PAPUA NEW GUINEA REVISED ENHANCED NDC 2020

Climate Change & Development Authority

ENERGY MITIGATION PLAN 2022-2025

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FOREWORD

Mr. William Lakain

Papua New Guinea (PNG) signed the United Nations Framework Convention on Climate Change (UNFCCC) in 1992 and ratified the convention in 1994. Since then, PNG has been committed to meeting its obligation under the convention. In 2015, PNG was among the 196 Parties that adopted the Paris Agreement in the 21st Conference of Parties. PNG ratified the Paris Agreement in 2016 and further passed the United Nations Paris Agreement (Implementation) Act in Parliament. This shows that PNG will be committed to meeting its obligation under the Paris Agreement.

Such commitment can be seen with the preparation and submission of the country's Nationally Determined Contribution as per Article 4 of the Paris Agreement in 2016. This was followed by the preparation and submission the Enhanced NDC in 2020.

The Enhanced NDC captures PNG's mitigation contribution from the two main emitting sectors which are the Energy and Agriculture, Forestry and Other Land Use (AFOLU) sectors. PNG has also developed an Enhanced NDC Implementation Plan (2021-2030) which outlines detailed activities that will be implemented to achieve the Energy and AFOLU targets. Furthermore, the country has developed two NDC Implementation roadmaps for the electricity and AFOLU sector.

The Climate Change and Development Authority (CCDA) is the mandated government entity in PNG that is responsible for coordinating the implementation of the Paris Agreement in PNG. Therefore, CCDA will be responsible for making sure that projects and activities identified in the Enhanced NDC implementation Plan (2021-2030) and the two roadmaps are successfully implemented by the key implementing agencies in order to achieve the Enhanced NDC targets.

However, as a small island developing state PNG will require support from the international community. Thus, CCDA has developed the Energy Mitigation Plan with technical and funding assistance from the GIZ through the NDC Partnership Climate Action and the Pacific Regional NDC Hub. The Energy Mitigation Plan outlines the means of implementation which includes funding, capacity building needs, technology and research and development in order to implement the activities and projects identified in the Enhanced NDC Implementation Plan and NDC Implementation Roadmap for the electricity sector.

The Energy Mitigation Plan will be used to guide to source the support that will be needed by PNG to achieving it Enhanced NDC targets in the energy sector.

William Lakain
Acting Managing Director, Climate Change and Development Authority

ACKNOWLEDGEMENTS

This supplementary Energy Mitigation Plan 2022-2025 was supported through the NDC Partnership Climate Action Enhancement Package (CAEP) with technical assistance from GIZ and the Pacific Regional NDC Hub.

The Plan was prepared by JAC Consultancy Services under the guidance of the Climate Change Development Authority and the Energy Sub-Technical Working Committee of the Government of Papua New Guinea

CCDA would also like to express our appreciation to the Food and Agriculture Organization of the United Nations for the financial assistance provided through the Global Environmental Facility – Capacity Building Initiative for Transparency (GEF-CBIT) Project and the Green Climate Fund Readiness Project.

The CCDA on behalf of Government of PNG, GIZ and the Pacific Regional NDC Hub would like to acknowledge the valuable inputs of stakeholders engaged through the process and engagement from members of the Energy Sub-Technical Working Committee, relevant development partners and key stakeholders. Following are the key stakeholders that contributed towards the development of this plan:

- National Energy Authority (NEA);
- PNG Power Limited (PPL);
- Department of Transport (DoT).

And finally, officers under the MRV and National Communications division for delivering this project.

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ACRONYMS

AFOLU	Agriculture Forestry and Other Land Use
APEC	Asia-Pacific Economic Cooperation
BUR	Biennial Update report
CCDA	Climate Change Development Authority
CO_2 eq	Carbo dioxide equivalent
DNPM	Department of National Planning and Monitoring
DoWH	Department of Works and Highways
DSP	Development Strategic Plan
ESTWC	Energy Sub-Technical Working Committee
GDP	Gross Domestic Product
GEF	Global Environment Facility
Gg	Giga gram
GHG	Greenhouse Gas
ICAO	International Civil Aviation Organization
IPP	Independent Power Producers
K	Kina, monetary unit of Papua New Guinea
ktoe	Kilo-tonne of oil equivalent
LNG	Liquefied Natural Gas
MRV	Monitoring, Reporting and Verification
MTDP	Medium Term Development Plan
MW	Megawatt
NDC	National Disaster Centre
NEA	National Energy Authority
NSO	National Statistical Office
PNG	Papua New Guinea
PNGFA	Papua New Guinea Forest Authority
PPL	PNG Power Limited
STaRS	National Strategy for Responsible Sustainable Development
STWC	Sub-Technical Working Committee
UNFCCC	United Nations Framework Convention on Climate Change

EXECUTIVE SUMMARY

Papua New Guinea (PNG) possesses abundant amount of indigenous energy resources and reserves including oil, gas, coal, hydro, biomass and other renewables. The country produces and exports most of the oil and gas. According to the APEC Energy Balance Table the total energy consumed in 2019 is 3,336 ktoe from which 42% was residential, 25% was industry, 18% was transport, 10% was commercial buildings and 3% agriculture. The total installed capacity is estimated to be 580 MW and consist of 230MW hydro, 217 diesel, 82MW gas-fired and 53MW geothermal.

According to PNG's First Biennial Update Report (BUR1), Greenhouse gas (GHG) emissions from the energy sector amounted to 11,806.26 Giga grams of carbon dioxide equivalent (Gg CO_2 eq) an increase of 5,532.37 Gg CO_2eq (88.2 %) when compared to 2000. The Energy Industries sub sector contributed 35 % to the total sector emissions in 2015, followed by fugitive emissions sub sector from natural gas (27 %), and transport sub sector (17 %).

The PNG government has taken the approach in revisiting all policies and plans against assumptions of sustainable growth and to manage the resources being exploited to sustain the economy hence, all polices have been developed for sustainable socio-economic growth of PNG and for the development of the energy sector in particular, for both short term and long-term development. This includes the Vision 2050, Development Strategic Plan 2010-2030, National Strategy for Responsible Sustainable Development for Papua New Guinea, Medium Term Development Plan III (2018-2022), National Energy Policy and National Electricity Roll Out Plan (NEROP).

