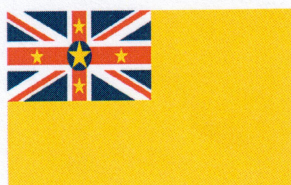





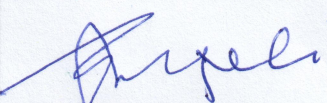
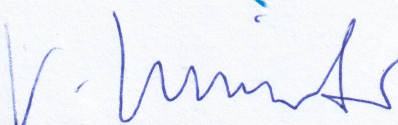
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United Nations Development Programme
Project Document template for nationally implemented projects
financed by the GEF/LDCF/SCCF Trust Funds

Project Title: Accelerating Renewable Energy and Energy Efficiency Applications in Niue (AREAN)		
Country: Niue	Implementing Partner: In Niue: Department of Utilities. Ministry of Infrastructure	Management Arrangements: National Implementation Modality (NIM)
<p>UNDAF/Country Programme Outcome: <i>UN Pacific Strategy 2018-2022:</i> Outcome 1 – Climate Change, Disaster Resilience and Environmental Protection.</p> <p>UNDP Sub-Regional Programme Document 2018-2022: Outcome 1 – By year 2022, people and ecosystems in the Pacific are more resilient to the impacts of climate change, climate variability and disasters; and environmental protection is strengthened.</p>		
<p>UNDP Strategic Plan Output: <i>Output 1.4:</i> Scaled up action on climate change adaptation and mitigation across sectors which is funded and implemented. <i>Output 1.5.</i> Inclusive and sustainable solutions adopted to achieve increased energy efficiency and universal modern energy access (especially off-grid sources of renewable energy)</p>		
UNDP Social and Environmental Screening Category: Moderate	UNDP Gender Marker: GEN1	
Atlas Project ID/Award ID number: 00117508	Atlas Output ID/Project ID number: 00114277	
UNDP-GEF PIMS ID number: PIMS 6037	GEF ID number: ¹ 9752	
Planned start date: 1 October 2019	Planned end date: 30 September 2023	
LPAC date: 16 September 2019		
<p>Brief project description: The objective of the AREAN project is to enable the achievement of low carbon energy access, sustainable energy and green growth targets of Niue as stated in the Niue Sustainable Energy Road Map (NiSERM), which is the basis of the country's latest NDC. The government has been, and continues to be, very focused on the achievement of its renewable energy and energy efficiency targets, especially the generation of 80% of its electricity needs from renewable sources by 2025; however, the available financial and technical resources will not be enough to guarantee a timely and full achievement of said targets without additional support from international donors. The design of AREAN follows a holistic approach to the removal of all the barriers, identified in the AREAN Project Information Form (PIF) and confirmed during the project development stage, by synergistically interconnecting all the activities of five (5) different components, namely: 1) Improvements in Energy Integrated Development Policy and Planning; 2) Institutional Capacity Building on Low Carbon Development; 3) Improvements in the Financing of Low Carbon Development Initiatives; 4) Climate Resilient and Low Carbon Technologies Applications; and 5) Enhancement of Awareness on Low Carbon Development. The project will be implemented over a period of 48 months, spanning from 2019 to 2023, and the total amount of GHG emission reductions is estimated to be approximately 112.2 kilotons CO₂. The GHG emission reductions will be partly realized during the implementation period of the AREAN project and partly achieved after the completion of the project, throughout the lifespan of the equipment provided for the demonstration projects as well as other investment type activities.</p>		

¹Project ID number will be assigned by GEFSEC and to be entered by Agency in subsequent document submissions.

FINANCING PLAN		
GEF Trust Fund		US\$ 3,321,563
Cash co-financing to be administered by UNDP		
(1) Total Budget administered by UNDP		US\$ 3,321,563
PARALLEL CO-FINANCING (all other co-financing that is not cash co-financing administered by UNDP)		
UNDP		US\$ 100,000
Co-financing: Government of Niue (Grants)		US\$ 15,706,000
Co-financing: Government of Niue (In-Kind)		US\$ 1,900,000
(2) Total co-financing		US\$ 17,706,000
(3) Grand-Total Project Financing (1) +(2)		US\$ 21,027,563
SIGNATURES		
Signature:  Ms. Peleni Talagi Secretary to Government	Agreed by Government	Date/Month/Year: 22/08/2019
Signature:  Hon. Pokotoa Sipeli Minister of Infrastructure Ministry of Infrastructure Government of Niue	Agreed by Implementing Partner	Date/Month/Year: 29/08/2019
Signature:  Ms. Verena Linneweber Deputy Resident Representative UNDP MCO Cook Islands, Niue, Samoa & Tokelau	Agreed by UNDP	Date/Month/Year: 29/08/2019

List of Abbreviations & Acronyms

ADB	Asian Development Bank
ADO	Automotive Diesel Oil
AREAN	Accelerating Renewable Energy and Energy Efficiency Applications in Niue
BAU	Business-as-Usual
BEMS	Building Energy Management System
CCM	Climate Change Mitigation
CTA	Chief Technical Advisor
DoT	Department of Transport
DoU	Department of Utilities
EC	Energy Conservation
EDF	European Development Fund
EE	Energy Efficiency
EMRS	Energy Monitoring and Reporting System
EV	Electric Vehicle
GDP	Gross Domestic Product
GHG	Green House Gas
GIZ	Gesellschaft für Internationale Zusammenarbeit
GJ	Giga Joule
GoN	Government of Niue
GoNZ	Government of New Zealand
GW	Giga Watt
GWh	Giga Watt hour
INDC	Intended Nationally Determined Contribution
IRR	Implementing Rules and Regulations
IUCN	International Union for Conservation of Nature
km ²	Square kilometer
kW	kilo Watt
kWh	kilo Watt hour
kWp	kilo Watt peak
LC	Low Carbon
LCD	Low Carbon Development
LFA	Log Frame Analyses
LPG	Liquefied Petrol Gas
MCO	Multi-Country Office
Mol	Ministry of Infrastructure
MW	Mega Watt
MWh	Mega Watt hour
MWp	Mega Watt peak
M&E	Monitoring and Evaluation
NBF	Niue Bulk Fuels
NDB	Niue Development Bank
NDC	Nationally Determined Contribution
NiSERM	Niue Strategic Energy Road Map
NNSP	Niue National Strategic Plan
NPC	Niue Power Corporation
NPD	National Project Director
NZ\$	New Zealand Dollar
NZHC	New Zealand High Commission
OFP	Operational Focal Point

O&M	Operation and Maintenance
PALS	Pacific Appliance and Labelling Standards
PB	Project Board
PIC	Pacific Island Country
PIR	Project Implementation Review
PMCU	Project Management and Coordination Unit
PMU	Project Management Unit
PV	Photo Voltaic
PWD	Public Works Department
RE	Renewable Energy
RET	Renewable Energy technology
RMU	Ring Main Unit
SAIDI	System Average Interruption Duration index
SCADA	Supervisory Control And Data Acquisition
SDG	Sustainable Development Goal
SIDS	Small Islands Developing States
SOE	State Owned Enterprise
SPC	Secretariat of the Pacific Community
TA	Technical Assistance
tCO ₂ -eq	tonne Carbon dioxide equivalent
ToC	Theory of Change
toe	tonne oil equivalent
UNDP	United Nation Development Program
UNFCCC	United Nations Framework Convention on Climate Change
US\$	United States Dollar

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II. DEVELOPMENT CHALLENGE

2.1 Development Challenge and Relevance to National Development Priorities, Global Environment and Sustainable Development Goals (SDGs)

Niue is a South Pacific elevated coral island located in the middle of a triangle formed by Tonga, Samoa and the Cook Islands. With a land area of 260 km² and a population of approximately 1500 people, Niue is one of the smallest and least populated countries in the world. The terrain consists of steep limestone cliffs along the coast with a central plateau rising to about 60 meters above sea level. The island has a tropical climate, with most rainfall occurring between November and April. Because of its small land size and population, and relatively poor soil, Niue has very limited natural and human resources, making the country highly dependent on foreign aid and international support.

Niue gained a status of self-government in free association with New Zealand in 1974, as an outcome of a referendum. New Zealand, however, maintains a statutory obligation to provide financial support to Niue. The country's 2012 GDP was NZ\$ 24.5 million (~US\$ 19.5 million), equivalent to a GDP per capita of NZ\$ 16,300 (~US\$ 13,000) (NiSERM). New Zealand's financial support is about 70% of Niue's GDP (INDC¹). Due to its geographic isolation, freight costs to provide goods and services are particularly high.

Because of all these constraints, Niue is far from being economically self-sufficient and it strongly depends on financial support from international developing partners. In addition, Niue is not currently accredited to apply for loans (a membership request to the Asian Development Bank –ADB– is still under consideration) and therefore financial support must come in the form of grants.

On October 2016, Niue submitted to the UNFCCC its Intended Nationally Determined Contributions or INDC, and on the same date the Government of Niue (GoN) also ratified the Paris Agreement essentially turning its INDC into an NDC. The NDC is based on the Niue Strategic Energy Road Map for 2015-2025 (NiSERM²), which contains all its energy targets set and/or reformulated. The main goal set in the NiSERM is to generate 80% of its electricity needs from Renewable Energy (RE) sources by 2025. The achievement of this target will be Niue's contribution to the global environmental protection and to the world's efforts of reducing the total GHG emissions. However, Niue does not have the financial means or the technical expertise to achieve this goal on its own, without external support. To fulfill its pledge the country is therefore requesting financial aid and technical assistance through the preparation of the present project proposal: ***Accelerating Renewable Energy and Energy Efficiency Applications in Niue (AREAN)***. The objective of AREAN is to enable and facilitate the achievement of low carbon energy access, sustainable energy, and green growth targets of Niue. The achievement of the 80% electricity from RE is prevented by grid instability issues that affected the electric grid since the early stages of solar PV projects implementation and have not been solved yet. In addition, stakeholder consultations have shown that these problems of grid instability have led to a general climate of lack of confidence in this technology among Niueans.

It must be noted that the country has two remarkable features: 1) Niue has achieved 100% electricity penetration and all 14 villages spread throughout the island are grid connected; and 2) the island is a net sink for GHG emissions, due to its large forest area. Every year Niue removes approximately 139,000 tCO_{2-eq} versus ~5,000 tCO_{2-eq} emitted (GHG emissions from waste and agriculture sectors are not measured) (NiSERM).

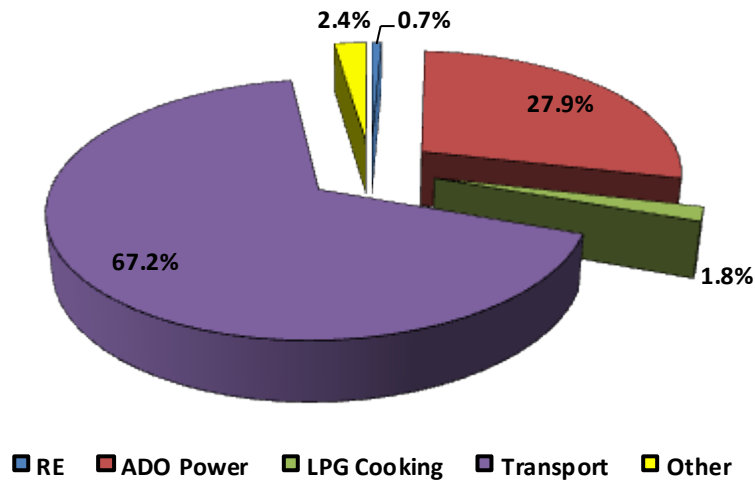
¹ Niue Intended Nationally Determined Contributions,

<http://www4.unfccc.int/ndcregistry/PublishedDocuments/Niue%20First/Niue%20INDC%20Final.pdf>

² Niue Strategic Energy Road Map for 2015-2025, http://prdrse4all.spc.int/system/files/niue_strategic_energy_road_map_2015-2025_updated_3.pdf

The major issue for Niue’s energy sector is that 99% of energy demand is met through imported fossil fuels (primarily used for land/air/marine transportation, electricity generation, and cooking; Figure 1 provides a breakdown of all energy consumed in Niue in 2017), while only 1% is met domestically (solar energy for water heaters and electricity generation, and biomass for cooking).

Figure 1. Niue Energy Consumption in 2017 – Total Energy 111,900 GJ (GoN)



Due to high freight costs, energy imports impact by as much as 15.3% of Niue’s GDP (NiSERM), which is practically twice as large as the average value of 7.8% for fossil fuels imports as percentage of GDP recorded for similar Pacific Island Countries (PICs) (PFTAC – IMF³). The situation is worsened by two factors: 1) Niue has a very small population, which means a small basis for tax revenues; however GoN still has to provide all basic services (health, education, finance, safety, etc.) whose costs cannot be distributed over a large number of beneficiaries resulting in high costs per capita; and 2) additionally, and perhaps most importantly, the population density of Niue is among the lowest in the whole world standing at less than 6 people/km²; since villages practically occupy the entire island, this translates into extremely high costs per capita of building, operating and maintaining infrastructures necessary to deliver public services (roads, electricity distribution network, water distribution system, public illumination, waste collection and disposal systems, etc.).

In addition, being so dependent on fuel imports, Niue is constantly exposed to the risk of not receiving fuel supplies on time, especially during cyclone season, which lasts from November through April. GoN has plans to increase its fuel supply security to 60 days (regular shipments are delivered every 28 days), up from the current levels of 42 days (which provides a two-week buffer in addition to the normal four-week shipment schedule). Furthermore, air quality around the powerhouse is negatively affected by the constant burning of diesel oil. Reducing the diesel generator operations to only provide 20% of the electricity needs will improve not only the working conditions of the Niue Power Corporation (NPC) employees but the air quality of the people living in proximity of the powerhouse as well.

Besides providing global environment benefits and making Niue more energy independent, a significant advantage of achieving the RE and Energy Efficiency (EE) targets established in the NiSERM would be the possibility of freeing a significant portion of the public finances and direct the funds toward activities to promote social and economic advancements.

³ www.pftac.org/content/dam/PFTAC/Documents/Useful%20Links/Regional%20Papers/PFTAC_Energy_Prices.pdf

AREAN is relevant to the achievement of several Sustainable Development Goals (SDGs) as set by the United Nations Development Programme (UNDP). Primarily to Goal 7: “Ensure access to affordable, reliable, sustainable and modern energy for all”, but also to Goal 8: “Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all”, Goal 13: “Take urgent action to combat climate change and its impacts by regulating emissions and promoting developments in renewable energy”, and to a lesser extent to Goal 6: “Ensure availability and sustainable management of water and sanitation for all” and Goal 9: “Build resilient infrastructure, promote inclusive and sustainable industrialization, and foster innovation”.

2.2 Barrier Analysis

The approach taken for the design of the AREAN project is barrier removal. The barriers hindering the achievement of the green growth targets set in the NiSERM have been identified in the AREAN Project Information Form (PIF). During the Logical Framework Analysis (LFA) Workshop, held in Alofi, Niue on February 13 and 14 2018, the participant stakeholders have analyzed them and identified the immediate, intermediate and root causes of the core problem of low carbon energy access, sustainable energy, and green growth targets of Niue not being fully achieved. The identified immediate causes of the core problem are:

1. Inadequate and not fully enforced policies, regulations and standards related to sustainable energy and Low Carbon Development.
2. Uncoordinated to non-enforcement of plans, policies, regulations and implementation of programs/projects on the application of climate resilient and low carbon technologies in the end-use sectors.
3. Limited availability of, and access to, financing for sustainable energy, energy access and low carbon development initiatives in the energy supply and demand sectors.
4. Climate resilient and low carbon techniques and practices are not adopted and implemented in the energy supply and energy end use sectors.
5. Low level of confidence in the viability of climate resilient and low carbon technology applications in the energy supply and demand sectors.
6. Low level of awareness and poor attitude towards Climate Resilient and Low Carbon technologies in the energy end use sectors.

The causes of the core barriers are discussed next.

Policy and Regulatory Barriers:

The main barrier under this category is the lack of policies for enabling actions that would motivate interest in developing and sustaining the country’s energy sector. Among these are: (a) very general policies on renewable energy and energy efficiency; (b) lack of policies regarding financial/fiscal incentives that would encourage private sector (local and/or foreign) capital in sustainable energy projects in the country; (c) inadequate enforcement of existing energy policies and strategies, inclusive of the supporting rules/guidance and legislations/regulations; and, (d) lack of specific policies and regulations about the energy utilization in major end-use sectors, e.g., buildings sector (i.e., no specific aspects of EE and RE applications in the national building code) and in the transport sector. Apart from the policy/regulatory related barriers, there is the absence of energy integrated development planning for the different sectors of the national economy that consider the energy and environmental impacts of development policies, decisions and programs implemented.

Institutional Barriers:

Presently, the coordination of the national energy objectives and strategies to the policies, strategies and work programs of other relevant government entities are inadequate. With the current status of

the NPC as a State-Owned Enterprise (SOE), it is not very clear how it coordinates its work with the responsible GoN entity in electricity generation and distribution. This problem of weak institutions that are inadequate to provide sustainable operations of energy systems is exacerbated by the fact that NPC needs capacity building in this area. Also, among the causes of the weak institutional capacity is the lack of government energy planners and energy specialists on RE, non-RE and EE technologies that can ensure donor funded energy projects are in fact appropriate for the country.

Financial and Market Barriers:

The lack of financing is the major financial/market barrier to the implementation of RE and EE projects in the country. This is mainly because of: (a) dependence on donor funding for this kind of projects; (b) inadequate government budgets for renewable energy development; (c) fiscal policies that are biased against RE and EE (e.g., import duties levied on RE/EE systems); (d) limited opportunities for access to funding for RE and EE projects by energy consumers, due to lack of capacity to develop and prepare bankable RE and EE project proposals; and, (e) private sector involvement in the energy sector is limited. In addition, the cost of RE-generated electricity is often perceived to be not competitive because petroleum fuels are more convenient to use and currently are relatively cheap compared to previous years. Furthermore, the rather small market size of Niue is not attractive to private enterprises interested in providing RE systems or selling EE appliances/equipment. The market for technical skills and products is small for the profitable development of a private sector technical services or sales industry.

Technical Barriers:

The current major technical barrier is the grid instability when more RE-based systems are integrated to the existing power grid. While the limited capacity of NPC technical and operational personnel on the integration of RE-based power generation systems and on the operation and maintenance of such grid connected systems contributes to this problem, such problem has not yet been adequately addressed. This has resulted to some of the presently installed on-grid solar PV systems not able to feed into the grid. The current low level of energy generated from renewable sources achieved reflects the limited successful Renewable Energy Technology (RET) applications experience, particularly RE systems for electricity generation. The lack of capacity to operate and maintain RE systems (power and non-power applications) is exacerbated by the difficult environment for installed electrical and mechanical equipment for RE-based power generation. There are also a very small number of government and private sector people having technical competence applicable to energy development because of the lack of opportunities, apart from projects, for continuing education on RE and EE technologies applications, and in the operation and maintenance of systems employed in such applications.

Awareness and Capacity Barriers:

There is in general lack of confidence in RE due to previous project failures in Niue and in other PICs, and the current grid stability problem that resulted in the non-use of some of the installed grid connected solar PV systems. This makes it difficult to generate enthusiasm at either the public or private level for new RE efforts. This is also due to the lack of understanding of the application of RE and EE technologies by decision makers, the general public and businesses especially on the advantages, disadvantages and costs of RE and EE technologies. Because of the lack of opportunities to apply knowledge and skills learned from capacity development on RE and EE technology applications, and in the operation and maintenance of systems in such applications, the expected impact in terms of the level of knowledge and technical skills of technical personnel in NPC and the government was not realized.

With regards to knowledge and information on low carbon (both RE and EE) technologies, there is lack of information about LC technologies, and the performance of the solar PV systems that are connected

into the NPC grid. Information about the power generation performance of the utility remains very limited for NPC or government to be able to make a truly informed decision as to the proper course to take to improve the system performance reliability. Moreover, there is also low level of capacity among government institutions in data acquisition, analysis and management, as well as on the use of existing computer models for sustainable energy and LCD.

The abovementioned barriers, if not properly and adequately addressed/removed will continue to prevent the timely and complete achievement of the NiSERM targets.

2.3. Business-As-Usual Scenario

AREAN Project’s objective to enable Niue to achieve its low carbon energy access, sustainable energy, and green growth targets is based on the country’s NDC, which in turn was based on the NiSERM, an energy road map prepared for the decade 2015-2025. The main target set by Niue is the generation of 80% of its electricity needs from renewable energy sources by 2025. Additionally, the road map established other RE/EE targets, as shown in Table 1 below. To date very little has been done to convert in action the recommendations provided by the NiSERM. Specifically, in the past three years the projects completed or initiated are: a) the establishment, in early 2017, of a US\$ 80,000 high energy efficiency household appliances rebate/loan scheme (which includes freezers, refrigerators and washing machines). To date the scheme has not disbursed all of its available budget yet; b) the installation of a 90 kWp solar PV system in 2016 funded through EDF-10; c) the recent shipment and installation of 200 kWp of solar PV panels donated by Japan; d) the installation of two water solar pumps that reduce the electricity demand (issues have been reported on the mal-functioning of these pumps, likely related to the inadequate power capacity to supply the required water volumes); and e) three second hand electric vehicles (EV) have been purchased by private owners.

