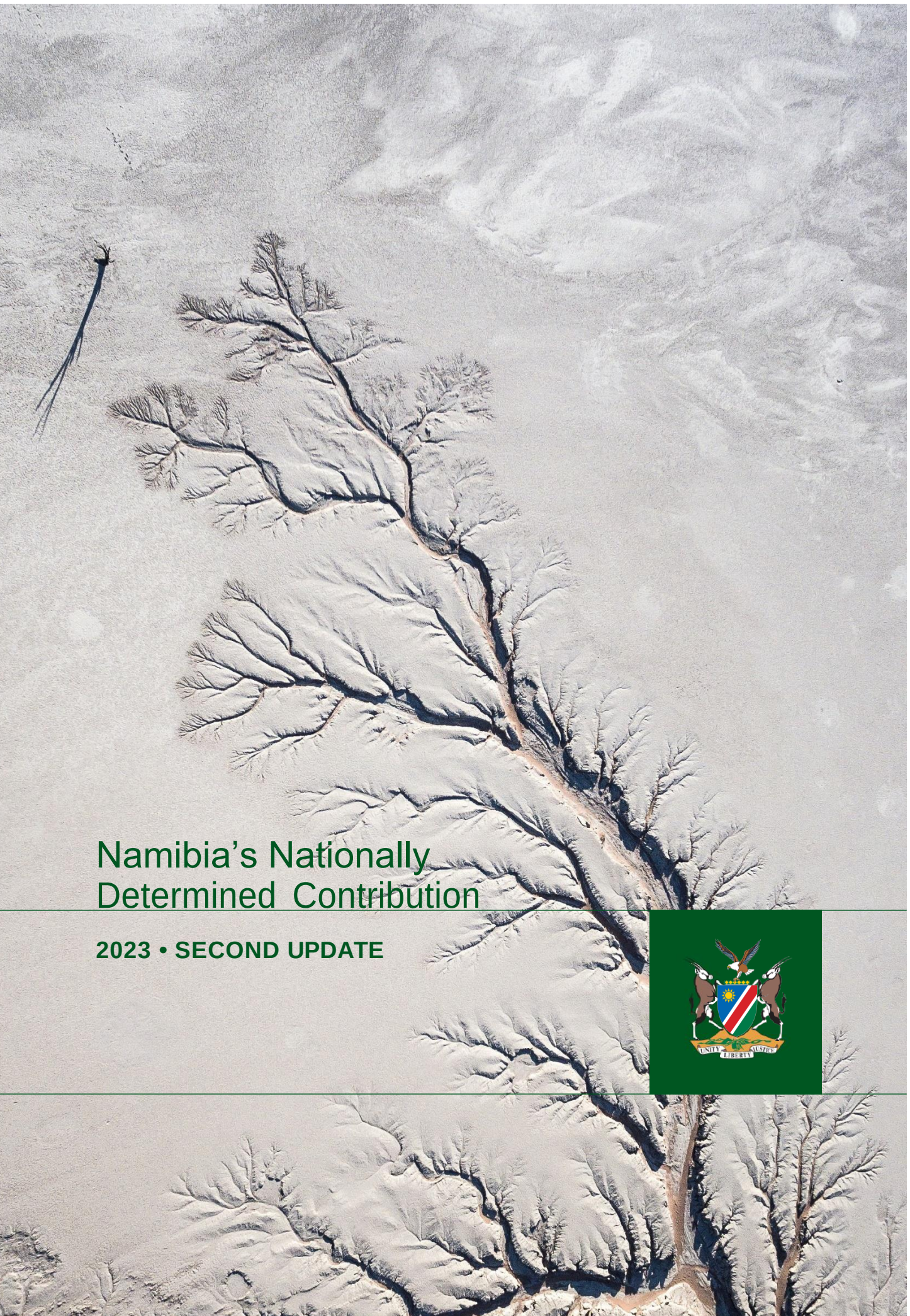

Namibia's Nationally Determined Contribution

2023 • SECOND UPDATE

ACKNOWLEDGEMENT

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REPUBLIC OF NAMIBIA

Namibia's First NDC – Second update

April 2023

FOREWORD

The existential danger to Namibia remains climate change. We are one of the countries most vulnerable to its adverse impacts. This is partly due to our peculiar geographical climate. Extreme conditions such as persistent droughts and flooding frequently expose our land.

In addition to these challenges, we are now tackling a range of global challenges that also threaten our capacity to cope and our desire to achieve sustainable growth. This is clear from the impacts of the recent COVID-19 pandemic, which has further intensified our vulnerability to external shocks. Thus, without external assistance, the government's recovery strategies and stronger policies cannot be efficiently enforced. Despite these challenges, and while our contribution to GHG emissions is just 0.0003% of the global share, we are committed to climate leadership and intend to promote more successful and bold steps to solve the climate problem facing the world today.

In this revised NDC, we have made aggressive proposals to enhance our BAU sink potential by 13% in 2030. In addition, if we obtain sufficient timely foreign funding and aid, we can aim at increasing this sink potential of 2030. To meet the emission reduction goals, we have set aggressive plans to boost the penetration of renewable energy through various initiatives.

Our NDC puts equal emphasis on further improving our adaptation and developing future climate resilience to reduce climate threats to our populations and their livelihoods. Our contribution to achieving resilient growth is evidenced by a range of ongoing projects, such as the Community Based Adaptation programmes focusing on agricultural and pastoral communities in the north-central and far northeast region of the country, undertaking community-based projects to build resilience to climate change by increasing resilience against climate-induced land degradation. Also, this NDC will encourage efforts to achieve the government's vision for a 'green economy' that encourages balanced economic development while safeguarding our environment.

Several stakeholder consultations and reviews of ongoing initiatives, partnerships and programmes in various sectors are part of this revised NDC. Efforts were also made to ensure that this NDC is aligned with all the strategies, plans and visions of the Republic of Namibia. Namibia is committed to achieving a climate-resilient and low-emission pathway.

On behalf of the Government and the People of Namibia, I am delighted to present this document as our resolve to do our part in the fulfilment of our national obligations to the UNFCCC and the international community at large. Let us save the planet.

REPUBLIC OF NAMIBIA
20 NOV 2023
OFFICE OF THE MINISTER
PRIVATE BAG 13306, WINDHOEK

Hon. Minister Pohamba Penomwenyo Shifeta
Minister of Environment, Forestry and Tourism

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ABBREVIATIONS AND ACRONYMS

%	Per cent
AFOLU	Agriculture, Forestry and Other Land Use
AR5	Fifth Assessment Report
BAU	Business As Usual
BEV	Battery Electric Vehicle
BTR	Biennial Transparency Report
BUR	Biennial Update Report
CCU	Climate Change Unit
CH4	Methane
CMA	Conference of the Parties serving as the meeting of the Parties to the Paris Agreement
CO_2	Carbon Dioxide
COP or CP	Conference Of Parties
COVID-19	Coronavirus disease 2019
CSO	Civil Society Organization
DEA	Department of Environmental Affairs
e	equivalent
EIF	Environment Investment Fund
EWS	Early Warning System
FOREX	Foreign Exchange
GCM	General Circulation Model
GDP	Gross Domestic Product
GEF	Global Environment Facility
GCF	Green Climate Fund
GHG	Greenhouse Gas
GIZ	German Agency for International Cooperation
GW	Gigawatt
GWP	Global Warming Potential
H2	Hydrogen
ha	Hectare
HDI	Human development Index
HFC	Hydrofluorocarbon
HFO	Heavy Fuel Oil
HIV/AIDS	human immunodeficiency virus/ acquired immunodeficiency syndrome
ICEV	Internal Combustion Engine Vehicle
ICT	Information and Communication Technology
ICTU	Information to facilitate Clarity, Transparency and Understanding
IMF	International Monetary Fund
INDC	Intended Nationally Determined Contribution
IPCC	Inter-Governmental Panel of Climate Change
IPP	Independent Power Producer
IPPU	Industrial Processes and Product Use
ISAP	Implementation Strategy and Action Plan
K	Thousand

km	Kilometre
LULUCF	Land Use Land Use Change and Forestry
M	Million
M&E	Monitoring and Evaluation
MAWLR	Ministry of Agriculture, Water and Land Reform
MEFT	Ministry of Environment, Forestry and Tourism
mm	Millimetre
MRV	Measure, Report, Verify
N2O	Nitrous Oxide
NC	National Communication
NCCC	National Climate Change Committee
NDC	Nationally Determined Contribution
NDP	National Development Plan
NGO	Non-Governmental Organization
NHIES	Namibia Household Income and Expenditure Survey
NIR	National Inventory Report
NIRP	National Integrated Resource Plan
NPC	National Planning Commission
NSA	Namibia Statistics Agency
oC	Degrees Centigrade
PA	Paris Agreement
PFC	PerFluoro Carbon
PV	Photovoltaic
SDG	Sustainable Development Goal
SOC	Soil Organic Carbon
t	tonnes
TACCC	Transparency, Accuracy, Completeness, Comparability, Consistency
UNDP	United Nations Development Programme
UNFCCC	United Nations Framework Convention on Climate Change
USD	United States Dollar
VA	Vulnerability and Adaptation

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EXECUTIVE SUMMARY

Background

In line with Article 4 of the Paris Agreement (PA) and Decision 1/CP.21 of the UNFCCC, Namibia submitted a revised version of its First NDC in July 2021 which inadvertently did not include Information to facilitate Clarity, Transparency and Understanding (ICTU) to be in line with Decision 4/CMA.1 and the major updates in its GHG inventory. Namibia made good of these shortcomings in this updated version, referred to as First NDC second update which covers the period 2021 to 2030, to inform the global stocktake more accurately on its efforts to implement the Convention. The urgent adaptation actions to enable the country to build its resilience and meet the sustainable development goals within its low emissions development strategy have also been included.

Salient Features of Namibia

Namibia's territory extends over some 825,000 square km for a widely dispersed population of nearly 2.6 million which exacerbates development, by impeding adaptation and rapid interventions to reduce risks and damage, inclusive of loss of lives, stemming from extreme weather events. It is an arid country with a highly skewed precipitation regime, ranging from less than 25 mm to just more than 600 mm annually, that makes it a water scarce country.

Namibia's economy is highly dependent on natural resources, making it highly vulnerable to climate change. Its development is already facing the brunt of climate change, with persistent droughts, frequent floods and more frequent epidemics seriously affecting the economic sectors Agriculture, Water Resources, Biodiversity and Ecosystems, Fisheries, Health, Infrastructure and Coastal Zone.

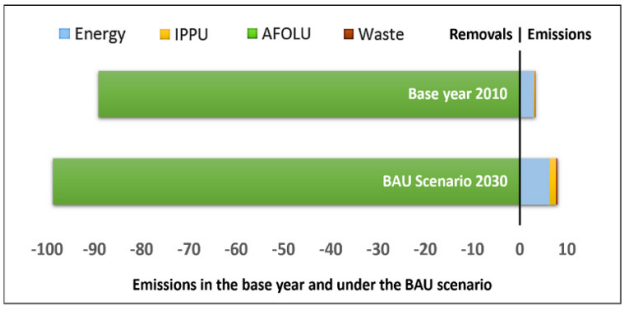
Climate change effects in Namibia are underpinned by inequalities, with women more likely to be living in poverty than men. Climate-related shocks will exacerbate this poverty due to women's socio-economic marginalization. Gender responsiveness is therefore an integral part of Namibia's climate change response.

Namibia's Emissions and Business as Usual Scenario

Namibia, presently a net sink, is projected to remain so in 2030 and its share of global aggregated emissions weighs only 0.00026%[1].