PNG's Enhanced Nationally Determined Contribution (NDC) 2020 outlines PNG's commitment to a headline target of carbon neutrality within the energy industries sub sector. This would be achieved through:

i. Enhanced levels of renewables in the energy mix from 30% in 2015 to 78% by 2030 for on-grid connection (non-GHG quantitative target);

ii. Reducing electricity demand through energy efficiency;

iii. Fossil fuel off-setting from energy industries sub-sector through nature-based solutions;

iv. Enhanced data collection

Other potential mitigation measures under the energy sector are from the transport sub sector which involves the reduction of fuel consumption.

The Enhanced NDC Implementation Plan (2021-2030) seeks to drive and coordinate support from the international development community, investments from both the public and private sectors, and other actions from other relevant key stakeholders, both domestic and foreign, to help PNG achieve its Enhanced NDC targets. The implementation plan outlines 36 projects and 6 activities to be implemented to achieve the energy sector targets by 2030.

The Energy Mitigation Plan builds on the 36 projects and 6 activities outlined in the Enhanced NDC Implementation plan and the goal is to promote the implementation of these projects and activities from 2022 to 2025. The objective is to identify the means of implementation for these projects and activities. The means of implementation includes funding, capacity building, technology and research and development.

PART

1

INTRODUCTION

SECTION 1.1

OVERVIEW OF THE ENERGY SECTOR IN PAPUA NEW GUINEA

Papua New Guinea possesses a significant amount of indigenous energy resources and reserves including oil, gas, coal, hydro, biomass, and other renewables. Once harnessed this may be able to accelerate PNG's development and progress. According to the APEC energy balance table for PNG, the total indigenous production in 2019 was 13,847 kilotons of oil equivalent (ktoe). 83% of the indigenous production was natural gas, 2% (crude oil), 12% (biomass), 3% (geothermal) and 1% (hydro).

Most of the crude oil and natural gas produced is exported thus the country has to import to meet its energy demand. According to the APEC energy balance table for PNG, the total energy exports in 2019 were 11,795 ktoe which includes Natural gas (94%), Petroleum products (4%), and crude oil (2%). While the total energy imports in 2019 were 2,723 ktoe of which 48% was crude oil and 52% were petroleum products including motor gasoline, diesel oil, fuel oil, jet kerosene, and Liquid Petroleum Gas. A total of 1,320 ktoe of crude oil was refined producing 1,117 ktoe of petroleum products in the same year.

The total energy consumed in 2019 is 3,336 ktoe as per the APEC energy balance table and the highest consumption was from residential (42%) followed by industry (27%) then transport (18%) and commercial building (10%). The least consuming sub-sector was agriculture (3%).

PNG has a mix of electricity generation sources, with hydropower dominating the energy mix. Overall, there is approximately 580 megawatts (MW) of installed generation capacity. PNG Power Limited manages about 300MW with the balance generated by Independent Power Producers for use as captive generation sites (e.g. mining and extractive sites). The mix includes hydro (230MW or 39.7%), diesel (217MW or 37.4%), gas-fired (82MW or 14.1%), and geothermal (53MW or 9.1%).

SECTION 1.2

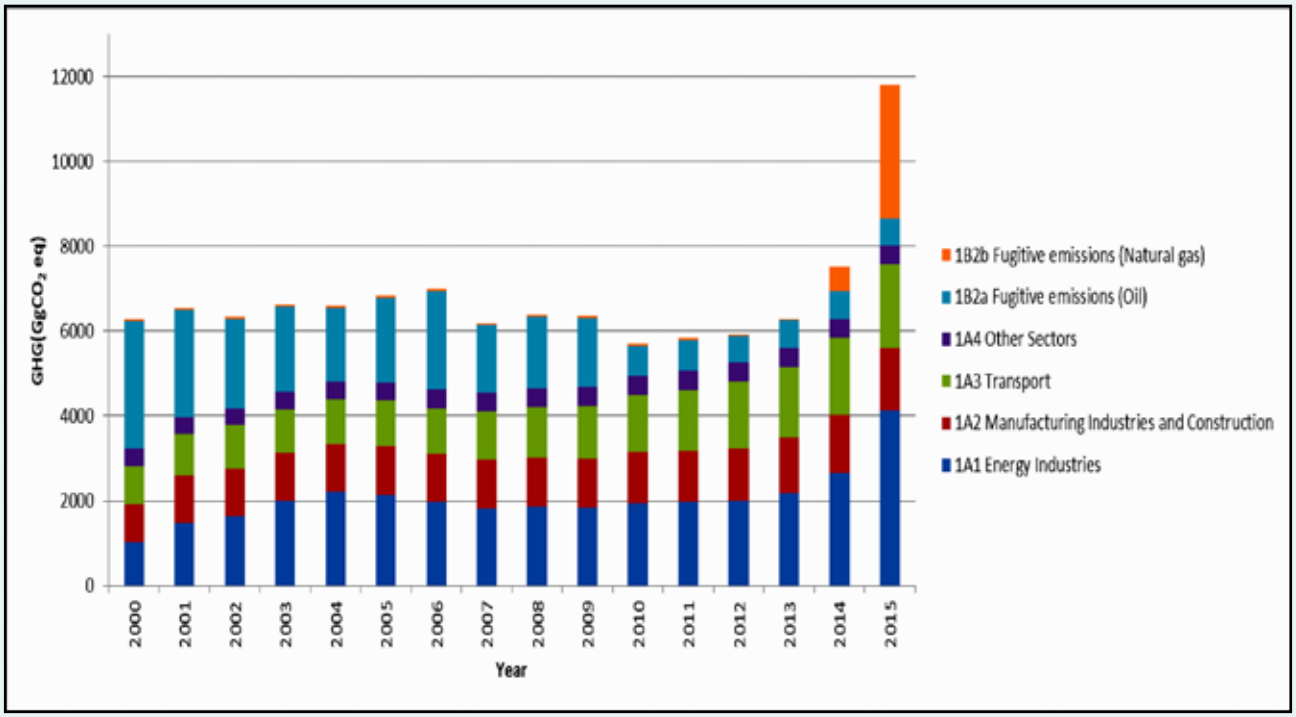
GHG EMISSIONS PROFILE FOR THE ENERGY SECTOR

According to PNG's First Biennial Update Report (BUR1) , Greenhouse gas (GHG) emissions from the energy sector amounted to 11,806.26 Gg CO_2 eq an increase of 5,532.37 Gg CO_2eq (88.2 %) when compared to 2000. The Energy Industries sub-sector contributed 35 % to the total sector emissions in 2015, followed by fugitive emissions sub-sector from natural gas (27 %), and transport sub-sector (17 %). 68 % of total sector emissions are CO_2, while CH_4 contributed 31 % and N_2O with 0.4 %. The figure below outlines the time-series of total GHG emissions from the energy sector

Energy industries has been the main emitting sub-sector from 2000 to 2015 and this was mainly from electricity generation.