Table 1. Niue RE and EE Targets (NiSERM and updates from GoN)

Target	Target Year	Baseline
Generate 80% of electricity with renewable sources	2025	2% in 2014
Reduce electricity demand by 10%	2020	BAU
Reduce electricity demand by 15%	2025	BAU
Reduce power station losses to 4.5%	2020	5.2% in 2011
Reduce power station losses to 4.0%	2025	5.2% in 2011
Increase diesel GenSets power generation efficiency to 4.0 kWh/L	2020	3.77 kWh/L in 2014
Introduce 1.0% of fuel-efficient vehicles	2020	0% in 2014
90% of households use LPG for cooking	2025	34% in 2014
Keep Average Forced Outage below the regional average of 5.4%*	2020	
Keep SAIDI < 200 min/customer, the regional average goal*	2020	

*Baseline values for these two targets are not available

It appears clear that under this BAU scenario, Niue will be unable to timely achieve all its targets if financial and technical support from international donors and development partners are not made available.

The biggest technical challenges faced by Niue are the severe grid instability issues suffered since the beginning of the adoption of solar PV technologies. Because of these issues, most of the PV systems have been put off-line and a thorough assessment analysis has been conducted on how instability

issues of that current grid can be resolved (KEMA⁴). Because of this situation, solar PV panels only provide about 2% of Niue’s ~3.5 GWh of yearly electricity generation. With the installation of the 200 kWp PV panels donated by Japan (the installation costs are borne by New Zealand), Niue has reached a solar PV generation capacity of 543 kWp, but since the instability issues have not been solved yet the current amount of on-grid/off-grid solar panels is not clearly defined.

2.4. Baseline Initiatives

Currently, there are several baseline projects/programs⁵ that are ongoing and planned (and budgeted) that will allow Niue to get closer to achieve the targets stated in Table 1. These include:

Baseline Project/Program	Description	Available Budget, US\$⁶
<i>Niue/NZ Renewable Energy Partnership – 1st Tranche</i>	This is a New Zealand funded project aimed at bringing the power generation capacity (kW) from solar PV systems up to a level that will generate electricity that is approximately 35% of the total national electricity production. The activities include a) the installation of the 200 kWp solar PV system; b) purchase of 9 transformers and switchgears (Ring Main Unit – RMU); c) capacity building for NPC personnel; d) installation of 600 kWp solar PV panels; e) installation of 750 kWp of inverters and power conversion equipment; f) purchase of 3.15 MWh Li-ion Powerwall II Tesla batteries for electricity storage; and g) interventions towards the stabilization of the electric grid. It is important to highlight that the activities under this project will not remove all the grid instability issues especially with the addition of significant solar PV power generation capacity.	3,500,000
<i>Niue/NZ Renewable Energy Partnership – 2nd Tranche</i>	This planned subsequent grant project is aimed at bringing Niue to achieving approximately 55% RE electricity production. The activities include a) purchase additional Li-ion Powerwall II Tesla battery banks; and b) installation of additional solar PV panels ⁷ .	3,500,000
<i>Construction of the new Cabinet and Parliamentary House (Fale Fono)</i>	Design and construction of a new building to host the country’s Premier and Cabinet. It will incorporate state-of-the-art climate resilient measures in the building design. However, low carbon (RE and EE) technology features have not been adequately considered and adopted.	3,500,000
<i>Implementation of the Joint National Adaptation Plan (JNAP)</i>	The main purpose of this plan is to assist and support the GoN in reducing its vulnerability to climate driven extreme events. The plan also promotes mitigation actions and energy efficiency and energy conservation measures in sectors such as electricity, buildings, transportation, industry, tourism, agriculture, forestry, communication and water.	3,000,000
<i>Implementation of the Niue National Strategic Plan (NNSP⁸)</i>	The NNSP (2016-2026) is an annual strategic development planning based on inputs provided by the various GoN ministries and departments, including the implementation of specific policy research studies and capacity development in economic planning.	490,000

⁴ “Niue Dynamic Stability Study – Integrating Renewable Energy”, Niue Power Corporation, DNV KEMA, 2012

⁵ Some of the baseline projects identified at the time of the Project Information Form (PIF) preparation were already completed by 2018 and are not included in the above table.

⁶ This is estimated available budget during the implementation period of the AREAN Project

⁷ The exact total capacity that will be installed during this phase has not been determined yet and it will also depend on the battery capacity that will be procured (the objective is to add 5.0 MWh of storage capacity). During consultations with stakeholders, the New Zealand High Commission (NZHC) in Niue has indicated New Zealand willingness to provide more financial support to achieve the 80% electricity production target from RE. Completion of this project is slated for 2020.

⁸ “Niue National Strategic Plan – 2016-2026”, Government of Niue, 2016

<i>Implementation of the Energy Facility Asset Maintenance Plan</i>	Annual budget is allocated for this plan, which is for asset maintenance of the Niue power utility (NPC). This also covers technical support, staff, and data management of the power production information from the diesel generators as well as the RE systems. The asset management plan is co-funded by NZAid and the GoN.	1,505,000
<i>Construction of the Waste Recycling Centre</i>	This AusAid and NZAid funded project is for establishing and operating a waste recycling system. The activities will also include the assessment of potential and feasibility of waste-to-energy systems using solid and liquid wastes.	740,000
<i>Energy Compliance</i>	This GoN funded initiative provides the Ministry of Infrastructure, Regulatory Unit and Water Supply annual recurrent budget-Staff and Office space for use during the AREAN Project implementation period	560,000
<i>Energy Finance</i>	This GoN funded initiative provides the Treasury and Project management unit annual support towards project administrations, financing and M&E duration of the project and project evaluations process	500,000
<i>Implementation of the Water Strategic Plan</i>	For the implementation of specific water system improvement projects to contribute to the achievement of the water sector targets specified in the NiSERM, as well as capacity building program in water supply and use, including the potential application of EE and EC measures.	245,000
<i>Procurement of 11kV Transformer and Switchgears</i>	This for the completion of the underground electric cable network, which will make Niue's electric grid completely underground, and installation of additional transformers and 8 switchgears.	190,000
<i>Implementation of the GIZ-Alofi Project</i>	This German funded project provides financial support to improve Niue's water sector. It includes activities on capacity building and research focused on improving the water quality and the water delivery system.	196,000
<i>Adoption of Fuel-Efficient Vehicles</i>	This GoN support program to incentivize people to buy and use fuel efficient vehicles is intended to achieve the NiSERM target of 1% of efficient vehicles (including electric vehicles, hybrid cars, and engine cylinder capacity of less than 1300 cc) by 2020. The program enables the complete waiving import duties on such type of vehicles.	140,000
<i>High EE Household Appliances Financing Scheme</i>	This is an ongoing program launched in 2017 that provides a fixed 25% rebate for purchasing high energy efficient refrigerators, freezers and washing machine. Alternatively, the participant to this financing scheme can opt to obtain a 0%-interest loan on the entire capital expenditure.	40,000

Despite the above baseline initiatives, it is expected that the completion of all these projects will not be enough to realize the timely achievement of Niue's RE/EE targets. The AREAN Project is intended to enable and facilitate the achievement of such targets with the implementation of a set of incremental activities that will enhance the results achieved with these baseline projects. These incremental activities are designed to facilitate the removal all the barriers hindering the achievement of the GON's energy targets.

III. STRATEGY

3.1. Applied Project Strategy and Incremental Activities

The AREAN Project is designed based on a barrier removal strategy. The strategy calls for the design of *ad-hoc* activities that build on, and complement/supplement/augment, the baseline projects to address the identified barriers (See Section 2.2). A barrier removal approach is the best available strategy because of its sustainability; removing the root, intermediate and immediate causes of the core problem of Niue's energy access, sustainable energy, and green growth targets not being fully achieved will enable the country to become independent in pursuing its energy targets in the future. The strategy is illustrated in the Theory of Change (ToC) diagram below. The ToC diagram shows the immediate causes that hinder GoN's efforts to achieve its energy roadmap targets and the consequence of not removing them. The implementation of the activities of the AREAN Project will remove the barriers and enable the realization of desirable outcomes that contribute to the achievement of the Project Objective: ***“Enabling the achievement of low carbon energy access, sustainable energy, and green growth targets of Niue”***. The following are the expected outcomes of the project and the proposed key ways in which the barrier removal approach strategy will be carried out to realize them:

Improved policy and regulatory frameworks in the application of energy efficiency and renewable energy technologies in the energy end-use sectors: The approach to deliver this first outcome is a threefold plan. It will start with the verification and confirmation of the earlier and new identified gaps and needs to fill in current policies and regulations as well as definition of areas of competence in relevant GoN departments and ministries. Next, existing laws and acts are revised, and new ones are formulated, approved and enforced in order to support the development and implementation of LC technologies. Recommended revised and new policies and regulations will be primarily delivered during the first half of the project implementation so that they can be evaluated and subsequently follow-up action plans to continue to improve the policy and regulatory frameworks can be prepared and implemented. These activities will be completed by an assessment of capacity needs of GoN personnel and, during the second half of the project implementation, training programs will be designed *ad-hoc* to make them capable of carrying out, after the project completion, energy planning and management of technology applications.

Effective enforcement of plans, policies and regulations, and implementation of programs/projects on the application of climate resilient and LC technologies in the end-use sectors: This outcome is linked to the previous outcome. Niue does not have a clear institutional framework in place to enforce the RE/EE policies and regulations that will be formulated/revised to deliver the first outcome. AREAN is designed to take all the actions required to define and/or clarify the role of all relevant stakeholders that are part of the institutional framework and coordinate their efforts, interactions and synergies for enforcing RE/EE policies and regulations. Training programs for relevant GoN personnel and stakeholders will be designed on how to fulfill their institutional mandates. A new government entity will be established to harmonize donor requirements with national systems in place, which will help standardize the design, implementation and management of LCD projects. Also, with the recent change of status of NPC becoming a SOE, the introduction of an independent regulator would facilitate the supervision of NPC operations. Like the previous outcome, evaluation reports will be prepared to draft and implement the necessary follow-up action plans that will allow supporting the institutional framework.

Increased availability of, and access to, financing for sustainable energy, energy access LCD initiatives in the energy supply and demand sectors: The achievement of this outcome is pivotal for the success of AREAN in facilitating and enabling Niue to achieve all its green energy targets. Despite the high costs

for importing efficient appliances and RE/EE technologies, Niue does not have in place any sort of incentives except for efficient cars (for which import duties are waived). AREAN strategy is to introduce financial and fiscal incentives that will increase the adoption of LC technologies. Training of key GoN stakeholders will make Niue capable of preparing and managing its own bankable project design. Training and support will be also provided to financial institutions (i.e., Niue Development Bank and Kiwibank) to efficiently run financing schemes to favor the adoption of EE technologies and special loans for the implementation of RE installations. These activities have the intent of establishing a private market to attract local and foreign investments; this economic and social development will be further supported by implementing training programs for RE/EE service providers and by producing and disseminating information material. The financial and fiscal incentives, as well as the financing schemes that will be implemented under the AREAN Project will be assessed and evaluation reports will be prepared and used for drafting and implementing follow up action plans to provide financing resources for LCD initiatives for the long term.

Climate resilient and LC techniques and practices adopted and implemented in the energy supply and energy end-use sectors: For the achievement of this outcome AREAN will tackle the biggest hurdle to the achievement of Niue's green energy targets, the stabilization of the electric grid. The approach is to further enhance the NZ-funded solar PV system projects described in Section 3.2.1. The stakeholder consultation stage has been useful to identify the activities needed to complement the baseline projects and guarantee the stable functioning of the electric grid. These activities will concern primarily the establishment, adoption and enforcement of codes and regulations that all RE power installers will have to follow and abide by. These activities will lead to the standardization of RE system implementations which in turn will allow NPC to perform a more efficient control of the electric grid (both the diesel generator sets and the solar PV systems) and to implement more reliable load dispatch procedures. Training programs designed for NPC personnel will familiarize them with the new technologies and control systems. AREAN will also assess safe handling and disposal of RE/EE waste (i.e., batteries, solar PV panels, incandescent light bulbs, etc.) as well as assessment of potential uses of municipal waste for power generation and safe disposal of ultimate residual waste; these needs were identified during the stakeholder consultations as well. In order to guarantee the long-term sustainability of these activities, follow-up action plans will be designed based on a comprehensive evaluation of these activities and those that collectively contributed to the realization of the other project outcomes.

Enhanced confidence in the viability of climate resilient and LC technology applications in the energy supply and demand sectors: Because of the severe grid instability issues due to the integration of solar PV units into the existing power grid, Niueans became understandably skeptical towards solar PV power generation technology. Furthermore, since electricity and money savings associated with the purchase of high energy efficiency household appliances have not been clearly explained and illustrated with examples, such appliances are simply perceived as too expensive. It is therefore crucial to propose a portfolio of LC technology applications and LC development projects that can be implemented, demonstrated, and then possibly replicated. The planned LC technology interventions are also designed to enhance people confidence in the viability of, and benefits from, the application of appropriate RE/EE technologies. Strengthening people confidence is propaedeutic to the creation of a local market for LC technologies and for private investments. Furthermore, these interventions will help validate proven, cost-effective LC technologies never implemented in Niue and facilitate the achievement of the NiSERM energy targets. Once installed, the performance of these applications will be monitored, and evaluation reports will be prepared. Producing evaluation reports will allow paving the way to scale-up and replicate these LC interventions, not only in Niue but also in similar PICs and SIDS. The selected RE and EE technology applications (detailed descriptions are given in Annex L) are:

Theory of Change (ToC) – 1 of 2

Immediate Causes

Inadequate and not fully enforced policies, regulations and standards related to sustainable energy and LCD

Uncoordinated to non-enforcement of plans, policies, regulations and implementation of program/projects on the application of climate resilient and LC technologies in the end-use sectors

Limited availability of, and access to, financing for sustainable energy, RE access and LCD initiatives in the energy supply and demand sector

Climate resilient and LC techniques and practices are not adopted and implemented in the energy supply and energy end-use sectors

Low level of confidence in the viability of climate resilient and LC technology applications in the energy supply and demand sector

Low level of awareness and negative attitude towards climate resilient and LCD in the energy end-use sectors

Consequence

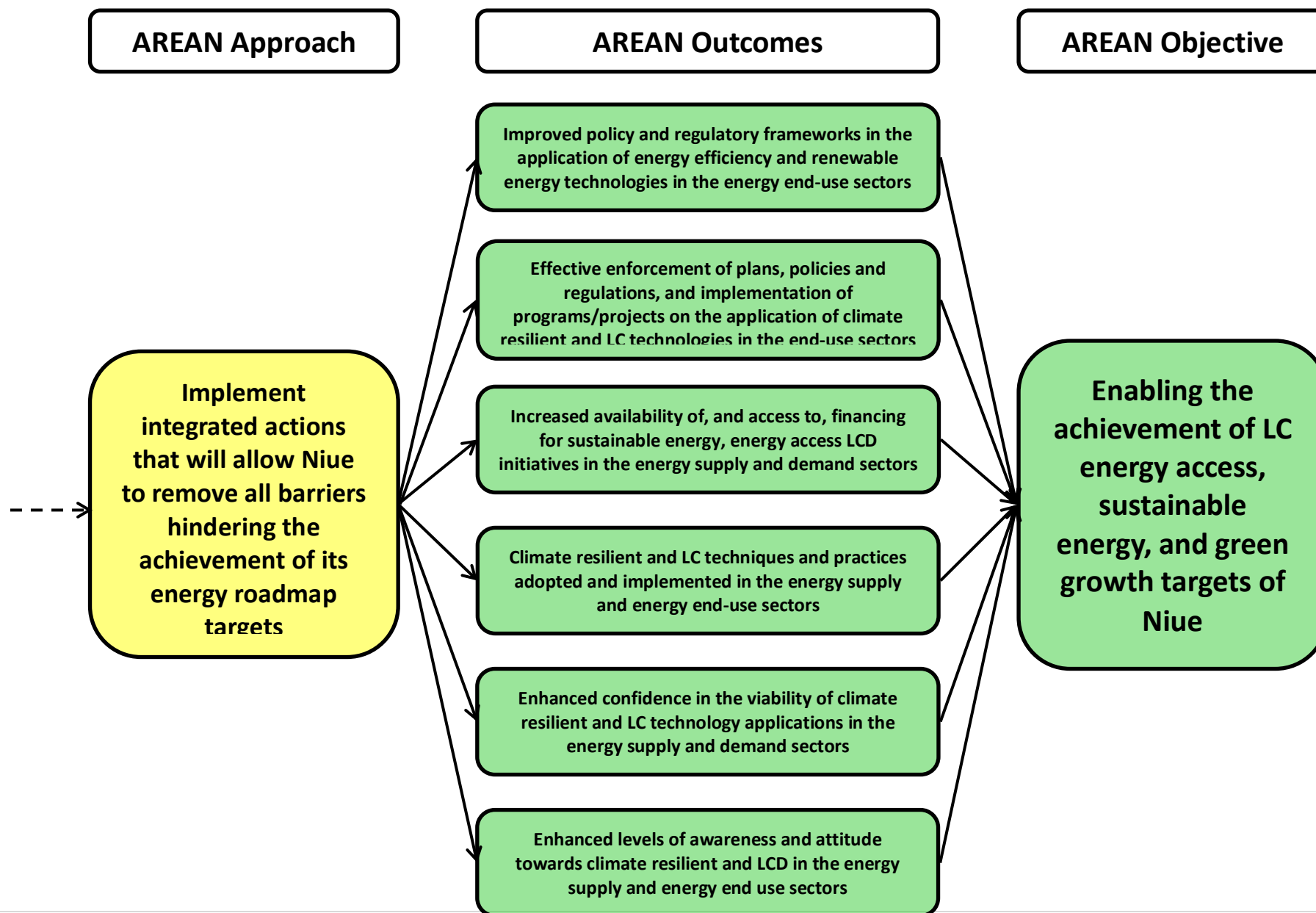
LC energy access, sustainable energy and green growth targets of Niue are not fully achieved

AREAN Approach

Implement integrated actions that will allow Niue to remove all barriers hindering the achievement of its energy roadmap targets



Theory of Change (ToC) – 2 of 2



- 1) *Enhanced Integrated Solar-Diesel Hybrid Power Generation and Distribution*⁹
- 2) *Renewable Energy and Energy Efficiency Technologies Applications in Residential/ Commercial Sector*
- 3) *Integrated¹⁰ Solar Powered LED Street Lighting*
- 4) *Retrofit of Buildings with Energy Efficiency and Renewable Energy Technologies*
- 5) *Solar Energy Use in Water Pumping Systems*

Enhanced levels of awareness and attitude towards climate resilient and LCD in the energy supply and energy end use sectors: The activities to deliver the outputs that will collectively bring about this last outcome include the design, establishment and operationalization of various low carbon development enabling systems (energy audit, energy monitoring and reporting, energy database and information sharing); conduct of energy audits, and piloting of the energy monitoring and reporting system. Associated capacity building for the relevant GoN personnel and stakeholders will be carried out on the operation and use of these established systems. Lastly, activities and initiatives to raise awareness about RE and EE technologies and programs in Niue are also included.

The successful implementation of AREAN will benefit the entire population of Niue in several aspects. Niue will have a more efficient, reliable and cost-effective power generation and distribution network. Also, with the adoption of public LED streetlights and solar water pumps, the country will have safer and more robust infrastructures. The creation of a RE/EE market capable of attracting local and foreign private investments and creating new jobs will also provide significant socio-economic benefits for everybody.

In terms of innovativeness, as already mentioned, some demonstrations such as introducing hybrid cars and electric vehicles in a PIC is new, while solar water pumps have not been widely adopted yet. AREAN can therefore provide the basis for lessons learned and then replicated also in similar island countries in the Pacific as well as other regions. Furthermore, in example the adoption of hybrid cars and EVs could pave the roads in the future for the introduction of solar PV powered fast charging stations, which would prevent surges in electricity demand, a technology that has not been deployed yet in any PICs. Lastly, and perhaps the most significant innovativeness in the design of AREAN is its holistic approach to the solution of all the problems by interconnecting activities of different components synergistically. The success of AREAN design and implementation can create a model that can be replicated in other island countries that share with Niue similar problems and barriers to low carbon development.

⁹ This builds on the Niue/NZ Renewable Energy Partnership and EDF-11 projects, which by themselves will not be enough to stabilize the current power grid.

¹⁰ Here "Integrated" refers to the fact that all equipment (solar PV panels; LED light; rechargeable battery; pole; and cables and control system) is assembled into one integrated system.

IV. RESULTS AND PARTNERSHIPS

4.1 Expected Results

Goal: Improved energy consumption index and reduced annual growth rate of GHG emissions in the country's energy supply and energy end-use sectors.

Project Objective: Enabling the achievement of low carbon energy access, sustainable energy, and green growth targets of Niue.