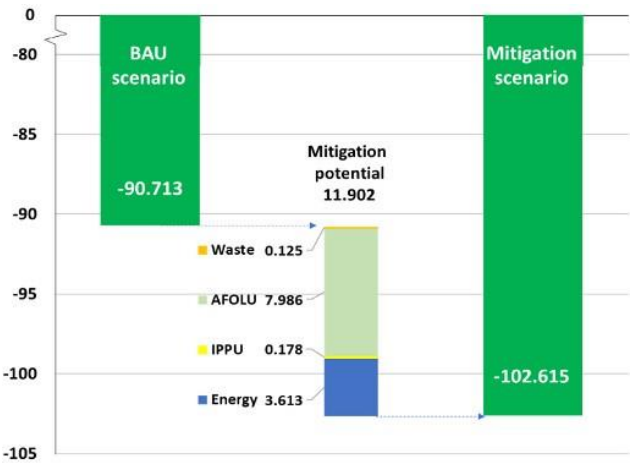
Namibia's latest GHG inventory, covering the period 1990 to 2016, shows its net sink capacity increased from -85.823 Mt CO_2 e in 2010 to -104.206 Mt CO_2 e in 2016.

The Business As Usual scenario projects Namibia to increase its net sink capacity by 4.890 Mt CO_2 e (5.7%) from -85.823 Mt CO_2 e in the base year 2010 to -90.713 Mt CO_2 e in 2030.



Mitigation

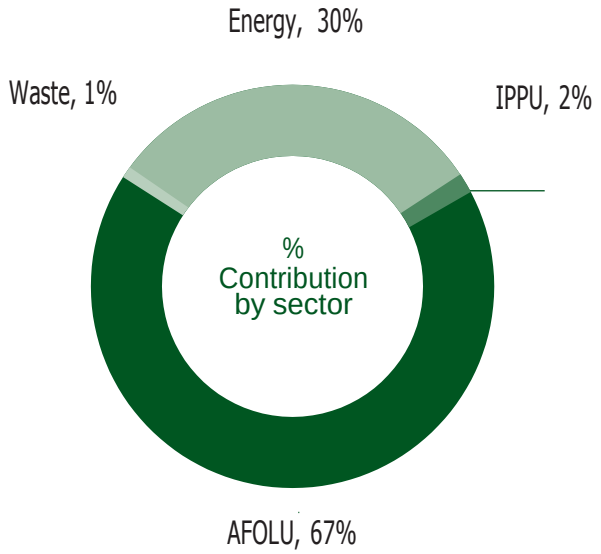
As a Party to the PA, Namibia is committed to contribute to the global efforts towards meeting its Article 2, paragraph 1 (a) by reducing its emissions and increasing its removals. Namibia targets a reduction of its projected national emissions by 7.669 Mt CO_2 e while concurrently increasing its removals by 4.233 Mt CO_2 e for a total mitigation potential of 11.902 Mt CO_2 e. Successful implementation of all mitigation measures will enhance Namibia's sink capacity from the BAU scenario of -90.713 Mt CO_2 e to the mitigation scenario of -102.615 Mt CO_2 e.

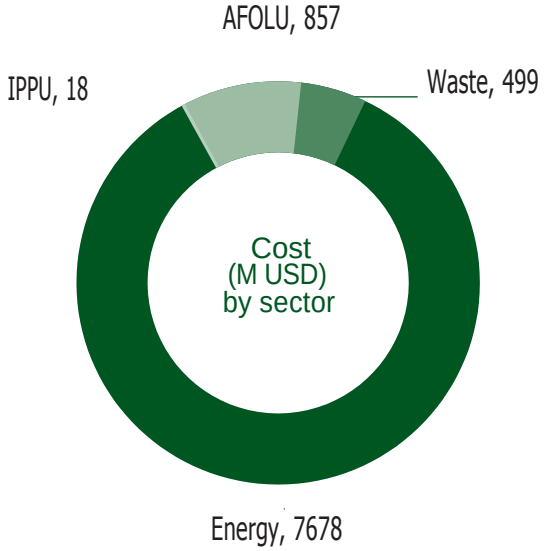


Namibia's BAU and mitigation scenario potential

The Energy and AFOLU sectors will be the main contributors with 30% and 67% of the national mitigation potential in 2030. The total cost for implementing the mitigation measures is nearly 9,052 M USD.

[1] https://data.worldbank.org/indicator/EN.ATM.GHGT.KT.CE





Namibia has provided information needed to facilitate clarity, transparency and understanding of its NDC, as referred to in decision 1/CP.21, paragraph 28 (Annex 1).

Namibia is committed to maintain the same approach adopted up to now in line with Article 4, paragraph 14 and the Transparent, Accurate, Consistent, Complete and Comparable principles highlighted in Article 4, paragraph 13 of the PA when accounting for its GHG emissions and removals.

It has addressed Article 4, paragraph 3 of the PA by increasing its sink capacity through actions to both reduce emissions and increase removals and Article 4, paragraph 4 through an economy wide emission reduction, addressing the 4 IPCC sectors and widening the scope by adding emissions reductions from new categories.

Namibia has targeted emissions reductions and increased removals to contribute towards Article 2, paragraph 1 (a) of the PA. Being a sink, it cannot contribute towards Article 4, paragraph 1 of the PA, namely peaking of its emissions followed by a rapid reduction thereafter.

Namibia has kept the base year of 2010 adopted for the First NDC in this updated version also and presents its mitigation contribution for the year 2030 expressed as an increase of its sink capacity.

The IPCC 2006 guidelines, guidance provided in the annexes to decisions 4.CMA.1 and 9/CMA.1, the latest Global Warming Potentials from the IPCC Fifth Assessment Report as recommended in Decision 18/CMA.1 and latest information on the national current and draft policies, development plans and strategies have guided the updating of this NDC. Data sources exploited for the latest GHG inventory have been adopted for projecting BAU emissions. All emissions and removals are expressed in million metric tonnes of CO_2 equivalent (Mt CO2 e).

The measures identified for implementation cover the period 2021 to 2030, the latter being the single target year. Actions implemented prior to 2021 have been reported for information purposes. Namibia's First NDC second update covers the 4 IPCC sectors Energy, IPPU, AFOLU and Waste.

Identified co-benefits resulting from adaptation actions are:

- CO_2 sequestration through the development of urban green corridors and agroforestry.
- Improving soil carbon through conservation agriculture combined with the use of compost and biochar.
- Improving soil carbon in land restored through removal of encroaching bushfor biodiversity conservation and food security.
- Carbon capture through enhanced vegetation during the establishment and restoration of one riparian buffer.
- Reduction of CH4 emissions through water recycling for reuse or recharging of aquifers.
- Establishment of firebreaks to reduce GHG emissions.

Adaptation

Reduction of risks and lowering vulnerability through adaptation actions are guided by the vulnerability assessments completed to-date and reported in the latest National Communication and other stand-alone reports. Namibia is presently preparing its National Adaptation Plan in line with Namibia's First Adaptation framework submitted to the UNFCCC.

Namibia is a country experiencing great social and economic inequalities. It's mostly arid environment coupled with poor socio-economic conditions often result in overexploitation of scarce natural resources which poses a huge threat on the stability of human populations. The country has been experiencing increasingly erratic rainfall patterns, prolonged droughts, floods and wildfires. These events have severely impacted the main sources of livelihood, particularly for the elderly, women, children and those with compromised health conditions. Many households are frequently not able to secure their essential needs.

The average annual temperature in Namibia increased at a rate of 0.0123 oC over the period 1901-2016 while a non-significant increase of about 0.039mm is observed in annual precipitation.

It is projected that the north-eastern parts of the country will experience the highest increases in average annual temperature, 2 oC and 4 oC relative to the baseline (1981-2018) by mid- and end-century respectively, under the worst-case scenario (i.e., a2 Emission Scenario).

The majority of the 35 Global Circulation Models used predict that Namibia will become drier, that rainfall variability will likely increase and extreme events such as droughts and floods are expected to increase in frequency and intensity. Mid- and end-century projections respectively show, with low confidence, a 7 % and 14 % reduction of rainfall from the baseline period (1981-2018).

Namibia's socioeconomic development is highly natural resource based and crucial activities primordial for the welfare of the population are already being severely impacted by climate change. The latest assessment from Namibia's fourth national communication indicated the high vulnerability of the agriculture, water resources, coastal zone, health, biodiversity, ecosystems, fisheries and tourism sectors. A different approach, based on vulnerability indices, indicated that the constituencies in the southern part of the country are more resilient compared to those in the northern regions where the poorer segments of the population reside.

Appropriate and timely adaptation is thus key to Namibia. A prioritized list of 36 measures comprising 84 actions on 8 sectors have been identified. The total cost disaggregated by socio-economic sector for implementation of these measures to the 2030-time horizon is 6,013 M USD. As for mitigation, Namibia counts on the support of the international community to successfully implement the adaptation measures, namely 10% being unconditional and the difference conditional.

Sector	No. of measures	No. of actions	Cost (M USD)
Agriculture and Food Security	9	25	1,514
Water Resources	5	12	3,505
Biodiversity and Ecosystems	6	8	371
Fisheries and Aquaculture	5	11	85
Health	3	12	94
Cross-cutting issues	5	12	162
Infrastructure	2	3	258
Coastal Zone	1	1	24
Total	36	86	6,013

Equity, Fairness and Ambition

Namibia considers its First NDC second update to be equitable, fair and ambitious. Firstly, it contributes to achieving the ultimate objective of the UNFCCC and the PA. Secondly, this First NDC second update is aligned with Namibia's long term national and sectoral development strategies contained in its Vision 2030 and the NDP5 (2017-18 to 2021-22) while addressing gender equality. The Harambee Prosperity Plan II, covering the period 2021 to 2025 aims at implementing programmes to enhance service delivery and economic recovery through inclusive growth, while strengthening Namibia to deal with socioeconomic challenges and preparing it for global opportunities following the COVID-19 pandemic. It also informed the updating exercise.

The fairness and ambition of this First NDC second update rest in the country's voluntary willingness to pursue on the reduction of its national emissions despite having been and projected to remain a sink until 2030. Furthermore, Namibia has increased the scope of its mitigation targets by addressing additional gasesand emitting categories. Namibia will increase its removals and sink capacity through the actions earmarked for implementationin the First NDC second update.

Measurement, Reporting and Verification

The successful implementation of Namibia's First NDC second update rests on a functional Measurement, Reporting and Verification (MRV) system to enable the country to track and report on the implementation of the actions, including financial, technological, and technical support received and needed, and capacity building. The MRV system will enable Namibia to be compliant with the Enhanced Transparency Framework under Article 13 of the PA, namely decision 18.CMA.1 when reporting information in its Biennial Transparency Report (BTR).

Namibia is presently reviewing and consolidating its M&E system to transform it into a more robust MRV structure. This system comprises four components to track emissions, mitigation, support and needs and adaptation for inclusion in the BTRs. Once developed and fully operationalized, the system will guarantee a regular flow of data and other information on all climate actions, including the official procedures and tools for supporting their collection and sharing after capacity building of all stakeholders involved in the implementation of the NDC activities.

The MRV system will also capture information on environmental, social, and economic benefits in line with the Sustainable Development Goals within the low emissions development agenda of the country. The new MRV system and its archiving mechanism will be tested and rolled out during the preparation of the BUR1.

Gender Mainstreaming

Climate change is gender differentiated with the adverse impact affecting minorities such as women, girls and the disabled disproportionately. Women's vulnerabilities to climate change are also closely linked to their socially and culturally determined gender roles and responsibilities; differentiations in terms of access to resources; limited voice and participation in decision-making; their geographical location; degree of reliance on rainfed agriculture and access to technology to improve their adaptive capacity.

The National Gender Policy (2010-2020) is the overarching framework providing mechanisms and guidelines for achieving gender equality and empowerment, namely on climate change identified as one of the emerging issues on the gender issue. It therefore provides a sound policy framework for the development of gender responsive climate actions for Namibia's NDC Implementation Strategy and Action Plan. Namibia's Climate Change Strategy and Action Plan (2013-2020) calls for the inclusion of the needs of women into climate change planning, the challenge being to translate these broad policy objectives into implementation and to deliver tangible benefits to women and men.

The development of gender responsive measures within Namibia's NDC will focus on climate change adaptation, while not neglecting mitigation and cross-cutting issues, as the effects of climate change will disproportionately affect the livelihoods of women, who do rely on natural resources for food security and subsistence.

