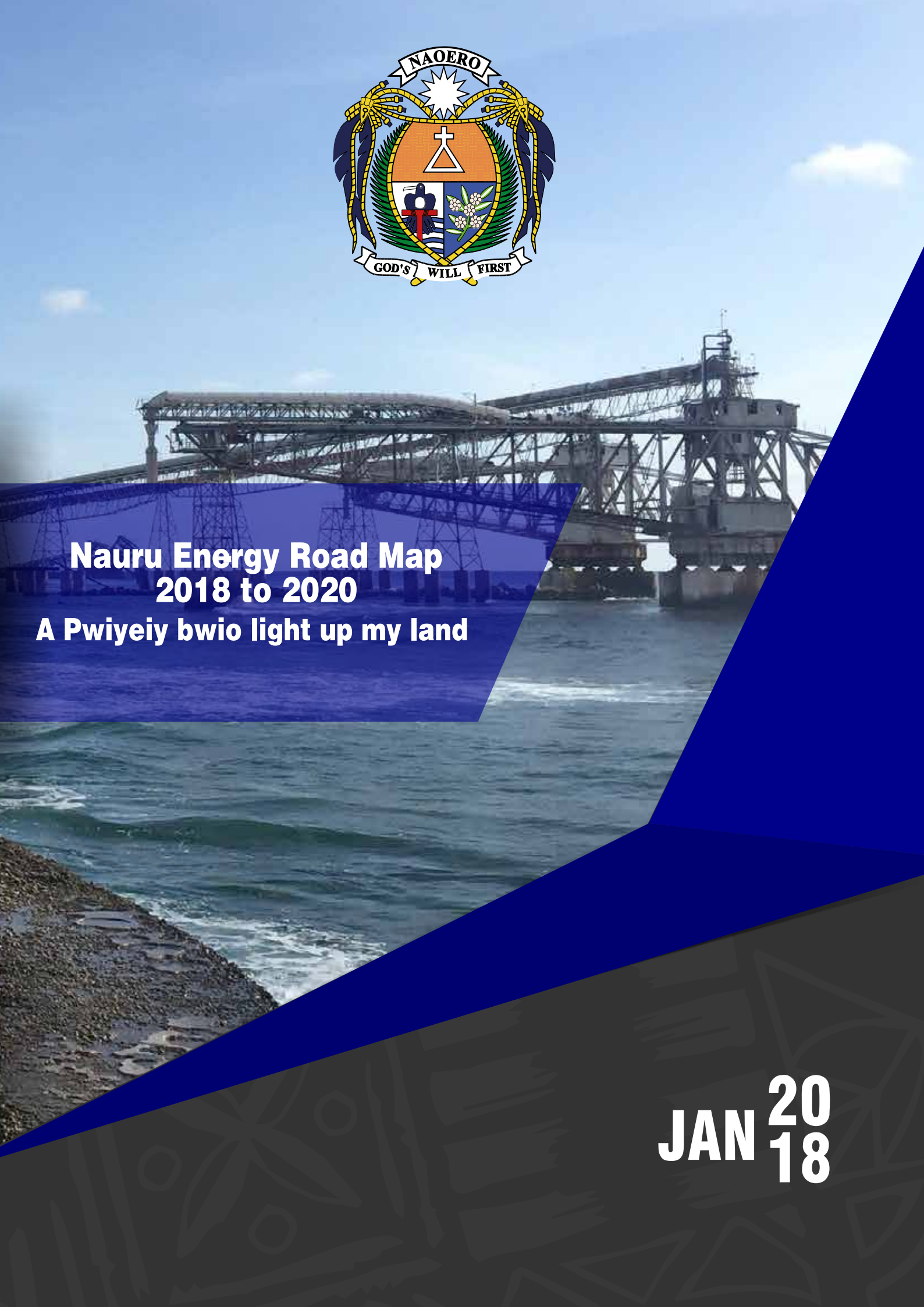

Nauru Energy Road Map 2018 to 2020

A Pwiyeiy bwio light up my land

JAN 2018

Nauru Energy Road Map

2018 to 2020

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Minister's Foreword
Ekamawir Omo

I am pleased to present this update of the Nauru Energy Road Map. The first Nauru Energy Road Map was endorsed in 2014 and since its adoption, implementation has been particularly good in the area of electricity supply. However, challenges posed by capacity issues, has limited progress in other areas. Institutional strengthening is being implemented across the board at the Nauru Utilities Corporation to address gaps, inadequacies and the various other challenges.

The purpose of this update is to reconfirm our national commitment to improving the sustainability of energy use through renewable energy and energy efficiency to contribute to a sustainable quality of life for all Nauruans.

Almost three quarters of the world's energy needs today are met from fossil fuels and this increases greenhouse gas emissions and the impact of climate change on our vulnerable ecosystem, an ecosystem that is the foundation of our society, our economy, and our environment. Nauru imports all of the fossil fuels it uses which is a huge drain of scarce funds and this is not sustainable for the long term development of Nauru. Fortunately, Nauru has the blessings of the sun and installing solar photovoltaic systems can reduce our reliance and expenditure on fossil fuels.

Significantly improving the efficiency of our energy use offers even larger economic benefits and is considered a priority in the long term development strategy of Nauru.

Through the National Sustainable Development Strategy consultative process the Government of Nauru has set three ambitious targets to achieve by 2020. They are:

1. 24/7 grid electricity supply with minimal interruptions
2. 50% of grid electricity supply from renewable energy sources, and
3. 30% improvement in energy efficiency in the residential, commercial and government sectors.

To ensure our social and economic development visions are achieved, Nauru must work together with our regional and international partners to accomplish the outcomes and targets set out under the National Energy Policy Framework and this updated Nauru Energy Road Map.

I call upon every individual, Government institutions, industries, the private sector and the international community to support and contribute to the implementation of Nauru's Energy Road Map for our sake and for the wellbeing of future generations.

Hon. Baron Divavesi Waqa
President and Minister for Commerce, Industry and Environment

Glossary

ADB	Asian Development Bank
AUD	Australian dollar
CIE	Department of Commerce, Industry and Environment
DoA	Department of Agriculture
DoE	Department of Education
DoF	Department of Finance
DoJ	Department of Justice
DoT	Department of Transport
EU	European Union
GDP	Gross Domestic Product
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
GoN	Government of Nauru
HFO	Heavy Fuel Oil
HIES	Household Income and Expenditure Survey
IPP	Independent Power Producer
IRENA	International Renewable Energy Agency
kV	kilovolts
kWh	kilowatt hour
LPG	Liquid Petroleum Gas
M&E	Monitoring and Evaluation
MDG	Millennium Development Goals
MW	Megawatt
NBoS	Nauru Bureau of Statistics
NEPF	National Energy Policy Framework
NERM	Nauru Energy Road Map
NGO	Non-Governmental Organisation
NIANGO	Nauru Island Association of Non-Governmental Organisations
NRC	Nauru Rehabilitation Corporation
NSDS	National Sustainable Development Strategy
NUC	Nauru Utilities Corporation
OTEC	Ocean Thermal Energy Conversion
PAD	Planning and Aid Division of the Department of Finance
PIFS	Pacific Islands Forum Secretariat
PPA	Pacific Power Association
PSC	Project Steering Committee
PV	Photovoltaic
RONPHOS	Republic of Nauru Phosphate company
RPC	Regional Processing Centre
SE4ALL	United Nations Sustainable Energy for All initiative
SPC	Secretariat of the Pacific Community
SPREP	Secretariat of the Pacific Regional Environment Programme
TWGEn	Technical Working Group on Energy in Nauru
UNDP	United Nations Development Programme
UNFCCC	United Nations Framework Convention on Climate Change

Executive Summary

The Nauru Energy Road Map (NERM) 2014 - 20201 was developed during 2013 and built upon the energy sector development agenda outlined in the:

- National Sustainable Development Strategy 2005 - 2025 (revised 2009), and
- National Energy Policy Framework of 2009.

The purpose of the Development Strategy and Energy Policy Framework as well as the NERM is to enable the achievement of Nauru's overall vision of:

A future where individual, community, business and government partnerships contribute to a sustainable quality of life for all Nauruans.

This updated NERM 2018 to 2020 was developed in 2017/18 after a review of the NERM 2014 - 2020, consultations in Nauru on implementation progress to 2017 and is based on the original document. The key changes include renaming the Action Plans, reducing the number of Activities to be implemented, ordering the Activities by Lead Agency and Time Frame, as well as revising wording for some of the Activities and Expected Results.

Nauru imports all of the fossil fuel it consumes. This is a significant component of the amount of money leaving Nauru each year. This annual cost is also volatile due to its dependence on global oil prices. Recent figures on fuel demand are shown below.

Table 1: Fuel Demand, million litres per year.

Sector	2015-16	2016-17
NUC diesel	9.24	9.44
Retail diesel	8.17	7.44
Retail petrol	4.35	4.10
Aviation	5.94	4.81
LPG*	~0.02	~0.02
Total Ml pa	**27.72**	**25.81**

Source: Annual fuel demand calculated from monthly average demand by sector figures in 'Nauru Annual Vital Report 2017' extract provided by Department of Finance in email of 24 November 2017. * LPG figure estimated from 2014 NERM.

The NERM is the implementation plan for Activities to facilitate Nauru's energy sector development agenda. The main targets of the NERM 2014 - 2020 were that by 2020, Nauru would have:

i) 24/7 grid electricity supply with minimal interruptions.

ii) 50% of grid electricity supplied from renewable energy sources.

iii) 30% improvement in energy efficiency in the residential, commercial and government sectors.

These targets are fairly broad and they haven't been revised for this updated NERM. How they could be interpreted and measured is discussed in Section 8 Monitoring and Evaluation.

[1] http://prdrse4all.spc.int/system/files/second_draft_nauru_energy_road_map_v6_0.pdf

The outcomes the NERM 2014 - 2020 aimed to achieve were:

- A reliable, affordable and safe power supply and services.
- A reliable and safe supply of fossil fuels.
- Universal access to reliable and affordable energy services.
- An efficient supply and use of energy.
- A significant contribution from renewable energy towards electricity supply.
- Financial sustainability of the energy sector.
- Efficient, robust and well-resourced institutions for energy planning and implementation.

These outcomes remain the same for this updated NERM.

This updated NERM renames the six Actions Plans as follows:

- Capacity,
- Power,
- Renewables,
- Efficiency,
- Fuels, and
- Transport.

Each Action Plan has a range of Strategies. Each Strategy has multiple Activities with a variety of Lead Agencies. The NERM 2014 - 2020 listed its 110 Activities by Action Plan and Strategy.

