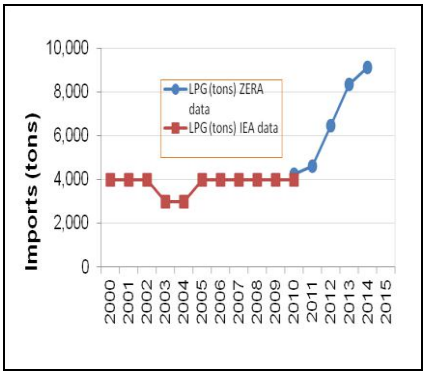


Figure 3a). Construction work at the Powerhouse of Kariba South Expansion project: b) Liquefied petroleum gas imports during the period 2000-2014

- Mini-hydros are already being constructed by Independent Power Producers (IPPs) and the mini-hydro installed capacity and is expected to rise to 27 MW early 2016.
- Solar energy, which has a huge potential of reducing especially if combined with hydro –power is already under consideration, Fig 4.

Figure 4. Street solar lighting project in Harare

8. Institutional arrangement and Implementation process	The Ministry of Environment, Water and Climate as the National Focal Point on Climate Change, is mandated to guide the nation's compliance in all multi-lateral environmental agreements, including INDC. On INDCs, the Ministry works in constant liaison with the Office of President & Cabinet. Other relevant Ministries and key stakeholders are involved to ensure implementation and alignment with the various sectoral plans and the broader national vision. As Zimbabwe strives to mainstream climate change in all socio-economic sectors, the proposed mitigation options will be implemented in line with the country's national plans and programmes.
9. Means of Implementation	**Support Needs:** Conditional actions will be implemented subject to availability of affordable international financial support, investment, ability to leverage on our resources, technology development and transfer and capacity development as well as continued improvement in our national circumstances and creation of enabling environment. The various funding, technology and capacity mechanisms related to the Convention such as the Green Climate Fund (GCF), Climate Technology Centre and Network (CTCN), Adaptation Fund, Global Environmental Facility (GEF) and continued investment by developmental partners in the national climate change discourse will be critical. The enactment of a 'favourable' agreement in Paris, France in December 2015 will be an added advantage. Zimbabwe also intends to leverage on its resources including carbon credits or sell of emission reductions units through international and regional carbon markets and/or carbon pricing mechanisms to mobilise more resources for managing climate change.