Implementation Plan and Strategy

To implement the measures, set out in this First NDC second update, Namibia has produced its NDC Implementation Strategy and Action Plan (NDC-ISAP), which covers the period 2023-2030. The NDC-ISAP consists of one overarching document which consolidates the key information for managing and tracking implementation, supported by a set of sectoral action plans, inclusive of both mitigation, adaptation and cross cutting issues to realise co-benefits and ensure policy coherence. The plans summarise the key background, existing support, capacity and technologies to provide a clear picture of the state of play and opportunities for implementation and the key challenges and needs inclusive of gender issues to ensure that the needs of all are mainstreamed in climate change planning.

The NDC-ISAP is expected to guide climate action in-country, both in terms of priorities, monitoring and reporting. The NDC-ISAP therefore outlines activities to be carried out within each sector for each of the NDC measures. Stakeholders (lead and partner agencies) will carry out the activities and actions in a coordinated, collaborative and integrated approach.

To fully implement the mitigation and adaptation measures contained in this NDC, Namibia will require finance, capacity building and technology transfer, as well as a country driven policy process and robust institutional arrangements. As part of the First NDC second update revision process, analysis and consultations with sector experts were undertaken to produce cost estimates for the measures. The total estimated cost for all the NDC measures is 15,065 M USD. Of this, 13,558.5 M USD (90%) is conditional on international support.

Namibia intends to meet its conditional contribution using climate finance and international market mechanisms where appropriate, building upon the experience of already existing practice.

1. BACKGROUND

In line with Article 4 of the Paris Agreement (PA) and decision 1/CP.21 of the UNFCCC, Namibia submitted a revised version of its First NDC in July 2021 during the 26th Conference of the Parties. Information to facilitate Clarity, Transparency and Understanding (ICTU) to be in line with Decision 4/CMA.1 and the major updates in its GHG inventory were overlooked. Namibia is addressing these omissions in an updated version, referred to as First NDC updated submission, to inform the global stocktake more accurately on its commitments. Furthermore, the urgent adaptation actions for the country to build its resilience and meet the sustainable development goals (SDGs) within its low emissions development strategy have been included. This updated version covers the period 2021 to 2030.

2. SALIENT FEATURES OF NAMIBIA

Namibia's territory extends over some 825,000 square km for a widely scattered population of nearly 2.6 million which exacerbates development, by impeding adaptation and rapid interventions to reduce risks and damage, inclusive of loss of lives stemming from extreme weather events.

- Namibia is an arid country with a highly skewed precipitation regime, ranging from less than 25mm to just more than 600mm annually, that makes it a water scarce country. This hampers all activities needing water, notwithstanding human dependence on a regular domestic supply of good quality water and proper sanitation.
- Namibia's economy is highly dependent on natural resources, making it highly vulnerable to climate change.
- Namibia's average Human Development Index (HDI), 0.552 in the rural regions to 0.735 in the capital city, was 0.646 in 2019, placing it 130th on 189 countries. The lowest HDIs are associated with the poorer rural constituencies which are also more vulnerable to climate change as per Namibia's Fourth National Communication (NC4)[2].
- The effects of climate change in Namibia are underpinned by inequalities, with women more likely to suffer as they are living in higher poverty compared to men. Climate-related shocks will exacerbate this situation due to women's socio-economic marginalization. Gender responsiveness is therefore an integral part of Namibia's climate response.
- According to a World Bank estimate, Namibia's Gini index was 59.1 in 2015, 2nd on the listed 162 countries, showing the high exposure and vulnerability of a significant proportion of the population.
- Namibia has experienced invasion of alien and expansion of indigenous species over several decades with serious detrimental effects on the savannah and grassland ecosystems, and the biodiversity hosted in these.
- Namibia is a net sink of carbon dioxide (CO2) and is projected to remain so in 2030.
- Namibia's share of global aggregated emissions weighs only 0.00026%[3] and yet it is paying a heavy toll to cope with climate change which is undermining the national development agenda.
- It is already facing the brunt of climate change, with persistent droughts, frequent floods and more frequent epidemics seriously affecting economic sectors Agriculture, Water Resources, Biodiversity and Ecosystems, Fisheries, Health, Infrastructure and Coastal Zone.
- Agriculture is a strategic sector impacting directly on the livelihood of more than 70% of the population and employing about one third of the Namibian work force, of which the majority are women.
- In 2022, community conservation covered 180,083km^2, about 58.7% of communal land with an estimated 212,092 residents. By end 2017, there were 32 registered community forests, covering a total of 30,828km^2 of Namibia, 89% of which overlaps with conservancies. The conservancies and community forests cover about 20% of Namibia and are very vulnerable to climate change.

[2] https://unfccc.int/sites/default/files/resource/Namibia%20-%20NC4%20-%20Final%20signed.pdf
[3] https://data.worldbank.org/indicator/EN.ATM.GHGT.KT.CE

3. MITIGATION

3.1. Introduction

The First NDC update 1 presented mitigation as a reduction of gross emissions when Namibia is a net sink. The First NDC second update is correcting this anomaly by expressing mitigation relative to net emissions, that is, the enhancement in the net sink capacity of the country.

3.2 GHG Inventory

Namibia's latest GHG inventory, a stand-alone National Inventory Report submitted with its Fourth Biennial Update Report in 2021, covered the period 1990 to 2016. These emissions have been recalculated to reflect changes in the activity areas, improvements in activity data and derived national emission factors, and updated using the Global Warming Potentials of the Fifth Assessment Report (AR5) to be in line with Decision 18/ CMA.1. The net sink capacity of Namibia increased from -85.823 Mt CO2 e in 2010 to -104.206 Mt CO2 e in 2016.

3.3. Business As Usual Scenario

3.3.1. National

Past data were coupled with anticipated socio-economic assumptions, namely GDP and population growth, to make projections for 2030 using the 2006 IPCC software to compute emissions and removals at the category level. The Business As Usual (BAU) scenario projects Namibia to be a net sink of -90.713 Mt CO2 e in 2030 compared to a net sink capacity of -85.823 Mt CO2 e in the base year 2010 which represents an increase of 4.890 Mt CO2 e (5.7%). This sink increase is disaggregated by IPCC sector in Table 1.

Table 1. Base year and BAU emissions

Sector	Base year 2010	BAU 2030
Energy	2.976	6.291
IPPU	0.138	1.386
AFOLU	-89.103	-98.750
Waste	0.166	0.360
Total	-85.823	-90.713

3.4. National Mitigation Potential

Namibia has invested, and will pursue as a Party to the Paris Agreement, to meet its article 2, paragraph 1 (a) by reducing its emissions and increasing its removals to contribute to the global efforts to maintain the increase in temperature at below 2 oC. Thus, Namibia targets a reduction of its projected national emissions by 7.669 Mt CO2 e while concurrently increasing its removals by 4.213 Mt CO2 e for a total mitigation potential of 11.902 Mt CO2 e.

Successful implementation of all mitigation measures will enhance Namibia's sink capacity from the BAU scenario of 90.713 Mt CO2 e to the mitigation scenario of 102.615 Mt CO2 e (Figure 1).

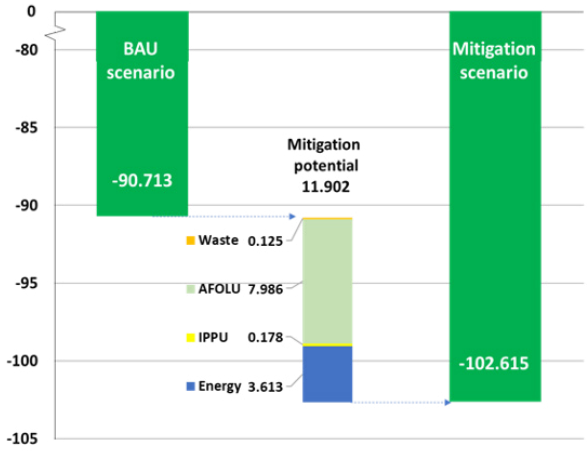


Figure 1. BAU and mitigation scenarios with sectoral potential (Mt CO2 e)

The share and costs of the mitigation potential by sector are shown in Figures 2 and 3 respectively. The total cost for implementing all measures is nearly 9,052 M USD. AFOLU, with 67% of the national mitigation potential, is estimated to cost only 857 M USD compared to the 7,678 M USD of the Energy sector for mitigating 30%. All mitigation measures are now conditional and are listed in Annex 1 to this document.

4. INFORMATION TO FACILITATE CLARITY, TRANSPARENCY AND UNDERSTANDING

Parties are required to report Information to facilitate Clarity, Transparency and Understanding (ICTU) of nationally determined contributions, referred to in decision 1/CP.21, paragraph 28 (Annex 1) and these are provided in Table 2.

Table 2. Information to facilitate Clarity, Transparency, and Understanding

Element of Annex 1 to decision 1/CP.21, paragraph 28	Response from Namibia
1. Quantifiable information on the reference point (including, as appropriate, a base year)	
(a) Reference year(s), base year(s), reference period(s) or other starting point(s);	Namibia has kept the same base year of 2010 adopted for the First NDC in this updated version also. The country is presenting its mitigation contribution for the year 2030, expressed as an increase of its sink capacity.
(b) Quantifiable information on the reference indicators, their values in the reference year(s), base year(s), reference period(s) or other starting point(s), and, as applicable, in the target year;	Namibia has been a net sink over the full time series 1990 to 2016 as reported in its latest GHG inventory submitted to the UNFCCC in 2021 in its fifth national inventory report. Base year (2010) net removals stood at -85.823 Mt CO2 e. The country is projected to increase its sink capacity by 4.890 Mt CO2 e to -90.713 Mt CO2 e in the target year 2030 under the BAU scenario. The BAU scenario is projected based on observed emissions trends during the baseline period 2000-2010 and currently available socio-economic information and development plans, inclusive of the impact of the COVID-19 pandemic. The projections are done on an individual category basis and summed up to arrive at sector and eventual national levels. This multi criteria approach provides for more accuracy in the projections.
(c) For strategies, plans and actions referred to in Article 4, paragraph 6, of the Paris Agreement, or polices and measures as components of nationally determined contributions where paragraph 1(b) above is not applicable, Parties to provide other relevant information;	Not applicable
(d) Target relative to the reference indicator, expressed numerically, for example in percentage or amount of reduction;	Namibia, despite being historically a sink and projected to remain so by the target year 2030 in the BAU scenario started to undertake mitigation as from the base year 2010 and is committed to continue on this path to reduce its emissions. A total mitigation potential of 11.902 Mt CO2 e in absolute terms is projected, representing an increase in the sink capacity by 13.1% compared to the BAU scenario in 2030.

