Government of Tuvalu

Updated Nationally Determined Contribution (NDC)

November 2022

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IMPLEMENTING PARTNERS

REGIONAL PACIFIC NDC HUB

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Acronyms and Abbreviations

ADB	Asian Development Bank
AFOLU	Agriculture, Forestry, and Other Land Use
CDP	Committee for Development Policy
CH_4	Methane
CMA	Conference of the Parties serving as Meeting of the Parties
CO	Carbon monoxide
CO_2	Carbon dioxide
CO_2e	Carbon dioxide equivalent
COP	Conference of the Parties
COVID-19	Coronavirus
DOCK	(SIDS) DOCK is a United Nations recognized international organization established in 2015. SIDS DOCK represents 32 small islands and low-lying developing states across the globe and is so named because it is designed as a DOCKing station.
DWM	Department of Waste Management
EEZ	Exclusive Economic Zone
ESMAP	Energy Sector Management Assistance Program
EU	European Union
FASNETT	Facilitation of the Achievement of Sustainable National Energy Targets of Tuvalu
GCF	Green Climate Fund
GDP	Gross Domestic Product
GEF	Global Environment Facility
Gg	Gigagram
GGGI	Global Green Growth Institute
GHG	Greenhouse Gas
GNI	Gross National Income
IDA	International Development Association
INDC	Intended Nationally Determined Contribution
IPCC	Intergovernmental Panel on Climate Change
IPPU	Industrial Processes and Product Use
J-PRISM	Japanese Technical Cooperation Project for Promotion of Regional Initiative on Solid Waste Management in Pacific Island Countries
kL	kiloliter
km	kilometer
km^2	Kilometer squared
KSA	Key Strategic Actions
kW	kilowatt
LDC	Least Developed Country
m	meter
MFAT	Ministry of Foreign Affairs and Trade
MTET	Ministry of Transport, Energy, and Tourism
MW	megawatt
MWh	megawatt-hour
N_2O	Nitrous oxide
NAP	National Adaptation Plan
NAPA	National Adaptation Programme of Action
NDC	Nationally Determined Contribution
NMVOC	Non-methane volatile organic compound

NO	National Outcomes
NO_x	Nitrous oxide
NSAP	National Strategic Action Plan for Climate Change and Disaster Risk Management
°	Degree
PV	Photovoltaic
SIDS	Small Island Developing State
SNC	Second National Communication
SO_2	Sulphur dioxide
SPREP	Secretariat of the Pacific Regional Environment Programme
Te Kaniva	Tuvalu National Climate Change Policy 2012-2021
Te Kete	National Strategy for Sustainable Development 2021-2030
TISIP	Infrastructure Strategy and Investment Plan 2016-2025
UN	United Nations
UNFCCC	United Nations Framework Convention on Climate Change
US$	United States Dollar

Introduction

The Government of Tuvalu developed its Intended Nationally Determined Contribution (INDC) and submitted it to the United Nations Framework Convention on Climate Change (UNFCCC) in 2015 and ratified the Paris Agreement on 22 April 2016. When the Paris Agreement came into force on 04 November 2016, Tuvalu's INDC submitted in 2015 automatically became Tuvalu's First NDC.

The Government of Tuvalu is committed to the full, effective, and transparent implementation of the Paris Agreement in accordance with its provisions and the relevant Decision of the Conference of the Parties (COP) to the UNFCCC serving as the Parties to the Paris Agreement (CMA).

In accordance with decision 1/CP.21, Tuvalu hereby communicates Tuvalu's Updated Nationally Determined Contribution (NDC) under Article 4 of the Paris Agreement.

In this Updated NDC, Tuvalu hereby communicates to the UNFCCC:

An update to its existing NDC pursuant to Article 4.11 of the Paris Agreement that includes:

- Tuvalu commits to the reduction of greenhouse gas (GHG) emissions from the electricity (power) sector by 100%, i.e., almost zero emissions by 2030.
- Increase energy efficiency in Funafuti by 30%.
- Tuvalu's indicative quantified economy-wide target to reduce total GHG emissions from the entire energy sector to 60% below 2010 levels by 2030.
- Zero carbon development pathway by 2050.

GHG emissions will be further reduced from the other key sectors, agriculture, and waste, conditional upon necessary technology and finance.

Tuvalu sets new renewable energy targets for electricity generation on the basis that when the renewable energy contribution exceeds 98% or so, the cost of energy becomes a lot flatter, meaning that the increase in renewable energy at this point has marginal benefit and becomes more expensive. However, considering Tuvalu's national circumstances, the timeline has been changed to 2030.

Overall, GHG emissions reduction from the energy sector takes into account the increasing demand for imported fuels for transportation. Since 1996, the total import of diesel has tripled and only in 2015, a total 1,402 kL of fuel was used for electricity generation[1]. The increase in demand for imported fuel is directly proportional economic growth. With additional renewable energy for electricity, imported fuels will be freed-up for transportation. However, unless there are alternative fuels for transportation, fuel demand for transportation will increase especially for people living in outer islands and as urbanization continues.