For this updated NERM, the Activities have been listed by Lead Agency and Time Frame. Activities reported as complete and no longer a priority are provided in the Appendices.

This updated NERM has also refined the monitoring indicators to assist with progress assessments and reporting.

Acknowledgements

This updated NERM 2018 to 2020 is a publication of the Government of Nauru (GoN).

The development of the updated NERM 2018 to 2020 was facilitated by ITP Renewables and supported by the UNDP via the Australian Government Department of Foreign Affairs and Trade funded UNDP Regional Programme Activities.

In addition, numerous stakeholders contributed to this update including:

- Nauru, (CIE, NUC, DoF, DoA, DoE, DoJ, DoT, NRC, RONPHOS, Eigugu Energy, Bureau of Statistics), and
- international, (ADB, PPA, Australian High Commission, NZ MFAT, GIZ, SPREP, Vital Energy and IRENA).

1. Nauru Overview

Nauru is one of the world's smallest countries and one of the most remote. Total land area is 21km^2.In 2016, the World Bank estimated a population of about 13,050 people. Nauru's currency is the Australian Dollar (AUD) and the per capita Gross Domestic Product (GDP) in 2016 was approximately $10,500 per year2.

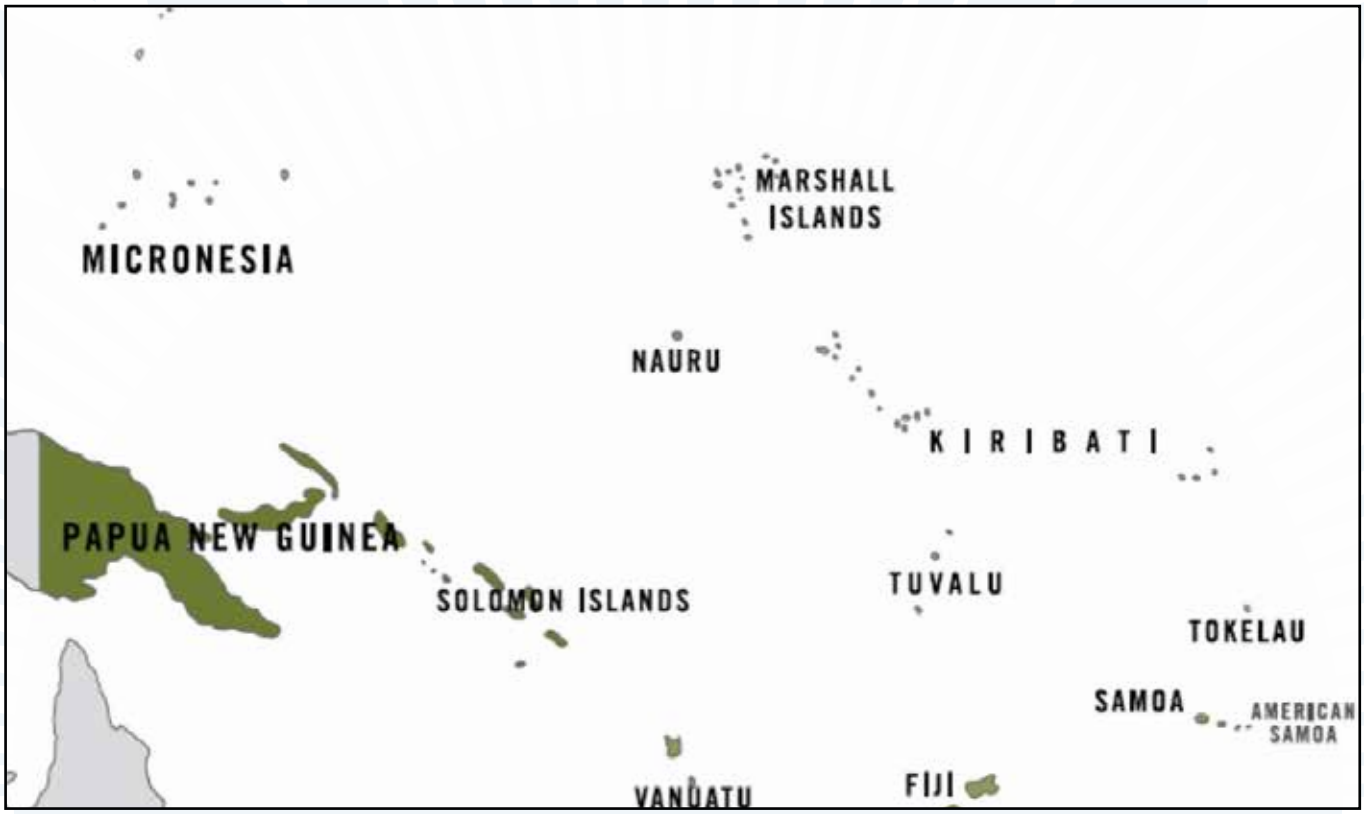

Figure 1: Nauru's location, (from: www.dfat.gov.au).

Nauru faces economic, environmental and social challenges. Aid is an essential source of funding for Nauru's development including implementation of the NERM.

Nauru's National Sustainability Development Strategy 2005 - 2025 (NSDS) outlines the long-term plan for Nauru's development. It was revised in 2009 and reviewed and updated again in 2017/18.

The Nauru Energy Policy Framework[3] (NEPF) was endorsed by the Government of Nauru (GoN) in 2009. The NEPF outlines a policy framework that builds on the energy priorities outlined in the NSDS.

Further background on Nauru's energy sector is provided in Appendix A.

2. Government of Nauru's Energy Vision

Nauru's energy vision is documented in the energy sector goals of the NSDS:

'Provide a reliable, affordable, secure and sustainable energy supply to meet the socio economic development needs of Nauru.'

[2] Converted to AUD from the 2016 USD amount provided here: https://data.worldbank.org/country/Nauru
[3] http://prdrse4all.spc.int/node/4/content/nauru-energy-policy-framework

3. Energy Outcomes

The energy sector outcomes for the NERM are outlined in the NEPF.

The outcomes are:

1. A reliable, affordable and safe power supply and services.
2. A reliable and safe supply of fossil fuels.
3. Universal access to reliable and affordable energy services.
4. An efficient supply and use of energy.
5. A significant contribution from renewable energy towards electricity supply.
6. Financial sustainability of the energy sector.
7. Efficient, robust and well-resourced institutions for energy planning and Wimplementation.

These outcomes are fairly broad and have not been changed for the updated NERM.

4. NERM Targets

The NERM 2014 - 2020 was the implementation plan for the NSDS and NEPF and its original targets for 2020 were:

i) 24/7 grid electricity supply with minimal interruptions.

ii) 50% of grid electricity supplied from renewable energy sources.

iii) 30% improvement in energy efficiency in the residential, commercial and government sectors.

These targets are fairly broad. They haven't been revised for this updated NERM, but how they could be interpreted, measured and reported is discussed in Section 8 Monitoring and Evaluation.

To make progress towards these targets, the NERM 2014 - 2020 had six Action Plans and 19 Strategies. Each Strategy had a range of Activities and the allocation of Lead Agencies to the Activities is shown in the following table.

Table 2: Lead Agency and number of Activities, (from NERM 2014 - 2020).

Lead Agency	Activities
NUC	59
CIE	47
DoF	2
DoT	1
Statistics Office	1
Total	**110**

5. Action Plans

This updated NERM renames and reorders the six Action Plans. They are listed below with their Policy Statement and Strategies from the NERM 2014 - 2020.

Capacity: Efficient, robust and well-resourced institutions for energy planning and implementation.

1. Establish appropriate policies, regulations and legislation for the energy sector.
2. Facilitate development of appropriate local skill base to meet ongoing demand in energy sector.
3. Improve governance and accountability in the energy sector.
4. Foster a culture of partnerships between public and private sectors including the community.

Power: A reliable, affordable and safe electrical power supply and services.

1. Upgrade assets.
2. Improve planning and management.
3. Improve supply-side energy efficiency.
4. Move toward full recovery of operating and maintenance costs.
5. Develop and safeguard NUC staff.

Renewables: 50% of electricity used in Nauru comes from renewable energy sources by 2020.

1. Phased implementation of large-scale solar.
2. Investigation and implementation of other renewable energy sources.
3. Build in-country capacity to operate and maintain solar PV systems.

Efficiency: An efficient supply and use of energy.

1. Data collection and analysis for preparation for Demand Side Management implementation.
2. Implementation of demand side energy efficiency.
3. Introduction of energy labelling and Minimum Energy Performance Standards.

Fuels: A reliable and safe supply of fossil fuels.

1. Establish an economically efficient, secure and safe National Fuel Terminal and fuel supply.
2. Investigate ways to reduce use or find alternatives to liquid fuels.

Transport: Policy to be developed as part of road map implementation.

1. Implementation of energy efficiency in transport.
2. Investigate substitutes to diesel and petrol for transport.

For this update of the NERM, the Activities have been given unique identifiers based on their Action Plan and Strategy. For example, the first Activity in Strategy 1 of the Capacity Action Plan is numbered **C1.1**.

6. Activities by Lead Agency

For this updated NERM, the information in the Action Plan tables has been reordered by Lead Agency and forecast Time Frame.

Other key changes include the following:

- The Activity Importance column has been deleted as the three categories of Very High, High and Medium were considered to not be essential for implementation.
- The forecast Time Frame column has been updated and revised to calendar year quarters, (Q1 = January to March).
- Two additional columns have been added to the Activities table:
  - Funding source - to allow for the source of the Estimated Budget to be documented, if known. Dept refers to Departmental Budget and Aid refers to a, yet to be specified, aid funder.
  - Notes - to provide further context, if available.

This information, for still relevant Activities, is presented in the following tables for CIE and NUC.

Activities where stakeholders indicated that the Activity:

- was completed, are listed in Appendix B. The NERM 2014 - 2020 had only four Activities that weren't led by CIE or NUC. These were all reported as complete, so they are listed in Appendix B.
- was no longer a priority, are listed in Appendix C.

In addition, some similar and synergistic Activities have been merged.

This new format for the Action Plans still allows for Activities to be linked back to their Action Plan and Strategy through their identifying number. However, ordering by Lead Agency and forecast Time Frame is considered to be more user-friendly for planning, resourcing and implementation.