Element of Annex 1 to decision 1/CP.21, paragraph 28	Response from Namibia
(e) Information on sources of data used in quantifying the reference point(s);	Namibia built its capacity over time on data collection when preparing its national reports for submission to the UNFCCC. Numerous improvements have been made when computing emissions for the GHG inventory to meet the TACCC principles. The major improvements are captured in the NIR3 and the additional ones in subsequent NIRs up to the NIR5, the latest GHG inventory contained in the fifth National Inventory Report available on the UNFCCC website. The latest improvement is the adoption of the GWPs of the AR5 report of the IPCC which have been used to calculate aggregated emissions of the latest inventory for estimating emissions of the base year 2010, working the BAU scenario and assessing the mitigation potential of the target year 2030 for this First NDC Second update. The same data sources exploited for the latest GHG inventory[5] have served for projecting BAU emissions. These are: • The Inter-censal household survey of the Namibian Statistics Agency (NHIES 2016). • The Draft version of the NIRP 2022 provided by the Ministry of Mines and Energy. • The draft Mid Term Review report on achievements and progress made on Vision 2030 from the National Planning Commission. • The IMF report on impact of COVID-19 on Namibia's economy and future GDP growth[6]. • The latest vehicle fleet data from the Namibia Road Authority annual reports 2012/13 to 2019/20. • The 2020 annual report on output by industry segment from the Chamber of Mines[7]. • Meetings with stakeholders to inform on the current situation in different economic sectors and expected future.
(f) Information on the circumstances under which the Party may update the values of the reference indicators.	The methods of estimation and the emissions in the base year are subject to further updates, depending on, among others, future international negotiations on estimating and accounting rules, the possible update of various statistical data, namely land use for annually reported figures, the development of national emission factors and the review of estimation methods.
2. Time frames and/or periods for implementation	
(a) Time frame and/or period for implementation, including start and end date, consistent with any further relevant decision adopted by the Conference of the Parties serving as the meeting of the Parties to the PA(CMA);	Namibia started mitigation since the past 2 decades and can track the major actions implemented since 2010. Further momentum has been provided with the adoption of the PA in 2015 which boosted mitigation in Namibia. The measures identified for implementation in this First NDC second update covers the period 2021 to 2030. Measures implemented prior to 2021 will also be reported for information purposes

[5] https://unfccc.int/documents/268417

[6] IMF, April 2022, https://www.elibrary.imf.org/downloadpdf/journals/002/2021/076/002.2021.issue-076-en.xml

[7] https://chamberofmines.org.na/wp-content/uploads/2021/07/Output-by-mine-Chamber-of-Mines-of-Namibia-Members.xlsx

Element of Annex 1 to decision 1/CP.21, paragraph 28	Response from Namibia
(b) Whether it is a single-year or multi-year target, as applicable.	Single year target - 2030.
3. Scope and coverage	
(a) General description of the target;	Namibia aims at reducing its greenhouse gas emissions by 24 percent compared to the BAU scenario by the year 2030 from its base year 2010 levels, keeping an ambitious target which will concurrently also maintain the country's sink status.
(b) Sectors, gases, categories, and pools covered by the nationally determined contribution, including, as applicable, consistent with Intergovernmental Panel on Climate Change (IPCC) guidelines;	Namibia's First NDC second update covers the 4 IPCC sectors Energy, IPPU, AFOLU and Waste as follows. (a) Energy - Fuel Combustion (Energy industries, Road and Rail Transport, Residential, Agriculture/Forestry/Fishing - Agriculture and Fishing) (b) IPPU (Cement production, RAC and Non-Energy Products from Fuels and Solvent Use) (c) Agriculture (Livestock and Crops) (d) Land Use, Land-Use Change and Forestry (LULUCF) (e) Waste (Solid and Wastewater) Gases covered are CO2, CH4, N2O and HFCs The IPCC 2006 Guidelines have been used to compute the GHG inventory and report thereon as well as for estimating emissions and removals for accounting in this updated version. All emitting source categories from Namibia's latest inventory (NIR5) compiled and submitted with the BUR4 report have been included in the BAU scenario which covers the whole territory.
(c) How the Party has taken into consideration paragraph 31(c) and (d) of decision 1/CP.21;	The coverage of categories as per Namibia's NIR5 report have been maintained. Due to lack of good quality data, the following categories are still not covered in the GHG inventory: • HFCs and PFCs from fire protection equipment and solvent use • Sulphur hexafluoride from electrical equipment and military use • Incineration of waste (medical) The scope of the GHG inventory has widened compared to the one on which the First NDC was based

Element of Annex 1 to decision 1/CP.21, paragraph 28	Response from Namibia
(d) Mitigation co-benefits resulting from Parties' adaptation actions and/or economic diversification plans, including description of specific projects, measures, and initiatives of Parties' adaptation actions and/or economic diversification plans.	The following co-benefits resulting from adaptation actions have been identified: • CO_2 sequestration through the development of urban green corridors and agroforestry. • Improving soil carbon through conservation agriculture combined with the use of compost/biochar. • Improving soil carbon in land restored through removal of encroaching bush for biodiversity conservation and food security. • Carbon capture through enhanced vegetation during the establishment and restoration of riparian buffers. • Reduce CH4 emissions through water recycling for reuse or recharging of aquifers. • Establishment of firebreaks
4. Planning processes	
(a) Information on the planning processes that the Party undertook to prepare its nationally determined contribution and, if available, on the Party's implementation plans, including, as appropriate:	
(i) Domestic institutional arrangements, public participation and engagement with local communities and indigenous peoples, in a gender-responsive manner; if available, information provided on a Party's implementation plans	The Cabinet of Namibia is the Government entity entrusted with the overall responsibility for the development of national policies on climate change. The National Climate Change Committee (NCCC) oversees the implementation of the climate change policy, including the preparation of the reports for submission to the Convention and also plays an advisory role to Government on climate change issues and the NDC. It comprises representatives from various ministries and other stakeholders such as the private sector and NGOs amongst others. The Ministry of Environment, Forestry and Tourism (MEFT) is the official government agency responsible for coordinating and implementing climate change activities, including the preparation of reports for the country to meet its reporting obligations. This isdone through the Climate Change Unit (CCU) established within the Department of Environmental Affairs (DEA) under the guidance of the NCCC. Other ministries and stakeholders contribute as members of the different working groups established so far for reporting purposes. The NDC-ISAP has been developed through stakeholder consultation to ensure there is ownership and buy-in to implement the measures at sector level. The sector plans have been organised to reflect institutional responsibilities and structures. Individual Ministries will be responsible for the overall implementation of the activities within the Sectoral Action Plans. During the updating of the NDC, extensive wide stakeholder consultation took place, with special emphasis on gender. The consultancy teams worked proactively to incorporate gender perspectives, including gender equal participation, into concrete actions, while aiming at enhanced participation of women in policy decision-making processes for responding to climate change problems, in line with the international context.

Element of Annex 1 to decision 1/CP.21, paragraph 28	Response from Namibia
(ii) Contextual matters, including, inter alia, as appropriate:	
a. National circumstances, such as geography, climate, economy, sustainable development, and poverty eradication.	Namibia's BUR4[8] provides detailed information on the National circumstances. Salient features giving an update of the situation is included in this First NDC second update.
b. Best practices and experience related to the preparation of the nationally determined contribution;	The IPCC 2006 guidelines, guidance provided in the annexes to decisions 4.CMA.1 and 9/CMA.1, the latest GWPs as recommended in Decision 18/CMA.1 and latest information on the national development plans and strategies have guided the updating of this NDC.
c. Other contextual aspirations and priorities acknowledged when joining the Paris Agreement;	Namibia has already embarked on a low-carbon development strategy, particularly on electricity generation. Internal resources are geared towards maintaining the appropriate balance between socio-economic development and the environment. However, the ambitious targets set by the country have conditionality implications in terms of financing and technology transfer. Namibia imports electricity to meet the major share of its demand which explains the very low emissions associated with this activity. Electricity from renewable sources met nearly 96% of local production in the base year and this share has been maintained when working out the BAU scenario. Namibia, being and remaining a sink up to the year 2030 and the fact that the vulnerability of the country to climate change is high, regards adaptation as a priority, particularly in the Agriculture and Food Security and Water Resources sectors.
(b) Specific information applicable to Parties, including regional economic integration organizations and their member States, that have reached an agreement to act jointly under Article 4, paragraph 2, of the Paris Agreement, including the Parties that agreed to act jointly and the terms of the agreement, in accordance with Article 4, paragraphs 16–18, of the Paris Agreement;	Not applicable – Namibia has no standing agreement to act jointly under Article 4, paragraph 2 of the PA.
(c) How the Party's preparation of its NDC has been informed by the outcomes of the global stocktake, in accordance with Article 4, paragraph 9, of the Paris Agreement;	Not applicable - Namibia is submitting its First NDC second update in 2022 while the first global stocktake is due in 2023.
(d) Each Party with an NDC under Article 4 of the PA that consists of adaptation action and/or economic diversification plans resulting in mitigation co-benefits consistent with Article 4, paragraph 7, of the PA to submit information on:	

[8] https://unfccc.int/sites/default/files/resource/Namibia-BUR4-FINAL.pdf

Element of Annex 1 to decision 1/CP.21, paragraph 28	Response from Namibia
How the economic and social consequences of response measures have been considered in developing the NDC;	As mentioned in 4 (a) (ii)-a above, the measures are aligned with national policies, plans and strategies aiming at improving the livelihood and resilience of the economy and the population. Furthermore, adaptation measures mainstreamed in the national budget plan under the NDP 5 were strengthened to increase their coverage and quicken their implementation throughout the country.
Specific projects, measures and activities to be implemented to contribute to mitigation co-benefits, including information on adaptation plans that also yield mitigation co-benefits, which may cover, but are not limited to, key sectors, such as energy, resources, water resources, coastal resources, human settlements and urban planning, agriculture and forestry; and economic diversification actions, which may cover, but are not limited to, sectors such as manufacturing and industry, energy and mining, transport and communication, construction, tourism, real estate, agriculture and fisheries.	Reduction of risks and lowering vulnerability through adaptation actions are guided by the vulnerability assessments completed to-date and reported in the latest NC and other stand-alone reports available. Namibia is presently preparing its National adaptation Plan in line with Namibia's First Adaptation framework submitted to the UNFCCC. These measures are further detailed in section 3 (d) above.
5. Assumptions and methodological approaches, including those for estimating and accounting for anthropogenic greenhouse gas emissions and, as appropriate, removals	
a. Assumptions and methodological approaches used for accounting for anthropogenic greenhouse gas emissions and removals corresponding to the Party's nationally determined contribution, consistent with decision 1/CP.21, paragraph 31, and accounting guidance adopted by the CMA;	The same guiding principles as for the NIR5 of Namibia have been kept in estimating the GHG emissions and removals for the BAU scenario. These are: • IPCC 2006 guidelines • Latest available GWPs - AR5 • Inclusion of LULUCF Projections for the BAU scenario have been made on a source category basis with varying trends according to the latest data available. The mitigation potential of the various measures has been derived using the same methodology as outlined for the estimation of the emissions under the BAU scenario.
b. Assumptions and methodological approaches used for accounting for the implementation of policies and measures or strategies in the nationally determined contribution;	The First NDC second update measures are aligned with current and draft national policies, plans and strategies. Costs have been taken from the national documents where available or estimated from publications or information available on the internet.
c. If applicable, information on how the Party will take into account existing methods and guidance under the Convention to account for anthropogenic emissions and removals, in accordance with Article 4, paragraph 14, of the Paris Agreement, as appropriate;	Namibia is committed to maintain the same approach adopted up to now in line with Article 4, paragraph 14 and the TACCC principles highlighted in Article 4, paragraph 13 of the PA in accounting its GHG emissions and removals.