The emissions increased slightly from 2000 to 2004 due to the increase in demand for electricity then remained constant from 2005 to 2013 and increased rapidly from 2014 to 2015 due to the increasing demand for electricity especially for the operation of the LNG project. Emissions from transport sub-sector increased rapidly from 2007 to 2015 as the demand for land, marine and air transport increased. In the fugitive emissions sub-sector, fugitive emissions from oil production decreased between 2000 and 2015 as the production of oil decreased while fugitive emissions from the gas sector increased due to the increase in production of natural gas (LNG project) especially in 2015. As for the other sub-sectors and the manufacturing industries and construction sub-sector, the emissions remained quite constant between 2000 and 2015.

Figure 1: Time-series of total GHG emissions from the energy sector by category (source: PNG's First Biennial Update Report)



SECTION 1.3 POLICY FRAMEWORK IN THE ENERGY SECTOR

SUB - SECTION 1.3.1

Vision 2050

PNG's Vision 2050 is the country's unified strategic vision for socio-economic growth that aims to build a "Smart, Wise, Fair, Healthy and Happy Society." The Vision 2050 captures the relevant elements which were shaped by the PNG National Constitution and gave birth to the seven pillars which are:

- *Human Capital Development, Gender, Youth and People Empowerment;*
- *Wealth Creation;*
- *Institutional Development and Service Delivery;*
- *Security and International Relations;*
- *Environment sustainability and climate change;*
- *Spiritual, Cultural, and Community Development; and*
- *Strategic Planning, Integration, and Control*

Development targets for the energy sector in the Vision 2050 include:

i. *Increase the availability of rural electrification from 15% to 100% of the population;*

ii. *Provide 100% power generation from renewable energy sources; and*

iii. *Establish a Sustainable Development Policy for the energy sector by 2050*

SUB - SECTION 1.3.2

PNG Development Strategic Plan (2010-2030)

The PNG Strategic Development Plan (2010-2030) is a strategic planning document that articulates long-term national goals and formulates strategies that provide guidelines for action plans and resource programs. It is a 20-year long-term development blueprint created to achieve Vision 2050. Strategies under the extractive sectors and energy sectors are designed to be pursued with clear consideration for environmental sustainability and addressing the issues of climate change in ways that best suit PNG's development needs.

SUB - SECTION 1.3.3

National Strategy for Responsible Sustainable Development for Papua New Guinea

The National Strategy for Responsible Sustainable Development (StaRs) builds on the gains made by the Vision 2050 and PNG DSP (2010-2050) and prescribes a new development road map that incorporates these elements that make for a growth strategy that is truly strategic, futuristic, and appropriate for the future. StaRs introduce three essential enabling dimensions for transitioning from brown-driven growth to inclusive green growth. The dimensions are a national green growth plan to create enabling conditions; green growth mainstreaming mechanisms to enable opportunities to be explored through existing economic activities, and green growth policy instruments to tap specific opportunities within spatial and resource systems.

SUB - SECTION 1.3.4

Medium Term Development Plan III (2018-2022)

The MTDP III sets out the Government's development priorities from 2018 to 2022. It provides the direction for everyone with a stake in the development, including departments and agencies at all levels of government, the private sector, development partners, and other stakeholders. The MTDP III defines the policy directions and priority areas for investment within different sectors. This ensures the flow and direction of resources to where they are required to change people's lives. The MTDP III outlines strategic intervention, implementation strategies, and key players to contribute to the PNG's development outcomes through collective participation by all Papua New Guineans.

SUB - SECTION 1.3.5

National Energy Policy (2017-2027)

The general objective of the energy policy is to ensure an affordable, competitive, sustainable, and reliable supply of energy to meet national and provincial development needs at the least cost while protecting and conserving the environment. The policy sets out the measures required to achieve these objectives, such as promoting the introduction of renewable energies.PNG has underutilized indigenous energy sources such as hydro, biomass, natural gas, geothermal, solar, and wind. The development of these resources would accelerate PNG's potential to increase its electrification rate, energy production, and exports (where possible) and sustain economic growth. This policy provides challenges and strategies for all renewables, and organizes approaches to promote their introduction.

SUB - SECTION 1.3.6

National Electricity Roll Out Plan

The National Electricity Roll Out Plan (NEROP) was developed to assist the country meet its target of 70% of the population having access to electricity by 2030. NEROP provides a comprehensive scan of least-cost power development options, employing geographic information systems (GIS) mapping, focusing on on-grid extension and densification, and referencing the role of mini-grids and solar home systems for most difficult-to-access communities. Designing of electricity infrastructure projects are underway to accelerate NEROP implementation.

SUB - SECTION 1.3.7

PNG's Sustainable Development Goal 13 Roadmap

PNG's Sustainable Development Goal 13 Roadmap consists of a set of 30 actions that need to be achieved by 2030. The timeline outlines four phases of milestones that will act as the foundation for PNG to achieve the 30 actions of the Roadmap by 2030 and therefore the key targets of Sustainable Development Goal 13. Critically, the 30 actions of the Roadmap are intended to not only address the challenges of climate change, but also help set PNG on a pathway to a truly climate-smart, healthy, and prosperous nation, and to achieve the objectives set out in the country's MTDP III. The 10 sectoral themes relate to climate governance, energy, forestry, agriculture, infrastructure, fisheries, tourism, biodiversity, minerals, and health. There are 4 actions for the energy sector and including:

(i) Carbon-neutral gas and mineral sector;
(ii) Renewables-based rural electrification;
(iii) Resilient, reliable and efficient electricity grids; and
(iv) Energy efficient government and private sector

SECTION 1.4

PNG'S ENHANCED NDC 2020

PNG's Enhanced Nationally Determined Contribution (NDC) 2020 builds on the first NDC submitted to the United Nations Framework Convention on Climate Change (UNFCCC) in 2016. The Enhanced NDC 2020 sets out targets through the implementation period 2021-2030 for the energy and AFOLU sector as well as priority areas under adaptation. The Enhanced NDC 2020 does not outline specific GHG reduction targets for the energy sector due to partially accurate GHG emissions in the BUR1, thus the targets established were non-GHG.