CIE Activity	Lead Agency (supporting agencies)	Time Frame	Expected results / outputs	Estimated budget AUD ($,000)	Funding source (if known)	Notes
C1.6 Investigate options, develop and implement a framework for private sector (IPPs, businesses and residences) renewable energy grid-connection and relevant supporting instruments (e.g. net-metering).	CIE (NUC, DoF, DoJ)	Q2 2018	Appropriate framework developed and implemented.	150	Aid	NUC has made arrangement for net-billing. This Activity is discussed further in Section 7.2. Information for rooftop PV systems to be published on NUC's website.
R3.1 Develop and implement installation, operating and maintanence training programs for the solar photovoltaic (PV) installations.	CIE (NUC, DoE, Nauru College and other stakeholders)	Q2 2018	Local persons capable of installing and O&M of solar PV plants.	30	Aid	Some level of PV training for NUC staff has been implemented. Further PV training opportunities to be developed in 2018.
C2.1 Assess training needs and develop appropriate training strategy for secondary and primary school teachers, managers, small businesses, technicians, tradespeople, etc.	CIE (DoE)	Q2 2018	Training plan / strategies developed.	30	Aid	A national Training Needs and Gap Analysis covering sustainable energy (and climate change adaptation) was undertaken in 2015/16 by the PacTVET project. Training is further discussed in Section 7.3.
C2.4 Develop energy curriculum for schools focusing on energy efficiency and renewable energy.	CIE (DoE)	Q3 2018	Increased knowledge base on energy.	50	Aid	Publish curriculum on appropriate website.
R3.2 Establish regular training in solar energy and other relevant renewables as well as energy efficiency in a local training institution.	CIE (NUC, DoE, Nauru College and other stakeholders)	Q3 2018	Course on solar energy available locally.	30	Aid	$20k for setting up training course, $10k recurring annual cost.

6.1 CIE

The 28 still relevant Activities where CIE is the Lead Agency as well as new Activities are listed below, in the order of their forecast Time Frame.

CIE Activity	Lead Agency (supporting agencies)	Time Frame	Expected results / outputs	Estimated budget AUD ($,000)	Funding source (if known)	Notes
C3.6 Develop detailed Monitoring and Evaluation plan for the NERM.	CIE	Q1 2018	Monitoring and Evaluation Plan for Road Map developed and used.		UNDP	The Plan has been revised as part of the updated NERM, see Section 8. CIE to report appropriate indicators in its Annual Reports.
C3.5 Carry out an assessment of the institutional arrangements for the implementation of the NERM including recommendations for long term implementation.	CIE (DoF)	Q1 2018	Assessment carried out and appropriate recommendations made.		UNDP	NERM Coordinating Committee to take on the roles of the Technical Working Group on Energy and the Project Steering Committee.
C3.4 Support and facilitate the activities of the NERM Coordinating Committee.	CIE	Q1 2018 and ongoing	Appropriate support to meetings of the NERM Coordinating Committee.	10	Dept	This Activity has been revised from the no longer required **C3.4**. The NERM Coordinating Committee should meet at least every 6 months.
C3.3 Recruit new staff to support the function of the CIE Energy Unit including NERM implementation.	CIE	Q2 2018	Established Energy position(s) filled.	20	Dept	The CIE Energy Unit was formally established in July 2017. The Energy Unit consists of Director for Climate Change & Energy and an Energy Officer (currently a vacant position). Recruitment of Energy Officer scheduled for 2018.
T1.9 Establish a data collection system for energy and transport data (related to other databases as appropriate).	CIE (DoT, NBoS, Our Airline and others)	Q2 2018	Data collection system established.	30	Dept	This Activity discussed further in Section 7.1.

CIE Activity	Lead Agency (supporting agencies)	Time Frame	Expected results / outputs	Estimated budget AUD ($,000)	Funding source (if known)	Notes
E1.3 Undertake energy surveys/audits of hotels and commercial buildings.	CIE (NUC)	Q1 2019	Identify measures to reduce electricity use in hotels and commerce	30	Aid	Further details are provided in Section 7.5. Activity **E1.4** could also be included in the Scope of Work.
E1.4 Undertake industrial energy audits of RONPHOS and NRC facilities.	CIE (RONPHOS and NRC)	Q1 2019	Measures to reduce fuel use at RONPHOS and NRC identified.	50	Aid	This Activity could be combined with Activity **E1.3**.
C1.5 Review of regulatory or policy barriers (e.g. import duties) to efficiency and renewables investments.	CIE (NUC, DoF, Customs, DoJ)	Q1 2019	Changes that will enhance investment proposed.	20	Aid	Further details in Section 7.6.
C2.2 Carry out training in technical skills for efficiency and renewables as identified in Activity **C2.1**. Establish train the trainers programs in efficiency and renewables for local teachers, equipment operators, managers and technicians.	CIE (NUC)	Q1 2019	More people in key positions trained. Qualified local trainers. Training programs established.	80	Aid	This Activity has been merged with **C2.3**.
E2.5 Undertake energy efficiency actions in Government Buildings.	CIE (Govt Agencies)	Q2 2019	Efficiency actions undertaken.	50	Aid	This is implementing the recommendation of energy audits involving investments.
E3.3 Carry out awareness raising on MEPS and labelling to communities, businesses and government.	CIE	Q2 2019 and ongoing for 2 years after mandatory MEPS and labeling introduced	Communities, businesses and government are aware of MEPS and labelling.	60	Aid	This Activity is discussed further in Section 7.7.

CIE Activity	Lead Agency (supporting agencies)	Time Frame	Expected results / outputs	Estimated budget AUD ($,000)	Funding source (if known)	Notes
E3.1 Prepare feasibility study to determine the best approach to MEPS and labelling.	CIE	Q3 2018	Best approach to MEPS and labeling determined.	30	Dept	If possible, join SPC's Pacific Appliance Labelling and Standards (PALS) project that may assist with determining the optimal approach.
E3.4 Prepare and enact appropriate legislation for MEPS and labelling.	CIE (DoJ)	Q4 2018	MEPS and labeling legislation enacted.	20	Dept	Legislation could also include the implementation of other, relevant efficiency Activities.
E3.2 Introduce Minimum Energy Performance Standards (MEPS) and labelling of high electricity consumption appliances such as air conditioners, freezers, refrigerators, etc.	CIE (NUC, private sector and other stakeholders)	Q4 2018	MEPS and energy labelling for select appliances introduced.	50	Aid	MEPS and mandatory energy labelling may require legislation, (this is Activity **E3.4** above). SPC to be contacted for update on the Pacific Appliance and Labelling and Standards program.
E3.5 Training to customs and other government departments on MEPS and labeling, including enforcement.	NUC (CIE)	Q4 2018	Customs and other government departments trained on MEPS and labelling.	10	Dept	The Lead Agency for this Activity has been changed to CIE from NUC.
C1.1 Develop a legislative and governance framework for the energy sector.	CIE (DoJ)	Q1 2019	Overall Energy Act or other appropriate legislation in place.	100	Aid	While some stakeholders appear unconvinced that an overall Energy Act is required, the purpose of the Act is discussed in Section 7.4. This Activity is to be informed by the Legislative Gap Analysis Report due to be completed in Q1 2018.

CIE Activity	Lead Agency (supporting agencies)	Time Frame	Expected results / outputs	Estimated budget AUD ($,000)	Funding source (if known)	Notes
E2.4 Establish guidelines and financial incentives for energy efficiency measures in construction or retrofitting of buildings.	CIE	Q2 2020	Guidelines and financial incentives in place.	150	Aid	Guidelines and incentives in other PICs to be researched to assist with implementing this Activity.
T2.1 Study the feasibility of LPG, hybrid and electric (powered by renewable electricity) vehicles, including buses.	CIE	Q4 2020	Feasibility of options established.	30	Dept or Aid	Undertake desktop analysis as fuel prices rise to investigate if a feasibility study is worth commissioning.

CIE Activity	Lead Agency (supporting agencies)	Time Frame	Expected results / outputs	Estimated budget AUD ($,000)	Funding source (if known)	Notes
E1.5 Assess feasibility of efficiency technologies, including cost benefit analysis and develop relevant financing options for end users to make efficiency investments which are compatible with local institutional and financing structures.	CIE (DoF)	Q2 2019	List of efficient technologies defined. Incentives and financing options for support investment into efficiency identified.	40	Aid	This Activity is further defined in Section 7.8. NUC is already offering a 30% capital subsidy for some a few appliances through the Low Carbon Fund, an initiative supported by IUCN, UNEP and GEF.
T1.8 Design and implement awareness campaign to communities on energy efficiency in transport.	CIE (DoT)	Q2 2019 and ongoing		10	Dept	Recurring annual budget. This Activity is discussed further in Section 7.9.
R2.3 Undertake pre-feasibility studies for other renewable energy sources, such as waste-to-energy and OTEC.	CIE (NUC)	Q3 2019	Studies published on suitable website.	200	Aid	Study to focus on CIE's interest in a waste-to-energy plant and NUC's interest in OTEC technology developments.
T1.3 Undertake a study of incentives to increase the use of bicycles and motorcycles for personal transport, as well as car-pooling and other behavioural changes to encourage energy efficiency, and implement as appropriate. This study could also assess options to discourage the importation of vehicles that have larger engines (e.g. through increased import duties, etc).	CIE (DoT, DoF)	Q4 2019	Options for incentives identified. If incentives are implemented, budget may need to be increased.	40	Aid	This Activity has been merged with Activity **T1.6** to focus on different registration fees for vehicles depending on fuel consumption and age. Applying import duties proportional to fuel consumption may be the role of Customs. Implementation is **T1.7** by Q1 2020.
T1.7 Implement appropriate options to discourage the importation of vehicles with large engines.	CIE (DoF, Customs and others)	Q1 2020	Options to discourage importation of vehicles with large engines implemented.	20	Dept	See Note above for **T1.3**.

NUC Activity	Lead Agency (supporting agencies)	Time Frame	Expected results / outputs	Estimated budget AUD ($,000)	Funding source (if known)	Notes
E1.7 Carry out safe and environmentally sound disposal of retired generators and other old equipment that is replaced.	NUC	Q3 2018	Safe and environmentally sound disposal of equipment.	200	Aid	
E1.1 Purchase and install new Transmission and Distribution (T&D) equipment.	NUC	Q4 2018	T&D equipment purchased and installed.	2,000	EU	New 11kV line through centre of island due to be built in 2018.
R1.6 Commission Meneng 1.0 MW solar PV system.	NUC	Q4 2018	New solar PV system at Meneng providing full output to grid.	3,300	NZ MFAT & EU	The tender for this project and a 300 kW rooftop PV system for the new jail closed on 28 Nov 2017. The ground-mounted solar PV system is to be at least 1 MW with a fibre optic cable linking it to the diesel powerhouse control system.
R1.2 Undertake a survey of roof tops and parking areas to establish locations for solar installations and locate land topside for potential large scale solar plants.	NUC (CIE)	Q1 2019	Sites (roofs, power poles and parking lots) suitable for grid-connected solar identified.	10	NUC	List of potential sites and suitable roof areas' approximate size to be published on NUC's website. NUC to promote potential of rooftop PV.