Component 1: Improvements in Energy Integrated Development Policy and Planning

Outcome 1: Improved policy and regulatory frameworks in the application of energy efficiency and renewable energy technologies in the energy end-use sectors

Output 1.1: Comprehensive policy research, impact analyses and assessment reports on sustainable energy and low carbon (LC) development policies and regulations

Activity	Description
<i>Activity 1.1.1: Conduct assessments to identify gaps and needs in sustainable energy and LC development policies and regulations.</i>	A review of the existing policy and regulatory framework in force in Niue's energy supply and end-use sectors will be conducted. Simultaneously, a review of policy and regulatory frameworks established in PICs and SIDS that share with Niue similar development challenges will also be conducted to take advantage of the lessons learned in previous analogous projects. A report will be produced to guide GoN on the actions to take to revise, or write new, policies and regulations to incorporate sustainable energy and low carbon development measures.
<i>Activity 1.1.2: Define RE/EE areas of competence and gaps to fill of relevant GoN ministries and departments and assess potential synergies.</i>	An analysis will be conducted to evaluate all key GoN stakeholders to contour their areas of competence for the advancement of RE and EE technologies implementation. Roles and responsibilities will also be clearly defined in order to prevent duplication of work and to potentially foster synergistic interaction between all relevant stakeholders.

GEF support is required for the incremental technical assistance in the conduct of the review of the background documents and for report preparation.

Output 1.2: Formulated/ revised, approved and enforced policies, implementing rules and regulations (IRRs) and LC standards

Activity	Description
<i>Activity 1.2.1: Revise the Electricity Act and incorporate RE and EE matters.</i>	This involves the incorporation of relevant provisions on RE and EE matters in the Electricity Act that is currently undergoing revision. This will also involve capacity building for local professionals and GoN technical staff who are working on the review. Technical assistance will be provided to assist the GoN and other relevant stakeholders in analyzing the implications of the new Electricity Act, if needed make the required amendments to the Act, and finally favor its approval.

<p><i>Activity 1.2.2: Formulate/recommend, approve and enforce policies for independent power producers to connect to the grid, and for the private sector to participate to the energy sector.</i></p>	<p>This involves the drafting of a document to set the rules to follow for those independent power producers (primarily solar PV systems) that want to connect to the grid. The rules will cover the size of the system, the required equipment and the definition of the technical specs for power installations to qualify for grid connection. The formulation of such policy and its subsequent approval and enforcement will prepare the ground for the creation of a market capable of attracting private investors.</p>
<p><i>Activity 1.2.3: Provide technical assistance in establishing and implementing sectoral codes of conduct, guidelines and standards of operations for the energy industry¹¹.</i></p>	<p>This activity involves establishing energy industry codes to define the roles and responsibility of participants, the standard procedures for their operations and the interactions with each other, as well as their minimum performance expectations. This activity will include conducting a comprehensive review of the current situation of energy industry practices in Niue and the regional and international experience in establishing and enforcing energy industry codes, especially in similar PICs. The energy industry codes will be developed through a participatory process, involving all stakeholders, under the umbrella of the new Energy Act that is being developed now. The codes will focus mainly on the electricity sector, covering electricity supply, connection of independent power production systems, metering, quality of services, safety, asset managements, etc. Technical assistance will be provided in endorsing and implementing the developed energy industry codes.</p>
<p><i>Activity 1.2.4: Draft and implement a waste management plan for RE projects (i.e., batteries, PV panels, incandescent light bulbs, etc.).</i></p>	<p>Introduction of LC technologies will also generate special waste that needs to be adequately managed. A plan will be developed for the collection, storage, and safe final disposal of waste produced from RE projects. The plan will also cover potential recycling and reuse of this waste once a local RE/EE market has been established.</p>
<p><i>Activity 1.2.5: Conduct integrated development planning and prepare energy integrated development plans for sectors of the national economy involving energy and environmental impacts.</i></p>	<p>This involves the development of an inter-ministerial, integrated development plan covering all aspects of energy generation and consumption, environmental protection, as well as the required infrastructures. The proposed integrated development plans will be prepared and presented to the GoN for approval and implementation.</p>
<p><i>Activity 1.2.6: Establish and implement appropriate energy prices and service quality regulations.</i></p>	<p>This entails reviewing regional and international experiences in regulating energy prices, particularly electricity prices, and service quality in similar PICs. This will include developing appropriate: a) price setting methodologies; b) service quality standards; and c) prices and services monitoring and review mechanisms. Prices established need to reflect the full cost of delivering energy and ensure satisfactory service</p>

¹¹ Energy industry in this context covers both utility- (NPC) and privately-owned energy generation systems that are and will be installed, as well as all the stakeholders involved in their development, operationalization and maintenance.

	quality. Properly priced energy, and electricity, will also provide incentives for consumers to improve energy efficiency use.
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GEF support is required for the incremental technical assistance in the review of the Electricity Act, for policy formulation, development of safety codes, and for the drafting of plans.

Output 1.3: Completed and fully evaluated policies, IRRs and LC standards, and approved and implemented follow-up plans for their enhancement

Activity	Description
<i>Activity 1.3.1: Evaluation of policies, IRRs and LC standards and drafting of evaluation reports.</i>	The efficacy of the policies and regulatory frameworks that are revised and formulated under AREAN will be evaluated during and at the end of project implementation and related interim and final evaluation reports will be prepared. For the evaluation of policies and regulatory frameworks and preparation of the reports an international consultant will be hired and supported by a local professional, which will also contribute to capacity building.
<i>Activity 1.3.2: Develop and implement follow-up action plans based on the evaluation reports.</i>	The evaluation reports prepared in Activity 1.3.1 will be the basis for the formulation and implementation of follow-up action plans. The drafting and development of these follow-up action plans will also involve capacity building for the local professionals.
<i>Activity 1.3.3: Assess capacity needs of GoN personnel, design training programs, and train GoN personnel to carry out energy planning and management of technology applications.</i>	The activity involves a capacity assessment of relevant GoN personnel to determine the needs and gaps to fill in the area of energy planning and management of technology applications. Based on the assessment, a training program will be organized and conducted for stakeholders from GoN departments, SOEs and other organizations related to energy planning and management of technology applications (i.e., participant will be selected from the Department of Utilities, Department of Transport, Treasury Department, Crown Law, NPC, NBF, PMCU, NDB, etc.). A year after its completion the efficacy of the training program will be assessed, and based on the outcome of this evaluation, if required, a follow up training program will be organized, conducted and then evaluated.

GEF support is required for the incremental technical assistance in the evaluation of policy, IRRs and LC standards, training programs, preparation of reports, and drafting and implementation of action plans.

Component 2: Institutional Capacity Building on Low Carbon Development

Outcome 2: Effective enforcement of plans, policies and regulations, and implementation of programs/projects on the application of climate resilient and low carbon technologies in the end-use sectors

Output 2.1: Formulated and recommended institutional framework that supports the implementation of LC development policies and regulations

Activity	Description
<i>Activity 2.1.1: Assess the current institutional</i>	To conduct the assessment all the institutional steps and procedures that the key stakeholders must follow for the implementation of energy

<i>arrangements for implementation of energy and infrastructure plans and assess stakeholders' role and gaps to fill.</i>	and infrastructure plans will be simulated. This will allow highlighting of the gaps to fill with the establishment of new professional figures or through the participation of additional GoN departments, and to clearly define roles and responsibility for all stakeholders involved. At the end of the assessment a report will be prepared.
<i>Activity 2.1.2: Establish an operational Government entity that is capable of effectively implementing LCD policies and regulations.</i>	This activity involves the capacity building and organization of the institutional framework for establishing and operationalizing a GoN unit devoted to the implementation of LC development policies and regulations. Depending on the expertise required, members of the unit can be a combination of available personnel of GoN departments and ministries with the addition of new staff to bring to the unit missing and desirable skills. Staff members will be trained on how to be part of Niue's institutional framework in supporting the implementation of LCD policies and regulations.
<i>Activity 2.1.3: Formulate and mandate laws to regulate the implementation of LC policies and initiatives.</i>	The assessment of role and gaps to fill (Activity 2.1.1) will be used as basis for the formulation, approval and enforcement of new laws for LC development. The laws should be formulated also with the intent to favor the coordination in this field between national and donors' requirements.

GEF support is required for the incremental technical assistance in the evaluation of institutional arrangements, training programs, and preparation of reports.

Output 2.2: Adopted and enforced suitable institutional mechanisms that integrate LC development with the socio-economic, climate change, infrastructure and disaster management objectives of the country

Activity	Description
<i>Activity 2.2.1: Design and implement training programs for relevant GoN personnel and stakeholders to fulfill their institutional mandates.</i>	Training programs will be designed, organized and conducted to teach how to integrate institutional mechanisms (developed in Activity 2.2.2 and 2.2.3) with other related objectives of Niue. Participants to the training will comprise personnel from relevant GoN departments and ministries and other key stakeholders (including the operational unit established in Activity 2.1.2).
<i>Activity 2.2.2: Develop and apply procedures or guidelines on how to integrate LC developments with energy, climate change and other relevant objectives of Niue.</i>	Documents defining energy and climate change mitigation/adaptation, as well as socio-economic and infrastructure management objectives of Niue (i.e., NiSERM, NDC, NNSP, etc.) will be reviewed and used as references to develop procedures tailor-made for Niue on how to align and integrate the development of LC projects with those objectives. The procedures will then be applied to the LCD activities proposed under AREAN as well as in future LDC projects in Niue.
<i>Activity 2.2.3: Establish an appropriate corporate governance structures for the two</i>	With the status of NPC and NBF as SOEs, the aim of this activity is to formulate, approve, and implement SOE legislation, with the objectives to delineate the roles and responsibility of government and SOEs and to establish appropriate governance mechanisms and performance

<i>SOEs (NPC and NBF) in the energy sector.</i>	requirements for SOEs. For this purpose, a utility regulator must be established ¹² .
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GEF support is required for the incremental technical assistance in capacity building, developing procedure for LCD, formulation and implementation of new legislations, and the establishment of an independent utility regulator position (the salary will be responsibility of GoN).

Output 2.3: Performance evaluation report on the adopted institutional framework and mechanisms, promotion and implementation of the recommendations offered, and maintenance strategy incorporated in the design of projects

Activity	Description
<i>Activity 2.3.1: Evaluate the adopted institutional framework and produce evaluation reports.</i>	Efficacy of the adopted institutional frameworks established under AREAN will be evaluated and interim and final evaluation reports will be prepared. For the evaluation of the institutional framework and preparation of the reports an international consultant will be hired and supported by a local professional, which will also contribute to capacity building.
<i>Activity 2.3.2: Prepare and implement follow-up action plans based on the evaluation reports.</i>	The evaluation reports prepared in Activity 2.3.1 will be the basis for the formulation and implementation of follow-up action plans. Like Activity 2.3.1, the drafting of these action plans will be carried out by an international consultant that will be supported by a local professional, which will also contribute to capacity building.
<i>Activity 2.3.3: Prepare and enforce maintenance strategy in RE/EE project designs.</i>	Each new RE/EE technology project in Niue, irrespective of the source of funding, will be supplemented with the preparation of a maintenance strategy that will maximize the efficiency and possibly extend the lifespan of the equipment, particularly in a challenging environment like Niue. The proposed strategies will then be promoted and supported for application in the installation of the pertinent hardware such as solar PV systems, Li-ion battery banks, power inverters, transformers, solar water pumps, solar powered LED streetlights, etc.

GEF support is required for the incremental technical assistance in evaluation of institutional frameworks, report preparation, drafting and implementation of action plans, and formulation of a maintenance strategy

Component 3: Improvements in the Financing of Low Carbon Development Initiatives

Outcome 3: Increased availability of, and access to, financing for sustainable energy, energy access and low carbon development initiatives in the energy supply and demand sectors

Output 3.1: Designed and implemented financing instruments for the Niue Development Bank for financing EE and RE technology application initiatives

Activity	Description
<i>Activity 3.1.1: Design appropriate financing</i>	A preliminary assessment phase will be performed to determine which financing instruments and with what timeframe can be implemented in

¹² The role of the utility regulator can be part of Department of Utilities. The roles and responsibilities of the utility regulator includes, among others: (a) Protect the short and long-term interests of electricity (and maybe water too) consumers regarding price and quality of service; (b) Promote an efficient power (and maybe water too) industry that can deliver high quality services; and, (c) Promote the development and maintenance of an economic and coordinated power industry.

<i>instruments for stimulating the adoption and application of EE and RE technologies.</i>	Niue. The potential mechanisms include net metering and feed-in tariffs for independent power producers. The design will also establish the “per unit” incentives and the total available budget to avoid the creation of a financial bubble.
<i>Activity 3.1.2: Design suitable financing scheme for supporting widespread application of EE and RE appliances and equipment</i>	This involves the determination for example of the following: range of RE/EE equipment to be supported; criteria for assessing financial support applications; targeted distribution of financing among different types of borrowers, etc.; best approach for distributing funds to beneficiaries, whether it be all up-front, or half up-front and half based on performance, etc.; the evaluation method for fund performance; and measures for monitoring the NDB.
<i>Activity 3.1.3: Implementation of the designed and approved financing scheme.</i>	This activity involves the implementation by the NDB of the financing scheme designed under Activity 3.1.2. Also included is the monitoring and evaluation of the performance of the financing scheme.
<i>Activity 3.1.4: Provision of outreach and technical assistance to applicants to the financial support fund (Activity 3.1.3).</i>	This activity involves promotion to potential applicants and assist them (if requested) in the financing application process. For interested parties, support will be provided in the identification of desirable sources of EE and RE appliance/equipment at good cost. Support will also include help in completing applications for financing.

GEF support is required for the incremental technical assistance in the assessment and design of potential financing schemes

Output 3.2: Evaluation report on the performance of the established financing instruments

Activity	Description
<i>Activity 3.2.1: Evaluate the designed and implemented financing instruments and produce an evaluation report.</i>	The efficacy of the financing instruments established and implemented under AREAN will be evaluated and an evaluation report will be prepared. Based on the results of this evaluation, if required, modifications of the financing instruments will be made. For the evaluation process, the services of an international consultant will be engaged and supported by a local professional, which will contribute to local capacity building.

GEF support is required for the incremental technical assistance in the evaluation of the financing schemes and preparation of reports

Output 3.3: Enhanced financing policies for supporting initiatives on LC development

Activity	Description
<i>Activity 3.3.1: Review of financing policies on sustainable energy and LC development.</i>	This involves the conduct of a review of the existing financing policies in Niue, particularly in regards energy utilization and energy infrastructure operation, maintenance and developments. The review also includes evaluation of the sources and sourcing of financing for sustainable energy and low carbon development. It will also assess financing policies and regulations in PICs and SIDS that share with Niue similar development challenges. A report will be produced to guide GoN on the

	<p>actions to take to revise, or write new, financing policies and regulations to include aspects of sustainable energy and low carbon development.</p> <p>Regarding the sourcing of financing for sustainable energy and low carbon development efforts, this activity includes the following: a) mapping available or potentially available domestic and international financial sources and financing mechanisms for RE/EE development in Niue; and, b) exploring new financing sources and innovative financing models for the development of RE/EE in Niue.</p>
<p><i>Activity 3.3.2: Design and conduct training programs for relevant GoN personnel in sustainable energy and low carbon development financing policymaking.</i></p>	<p>This activity involves the design, organization, and implementation of a capacity development program for relevant GoN entities in the formulation of financing policies and sourcing of financing for sustainable energy and low carbon development initiatives. Specific aspects to be covered are: (a) improving the capacity of local financial institutions for financing RE/EE projects and developing new financing products; b) mechanisms that enable lending from international capital market; c) exploring financing sources and business models including private sector investment, various forms of public-private partnerships, development assistance, South-South and Triangular Cooperation, investment from multilateral development banks, diaspora investment, etc.; and, c) formulating financing policies and associated implementing rules and regulations (IRRs) for increased financing for LC development.</p>
<p><i>Activity 3.3.3: Formulate, approve and enforce financing policies to support LC development.</i></p>	<p>This involves the formulation of relevant financing policies (including policy instruments) by the relevant GoN entities as well as IRRs based on the results and inputs from Activities 3.3.1 and 3.3.2. The formulated policies and IRRs will be promoted to the relevant stakeholders to enable approval by GoN. The approved policies will be enforced during AREAN Project implementation.</p>
<p><i>Activity 3.3.4: Evaluate the enforced financing policies and IRRs.</i></p>	<p>This activity involves the evaluation of the effectiveness of the financial policies and IRRs formulated, approved and enforced under AREAN. The evaluation report will be prepared and presented to the GoN. Based on the results of the evaluation, where necessary, modifications of the financing policies and IRRs will be made.</p>

GEF support is required for the incremental technical assistance in the design and organization of training programs, and formulation and approval of policies

Output 3.4: Competitive market for private sector on RE/EE products and technical skills

Activity	Description
<p><i>Activity 3.4.1: Design training programs to improve technical skills of RE/EE service providers.</i></p>	<p>While the activities implemented under Components 1-4 aim to set up the institutional, regulatory, and technical frameworks for a functioning RE/EE market and provide both fiscal and financial incentives encouraging the entry of private players, to favor the establishment of a functioning RE/EE market, local service providers need to acquire the ability to install, service and repair the RE/EE equipment. The training program will be designed, organized and implemented together with the Chamber of Commerce and will include, but not limited to, solar PV panels, batteries, hybrid cars and electric vehicles, LED streetlights, etc. During the design phase, the most cost effective and efficient way of</p>

	delivering the training programs will also be assessed. For example, in person vs online courses, or locally organized vs abroad courses.
<i>Activity 3.4.2: Prepare informative material on RE technologies and EE appliances to increase public awareness and interest.</i>	Informative material on RE/EE technologies will be developed and published for dissemination. These include pamphlets that illustrate to the general public the energy and economic advantages. The pamphlets will show with examples the investment recovery time for independent solar PV installations; vis-à-vis comparisons between cost savings by choosing high energy efficient appliances vs. low efficiency ones; advantages of buying an energy efficient vehicles vs a conventional diesel or petrol one; etc. In addition, promotion of RE/EE initiatives will also be done through local media and in public offices and schools.
<i>Activity 3.4.3: Establish financial and fiscal incentives to encourage RE/EE products.</i>	This activity will be performed in coordination with the Treasury Department, the Chamber of Commerce and NDB/Kiwibank. Potential fiscal and financial incentives will be evaluated and selected. Among the possible fiscal incentives that can be considered is the waiver or reduction of import duties on RE/EE technologies for private installers. In this case, a detailed list of products that qualify for the incentives will be produced and publicized. In addition, financial incentives in combination with existing rebate/loan programs will be considered through the development of schemes that will be specifically prepared and described in Outcome 4.2 below.

GEF support is required for the incremental technical assistance in the design and organization of training programs, preparation of informative material, and evaluation and establishment of fiscal/financial incentives

Component 4: Climate Resilient and Low Carbon Technologies Applications

Outcome 4.1: Climate resilient and low carbon techniques and practices adopted and implemented in the energy supply and energy end-use sectors

Output 4.1.1: Completed comprehensive assessments of other applicable LC technologies that can be feasibly implemented in the energy generation and energy end-use sectors to support the timely achievement of the NiSERM targets

Activity	Description
<i>Activity 4.1.1.1: Assess applicable LC technologies to support the achievement of the NiSERM targets and prepare an assessment report.</i>	At the early stages of AREAN implementation, an assessment will be conducted of potential applicable LC technologies for the country to determine their individual feasibility. This includes the techno-economic feasibility of LC technologies mentioned in the country's NDC and NiSERM. A feasibility assessment report will be prepared. Furthermore, the report will define the capacity to install and the timeline of these RE/EE developments necessary to allow Niue to achieve its NiSERM targets.
<i>Activity 4.1.1.2: Evaluate the optimal solar PV power generation inputs into the existing power grid system.</i>	This activity entails the evaluation of the various options for the installation of solar PV systems in terms of determining the timing of the installations and the capacity of each solar PV power generation systems. This step is crucial to allow proper pacing of the completion of the PV installations and guaranteeing enough time to put in place all the supporting equipment (shunt reactors, RMUs, batteries, etc.) as well as

	the required control systems and load dispatch procedures, and then verify the stability of the grid.
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GEF support is required for the incremental technical assistance in the assessment of LC technologies, report preparation, and evaluation of optimal PV inputs

Output 4.1.2: Completed design, engineering, and implementation plans for an expanded solar-diesel hybrid power generation and distribution system¹³.