Element of Annex 1 to decision 1/CP.21, paragraph 28	Response from Namibia
d. IPCC methodologies and metrics used for estimating anthropogenic greenhouse gas emissions and removals;	Namibia adopted the IPCC 2006 Guidelines for estimating emissions and removals and the latest GWPs (AR5) for CO2 equivalence as per Decision 18/CMA.1. All emissions and removals are expressed in Mt CO2 e in this First NDC second update.
e. Sector-, category- or activity specific assumptions, methodologies and approaches consistent with IPCC guidance, as appropriate, including, as applicable:	
i. Approach to addressing emissions and subsequent removals from natural disturbances on managed lands;	Disturbances occurring on managed land, namely wildfires are tracked using satellite imagery and reported in the GHG inventory. Subsequent removals have not been addressed up to now because of inadequate data on the exact amount of woody biomass lost.
ii. Approach used to account for emissions and removals from harvested wood products;	The IPCC recommended approach has been adopted to-date using national data based on trade statistics. Wood removal was estimated for the period 1961 to date through use rate and population to supplement national data when these were not available, especially for the period prior to independence when data was not collected and archived.
iii. Approach used to address the effects of age-class structure in forests;	Namibia experiences very specific climatic conditions, namely arid conditions with a highly skewed rainfall and very high evaporation. Growth of woody vegetation is thus very slow such that trees takes much more than the usual 20 years adopted for reaching maturity. The approach adopted differed from those of IPCC in that national emission factors and stock factors were generated based on forest inventories, information from peer reviewed publications and other scientific studies. Details on the approach is available in the NIR3 submitted to the UNFCCC in October 2018.
f. Other assumptions and methodological approaches used for understanding the nationally determined contribution and, if applicable, estimating corresponding emissions and removals, including:	
i. How the reference indicators, baseline(s) and/or reference level(s), including, where applicable, sector-, category- or activity specific reference levels, are constructed, including, for example, key parameters, assumptions, definitions, methodologies, data sources and models used;	The reference indicators for Namibia's First NDC second update are the total GHG emissions and removals for the base year 2010 published in the NIR5 of Namibia with the BUR4 and submitted to the UNFCCC Secretariat in February 2021. The key parameters, assumptions, definitions, methodologies, data sources and models used to estimate emissions and removals are documented in this NIR5.
ii. For Parties with nationally determined contributions that contain non-greenhouse-gas components, information on assumptions and methodological approaches used in relation to those components, as applicable;	Not applicable

Element of Annex 1 to decision 1/CP.21, paragraph 28	Response from Namibia
iii. For climate forcers included in nationally determined contributions not covered by IPCC guidelines, information on how the climate forcers are estimated;	Not applicable
iv. Further technical information, as necessary;	Not applicable
g. The intention to use voluntary cooperation under Article 6 of the Paris Agreement, if applicable.	Namibia intends to use voluntary cooperation under Article 6 of the Paris Agreement.
6. How the Party considers that its NDC is fair and ambitious in light of its national circumstances	
a. How the Party considers that its NDC is fair and ambitious in the light of its national circumstances;	Namibia considers that its First NDC second update is fair and ambitious as it has set a target for increasing its sink capacity by 13.1% to the 2030 time-horizon. It has adopted a two-pronged approach, implementing measures to both reduce emissions and enhance removals. The level of ambition is clearly seen as the country seeks to replace imported electricity that is responsible for emissions with renewable sources and maintaining its almost 96% of renewables in its energy mix of the base year 2010. Moreover, Namibia has widened the scope of its mitigation by increasing the number of categories and gases covered in this updated version.
b. Fairness considerations, including reflecting on equity;	Namibia has prioritized measures to be implemented using a clear transparent approach identified in line with its low emissions development strategy within its Vision 2030, the NDP5 and the Harambee Prosperity Plan which aims at sustainable and inclusive development of the country.
c. How the Party has addressed Article 4, paragraph 3, of the Paris Agreement;	Namibia has addressed Article 4, paragraph 3 of the PA by increasing its sink capacity through actions to both reduce emissions and increase removals.
d. How the Party has addressed Article 4, paragraph 4, of the Paris Agreement;	Namibia has addressed Article 4, paragraph 4 of the PA by addressing an economy wide emission reduction, addressing the 4 IPCC sectors, and widening the scope by adding emissions reduction from new categories.
e. How the Party has addressed Article 4, paragraph 6, of the Paris Agreement.	Not applicable
7. How the NDC contributes towards achieving the objectives of the Convention as set out in its Article 2	
a. How the NDC contributes towards achieving the objective of the Convention as set out in its Article 2;	Namibia aims to reduce emissions and increase removals to further enhance its sink capacity by 2030 to contribute to the objective of the Convention as set out in its Article 2 to achieve stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system.

5. ADAPTATION

5.1. Introduction

Namibia is a country experiencing great social and economic inequalities. It's mostly arid environment coupled with poor socio-economic conditions often result in overexploitation of scarce natural resources which poses a huge threat for the stability of ecosystems. The country has been experiencing increasingly erratic rainfall patterns, prolonged droughts, floods and wildfires. These events have severely impacted the main sources of livelihood, particularly for the elderly, women, children and those with compromised health conditions. Many households are frequently not able to secure their essential needs.

5.1.1 Historical and Projected Climate

The average annual temperature in Namibia has been increasing at a rate of 0.0123oC over the period 1901-2016 (NC4[12]). Unlike temperature, there are no obvious trends in precipitation during the reference period. A non-significant increase of about 0.039 mm is observed in annual precipitation.

It is predicted that the north-eastern parts of the country will experience the highest increases in average annual temperature. It is projected that the mean annual temperature will increase by 2oC and 4oC relative to the baseline (1981-2018) by mid- and end-century respectively, under the worst-case scenario (i.e., a2 Emission Scenario).

The majority of the 35 GCMs used predict that Namibia will become drier, that rainfall variability will likely increase and that extreme events such as droughts and floods will become more frequent and intense. Mid-, and end-century projections respectively show, with low confidence, a 7% and 14% reduction of rainfall from the baseline period (1981-2018).

5.1.2. Vulnerability

As per the above projections, it is anticipated that women and children will be disproportionately affected by climate-related disasters due to their socio-economic status. The occurrence of natural disasters, namely floods, droughts and epidemics, have had dire socioeconomic impacts including loss of numerous lives. It is estimated that during the period 1980 to 2020, droughts (9), epidemics (7) and flood (15) events have cumulatively affected more than 3.25 million people, costing the economy more than 2 billion USD. Epidemics other than the COVID-19 pandemic and floods are responsible for claiming more than 555 lives over the same period[13].

Namibia's socioeconomic development is highly natural resource based and critical activities primordial for the welfare of the population are already being severely impacted by climate change. The latest assessment from the NC4 indicated the high vulnerability of the agriculture, water resources, coastal zone, health, biodiversity, ecosystems, fisheries and tourism sectors. A new approach used to calculate the vulnerability index of the 121 constituencies of Namibia indicated that those in the southern part of the country were more resilient compared to those in the northern regions where the poorer segments of the population reside.

5.2. Adaptation Measures

Adaptation measures have been assessed for the most vulnerable sectors. Furthermore, actions under different measures for urgent adaptation have been prioritized and costed. The total costs disaggregated by socio-economic sector for implementation of the prioritized 36 measures comprising 84 actions under 8 sectors for adaptation to the 2030-time horizon is 6,013 M USD (Table 3). More details pertaining to the measures and actions by sector are presented in Annex 2 to this document.

6. EQUITY, FAIRNESS AND AMBITION

Namibia considers its First NDC second update to be equitable, fair and ambitious. Firstly, it contributes to achieving the ultimate objective of the UNFCCC and the PA. Secondly, this update aligns climate actions with Namibia's long term national and sectoral development strategies contained in its Vision 2030 and the fifth National Development Plan NDP5 (2017-18 to 2021-22) and sectoral policies and strategies. Climate change mitigation and adaptation ambitions fall under the goals Conservation and Sustainable Use of Natural Resources, Environmental Management and Climate Change of the third pillar "Environmental Sustainability" while equity is addressed under the goal Inclusive, Equitable and Sustainable Economic Growth of the first pillar "Economic Development" that also addresses gender equality. The country has also started the process for developing its National Adaptation Plan which will further guide adaptation within the context of the NDC. The second part of the Harambee Prosperity Plan covering the period 2021 to 2025 aims at implementing programmes which enhance service delivery and economic recovery through inclusive growth, strengthening Namibia to deal with socioeconomic challenges and preparing it for global opportunities following the COVID-19 pandemic. It is equitable and also in line with the First NDC second update.

[12] https://unfccc.int/sites/default/files/resource/Namibia%20-%20NC4%20-%20Final%20signed.pdf

[13] Climate Risk Profile: https://climateknowledgeportal.worldbank.org › sites › default › files › 2021-08 › 15931-WB_Namibia

Table 3. Cost of adaptation by sector

Sector	No. of measures	No. of actions	Cost (M USD)
Agriculture and Food Security	9	25	1,514
Water Resources	5	12	3,505
Biodiversity and Ecosystems	6	8	371
Fisheries and Aquaculture	5	11	85
Health	3	12	94
Cross-cutting Issues	5	12	162
Infrastructure	2	3	258
Coastal Zone	1	1	24
Total	36	84	6,013

The fairness and ambition (refer to item 6 of section 4 - ICTU) of Namibia's First NDC second update rest in the country's voluntary willingness to pursue on the reduction of its national emissions despite having historically been a sink and projected to remain so until 2030. Moreover, Namibia has increased the scopeof its mitigation targets by addressing additional gases and emitting categories compared to the First NDC. Namibia aims at increasing its removals and sink capacity through the actions earmarked for implementation in the First NDC second update.

7. MEASUREMENT REPORTING AND VERIFICATION

The successful implementation of Namibia's First NDC second update rests on a functional Measurement, Reporting and Verification (MRV) system to enable the country to report on the implementation of the mitigation and adaptation actions, including financial, technological, technical and capacity building support received and needed. The roll-out of an operational MRV system is the foundation for Namibia to track emissions levels, and for progress on mitigation and adaptation to inform the global stocktake on its contributions to meet the goals of the Paris Agreement. The MRV system will also enable Namibia to be compliant with the Enhanced Transparency Framework under Article 13 of the PA, namely decision 18.CMA.1 when reporting information in its Biennial Transparency Report.

Namibia has in place a continuous Monitoring and Evaluation (M&E) system, implemented under the guidance of the National Planning Commission (NPC), for tracking all socio-economic activities, including those of the MEFT, responsible for climate change. Government departments regularly assess collected, and verified data, inclusive of contributions from the private sector, to measure productivity and to conform to legislations. These data are then analysed and reported to the parent ministries for transmission to the NPC and administrative entities to inform them of the progress and achievements of their respective programmes. The information also serves for more informed decision-making and for guiding implementation as well as reviewing of policies and strategies within the NDP. Most of these data are stored in private databases and/or centralized ones within the National Statistics Agency (NSA) for further analysis and eventual archiving. The M&E system has been very useful to track progress, support and inform government on the implementation of the NDPs. Unfortunately, activity data required specifically for compiling GHG inventories, tracking mitigation and adaptation actions, assessing needs and reporting on support received are still mostly dispersed with individual public and private sector institutions and organizations.

Data collection is thus still on an ad-hoc basis for reporting to the Convention. Similarly, gender equality considerations are not sufficiently integrated into the existing system, and this need to be addressed. Namibia is presently reviewing and consolidating this M&E system into a more robust MRV structure as required by decision 18/CMA.1 through the strengthening of its institutional and technical capacity to report to the Convention.

This system comprises four components to track emissions, mitigation, support and needs, and adaptation for inclusion in the BTRs. Once developed and fully operationalized, the system will guarantee availability of data and other information on all climate actions, including the official procedures and tools for supporting their collection and sharing after capacity building of all stakeholders involved in the implementation of these updated NDC activities. The MRV system will concurrently capture

information on environmental, social and economic benefits in line with the SDGs within the low emissions development agenda of the country, with particular attention to gender considerations. The new MRV system and its archiving mechanism will be tested and rolled out during the preparation of the BTR1.

8. GENDER MAINSTREAMING IN THE FIRST NDC SECOND UPDATE

Climate change is gender differentiated. The adverse impact of climate change affects minorities disproportionately, including women and girls which will be the hardest hit. Women's vulnerabilities to climate change are also closely linked to their socially and culturally determined gender roles and responsibilities; differentiations in terms of access to resources; limited voice and participation in decision-making; their geographical location; degree of reliance on rain-fed agriculture and access to technology to improve their adaptive capacity.

The National Gender Policy (2010-2020) is the overarching document providing mechanisms and guidelines for achieving gender equality and empowering women in all sectors of development in Namibia. It identified climate change as one of the emerging issues affecting the achievement of gender equality and provides therefore a sound policy framework for the development of gender responsive climate action for Namibia's NDC Implementation Strategy and Action Plan (NDC-ISAP). Namibia's Climate Change Strategy and Action Plan (2013-2020) called for the inclusion of the needs of women into climate change planning, but the challenge has been to translate these broad policy objectives into implementation and deliver tangible benefits to women and men. Both these documents make it a priority for women to be involved in climate change awareness and knowledge sharing and to participate in the planning, development and implementation of appropriate climate change adaptation and mitigation responses.