6.2 NUC

The 11 still relevant Activities where NUC is the Lead Agency as well as new activities are listed below, in the order of their estimated Time Frame.

NUC Activity	Lead Agency (supporting agencies)	Time Frame	Expected results / outputs	Estimated budget AUD ($,000)	Funding source (if known)	Notes
E2.1 Prepare and implement energy efficiency campaign to residential customers including financial incentives for people to exchange less energy efficient appliances for new, more efficient ones.	NUC (CIE)	Ongoing	Residential customers consider energy efficiency and chose more efficient appliances.	10	NUC	This Activity has merged **E2.1** and **E2.2**. Education resources to be published on NUC's website. Recurring annual budget.
E2.3 Review draft NUC Power System Rules and Regulations, update these (including making electricity theft a crime and covering embedded generation from renewable energy sources) and enact final NUC Power System Rules and Regulations.	NUC (CIE, DoJ)	Q1 2018	NUC Power System Rules and Regulations finalised and enacted.	40	UNDP, GIZ & EU	This Activity is an expanded version of the original **E2.3** and also incorporates the original **C1.2** Develop supporting regulations for the NUC Act. Some funding likley to be available from the *Enabling the Implementation of the Nauru Energy Road Map* project in 2018. Updated Power System Rules and Regulations to be published on appropriate website(s). NUC Regulations 2012 are on the subordinate legislation part of the RONLAW website. It is proposed that the NUC Power System Rules and Regulations replace these.
C4.2 Disseminate information on efficiency measures, PV buyback tariffs plus metering and other information regarding changes in the power sector as and when appropriate.	NUC (CIE)	Q2 2018	Information on PV buyback tariffs and metering as well as IPP policy and others disseminated.	20	NUC	The Lead Agency for this Activity has been revised from CIE to NUC. Information needs to be published on NUC's website in an easy-to-understand manner.

NUC Activity	Lead Agency (supporting agencies)	Time Frame	Expected results / outputs	Estimated budget AUD ($,000)	Funding source (if known)	Notes
R1.7 Install 7 to 10 MW solar PV system including associated enabling equipment to maintain grid stability. Associated enabling equipment includes batteries, advanced inverters and control systems, cloud camera, frequency resisistors, capacitors and/or low-load diesel gensets to allow integration of high shares of PV.	NUC	Q4 2019	Further 7 to 10 MW of PV installed at the Meneng site with associated enabling equipment contributing output to the grid.	>40,000	ADB, GCF & others	Enabling equipment should be a requirement of the solar PV system tender, not separate. Advanced control and communication systems as well as significant other enabling equipment, such as batteries, will be required to maintain grid stability. Estimated budget is highly dependent on PV sizing and required enabling equipment which is dependent on load growth and forecasts.
R1.8 Install further large solar PV farm(s) to meet the 2020 renewable energy electricity supply target. Size of additional solar PV farm(s) will depend on load growth to 2020.	NUC	Q1 2020	Additional solar PV farm(s) installed.	Not yet estimated.	Aid	If 7 MW of additional PV is able to be added to the 11kV grid at the Meneng site as part of Activity **R1.7,** along with the other expected PV additions, this will bring Nauru's total PV to around 10 MW. This will generate about 18 GWh per year. This is approximately half of 2016/17's total generation. As the load is forecast to grow from new connections, additional sites may need to be tendered with the Meneng site to reach the 50% by 2020 target. Locating almost all the PV at the Meneng site to meet the 50% target may not be optimal due to potential network constraints.

NUC Activity	Lead Agency (supporting agencies)	Time Frame	Expected results / outputs	Estimated budget AUD ($,000)	Funding source (if known)	Notes
R1.5 Install 600 to 1000 kW of grid-connected solar PV without storage Bottomside on government owned buildings, parking lots, etc.	NUC (CIE)	Q2 2019	Rooftop PV - additional 600 to 1,000 kW installed.	1,800 to 3,000	Aid	This Activity is seeking to increase the total capacity of rooftop PV systems from ~200 kW in 2016 to a total of around 1 MW by mid 2019. Estimated budget has been revised down to $3/W. Installed cost of rooftop PV likely to be less than this but limited competition makes accurate budget forecasting a challenge. Car park shading PV systems likely to be more expensive than rooftop PV systems, so final costs will depend on proportions of each as well as individual PV system sizes and any roof upgrade requirements.
E3.5 Review opportunities for: - savings of electricity from water pumping and reverse osmosis units, - back-up solar powered reverse osmosis units in alternative locations, - additional water storage with reticulated water distribution, and - reducing leakages in the reticulation, delivery and storage systems /tanks. Carry out feasibility study for most promising water sector opportunity and, if favorable, implement.	NUC	Q3 2019	Opportunities for electricity savings, solar generation and reticulation in water production and distribution identified and implemented.	150	Aid	This Activity has merged **E3.5**, **E3.6**, **R2.4** and **P2.7**. Publish studies on NUC website.

7. Implementation

This section provides further discussion of some of CIE's Activities with the aim of assisting with their preparation and implementation.

7.1 Energy and Transport Database

Activity **T1.9** is 'Establish a data collection system for energy and transport data (related to other databases as appropriate).' This Activity has an estimated, CIE Departmental budget of $30,000.

Setting up a spreadsheet to store key energy data and the NERM monitoring indicators is not expected to be expensive. However, maintaining and populating this spreadsheet with key historical data and ongoing data is expected to take resources and time. Improved data tracking will assist in making CIE's Annual Reports more informative.

7.2 Grid-connect PV Standards, Regulations and Guidelines

Activity **C1.6** is 'Investigate options, develop and implement a framework for private sector (IPPs, businesses and residences) renewable energy grid-connection and relevant supporting instruments (e.g. net-metering).'

The installation, metering and billing requirements for rooftop PV systems need to be clearly specified and published. A consultant could be engaged to review NUC's draft requirements for rooftop PV systems. The PV requirements need to be published on a website and be easy to understand as well as easy to find.

Several Pacific Island utilities have published Regulations and Guidelines for rooftop PV systems. Further information is available from the Pacific Power Association and other websites. For example, a useful document for installations is the *Grid-connected PV Systems Installation Guidelines for the Pacific Islands* published on SEIAPI's website4. SEIAPI also has prepared guidelines for the design of grid-connected solar PV systems.

IPPs usually refers to Independent Power Producers selling electricity to utilities from a ground mounted, large PV system through a Power Purchase Agreement. This is not seen as a priority due to the relatively, small size of Nauru's load and the need for complex, grid-integration components for any further, large solar PV systems in Nauru.

In 2018, as part of the GoN's (UNDP/GIZ/EU supported), *Enabling the Implementation of the Nauru Energy Road Map* project, a review and update of the draft *NUC Power System Rules and Regulations*, including drafting sections related to embedded renewable generation, will be undertaken. This will also include a review of existing, relevant technical international and regional standards for solar PV and their relevance to the technical standards and requirements for Nauru. This Activity has synergies with **C1.1** 'Develop a legislative and governance framework for the energy sector.'

7.3 Training Strategy

Activity **C2.1** is, 'Assess training needs and develop appropriate training strategy for secondary and primary school teachers, managers, small businesses, technicians, tradespeople, etc.' This Activity has an estimated budget of $30,000.

[4] http://seiapi.com/wp-content/uploads/2014/11/GRID-CONNECTED-PV-SYSTEM-INSTALLATION-GUIDELINES.pdf

If funding can be secured, this Activity could be implemented by commissioning a specialist training consultant to develop the strategy and associated training materials as well as publish it on an appropriate website. The Nauru Training Needs and Gap Analysis5 was undertaken in 2015/16. It provides useful background information for developing the Training Strategy and contains two recommendations for climate change/disaster risk reduction training as well as one for sustainable energy and energy efficiency training. This Activity could be combined with other Activities developing curriculum and building capacity and resources in the training sector.

7.4 Energy Act

Activity **C1.1** is 'Develop a legislative and governance framework for the energy sector.' This Activity has an estimated budget of $100,000.

A specialist legal consultant could be engaged to consult with stakeholders and draft a possible Energy Act or a suite of Acts to clarify roles and implement Nauru's energy development agenda. Funds for providing preliminary technical input towards preparation of energy sector legislation are likely to be available in 2018 as part of the GoN's (UNDP/GIZ/EU supported) *Enabling the Implementation of the Nauru Energy Road Map.*

In 2017, there appears to be several entities with responsibilities in the energy sector. These responsibilities do not appear to all be legally mandated.

The 2017 consultations and previous analysis indicates the following agencies and their key energy sector roles:

i) Department of Finance (DoF), including the Planning and Aid Division (PAD), allocates annual budgets, provides oversight of the NSDS, regulates prices for fuel,and coordinates development assistance, (NERM 2014 - 2020).

ii) CIE, carries out energy policy and planning functions, as well as climate change mitigation and adaptation policy, (NERM 2014 - 2020).

iii) NUC is the sole provider of grid electricity and water, (NUC ACT 2011[6]).

iv) Vital Energy procures fuel and manages the fuel tank farm, (Petroleum Supply and Facility Management Agreement7).

v) Department of Transport, regulates the transport sector (NERM 2014 - 2020).

The NUC Act 2011 states the legal obligations of the utility for water and fuel. The NUC Regulations 2012[8] came into force on 18 October 2012. These Regulations are only 8 pages long and are limited to the Advisory Committee and Recovery of Fees from Post-paid Customers.

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[5] http://prdrse4all.spc.int/sites/default/files/nauru_0.pdf

[6] The Nauru Utilities Corporation Act 2011 describes the functions of the corporation, see http://ronlaw.gov.nr/nauru_lpms/index.php/act/view/799

[7] The Agreement between GoN and Vital Energy is commercial in-confidence but was executed in June 2015. The Background Wsection indicates that procuring fuel was part of the Request for Tender.

[8] The NUC Regulations 2012 are provided at a separate part of the RONLAW website: http://ronlaw.gov.nr/nauru_lpms/index.php/subordinate_legislation/view/526

The NUC Act was amended in 2016 to create a Board of Directors for NUC. There is also the draft document titled, 'NUC Power System Rules and Regulations' that is being updated and expanded in Activity **C1.6**.

Page 23 of the NERM 2014 - 2020 states, 'A legislative framework is required which provides for an appropriate governance regime including consideration of an overarching Energy Act. Having the appropriate legislation in place will be essential in improving the performance of the energy sector. The legislation should also promote and encourage active participation of the private sector and civil society.'

Page 24 of the NERM 2014 - 2020 NERM states, 'There is no independent energy regulator in Nauru, as this would not be a cost-effective option given the size of the country.'