Tuvalu considers that the focus of the Updated NDC should primarily be mitigation. In terms of adaptation, Tuvalu's adaptation actions are comprehensively articulated in the Environmental and Social Management Plan 2021, the Second National Communication 2015, National Strategic Action Plan for Climate Change and Disaster Risk Management 2012-2016, the National Climate Change Policy 2021-2030, and the Recovery and Vulnerability Reduction Plan. Hence, no adaptation actions are included in this Updated NDC.

Tuvalu's National Circumstances

Tuvalu archipelago comprises nine small islands scattered over 500,000km^2 of the western Pacific Ocean between 5^0 to 10^0 South and 176^0 to 180^0 West. Six out of nine of these islands

[1] Government of Tuvalu, 2015, Second National Communication to the UNFCCC

are atoll islands (with ponding lagoons) namely Nanumea, Nui, Vaitupu, Nukufetau, Funafuti, and Nukulaelae. The remaining three islands, Nanumaga, Niutao, and Niulakita are raised limestone reef islands. Funafuti Atoll is the capital of Tuvalu and consists of two main islands – Fongafale and Amatuku. All the islands are less than five meters above sea level, with the biggest island, Vaitupu, having a land area of just over 524 hectares. The total land area is approximately 26km^2 with an exclusive economic zone (EEZ) of 719,174km^2. The islands are made up of infertile sandy or gravel coralline soil, which limits agricultural development and food security in most places. The island is less than 75m wide, which provides limited space for development.

Tuvalu is the world's second lowest-lying country[2] and sea level rise poses a fundamental risk to its very existence. Tuvalu's geography makes it susceptible to the impacts of climate change, given that the highest elevation is less than 5m above sea level and may vary across the nine atolls depending on local socio-economic and cultural context. Storm surges, king tides, and floods are common occurrences and have intensified due to changes in weather patterns and sea-level rise (estimated at about 5 millimeters/year and estimated to be up to 0.97 meters in next 100 years).

Sea level rise has generated particular concern since all human settlements and development of Tuvalu is effectively coastal and is thereby vulnerable to coastal inundation and erosion. Furthermore, sustainable supply of freshwater is at risk due to changes in rainfall patterns, lack of rainwater storage capacity as well as potential salinization of ground water due to high sea level rise.

Tuvalu's vulnerability to the impacts of climate change characterizes it as a 'sinking' nation. Tuvalu has high levels of exposure to both local and abstract climate change stressors.

Considering Tuvalu's geo-physical setting with socio-economic contexts, Tuvalu faces development challenges with its small population size, remoteness, and vulnerability to external shocks such as the COVID-19 pandemic and accelerating economic hardship by natural disasters such as the Category 3 tropical cyclone which hit Tuvalu in January 2020.

Tuvalu's Socio-Economic Context

Fongafale Islet – a sliver of land 12km long and between 10m and 400m wide, hosts the capital of Tuvalu, and is home to over 50% of Tuvalu's population of 10,507 (in 2017). The other islands are sparely populated, and some reefs are inaccessible to large boats. Fongafale is also the location of Tuvalu's hospital, primary school, a branch campus of the University of the South Pacific, radio station, main port, international airport, power and water utilities, and most businesses. Tuvalu's Maritime Training Institute is located in Amatuku, the other island of Funafuti.

Social life in Tuvalu is dominated by the family, island community, and church. Tuvalu's guiding social principles includes *fakalogo* (obedience), *ava* (respect), *fakamaoni* (integrity), and *alofa* (love, caring and the sharing of resources).

Tuvalu is a Least Developed County (LDC) as well as a Small Island Developing State (SIDS). Tuvalu faces unique social, economic, and environmental vulnerabilities. However, since the publication of Tuvalu's First NDC, the Committee for Development Policy (CDP) of the UN Economic and Social Council recommended deferring Tuvalu's graduation from LDC status to developing country status in 2024[3]. This is due to unprecedented socio-economic impacts of the COVID-19 pandemic, which has impacted Tuvalu's economy due to closure of borders and

[2] Government of Tuvalu, 2015 Intended Nationally Determined Contribution.

[3] N2114960.pdf (un.org) https://documents-dds-ny.un.org/doc/UNDOC/GEN/N21/149/60/PDF/N2114960.pdf?OpenElement

restrictions in the movement of goods and people as well as immediate threat of climate change and natural disasters.

Tuvalu has a narrow economic base with the fisheries sector contributing up to 60% of the Government's revenue. Other significant revenue sources include sovereign wealth contracts and donor aid. Tuvalu's economy has expanded over the last seven years. As of 2021, Tuvalu has a gross national income (GNI) per capita of approximately US$6,600. Tuvalu's gross domestic product (GDP) has also increased from US$39.7 million in 2013 to US$44.7 million in 2020. Tuvalu's GDP is dependent on fishing and internet domain licensing fees, remittances, and trust fund returns. Tuvalu's exports in 2020 equated to US$12.7 million, mainly from non-fillet frozen fish and x-ray equipment.

Tuvalu remains extremely reliant on imports, particularly food, fuel, and skilled services. Tuvalu's economic diversification is minimal due to Tuvalu's small population and lack of land area and resources. Tuvalu remains heavily reliant on imports. Tuvalu's annual imports totaled approximately US$60 million in 2020. However, Tuvalu's economy is expected to rebound as growth is expected to increase to 3.5 percent in 2022[4].