The Enhanced NDC 2020 outlines PNG's commitment to a headline target of carbon neutrality within the energy industries sub sector. This would be achieved through:

(v) Enhance levels of renewables in the energy mix from 30% in 2015 to 78% by 2030 for on-grid connection (non-GHG quantitative target);

(vi) Reducing electricity demand through energy efficiency;

(vii) Fossil fuel off-setting from energy industries sub-sector through nature-based solutions;

(viii) Enhanced data collection

Other potential mitigation measures under the energy sector are from the transport sub sector which involves the reduction of fuel consumption. These measures include:

- *Reduce vehicle-miles through more compact development patterns;*
- *Encourage the introduction of fuel-efficient trans port equipment;*
- *Encourage sustainable substitution of fossil fuels with biofuels;*
- *Monitor vehicle fleet-weighted fuel and CO_2 efficiency;*
- *Encourage the introduction of hybrid and electric vehicles*

SUB - SECTION 1.4.1

Enhanced NDC Implementation Plan (2021-2030)

The Enhanced NDC Implementation Plan (2021-2030) seeks to drive and coordinate support from the international development community, investments from both the public and private sectors, and other actions from other relevant key stakeholders, both domestic and foreign, to help PNG achieve its Enhanced NDC targets. The main objective of the Enhanced NDC Implementation plan is to reach the emissions reduction targets from the energy and AFOLU sectors as well as adaptation targets as defined in PNG's Enhanced NDC 2020. For the energy sector there are 36 projects and 6 activities to be implemented to achieve the energy sector targets by 2030.

SUB - SECTION 1.4.2

NDC Implementation Roadmap for the Electricity Sector

The goal of the NDC implementation roadmap for the electricity sector is to support PNG's aspiration for a 78% share of renewable energy in the on-grid system by 2030. The roadmap builds on from the 36 projects outlined in the Enhanced NDC Implementation Plan and illustrates a pathway for implementing these projects and articulates aspects of the enabling environment that may need strengthening to reach the targets set out in the Enhanced NDC.

PART
2

CONTEX OF THE ENERGY MITIGATION PLAN

CONTEXT OF THE ENERGY MITIGATION PLAN

The Energy Mitigation plan builds on the 36 projects and 6 activities outlined in the Enhanced NDC Implementation Plan (2021-2030) as well as the NDC Implementation roadmap for the electricity sector.

SECTION 2.1 GOAL

The goal of this Energy Mitigation Plan is to promote the implementation of priority actions in the Energy Sector as listed under the Revised Enhanced NDC 2020 Implementation Plan (2021-2030), and the NDC Electricity Roadmap (2021-2030).

SECTION 2.2 TIMEFRAME

The timeframe for the Energy Mitigation Plan is from 2022-2025 and is in-line with the Global Stocktake and NDC review process of the Paris Agreement

SECTION 2.3 OBJECTIVE

The objective of the Energy Mitigation Plan to identify the means of implementation for the projects and activities in the Enhanced NDC Implementation plan (2021-2030) and NDC Implementation for the electricity sector.

SECTION 2.4 FOCUS

The focus to the Energy Mitigation plan is on those projects and activities that will be implemented between 2022-2025 as outlined in the Enhanced NDC Implementation plan and NDC Implementation for the electricity sector.

SECTION 2.5 METHODOLOGY

The methodological approach used to develop the Energy Mitigation Plan includes the mix-method approach which used both qualitative and quantitative data collection and analysis. Desktop research, key document reviews, interviews and stakeholder workshops were carried out as part of the writing up and validation process involved in completing this document.

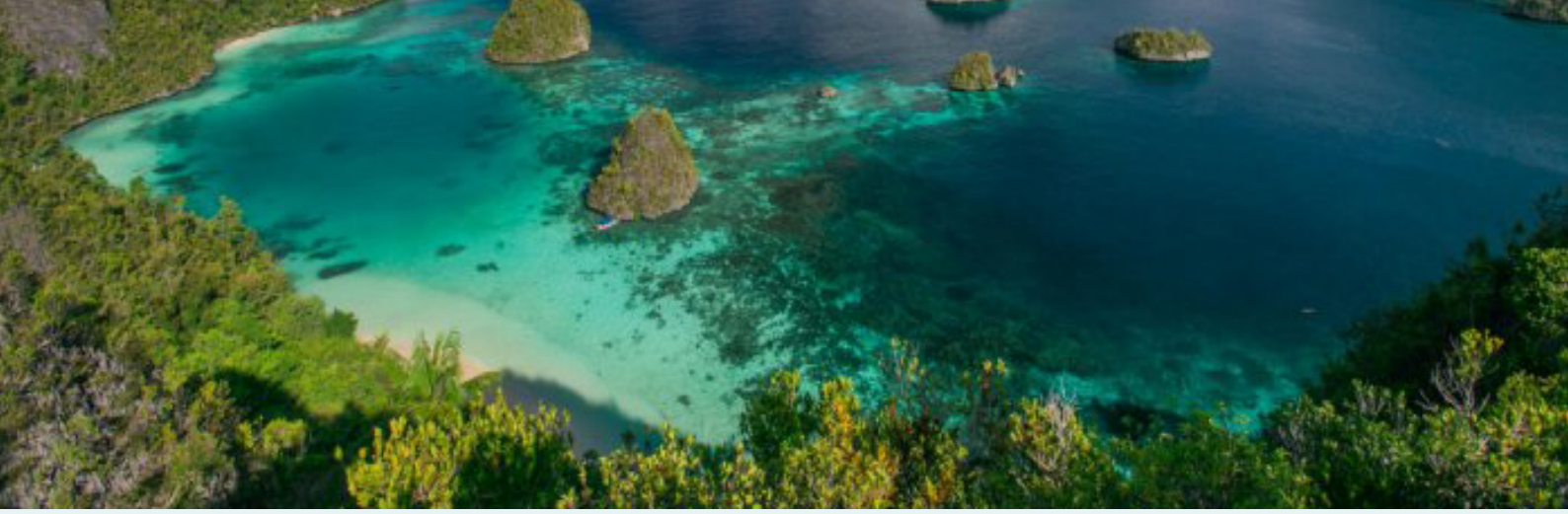
SECTION 2.6 MEANS OF IMPLEMENTATION

The means of implementation (MOI) describes the key components required to effectively implement the mitigation activities, namely, funding for the proposed project, capacity building, technology and research and development (R&D). Funding explores the potential source and type of funding that can be accessed or mobilized to develop the project, capacity building is concerned with providing the required technical knowledge, skills and competency in key technical areas to develop and implement the project, technology is about selecting the appropriate technology for the local area in order to harness biomass, hydro or solar energy potential and the management and maintenance requirements in the long-term, and research and development is aimed at understanding any relevant information pre-project development phase, during development and in the operational phase to seek cost-effective and high performance options and to inform decision making process of government and project partners.