Activity	Description
<i>Activity 4.1.2.1: Develop comprehensive engineering design and plans for the expanded solar-diesel hybrid power generation and distribution system.</i>	<p>This involves the design, engineering and implementation plans for the installation of additional solar PV systems that will be integrated into the existing power grid to bring the level of RE-based power generation up to about 55% of the national electricity production. The technical and operational specifications of the expanded system will be established, and the installation scheme will be engineered to meet the target %RE electricity level. The sizing of the required solar PV system will be determined, as well as the accompanying components (e.g., inverters and power conversion equipment, batteries (e.g., Li-ion Powerwall II Tesla batteries) for electricity storage, and new distribution system equipment (i.e., transformers and switchgears) to prevent potential problems (i.e., grid instability) when electricity from the additional installed new solar PV systems are fed into the power grid. See below specific activities on this including the enhanced controls that will ensure the reliability of the expanded system and optimal load dispatch of both the existing and newly installed power generation assets.</p> <p>This activity also includes the design and implementation of a capacity building program for NPC personnel on the proper operation and maintenance of the new installed systems and controls. This requires close coordination with the Ministry of Infrastructure (MoI), which is also the one in-charge of the Niue/NZ Renewable Energy Partnership project. Lastly, this activity also entails the discussions between MoI and the New Zealand High Commission (NZHC) in Niue regarding plans for New Zealand funding for more financial support to fully achieve the country’s 80% electricity generation target from RE resources.</p>
<i>Activity 4.1.2.2: Develop comprehensive design, engineering and implementation plans for the most feasible scheme for grid stability improvement.</i>	<p>The initial step of this activity is a thorough review of the grid stability assessment report prepared by DNV KEMA in 2012, when solar PV installations contributed only a small fraction of the total power generation capacity. An updated grid stability improvement scheme will be designed to consider the 2025 target of 80% electricity generation from RE sources set by Niue. The scheme will involve the establishment of grid codes requirements to support the grid system during normal operation and during grid failure. Furthermore, for stability and reliability purposes, NPC must maintain basic electrical data/information on the existing grid system with assets management procedures.</p>

¹³ This is for the expansion of the current solar PV power generation capacity of the NPC power grid in line with the achievement of the 2025 target of 80% electricity generation from RE resources. This also include the design, engineering and implementation plans for ensuring a stable power grid when the electricity production from the new solar PV systems is fed into the existing power grid.

	<p>Corrective measures will be undertaken, to further stabilize the electric grid and increase the reliability of electricity supply operations, by designing an improved grid. The design will include sizing and implementation of shunt reactors, replacement of transformers and addition of RMUs, installation of battery storage systems, providing generators with adequate low voltage ride through capabilities, provide frequency control capabilities, include automated monitoring and control systems, and any other equipment and measure deemed necessary. The installation of the battery energy storage systems will support the diesel generators in stabilizing the grid in the event of a drop in solar PV electricity generation. Lastly, the implementation plans for the designed grid stability scheme will be developed.</p> <p>The abovementioned new equipment that will be installed: a) increase the electric grid efficiency by reducing the transmission losses; b) improve the reliability of NPC operations and electricity dispatch; and c) have environmental benefits since old transformers leak oil into the ground. Proper safe recycling and disposal of the replaced equipment will also be carried out, while NPC will provide for the maintenance of the new equipment after the completion of the AREAN project.</p>
<p><i>Activity 4.1.2.3: Automate the operations of remote solar PV power system installations and data collection.</i></p>	<p>This activity entails the automation of system operations as well as control and data acquisition of both existing and new solar PV installations (solar PV panels, power inverters, and batteries). The new transformers will be equipped with data loggers and the SCADA (Supervisory Control And Data Acquisition) system¹⁴ at NPC powerhouse will be updated as part of the New Zealand project. The adequacy of the new SCADA system will have to be reassessed because of the addition of new equipment (e.g., new transformers and switchgears, as well as new PV panels and battery storage systems) and new grid code requirements. Training programs will be also designed and organized to familiarize NPC personnel with the new codes and procedures and new equipment.</p>
<p><i>Activity 4.1.2.4: Implement an integrated RE generation forecasting tool to the SCADA system.</i></p>	<p>This activity entails the installation of a state-of-the art forecasting tool to allow the SCADA system to perform day-ahead planning of the load dispatch planning and support the reliability and operational procedures. The purpose of the RE generation forecasting system is to assist NPC to distinguish between variability and uncertainty when planning and operating the grid system with 80% solar PV. The forecasting tool will reduce the uncertainty of the solar PV generation, so that its variability can be more precisely accommodated in the grid system. The accuracy of forecasts and timely operational responses for up-ramps and down-ramps are critical for maintaining reliability and lowering the grid operation cost because of the high solar PV penetration level in the grid system. Training of the NPC personnel will be conducted with the support of expert staff members of the Niue Met Services.</p>

¹⁴ The new SCADA system will be able to communicate with the solar PV installations, the battery energy storage system, the grid components and the RMUs to determine power quality issues, grid stability issues, manual control/remote monitoring and measure the electricity generated by each solar PV system and load supplied into the grid.

<p><i>Activity 4.1.2.5: Demonstrate the monitoring, operation and performance of the RE-generation forecasting tool to support with day-ahead planning.</i></p>	<p>NPC personnel dedicated to the operation and control of the solar PV systems, supported by staff of the Niue Met Services, will participate in trials designed to demonstrate and evaluate the performance of the RE-generation forecasting tool. Uniform standards for the preparation and delivery of RE-generation forecasts will be developed and approved. Following these standards and based on expected amount and timing of sunshine, NPC will perform dry runs on how to convert the forecasts in practical operation of the diesel gensets and the battery packs to prevent grid instability and power outages. The efficacy of the forecasting tool will be tested and evaluated each time a significant amount of intermittent power generation capacity must be connected to the electric grid and appropriate modifications to the forecasting tool will be carried out.</p>
<p><i>Activity 4.1.2.6: Optimize the performance of power generation units at NPC powerhouse with solar PV systems integrated into the electric grid.</i></p>	<p>This activity involves the implementation of combined load dispatch control capabilities with energy storage functionalities. A fuel save controller is already installed in the NPC diesel powerhouse to optimize the fuel consumptions of existing diesel gensets. Compensation of the varying loads will be performed with the support of the battery energy storage systems, and reactive power and voltage/frequency control. This intervention is intended to optimize the performance of the power generation units and in turn reduce diesel fuel consumptions, with reduction of GHG emission and improvement of air quality for the NPC personnel.</p>
<p><i>Activity 4.1.2.7: Monitor and evaluate the power generation performance at NPC.</i></p>	<p>Power plant performance testing procedures will be designed for NPC, to verify the energy efficiency of generation of their power units (both diesel gensets and solar PV systems), as well as their distribution systems. The performance testing will cover waste heat recovery potential as well. NiSERM also sets targets for utility performance in terms of reliability of the electricity distribution system (forced outage rate) and duration of power outages (System Average Interruption Duration Index – SAIDI), for which Niue presently has no data. Concurrently, needed measuring and monitoring equipment will be procured and relevant NPC personnel will be trained in using such equipment.</p>
<p><i>Activity 4.1.2.8: Establish codes and regulation for safe power generation control and load dispatch.</i></p>	<p>This activity is linked to Activity 4.1.2.1. The grid codes, guidelines and regulations that will be established for safe control and operation of the electric grid and optimal load dispatch strategies include: RE system installation and grid-connection procedures; RE protection equipment requirements (i.e., solar PV panels, battery storage systems, PV panels and battery inverters, etc.); voltage regulations; active and reactive power control; grid compliance testing; grid control systems; voltage and frequency control systems; power quality and power factor; grid stabilization procedures; SCADA communication and optimal load dispatch/regulation strategies; safety and protection procedures; and all other aspects deemed necessary to guarantee stability and reliability of the electric grid. The established codes and regulations will be afterwards approved by DoU-Mol and enforced. The established codes, guidelines and regulations will be evaluated a year after they have been approved and, if required, appropriate modifications will be made.</p>
<p><i>Activity 4.1.2.9: Design and implement a</i></p>	<p>Design a capacity development program on grid code requirements for RE; utility practices and procedures for data collection/analysis and real</p>

<p><i>capacity building program on electricity generation, transmission and distribution O&M.</i></p>	<p>time control; battery storage settings and functionality; asset management reporting; operation and Maintenance (O&M) of the electricity distribution grid; SCADA system operations for 80% electricity generated with RE sources; and optimal load dispatch. Due to the large number of topics to cover, the capacity building activities will be organized in stages. Participants will be organized in teams. During the first training stage, each team will be trained on a specific set of skills (in this way there will be personnel skilled on every subject). The following training stage the teams will be rotated in such a way that at the end of all training stages every participant will be trained on every topic. Participants in this training program will be NPC staff and relevant GoN personnel.</p>
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GEF support is required for the incremental technical assistance to develop implementation plans for grid stabilization, establish measures to increase grid stability, automate remote PV systems operation and data collection, optimize the SCADA system and the diesel gensets operation, establish codes and regulation for optimal load dispatch, develop and test a forecasting tool, and for training programs

Output 4.1.3: Completed design and implementation plans for the replication and/or scale up of demonstrated EE sustainable energy and LC energy projects

Activity	Description
<p><i>Activity 4.1.3.1: Train a pool of local experts in energy development and utilization as well as in applying new RE/EE technologies.</i></p>	<p>Design, organize and conduct a training program to educate local expert on renewable energy technologies, focusing on those that have been and will be demonstrated and installed in Niue, as well as on the utilization of those RE technologies. Participants will include personnel from relevant GoN offices, NPC, NBF, the Chamber of Commerce, and service providers. In order to guarantee the sustainability and replicability of the RE/EE technology systems installed, a mid- to long-term plan will be developed in cooperation with the GoN to periodically organize (i.e., every three years) similar and follow-up training programs to educate new local experts as well as to update and strengthen the capabilities of previously trained experts.</p>
<p><i>Activity 4.1.3.2: Design and implement training programs for relevant GoN personnel and stakeholders in RE/EE financing to develop and prepare bankable project proposals.</i></p>	<p>The activity involves a capacity assessment of relevant GoN personnel to determine the needs and gaps to fill in developing and preparing bankable sustainable energy and low carbon technology application project proposals. Based on the assessment, a training program on project development, design and preparation will be designed, organized and conducted for stakeholders from GoN departments, SOEs and other organizations related to project proposal preparation. Participants will be selected from NPC, NBF, PMCU, NDB, DoU, DoT, Treasury Department, Crown Law, etc.</p>
<p><i>Activity 4.1.3.3: Design the implementation plan for the scale up of RE/EE projects.</i></p>	<p>Based on the action plan prepared under Activity 4.1.4.4, feasible replication and/or scale-up RE/EE projects will be designed, and the implementation plans will be prepared. The plans could include, but not be limited to, the installations of additional LED streetlights, the extension of high EE household appliances financing schemes, introduction of more high efficiency vehicles, etc. For the design and implementation of the scale-up projects an international consultant will be hired and supported by a local professional, which will also contribute to capacity building.</p>

GEF support is required for the incremental technical assistance in the design and organization of training programs, and design and implementation of scale-up plans

Output 4.1.4: Fully evaluated portfolio of follow-up sustainable energy and LC technology (EE and RE) application projects in other villages

Activity	Description
<i>Activity 4.1.4.1: Evaluate RE/EE application projects and produce evaluation reports.</i>	This activity involves the assessment of the results of the RE/EE projects implemented under AREAN. The evaluation will focus on the achievement of the objective and planned outcomes and outputs of each project, as well as their operational performance, particularly the energy and GHG emission abatement performance, and economics. Interim and final evaluation reports will be prepared presenting the results, analyses, conclusions and recommendations in each project.
<i>Activity 4.1.4.2: Assess safe RE/EE waste disposal (i.e., batteries, solar PV panels, incandescent light bulbs, etc.) and prepare an assessment report.</i>	This activity involves the conduct of an assessment of various means/approaches for the safe disposal of RE/EE waste that could be potentially harmful for the environment. Based on the assessment, the procedure for a safe disposal of such waste, in the context of Niue, will be established. The assessment will ascertain what types of waste can be possibly reused or recycled. Additionally, for the portion of waste that must be disposed of, it will be determined if it can be disposed of in Niue or if it must be shipped overseas. Facilities where reuse, recycle or dispose RE/EE waste can also be part on the newly established RE/EE market in Niue. The report drafted will build on the strategies developed under Activity 1.2.4. This activity will build on and expand the objective of the baseline project sponsored by AusAid and NZAid for the construction of a waste recycling center and described in Section 3.2.1.
<i>Activity 4.1.4.3: Assess potential use of municipal waste for energy generation, including safe disposal of final residual waste, and prepare evaluation report.</i>	This activity entails the assessment of the potential use of municipal waste (kitchen waste, gardening, sewage, etc.) as a source of sustainable energy. During the assessment the volumes of waste as well as type of energy produced (biogas, electricity, etc.) and capacity of generation will be determined. In addition, it will also be established a plan for the logistics of the process, such as waste collection, transport to the processing facility and distribution of the energy generated. Finally, safe disposal of residual waste (i.e., in an eco-friendly landfill) will also be evaluated. An evaluation report will be then prepared. This activity will build on the AusAid/NZAid project mentioned above.
<i>Activity 4.1.4.4: Prepare a follow-up action plan based on the evaluation report.</i>	The evaluation report prepared in Activity 4.1.4.1 will be the basis for the formulation and implementation of a follow-up action plan. The action plan will present the RE/EE projects that will be further promoted for subsequent implementation in the country. The action plan will also detail the various requirements and enabling conditions for facilitating the implementation the projects, including how these will be supported.

GEF support is required for the incremental technical assistance in the evaluation of RE/EE projects, RE/EE waste disposal systems and waste to energy potential, and preparation of action plans and evaluation reports.

Outcome 4.2: Enhanced confidence in the viability of climate resilient and low carbon technology applications in the energy supply and demand sectors

Output 4.2.1: Completed designs and implementation plans of LC technology application demonstrations

Activity	Description
<i>Activity 4.2.1.1: Evaluate feasibility of RE and EE demonstration projects and prepare assessment reports.</i>	Based on the recommendations for LC demonstration projects, as summarized in Annex L and building on the baseline projects described in Section 3.2.1, detailed assessments will be carried out on the feasibility of these demos. The assessment will determine the actual number and capacity of units that will be installed under each demo; such as solar powered LED streetlights and solar water pumps. For EE financing schemes related to household appliances, independent PV installations and efficient vehicles, the assessment will determine the viability of the incentives recommended at this design stage and refine them accordingly. Finally, for the EE buildings, the assessment will establish the feasibility of the interventions proposed in Annex L and refine them as needed. The findings, results and recommendations of the feasibility assessments will be presented and discussed in detail in the assessment report.
<i>Activity 4.2.1.2: Prepare engineering design and implementation plans for the implementation of the selected RE and EE demonstration projects.</i>	Based on the recommendations provided in Annex L and on the assessment, reports produced under Activity 4.2.1.1, the demo projects will be designed in detail. Subsequently, implementation plans will be prepared to assure the completion of all demos within the timeframe established by AREAN.

GEF support is required for the incremental technical assistance in assessing the feasibility of the RE/EE demo projects, and preparation of engineering designs and implementation plans.

Output 4.2.2: Successfully installed and operational systems of the implemented demonstrations of sustainable energy and LC technology (EE and RE) applications

Activity	Description
<i>Activity 4.2.2.1: Install and operate the selected RE and EE demonstration projects.</i>	This activity involves the installation of all selected RE/EE demos under the direction of the project manager and the supervision of GoN and UNDP. This entails the actual installation, operation and maintenance of the systems that make up the RE/EE demonstrations. The implementation of the demo projects will be carried out by the demo host with the support of the AREAN project team to ensure that all requirements for the successful implementation of the demo are in place. Each demo project will be regularly monitored by the host and the AREAN project personnel using a common M&E system that will be designed and employed for this purpose. Procurement of the equipment will be done internationally following a best-bidder criterion. Where appropriate, installation of the equipment, replacement/repair warranties, and proper training of staff for the operation of the demos must be included.
<i>Activity 4.2.2.2: Prepare the demo project</i>	This involves the documentation of the results of the implemented RE/EE technology application demonstrations. An inventory of the

<i>profiles (as case studies).</i>	demo project results (e.g., energy use, operational performance, economic performance) will be prepared. The results will be compared to the results of similar RE/EE technology application projects that were implemented in other countries. Each project report will be summarized into project profiles (or case studies) following an agreed presentation format.
<i>Activity 4.2.2.3: Conduct an overall performance evaluation of the demos.</i>	This involves a comprehensive analysis of the results from each demonstration. The analysis will be on the energy performance, as well as the economic feasibility performance of each demo. The results of the analysis and pertinent conclusions and recommendations will be publicized, including the demo project results and recommendations. Technical guidance materials (web-based and printed media) on specific RE/EE technology applications will also be prepared and disseminated.

GEF support is required for the incremental technical assistance for the installation and operation of the RE/EE demos as well as transformers and switchgears, and the preparation of case studies and evaluation reports.

Output 4.2.3: Established and operational energy monitoring and reporting system (all energy forms), and completed and evaluated pilots on its implementation

Activity	Description
<i>Activity 4.2.3.1: Assess gaps in energy data collection (all energy forms and both supply and consumption) and design an energy monitoring and reporting system.</i>	An assessment of the gaps existing in the data collection procedures and systems in the energy supply and energy end-use sectors will be carried out. The assessment will consider all energy forms and will also include unbilled electricity (used for public illumination and for the water distribution system). Findings/results and recommendations will be documented in an assessment report. The report will be then the basis for the development and establishment of an all-encompassing energy monitoring and reporting system (EMRS).
<i>Activity 4.2.3.2: Design, organize and conduct a training program on energy monitoring and reporting system.</i>	This activity entails the design and organization of a capacity development program on the energy monitoring and reporting system established under Activity 4.2.3.1. The training program will cover all the features and functioning of the EMRS and how it links to both existing technologies and new technologies introduced under AREAN. Participants in the training program will include all relevant energy stakeholders, such as personnel from NPC, NBF, DoU, DoT and the Chamber of Commerce.
<i>Activity 4.2.3.3: Design and evaluation of energy monitoring and reporting system pilots.</i>	This activity involves the design of EMRS pilot projects to test the validity of the system before its full-scale deployment and operationalization. The required measuring devices will be procured and installed. These pilots will also allow assessing the efficacy of the training program. The results of the assessment will then be used to adopt potential corrective measures for the finalization of the EMRS. The EMRS will be re-evaluated a year after it has been finalized and, if required, appropriate modifications will be made.

GEF support is required for the incremental technical assistance in the development of the EMRS, training programs, design of EMRS pilots, procurement of measuring devices, and preparation of reports.

Component 5: Enhancement of Awareness on Low Carbon Development

Outcome 5: Enhanced levels of awareness and attitude towards climate resilient and low carbon development in the energy supply and energy end use sectors

Output 5.1: Established and operational energy audit system covering government and commercial buildings and facilities, as well as industrial companies

Activity	Description
<i>Activity 5.1.1: Design an energy audit system and facilitate its approval and implementation.</i>	This activity involves the design of energy auditing system as applied in the end-use sectors in Niue. The system will be used to check the energy performance and energy utilization efficiency of government and commercial buildings, and large public energy consumers (i.e., NBF, the wharf, etc.) to determine potential areas of energy consumption (EC) reduction and EE improvement. The energy audits will be based on procedures enforced in the Pacific region, preferably New Zealand or another PIC. Intervals to conduct the auditing will also be determined at this stage. The designed energy auditing system (inclusive of procedures) will be presented and promoted to the relevant GoN entity for approval and application. The energy audit system will be evaluated a year after it has been finalized and, if required, appropriate modifications will be made.
<i>Activity 5.1.2: Design and train relevant GoN personnel and stakeholders in conducting energy audits.</i>	To allow continuation of energy auditing processes past the lifetime of AREAN implementation, training programs for relevant GoN personnel and other key stakeholders will be organized on how to conduct energy audits for government and commercial buildings, and large public energy consumers. An energy audit unit within the MoI will be formed and mandated to carry out energy audits of energy consuming entities in the country.
<i>Activity 5.1.3: Perform energy auditing of GoN and commercial buildings.</i>	The trained energy audit unit will conduct the energy audits in identified energy end-users at established schedules. To guarantee impartiality of the process, the energy auditing unit will be headed by the independent energy regulator.

GEF support is required for the incremental technical assistance in the design of an energy audit system, for conducting energy audits, and for training programs.

Output 5.2: Established and operational energy (all energy forms) and energy technology database system

Activity	Description
<i>Activity 5.2.1: Establish an energy database to store all energy related information and establish a communication plan.</i>	This activity involves the design and establishment of a database, which will be the official repository of data and information on planned and implemented LC (RE and EE) technology applications in the country as well as data collected with the EMRS developed under Activity 4.2.3.1. The information relative to the RE/EE technology applications and that relative to all energy forms will be stored into two separate modules of the main database. The database will be accessible to all energy stakeholders in Niue and will be used for energy planning and for drafting policies and regulations. The database will be also shared with international donors, implementing partners and consultants when

	designing and implementing energy related projects. In order to avoid conflict and duplication of data, proper communication channels and procedure will be established. Procedures for servicing data/information request will also be established. It would be advisable to house the energy database with the Mol-DoU. The operation of the database will be evaluated a year after it has been finalized and, if required, appropriate modifications will be made.
<i>Activity 5.2.2: Operate and maintain the energy database.</i>	This activity is mainly for the designated responsible party for the operation and maintenance of the energy database. This involves the gathering of the relevant energy data from the various data sources through the established communication channels and procedures. Data gathered will be processed (analyzed and verified) and encoded into the energy database. Processing of relevant data into useful information, such as charts, graphs and tables, and requests for data/information will be carried out by the designated database management entity.
<i>Activity 5.2.3: Design and implement a capacity building program for Government institutions on the operation and maintenance of the energy database.</i>	This involves the design, organize and conduct of training courses for all relevant GoN and SOEs personnel on the operation and maintenance of the energy database. The training will include how to gather and analyze the energy data, both energy supply and end-user sectors. Participants will become able to interpret and manage energy data and organize the information in tables, graphs and other useful forms to be used for planning, budgeting, project proposals and similar actions. Staff from the department of statistics will be engaged in the training program design and implementation.