Tuvalu is highly dependent on imported energy resources, primarily petroleum products. This is due to Tuvalu not having any conventional energy resources. Despite increasing use of renewable energy sources for electricity generation, Tuvalu is heavily reliant on imported fuels for transport (including domestic maritime) as well as household use. High fuel prices, fluctuations and supply disruptions have a destabilizing effect on business and households, limiting growth and reducing food security, especially in the most isolated outer islands.

The COVID-19 pandemic has heightened Tuvalu's reliance on imports. Despite low case numbers, global lockdowns, supply chain disruptions, and economic instability have impacted Tuvalu. In particular, the frequency of essential goods including food, medicine, and fuel being transported to (and within) Tuvalu has reduced. In addition, health services in Tuvalu are already stretched. A COVID-19 outbreak (or another infectious disease outbreak), would be extremely detrimental to the country.

Tuvalu's National Development Priorities

Tuvalu has outlined its overarching national development priorities in Te Kete: National Strategy for Sustainable Development 2021-2030 (Te Kete). The planning framework that underpins Te Kete requires Government departments to submit annual work plans and budgets that are aligned with the strategic priority areas.

The National Strategy for Sustainable Development Plan is a 10-year plan that focuses on the national vision of 'a peaceful, resilient and prosperous Tuvalu', which is firmly grounded in traditional cultural values and strong Christian faith. Te Kete is a high-level planning and result oriented (*seai ko pati kae ko faiga – not words but deeds*) strategic plan. Te Kete includes five strategic priority areas: the enabling environment for sustainable development; economic development; social development and inclusion; islands and culture; and infrastructure development. These five strategic areas include 20 national outcomes (NOs) and 89 key strategic actions (KSAs). All programs will be aligned to the national vision, goals, and policy objectives in order to realize noble results.

Out of 20 national outcomes, the following outcomes are identified as they appear linked to the increase of greenhouse gas (GHG) emissions over the short term.

[4] Tuvalu: Staff Concluding Statement of the 2021 Article IV Mission (imf.org)
https://www.imf.org/en/News/Articles/2021/04/26/mcs042621-tuvalu-staff-concluding-statement-of-the-2021-article-iv-mission

- **National Outcome 7** – increasing fisheries contribution to socio-economic development and quality of life is likely to increase GHG emissions from Tuvalu's maritime sub-sector.
- **National Outcome 8** – increasing agricultural productivity, particularly through increasing local food production, including crops and livestock, may increase GHG emission from Tuvalu's agriculture sector.
- **National Outcome 17** – developing and implementing resilient housing and upgrading national building facilities may increase GHG emissions from Tuvalu's energy sector temporarily.
- **National Outcome 18** – improving shipping, networking, and harbor facilities may increase GHG emissions across the energy sector and sub-sectors.
- **National Outcome 20** – access to clean water and sanitation may require additional energy as well, which could also be associated with increase in emissions.

Tuvalu has several national guidelines, strategies, plans and policies which also forms part of the national development strategy and have been taken into consideration when updating the NDC:

- **Infrastructure Strategy and Investment Plan 2016–2025 (TISIP)**
  The TISIP plan provides a country-led and prioritized investment plan for Tuvalu's economic infrastructure between 2016-2025. It identifies the investment needs and priorities for economic infrastructure and asses the financial resources essential to support implementation. It covers multiple sectors, including maritime transport, land transport, water and sanitation, waste management, energy, and coastal protection.
- **Second National Communication to the UNFCCC (SNC) 2015**
  The Second National Communication provides information on the progress made by Tuvalu and includes the national inventory of anthropogenic GHG emissions.
- **Recovery and Vulnerability Reduction Plan 2015**
  This Plan addresses the investment needs to recover from Tropical Cyclone Pam and outlines long-term infrastructure rehabilitation needs.
- **Te Kaniva: Tuvalu National Climate Change Policy 2012-2021**
  Te Kaniva prescribes the Government of Tuvalu's strategic policies for responding to climate change impacts and related disaster risks over the next 10 years (2012-2021). The Policy is directly linked to the National Strategic Action Plan for Climate Change and Disaster Risk Management (NSAP).
- **The National Strategic Action Plan (NSAP) 2012-2016**
  NSAP provides a prioritized program of action for the Government of Tuvalu to implement, in collaboration with the private sector and wider society, between 2012-2016.
- **Te Vaka Fenua o Tuvalu National Climate Change Policy 2021-2030**
  Te Vaka Fenua o Tuvalu has been developed to respond to the needs of Tuvalu's people. The policy advances Tuvalu's national priorities set out in the National Strategy for Sustainable Development 2021-2030 Te Kete, some of which contribute towards addressing regional and international commitments on climate change.

Mitigation

Greenhouse Gas Emissions

Tuvalu's last comprehensive national GHG inventory was prepared in 2002. Data on electricity sector GHG emissions was updated in 2014. According to Tuvalu's Second National Communication (SNC), Tuvalu's total GHG emissions in 2014 were 18.47 Gg CO_2e.

Of this total, 11.16 Gg CO_2e came from the energy sector (60% of total GHG emissions). Within the energy sector, electricity generation was the largest source of GHG emissions included in Tuvalu's SNC, contributing 5.43 Gg CO_2e (49% of the total energy sector GHG emissions).