PART

3

ENERGY MITIGATION PLAN



ENERGY MITIGATION PLAN

As mentioned in section 1.4 the headline target for the energy section is for carbon neutrality within the energy industries subsector. And this will be achieved through Non-GHG quantitative target and non-GHG action based targets. The Non-GHG quantitative target includes enhancing the levels of renewables in the energy mix from 20% (2015) to 78% for on-grid connection.

While the Non-GHG action-based targets includes:

i. *Reduce energy demand through the adoption and implementation of Minimum Energy Performance Standards, and Labelling;*

ii. *Establish a framework for fossil fuel emission offsetting; and*

iii. *Enhance data collection capabilities*

The figure below describes the energy sector targets.

Energy sector heahline target: Caerbon neutrality within the energy industries subsector

1. Non GHG Quantitative Target
Enhance levels of renewables in the energy mix from 30% (2015) to 78% for on-grid connection

2. Non-GHG Action Based Tagets
2.2. Reduce energy demand through the adoption and implementation of MEPSL
2.2. Establish a framework for fossil fuel emission offsetting
2.3. Enhance data collection capabilities

Figure 2: Targets for the Energy Sector in the Enhanced NDC (source: Enhanced NDC Implementation Plan (2021-2030)

SECTION 3.1

ENHANCED LEVELS OF RENEWABLES IN THE ENERGY MIX FROM 30% (2015) TO 78% BY 2030 FOR ON-GRID CONNECTION

There are 36 renewable energy projects identified in the Enhanced NDC Implementation plan (2021-2030) and NDC Implementation Roadmap for the Electricity sector that will be implemented from 2021 to 2030. The projects are classified into planned and proposed projects. Planned projects are those projects at the final stage with possible or secured funding. Proposed projects are projects that have been identified through preliminary studies and will require funding.

SUB - SECTION 3.1.1

Projects or activities identified in the Implementation Plan and Roadmap

The NDC Implementation Roadmap for the Electricity sector further maps out these projects in short term (2021-2023), Medium-term (2024-2027), and long term (2028-2030). The Energy Mitigation plan will be focused on the short term (2021-2023) and to some extent medium-term (2024-2027). The table below outlines the number of projects within this timeframe. Detailed list of projects is provided in the Annex

SUB - SECTION 3.1.2

Collaboration and partnership

In all these projects, regardless of the scale and delivery timeframes, it is crucial for PPL, National Energy Authority (NEA), Department of Works and Highways (DoWH), Climate Change and Development Authority (CCDA) & other project partners to work closely with Provincial & Local level Governments to address key project variables including local community issues such as resources and constraints. Ensure that the institutional capacity of the government system (technical-expertise & equipment required under appropriate sector programmes, and public finance) are built in. This is the "Implementation Costs" of the projects to inform the process of accessing or mobilizing finance both domestic and international. Establish robust operational models for sustainability based on strong local partnerships.

Effectively coordinate research funding, monitor progress and disseminate results and information to government, industry and the community.

Table 1: Renewable energy projects

Period	Total Projects	Estimated Installed	Technology Capacity
Short term (2021-2023)	9	176 MW	2 solar, 7 hydro
Medium-term (2024-2027)	5	61 MW	4 hydro,1 biomass

SUB - SECTION 3.1.3

Means of Implementation

Table 2: Means of implementation for the renewable energy targets

ACTIVITY	MEANS OF IMPLEMANTATION				TIME FRAME
	Funding	Capacity Building	Technology	R&D	
Successful implementation of proposed projects defined in NDC Roadmap	• Bilateral funding (under PPL pipeline projects) • Public Private Partnership investments • Multilateral grants • Government co-funding	• Technical capacity to conduct feasibility study for proposed projects • Solar training on operation and maintenance for PPL technical officers (on-grid), National Energy Authority and Provincial Administration (off-grid) • Hydro training on operation and maintenance for PPL technical officers (on-grid), National Energy Authority and Provincial Administration (off-grid)	• Solar intensity measurement instruments • Hydro energy/ flow measurements Solar systems/ facilities that are suitable for the site and to local capacities • Cost-effective for thelong-term • Hydro-diesel: reduction of diesel back-up generators	• Research in areas/locations which have not been studied to obtain necessary baseline information for future projects • Research on actual long-term emissions reduction from hydro and solar technologies with consideration on its long-term performance • Cost-effectiveness of proposed technology for the targeted sites • Research to identify the long-term costs to consumers • Costs associated on using certain technology types.	2022-2025

SECTION 3.2

REDUCE ENERGY DEMAND THROUGH THE ADOPTION AND IMPLEMENTATION OF MEPSL

As a demand-side management policy and programme, increased efficiency of energy use will play a key role in mitigating the growth in PNG's demand for energy linked to a growing economy and population. Central to this approach will be the adoption and implementation of Minimum Energy Performance Standards and Labelling (MEPSL) Regulations as well as enhancing public awareness of energy use and means of reducing energy use. In-depth work in the areas of building designs and energy efficiencies such as evaluating the performance of installed lighting, air conditioning and refrigeration systems and developing recommendations to improve such systems as retrofits or in industrial energy efficiency audits and retrofits will require financial and technical support. The draft MEPSL Regulation is intended to be fully implemented by 2030. Limited data on existing energy use and potential trends currently prohibits placing a quantified target on the impact of these actions, therefore, the non-GHG action-based target are proposed.

The Energy Efficiency activities in this Plan were taken from the Revised Enhanced NDC 2020 Implementation Plan (2021-2030).

SUB - SECTION 3.2.1

Activities identified in the Enhanced NCD Implementation plan (2021-2030)

The activity identified in the Enhanced NDC Implementation Plan (2021-2030) includes the development of a National Energy Efficiency roadmap.

SUB - SECTION 3.2.2

Collaboration and partnership

The NEA and CCDA will work closely with the National Institute of Standards and Industrial Technology (NISIT) and in particular DoWH, Central Building Board and Building Boards in Municipalities/Towns responsible for evaluation and approval of building design and other infrastructure standards (household, commercial and industries). Collaborate with NISIT on equipment and technology standards and the University of Technology (UNITECH) on environment friendly design, construction and technology adoptions.