GEF support is required for the incremental technical assistance in the establishment, operation and maintenance of an energy database and a communication plan, and for capacity building.

Output 5.3: Established and operational information exchange network for the promotion and dissemination of knowledge on sustainable energy and LC development

Activity	Description
<i>Activity 5.3.1: Establish an information exchange/sharing platform on sustainable energy and LC development for the general public.</i>	This activity involves the creation of an energy information sharing platform (website, information desks, etc.) where RE/EE related data will be stored, processed and made available to the general public. Different from the energy database described in Activity 5.2.1, this platform and its communication channels are devoted to the general public to inform them about LC technologies and for helping them making energy-related decisions, such as: the purchase of a new appliances or a transport vehicle, the installations of an independent solar PV system, the calculation of energy savings associated to RE/EE technologies, their potential participation in the newly established RE/EE market, etc. The website and the information desk could be housed at and maintained by the Chamber of Commerce or by NDB/Kiwibank. The operation of the information exchange network will be evaluated a year after it has been finalized and, if required, appropriate modifications will be made.
<i>Activity 5.3.2: Design, implement and evaluate awareness</i>	Due to the grid instability issues and to the extremely expensive high energy efficiency household appliances, the general public in Niue has little confidence in the viability of RE/EE technologies. Programs will be designed to increase people’s confidence in LC technologies. These

<p><i>raising programs on RE/EE projects.</i></p>	<p>programs will include activities in school where students prepare projects on sustainable energy, with a final exhibition with family and friends. Information material prepared under Activity 3.4.2 will be made available in all public offices (Chamber of Commerce, NDB/Kiwibank office, PWD, etc.). Other initiatives will be organized at the Fale Fono, the EE demo building described in Annex L, where people can see in person EE technologies and ask information on RE/EE programs supported by GoN. Furthermore, once training programs on different aspects of LCD for relevant GoN personnel and key stakeholders have been completed (part of Activity 5.3.3), two windows will be open, one at the DoU for technical matters and one at NDB/Kiwibank for financial inquiries, where trained staff will answer questions from the general public. A survey will also be prepared and performed at the beginning, mid-term, and end of AREAN implementation to monitor and evaluate the success of the awareness raising programs.</p>
<p><i>Activity 5.3.3: Design and implement training programs for relevant GoN personnel and stakeholders (Chamber of Commerce, DoU, NDB and Kiwibank) to inform the general public on advantages of LC technologies.</i></p>	<p>This activity will complement Activity 5.3.2 above. Relevant GoN personnel, especially from the Chamber of Commerce, NDB/Kiwibank and the DoU will undergo a training program designed <i>ad-hoc</i> to educate them about all LC technologies implemented in Niue. The participants will also be trained on policies, financial/fiscal incentives available to the private sector and all action plans and programs in order to be able to provide information to the general public on all aspects of sustainable energy and low carbon technology developments.</p>

GEF support is required for the incremental technical assistance in the establishment of an information exchange platform, design and implementation of an awareness raising program, design and conduction of surveys, and for training programs.

4.2 Partnerships

The AREAN Project will be implemented in partnership with several international donors that also contribute to addressing the development challenges and support the achievement of GoN energy targets.

Partners	Relevance to AREAN and Description of Initiatives
<p>Government of Niue (GoN)</p>	<p>The Government of Niue will be a pivotal partner for this project because of the many ministries, departments and SOEs involved in AREAN design and implementation. GoN is the implementer and/or sponsor on most of the baseline projects that are currently ongoing or planned in Niue and that will constitute the backbone of the project co-financing activities. The personnel will be involved in all the project components especially for the establishment, approval and implementation of policies and regulations, and as participants in several of the training programs that will be organized under AREAN. In addition, one of the demonstration projects (EE building design and construction) will involve the newly planned Government Cabinet building (the Fale Fono).</p>
<p>Government of New Zealand (GoNZ)</p>	<p>New Zealand has a statutory obligation to financially support Niue’s development initiatives, including LCD and climate change mitigation</p>

	<p>interventions. As such, New Zealand, through its diplomatic mission, is supporting GoN efforts in meeting its target of 80% electricity generation from RE sources by 2025. GoNZ is financing two consecutive US\$ 3.5 M (NZ\$ 5.0 M) projects for the implementation of solar PV panels, solar battery storage banks, power conversion systems, a portion of the required transformers and switchgears, NPC personnel training, and several remediation interventions of the existing generation and network assets. During stakeholder consultations, NZHC has pledged additional GoNZ financial support, if needed, to reach the 80% RE target. Several AREAN activities, especially those relevant to the grid stabilization, are incremental activities tailored around New Zealand’s sponsored baseline projects. For the grants and typology of initiatives, NZHC is a primary partner for the implementation of the AREAN project.</p>
European Developing Fund (EDF)	<p>EDF has sponsored several energy-related projects in Niue. Specifically, EDF-11 is supporting the completion of the underground electric grid and they are also sponsoring the acquisition of additional power transformers and switchgears (still not enough to achieve NPC total needs). The project relevance to AREAN is for contributing to the stabilization of the electric grid.</p>
Niue Development Bank (NDB) and the Alofi branch of Kiwibank	<p>Niue currently has a high energy efficiency household appliances rebate/loan program with Low Carbon Islands Project funded by GEF through IUCN and implemented by NDB and the Alofi Kiwibank branch. The US\$ 80,000 has had limited success to date, but it has laid the ground for AREAN’s incremental activities to further support high efficiency appliances penetration, by adding other appliances, upgrading the budget, refining the scheme and preparing informational and promotional materials.</p>
Niue’s Chamber of Commerce	<p>The Chamber of Commerce has expressed its intention and willingness to partner with AREAN to support the creation of a local market for RE and EE technologies and services. Specifically, the Chamber is interested in sponsoring and help organizing programs to train repair and service providers in technologies new to Niue and that will be adopted under AREAN, such as electric vehicles and hybrid cars.</p>
Village/Community Leaders	<p>The country of Niue is sectioned into 14 villages, each with its own council who actively participate into all decisions involving the village and its inhabitants. For the selection of the location of some of the LC technology demos (such as for the LED streetlights and for the solar water pumps), for the subsequent project implementation, and for the planning of their replication, the project management team will partner with the village councils and leaders in Niue.</p>

4.3 **Risks and Assumptions**

As per standard UNDP requirements, the Project Manager will monitor risks quarterly and report on the status of risks to the UNDP Country Office. The UNDP Country Office will record progress in the UNDP ATLAS risk log. Risks will be reported as critical when the impact and probability are high (i.e. when impact is rated as 5, and when impact is rated as 4 and probability is rated at 3 or higher). Management responses to critical risks will also be reported to the GEF in the annual PIR.

The risks that might prevent the project objectives from being achieved, during the project implementation, are listed as follows:

Project Risks					
Description	Type	Impact & Probability	Mitigation Measures	Owner	Status
The project activities may not be fully implemented due to inadequate local capacity	Technical, Operational	P = 2 I = 4	Prevention: GoN will set up a capable project team comprising competent local and international experts to expand the capacity of the local community people in the implementation of the relevant project activities. The proposed project will be coordinated closely with other relevant projects in the country mainly to make use of potential synergies in the management of the project implementation. This is in addition to the support from UNDP-Samoa MCO that GoN can request. Alleviation: UNDP-Samoa MCO, with the agreement of the implementing partner will manage and expedite the procurement process for external personnel that will work on the project activities. Potential modification of activities to allow for expeditious implementation will be done.	PMU, DoU, PMCU	No Change
The pre-identified and other anticipated co-financing for specific activities of the project may not be available on a timely manner	Financial	P = 1 I = 4	Prevention: GoN assurance of co-funding shall be confirmed and secured prior to project launching. The project team will closely monitor and ensure the timely availability of co-financing from project partners and co-financers during project implementation. Alleviation: Reallocation of budget to support the implementation of activities that will be affected by the delays in the availability of co-financing. In case co-financing will not happen, potential modifications of activities can be done to allow delivery of alternative outputs that are still contributing to the achievement of the relevant outcomes. Together with the NPD conduct follow-up meetings with co-financer, or alternatively find and negotiate with other potential co-financers.	PMU, PMCU	Reducing
The follow-up/through work needed to sustain the achieved outcomes and benefits may not happen	Operational, Financial	P = 3 I = 2	Prevention: As part of the project activities, the development of a sustainable follow-up plan will ensure that follow-through from the key stakeholders (e.g., GoN) will happen by involving them in the planning process itself and getting their commitments when signing off on the plan implementation. The sustenance of the outcomes that are realized during project implementation will form part of the follow-up plan. Alleviation: Agreement and regular follow up with the project partners involved in the implementation of completed activities in the sustained application of the systems/frameworks that will be established and operationalized by the project.	PMCU, DoU-Mol	No Change
RE-based energy generation (power and	Environmental	P = 2 I = 4	Prevention: It is already common in international design and engineering practices, as well as in the construction/installation of RE-based energy generation units to follow proper engineering design	DoU, NPC, PMU, PMCU	No Change

non-power purposes) installations can be seriously affected by adverse climate-related events			and construction that ensure not only structural integrity but also climate resilience. This applies also in the procurement, design/engineering, installation and operation of the pertinent installations. Alleviation: Depending on the extent of the impacts of the adverse climate-related events, appropriate modifications in the installations (and budget) will be done. Potential reduction in the number of installations, or replacement with alternative demos will be done while considering the need to ensure the resulting interventions are still contributing to the realization of the project outcomes.		
Villages may not support the project implementation	Operational, Organizational	P = 1 I = 3	Prevention: The coordination of the project implementation with the project partners will be the main responsibility of DoU-Mol and is expected to be supported by other departments of Mol. Mol good standing and rapport will be put to good use to actively promote the implementation of this project and ensure the support of the villages. Alleviation: In the first place, select villages that are willing to support the project. In case selected villages will withdraw support during the project implementation, the demos will be redesigned for implementation within and in the fringes of the national capital.	DoU-Mol PMCU	Reducing
The recommended policies and regulations of the project by the pertinent GoN agencies may be delayed in approval and enforcement	Political, Regulatory	P = 1 I = 3	Prevention: Advocacy campaigns will be included in the project to gain adequate support from the regulatory bodies on the adoption of the recommended policies and regulations. UNDP will assist if necessary. Alleviation: PB meetings and special meetings with the pertinent GoN agencies will be conducted to discuss and determine what it will take for the agencies to expedite the approval and enforcement of the recommended policies and IRRs and come up with the appropriate actions to resolve the issues/problems. Thereafter implement the action points accordingly.	PMU, PMCU	No Change
Change in national government administration may potentially reduce government support to the project	Political	P = 1 I = 3	Prevention: DoU-Mol and other GoN departments involved in the project will monitor political dynamics and will try to resolve any misunderstanding within the project. If warranted, UNDP executive management intervention may be required. Alleviation: PB meetings and special meetings with the implementing partner and GEF OFP will be conducted to discuss courses of actions to take to sustain GoN's support to the project and carry out such plans accordingly.	DoU-Mol PMCU	No Change
Further reduction in petroleum fuel prices will reduce interest in RE-based power generation	Strategic	P = 1 I = 3	Prevention: While the project has no control on the petroleum fuel prices, the project's awareness raising interventions are expected to sustain the overall interest of the country in transforming their power generation system to RE-based systems even when the petroleum fuel prices are relatively low. Alleviation: Although the petroleum fuel prices are currently in on an uptrend, which is good for RE	DoU, NPC, NBF, PMCU	No Change

			promotion and application, in case prices go down, the project will emphasize the need to take advantage of the energy, environment and economic benefits of RE, and the country's obligation towards the realization of its CCM targets in its NDC to ensure that the interest of GoN in low carbon development is sustained.		
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A preliminary Social and Environmental Safeguard screening was conducted during the PIF preparation and it has been reviewed and updated during this project design process and included here as Annex F. The overall social and environmental risk rating of the project is *moderate*, with four out of the eight risk categories rated moderate and four rated low risk. Because of this rating, all AREAN activities will be preceded by the preparation of an Environmental and Social Management Plan (ESMP). Since the completion of the ESMP is propaedeutic to any activities, it is important to complete the plan during the first year of AREAN implementation. The activities that will have the strongest impact will be especially the demo projects. For example:

1. Environmental:

- a. All special waste generated by implementing RE and EE technologies will have to be properly disposed (i.e., battery banks for RE electricity storage, solar PV panels, incandescent lightbulbs, low energy efficiency household appliances, etc.).
- b. Locations for LED streetlight installations must not have a negative impact on the local fauna (in other PICs, bird nesting has been affected by an improper choice of sites for streetlight installations).

2. Social:

- a. Waste disposal facilities must be chosen without affecting the health and safety of local population.
- b. Any activity involving replacement of equipment (i.e., transformers, solar water pumps, etc.) must be done, whenever possible, in the same site of the old equipment; if this is not possible, the new site must be chosen without affecting health and safety of the local population and taking into consideration the risks of natural climate events affecting Niue.

Environmental and social grievances will be reported to the GEF in the annual PIR.

4.4 Stakeholder Engagement Plan

Based on the stakeholder analysis, the project's key players include MoI, PMCU, NPC and related GoN Departments and agencies. They will take active part in the implementation of the AREAN project activities while the others will assume either supporting or beneficiary roles.

Stakeholder	Roles and Responsibilities in Project Implementation
Department of Utilities – Ministry of Infrastructure (DoU-MoI)	The Department of Utilities is the government entity that has control of the energy-related state-owned enterprises, such as NPC and NBF. DoU has been designated as the implementing partner for AREAN and therefore it will assume a leadership role during project implementation providing guidance and supervision. DoU staff will cooperate closely with the project implementation management team throughout the entire duration of the project and for all activities. DoU will be responsible for communication and coordination with the office of the national GEF OFP

	and UNDP and will liaise with villages during implementation of the demo projects. Lastly, they will provide data inputs on plans and programs of the country concerning the energy provision in the public infrastructure, transport and communications projects of the government.
Project Management and Coordination Unit (PMCU)	The project will be implemented under UNDP's National Implementation Modality (NIM) mechanism. PMCU, a department under the Premier's office, will provide centralized project management services, coordinate project management activities, and facilitate stakeholder relationships.
Niue Power Corporation (NPC)	NPC, newly established as state owned enterprise, manages all assets and is responsible for the generation and distribution of power generation in Niue. NPC role will be critical in the implementation of all AREAN's activities related to grid stabilization, installation of RE power generation systems and ancillary equipment. Its management and staff will work closely with the implementation management team to provide information, support and it will be the recipient of several training programs.
Department of Transportation – Ministry of Infrastructure (DoT-Mol)	DoT will be involved in the activities that will facilitate the adoption of high energy efficiency cars, especially electric vehicles and hybrid cars. Furthermore, as responsible for Niue's roads, it can provide valuable guidance to select the best locations for the solar powered LED streetlights. Similarly, to most stakeholders involved, staff members will be trained through some of the programs that will be planned and delivered under AREAN.
Treasury Department	The role of the Treasury Department will be pivotal for the approval and enforcement of fiscal and financial incentives to support the development of RE and EE technologies. Electricity price revision and extension of energy subsidies will be also undertaken by this department.
Crown Law	Responsible for the provision of legal comments on project agreements and documents for projects.
Niue Bulk Fuel (NBF)	Like NPC, this SOE manages the imports and distribution of fossil fuels into Niue. With a shift towards RE/EE technologies, the day-to-day operation of this unit will be highly affected by the implementation of AREAN activities (especially in terms of diesel imports). NBF will provide valuable information and support to AREAN and its staff will be recipient of some of the training programs.
Niue Chamber of Commerce	The Chamber of Commerce has expressed its intention and willingness to partner with AREAN to support the creation of a local market for RE and EE technologies and services. Specifically, the Chamber is interested in sponsoring and help organizing programs to train repair and service providers in technologies new to Niue and that will be adopted under AREAN, such as electric vehicles and hybrid cars. Expertise of the Chamber of Commerce personnel will also be requested when financial and fiscal incentives to stimulate the creation of a local RE/EE market. Finally, the Chamber of Commerce will also help promote awareness raising activities by providing information about RE/EE technologies to the general public.
Niue Development Bank (NDB) and Kiwibank	The NDB and the Alofi branch of the Kiwibank are currently managing the IUCN financing scheme to promote high energy efficiency household appliances. The two financial institutions will be engaged during the AREAN implementation period for several awareness raising and information dissemination activities related to RE/EE technologies. The expertise of the NDB and Kiwibank personnel will also be requested for the

	establishment of financial and fiscal incentives aiming to create a RE/EE market in Niue.
GoN Ministries and Departments	All relevant GoN ministries and departments (e.g., Ministry of Natural Resources; Department of Agriculture, Fisheries and Forestry; Ministry of Social Services; Department of Statistics; Department of Water Resources; Niue Met Services) and stakeholders will be involved during AREAN implementation activities. Their services, expertise and database of information will be especially useful for the success of the demonstration projects, for capacity building and awareness rising around RE and EE technologies. Staff members will be involved in several training initiatives.
Village/Community Leaders	The 14 village councils will be consulted for the selection of the location of some of the LC technology demos (such as for the LED streetlights and for the solar water pumps) and for the subsequent project implementation. Furthermore, the village councils and community leaders will play a crucial role for the planning and replication of the RE/EE technologies demonstrated under AREAN.
Non-Governmental Organizations	The project will also involve civil society organization such as the Women’s Group and all organizations related to the preservation of Niue’s heritage.
Niue Population	The entire population of Niue will be involved in the awareness activities that will be organized and implemented under AREAN. They will all be beneficiaries of a more efficient and reliable electricity grid as well as a greener and more sustainable environment.

4.5 Gender Equality and Empowering Women

Stakeholder consultations held during the first field mission have been also used to bring to light potential gender issues. For this preliminary exploration it has been very instrumental the meeting with Ms. Gaylene Tasmania, the Director of the Department of Social Services. Ms. Tasmania remarked that there are no gender issues in Niue. Statement supported by some numerical evidence. For example, in GoN there are 11 managerial positions, five (5) of which are currently held by women. Additionally, school enrolment (level of instruction can be used as an indicator to infer the future shaping of government managerial and other skilled positions) counts 55% of girls vs. 45% of boys.

Furthermore, there were no discriminations observed in any workplace or any specific socio-economic sector that would favor one gender over the other. In any case, all activities under AREAN will be designed and implemented in a gender inclusive manner, which will continue to guarantee the equal opportunity environment established in Niue. A complete gender analysis is included as Annex P.

4.6 South-South and Triangular Cooperation (SSTrC)

Pacific islands share similar obstacles with one another when it comes to remoteness, challenging environmental conditions, limited professional skills and scarce natural resources. It is therefore useful to create an osmotic flux of lessons learned from previous projects among PICs. Whenever possible, experience with similar projects in other PICs should be used especially in terms of experience acquired and lesson learned. Many PICs have already implemented projects involving, among others: a) installation of large capacities, in percentage terms, of solar PV systems for electricity generation; b) successful financial schemes for the adoption of high energy efficiency household appliances; and c) training programs to strengthen local capacity in RE/EE technologies. AREAN project design, and especially implementation, will tap into the pool of lessons learned from these projects. For example, there are projects already implemented in the Cook Islands and Tokelau (countries that enjoy statutory obligations from New Zealand like the one established by Niue); whenever technically

possible and financially viable suppliers and service providers that have already had experience in PICs are to be favored. Alternatively, procuring equipment and expertise from developing countries in the South-East Asia and Pacific areas will also be explored.

On the other hand, there are activities designed for which Niue will be a pioneer implementer, including: a) country-wide scale installation of water solar pumps; b) adoption of electric vehicles and hybrid cars; and c) holistic approach to the introduction of policies, regulatory framework, institutional framework, and codes and procedures for grid control and optimal electric load dispatch. In these cases, the flux of information and lessons learned will flow in the opposite direction and other countries will benefit from Niue's experience.

This two-way cooperative approach, which involves expertise and technology transfer, will accelerate development of LC technologies and initiatives in the Pacific region with subsequent socio-economic advancements and furthermore it will facilitate PICs in achieving Sustainable Development Goals.

4.7 Sustainability and Scaling Up

Sustainability: The project will involve the creation of the required enabling conditions that through the adoption of supportive policies/regulations, institutional mechanisms, and financial/fiscal incentives will facilitate the widespread application of sustainable energy and low carbon technologies in the energy generation and energy end-use sectors in Niue. This is to ensure sustainability of the systems and frameworks that will be established under the project. The development of a suitable follow-up action plan for approval and enforcement after project completion will ensure the sustainability of these established systems/frameworks. Since the project is linked and is complementing and supplementing the development and infrastructure plans of the country, e.g., Niue National Strategic Plan; National Integrated Strategic Energy Road Map (NiSERM), the sustainability of project outputs will be continued.