Maritime transport produced the second-largest share of energy sector GHG emissions, contributing 3.35 Gg CO_2e (30% of emissions), while road transport contributed only 5% of Tuvalu's energy sector GHG emissions. AFOLU sector GHG emissions include 4.62 Gg CO_2e from agriculture and -0.03 Gg CO_2e from land use change and forestry.

Energy

Tuvalu will continue to accelerate renewable energy for electricity generation, which will reduce the demand for fuels to generate electricity. Besides solar PV, other options will also be explored, for example, solar PV with battery storage, wind, ocean tidal energy conversion (once these become available and affordable). Alternative transports such as solar-powered e-bikes as well as relevant decarbonization options in the domestic maritime sector will also be explored.

Large scale energy efficiency improvements will also help reduce electricity demand or fuel use. Combining implementation of renewable energy for electricity generation and improved energy efficiency will not only be cost effective but will ensure that affordable electricity is available to the people of Tuvalu.

IPPU

GHG emissions from IPPU sector represent a small share of Tuvalu's total GHG emissions and insufficient information and data prevents the establishment of an accurate mitigation approach.

AFOLU

AFOLU sector contributes nearly one-quarter of Tuvalu's GHG emissions. GHG emissions mitigation pathway and GHG emission reduction opportunities could be identified based on AFOLU sectoral and sub-sectoral GHG emission reduction potential and taking into account Tuvalu's national circumstances and relevant national strategies, including Te Kete and any subsequent work. Tuvalu has early experience in biogas projects which not only produces energy for cooking but also reduces methane emissions from livestock.

Waste

Waste sectors contribute 14% of Tuvalu's GHG emissions. On the basis of waste sector's GHG emission reduction potential and taking into account national strategies, including Tuvalu's Integrated Waste Policy and Action Plan 2017-2026, Tuvalu's Infrastructure Investment Plan 2020-2025, and subsequent work, GHG emissions mitigation pathway and GHG emissions reduction opportunities could be identified.

In addition, Tuvalu could initiate ocean-based carbon sequestrations activities especially for nearshore ecosystems such as blue carbon.

Current and Planned Mitigation Actions

1. **Renewable Energy**

To meet electricity sector objectives, electricity will be generated using renewable energy in all nine islands in Tuvalu. As of 2020, the total installed generation capacity in Funafuti is 2,550 kW, of which 1,800 kW (74%) is diesel. Off-grid generators and solar PV installations make up the additional electricity capacity. The outer islands of Tuvalu are already generating 80% to 90% of their electricity from renewable sources. Diesel is used for the remaining 10% to 20% of

generation on these outer islands[5]. This is because demand is high so solar PV panels alone cannot meet the demand, so diesel generators are being used.

Tuvalu has currently achieved approximately 20% of its 100% renewable energy target. This has been achieved through several actions.

New Zealand's Ministry of Foreign Affairs and Trade (MFAT) funded a US$1.3 million installation of rooftop solar panels on the government building and media centre on Funafuti, completed in 2015[6]. MFAT also funded a US$11 million installation of hybrid mini-grid systems on Nanumaga, Nanumea, Niutao, and Vaitupu. Construction started in February 2014 and was completed in December 2015[7]. Funding from the European Union (EU) developed three further mini-grid systems on Nukulaelae, Nukufetau, and Nui[8].

New solar PV installations are set to further increase the renewable share in Tuvalu's electricity sector. In 2014, the World Bank approved a US$7 million grant from the International Development Association (IDA), which was supported by a US$2.1 million grant from Energy Sector Management Assistance Program (ESMAP) Small Islands Development States (SIDS) DOCK Support Program, to implement solar PVs, wind power infrastructure, battery storage, and grid communication systems in Tuvalu. As of October 2020, 60% of the equipment to build the solar installation has been delivered and stored in Tuvalu. Installation is set to commence when borders reopen, with construction completion planned in September 2022[9].

Two large renewable energy projects, funded by the World Bank and the Asian Development Bank (ADB), will see the installation of an additional 2MW of solar PV, 2MWh of battery storage, and a small, 200kW wind turbine on Funafuti. These projects have been delayed due to COVID-19 and are set to resume when borders reopen[10]. MFAT is also developing a new solar PV plant (with battery storage) in Funafuti. The US$6 million project will include 770 kW of Solar PV and at least 1 MWh of battery storage. The plant will help replace diesel on the island, where about 85% of electricity is currently generated from diesel. The plant was expected to be completed by the end of 2020 but has been delayed due to COVID-19 travel restrictions. Construction is set to resume when borders reopen[11].

The Facilitation of the Achievement of Sustainable National Energy Targets of Tuvalu (FASNETT), funded by the Global Environment Facility (GEF), seeks to facilitate the development and use of feasible renewable energy resources and the application of energy efficiency technologies for achieving Tuvalu's 100% renewable energy targets. The project was approved for implementation in 2017 but has a revised completion date of the end of 2022[12].