SUB - SECTION 3.2.3

Means of Implementation

Table 3: Means of implementation for the MEPSL

ACTIVITY	MEANS OF IMPLEMANTATION				TIME FRAME
	Funding	Capacity Building	Technology	R&D	
Adoption of Minimum Energy Performance Standards and Labelling Regulations	• Bilateral funding • Multilateral grants • Government co-funding	• Training/upskilling of CCDA, NEA, DoW, NISIT staff on technical knowledge and policy formulation process on energy efficiency (EE) preferably by industry experts	• Conduct a technology needs assessment for EE technology in the industry	• Explore technology options in building designs, lighting, air conditioning systems, and refrigeration systems. • Partner with the University of Technology (UNITECH) for research on design, construction and technology types and standards, and collaborate with international partners where required	2022-2025

SECTION 3.3

ESTABLISH A FRAMEWORK FOR FOSSIL FUEL EMISSION OFFSETTING

PNG remains committed to an energy transition but also recognizes that a full transition will take time given PNG's complex geographies and dispersed population as well as a growing economy. As such, a framework for offsetting of emissions from fossil fuels will be introduced to support economic incentives for transition while also helping to finance domestic nature-based solutions in particular, reduced emissions and enhanced removals from the forest sector.

SUB - SECTION 3.3.1 Activities identified in Enhanced NCD Implementation plan (2021- 2030)

The activity identified in the Enhanced NDC Implementation plan (2021-2030) is to develop an action plan for offsetting fossil fule emissions by 2024 that will capture detailed activities to achieve this action.

SUB - SECTION 3.3.2 Collaboration and partnership

Stakeholder collaboration and partnership both from the public and private sector is required to implement this activity. The implementation plan has identified key government agencies which includes the NEA and PNG Forest Authority.

SUB - SECTION 3.3.3 Means of implementation

Table 4: Means of implementation for action plan for offsetting fossil fuel emissions

ACTIVITY	MEANS OF IMPLEMANTATION				TIME FRAME
	Funding	Capacity Building	Technology	R&D	
Action plan for offsetting fossil fuel emissions	• Bilateral funding • Multilateral grants • Possible funding from GEF for the preparation of BTR • Government co-funding	• Training/ upskilling of CCDA, NEA, PNGFA, ESTWC members and AFOLU STWC members on technical knowledge on methodologies used for carbon offsets.	• Conduct a technology needs assessment for relevant software tools for compiling and analyzing energy data	• Country specific emission factor	2022-2023

SECTION 3.4

ENHANCING DATA COLLECTION CAPABILITIES

PNG will establish a framework for enhancing data collection on energy use and associated emissions to support improved policy and regulation to manage emissions.

SUB - SECTION 3.4.1 Activities identified in Enhanced NCD implementation plan (2021-2030)

The activity identified in the Enhanced NCD implementation plan (2021-2030) is the development of a data collection strategy by 2022. The objective is to address gaps, challenges and capacity building needs to improve energy data collection. This activity will be implemented in conjunction with the GHG Improvement plan.

SUB - SECTION 3.4.2 Collaboration and partnership

Collaboration and partnership will be required from all relevant stakeholders in the energy sector which includes both the government agencies and private sector. Relevant stakeholders that were identified in the implementation plan includes the NEA and members of the ESTWC.

SUB - SECTION 3.4.3 Means of Implementation

Table 5: Means of Implementation for energy data collection strategy

ACTIVITY	MEANS OF IMPLEMANTATION				TIME
	Funding	Capacity Building	Technology	R&D	
Energy data collection strategy	• Bilateral funding • Multilateral grants • Possible funding from GEF for the preparation of BTR • Government co-funding	• Training/ upskilling of CCDA, NEA, and ESTWC members on technical knowledge to collect, compile and analyses energy data.	• Conduct a technology needs assessment for relevant software tools for compiling and analyzing energy data	• Research on relevant energy data compilation standards	2022-2024

SECTION 3.5 OTHER POTENTIAL MEASURES

As explained in section 1.4, other potential measures from the energy sector are from the transport sub-sector. A number of regulations and standards and economic incentives for GHG emissions reductions are proposed for the road transport sector in the Enhanced NDC 2020. These are non-GHG measures used as proxies towards achieving absolute GHG emissions reductions in road transport, given that no activity data and information on fuel combustion is available, and obviously technology type has not changed in the last few decades – the piston engine vehicles will be around for a while even during the road transport transition period from combustion engines to electric vehicles which will take years for developing countries like Papua New Guinea.

SUB - SECTION 3.5.1

Activities identified in the Enhanced NDC Implementation Plan (2021-2030)

The Enhanced NDC Implementation Plan (2021-2030) proposes a single mitigation activity for road transport is Green Transport E-Mobility Policy for PNG. However, other actions that were identified in the Enhanced NDC that will most likely be implemented between the timeframe of this Energy Mitigation Plan (2022-2025) includes:

i. *Encourage the introduction of electric vehicles;*
ii. *Encourage the introduction of hybrid vehicles (combustion and electricity to reduce emissions in mobile combustion of fuel;*
iii. *Promote clean fuel technology and standards;*
iv. *Explore options for alternative fuel for the aviation.*

SUB - SECTION 3.5.2

Collaboration and partnership

The Enhanced NDC Implementation Plan (2021-2030) outlines the collaboration of the CCDA with the lead agency in the transport sector which is the Department of Transport and Implementation (DoT) in implementing these activities. Other supporting agencies include the NEA and Department of Higher Education, Research, Science and Technology (DHERST), National Roads Authority, Civil Aviation Safety Authority and the National Capital District Commission.

SUB - SECTION 3.5.3 Means of implementation

Table 6: Means of implementation for the transport sector

ACTIVITY	MEANS OF IMPLEMANTATION				TIME FRAME
	Funding	Capacity Building	Technology	R&D	
Green Transport E-Mobility Policy for PNG	• Government • Public Private Partnership investment • Multilateral financial institutions	• Technical assistance and capacity building on mitigation assessment of road transport	• Conduct a technology needs assessment of green transport e-mobility and its implementation in developed countries	• Study on the feasibility of green transport e-mobility • Study on the critical supporting infrastructure required to enable green transport e-mobility in PNG	2022-2025
Encourage the introduction of electric vehicles	• Government • Public Private Partnership investment • Multilateral financial institutions	• Relevant capacity building needs for the key implementing agency (DoT)	• Conduct a technology needs assessment for the introduction of EVs in PNG	• Research on the feasibility of electric vehicles • Study on the critical supporting infrastructure required to enable EVs in PNG	2022-2025
Promote clean fuel technology and standards	• Government • Public Private Partnership investment • Multilateral financial institutions	• Relevant capacity building needs for the key implementing agency (DoT)	• Explore cleaner fuel technology vehicles on the market by vehicle dealers	• Study on cleaner fuel options in the market and economic implications	2022-2025
Encourage the introduction of hybrid vehicles (combustion and electric) to reduce emissions in mobile combustion of fuel	• Government • Public Private Partnership investment • Multilateral financial institutions	• Relevant capacity building needs for the key implementing agency (DoT)	• Technology needs assessment on introduction of hybrid models in PNG	• Study on hybrid models and economic impacts	2022-2025
Explore options for alternative fuel for the aviation.	• Government • Public Private Partnership investment • Multilateral financial institutions	• Relevant capacity building needs for the key implementing agency (DoT)	• Technology needs assessment on introduction of alternative fuel for the aviation in PNG	• Study on the impacts of alternative fuel on work force transition and operations	2022-2025