Potential for Scaling-up: The project is also meant to support the current plans and programs of the country towards achieving its NiSERM targets. The RE-based energy system demonstrations that will be implemented in selected villages can be replicated as is, or at a scaled-up configuration in other villages. Such demonstrations are meant to be replicated and/or scaled-up to achieve enhanced energy security and climate resilient energy supplies. The portfolio of feasible low carbon technology application projects that will be developed under the project would most likely include those that are scale-up and replication of the demo projects. Best practices and lessons learned that will come out from the project implementation will also be shared with other PICs and SIDS with similar circumstances of the country, thereby ensuring the scaling up of the project interventions beyond Niue.

V. PROJECT MANAGEMENT

5.1 Cost Efficiency & Effectiveness

The remoteness and small population of Niue, which impedes any substantial economy of scale, strongly affect the price of goods and services imported. Generating 80% of electricity with indigenous renewable sources will significantly and positively impact GoN's balance of payments (besides providing environmental benefits and facilitating energy independence), since costly diesel shipments will be drastically reduced. As described in Section 3.2.2, the proposed approach for enabling the achievement of the %RE targets in the NISERM is barrier removal. More specifically the removal of barriers associated with the lack of supportive policies, regulations and institutional mechanisms; as well as the limited capacity and knowledge about the application, design, financing and operation of feasible RE-based energy systems (both for power and non-power applications) by the public and private sectors of the country would form the bulk of the proposed UNDP-GEF project. Most of the barrier removal activities make up the incremental activities that the project will carry out, particularly those that the GoN will not be, or presently does not have the capacity of, addressing. It is very necessary to provide the incremental support activities to facilitate the demonstration of the processes and procedures involved in integrated energy planning, application of the energy-saving techniques and technologies in the energy end use sectors (public and residential) of the country. Without the incremental barrier removal and enabling activities the achievement of the anticipated alternative scenario in the energy end use sectors in Niue will not be realized. Incremental activities to establish and enforce policy and regulatory frameworks that are supportive (through effective institutional arrangements, financial/fiscal incentives, information sharing, etc.) will be necessary to sustain the replication of low carbon technologies/techniques that will be showcased and promoted under the project. It should be emphasized that the realization of the substantial sustainable development benefits that result from the application of such initiatives is contingent to the removal of the barriers that the GEF can help eliminate.

The applied barrier removal approach is a strategy proven to be very successful in numerous RE/EE projects implemented over the years by UNDP in several PICs. In addition, AREAN holistic approach of simultaneously removing all identified barriers makes the project more cost efficient and more effective by avoiding any unnecessary duplication while taking advantage of all synergies created. As mentioned above, many AREAN activities have been designed to complement and improve the baseline of RE/EE projects currently ongoing or planned with the purpose of maximizing the effectiveness of the interventions proposed. For example, introducing standardized technical specs for RE/EE equipment and systems, as well as establishing and approving codes and procedures for RE technology implementations, grid control and optimal load dispatch will leverage the financial efforts of co-financed projects. Cost efficiency, when implementing AREAN activities, will be further pursued by procuring the most financially viable equipment and service providers available, which have been possibly already proven in similar projects.

Since the main essence of the proposed project is the reduction of diesel-based power generation in the country, the global environmental benefits of the proposed GEF project would mainly come from GHG emission reductions (tons CO₂) from fossil fuel substitutions in electricity generation, and other energy end-uses particularly in using available feasible RE resources. Sustainable energy initiatives that would lead to the improvement of the specific energy consumption of energy end use sectors through improved energy utilization efficiency will also contribute to this. In summary, the GHG emissions reductions would come from: (1) Direct emission reductions from completed sustainable energy and low carbon technology application demonstrations and replications; and, (2) Indirect emission reductions from follow-up sustainable energy and low carbon (RE and EE) technology application projects in the country as influenced by this proposed GEF project. The cumulative amount

of GHG emission that will be avoided because of AREAN will be approximately 110,000 tCO_{2eq}; this figure considers that the LC technologies that will be implemented (such as solar PV panels, solar water pumps, EVs and hybrid cars, LED streetlights, high energy efficient household appliances, etc.) have a lifespan longer than the duration of the AREAN project implementation phase. It should be also pointed out that many of the activities proposed under AREAN are for Technical Assistance (TA), which will contribute to capacity building by offering training programs designed *ad-hoc* to relevant GoN personnel and key stakeholders. Skilled personnel can guarantee the long-term sustainability of the measures adopted and demos implemented under AREAN, contributing to improving cost efficiency and effectiveness of the project. Considering the small scale of Niue and that many of the designed interventions will be TA activities, which facilitate GHG emission reduction but do not have a direct impact, removing ~100,000 tCO_{2eq} is a positive result.

5.2 Project Management

The responsibility for the execution of the project under the national implementation modality is with the Implementing Partner (DoU-Mol) and will work closely with other relevant stakeholders, especially the PMCU. The DoU-Mol in cooperation with the PMCU will establish a Project Management Unit (PMU) for the overall coordination, as well as resource management, of this project. The PMU will be organized to include the services of the Project Manager, the Project Technical Officer, the Project Finance and Administrative Officer, the Project Communication Officer and the Chief Technical Advisor (CTA).

The PMU will be very helpful in providing management services by following the procedures of UNDP and funding agencies and the Financial Regulations and Rules of UNDP and providing for the required guidance to ensure best value for money, fairness, integrity, transparency, and effective international competition that UNDP adheres to.

With PMU providing the supportive role, the Project Manager is responsible for:

- Managing the overall conduct of the project
- Implementing activities by mobilizing goods and services
- Checking on progress and watch for plan deviations
- Ensuring that changes are controlled, and problems addressed
- Monitoring progress and risks
- Reporting on progress including measures to address challenges and opportunities.

The Project Manager should coordinate with the pertinent programme and operational units of the DoU-Mol and PMCU on the follow up of disbursements against obligations and other matters in relation to project implementation and management.

5.3 Agreement on Intellectual Property Rights and Use of Logo on the Project's Deliverables and Disclosure of Information

To accord proper acknowledgement to the GEF for providing grant funding, the GEF logo will appear together with the UNDP logo on all promotional materials, other written materials like publications developed by the project, and project hardware. Any citation on publications regarding projects funded by the GEF will also accord proper acknowledgement to the GEF. Information will be disclosed in accordance with relevant policies notably the UNDP Disclosure Policy¹⁵ and the GEF policy on public involvement¹⁶.

¹⁵ See http://www.undp.org/content/undp/en/home/operations/transparency/information_disclosurepolicy/

¹⁶ See https://www.thegef.org/gef/policies_guidelines

VI. PROJECT RESULTS FRAMEWORK

This project will contribute to the following Sustainable Development Goal (s): SDG 7: “Ensure access to affordable, reliable, sustainable and modern energy for all”; SDG 13: “Take urgent action to combat climate change and its impacts by regulating emissions and promoting developments in renewable energy”; SDG 8: “Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all”; and, SDG 9: “Build resilient infrastructure, promote inclusive and sustainable industrialization, and foster innovation”						
This project will contribute to the following country outcome included in the UNDAF/Country Programme Document: <i>UN Pacific Strategy 2018-2022</i> : Outcome 1 – Climate Change, Disaster Resilience and Environmental Protection; <i>UNDP Sub-Regional Programme Document 2018-2022</i> : Outcome 1 – By year 2022, people and ecosystems in the Pacific are more resilient to the impacts of climate change, climate variability and disasters; and environmental protection is strengthened.						
This project will be linked to the following output of the UNDP Strategic Plan: Output 1.4: Scaled up action on climate change adaptation and mitigation cross sectors which is funded and implemented. Output 1.5: Inclusive and sustainable solutions adopted to achieve increased energy efficiency and universal modern energy access (especially off-grid sources of renewable energy)						
	Objective and Outcome Indicators	Baseline	Mid-term Target	End of Project Target	Means of Verification	Assumptions
Project Goal: Improved energy consumption index and reduced annual growth rate of GHG emissions in the country’s energy supply and energy end-use sectors	Reduction in the overall national energy utilization intensity (toe ¹⁷ /1,000 US\$ GDP ¹⁸)	0.109	0.095	0.089	Annual energy supply and consumption reports submitted by relevant GoN entities, NPC, NBF, DoU-Mol, and the Treasury Department Project M&E reports	Continuous commitment of GoN in efforts to achieve the NiSERM targets irrespective of which party is in power
	Cumulative GHG emission reduction ¹⁹ from fossil fuel utilization, tons CO ₂	0	4,108	9,242 ²⁰		
Project Objective: Enabling the achievement of low carbon energy access,	Cumulative fossil fuel savings ²¹ due to sustainable energy and low carbon interventions implemented, toe	0	1,361	3,281	Annual energy supply and consumption reports submitted by relevant entities, NPC, NBF,	Realization of committed co-financing from the national government in the implementation of project

¹⁷ Calculation of tons of Oil Equivalent (toe): 1) Amount of solar PV electricity (kWh) is considered as electricity produced from diesel power generation. The amount of diesel fuel (liters) used to generate this amount of electricity is calculated and then converted into toe; and 2) the toe value is added to the rest of the country’s energy consumption (toe), i.e., energy consumption in all other sectors, except from solar PV).

¹⁸ GDP data were available for year 2003 and year 2012. These two values have been used to determine the average GDP growth rate over this period, which was 6.2% (CIA gave the same 6.2% GDP growth rate also for the period prior to 2003). The assumption made is that GDP will continue to grow at the same rate for the next few years.

¹⁹ Since the RE and EE targets will be fully achieved by 2025, and the solar PV installations have a duration of ~25 years, the cumulative GHG emission reductions over the lifetime of the equipment acquired will continue well past the end of AREAN implementation. Annex L shows these estimates in detail. By the end of all equipment lifetime the estimated cumulative GHG emission reductions will be 99,633 tCO₂.

²⁰ In line with the plan to achieve all the NiSERM targets, the GoN, with the cooperation of NZHC, will implement new RE-based power generation projects during the AREAN implementation period. The estimated GHG emission reduction (631 tons CO₂) from such projects is included in this EOP target.

²¹ Similarly, to the GHG emission reductions, also the fuel savings will continue well past the project implementation, due to the long lifetime of the equipment acquired.

sustainable energy, and green growth targets of Niue	% RE electricity production ²²	1.8%	64%	73%	DoU-Mol and the Treasury Department Project M&E and activity reports Trade and commerce reports	activities and monitoring systems
	No. of new jobs created in the application of sustainable energy and LC technologies and techniques in the energy supply and energy end-use sectors in Niue ²³	0	3	8		
Component 1: Improvements in Energy Integrated Development Policy and Planning						
Outcome 1: Improved policy and regulatory frameworks in the application of energy efficiency and renewable energy technologies in the energy end-use sectors	No. of approved and enforced RE and EC&EE policies, and associated guidance and implementing rules and regulations	0	2	2	Documents on RE and EC&EE policies, regulations and energy standards Annual reports from DoU-Mol, NPC, and Bulk Fuels Project M&E and activity reports	Full and continuous commitment and support of the national government in the implementation of energy policies and regulations in the energy and end-use sectors
	No. of formulated and approved policies and regulations incorporated in the country's Energy Act	0	2	2 ²⁴		
Component 2: Institutional Capacity Building on Low Carbon Development						
Outcome 2: Effective enforcement of plans, policies and regulations, and implementation of programs/projects on the application of climate resilient and low carbon technologies in the end-use sectors	No. of sectoral integrated development plans that are implemented and managed through the established and adopted integrated institutional mechanisms	0	1	2	Documents on the institutional mechanisms Documents on low carbon development processes Annual Reports on the sectoral integrated development plan implementation Project M&E and activity reports	Continuous commitment and support by the national government, private sector and public, in general on the successfully implemented institutional arrangements even after the AREAN project completion
	No. of low carbon development initiatives facilitated by adopted and enforced institutional arrangements mentioned in Indicator 1	0	2	4		

²² NZHC has indicated a very aggressive implementation strategy with the installation of most of the solar PV power capacity to achieve 80% generation completed by mid-term; additional PV systems have been considered after the completion of the 2 NZ projects to achieve the NiSERM target, as pledged by the NZHC.

²³ Job creation will continue past the completion of AREAN implementation, since the benefits of the activities that will lead to the creation of a RE/EE market will continue past project completion.

²⁴ Review of the Energy Act will be completed by mid-term, therefore there will be no change for the end of project target

Component 3: Improvements in the Financing of Low Carbon Initiatives						
Outcome 3: Increased availability of, and access to, financing for sustainable energy, energy access and low carbon development initiatives in the energy supply and demand sectors	No. of developed and recommended financing schemes/mechanisms with Niue Development Bank for supporting climate resilient and low carbon development initiatives in the country	0	1	2	Documents on the development process for the financial schemes Annual Reports on the planned and implemented low carbon development projects that are financed through the adopted financing scheme(s) Project M&E and activity reports	Continuous commitment and support by the national government and financial sector on the implementation of the adopted financing schemes
	No. of small-scale EE projects and RE technology projects financed either through the adopted financing scheme; or by private sector investment	0	2	6		
	No. of recommended finance/fiscal policies for supporting initiatives on LC development	0	2	2 ²⁵		
Component 4: Climate Resilient and Low Carbon Technologies Application						
Outcome 4.1: Climate resilient and low carbon techniques and practices adopted and implemented in the energy supply and energy end-use sectors	No. of completed feasibility assessments conducted for planned energy-integrated socio-economic development activities that feature RE and EE technology applications	0	2	4	RE/EE technology projects feasibility assessment reports Project M&E and activity reports	Consumers and the private sector fully support and commit to the feasible replication of successful results of the demo projects
Outcome 4.2: Enhanced confidence in the viability of climate resilient and low carbon technology applications in the energy supply and demand sectors	Cumulative amount of energy savings from the successfully installed and operational demonstrations (including replications) of sustainable energy and low carbon technology applications, toe ²⁶	0	0	368	Demo RE-based electricity generation and low carbon technology application project profiles Performance and evaluation reports of the demo projects Project M&E and activity reports	As per schedule implementation and completion of demo projects Consumers and the private sector fully support and commit to the feasible

²⁵ In order to maximize the benefits of the fiscal/financial policies and incentives, they will be designed and implemented by mid-term.

²⁶ Demos will be completed during the second half of AREAN and their benefits will largely be achieved after project completion; similarly, replications (see Table L.6) will be implemented after the end of AREAN.

	No. of RE and EE technologies application projects designed and financed for implementation as influenced by the results and outcomes of the demonstrations	0	1 ²⁷	5		replication of successful results of the demo projects
Component 5: Enhancement of Awareness on Low Carbon Development						
Outcome 5: Enhanced levels of awareness and attitude towards climate resilient and low carbon development in the energy supply and energy end use sectors	Incremental no. of energy consumers (e.g., households) that will utilize EE appliances and RE-based energy generating and consuming equipment acquired through AREAN initiatives	0	40	160 ²⁸	Survey of energy consumption of consumers (e.g., household energy survey) Business registrations of local technical and engineering service providers that are working on low carbon technology projects Project M&E and activity reports	Continuous commitment and support on sustainable energy and low carbon development by the national government
	No. of local firms that can capably provide technical, engineering and maintenance services for sustainable energy and low carbon technology application projects	0	1	3		

²⁷ Completion of demo activities will come after the completion of feasibility studies and it will take long time to be completed. Based on the demo projects described in Annex L only one demo (the completion of the high energy efficiency demonstration building) will be completed by mid-term, all other demos will be completed by end of project.

²⁸ This represents one third of Niue's ~480 households (it is estimated that just over 50% of the total households have very low efficiency appliances; therefore, AREAN aims to involve about two thirds of the target households).

VII. MONITORING AND EVALUATION (M&E) PLAN

The project results as outlined in the project results framework will be monitored annually and evaluated periodically during project implementation to ensure the project effectively achieves these results. The project monitoring and evaluation plan will also facilitate learning and ensure knowledge is shared and widely disseminated to support the scaling up and replication of project results.

Project-level monitoring and evaluation will be undertaken in compliance with UNDP requirements as outlined in the [UNDP POPP](#) and [UNDP Evaluation Policy](#). While these UNDP requirements are not outlined in this project document, the UNDP Country Office will work with the relevant project stakeholders to ensure UNDP M&E requirements are met in a timely fashion and to high quality standards. Additional mandatory GEF-specific M&E requirements (as outlined below) will be undertaken in accordance with the [GEF M&E policy](#) and other relevant GEF policies²⁹.

In addition to these mandatory UNDP and GEF M&E requirements, other M&E activities deemed necessary to support project-level adaptive management will be agreed during the Project Inception Workshop and will be detailed in the Inception Report. This will include the exact role of project target groups and other stakeholders in project M&E activities including the GEF Operational Focal Point and national/regional institutes assigned to undertake project monitoring. The GEF Operational Focal Point will strive to ensure consistency in the approach taken to the GEF-specific M&E requirements (notably the GEF Core Indicators) across all GEF-financed projects in the country. This could be achieved for example by using one national institute to complete the GEF Core Indicators for all GEF-financed projects in the country, including projects supported by other GEF Agencies.³⁰

M&E Oversight and monitoring responsibilities:

Project Manager: The Project Manager is responsible for day-to-day project management and regular monitoring of project results and risks, including social and environmental risks. The Project Manager will ensure that all project staff maintains a high level of transparency, responsibility and accountability in M&E and reporting of project results. The Project Manager will inform the Project Board, the UNDP Country Office and the UNDP-GEF RTA of any delays or difficulties as they arise during implementation so that appropriate support and corrective measures can be adopted.

The Project Manager will develop annual work plans based on the multi-year work plan included in Annex A, including annual output targets to support the efficient implementation of the project. The Project Manager will ensure that the standard UNDP and GEF M&E requirements are fulfilled to the highest quality. This includes, but is not limited to, ensuring the results framework indicators are monitored annually in time for evidence-based reporting in the GEF PIR, and that the monitoring of risks and the various plans/strategies developed to support project implementation (e.g. gender strategy, KM strategy etc..) occur on a regular basis.

Project Board (PB): The PB will take corrective action as needed to ensure the project achieves the desired results. The PB will hold project reviews to assess the performance of the project and appraise the Annual Work Plan for the following year. In the project's final year, the PB will hold an end-of-project review to capture lessons learned and discuss opportunities for scaling up and to highlight project results and lessons learned with relevant audiences. This meeting will also discuss the findings outlined in the project terminal evaluation report and the management response.

²⁹ See https://www.thegef.org/gef/policies_guidelines

³⁰ See https://www.thegef.org/gef/gef_agencies

Project Implementing Partner: The Implementing Partner is responsible for providing all required information and data necessary for timely, comprehensive and evidence-based project reporting, including results and financial data, as necessary and appropriate. The Implementing Partner will strive to ensure project-level M&E is undertaken by national institutes and is aligned with national systems so that the data used by and generated by the project supports national systems.

UNDP Country Office: The UNDP Country Office will support the Project Manager as needed, including through annual supervision missions. The annual supervision missions will take place per the schedule outlined in the annual work plan. Supervision mission reports will be circulated to the project team and PB within one month of the mission. The UNDP Country Office will initiate and organize key GEF M&E activities including the annual GEF PIR, the independent mid-term review and the independent terminal evaluation. The UNDP Country Office will also ensure that the standard UNDP and GEF M&E requirements are fulfilled to the highest quality.

The UNDP Country Office is responsible for complying with all UNDP project-level M&E requirements as outlined in the [UNDP POPP](#). This includes ensuring the UNDP Quality Assurance Assessment is undertaken (during the design stage, annually during the implementation stage, and at the end of the project); that annual targets at the output level are developed and monitored and reported using UNDP corporate systems; the regular updating of the ATLAS risk log; and, the updating of the UNDP gender marker on an annual basis based on gender mainstreaming progress reported in the GEF PIR and the UNDP ROAR. Any quality concerns flagged during these M&E activities (e.g. annual GEF PIR quality assessment ratings) must be addressed by the UNDP Country Office and the Project Manager.

The UNDP Country Office will retain all M&E records for this project for up to seven years after project financial closure to support ex-post evaluations undertaken by the UNDP Independent Evaluation Office (IEO) and/or the GEF Independent Evaluation Office (IEO).

UNDP-GEF Unit: Additional M&E and implementation quality assurance and troubleshooting support will be provided by the UNDP-GEF Regional Technical Advisor and the UNDP-GEF Directorate as needed.

Audit: The project will be audited per UNDP Financial Regulations and Rules and applicable audit policies on NIM implemented projects.³¹

Additional GEF monitoring and reporting requirements:

Inception Workshop and Report: A project inception workshop will be held within two months after the project document has been signed by all relevant parties to, amongst others:

- a) Re-orient project stakeholders to the project strategy and discuss any changes in the overall context that influence project strategy and implementation;
- b) Discuss the roles and responsibilities of the project team, including reporting and communication lines and conflict resolution mechanisms;
- c) Review the results framework and finalize the indicators, means of verification and monitoring plan;
- d) Discuss reporting, monitoring and evaluation roles and responsibilities and finalize the M&E budget; identify national/regional institutes to be involved in project-level M&E; discuss the role of the GEF OFP in M&E;
- e) Update and review responsibilities for monitoring the various project plans and strategies, including the risk log; Environmental and Social Management Plan and other safeguard

³¹ See guidance here: <https://info.undp.org/global/popp/frm/pages/financial-management-and-execution-modalities.aspx>

requirements; the gender strategy; the knowledge management strategy, and other relevant strategies;

- f) Review financial reporting procedures and mandatory requirements, and agree on the arrangements for the annual audit; and
- g) Plan and schedule PB meetings and finalize the first-year annual work plan.