5 ADB (2019), Tuvalu: Funafuti Road Map. https://www.adb.org/sites/default/files/linked-documents/49450-015-sd-04.pdf

6 Allen and Clark (2017)., Evaluation of New Zealand's Development Cooperation in Tuvalu. https://www.mfat.govt.nz/assets/Aid-Prog-docs/Evaluations/2017/Aid-Tuvalu-evaluation-report-l70717.pdf

7 Allen and Clark (2017)., Evaluation of New Zealand's Development Cooperation in Tuvalu. https://www.mfat.govt.nz/assets/Aid-Prog-docs/Evaluations/2017/Aid-Tuvalu-evaluation-report-l70717.pdf

8 New Zealand (2014), New Zealand and EU Support RE in Tuvalu. https://www.beehive.govt.nz/release/nz-and-eu-support-renewable-energy-tuvalu

9 World Bank (2020), Supporting Tuvalu's Move Toward 100% RE. https://documents1.worldbank.org/curated/en/778441609911205874/pdf/Supporting-Tuvalu-Move-Toward-100-Percent-Renewable-Energy.pdf

10 ADB (2019), Tuvalu: Increasing Access to RE. https://www.adb.org/sites/default/files/project-documents/49450/49450-015-iee-en.pdf

11 Infratech (n.d.), First Solar-Battery Project completed for Tuvalu. https://www.infratec.co.nz/projects/first-solar-battery-project-completed-for-tuvalu

12 GEF (2015), FASNETT. https://www.thegef.org/project/facilitation-achievement-sustainable-national-energy-targets-tuvalu-fasnett

Following the completion of these projects, Funafuti is expected to achieve a renewable energy contribution of approximately 90%. This will mean that nationwide, Tuvalu will generate approximately 90% of its electricity through renewable sources. These projects will reduce GHG emissions from the electricity generation (power) sector by approximately 87% and will contribute to reducing overall GHG emissions from the energy sector.

The solar power for all islands is connected to the main grid (no standalone systems). For the outer islands, there is no plans to increase the size of mini grids at the moment, but there is maintenance needed for solar panels as well as battery systems that have become obsolete.

2. Energy Efficiency

Tuvalu does not provide specific targets or actions for commercial, institutional, and residential energy use. Despite this, Tuvalu has implemented some energy efficiency projects to support energy sector targets. The Development Bank of Tuvalu started a subsidy scheme for energy-efficient appliances and housing retrofits in 2016. In November 2020, the bank was given financial assistance of US$38,600 to buffer the bank's existing energy efficiency program. The programme will now be enhanced and implemented as part of the FASNETT project[13]. The Department of Energy has also been running a quarterly education programme, broadcast on public radio, covering household energy efficiency. The project is set to be completed by the end of 2022. Tuvalu also passed the Energy Efficiency Act in 2016. The Act promotes energy efficiency and legislates control of the import, use, and sale of inefficient electrical appliances.

3. Transport

Tuvalu's Ministry of Transport, Energy and Tourism (MTET) is implementing an outer islands maritime infrastructure project which involves building and rehabilitating boat harbours on the island of Nukulaelae, Niutao, and Nui, building better maritime facilities to expedite cargo handling and improve the safety and security of vessel and passenger traffic, building capacity to maintain maritime infrastructure, and developing a master plan for future harbour developments[14]. The project is expected to cost US$13.3 million. An ADB grant will fund US$11.3 million of the project, a GEF grant will fund US$500,000, and the remaining US$1.5 million will be provided by the Government of Tuvalu[15]. Construction of the boat harbour in Nukulaelae is 90% complete, and the civil works contract for the Niutao project was awarded in November 2020, with the contract for Nui scheduled to be awarded in late 2022.

Tuvalu has a pilot e-bike program with 12 e-bikes are currently being procured in the country. The total project cost is USD35,000 including spare parts and training.

4. Waste

Tuvalu's Integrated Waste Policy and Action Plan 2017-2026 outlines strategic goals and actions to support waste management in Tuvalu. These include introducing waste reduction and resource recovery programmes, improving waste collection services on the outer islands, and creating, amending, and updating laws, regulations, and policies to support waste reduction[16].

13 GEF and UNDP (n.d.), FASNETT. https://info.undp.org/docs/pdc/Documents/TUV/PIMS%205613%20TUV%20FASNETT%20Project%20Document%20Final.pdf;

14 ADB (2020), Proposed Grant for Second Additional Financing Tuvalu: Outer Island Maritime Infrastructure Project. https://www.adb.org/sites/default/files/project-documents/48484/48484-005-rrp-en.pdf;

15 https://www.rnz.co.nz/international/pacific-news/318864/improved-maritime-facilities-for-tuvalu-outer-islands

16 Tuvalu Integrated Waste Policy and Action Plan 2016 https://tuvalu-data.sprep.org/system/files/Tuvalu%20Integrated%20Waste%20Policy%20%26%20Action%20Plan.pdf

The Plan also includes an activity to undertake a baseline survey of existing waste conditions and services and regular collection of data.

Work undertaken by Tuvalu's Department of Waste Management (DWM), SPREP, and the J-PRISM project has improved solid waste collection and the capture of sector data, such as the amount of solid waste sent to the landfill daily[17].