Page 67 of the NERM 2014 - 2020 states, 'National energy legislation will be important in facilitating NERM implementation and in enabling good governance requirements to be met. Thus development and adoption of national energy legislation is essential for the success of the NERM implementation and overall development of the energy sector. Energy legislation should define the role of the government, in terms of planning, developing, and coordinating energy initiatives, energy sector regulation and creating a market where private sector and community stakeholders can engage effectively, for example, by the introduction of net-metering.'

In addition, there is no legislation in place to regulate the importation of energy consuming appliances. An Energy Act may provide an opportunity to clarify responsibilities, improve governance and reporting as well as implement Activities involving regulations. Several of the NERM Activities are likely to require a legal framework to be fully implemented.

7.5 Energy Audits for Hotels, Commercial Buildings, RONPHOS and NRC offices

Activity **E1.3** is 'Undertake energy surveys/audits of hotels and commercial buildings.' This Activity has a revised, estimated budget of $30,000 from unspecified aid funding.

Page 51 of the NERM 2014 - 2020 states, 'However the usage patterns of commercial entities are quite different from those of residences and surveys/energy audits will need to be carried out to determine energy use patterns. Unfortunately, the experience in other Pacific countries has been that energy audits of commercial entities often do not result in significant investment in energy efficiency measures by the audited businesses.

Therefore, audits should be provided only to businesses that specifically state their intent to follow through with actual investments that are determined to have a payback that is less than a pre-agreed upon time period. RONPHOS and NRC offices should also be targeted as these are some of the bigger office spaces and also these are state-owned enterprises. It may be reasonable for a nominal fee to be charged to businesses, RONPHOS and NRC for the audit if reasonable measures for efficiency improvement are found to be cost effective but no investment results from the audit report.'

If $30,000 of aid funding is secured, it may be sufficient for a basic energy audit of several sites depending on how it is procured. An approach could be to request energy audit consultants to undertake Type 1 Energy Audit[9] assessments of six of the most energy intensive sites and train local staff in energy efficiency assessments.

[9] For a definition, see: https://www.energy.gov.au/business/conduct-energy-assessment

7.6 Import Duties

Activity **C1.5** is 'Review of regulatory or policy barriers (e.g. import duties) to efficiency and renewable investments.' This Activity has an estimated budget of $20,000 from unspecified, aid funding.

This Activity could be implemented with the Energy Audit assessments to request the consultants to develop a list of products and energy specifications for the GoN to consider import duty reductions.

Research on existing import duties for efficiency and renewable investments would be useful background. The Marshall Islands', Fiji's and other Pacific Island Countries' efforts at reducing import duties[10] could be examined for relevance to Nauru.

7.7 MEPS and Energy Labelling Information

Activity **E3.3** is, 'Carry out awareness raising on Minimum Energy Performance Standards (MEPS) and labelling to communities, businesses and government.' This Activity has an estimated budget of $60,000.

If aid funding can be secured, this Activity could be implemented by commissioning a specialist communications consultant to upgrade NUC's website, publish MEPS and energy labelling information online and hardcopy and promote this information through local partners.

As an alternative, CIE could consider developing an Energy Information website and brochures to make available information for people seeking to reduce their energy bills. A variety of public engagement could be used to promote the website and the brochures.

There is also the Pacific Appliance Labelling and Standards (PALS) Program[11] which supports establishment of Australian/New Zealand based MEPS and labelling in Pacific Island Countries. Nauru could consider joining this SPC run initiative.

Considering MEPS and energy labelling of appliances is to be compulsory, most stakeholders are likely to notice energy labelling when browsing shops selling labelled appliances. Thus this Activity is to focus on the understanding of the financial implications of MEPS and energy labelling which may require information brochures to be printed and made available at all points of sale. Further information on the Australian Government's approach is available from their Energy Rating website[12].

7.8 Efficiency Financing Options

Activity **E1.5** is 'Assess feasibility of efficiency technologies, including cost benefit analysis and develop relevant financing options for end users to make efficiency investments which are compatible with local institutional and financing structures.' This Activity has an estimated budget of $40,000 from an unspecified, aid funder.

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[10] Further information available from: https://policy.asiapacificenergy.org/node/2869, and http://www.frcs.org.fj/wp-content/uploads/2016/10/2016-2017-Incentives13OCT2016.p df

[11] https://prdrse4all.spc.int/node/4/content/pacific-appliance-labelling-and-standards-pals-regulatory-meeting-13-15-november-2017

[12] http://www.energyrating.gov.au/about/what-we-do/labelling

If the funding is secured, discussions could be held with the local bank on their interest in providing low-interest loans for efficiency investments with support from the GoN. The funding could be used to assist with negotiating the contractual terms and supporting the initial loans.

While low-interest loans appear to be an effective way of accelerating energy efficiency investments, they often have low take up rates for a variety of reasons. However, they can be a way for low income households to improve uptake of cost-effective, energy upgrades.

In addition, with support from the IUCN/UNEP/GEF Low Carbon Islands project, a Low Carbon Fund (LCF) was launched in January 2017. The LCF provides an incentive for the private sector (businesses and households) to switch towards energy efficient washing machines, fridges, and freezers. Specifically, the LCF provides a 30% capital subsidy when buying new efficient appliances. Further information on this is available from the Low Carbon Islands website[13].

7.9 Annual Transport Cost Information

Activity **T1.8** is, 'Design and implement awareness campaign to communities on energy efficiency in transport.' This Activity has an estimated budget of $10,000 Departmental.

With petrol being more than $2 per litre, the community already has a strong incentive to be energy efficient with their transport needs. However, the generally short distances travelled may mean the annual costs are not fully appreciated.

CIE could develop online and brochure information materials discussing the annual costs of travelling an appropriate distance, say 5,000 kms, with a variety of transport options, including the bus and electric vehicles. In addition, this information could include updates on the duties for importing vehicles depending on their fuel efficiency.

This Activity could also be combined with T2.1 'Study the feasibility of LPG, hybrid and electric (powered by renewable electricity) vehicles, including buses.'

Collecting other countries' transport information may provide useful background for progressing this Activity, for example the Green Vehicle Guide website[14].

13 http://lowcarbonislands.org/news/lowcarbonfundlaunch/
14 www.greenvehicleguide.gov.au

8. Monitoring and Evaluation

The main targets of the NERM 2014 - 2020 were that by 2020, Nauru would have:

i) 24/7 grid electricity supply with minimal interruptions.

ii) 50% of grid electricity supplied from renewable energy sources.

iii) 30% improvement in energy efficiency in the residential, commercial and government sectors.

While some of these targets are fairly broad, they haven't been revised for this updated NERM.

To allow for progress to be monitored, the following indicators (and data sources) could be reported on:

i) Annual period of interruptions reported in hours (NUC Annual Reports).

ii) The per cent annual GWh of electricity generated from renewable energy sources compared to the total GWh generated (NUC Annual Reports).

iii) Nauru's annual GDP $/GJ of imported energy consumed (CIE Annual Reports). In addition, the electricity consumption for each sector could be reported on an estimated GJ/m2 floor area basis.

The first and second monitoring indicators are from the NERM 2014 - 2020 and have been slightly reworded for clarity. The third monitoring indicator is new as the NERM 2014 - 2020 had the efficiency indicator as 'to be developed'. If the NERM targets are updated by the GoN, consideration could be given to refining the targets to be consistent with financial year reporting, providing more detailed monitoring methodologies as well as documenting data sources and where indicators are to be published.

These and other monitoring indicators, associated baselines and proposed targets are provided in the following Monitoring Plan table. The Notes column indicates if the Monitoring indicator is new or a more than minor revision of the NERM 2014 - 2020 Monitoring Indicator.

No.	NERM Monitoring Indicator	Baseline (Year)	Relevant Targets	Where Published	Notes
4	Price of electricity	Residential: first 200 kWh/month = 25c/kWh >200 kWh/month = 50c/kWh Others = 70c/kWh (2017)	N/a	NUC website www.nuc.com.nr	
5	Annual GWh of electricity generated from renewable sources and total generation in each financial year	RE 0.34 GWh, Total 31.74 GWh (2015/16) RE 1.21 GWh, Total 34.72 GWh (2016/17)	N/a	NUC Annual Reports	If 10 MW of PV in total is installed by 2020, this will generate around 18 GWh per year. While the renewable per cent of total generation is the key indicator, the GWh per year totals should also be provided in the CEO's statement in NUC's Annual Report for context.
6	NUC specific fuel consumption (kWh from diesel generation/litre)	3.5 kWh/l (2011)	4.0 kWh/l by 2020/21	NUC Annual Reports	This is a new target as the NERM 2014 - 2020 target for fuel efficiency was a 30% improvement by 2020 with no methodology for specifying this documented. NUC's Key Performance Indicator aim is 3.6 kWh/l, (NUC Annual Report 2016). Two 'fuel efficiencies' will need to be monitored and reported, overall fuel efficiency including PV generation and fuel efficiency for just diesel generated electricity.

Table 3: NERM Monitoring Plan

No.	NERM Monitoring Indicator	Baseline (Year)	Relevant Targets	Where Published	Notes
1	Annual hours of interruption per customer (reliable grid supply)	568 hours of interruptions per customer (2015/16)	Less than 12 hours in 2020-21.	NUC Annual Reports Minutes of interruptions per customer to be reported in hours	This new target is more consistent with NUC's Key Performance Indicator aim of less than 700 minutes (NUC Annual Report 2016). The previous NERM had a target of 0.92. Convert System Average Interruption Duration Index (reported in minutes) to hours.
2	GWh from renewable sources / GWh total generated (renewable generation per cent)	0.3% (2009) 1.1% (2015/16) 0.3 / 31.7 GWh 3.5% (2016/17) 1.2 / 34.7 GWh	50% of electricity generation to come from renewable energy sources by 2020	NUC Annual Reports Financial Year Energy Production and Sales section	The GWh generated figures should also be reported with the renewable generation per cent to provide context.
3	Annual GDP/GJ of imported energy consumed, or GJ/m^2 consumed by residential, commercial and government sectors (energy productivity)	Estimated $125/GJ (2015/16) (baseline of area in square metres of sectors yet to be developed)	30% improvement in energy efficiency by 2020	CIE Annual Report, part of the Public Service Report	This is a new methodology as the NERM 2014 - 2020 did not specify how to monitor this Target. Other efficiency indicators specific to residential, commercial and government sectors could also be developed.