PART
4

MONITORING AND EVALUTION

MONITORING AND EVALUATION

The CCDA in close collaboration with the PPL, NEA and the Department of National Planning and Monitoring (DNPM) shall provide monitoring and evaluation oversight on the Energy Mitigation Plan 2022-2025 utilizing the established monitoring and evaluation (M&E) framework and schedules as illustrated in the whole-of- government Governance Structure in figure 3 below.

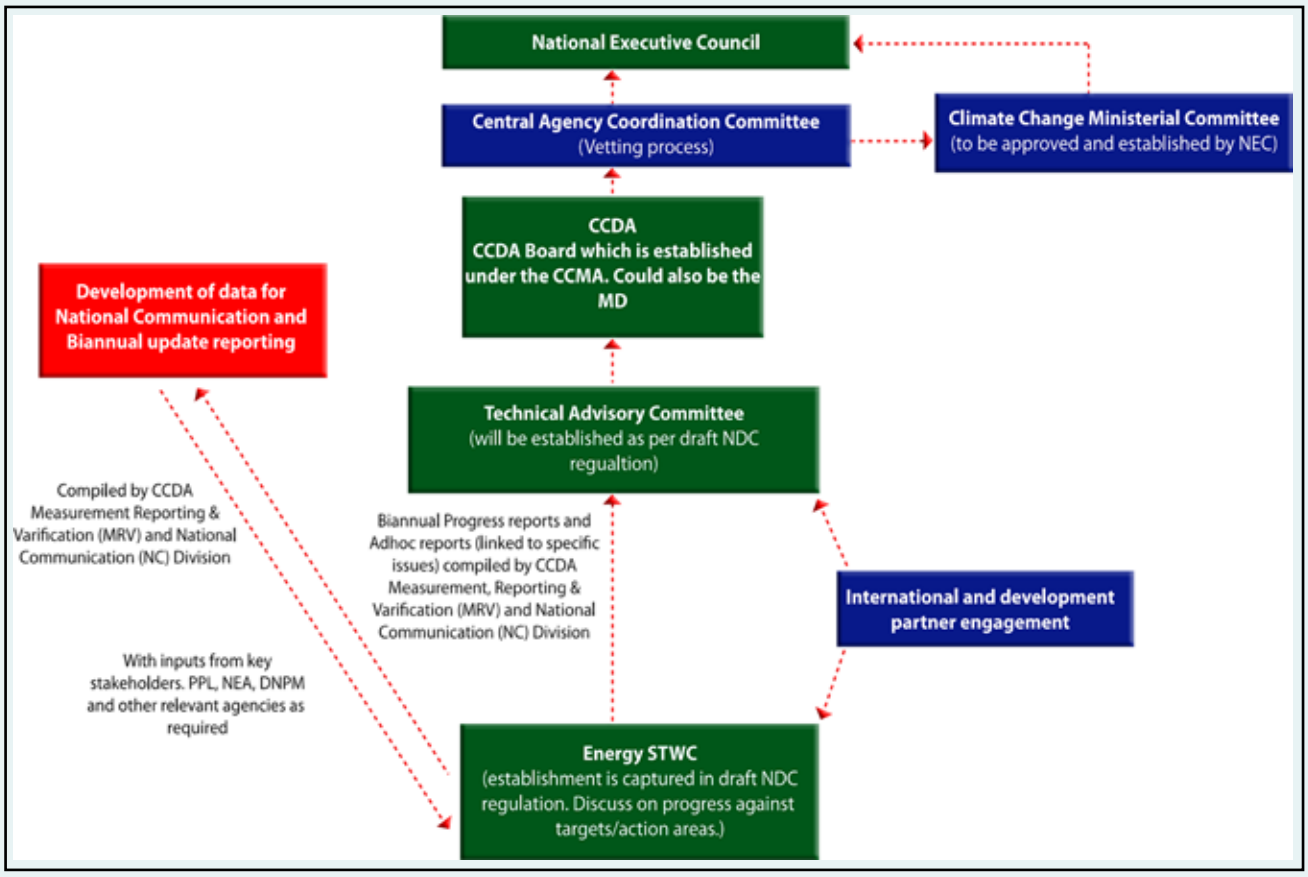


Figure 3: Governance structure (Source: PNG NDC Implementation Roadmap Electricity)

SECTION 4.2 TRANSPORT SECTOR MONITORING OF ACTIVITIES

The DoWH is responsible for the construction and maintenance of the road infrastructure in the country and the DoT is responsible for policy and regulations of the motor vehicles operations by users and the motor vehicle dealers industry in the country, although the actual vehicle registration function is carried out by Provincial Vehicle Registry and Licensing Offices, while in the two big cities of Port Moresby and Lae the Motor Vehicle Insurance Limited (MVIL) registers vehicles and issues driver licenses for the city residents.

Both the DoWH and DoT will be responsible for setting the regulatory and operational enabling environment for the introduction of electric vehicles into the country and will monitor the use of this new technology (EVs) and its impact on the economy and people.

Table 8 : Monitoring and reporting in the transport sector

Function	Lead Agency	Operational Report	Mitigation/Climate Change National Reporting	Reporting Period
Regulatory - Roads	National Road Authority (NRA)	National Government Ministry of Transport	NRA - CCDA	Annual
- Aviation	Civil Aviation Safety Authority (CASA)	National Government Ministry of Civil Aviation / Transport	CASA - CCDA	Annual
- Maritime	National Maritime & Safety Authority (NMSA)	National Government Ministry of Transport	NMSA - CCDA	Annual
Policy - Transport sector (vehicles)	Department of Transport	National Government Ministry of Transport	Department of Transport - CCDA	Annual
- Transport infrastructure	Department of Works	National Government Ministry of Works	Department of Works - CCDA	Annual
Operational State Enterprises	- Air Niugini - National Airport Corporation - PNG Ports - MVIL	Kumul Consolidated Holdings (KCH)	Direct - CCDA	Annual

SECTION 4.1 MONITORING OF ACTIVITIES IN THE ELECTRICITY SECTOR

PPL, a state-owned-enterprise (SoE) is responsible for electricity services in towns and cities of the country and is responsible for the development of the renewable electricity generation facilities and the on-grid connections and management from generation to distribution of electricity. PPL will be responsible for the operations of the hydro and solar facilities/stations and monitoring of performance of these facilities over time.