5. AFOLU

As of 2019, there were 40 biogas digesters in Niulakita, Nukulaelae, Nukufetau, Vaitupu, Nui, Niutao and Funafuti under the EU initiative of Adaptation to Climate Change and Sustainable Energy Community-based Schemes – Tuvalu[18]. In addition, there is a donation from the Israeli Government consisting of 20 biogas systems currently being tested by the Department of Agriculture.

Adaptation

Tuvalu's adaptation actions are articulated in national documents, such as the National Adaptation Programme of Action (NAPA) 2007, National Communications, National Strategic Action Plan for Climate Change and Disaster Risk Management 2012-2016, and the National Climate Change Policy 2021-2030.

Tuvalu's NAPA outlines urgent and immediate adaptation needs and specific adaptation projects:

- **Coastal:** increase resilience of coastal areas and settlements to climate change.
- **Agriculture:** increasing subsistence pit grown pulaka productivity through introduction of a salt tolerant pulaka species.
- **Water:** adaptation to frequent water shortages through increasing household water capacity, water collection accessories, and water conservation techniques.
- **Health:** protecting community health through control of vector borne/climate sensitive diseases and promotion of community access to quality potable water.
- **Fisheries:** strengthening of community-based conservation programmes on highly vulnerable near-shore marine ecosystems.
- **Disaster:** strengthening community disaster preparedness and response potential.
- **Fisheries:** adaptation to near-shore coastal shellfish fisheries resources and coral reef ecosystem productivity.

The Green Climate Fund (GCF) is providing Tuvalu with US$36 million of funding, along with US$2.9 million co-financing from the Government of Tuvalu, for a seven-year Coastal Adaptation Project. The project is building coastal resilience and management in three of Tuvalu's islands and aims to catalyse other sources of adaptation finance. The most recent GCF grant (US$7.5 million) was disbursed in 2022[19]. This project builds on existing infrastructure to protect coastal areas, including sea walls.

[17] PRIF (2019), Tuvalu: Waste Audit Report. https://tuvalu-data.sprep.org/system/files/Tuvalu%20Waste%20Audit%20Report_2019_Final%20v1.1.pdf; SPREP (2019), Tuvalu Waste Audit. https://tuvalu-data.sprep.org/data-dashboard/tuvalu-waste-audit-october-2019

[18] https://www.spc.int/updates/news/2019/05/forty-biogas-digesters-installed-in-the-islands-of-tuvalu-bring-community

[19] GCF (2022), Tuvalu Coastal Adaptation Project (TCAP). Available at: https://www.greenclimate.fund/project/fp015; Tuvalu Coastal Adaptation Project (n.d.). Available at: https://tcap.tv/

Tuvalu is currently developing a National Adaptation Plan (NAP) under GCF Readiness to advance medium and long-term adaptation planning.

Means of Implementation

Climate change is a cross-cutting development issue as it affects every aspect of the Tuvaluan way of life and livelihoods. Climate change impacts exacerbate existing cultural and socio-economic vulnerabilities. These impacts threaten the security of the nation. To this end, the people of Tuvalu are collectively building and strengthening the nation's resilience to combat climate change. However, this cannot be done alone and in isolation; regional and global cooperation is imperative to put Tuvalu on a pathway to climate change resilience and sustainable development.

Tuvalu is of the view that the scientific underpinnings of the discussions on climate change are clear in defining impact thresholds. Therefore, continuous, and long-term international cooperation is required.

Considering Tuvalu's national circumstances, the significant costs of imported fossil fuels are a major factor in Tuvalu's balance of payments. Whilst Tuvalu continues to take actions to reduce its fossil fuel import expenses, thereby reducing its GHG emissions, there is a need for support to assist its ambition to transform the energy sector to zero emissions through use of renewable energy for electricity generation and the transport sector decarbonization strategy.

Tuvalu's Updated NDC includes unconditional, conditional, and aspirational contributions to reduce emissions. The unconditional contribution includes actions that Tuvalu has already undertaken through renewable energy programs to significantly reduce its reliance on imported fossil fuels for electricity generation. It will continue to push for energy conservation, through other measures such as conservation, education and energy efficiency and other measures, recognizing its extreme vulnerability to the impacts of fossil fuel prices.

International support is crucial to enable Tuvalu to implement further actions outlined in its policies and plans, including at sector level. For example, the growing emissions in the transport sector needs to be addressed through technological innovations and transport sector decarbonization strategy. The goal to pursue a zero-carbon development pathway by 2050 is dependent on availability of finance and technology.