The Project Manager will prepare the inception report no later than one month after the inception workshop. The inception report will be cleared by the UNDP Country Office and the UNDP-GEF Regional Technical Adviser and will be approved by the PB.

GEF Project Implementation Report (PIR): The Project Manager, the UNDP Country Office, and the UNDP-GEF Regional Technical Adviser will provide objective input to the annual GEF PIR covering the reporting period July (previous year) to June (current year) for each year of project implementation. The Project Manager will ensure that the indicators included in the project results framework are monitored annually in advance of the PIR submission deadline so that progress can be reported in the PIR. Any environmental and social risks and related management plans will be monitored regularly, and progress will be reported in the PIR.

The PIR submitted to the GEF will be shared with the PB. The UNDP Country Office will coordinate the input of the GEF Operational Focal Point and other stakeholders to the PIR as appropriate. The quality rating of the previous year's PIR will be used to inform the preparation of the subsequent PIR.

Lessons learned and knowledge generation: Results from the project will be disseminated within and beyond the project intervention area through existing information sharing networks and forums. The project will identify and participate, as relevant and appropriate, in scientific, policy-based and/or any other networks, which may be of benefit to the project. The project will identify, analyze and share lessons learned that might be beneficial to the design and implementation of similar projects and disseminate these lessons widely. There will be continuous information exchange between this project and other projects of similar focus in the same country, region and globally.

GEF Focal Area Core Indicators: The prescribed GEF Core Indicators will be used to monitor global environmental benefit results. The baseline/CEO Endorsement GEF Focal Area Core Indicators (s) – submitted in Annex D to this AREAN project document – will be updated by the Project Manager/Team and shared with the mid-term review consultants and terminal evaluation consultants before the required review/evaluation missions take place. The updated GEF Core Indicators (s) will be submitted to the GEF along with the completed Mid-term Review report and Terminal Evaluation report.

Independent Mid-term Review (MTR): An independent mid-term review process will begin after the second PIR has been submitted to the GEF, and the MTR report will be submitted to the GEF in the same year as the 3rd PIR. The MTR findings and responses outlined in the management response will be incorporated as recommendations for enhanced implementation during the final half of the project's duration. The terms of reference, the review process and the MTR report will follow the standard templates and guidance prepared by the UNDP IEO for GEF-financed projects available on the [UNDP Evaluation Resource Center \(ERC\)](#). As noted in this guidance, the evaluation will be 'independent, impartial and rigorous'. The consultants that will be hired to undertake the assignment will be independent from organizations that were involved in designing, executing or advising on the project to be evaluated. The GEF Operational Focal Point and other stakeholders will be involved and consulted during the terminal evaluation process. Additional quality assurance support is available from the UNDP-GEF Directorate. The final MTR report will be available in English and will be cleared by the UNDP Country Office and the UNDP-GEF Regional Technical Adviser and approved by the PB.

Terminal Evaluation (TE): An independent terminal evaluation (TE) will take place upon completion of all major project outputs and activities. The terminal evaluation process will begin three months before operational closure of the project allowing the evaluation mission to proceed while the project team is still in place, yet ensuring the project is close enough to completion for the evaluation team to reach conclusions on key aspects such as project sustainability. The Project Manager will remain on contract until the TE report and management response have been finalized. The terms of reference, the evaluation process and the final TE report will follow the standard templates and guidance prepared by the UNDP IEO for GEF-financed projects available on the [UNDP Evaluation Resource Center](#). As noted in this guidance, the evaluation will be ‘independent, impartial and rigorous’. The consultants that will be hired to undertake the assignment will be independent from organizations that were involved in designing, executing or advising on the project to be evaluated. The GEF Operational Focal Point and other stakeholders will be involved and consulted during the terminal evaluation process. Additional quality assurance support is available from the UNDP-GEF Directorate. The final TE report will be cleared by the UNDP Country Office and the UNDP-GEF Regional Technical Adviser and will be approved by the PB. The TE report will be publicly available in English on the UNDP ERC.

The UNDP Country Office will include the planned project terminal evaluation in the UNDP Country Office evaluation plan and will upload the final terminal evaluation report in English and the corresponding management response to the UNDP Evaluation Resource Centre (ERC). Once uploaded to the ERC, the UNDP IEO will undertake a quality assessment and validate the findings and ratings in the TE report and rate the quality of the TE report. The UNDP IEO assessment report will be sent to the GEF IEO along with the project terminal evaluation report.

Final Report: The project’s terminal PIR along with the terminal evaluation (TE) report and corresponding management response will serve as the final project report package. The final project report package shall be discussed with the PB during an end-of-project review meeting to discuss lesson learned and opportunities for scaling up.

Mandatory GEF M&E Requirements and M&E Budget:

GEF M&E requirements	Primary responsibility	Indicative charged to the Project Budget ³² (US\$)		Time frame
		GEF grant	Co-financing	
Inception Workshop	UNDP Country Office	10,000	5,000	Within two months of project document signature
Inception Report	Project Manager	None	10,000	Within two weeks of inception workshop
Standard UNDP monitoring and reporting as outlined in the UNDP POPP	UNDP Country Office	None	None	Quarterly, annually
Monitoring of indicators in project results framework	Project Manager	4,000 per year	None	Annually
GEF Project Implementation Report (PIR)	Project Manager, UNDP Country Office and UNDP-GEF team	None	2,000 per year	Annually

³² Excluding project team staff time and UNDP staff time and travel expenses.

GEF M&E requirements	Primary responsibility	Indicative charged to the Project Budget ³² (US\$)		Time frame
		GEF grant	Co-financing	
NIM Audit as per UNDP audit policies	UNDP Country Office	2,500 per year	None	Annually or other frequency as per UNDP Audit policies
Lessons learned and knowledge generation	Project Manager	None	4,000 per year	Annually
Monitoring of environmental and social risks, and corresponding management plans	Project Manager, UNDP Country Office	None	2,000 per year	On-going
ESMP monitoring & evaluation	UNDP Country Office	5,000	5,000	Annually
Addressing environmental and social grievances	Project Manager, UNDP Country Office, and BPPS as needed	None for time of project manager, and UNDP Country Office	3,000 per year	
Project Board (PB) meetings	PB, UNDP Country Office, and Project Manager	None	2,000 per year	At minimum annually
Supervision missions	UNDP Country Office	None		Annually
Oversight missions	UNDP-GEF team	None		Troubleshooting as needed
Knowledge management	Project Manager	None		On-going
GEF Secretariat learning missions/site visits	UNDP Country Office, Project Manager, and UNDP-GEF team	None		To be determined
Mid-term GEF Core Indicator Tracking	Project Manager	None	10,000	Before mid-term review mission takes place
Independent Mid-term Review (MTR) and management response	UNDP Country Office, Project Team, and UNDP-GEF team	30,000		Between 2 nd and 3 rd PIR
Terminal GEF Core Indicators	Project Manager	None	10,000	Before terminal evaluation mission takes place
Independent Terminal Evaluation (TE) included in UNDP evaluation plan, and management response	UNDP Country Office, Project Team, and UNDP-GEF team	30,000		At least three months before operational closure
Translation of MTR and TE reports into English	UNDP Country Office	None	None	
TOTAL indicative COST Excluding project team staff time, and UNDP staff and travel expenses		107,000	92,000	

VIII. GOVERNANCE AND MANAGEMENT ARRANGEMENTS

Roles and Responsibilities of the Project's Governance Mechanism

As practiced in all UNDP/GEF-supported projects, UNDP always endeavors to seek adaptive management approach in the implementation of projects. Based on the partnerships defined and firmed up during the project development, the management arrangements have always been anchored on co-operation and mutual sharing of benefits where accountability and responsibility for implementing the project and achieving the project outputs.

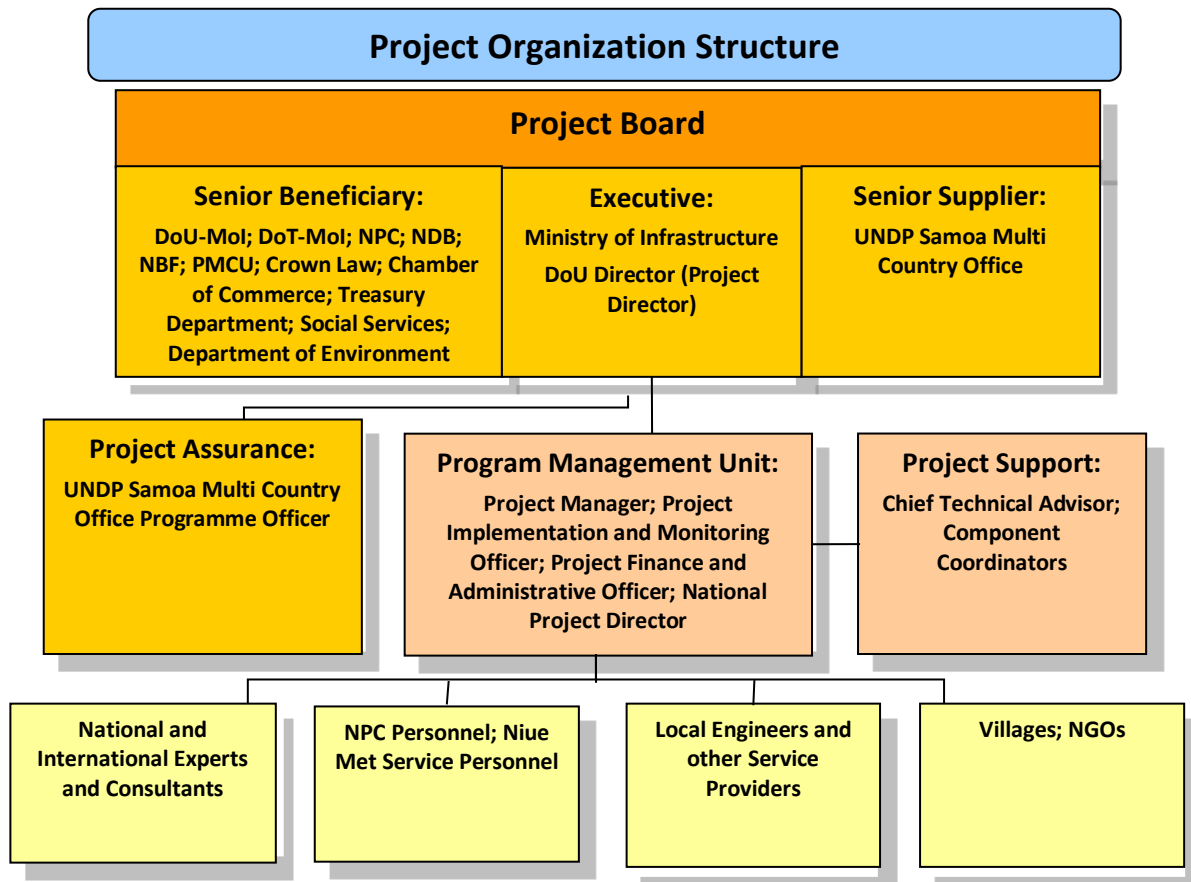
The project will be implemented following UNDP's national implementation modality, per the Standard Basis Assistance Agreement between UNDP and the Government of Niue, and the Country Programme.

The **Implementing Partner** for this project is the Niue Ministry of Infrastructure (Department of Utilities). The Implementing Partner is responsible and accountable for managing this project, including the monitoring and evaluation of project interventions, achieving project outcomes, and for the effective use of UNDP resources.

The Implementing Partner is responsible for:

- Approving and signing the multiyear workplan;
- Approving and signing the combined delivery report at the end of the year; and,
- Signing the financial report or the funding authorization and certificate of expenditures.

Figure 2. Project Organizational Chart



Project Board: The Project Board (also called Project Steering Committee) is responsible for making by consensus, management decisions when guidance is required by the Project Manager, including recommendations for UNDP/Implementing Partner approval of project plans and revisions, and addressing any project level grievances. In order to ensure UNDP’s ultimate accountability, Project Board decisions should be made in accordance with standards that shall ensure management for development results, best value money, fairness, integrity, transparency and effective international competition. In case a consensus cannot be reached within the Board, final decision shall rest with the UNDP Programme Manager.

Specific responsibilities of the Project Board include:

- Provide overall guidance and direction to the project, ensuring it remains within any specified constraints;
- Address project issues as raised by the project manager;
- Provide guidance on new project risks, and agree on possible countermeasures and management actions to address specific risks;
- Agree on project manager’s tolerances as required;
- Review the project progress, and provide direction and recommendations to ensure that the agreed deliverables are produced satisfactorily according to plans;
- Appraise the annual project implementation report, including the quality assessment rating report; make recommendations for the workplan;
- Provide ad hoc direction and advice for exceptional situations when the project manager’s tolerances are exceeded; and
- Assess and decide to proceed on project changes through appropriate revisions.

The composition of the Project Board must include the following roles:

Executive: The Executive is an individual who represents ownership of the project who will chair the Project Board. This role can be held by a representative from the Government Cooperating Agency or UNDP. The Executive is: Ministry of Infrastructure (Department of Utilities).

The Executive is ultimately responsible for the project, supported by the Senior Beneficiary and Senior Supplier. The Executive's role is to ensure that the project is focused throughout its life cycle on achieving its objectives and delivering outputs that will contribute to higher level outcomes. The executive must ensure that the project gives value for money, ensuring cost-conscious approach to the project, balancing the demands of beneficiary and supplier.

Specific Responsibilities: (as part of the above responsibilities for the Project Board)

- Ensure that there is a coherent project organization structure and logical set of plans;
- Set tolerances in the AWP and other plans as required for the Project Manager;
- Monitor and control the progress of the project at a strategic level;
- Ensure that risks are being tracked and mitigated as effectively as possible;
- Brief relevant stakeholders about project progress;
- Organize and chair Project Board meetings.

Senior Supplier: The Senior Supplier is an individual or group representing the interests of the parties concerned which provide funding and/or technical expertise to the project (designing, developing, facilitating, procuring, implementing). The Senior Supplier's primary function within the Board is to provide guidance regarding the technical feasibility of the project. The Senior Supplier role must have the authority to commit or acquire supplier resources required. If necessary, more than one person may be required for this role. Typically, the implementing partner, UNDP and/or donor(s) would be represented under this role. The Senior Supplier is UNDP Samoa Multi Country Office.

Specific Responsibilities (as part of the above responsibilities for the Project Board)

- Make sure that progress towards the outputs remains consistent from the supplier perspective;
- Promote and maintain focus on the expected project output(s) from the point of view of supplier management;
- Ensure that the supplier resources required for the project are made available;
- Contribute supplier opinions on Project Board decisions on whether to implement recommendations on proposed changes;
- Arbitrate on, and ensure resolution of, any supplier priority or resource conflicts.

Senior Beneficiary: The Senior Beneficiary is an individual or group of individuals representing the interests of those who will ultimately benefit from the project. The Senior Beneficiary's primary function within the Board is to ensure the realization of project results from the perspective of project beneficiaries. The Senior Beneficiary role is held by a representative of the government or civil society. The Senior Beneficiary is: DoU-Mol; DoT-Mol; NPC; NDB; NBF; PMCU; Crown Law; Chamber of Commerce; Treasury Department; Social Services; Department of Environment.

The Senior Beneficiary is responsible for validating the needs and for monitoring that the solution will meet those needs within the constraints of the project. The Senior Beneficiary role monitors progress against targets and quality criteria. This role may require more than one person to cover all the beneficiary interests. For the sake of effectiveness, the role should not be split between too many people.

Specific Responsibilities (as part of the above responsibilities for the Project Board)

- Prioritize and contribute beneficiaries' opinions on Project Board decisions on whether to implement recommendations on proposed changes;
- Specification of the Beneficiary's needs is accurate, complete and unambiguous;
- Implementation of activities at all stages is monitored to ensure that they will meet the beneficiary's needs and are progressing towards that target;
- Impact of potential changes is evaluated from the beneficiary point of view;
- Risks to the beneficiaries are frequently monitored.

Project Manager: The Project Manager has the authority to run the project on a day-to-day basis on behalf of the Project Board within the constraints laid down by the Board. The Project Manager is responsible for day-to-day management and decision-making for the project. The Project Manager's prime responsibility is to ensure that the project produces the results specified in the project document, to the required standard of quality and within the specified constraints of time and cost. The Implementing Partner appoints the Project Manager, who should be different from the Implementing Partner's representative in the Project Board.

Specific responsibilities include:

- Provide direction and guidance to project team(s)/ responsible party(ies);
- Liaise with the Project Board to assure the overall direction and integrity of the project;
- Identify and obtain any support and advice required for the management, planning and control of the project;
- Responsible for project administration;
- Plan the activities of the project and monitor progress against the project results framework and the approved annual workplan;
- Mobilize personnel, goods and services, training and micro-capital grants to initiative activities, including drafting terms of reference and work specifications, and overseeing all contractors' work;
- Monitor events as determined in the project monitoring schedule plan/timetable, and update the plan as required;
- Manage requests for the provision of financial resources by UNDP, through advance of funds, direct payments or reimbursement using the fund authorization and certificate of expenditures;
- Monitor financial resources and accounting to ensure the accuracy and reliability of financial reports;
- Be responsible for preparing and submitting financial reports to UNDP on a quarterly basis;
- Manage and monitor the project risks initially identified and submit new risks to the project board for consideration and decision on possible actions if required; update the status of these risks by maintaining the project risks log;
- Capture lessons learned during project implementation;
- Prepare the annual workplan for the following year; and update the Atlas Project Management module if external access is made available.
- Prepare the GEF PIR and submit the final report to the Project Board;
- Based on the GEF PIR and the Project Board review, prepare the AWP for the following year.
- Ensure the mid-term review process is undertaken as per the UNDP guidance, and submit the final MTR report to the Project Board.
- Identify follow-on actions and submit them for consideration to the Project Board;
- Ensure the terminal evaluation process is undertaken as per the UNDP guidance, and submit the final TE report to the Project Board

Project Assurance: UNDP provides a three – tier supervision, oversight and quality assurance role – funded by the GEF agency fee – involving UNDP staff in Country Offices and at regional and headquarters levels. Project Assurance must be totally independent of the Project Management function. The quality assurance role supports the Project Board and Project Management Unit by carrying out objective and independent project oversight and monitoring functions. This role ensures appropriate project management milestones are managed and completed. The Project Board cannot delegate any of its quality assurance responsibilities to the Project Manager. This project oversight and quality assurance role is covered by the GEF Agency.

Governance Role for Project Target Groups: Because of the small population of Niue, combined with the wide range of areas that will be covered by the projects and demos implemented under AREAN, the entire population of Niue is the target group of this project. The population will be engaged directly and through their village councils and leaders in several of the activities that will be conducted during the project implementation phase. First and foremost, the involvement of the village inhabitants and their local representatives will be instrumental in selecting the optimal, desirable locations for the installation of some of the LC technology demos, especially for the PV powered LED streetlights and the solar water pumps. Additionally, the Niue population, being the recipient of the awareness raising programs and initiatives on RE/EE measures, will provide valuable feedback in the form of surveys that will be conducted at the beginning (to design *ad-hoc*, needed actions), mid-term (to make proper additions and corrections to the awareness initiatives), and end (to determine the rate of success of all initiatives).

IX. FINANCIAL PLANNING AND MANAGEMENT

The total cost of the project is US\$ 21,027,563. This is financed through a GEF grant of US\$ 3,321,563, and US\$ 17,706,000 in co-financing from project partners. UNDP, as the GEF Implementing Agency, is responsible for the execution of the GEF resources and the cash co-financing transferred to UNDP bank account only.