As part of the climate solutions in Namibia, a gender-balance approach should incorporate the intersectional needs of the population to ensure inclusivity. Addressing gender imbalance is a priority for Namibia and there are plans in the pipeline to mainstream gender into planning and budgeting, including in the context of addressing climate change within the framework of this NDC. The development of gender responsive measures within Namibia's First NDC second update will focus on climate change adaptation, while not disregarding mitigation and cross-cutting issues, as the effects of climate change will disproportionately affect the livelihoods of women, who rely on natural resources for food security and subsistence.

9. IMPLEMENTATION STRATEGY AND ACTION PLAN

9.1 Means of Implementation

How NDCs are implemented and improved upon over time will determine whether the goals of the PA are achieved. This will be challenging, requiring considerable investment, capacity development, behaviour change, technological innovation and a scaling up of efforts never seen. The commitments made in NDCs represent the efforts needed to achieve, or work towards achieving, these goals. Namibia's First NDC second update includes both those actions which the country is already pushing ahead to implement to reduce emissions/enhance removals and adapt to the effects of climate change and those which are more ambitious but represent important options for decarbonising and adapting sectors. Some of these are highly ambitious, technologically challenging, or come at significant cost and would be conditional on successful transfer of technologies, strengthening capacities and financial support. To achieve the country's goals and implementation of the actions will need not only leadership, but considerable investment and international support.

9.2 Namibia's NDC Implementation Strategy and Action Plan (NDC-ISAP)

To implement the measures set out in this NDC, Namibia has produced its NDC-ISAP. The document has been developed by reviewing past and present strategic documents, both focusing on climate action, economic development and the implementation of SDGs and stakeholder consultations to ensure specific strategies and objectives are in line with the NDC-ISAP. It covers the period 2023-2030, with a focus on the period up to 2025. The reason for this focus on the near-term time horizon is that the sectoral action plans set out the detailed actions required to implement this NDC in the short term.

The NDC-ISAP consists of one overarching document which consolidates the key information for managing and tracking implementation, supported by a set of nine detailed sectoral action plans. The plans are structured based on key implementing sectors, inclusive of mitigation, adaptation and cross cutting issues to realise co-benefits and ensure policy coherence. The plans summarise the key background, existing support, capacity and technologies, to provide a clear picture of the state of play and opportunities for implementation, as well as the key challenges and needs. The plans seek to highlight the measures and activities which are already making good progress, as well as those which are more challenging. Gender issues have been included in all sectoral Action Plans to ensure that the needs of all are mainstreamed in climate change planning across all sectors.

The NDC-ISAP is expected to guide climate action in-country, both in terms of priorities, monitoring and reporting. The NDC-ISAP therefore outlines activities to be carried out within each sector for each of the NDC measures. Stakeholders (lead and partner agencies) will carry out the activities and actions in a coordinated, collaborative and integrated approach. The NDC-ISAP will be used to plan, design, prioritise and coordinate the next steps for successful implementation of the First NDC second update. The document is also a useful tool to reflect the ongoing efforts to develop, monitor and evaluate the performance of the First NDC second update measures. It is expected that this will be a 'live' document and may be updated over time. During its future updates, new sectors and activities may be added.

9.3 Funding, Transfer of Technologies and Strengthening Capacity

To fully implement the mitigation and adaptation measures contained in this NDC, Namibia will require finance, capacity building, technology transfer and country driven policy process and institutional arrangements. Insufficient climate finance, technologies and institutional capacity continue to be the key limiting factors impacting Namibia's implementation of the First NDC second update objectives. As part of the updating process and analysis, consultations with sector experts were undertaken to produce cost estimates for the measures. The total estimated cost for all the measures of the First NDC second update is 15,065 M USD. Of this, 13,558.5 M USD is conditional on international support.

Namibia intends to meet its conditional contribution using climate finance and international market mechanisms where appropriate, building upon the experience of already existing practices. The Environmental Investment Fund (EIF) of Namibia was accredited to access the Green Climate Fund (GCF) in 2016 and has to date seen the approval of four GCF projects, for a total funding amount of nearly USD 40 million. The EIF was also the first accredited entity to pilot the GCF's "enhanced direct access" approach, easing the application process which will continue to bring international funds for climate action. The Environmental Management Act is a key piece of environmental legislation, including the tax on road fuels. At the same time, Namibia is participating in the NDC partnership, a process that has so far attracted financing for readiness support on developing a pipeline of projects targeting public and private climate finance. The priority areas outlined in Namibia's NDC Partnership Plan include strengthening financing of projects that help reduce emissions and enhancing the country's resilience against the effects of climate change. Through these initiatives, many Development Agencies have pledged to support Namibia's Partnership Plan, including AfDB, FAO, EC, UNDP, WB and WRI.

Under the PA, developed countries have also committed to providing technology transfer and capacity building to developing countries. Specific needs for the implementation of Namibia's First NDC second update measures are identified in the Sector Action Plans, but cross-cutting needs are as follows:

- Improving access to finance, including expanding the number of accredited direct access entities in Namibia; cooperation with the private sector; and ensuring finance is accessible.
- Promoting and enhancing climate change education, public awareness and capacity development through communication, training, information and knowledge management. This knowledge should support further assessments and feasibility studies, as well as the policy and regulatory environment for priority projects currently at early stages, e.g., green hydrogen.
- Designing strategic ways to build and further develop capacity of sector experts in Monitoring and Evaluation and Monitoring, Reporting and Verification. This capacity should also inform implementation of actions and response mechanisms e.g., addressing climate impacts.
- Ensuring adequate public sector resourcing and fostering public private collaboration to coordinate wide scale programmes for implementation and building sectoral capacity. It is important that this institutional capacity is coupled with those required from the private sector (e.g., promoting climate-smart technologies and accessing and overcoming barriers to the diffusion of appropriate clean technologies, including facilitating partnerships and investments, e.g., for water infrastructure, electric vehicles).
- Supporting and training community organisations to build capacity and support the roll-out of clean technologies and climate resilient practices and programmes, e.g., farming communities, and encouraging the mainstreaming of gender in climate change issues.

The consultations undertaken through the First NDC second update revision process have created momentum for ongoing engagement. Successful mainstreaming of climate change into sector priorities must build on existing country driven policy mechanisms and institutional arrangements, recognising the technical knowledge and experience of sector specialists, whilst promoting cross-sectoral learning.

[14] Brown, L. et al. (2022). The Environmental Investment Fund of Namibia's journey with the Gren Climate Fund. Experiences, Good Practice and Lessons Learned. Environmental Investment Fund.

ANNEX 1. MITIGATION ACTIONS AND MEASURES BY SECTOR

A 1.1. Energy Sector

Mitigation measures (8) comprising 19 actions in the energy sector aim at substituting fossil fuels with renewables and increasing efficiency. The contribution in the reduction of emissions together with estimated costs of the different actions by category are depicted in Table A1.1. A total mitigation potential of 3.613 Mt CO2 e is estimated, inclusive of 0.332 Mt CO2 e of emissions already avoided since the base year 2010 to date. This represents 57% of the 6.291 Mt CO2 e of the BAU scenario.

Table A1.1 Emissions reduction and implementation costs by measure for the energy sector

Description of measures and actions		Year	Emissions reduction	Cost (M USD)
Measure 1. Energy Industries – Electricity generation - Substitute fossil fuel with renewable resources				
1. Anixas II plant		2030	0.00014	80
2. Omburu PV		2030	0.025	27
3. Kahn PV		2030	0.025	33
4. Otjikoto – Biomass to energy plant		2030	0.043	218
5. Wind Independent Power Producers (IPP)		2030	0.179	200
6. Baynes Hydro Project		2030	0.565	2,100
Indicator/s	Installed capacity; No. of GigaWatts (GW) generated			
Benefits	Energy security; Better air quality; FOREX savings; Job creation			
Measure 2. Energy Industries – Electricity use – Energy Efficiency measures				
1. Introduction of energy efficient appliances and equipment		On-going	0.048	154
Indicator/s	Number of energy efficient appliances and equipment introduced			
Benefits	Energy security; Better air quality			
Measure 3. Transport – Road Transportation - Substitute fossil fuel with green H2 and convert fossil fuel powered vehicles to electric ones				
Convert from ICEVs to BEVs (96,500 Light vehicles)		2030	0.607	2,316
Convert from ICEVs to BEVs (7,000 Heavy vehicles)		2030	0.414	840
Convert from ICEVs to Green H2 (96,500 Light vehicles)		2030	0.607	1,158
Convert from ICEVs to Green H2 (7,000 Heavy vehicles)		2030	0.414	126
Indicator/s	No. of vehicles converted			
Benefits	Lower emissions; Better air quality; FOREX savings			
Measure 4. Transport – Rail - Replace all diesel/HFO powered locomotives with new ones running on green H2				
1. Convert all diesel locomotives to use green H2		2030	0.057	300
Indicator/s	No. of locomotives running on green H2			
Benefits	Lower emissions; Better air quality; FOREX savings			
Measure 5. Commercial and institutional – Increase use of RE for lighting and water heating				

Description of measures and actions		Year	Emissions reduction	Cost (M USD)
1. Use of solar powered street lighting – 25,000 units of 60W installed over 5 years		2030	0.0002	26
2. Use of solar water heaters – 5,000 units over 5 years		2030	0.004	27
Indicator/s	(1) Number of solar powered streetlights installed; (2) Amount of electricity saved			
Benefits	(1) Energy savings; Better air quality, (2) Energy savings			
Measure 6*. Residential - Reduce fuelwood and fossil products with electricity generated from renewable sources and replace water electric heaters with solar energy ones				
1. Promote substitution of paraffin wax with electricity from renewable sources		2030	0.002	Under AFOLU
2. Promote substitution of fuel wood with electricity from renewable sources		2030	0.046	Under AFOLU
3. Installation 25,000 solar water heaters over 5 years		2030	0.0005	7
Indicator/s	(1) No. of households using paraffin wax (2) Improved health, (3) Number of households using solar water heaters			
Benefits	(1) Lower emissions; Better air quality; Improved health; (2) FOREX savings, (3) Energy security			
Measure 7. Agriculture - Substitute fossil fuel with solar energy				
1. Substitute fossil fuel with RE in existing and new PV pumps (20,000 units)		2030	0.095	48
Indicator/s	No. of solar pumps installed			
Benefits	Lower emissions; Improved livelihood; FOREX savings			
Measure 8. Fishing – Substitute fossil fuel with green H2 in fishing vessels.				
1. Substitute diesel with green H2 in 200 fishing vessels		2030	0.151	18
Indicator/s	No. of fishing vessels running on Green H2			
Benefits	Lower emissions; Improved livelihood; FOREX savings			
Total mitigation potential and cost of Energy measures			3.613	7,678

*There is no cost as the reduction is primarily resulting from the electrification programme

A 1.2. IPPU Sector

Three measures for 4 actions will bring a total mitigation potential of 0.178 Mt CO2 e at a cost of 18 M USD as shown in Table A1.2.

Table A1.2 Emissions reduction and implementation costs by measure in the IPPU sector

Description of measures and actions		Year	Emissions reduction	Cost (M USD)
IPPU -Measure 1. Mineral industry – Cement production – Substitute clinker				
1. Replace 10% clinker in cement with alternative material		2030	0.104	12
Indicator/s	Amount of clinker replaced in cement			
Benefits	Lower emissions			
IPPU- Measure 2. Non-energy product use –Reduce use of paraffin wax, candles, and lubricants				
1. Promote substitution of candles with electricity from renewable sources		2030	0.002	Under AFOLU
2. Reduced use of lubricants		2030	0.006	Under Energy
Indicator/s	(1) No. of households using candles for lightning, (2) Amount of lubricants used			
Benefits	(1) Lower emissions; Better air quality; Improved livelihood (2) Lower emissions; Better air quality			
IPPU – Measure 3. Product Uses as Substitutes for Ozone Depleting Substances – Refrigeration and air conditioning – Reduced use of HFCs				
1. Recovery of refrigerant gas from 10% of retiring equipment and introduction of alternatives with low GWPs in new equipment		2030	0.066	6
Indicator/s	No. of new equipment with low GWP refrigerants; Quantity of refrigerants recovered at retirement of equipment			
Benefits	Lower emissions; Job creation			
Total mitigation potential and cost of IPPU measures			0.178	18

A 1.3. AFOLU Sector

Removals and emissions reduction in the land sub-sector amount to 53.0% and 46.5% of the mitigation potential while livestock contributes the remaining 0.5%. The AFOLU sector comprises 3 measures and 11 actions for a total mitigation potential 7.986 Mt CO2 e for all measures at a cost of 857 M USD (Table A1.3).