Appendix: Information to facilitate clarity, transparency, and understanding of Tuvalu's Updated NDC

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)	2010
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	Tuvalu's last comprehensive national GHG inventory was prepared in 2002. Data on electricity sector GHG emissions was updated in 2014. According to Tuvalu's Second National Communication (SNC), Tuvalu's total GHG emissions in 2014 were 18.47 Gg CO_2e. **Energy:** 11.16 $GgCO_2e$ (60.40 % of total GHG emissions) **AFOLU:** 4.58 $GgCO_2e$ (24.80% of total GHG emissions) **Waste:** 2.64 $GgCO_2e$ (14.30 % of total GHG emissions) **Electricity:** 5.43 $GgCO_2e$ (49% of total energy sector GHG emissions) **Marine transport:** 3.35 $GgCO_2e$ (30% of total energy sector GHG emissions) **Road transport:** 0.57 $GgCO_2e$ (5% to total energy sector GHG emissions)
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	▪ National Strategy for Sustainable Development 2021-2030 (Te Kete) ▪ Infrastructure Strategy and Investment Plan 2016–2025 ▪ Second National Communication to the UNFCCC (SNC) 2015 ▪ Recovery and Vulnerability Reduction Plan 2015 ▪ Tuvalu National Climate Change Policy 2021-2030 ▪ The National Strategic Action Plan (NSAP) 2012-2016
d) Target relative to the reference indicator, expressed numerically, for example in percentage or amount of reduction	▪ Tuvalu commits to reduction of emissions of GHGs from the electricity generation (power) sector, by 100%, i.e., almost zero emissions by 2030. ▪ Increase energy efficiency on Funafuti by 30%. ▪ Tuvalu's indicative quantified economy-wide target for a reduction in total GHGs emissions from the entire energy sector 60% below 2010 levels by 2030. ▪ Zero carbon development pathway by 2050.
e) Information on sources of data used in quantifying the reference point(s)	▪ Second National Communication to the UNFCCC (SNC) 2015
f) Information on the circumstances under which the Party may update the values of the reference indicators	▪ The reference indicators for national and sectoral emissions may be updated to reflect the most recent information once the next GHG inventory is published.
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 Paris Agreement (CMA)	Start: 2022 End: 2030
b) Whether it is a single-year or multi-year target, as applicable	Multi-year
3. Scope and coverage	
a) General description of the target	▪ Electricity – zero emissions by 2030 ▪ Zero-carbon development pathway by 2050
b) Sectors, gases, categories, and pools covered by the nationally determined contribution, including, as applicable, consistent with Intergovernmental Panel on Climate Change (IPCC) guidelines;	**Sectors:** Electricity, land transport, maritime transport, AFOLU **Gases:** ▪ Targets will apply to all gases: Carbon dioxide (CO_2), Methane (CH_4), Nitrous oxide (N_2O), Carbon monoxide (CO), Sulphur dioxide (SO_2), Non-Volatile organic compound (NMVOC), Nitrogen Oxide (NOx) ▪ All targets will be expressed in CO_2 equivalent (CO_2e)
c) How the country has taken into consideration paragraph 31(c) and (d) of decision 1/CP.21: **(c) Parties strive to include all categories of anthropogenic emissions or removals in their nationally determined contributions and, once a source, sink or activity is included, continue to include it** **(d) Parties shall provide an explanation of why any categories of anthropogenic emissions or removals are excluded**	Tuvalu aimed to include all categories of anthropogenic emissions or removals into its Updated NDC. A target of GHG emissions reduction for the IPPU sector was not developed due to negligible impact on Tuvalu's Updated NDC.
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	Not applicable.
4. Planning processes	
a) Information on the planning processes that the country undertook to prepare its NDC and, if available, on the country's implementation plans, including, as appropriate:	
i) Domestic institutional arrangements, public participation and engagement with local communities	Tuvalu has developed an NDC Implementation Roadmap and NDC Investment Plan including Project Pipeline. This includes six projects:

and indigenous peoples, in a gender-responsive manner	▪ E-bike initiative ▪ Electrification of Tuvalu's light vehicle fleet ▪ Outboard motor transition from 2-stroke petrol outboards to 4-stroke ▪ Shore side electrical supply for at berth vessels ▪ Retrofitting of major hotels and commercial and governmental buildings ▪ Cold storage energy efficiency
ii) Contextual matters, including, inter alia, as appropriate:	
a. National circumstances, such as geography, climate, economy, sustainable development, and poverty eradication	Considering Tuvalu's geo-physical setting with socio-economic contexts, Tuvalu faces development challenges with its small population size, remoteness, and vulnerability to external shocks such as COVID-19 pandemic and accelerating economic hardship by natural disasters such as Category 3 tropical cyclone which hit Tuvalu in January 2020.
b. Best practices and experience related to the preparation of the nationally determined contributions	Coordination and consultation of all relevant stakeholders and alignment with existing policies and strategies.
c. Other contextual aspirations and priorities acknowledged when joining the Paris Agreement	Not applicable.
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.
c) How the country's preparation of its NDC has been informed by the outcomes of the global stock-take, in accordance with Article 4, paragraph 9, of the Paris Agreement	The outcome of global stock take in 2023 will inform Tuvalu in updating and enhancing future NDC.
d) Each Party with a nationally determined contribution under Article 4 of the Paris Agreement that consists of adaptation action and/or economic diversification plans resulting in mitigation co-benefits consistent with Article 4, paragraph 7, of the Paris Agreement to submit information on: **i) How the economic and social consequences of response measures have been considered in developing the nationally determined contribution.** **ii) Specific projects, measures, and activities to be implemented to contribute to mitigation co-benefits**	Not applicable.