No.	NERM Monitoring Indicator	Baseline (Year)	Relevant Targets	Where Published	Notes
4	Price of electricity	Residential: first 200 kWh/month = 25c/kWh >200 kWh/month = 50c/kWh Others = 70c/kWh (2017)	N/a	NUC website www.nuc.com.nr	
5	Annual GWh of electricity generated from renewable sources and total generation in each financial year	RE 0.34 GWh, Total 31.74 GWh (2015/16) RE 1.21 GWh, Total 34.72 GWh (2016/17)	N/a	NUC Annual Reports	If 10 MW of PV in total is installed by 2020, this will generate around 18 GWh per year. While the renewable per cent of total generation is the key indicator, the GWh per year totals should also be provided in the CEO's statement in NUC's Annual Report for context.
6	NUC specific fuel consumption (kWh from diesel generation/litre)	3.5 kWh/l (2011)	4.0 kWh/l by 2020/21	NUC Annual Reports	This is a new target as the NERM 2014 - 2020 target for fuel efficiency was a 30% improvement by 2020 with no methodology for specifying this documented. NUC's Key Performance Indicator aim is 3.6 kWh/l, (NUC Annual Report 2016). Two 'fuel efficiencies' will need to be monitored and reported, overall fuel efficiency including PV generation and fuel efficiency for just diesel generated electricity.

No.	NERM Monitoring Indicator	Baseline (Year)	Relevant Targets	Where Published	Notes
7	NUC generation labour productivity	1.2 GWh/FTE (2011)	N/a	NUC Annual Reports	Ratio of total electricity generation in GWh to the number of full-time equivalent (FTE) employees who operate and maintain the generating plant.
8	NUC training expense as a % of payroll	7.6% (2010)	N/a	NUC Annual Reports	
9	CIE annual budget allocation from Government budget $m	$0.45m (2012/13)	N/a	Department of Finance, National Budget	Disaggregate budget allocated to energy activities, if feasible.
10	System losses	22.4% (2009)	Less than 15% by 2020/21	NUC Annual Reports	This is a new target as the NERM 2014 - 2020 target for 'Total System losses' was a 30% improvement by 2020 with no methodology for specifying this documented. This appears to be reported as *Electricity Loss*. NUC's Key Performance Indicator aim for *Electricity Loss* is <20%, (NUC Annual Report 2016).
11	Non-technical losses	15.8% (2009)	Less than 10% by 2020/21	NUC Annual Reports	This is a new target as the NERM 2014 - 2020 did not have a target for Non-technical losses. This appears to be reported as *Unaccounted Energy*. NUC's Key performance Indicator aim for *Unaccounted Energy* is <20%, (NUC Annual Report 2016).

Dividing the total annual fuel imports by the estimated population, it is equivalent to almost 2,000 litres per person per year. While much of this consumption is not paid for by individuals, this per person figure does illustrate Nauru's heavy reliance on imported fossil fuels.
This illustrates the many challenges to improving sustainability and realising Nauru's energy vision of:
'Provide a reliable, affordable, secure and sustainable energy supply to meet the socio economic development needs of Nauru.'
Energy Policies
A number of strategies, policies and legislation relevant to the energy sector have been introduced by the Government of Nauru. These include:

- National Sustainable Development Strategy (NSDS) 2005 - 2025,
- Nauru's Utility Sector - A Strategy for Reform,
- National Energy Policy Framework (NEPF),
- National Energy Road Map 2014 - 2020,
- Nauru Utilities Corporation Act (2011 and Amended 2016),
- Intended Nationally Determined Contribution (INDC) under the UNFCCC, and
- Climate Change Adaptation and Disaster Risk Management Framework (RONAdapt).

Thus, there isn't a lack of energy strategies and policies. Where Nauru could improve is in the areas of capacity and resources for implementation, reporting, legislation and enforcement. As the 2015 Intended Nationally Determined Contribution (INDC) states, 'A number of development strategies and policy instruments as a response to climate change have been introduced by the Government since 2005 ' and 'However, Nauru's accomplishment remains on paper and it would require the necessary means of implementation through finance, capacity building and technology development and transfer to achieve tangible outcomes'.

An overview of three of the key energy sector components of Nauru's energy development agenda follows.

Intended Nationally Determined Contribution

The Republic of Nauru is fully committed to supporting successful outcomes from the annual Conference of the Parties (CoP) under the United Nations Framework Convention on Climate Change (UNFCCC). The Government of Nauru submitted its INDC15 in November 2015. This document states that Nauru's INDC hinges on its:

- NSDS 2005 - 2025, revised 2009,
- NERM 2014 - 2020,
- Second National Communication (SNC), submitted 2015, and
- RONAdapt.

15 http://www4.unfccc.int/ndcregistry/PublishedDocuments/Nauru%20First/Nauru_NDC.pdf

Appendix A: Energy sector overview

Nauru is located just south of the equator and 1,287 km west of the International Date Line. It's the smallest state in the Pacific with an area of around 21km2 and a population of about 13,050 people.

The Department of Commerce, Industry and Environment (CIE) carries out energy policy and planning functions, as well as climate change mitigation and adaptation policy, (NERM 2014 - 2020). Other agencies with energy sector responsibilities include Department of Transport (DoT) and Department of Finance (DoF), the latter who manages the Government of Nauru contract with Vital Energy for fuel supply and storage.

The Nauru Utility Corporation (NUC) is the government-owned utility responsible for public electricity and water. Vital Energy operates the fuel tank farm and is responsible for provision of fuel, (diesel, petrol and kerosene). LPG is sold by separate, private importers.

NUC's main powerhouse is located in Aiwo. In 2016, it had eight diesel generators in various states of operational capacity. During 2017, NUC installed and commissioned two new, 3.564 kVA generators.

Generation was reported as 31.7 GWh in financial year 2015/16 with sales at only 20 GWh. The NUC Annual Report 2016 documents Losses at 35% with Unaccounted Energy 37% and Electricity Loss 35%. The methodology for calculating these Key Performance Indicators is not documented. However, it does illustrate the need to increase efforts to reduce unmetered loads and network losses as well as improve power factors and transparency on this issue. More than 9.15 million litres of diesel and 80,000 litres of oil was consumed, (diesel generation only ~3.4 kWh / litre after power station use). The distribution system is a ring main and includes 11kV, 3.3kV and 415V sections.

The phosphate company, RONPHOS generates its own industrial power. The Australian Government's Regional Processing Centres and the new jail generate their own power. The new, 11kV transmission line through the centre of the island, planned to be built in 2018, is expected to connect these loads to the main-grid. This is expected to significantly increase the annual electricity consumption.

Nauru imports all of the fossil fuels it consumes. This is a significant component of the amount of money leaving Nauru each year which is also volatile due to its dependence on global oil prices. Recent figures on fuel imports and the Government of Nauru's (GoN) excise are shown below.

Table 1: Nauru's annual fossil fuel imports (million litres per year) and fuel levies.

Sector	2015-16	2016-17	Levy c/l	GoN $m
NUC diesel	9.24	9.44	6	0.57
Retail diesel	8.17	7.44	46	3.42
Retail petrol	4.35	4.10	46	1.88
Aviation	5.94	4.81	6	0.29
LPG*	~0.02	~0.02		
Total ML pa	**27.72**	**25.81**	**Total $m**	**6.16**

Source: Annual fuel demand calculated from monthly average demand by sector figures in 'Nauru Annual Vital Report 2017' extract attached to Department of Finance in email of 24 November 2017. * LPG figure estimated from 2014 NERM. Information on Compliance Integrity Program, Through Put Fee and Mooring Through Put Fee levies also provided by DoF and utilised to estimate sectors' total levies and the GoN annual income.

The Energy section of the NSDS has the following Strategies:

'Implement National Energy Policy Framework (NEPF) addressing:

i) cost effective, secure and sustainable procurement and supply of fuel,

ii) reliable and efficient energy supply and distribution,

iii) management of demand focussing on consumption efficiency and conservation, and

iv) increased use of renewable energy and other alternative forms of energy.'

There are some milestones associated with these strategies but they are mostly open to interpretation due to the lack of specific baselines. The NSDS originally set a goal of meeting 50% of Nauru's energy needs through renewable energy by 2015, which has been revised to 2020.

The 2017 review of the NSDS is expected to refine the performance targets and indicators to more specific outputs.

National Energy Policy Framework

The Nauru National Energy Policy Framework (NEPF) aimed to provide a guideline for the development of the energy sector in Nauru for the immediate future and mid and long term. It is dated May 2009 and is 24 pages.

The NEPF is driven by its vision statement:

'Reliable, affordable and sustainable energy, enabling the socio-economic development of Nauru.'

The NEPF identified seven strategic policy areas as critical to achieving the overall vision of the NEPF. These policy areas are listed below.

1. Power – a reliable, affordable and safe power supply and services.
2. Petrol – a reliable and safe supply of fossil fuels.
3. Renewables – 50% of energy used in Nauru comes from renewable sources by 2015.
4. Customers – universal access to reliable and affordable energy services.
5. Finance – financial sustainability of the energy sector.
6. Institutional – efficient, robust and well-resourced institutions for energy planning and implementation.
7. Efficiency – an efficient supply and use of energy.

Each policy area has a range of strategies that all appear reasonable, However, their level of implementation since publication of the NEPF is variable. This highlights the importance of clearly describing funding sources, tasks and responsibilities as well as monitoring indicators and their methodologies in future planning documents.

The INDC also states, 'The main mitigation contribution is to achieve the outcomes and targets under the National Energy Road Map (NERM), NSDS and recommendations under the SNC and is conditional on receiving adequate funding and resources.'

National Sustainable Development Strategy

The National Sustainable Development Strategy 2005 - 2025 (NSDS) outlines Nauru's energy vision as:

> *'Provide a reliable, affordable, secure and sustainable energy supply to meet the socio economic development needs of Nauru.'*

The NSDS16 is 90 pages and was revised in 2009. It is also being reviewed and updated in 2017/18. The NSDS illustrates the national level policy development and implementation framework as per the following figure.