Table A1.3 Emissions reduction and implementation costs by measure in the AFOLU sector

Description of measures and actions		Year	Emissions reduction	Cost (M USD)
AFOLU – Measure 1. Livestock – Other Cattle – Enteric fermentation – Reduce enteric fermentation				
1. Fattening of 147,000 heads of cattle in feedlots		2030	0.043	12
Indicator/s	No. of heads of cattle fattened			
Benefits	Lower emissions			
AFOLU – Measure 2. Land – Forestland – Wood removal – Reduce wood removal				
1. Enhance substitution of fuelwood with electricity from renewable sources		On-going	2.510	334
2. Increase rate of substitution of wood with other construction materials		On-going	1.200	456
Indicator/s	(1) No. of households using fuelwood; (2) No. of dwellings using materials other than indigenous wood			
Benefits	Lower emissions; Better air quality; Improved health; Better livelihood			
AFOLU– Measure 3. Land – Cropland, grassland, and settlements– Increase carbon sequestration				
1. Conversion of 10,000 ha of cropland set-aside to perennial cropland		2030	0.032	In adaptation
2. Enhance soil carbon sequestration using biochar and compost in cropland		2030	0.620	18
3. Enhance soil carbon sequestration using biochar and compost in grassland		2030	0.620	18
4. Improve Soil Organic Carbon (SOC) through aftercare to prevent re-encroachment in area bush thinned for Otjikoto biomass project		2030	0.247	5
5. Improve SOC through aftercare in area exploited for charcoal production		2030	2.516	10
6. Improve SOC through aftercare to prevent re-encroachment of bush thinned areas for improved pastures – 100K ha		2030	0.168	4
7. Create 5000 ha of urban green spaces and urban corridors		2030	0.010	In adaptation
8. Carbon sequestration through reinstatement of riparian buffer – 10K ha		2030	0.020	In adaptation
Indicator/s	(1) Area under perennial crops, (2) Amount biochar and compost applied to cropland, (3) Amount biochar and compost applied to grassland, (4) Area where aftercare is done in the Otjikoto project, (5) Area where aftercare is done following charcoal production (6) Area where aftercare is carried out for improved pastures (7) Area of urban green spaces and corridors created (8) Area of riparian buffer reinstated			

Description of measures and actions		Year	Emissions reduction	Cost (M USD)
Benefits	(1) Increased removals; Food security; Job creation, (2) Increased removals; Food security; Increased crop productivity, (3, 4, 5, 6) Increased removals; Food security; Increased productivity, (7) Increased removals, Better air quality (8) Increased removals; Reduced flooding; Enhance aquifer recharge; Improved livelihood			
Total mitigation potential and cost of AFOLU measures			7.986	857

A 1.4. Waste Sector

Total emissions avoided sum up to 0.125 Mt CO2 e for the 3 measures and 4 actions retained for a cost of 499 M USD (Table A1.4).

Table A1.4 Emissions reduction and implementation costs by measure in the waste sector

Description of measures and actions		Year	Emissions reduction	Cost (M USD)
Waste – Measure 1	Solid waste – Solid waste disposal system– Recycling, composting and recovery of landfill gas for production of electricity			
1. Composting of 112,000 tons of waste after segregation		2030	0.020	480
2. Recovery of landfill gas for production of electricity		2030	0.068	10
Indicator/s	(1) Amount waste segregated and composted, (2) Amount of landfill gas recovered; GW electricity generated			
Benefits	(1) Lower emissions; Better air quality, (2) Lower emissions; Better air quality; Energy security			
Waste – Measure 2	Incineration and open burning of waste – Open burning– Reduce open burning			
1. Reduction of 25% in open burning of waste by 2030		2030	0.010	9
Indicator/s	Amount of waste open-burned			
Benefits	Lower emissions; Better air quality			
Waste – Measure 3	Wastewater treatment and discharge – Domestic wastewater – Improve wastewater manage-ment			
1. Install reticulate systems for wastewater management (4 systems)		2030	0.027	In adaptation
Indicator/s	No. households connected to sewer system			
Benefits	Lower emissions; Improved sanitation; Water security			
Total mitigation potential and cost of Waste measures			0.125	499

ANNEX 2. ADAPTATION ACTIONS AND MEASURES BY SECTOR

A 2.1. Agriculture and Food Security

Despite its modest contribution to national GDP, agriculture impacts directly on the livelihood of 70% of the population. Approximately 48% of Namibia's rural households depend on subsistence agriculture according to Namibia's fifth National Development Plan (NDP5). Agriculture and food security are an adaptation priority for Namibia and nine measures comprising 25 actions at a total cost of 1,514 M USD have been identified to ensure food security. The measures with the year of implementation and cost are given in Table A2.1.

Table A2.1 Summary of costs of adaptation measures in the Agriculture and Food Security sector

Description of measures and actions		Year	Cost (M USD)
Measure 1. Improvement of livestock disease control, prevention and treatment including facilities			
1. Construct additional veterinary clinics and provision for equipment. 2. Develop inspection centres at border control 3. Improve animal health and marketing in the North Central areas		2030	132
Indicator/s	1. No. of veterinary clinics commissioned. 2. No. of inspection centres set up; No. of animals treated 3. No. of animals marketed through the new system		
Benefits	Reduced losses by communities; Improved productivity; Higher income of farmers; National food security		
Measure 2. Development of climate resilient livestock species			
1. Promote adoption of resilient species through small stock distribution preferentially to women and youth, in the rural communities 2. Set up a breeding programme for development of adapted breeds more resilient to higher temperatures		2030	67
Indicator/s	1. No of heads of small stock distributed; No of women, youth benefiting from the action. 2. Status of implementation of breeding programme		
Benefits	Reduced losses by communities; Improved productivity; Higher income of communities; National food security		
Measure 3. Improve fodder production and create fodder banks			
1. Develop fodder production using hydroponics 2. Create fodder banks		2030	100
Indicator/s	Amount of fodder produced; Number of fodder banks created		
Benefits	Improved productivity; Reduced livestock losses; Food security; Higher income of communities		
Measure 4. Value chain development of agricultural products			
1. Value chain development schemes for cereals, horticulture, beef, dairy, poultry, and agro processing 2. Set up 20 units for meat agro processing and 10 units for vegetable/fruit 3. Capacity building of key stakeholders for value chain development		2030	151
Indicator/s	No of value chain development schemes set up; No of agro processing units commissioned; No. of stakeholders trained		

Description of measures and actions		Year	Cost (M USD)
Benefits	Higher productivity; Secured income of communities; Food security nationwide; Stakeholders empowered		
Measure 5. Upgrading of soft and hard infrastructure for improved monitoring of climate impacts on agricultural production system			
1. Develop ICT facilities for intranet expansion in Ministry of Agriculture, Water and Land Reform (MAWLR) 2. Construct MAWLR regional offices 3. Provide ICT facilities to the network of surveillance system 4. Capacity building of extension officers and producers, especially the communities		2030	34
Indicator/s	Stage of development of intranet network constructed; No. of MAWLR decentralized functions in the regions; No. of users provided with ICT facilities; No. of extension officers and producers trained		
Benefits	Stable production; Higher income of communities; Women, youth and disabled empowered; Food security nationwide		
Measure 6. Promote conservation and organic agricultural practices			
1. Comprehensive conservation agriculture program 2. Capacity building program for extension officers and farmers on new practices		2030	28
Indicator/s	No. of hectares under conservation agriculture; No of extension officers and farmers capacitated		
Benefits	Reduced GHG emissions; More stable production; Higher income of communities; Women, youth and disabled empowered; Food security nationwide		
Measure 7. Improve support to enhance adaptation to CC through better adapted crops, crop husbandry practices, alternate crops			
1. Rehabilitate green scheme irrigation projects to diversity activities and production 2. Support development of mechanization 3. Rice production pilot project 4. Improve grain and seed storage facilities 5. Drip irrigate 5000 ha of mechanized cropland 6. Capacity building of farmers on new practices		2030	162
Indicator/s	No of green scheme projects operating optimally; Acreage mechanized; Rice [production pilot project implemented; No of grain and seed storage facilities completed; No. of hectares of mechanized area drip irrigated; No of farmers trained on new technologies		
Benefits	Diversified food production; Employment creation; Higher income of communities; Women, youth and disabled empowered; Food security nationwide		
Measure 8. Introduce new technologies to enhance/maintain crop productivity			
1. Develop 400 ha of net-house vegetable production systems 2. Capacity building and support to farmers to adopt new production systems		2030	240
Indicator/s	Area of net-house production system commissioned; No of farmers trained on new production system		
Benefits	Diversified food production; Employment creation; Higher income of communities; Women, youth and disabled empowered; Food security nationwide		

Description of measures and actions		Year	Cost (M USD)
Measure 9. Diversify from traditional crops to perennials			
1. Conversion of 10,000 ha of cropland set-aside to perennial cropland		2030	600
Indicator/s	Area of perennial cropland developed		
Benefits	Sequester carbon; Create employment; Generate income; Enhance water infiltration; Improved livelihood; Increased food production; National food security		
Total cost			1,514

A 2.2. Water Resources

Namibia is a water scarce country and lack of good quality and restricted availability undermine socio-economic development with climate change expected to exacerbate the situation. Five measures (Table A2.2) comprising 12 actions have been identified for implementation up to the year 2030 at a total cost of 3,505 M USD.

Table A2.2 Summary of costs of adaptation measures for the water resources sector

Description of measures and actions		Year	Cost (M USD)
Measure 1. Integrated Water Resources Management Plan			
1. Quantify hydrological (surface and ground water) resources 2. Develop a water resources management plan		2030	60
Indicator/s	Extent of country assessed for hydrological resources; Water resources management plan available		
Benefits	Improved knowledge on the hydrological resources; Improved availability and quality of water. Women and girls relieved from fetching water; Better health. Lower frequency of diseases associated with poor water quality		
Measure 2. Water Infrastructure Development, Maintenance and Rehabilitation			
1. Rehabilitate existing waterpoints 2. Construct new water points - boreholes 3. Extend the water supply infrastructure 4. Improve coverage of rural water supply 5. Construct reservoirs and dams		2030	875
Indicator/s	No of water points rehabilitated; No of new water points operational; Length of additional piping for water supply; No of additional communities connected to the water supply system; No of reservoir/ dam commissioned; No women and girls relieved from fetching water		
Benefits	Water security; Improved availability and quality of water; Women and girls relieved from fetching water; Better health; Lower frequency of diseases associated with poor water quality		
Measure 3. Water recycling			
1. Develop reticulate systems for secondary treatment of wastewater in 10 towns of 40,000 people 2. Use the treated water for agriculture or industry or recharge of aquifer 3. Stand-alone water treatment system for 100,000 households		2030	1,908
Indicator/s	No of towns connected to a reticulated system; No of stand-alone water treatment systems installed		

Description of measures and actions		Year	Cost (M USD)
Benefits	Reduced GHG emissions; Improved sanitation and health of communities; Improved water availability; Higher agricultural production, Enhanced storage, and water security; Reduced incidence of diseases associated with poor water quality		
Measure 4. Establishment and restoration of riparian buffers			
1. Establish and/or restore 5000 ha of Okavango riparian buffer		2030	12
Indicator/s	Area of Okavango river riparian buffer established/restored		
Benefits	Sequester CO2; Reduced flooding; Reduced non-point source pollution; Increased streambank stability; - Decreased streambank erosion; Improved water quality by enhancing the infiltration of pesticides, nutrients, pathogens, and sediment; Increased wildlife habitat and preserved biodiversity; Diverse array of wildlife supported; Recreation and aesthetics areas for residents		
Measure 5. Desalination			
1. Commission 6 coastal/inland systems to treat sea/brackish water		2030	650
Indicator/s	No of desalination systems installed		
Benefits	Improved availability of water for communities and wildlife; Water security; Improved livelihood		
Total			3,505

A 2.3. Biodiversity and Ecosystems

Ecosystem services are of prime importance to the communities and contribute substantially to the economy of the country. Ecosystems, hosting a very rich biodiversity, are fragile and could fail under the projected increased temperature and reduced rainfall regime. Adaptation of the ecosystems for preserving the biodiversity and services encompass 6 measures for 8 actions at a total cost of 371 M USD until 2030 have been identified (Table A2.3).