The recently established NEA will assume the licensing and economic regulatory functions of the Independent Consumer and Competition Commission (the ICCC). The transfer of functions from the ICCC to NEA has been completed under the amended NEA Act 2021 (as amended 2022). Thus NEA will have the power to regulate the operations of the power producers where there is a breach of licence conditions.

Table 7 : Monitoring and reporting in the electricity sector

Function	Lead Agency	Operational Report	Mitigation/Climate Change National Reporting	Reporting Period
Electricity generation and distribution	PPL	Kumul Consolidated Holdings (KCH)	PPL - CCDA	Annual
Electricity - regulatory body	NEA	National Government	NEA - CCDA	Annual
Provincial off-grid	Provincial Administration	NEA	Provincial Administration - CCDA	Annual National Fiscal & Economic Commission (NFEC) Reporting by the Provincial Governments
Independent power producers (IPPs)	Private sector	NEA	NEA - CCDA	Annual

ANNEX I:

Proposed Projects (Projects that will require funding) identified in Enhanced NDC Implementation Plan (2021-2030) that are proposed to be implemented from 2022-2025

No.	Project	Technology	Proposed Capacity (MW)	Location/System	Lead Implementing Agency (s)	Supporting Agency	Proposed timeframe for implementation	Proposed budget (Million USD)
1	Kerema Solar PV & Energy Storage System	Solar	1.5	Gulf/Kerema	PPL	NEA/CCDA	2022-2024	1.9
2	Alotau Solar PV & Energy Storage System	Solar	1.5	Milne Bay/Alotau	PPL	NEA/CCDA	2022-2024	1.9
3	Daru Solar PV & Energy Storage System	Solar	1.5	Western Province/Daru	PPL	NEA/CCDA	2024-2026	1.9
4	Manus Solar PV & Energy Storage System	Solar	1.5	Manus/Lorengau	PPL	NEA/CCDA	2022-2024	1.9
5	Alotau Solar PV & Energy Storage System	Solar	1	Milne Bay/Alotau	PPL	NEA/CCDA	2023-2026	1.4
6	Saussia Solar PV & Energy Storage System	Solar	10	East Sepik/Wewak	PPL	NEA/CCDA	2022-2024	12.9
7	Aitape Solar PV & Energy Storage System	Solar	0.4	West Sepik/Aitape	PPL	NEA/CCDA	2022-2023	0.5
8	Fincshafen Solar PV & Energy Storage System	Solar	0.45	Morobe/Fincshafen	PPL	NEA/CCDA	2024-2026	0.6
9	Kavieng Solar PV & Energy Storage System	Solar	1.5	New Ireland/Kavieng	PPL	NEA/CCDA	2023-2025	1.9
10	Maprik Solar PV & Energy Storage System	Solar	0.2	East Sepik/Maprik	PPL	NEA/CCDA	2022-2024	0.3
11	Gumini Hydro	Hydro	1.5	Milne Bay/Alotau	PPL	NEA/CCDA	2023-2026	2.9
12	Kereu 1 Hydro	Hydro	0.6	AROB/Arawa	PPL	NEA/CCDA	2022-2025	1.1
13	Lawes Hydro	Hydro	2	Manus/Lorengau	PPL	NEA/CCDA	2024-2026	2
14	Butaweng Hydro	Hydro	0.2	Morobe/Fincshafen	PPL	NEA/CCDA	2024-2026	0.4
15	Sohun Hydro	Hydro	0.3	New Ireland/Kavieng	PPL	NEA/CCDA	2023-2025	0.6

ANNEX II:

Non-GHG Quantitative Targets Additional activities identified in Enhanced NDC Implementation Plan (2021-2030)

No	Activity	Objective	Status	Lead Implementing Agency (s)	Supporting Agency (s)	Timeframe	Budget
1	Development of sub-sector Renewable Energy Policies: (i) Solar; (ii) Hydro; (iii) Ammonia and hydrogen; (iv) Biofuel; (v) Geothermal; (Sustainable aviation fuel; (vi) sustainable maritime fuel	To provide an enabling framework for renewable energy development	New proposal to develop an overall renewable energy policy. Although there is ongoing work on developing a solar energy policy supported by UNDP	NEA	PPL/CCDA	2022-2023	Need scoping to verify budget
2	Resource mapping for potential renewable energy sources	Map out potential renewable energy sources to achieve the vision 2050 target which is to generate electricity from 100% renewables	New Proposal	NEA	PPL/CCDA	2022-2025	Need scoping to verify budget

ANNEX III:

Non-GHG Action Based Targets action plan identified in Enhanced NDC Implementation Plan (2021-2030)

No	Activity	Objective	Status	Lead Implementing Agency (s)	Supporting Agency (s)	Timeframe	Budget
Reduce electricity demand through the adoption and implementation of minimum energy performance standards and labelling							
1	National Energy Efficiency roadmap	Energy Efficiency roadmap design and implementation	Ongoing	NEA/CCDA	UNDP (FREAGER Project)	2018-2021	Budget determined by scope of project
Establish a framework for fossil fuel emission offsetting							
1	Development of an Action Plan	To identify detailed activities that will be implemented to establish a framework for fossil fuel emission offsetting	New Proposal	CCDA	NEA/PNGFA	2022-2024	Need scoping to verify budget
Enhance data collection capabilities							
1	Development of energy data collection strategy	To address gaps, challenges and capacity building needs to improve energy data collection	New Proposal	CCDA/NEA/ESTWC members	IRENA	2022	

ANNEX IV:

Potential measure action plan – Encourage the introduction of electric vehicles

No	Activity	Objective	Status	Lead Implementing Agency (s)	Supporting Agency (s)	Timeframe	Budget
1	Green Transport E-Mobility Policy for PNG	The E-Mobility Policy will enable the development and implementation of electric vehicles in PNG	New proposal	DoT	CCDA/NEA/ DHERST	2022-2030	

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