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 GHG emissions and removals corresponding to the country's NDC, consistent with decision 1/ CP.21, paragraph 31, and accounting guidance adopted by the CMA: ▪ **31a. Parties account for anthropogenic emissions and removals in accordance with methodologies and common metrics assessed by the Intergovernmental Panel on Climate Change and adopted by the Conference of the Parties serving as the meeting of the Parties to the Paris Agreement.** ▪ **31b. Parties ensure methodological consistency, including on baselines, between the communication and implementation of nationally determined contributions"**	The anthropogenic emissions and removals in Tuvalu's GHG inventory were prepared and communicated in Second National Communication in 2015 in accordance with the methodologies and common metrics described in the 2006 IPCC Guidelines for National Greenhouse Gas Inventories (2006 IPCC Guidelines) and 2019 Refinement to the 2006 IPCC Guidelines for National GHG Inventories.
b) Assumptions and methodological approaches used for accounting for the implementation of policies and measures or strategies in the nationally determined contribution	The anthropogenic emissions and removals in Tuvalu's GHG inventory were prepared and communicated in Second National Communication in 2015 in accordance with the methodologies and common metrics described in the 2006 IPCC Guidelines for National Greenhouse Gas Inventories (2006 IPCC Guidelines) and 2019 Refinement to the 2006 IPCC Guidelines for National GHG Inventories.
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	The anthropogenic emissions and removals in Tuvalu's GHG inventory were prepared and communicated in Second National Communication in 2015 in accordance with the methodologies and common metrics described in the 2006 IPCC Guidelines for National Greenhouse Gas Inventories (2006 IPCC Guidelines) and 2019 Refinement to the 2006 IPCC Guidelines for National GHG Inventories.
d) IPCC methodologies and metrics used for estimating anthropogenic greenhouse gas emissions and removals	The anthropogenic emissions and removals in Tuvalu's GHG inventory were prepared and communicated in Second National Communication in 2015 in accordance with the methodologies and common metrics described in the 2006 IPCC Guidelines for National Greenhouse Gas Inventories (2006 IPCC Guidelines) and 2019 Refinement to the 2006 IPCC Guidelines for National GHG Inventories.
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 **ii) Approach used to account for emissions and removals from harvested wood products** **iii) Approach used to address the effects of age-class structure in forests** **iv) Treatment of land sector**	The anthropogenic removals in Tuvalu's GHG inventory were prepared and communicated in Second National Communication in 2015 in accordance with the methodologies and common metrics described in the 2006 IPCC Guidelines for National Greenhouse Gas Inventories (2006 IPCC Guidelines) and 2019 Refinement to the 2006 IPCC Guidelines for National GHG Inventories.
f) Other assumptions and methodological approaches used for understanding the NDC 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 anthropogenic emissions and removals in Tuvalu's GHG inventory were prepared and communicated in Second National Communication in 2015 in accordance with the methodologies and common metrics described in the 2006 IPCC Guidelines for National Greenhouse Gas Inventories (2006 IPCC Guidelines) and 2019 Refinement to the 2006 IPCC Guidelines for National GHG Inventories.
ii) Whether the baseline scenario is static (will be fixed over the period) or dynamic	The baseline scenario target is static.
iii) 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.
iv) For climate forcers included in nationally determined contributions not covered by IPCC guidelines, information on how the climate forcers are estimated;	Not applicable.
v) Further technical information, as necessary	Not applicable.
g) The intention to use voluntary cooperation under Article 6 of the Paris Agreement, if applicable	None.
6. How the Party considers that its nationally determined contribution is fair and ambitious in the light of its national circumstances	
a) How the Party considers that its nationally determined contribution is fair and ambitious in the light of its national circumstances;	Considering Tuvalu's geo-physical setting with socio-economic contexts, Tuvalu faces development challenges with its small population size, remoteness, and vulnerability to external shocks such as COVID-19 pandemic and accelerating economic hardship by natural disasters such as Category 3 tropical cyclone which hit Tuvalu in January 2020. Tuvalu recognizes the potential reduction of GHG emissions to support global efforts to address climate change issues and to support improving quality of life. On the basis of Tuvalu's national circumstances, Tuvalu considers its Updated NDC is fair and ambitious.
b) Fairness considerations, including reflecting on equity	

c) How the Party has addressed Article 4, paragraph 3, of the Paris Agreement	Tuvalu has set a clear pathway to decarbonize electricity sector by 100% renewable energy sources for electricity generation and setting GHG emissions reduction pathway in transport sector.
d) How the Party has addressed Article 4, paragraph 4, of the Paris Agreement;	Tuvalu's GHG emissions reduction targets as set out in Updated NDC covers both sector-specific and economy wide.
e) How the Party has addressed Article 4, paragraph 6, of the Paris Agreement	Tuvalu has ambition to zero carbon development pathway by 2050.
How the nationally determined contribution contributes towards achieving the objective of the Convention as set out in its Article 2	
a) How the nationally determined contribution contributes towards achieving the objective of the Convention as set out in its Article 2 ▪ **Anticipated national emissions in the target year or period if the contribution is achieved, the quantified GHG impact of the contribution,**	As part of its Updated NDC, Tuvalu has identified a clear and transparent target to reduce overall GHG emissions.
b) How the NDC contributes toward Article 2, paragraph 1(a), and Article 4, paragraph 1, of the Paris Agreement	As part of its Updated NDC, Tuvalu has identified a clear and transparent target to reduce overall GHG emissions.

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