Table A2.3 Summary of costs of adaptation measures for biodiversity and ecosystems

Description of measures and actions		Year	Cost (M USD)
Measure 1. Sustainable land management			
1. Thinning of encroacher bush and biomass utilisation 2. Integrated natural resource management		2030	12
Indicator/s	Area of bush encroached land cleared; Acreage under integrated resource management		
Benefits	Preservation of biodiversity, Employment creation; Electricity production; Charcoal; bush based animal feed and biochar production; Increased productivity of livestock; Food security nationwide. Diversification of on-farm income generation through encroacher bush value additions		
Measure 2. Management of State Protected Areas			
1. Fence highly exposed conservation areas 2. Upgrade tourists' sanitation facilities, particularly water supply and sewage points to prevent ecosystem degradation		2030	12
Indicator/s	Length of conservation areas fenced; No of water supply and sewage points developed		
Benefits	Preservation of biodiversity; Employment creation; Safeguarding ecosystem services; Improved community welfare		

Description of measures and actions		Year	Cost (M USD)
Measure 3. Environmental Management			
1. Develop and implement wildlife translocation schemes		2030	6
Indicator/s	No of schemes developed and heads of wildlife translocated		
Benefits	Preservation of the environment and of biodiversity		
Measure 4. Fire management plans			
1. Develop 5000 km of firebreaks		2030	17
Indicator/s	Length of firebreak made		
Benefits	Reduced GHG emissions; Preserve biodiversity		
Measure 5. Green spaces and urban corridors			
1. Create 5000 ha green spaces and urban corridors		2030	300
Indicator/s	Area of green space and urban corridor created		
Benefits	Preserve biodiversity; Enhanced water infiltration and recharge of aquifers; Reduced risks of flash floods; Sequester CO2; Reduced GHG emissions by limiting use of air-conditioners		
Measure 6. Adaptive management of fragile natural habitats (Karoo, Wetlands and Desert)			
1. Develop and implement a management strategy		2030	24
Indicator/s	No. of adaptive management strategy available for management of natural habitats		
Benefits	Preserve biodiversity; Protect ecosystems		
Total			371

A 2.4 Fisheries and Aquaculture

Commercial fishing, fish processing and inland fishery significantly contribute to the economy in terms of employment, export earnings, as well as to the GDP while enabling women empowerment through their participation in the chain of activities. Adaptation to compensate for the reduced productivity recorded in recent years because of climate change through 5 measures and 11 actions with the potential for further expansion within the blue economy development engine isestimated to cost 85 M USD (Table A2.4).

Table A2.4 Summary of costs for fisheries and aquaculture

Description of measures and actions		Year	Cost (M USD)
Measure 1. Support Sustainable use of fisheries resources by local communities			
1. Support vulnerability assessments (VA) for small scale fisheries in all regions 2. Identify and implement responsive adaptation actions		2030	10
Indicator/s	No. of VA studies conducted; No. of adaptations identified and implemented		
Benefits	Improved community livelihoods and well-being; Food security; Job creation		
Measure 2. Adaptive management and protection of aquatic ecosystems/biodiversity			
1. Establish community participatory (Fisheries reserves and marine protected areas) in selected areas 2. Adaptive management plans developed		2030	20

Description of measures and actions		Year	Cost (M USD)
Indicator/s	No. of participatory reserves established; No of localized management plans developed		
Benefits	Improved community livelihoods and well-being; Community governance; Ecosystem conservation		
Measure 3. Develop Mariculture within blue economy			
1. Develop 2 pilot farms of 2 ha each for prawns' culture 2. Develop 5 farms of 150,000 units each for oysters		2030	20
Indicator/s	No of prawn farms commissioned; No of oyster farms developed		
Benefits	Increased food production for local consumption and export; Improved welfare of communities, especially women; Food security; Job creation		
Measure 4. Strengthen Aquatic food systems			
1. Develop 5 aquaculture farms 2. Support establishment of small-holder fish farms 3. Supporting infrastructure (boreholes and ponds)		2030	25
Indicator/s	No of aquaculture farms completed; No. of small-holder farms established; No. of boreholes and ponds supporting small-holder aquaculture		
Benefits	Food security; Increased production of fish for local consumption; Improved welfare of communities, especially women; Job creation		
Measure 5. Building Climate Change resilience in both marine and freshwater fishing and aquaculture communities			
1. Support sustainable aquaculture models and practices 2. Strengthen research, extension, and advisory services		2030	10
Indicator/s	No. of aquaculture models established and demonstrated; No of research and extension plans identified and implemented		
Benefits	Improved community livelihoods and well-being; Improved fish production; Food security; Job creation; Research and extension driving development		
Total			85

A 2.5. Health

Namibia ranks 168 of 193 countries in 2022 with an average life expectancy of 64.86 years[15]. Females stand at 67.67 years and males at 61.83. The five leading causes of inpatient deaths (all age groups) are HIV/AIDS, diarrhoea, tuberculosis, pneumonia and malaria. Namibia is highly vulnerable to the adverse health implications from projected future climates which may have direct and indirect impacts on human health through impacts on water quality and availability, extreme weather events, nutritional status of humans, as well as distribution and abundance of vector organisms due to changing temperature and rainfall patterns and heat stress. Three adaptation measures, comprising 12 actions aim at improving health facilities coupled with enhanced monitoring and management of diseases. The estimated total cost (Table A2.5) by measure is 94 M USD.

Table A2.5 Summary of costs of adaptation measures for the health sector

Description of measures and actions		Year	Cost (M USD)
Measure 1. Health security			
1. Improve health facilities (infrastructure – 3 district hospitals) 2. Develop an appropriate surveillance/EWS 3. Capacity building		2030	78
Indicator/s	No of district hospitals commissioned; Surveillance system/EWS developed; Medical staff recruited and trained; No of awareness campaigns completed		
Benefits	Improved health system; Lower disease incidence; Reduced impacts of natural disasters; More abled medical staff		
Measure 2. Eradication of malaria			
1. Elimination of the vector in endemic areas 2. Improve control 3. Increase prevention 4. Enhance treatment		2030	4
Indicator/s	No of endemic malaria sites treated; No of persons affected with malaria; No of affected persons treated		
Benefits	Reduced incidence of malaria; Lower cost of treating malaria; Improved productivity of population		
Measure 3. Improve disease management			
1. Improve prevention 2. Better control 3. Improve treatment 4. Capacity building of medical staff 5. Sensitization of communities		2030	12
Indicator/s	No of cases of Bacterial Diarrhoea, Hepatitis A, Tuberculosis, Lower respiratory infections; No of staff trained; No of sensitization campaigns undertaken		
Benefits	Lower incidence of Bacterial Diarrhoea, Hepatitis A, Lower respiratory infections, and Tuberculosis; More qualified staff; Improved productivity of the population		
Total			94

[15] https://www.worldometers.info/demographics/life-expectancy/

A 2.6. Cross-cutting Issues

Building resilience of the vulnerable population is a major concern with regards to extreme weather events. The two most destructive events for society and economy with numerous deaths are floods and droughts. Available data estimated more than 25 occurrences since 1980 of floods, droughts and epidemics which claimed more than 500 lives, affected more than 3.2 million people for economic losses worth more than 215 million dollars[16]. Five cross-cutting measures, involving 12 actions, are considered as very urgent for implementation to the 2030-time horizon to avoid future damages and losses and will cost 162 M USD (Table A2.6).

Table A2.6 Summary of costs for cross-cutting issues

Description of measures and actions		Year	Cost (M USD)
Measure 1. Disaster Risk Management			
1. Develop a well-designed operational multi-hazard EWS 2. Identify and map high-risk areas 3. Develop and operationalize a crisis and disaster management system		2030	30
Indicator/s	No of hazards included in EWS; No of high-risk areas identified and mapped; Extent of development of disaster management system		
Benefits	Reduced economic losses; Lower death toll		
Measure 2. Education, Training and Public Awareness			
1. Develop a plan for inclusion of climate change in formal and informal education 2. Undertake an aggressive awareness programme for the most vulnerable constituencies		2030	30
Indicator/s	Plan for inclusion of climate change in formal and informal education system; No of awareness campaigns undertaken		
Benefits	Better preparedness for adaptation to climate change; Improved livelihood; Lesser socio-economic impacts; Higher communities' resilience		
Measure 3. Research and Systematic Observation			
1. Develop a Monitoring, modelling, and forecasting system (hydrometeorology) 2. Develop a National Climate Statistics database		2030	36
Indicator/s	Hydrometeorological forecasting system; System for climate statistics		
Benefits	Improved forecasting of weather extremes; Good quality hydrometeorological data		
Measure 4. Land planning			
1. Produce integrated regional land use plans 2. Integrate marginalized groups in development 3. Sustainable development of land in communal areas		2030	42
Indicator/s	No of regional land use plans completed; Extent of integration of marginalized groups in development; Acreage of land under sustainable development in communal areas		
Benefits	More sustainable use of natural resources; Lower incidence of natural disasters; Improved livelihood of marginalized groups; Empowerment of women and youth		

[16] EM-DAT: The Emergency Events Database – Universite catholique de Louvain (UCL) – CRED, D. Guha-Sapir, Brussels, Belgium. URL: http://emdat.be/emdat_db/)

Description of measures and actions		Year	Cost (M USD)
Measure 5. Gender mainstreaming			
1. Empower through provision of facilities for training and education of women and marginalized groups 2. Set up shelters to protect the most vulnerable victims		2030	24
Indicator/s	No of women and marginalized persons empowered; No of shelters erected		

A 2.7. Infrastructure

The direct and indirect impacts of climate change on infrastructure will have disastrous effects on the development of the country and must be addressed. There are two measures comprising of three actions which are estimated to cost 258 M USD (Table A2.7).

Table A2.7 Summary of costs for infrastructure

Description of measures and actions		Year	Cost (M USD)
Measure 1. National Infrastructure			
1. Undertake a national study to define vulnerability of infrastructure and enable more informed decisions for planning adaptation		2030	18
Indicator/s	Report on vulnerability of national infrastructure		
Benefits	Robust information available for informing decision-making		
Measure 2. Road Infrastructure			
1. Upgrade 100 km of roads usually flooded 2. Build drains to evacuate rainwater and prevent flooding of roads		2030	240
Indicator/s	Length of roads upgraded; Length of drains made		
Benefits	Reduced socio-economic losses; Lower death toll		
Total			258

A 2.8. Coastal Zone

Namibia is expected to experience a sea level rise of 20 cm by 2030 with storm surges being more likely. This is projected to cause coastal erosion and impact on property, infrastructure and water resources including the wetlands and coastal ecosystems. One basic measure and action has been retained to enable the country to better understand the vulnerability of the whole 1500 km coastal zone of the country to plan adequate and efficient adaptation.

The measure is Development of an Integrated Coastal Zone Management Plan during the period 2026 to 2030 at a cost of 24 M USD (Table A2.8).

Table A2.8 Summary of costs for coastal zone

Description of measures and actions		Year	Cost (M USD)
Measure 1. Integrated Coastal Zone Management Plan			
1. Develop an Integrated Coastal Zone Management plan		2030	24
Indicator/s	Report on integrated coastal zone management		
Benefits	Improved decision-making; Protect life and livelihood; Sustainable socio-economic development; Protection and conservation of ecosystems and biodiversity		
Total			24