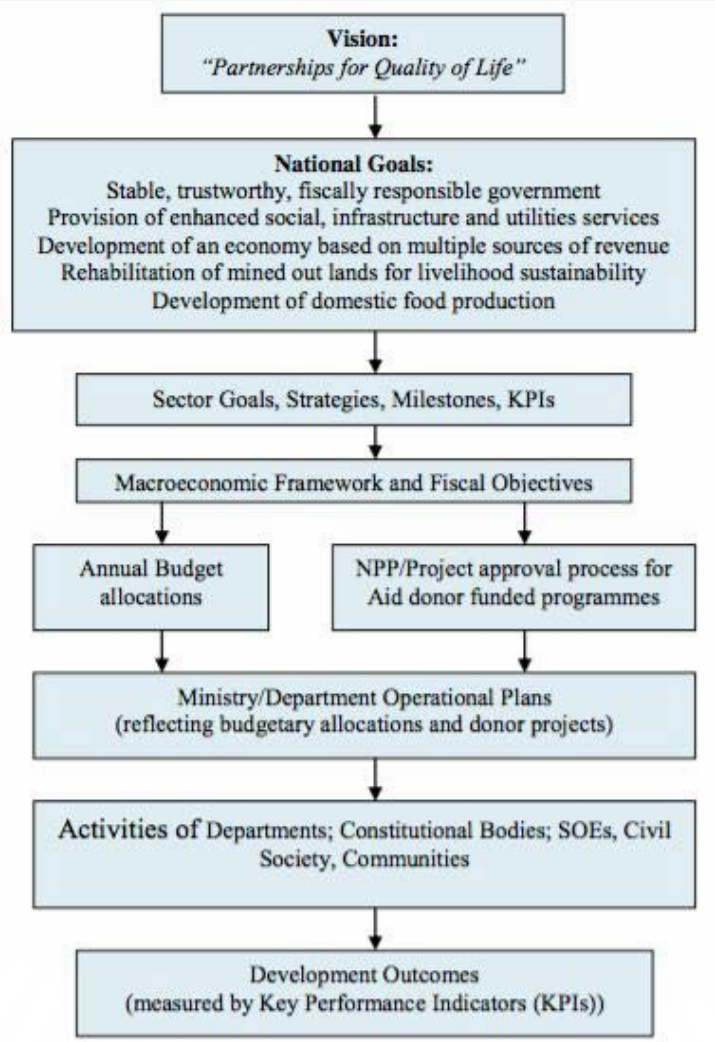

Figure 3: NSDS Policy Development and Implementation Framework.

This figure highlights the importance of Department Operational Plans. Another figure in the NSDS on monitoring policy implementation highlights the importance of Department Annual Reports.

[16] https://pafpnet.spc.int/pafpnet/attachments/article/224/Nauru%20NSDS%202005-2025%20%20(2009)%20cobp-nau-2012-2014-oth.pdf

Activity, reported as complete	Organization Responsible (supporting organizations)	Time Frame	Expected results / outputs	Notes (as per Nov 2017)
P2.2 Carry out capacity planning exercise for 2014 to 2020 including projected demand and generation.	NUC	6 months	Power development plan developed.	NUC's Strategic Plan was completed in 2014 and completes this Activity.
P2.3 Establish process for long-term financial planning and develop first long-term financial plan.	NUC	1 year	Process established. Plans developed.	NUC's Strategic Plan was completed in 2014 and completes this Activity.
P2.4 Develop annual procurement plan and maintenance plan.	NUC	Every year	Annual procurement and maintenance plan	NUC's Strategic Plan was completed in 2014 and outlines the procurement and maintenance plan. The 2014 NERM indicated that the procurement and maintenance plan should be updated every year but the next revision of NUC's Strategic Plan is scheduled for 2018.
P2.5 Undertake comprehensive technical assessment of generation, transmission and distribution, including thermo-graphic analysis.	NUC	6 months	Report on generation & T&D assets	NUC indicated that this Activity has been completed.
P2.6 Undertake comprehensive mapping, data compilation, inventory, storage planning and maintenance planning for all assets.	NUC	1 to 2 years	GIS database. Asset Inventory. Asset management plan.	NUC indicated that this Activity has been completed.
P2.7 Develop manuals for operation, safety, maintenance and service for all key equipment.	NUC	1 to 2 years	Manuals prepared.	NUC indicated that this Activity has been completed.

Appendix B: Activities completed

The following Activities were reported as completed as part of the 2017 consultations. Most of the text below is taken directly from the NERM 2014 - 2020. However, the Notes column is new, to provide context and information on when the Activity was completed, if known.

Activity, reported as complete	Organization Responsible (supporting organizations)	Time Frame	Expected results / outputs	Notes (as per Nov 2017)
C3.1 Establish an Energy Unit within the Department of CIE	CIE (DoF, Public Service)	1 year	Functioning Energy Unit	The Energy Unit appears to have been established but is not yet fully staffed.
C3.2 Establish position of Energy Coordinator within public service	CIE	1 year	Position and annual salary integrated into national budget.	CIE appear to have asked HR to commence process.
P1.2 Carry out structural repairs to the NUC powerhouse, including removal of the asbestos roofing and replacement.	NUC	1 to 2 years	Roof and building refurbished.	NUC indicated that this Activity has been completed.
P1.4 Purchase and install of a new generator.	NUC	1 year	Generator installed	NUC indicated that two new TDPS 3,564 kVA generators are expected to be fully commissioned by end of Nov 2017.
P1.5 Carry out major overhaul of the newest existing generator.	NUC	1 year	Generator overhauled; working at full capacity.	NUC indicated that this Activity has been completed.
P2.1 Review the corporate governance of NUC.	NUC (DoF)	1 year	Recommendations for corporate governance.	NUC's Strategic Plan was completed in 2014 and completes this Activity.

Activity, reported as complete	Organization Responsible (supporting organizations)	Time Frame	Expected results / outputs	Notes (as per Nov 2017)
P5.4 Develop and implement improved administrative procedures including payroll, job descriptions, workload planning and employee leave and related entitlements.	NUC (with Public Service system)	2 to 4 years	Appropriate administrative procedures implemented.	NUC indicated that this Activity has been completed as NUC's Strategic Plan was completed in 2014.
P4.1 Carry out a cost-of-service study for NUC across all three service areas of fuel, water and electricity, including water and electricity tariffs study (price, structure, etc).	NUC (CIE, PAD)	6 months	Cost-of-service defined for fuel, water and electricity. Electricity and water tariffs proposed.	NUC indicated that this Activity has been completed as NUC's Strategic Plan was completed in 2014.
P4.2 Carry out willingness-to-pay and affordability studies (carried out in conjunction with the cost-of-service and tariff studies above).	NUC (with Govt)	6 months	Better understanding of consumers' ability and willingness to pay.	NUC indicated that this Activity has been completed.
P4.3 Establish separate business unit financial information for water, electricity and fuel services.	NUC	1 year	Separate business unit financial information available.	NUC indicated that this Activity has been completed.
P4.4 Improve accounting systems through integration of the asset registry and the financial management information system.	NUC	1 to 2 years	Improved accounting systems.	NUC indicated that this Activity has been completed.

Activity, reported as complete	Organization Responsible (supporting organizations)	Time Frame	Expected results / outputs	Notes (as per Nov 2017)
P2.8 Develop asset security, disposal and revaluation policy.	NUC	3 to 4 years	Policy developed.	NUC indicated that this Activity has been completed.
P2.9 Collect baseline information and establish collection, storage, management and back-up processes for all financial and sales data.	NUC	1 to 2 years	Baseline information established Processes established.	NUC indicated that this Activity has been completed.
P2.10 Develop procedures for handling and monitoring customer complaints and train staff.	NUC	1 to 2 years	Procedure developed. Staff trained.	NUC indicated that this Activity has been completed.
P3.1 Establish a clear process for reconciling the fuel supplied by the tank farm and the fuel used by generating units.	NUC	6 months	Clear process established. New meters installed where needed.	NUC indicated that this Activity has been completed as NUC's Strategic Plan was completed in 2014 and the contract with Vital Energy was executed in June 2015.
P3.2 Analyse fuel use data, identify opportunities to reduces losses and implement.	NUC	1 to 2 years	Fuel losses reduced.	NUC indicated that this Activity has been completed.
P3.3 Develop new project proposals for improvement of transmission and distribution line losses as more information from metering becomes available.	NUC	2 to 3 years	Proposals submitted to appropriate funding agencies. Securing of new funding.	NUC indicated that this Activity has been completed.
P3.4 Implement further T&D loss reduction projects.	NUC	3 to 5 years	T&D losses reduced.	NUC indicated that this Activity has been completed.

Activity, reported as complete	Organization Responsible (supporting organizations)	Time Frame	Expected results / outputs	Notes (as per Nov 2017)
P5.5 Provide additional health and safety (H&S) training and enforce all H&S policies and practices.	NUC	1 year	Training provided. H&S policies implemented.	NUC indicated that this Activity has been completed.
P5.6 Purchase sufficient personal protection equipment for all staff.	NUC	1 to 2 years	Equipment purchased. Fewer accidents.	NUC indicated that this Activity has been completed.
R1.1 Prepare Solar Feasibility Study and technical standards and specifications for all phases of solar installations.	NUC (CIE)	6 months	Location, specifications, grid connections and costs of all solar plants determined.	NUC indicated that this Activity is completed as the tender for next solar PV farm at Meneng has been issued by NZ MFAT to select panel members. Tenders closed 28 November 2017. This tender is expected to lead to the installation of at least 1 MW of ground-mount solar PV at the Meneng site and rooftop PV for the new jail in 2018.
R1.3 Develop regulations, standards and payment methods for private generation using solar energy sources.	NUC (CIE)	2 to 3 years	Incentives and information to support private investment in solar in place.	NUC indicated that this Activity has been completed for rooftop PV. What rooftop PV information is available on NUC's website has not been able to be verified as NUC's website has not been accessible since September 2017.
R1.4 Prepare tender documents and carry out tender for first 600 to 1000 kW of grid-connected solar without storage.	NUC (DoF, CIE)	1 year	Contract awarded for installation of up to 1,000 kW	NUC indicated that this Activity is completed as the Masdar funded, Buada 500 kW solar PV system was commissioned May 2016.
R2.1 Carry out a wind resource assessment and feasibility study.	NUC	1 year	Determination of feasibility of wind power project.	NUC indicated that this Activity has been completed. Feasibility study should be published on an appropriate website.

Activity, reported as complete	Organization Responsible (supporting organizations)	Time Frame	Expected results / outputs	Notes (as per Nov 2017)
P4.5 Continue and strengthen prepayment and metering system, including: a) Move all residences and businesses to prepaid; b) meter all industrial and government buildings; c) Check systematically correct functioning of meters; and d) develop measures to prevent meter tampering.	NUC (CIE and other stakeholders)	1 year	All residences and businesses have pre-paid meters. Meter tampering reduced.	NUC indicated that this Activity has been completed.
P4.6 Develop and implement process to move fuel purchasing responsibility from government to NUC.	DoF (NUC)	2 years	Fuel purchase cost appears in NUC annual budget	DoF indicated this Activity was complete. Since June 2015, NUC purchases diesel fuel from Vital Energy.
P5.1 Identify training needs across all units and at all levels, develop a training plan and implement training programs.	NUC	6 months, ongoing training	Appropriately qualified staff. Improved staff retention.	NUC indicated that this Activity has been completed as NUC's Strategic Plan was completed in 2014.
P5.2 Develop and implement talent identification, apprenticeship and scholarship scheme for power sector.	NUC (DoE, DoF, CIE)	1 to 2 years, ongoing	Appropriately qualified staff. Improved staff retention.	NUC indicated that this Activity has been completed and is ongoing..
P5.3 Design and implement a Performance Management System for lower level NUC staff.	NUC	1 to 2 years	Performance Management system implemented.	NUC indicated that this Activity has been completed.

Activity, reported as complete	Organization Responsible (supporting organizations)	Time Frame	Expected results / outputs	Notes (as per Nov 2017)
F1.4 Carry out a feasibility study for the tender of the fuel terminal operation and bulk fuel supply to a private sector operator.	NUC (DoF)	6 months	Feasibility study completed.	DoF indicated that this Activity has been completed.
F1.5 If feasibility study is favorable, prepare documents for tender for private fuel terminal operator and bulk fuel supplier.	NUC (DoF)	1 year	Tender related documents prepared.	DoF indicated that this Activity has been completed.
F1.6 Undertake tender for a terminal operator and defined term (3-5 years) bulk fuel supplier.	NUC (DoF)	1 to 2 years	Fuel Terminal operator contracted. Long term supply arrangement in place. Technical Service Agreement in place.	DoF indicated that this Activity has been completed. The contract with Vital Energy was executed in June 2015.
F1.7 Establish a fuel industry levy to support government administration and regulation of fuel operator	DoF	2 to 3 years	Fuel industry levy established.	DoF indicated that three fuel industry levies have been introduced: • 3cpl Compliance Integrity Program • 3cpl Through Put Fee • 40cpl Mooring Through Put Fee (NUC and aviation exempt).
T1.5 Using results of Activity T1.3, design and implement a public transport system for Nauru.	DoT (CIE)	3 to 4 years	Public transport system designed and implemented.	DoT indicated that this Activity has been completed as public buses are available.

Activity, reported as complete	Organization Responsible (supporting organizations)	Time Frame	Expected results / outputs	Notes (as per Nov 2017)
E1.1 Carry out household energy use survey.	Statistics Office (CIE, NUC, IUCN and UNDP)	3 months	Characteristics of energy use in residences determined.	UNDP indicated that this Activity has been completed. Survey is on restricted access here: http://prdrse4all.spc.int/data/nauru-2015-household-electrical-appliances-lights-and-end-use-survey-datasets
E1.2 Procure the necessary software and analyse pre-payment meter data to identify customers tampering with meters and to categorize customers as to energy use to allow for targeted energy efficiency programs.	NUC	6 months	Software purchased. Pre-payment meter data analysed.	NUC indicated that this Activity has been completed.
E2.6 Replace street lights to EE technologies combined with solar power.	NUC	2 years	EE street lights installed.	NUC indicated that this Activity has been completed.
F1.1 Establish a technical service agreement with a fuel testing laboratory to sample, test and certify jet fuel existing stocks and new deliveries.	NUC	3 months	Certified, safe, quality compliant jet fuel.	DoF indicated that this Activity is completed as the contract with Vital Energy, executed in June 2015, requires them to test and ensure fuel quality.
F1.2 Prepare fuel pricing template and provide training to NUC and DoF staff.	NUC (DoF)	6 months	Template developed. Staff trained.	DoF indicated that this Activity is completed with the Nauru Pricing Template supported by a fuel consulting firm.
F1.3 Carry out training and recertification of staff at the fuel terminal including for shore officers, testing officers, terminal managers and aviation refuelers and fitters.	NUC	6 months	Staff trained and certified	DoF indicated that this Activity has been completed.

Activity, no longer a priority	Agency Responsible (supporting agencies)	Time Frame	Expected results / outputs	Notes (as per Nov 2017)
R2.5 Investigate the potential for and identify suitable plants that can be used to green the Topside and provide appropriate biomass for future biofuels production.	CIE (DoA, NRC)	3 to 5 years	Level of potential determined and suitable plants identified.	DoA and NRC indicated food production was a higher priority than biofuels.
R2.6 Investigate the potential for biogas from pigs (and other) for domestic cooking.	CIE	2 to 3 years	Level of potential for biogas cooking identified	DoA indicated this was not a priority as they only had a small number of pigs.
F1.8 Develop mechanism using the TWGEn for decisions on future capital works related to fuel supply.	CIE (TWGEn)	3 to 4 years	Mechanism established for decision making.	DoF indicated that this was no longer required.
F2.4 Carry out a study on potential substitutes of petroleum (e.g. biofuel, biomass).	CIE (DoA, NRC)	2 to 3 years	Realistic alternative fuel options for Nauru identified	DoA and NRC indicated limited interest in biofuels due to lack of feedstocks and food being a higher priority.
F2.2 Identify barriers to the increased use of LPG for cooking and design actions to remove those barriers (parallel with activity **F2.1**).	CIE (Various stakeholders)	1 to 2 years	Barriers to increased LPG use for cooking identified and removed.	CIE may not be able to influence the price of LPG. CIE and NUC indicated that this was no longer a priority.
F2.3 Implement actions to remove barriers to use of LPG as identified in Activity **F2.1** and **F2.2**.	CIE (Various other stakeholders)	2 to 3 years	LPG use for cooking increased.	This Activity may be beyond CIE's capacity to influence.
T1.1 Develop a policy statement and if appropriate, a target, for the transport sector with regard to energy related issues.	CIE (DoT)	1 year	Policy statement developed. Target agreed.	DoT indicated that this was not a priority.

Appendix C: Activities no longer a priority

For the following 18 Activities, stakeholders indicated they were no longer a priority during the 2017 consultations. Similar to the previous Activity tables, most of this text below is taken directly from the NERM 2014 - 2020. However, the Notes column is new, to provide further context and information.

Activity, no longer a priority	Agency Responsible (supporting agencies)	Time Frame	Expected results / outputs	Notes (as per Nov 2017)
C1.3 Develop Petroleum Act.	CIE (NUC, DoJ)	1 to 2 years	Petroleum Act and relevant regulatory instruments in place.	DoF indicated that a Petroleum Act was not a priority.
C3.4 Support and facilitate the activities of the PSC and the TWGEn.	CIE	Ongoing	Appropriate support provided to the TWGEn and the PSC.	TWGen and PSC do not appear to be ongoing. This has been revised to NERM Coordination Committee in CIE's Activities.
C3.7 Support capacity to collect and manage data and data sharing and reporting.	CIE	Ongoing	Support provided to energy data systems.	Data to be collected as well as where it is reported is outlined in the Monitoring and Evaluation Plan, so doesn't need to be a separate Activity.
C4.1 Develop private sector and community strategy, including engagement and multi-stakeholder partnerships.	CIE (Private sector, civil society and others)	6 months to 1 year	Private sector and community strategy developed.	Strategy C4 is Foster a culture of partnerships between public and private sectors including the community. Stakeholders indicated it was unclear what the focus of this strategy was to be.
C4.2 Implement engagement and multi-stakeholder participatory activities as laid out in the strategy developed under Activity **C4.1**.	CIE (Various stakeholders)	1 to 3 years	Greater engagement of private sector and communities in the energy sector. Development of multi-stakeholder partnerships.	See note for **C4.1**. If CIE wants to communicate and engage the community, a website may be useful.

Activity, no longer a priority	Agency Responsible (supporting agencies)	Time Frame	Expected results / outputs	Notes (as per Nov 2017)
R2.5 Investigate the potential for and identify suitable plants that can be used to green the Topside and provide appropriate biomass for future biofuels production.	CIE (DoA, NRC)	3 to 5 years	Level of potential determined and suitable plants identified.	DoA and NRC indicated food production was a higher priority than biofuels.
R2.6 Investigate the potential for biogas from pigs (and other) for domestic cooking.	CIE	2 to 3 years	Level of potential for biogas cooking identified	DoA indicated this was not a priority as they only had a small number of pigs.
F1.8 Develop mechanism using the TWGEn for decisions on future capital works related to fuel supply.	CIE (TWGEn)	3 to 4 years	Mechanism established for decision making.	DoF indicated that this was no longer required.
F2.4 Carry out a study on potential substitutes of petroleum (e.g. biofuel, biomass).	CIE (DoA, NRC)	2 to 3 years	Realistic alternative fuel options for Nauru identified	DoA and NRC indicated limited interest in biofuels due to lack of feedstocks and food being a higher priority.
F2.2 Identify barriers to the increased use of LPG for cooking and design actions to remove those barriers (parallel with activity **F2.1**).	CIE (Various stakeholders)	1 to 2 years	Barriers to increased LPG use for cooking identified and removed.	CIE may not be able to influence the price of LPG. CIE and NUC indicated that this was no longer a priority.
F2.3 Implement actions to remove barriers to use of LPG as identified in Activity **F2.1** and **F2.2**.	CIE (Various other stakeholders)	2 to 3 years	LPG use for cooking increased.	This Activity may be beyond CIE's capacity to influence.
T1.1 Develop a policy statement and if appropriate, a target, for the transport sector with regard to energy related issues.	CIE (DoT)	1 year	Policy statement developed. Target agreed.	DoT indicated that this was not a priority.

Activity, no longer a priority	Agency Responsible (supporting agencies)	Time Frame	Expected results / outputs	Notes (as per Nov 2017)
T1.2 Design and implement programs to provide incentives and facilities to improve the quality of maintenance for personal transport (cars).	CIE (DoT)	1 year	Improved maintenance and fuel efficiency of land vehicles.	CIE and DoT indicated that this was not a priority. Agencies do not appear to have the capacity or resources to design incentive programs and facilities to improve vehicle maintenance.
T1.4 Undertake a study of public transport systems in Pacific Islands, with similar traffic patterns.	CIE (DoT)	2 to 3 years	Study completed.	DoT indicated it was unclear what such study will achieve.
T2.2 Investigate the future potential of biofuel production on Topside for vehicles and small vessels.	CIE	3 to 5 years	Potential for biofuel identified.	DoA, NRC and CIE indicated limited interest in biofuel production from new crops.
P1.3 Purchase and install power quality equipment at the power station including AVR replacement and governor and upgrade of controls.	NUC	1 year	Power quality equipment purchased and installed	NUC indicates this is no longer required as the new diesel gensets remove the need for this.
R2.2 Prepare and implement wind generation project if determined to be economically feasible.	NUC	5 years	Wind project implemented.	Average wind speed at 30m above ground at Anabar was reported as 4.2 m/s. This is unlikely to be sufficient to justify wind generation. The 2010 Wind Power Feasibility Report is available by formal request to SPC[17].
F2.1 Undertake a study to explore options for more economic supply of LPG.	NUC (CIE)	1 to 2 years	Long term LPG supply options identified	CIE indicated limited interest in facilitating increased LPG competition.

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