Parallel co-financing: The actual realization of project co-financing will be monitored during the mid-term review and terminal evaluation process and will be reported to the GEF. The planned parallel co-financing will be used as follows:

Co-financing source	Co-financing type	Co-financing amount (US\$)	Planned Activities/Outputs	Risks	Risk Mitigation Measures
GoN	Grant	3,500,000	Fale Fono: Planned design, engineering and construction of the new Parliament Building	Project may not proceed or get delayed because of lack of budget, land acquisition problems or change in priorities	Facilitate through government procurement system and government acquisition procedures as national priority
	Grant	40,000	Low Carbon Fund: Existing financial scheme to financially support the purchase of energy efficient appliances (washing machines and fridges) by households	The scheme will not be completed because energy and cost savings are not clearly quantified to the general public	Informative campaign to show the energy and cost advantages of RE/EE technologies is readily organized as part of AREAN
	Grant	1,400,000	Energy Facility Asset Maintenance: NPC annual support towards technical support, staff and data management of the production information's and RE	Change of priorities in direction and assignment of personnel	Include in regular official programming and budgeting and provide for transitions in case of personnel movements
	Grant	3,000,000	Joint National Adaptation Plan: This plan is to assist the GoN in reducing its vulnerability to climate driven extreme events. The plan also includes activities to strengthen RE technologies, improve EE and energy security.	Project may not proceed or get delayed because of lack of budget or change in priorities	Facilitate through government procurement system as national priority
	Grant	140,000	GoN purchase of EVs	Project may not proceed or get delayed because of lack of budget or change in priorities	Facilitate through government procurement system as national priority
	In-Kind	490,000	Niue National Strategic Plan (NNSP)	Project may not proceed or get	Facilitate through government

			Implementation: Annual strategic development planning for the implementation of specific policy research studies and capacity development	delayed because of lack of budget or change in priorities	procurement system as national priority
	In-Kind	105,000	Assets Maintenance: annual budget destined to NPC for the maintenance of the power generation equipment and the electric grid	Government diverts funds to other uses	Facilitate through government procurement system as national priority
	In-Kind	560,000	Energy Compliance: Ministry of Infrastructure, Regulatory Unit and Water Supply annual recurrent budget-Staff and Office space for use during the AREAN Project implementation period	Change of priorities in direction and assignment of personnel	Include in regular official programming and budgeting and provide for transitions in case of personnel movements
	In-Kind	500,000	Energy Finances: Treasury and Project management unit annual support towards project administrations, financing and M&E duration of the project and project evaluations process	Change of priorities in direction and assignment of personnel	Include in regular official programming and budgeting and provide for transitions in case of personnel movements
	In-Kind	245,000	Water Strategic and Implementation Plan: Implementation of specific water system improvement projects as part of the initiatives to achieve the water sector targets in the NiSERM	This is part of a US\$ 700,000 project. Project may not proceed or get delayed because of lack of budget or change in priorities	Facilitate through government procurement system as national priority
New Zealand Government	Grant	3,000,000 ³³	NZ Project 1st Tranche: Installation of solar PV systems inclusive of solar PV arrays, battery storage units, and grid integration components. It also includes several step-up transformers.	The project implementation is being currently implemented (see Section 3.2.1). Phase 1 is largely completed and Phase 2 in under implementation	N/A
	Grant	3,500,000	NZ Project 2nd Tranche: Installation of additional solar PV systems inclusive of solar PV arrays, battery storage units, and grid integration components.	Project may get delayed if the installation of the solar PV panels under this project causes additional instability issues	Activities designed under AREAN for grid stability will be prioritized to allow for

³³ Budget left of the total USD 3.5M budget

					additional PV installations
AusAid/NZAid	Grant	740,000	Waste Recycling Centre: establishment and operation of a waste recycling system	Change of priorities or delays in disbursing the funds of either or both donors	Support the GoN in liaising with AusAid and NZAid to secure the budget
EU	Grant	190,000	EDF-11: Replacement/upgrading work on the national grid transmission network including capacity development activities	The project implementation is in an advanced implementation stage and there are no risks to prevent its completion	N/A
	Grant	196,000	GIZ-Alofi: Implementation of improvements in the water sector of Niue. Includes capacity building and research to improved water supply and quality.	The project implementation is in an advanced implementation stage and there are no risks to prevent its completion	N/A
UNDP	Grant	100,000	Project management and M&E	None	N/A
Total		17,706,000			
Grant		15,806,000			
In-kind		1,900,000			

UNDP Direct Project Services as Requested by Government: The UNDP, as GEF Agency for this project, will provide project management cycle services for the project as defined by the GEF Council. In addition, the Government of Niue may request UNDP direct services for specific projects, according to its policies and convenience. The UNDP and Government of Indonesia acknowledge and agree that those services are not mandatory and will be provided only upon Government request. If requested, the services would follow the UNDP policies on the recovery of direct costs. These services (and their costs) are specified in the Letter of Agreement (Annex J). As is determined by the GEF Council requirements, these service costs will be assigned as Project Management Cost, duly identified in the project budget as Direct Project Costs. Eligible Direct Project Costs should not be charged as a flat percentage. They should be calculated based on estimated actual or transaction-based costs and should be charged to the direct project costs account codes: “64397- Services to projects – CO staff” and “74596 – Services to projects – GOE for CO”.

Budget Revision and Tolerance: As per UNDP requirements outlined in the UNDP POPP, the PB will agree on a budget tolerance level for each plan under the overall annual work plan allowing the project manager to expend up to the tolerance level beyond the approved project budget amount for the year without requiring a revision from the PB. Should the following deviations occur, the Project Manager and UNDP Country Office will seek the approval of the UNDP-GEF team as these are considered major amendments by the GEF: a) Budget re-allocations among components in the project with amounts involving 10% of the total project grant or more; b) Introduction of new budget items/or components that exceed 5% of original GEF allocation.

Any over expenditure incurred beyond the available GEF grant amount will be absorbed by non-GEF resources (e.g. UNDP TRAC or cash co-financing).

Refund to Donor: Should a refund of unspent funds to the GEF be necessary, this will be managed directly by the UNDP-GEF Unit in New York.

Project Closure: Project closure will be conducted as per UNDP requirements outlined in the UNDP POPP.³⁴ On an exceptional basis only, a no-cost extension beyond the initial duration of the project will be sought from in-country UNDP colleagues and then the UNDP-GEF Executive Coordinator.

Operational completion: The project will be operationally completed when the last UNDP-financed inputs have been provided and the related activities have been completed. This includes the final clearance of the Terminal Evaluation Report (that will be available in English) and the corresponding management response, and the end-of-project review Project Board meeting. The Implementing Partner through a Project Board decision will notify the UNDP Country Office when operational closure has been completed. By this time, the relevant parties will have already agreed and confirmed in writing on the arrangements for the disposal of any equipment that is still the property of UNDP.

Transfer or disposal of assets: In consultation with the NIM Implementing Partner and other parties of the project, UNDP programme manager (UNDP Resident Representative) is responsible for deciding on the transfer or other disposal of assets. Transfer or disposal of assets is recommended to be reviewed and endorsed by the project board following UNDP rules and regulations. Assets may be transferred to the government for project activities managed by a national institution at any time during the life of a project. In all cases of transfer, a transfer document must be prepared and kept on file³⁵.

Financial completion: The project will be financially closed when the following conditions have been met: a) The project is operationally completed or has been cancelled; b) The Implementing Partner has reported all financial transactions to UNDP; c) UNDP has closed the accounts for the project; d) UNDP and the Implementing Partner have certified a final Combined Delivery Report (which serves as final budget revision).

The project will be financially completed within 12 months of operational closure or after the date of cancellation. Between operational and financial closure, the implementing partner will identify and settle all financial obligations and prepare a final expenditure report. The UNDP Country Office will send the final signed closure documents including confirmation of final cumulative expenditure and unspent balance to the UNDP-GEF Unit for confirmation before the project will be financially closed in Atlas by the UNDP Country Office.

³⁴ <https://info.undp.org/global/popp/ppm/Pages/Closing-a-Project.aspx>

³⁵ https://popp.undp.org/_layouts/15/WopiFrame.aspx?sourcedoc=/UNDP_POPP_DOCUMENT_LIBRARY/Public/PPM_Project%20Management_Closing.docx&action=default.

X. TOTAL BUDGET AND WORK PLAN

Total Budget and Work Plan			
Atlas Proposal or Award ID:	00117508	Atlas Primary Output Project ID:	00114277
Atlas Proposal or Award Title:	Accelerating Renewable Energy and Energy Efficiency Applications in Niue (AREAN)		
Atlas Business Unit	WSM10		
Atlas Primary Output Project Title	Accelerating Renewable Energy and Energy Efficiency Applications in Niue (AREAN)		
UNDP-GEF PIMS No.	PIMS 6037		
Implementing Partner	In Niue: Department of Utilities, Ministry of Infrastructure (DoU-Mol)		

GEF Component / Atlas Activity	Responsible Agency	Source of Fund	Budget Code	Description	Annual Expenses				Total	Budget Notes
					Year 1	Year 2	Year 3	Year 4		
Component 1: Improvements in Energy Integrated Development Policy and Planning										
Outcome 1: Improved policy and regulatory frameworks in the application of energy efficiency and renewable energy technologies in the energy end-use sectors	(DoU-Mol)	GEF	71200	International Consultants	52,500	21,700	7,000	7,000	88,200	1
			71300	Local Consultants	14,100	11,100	2,400	2,400	30,000	2
			71400	Contractual Services-Individual	11,137	11,138	11,137	11,138	44,550	3
			71600	Travel	4,000	4,000	2,000	0	10,000	4
			75700	Training, Workshops and Conference	0	0	3,500	7,500	11,000	5
			74500	Miscellaneous Expenses	300	300	325	325	1,250	6
Component 1 Total					82,037	48,238	26,362	28,363	185,000	
Component 2: Institutional Capacity Building on Low Carbon Development										
Outcome 2: Effective enforcement of plans, policies and regulations, and implementation of programs/projects on the application of climate resilient and low	(DoU-Mol)	GEF	71200	International Consultants	18,200	21,700	4,900	4,200	49,000	7
			71300	Local Consultants	4,500	6,000	2,400	2,100	15,000	8
			71400	Contractual Services-Individual	11,137	11,138	11,137	11,138	44,550	9
			71600	Travel	4,000	2,000	2,000	0	8,000	10
			75700	Training Workshops and Conference	4,000	4,000	2,000	0	10,000	11

carbon technologies in the end-use sectors			74200	Audio Visual and Printing Production Costs	500	1,000	500	0	2,000	12
			74500	Miscellaneous Expenses	363	362	363	362	1,450	13
Component 2 Total					42,700	46,200	23,300	17,800	130,000	
Component 3: Improvements in the Financing of Low Carbon Initiatives										
Outcome 3: Increased availability of, and access to, financing for sustainable energy, energy access and low carbon development initiatives in the energy supply and demand sectors	(DoU-Mol)	GEF	71200	International Consultant	7,700	16,100	8,400	4,200	36,400	14
			71300	Local Consultants	3,600	6,600	1,800	0	12,000	15
			71400	Contractual Services – Individual	11,137	11,138	11,137	11,138	44,550	16
			71600	Travel	2,810	2,320	2,320	0	7,450	17
			75700	Training Workshops and Conference	0	2,500	3,000	2,000	7,500	18
			74200	Audio Visual and Printing Production cost	1,000	1,200	1,000	1,000	4,200	19
			72500	Supplies	600	600	600	493	2,293	20
Component 3 Total					26,847	40,458	28,257	18,831	114,393	
Component 4: Climate Resilient and Low Carbon Technologies Application										
Outcome 4.1: Climate resilient and low carbon techniques and practices adopted and implemented in the energy supply and energy end-use sectors	(DoU-Mol)	GEF	72100	Contractual Services-Companies	0	32,200	32,200	32,200	96,600	21
			71300	Local Consultants	0	0	4,500	9,000	13,500	22
			71400	Contractual services-Individual	22,275	22,275	22,275	22,275	89,100	23
			72100	Contractual Services-Companies	65,600	80,000	80,000	0	225,600	24
			71600	Travel	3,000	5,000	5,000	4,200	17,200	25
			75700	Training Workshops and Conference	4,000	10,000	10,000	10,000	34,000	26
			72800	Information Technology Equipment	10,000	30,000	10,000	10,000	60,000	27
			74500	Miscellaneous	500	500	500	500	2,000	28
Outcome 4.1 Total					105,375	179,975	164,475	88,175	538,000	
			71200	International consultants	25,200	69,300	87,500	74,200	256,200	29

Outcome 4.2: Enhanced confidence in the viability of climate resilient and low carbon technology applications in the energy supply and demand sectors			71400	Contractual services-individual	33,412	33,413	33,412	33,413	133,650	30
			71600	Travel	4,000	6,000	8,000	4,000	22,000	31
			72100	Contractual services-companies	10,800	21,600	12,600	0	45,000	32
			72200	Equipment and Furniture	100,000	500,000	365,000	435,000	1,400,000	33
			74200	Audio Visual and Printing Production cost	2,500	3,000	3,000	2,500	11,000	34
			72500	Supplies	1,875	1,850	1,850	2,075	7,650	35
			75700	Training, Workshops and conferences	0	10,250	10,250	0	20,500	36
Outcome 4.2 Total					177,787	645,413	521,612	551,188	1,896,000	
Component 4 Total					283,162	825,388	686,087	639,363	2,434,000	
Component 5: Enhancement of Awareness on Low Carbon Development										
Outcome 5: Enhanced levels of awareness and attitude towards climate resilient and low carbon development in the energy supply and energy end use sectors	(DoU-Mol)	GEF	71200	International Consultant	7,000	28,000	35,000	16,800	86,800	37
			71300	Local Consultants	0	0	3,000	3,000	6,000	38
			71400	Contractual Services-Individual	22,275	22,275	22,275	22,275	89,100	39
			71600	Travel	0	2,000	3,000	3,000	8,000	40
			72100	Contractual Services-companies	15,000	0	15,000	15,000	45,000	41
			73300	Rental and Maintenance of IT Equipment	0	0	20,000	10,000	30,000	42
			74200	Audio Visual and Printing Production Costs	0	5,000	10,000	0	15,000	43
			75700	Training, Workshops and Conferences	0	10,050	10,050	0	20,100	44
Component 5 Total					44,275	67,325	118,325	70,075	300,000	
ALL Components Total					479,021	1,027,609	882,331	774,432	3,163,393	
Project Management										

Project Management		71400	Contractual Services-Individuals	18,222	18,222	18,222	18,222	72,888	45
		74100	Professional Services	0	30,000	10,000	30,000	70,000	46
		74596	Services to project-GOE	3,820	3,821	3,820	3,821	15,282	47
Project Management Total				22,042	52,043	32,042	52,043	158,170	
Overall GEF Budget				501,063	1,079,652	914,373	826,475	3,321,563	

Summary of Funds³⁶

Fund Source	Amount US\$				Total
	Year 1	Year 2	Year 3	Year 4	
Global Environment Facility	501,063	1,079,652	914,373	826,475	3,321,563
United Nations Development Programme	25,000	25,000	25,000	25,000	100,000
Government of Niue	4,401,500	4,401,500	4,401,500	4,401,500	17,606,000
TOTAL	4,927,563	5,506,152	5,340,873	5,252,975	21,027,563

Budget Notes:

No.	Explanation
1	International consultants: at US\$ 88,200 (to include fee, travel expenses and DSA) for 126 working days at US\$ 700 per working day (multiple activities could be conducted by one consultant), including: <ul style="list-style-type: none"> 30 working days for activities under Output 1.1: to conduct comprehensive policy research, impact analyses and assessment reports on suitable energy and LC development policies and regulations (US\$ 21,000) 62 working days for activities under Output 1.2: to formulate/revise, approve and enforce policies, implementing rules and regulations (IRRs) and LC standards (US \$43,400) 34 working days for activities under Output 1.3: to evaluate policies, IRRs and LC standards and drafting of evaluation reports; develop and implement follow-up action plans based on reports drafted; design and conduct a training program on how to carry out energy planning and technology application (US \$23,800)
2	National Consultants: US\$ 30,000 for 100 working days at US\$ 300 per working day (multiple activities could be conducted by one consultant), including:

³⁶ Summary table should include all financing of all kinds: GEF financing, co-financing, cash, in-kind, etc.

	<ul style="list-style-type: none"> • 24 working days for activities under Output 1.1; to conduct comprehensive policy research, impact analyses and assessment reports on suitable energy and LC development policies and regulations (US\$ 7,200) • 50 working days for activities under Output 1.2: to formulate/revise, approve and enforce policies, implementing rules and regulations (IRRs) and LC standards (US\$ 15,000) • 26 working days for activities under Output 1.3: to evaluate policies, IRRs and LC standards and drafting of evaluation reports; develop and implement follow-up action plans based on reports drafted; design and conduct a training program on how to carry out energy planning and technology application (US \$7,800)
3	Contractual Service – Individual; US\$ 44,550 for 149 working days to implement aspects of the component output and related inputs to the activities and targets outputs.
4	US\$ 10,000 travel cost associated with consultation with key stakeholders of the project, national agencies and responsible persons in national energy development, planning and development; coordinating with government agencies for adoption and implementation of the policy measures.
5	US\$ 11,000 for the organization and implementation of training programs for stakeholders from GoN departments, SOE's and other organization related to energy planning and management of technology applications (Activity 1.3.3).
6	US\$ 1,250 for miscellaneous expenses to support the other aspects of the component outputs and as contingency to related inputs to the activities and target outputs.
7	International Consultants: US\$ 49,000 (to include fee, travel expenses and DSA) for 70 working days at US\$ 700 per working day (multiple activities could be conducted by one consultant), including: <ul style="list-style-type: none"> • 27 working days for activities under Output 2.1; to formulate and recommend institutional framework that supports the implementation of LC development policies and regulations (US\$ 18,900) • 23 working days for activities under Output 2.2; to adopt and enforce suitable institutional mechanism that integrate LC development with socio-economic, climate change, infrastructures and disaster management objectives of the country (US \$16,100) • 20 working days for activities under Output 2.3; to carry out a performance evaluation report on the adopted institutional framework and mechanisms, promote and implement the recommendations offered, and incorporate of maintenance strategy in the design of projects (US \$14,000)
8	National Consultants: US\$ 15,000 for 50 working days at US\$ 300 per working day (multiple activities could be conducted by one consultant), including: <ul style="list-style-type: none"> • 20 working days for activities under Output 2.1; to formulate and recommend institutional framework that supports the implementation of LC development policies and regulations (US\$ 6,000) • 20 working days for activities under Output 2.2; to adopt and enforce suitable institutional mechanism that integrate LC development with socio-economic, climate change, infrastructures and disaster management objectives of the country (US\$ 6,000) • 10 working days for activities under Output 2.3; to carry out a performance evaluation report on the adopted institutional framework and mechanisms, promote and implement the recommendations offered, and incorporate of maintenance strategy in the design of projects (US\$ 3,000)
9	Contractual Service – Individual; US\$ 44,550 for 149 working days to implement aspects of the component output and related inputs to the activities and targets outputs.
10	US\$ 8,000 travel cost associated with consultation with key stakeholders of the project, national agencies and responsible persons in national energy development, planning and development; coordinating with government agencies for adoption and implementation of the policy measures.
11	US\$ 10,000 for the organization and implementation of training program for Activity 2.2.1.

12	US\$ 2,000 for acquisition of camera, audio visual equipment and printing, production costs for documenting and promoting the activities and outputs of the project.
13	US\$ 1,450 for miscellaneous expenses to support the other aspects of the component outputs and as contingency to related inputs to the activities and target outputs.
14	International Consultants: US\$ 36,400 (to include fee, travel expenses and DSA) for 52 working days at US\$ 700 per working day (multiple activities could be conducted by one consultant), including: <ul style="list-style-type: none"> • 10 working days for activities under Output 3.1: design and implement financing instruments for the adoption of RE/EE technologies; (US\$ 7,000) • 10 working days for activities under Output 3.2: assess the financing instruments designed in Activity 3.1.1 and produce evaluation reports; (US\$ 7,000) • 16 working days for activities under Output 3.3: Enhance financing policies on initiatives for LC development; Design and implement training programs for key GoN personnel and stakeholders on RE/EE financing. (US\$ 11,200) • 16 working days for activities under Output 3.4: design training, provide information materials and establish financial and fiscal incentives on RE/EE products for private sector.
15	National Consultants: US\$ 12,000 for 40 working days at US\$ 300 per working day (multiple activities could be conducted by one consultant), including: <ul style="list-style-type: none"> • 12 working days for activities under Output 3.1: design and implement financing instruments for the adoption of RE/EE technologies; (US\$ 3,600) • 10 working days for activities under Output 3.2: assess the financing instruments designed in Activity 3.1.1 and produce evaluation reports; (US\$ 3,000) • 10 working days for activities under Output 3.3: formulate and approve financing policies to support the development of LC technologies; (US\$ 3,000) • 8 working days for activities under Output 3.4: establish financial and fiscal incentives to encourage RE/EE technologies. (US\$ 2,400)
16	Contractual Service – Individual; US\$ 44,550 for 149 working days to implement aspects of the component output and related inputs to the activities and targets outputs.
17	US\$ 7,450 for car rental and petrol fee, as well as additional and unbudgeted travel expenses, for consultants and project partners.
18	US\$ 7,500 for the organization of two (2) training programs, one (1) for Activity 3.3.2 (US\$ 4,500) and one (1) for Activity 3.4.1 (US\$ 3,000).
19	US\$ 4,200 for printing, production costs for documenting and promoting the activities and outputs of the project.
20	US\$ 2,293 for ancillary supplies and miscellaneous provisions (Internet, telephone connections)
21	International Consultant; US\$ 96,600 for 138 working days at US\$ 700 per working day, including: <ul style="list-style-type: none"> • 44 working days for activities under Output 4.1.1: carry out comprehensive assessments of other applicable LC technologies that can be feasibly implemented in the energy generation and energy end-use sectors to support the timely achievement of the NiSERM targets; (US\$ 30,800) • 94 working days for activities under Output 4.1.2: to design and engineer, financial and implementation plans for the most feasible grid stability scheme that will be implemented; (US\$ 65,800)
22	National Consultants: US\$ 13,500 for 45 working days at US\$ 300 per working day, including: <ul style="list-style-type: none"> • 20 working days for activities under Output 4.1.3: design replication and/or scale-up RE/EE projects and prepare implementation plans; (US\$ 6,000) • 25 working days for Activity 4.1.4: assess efficiency of RE/EE projects implemented under AREAN and prepare interim (18 working days) and final evaluation reports (22 working days). (US\$ 7,500)
23	Contractual Service – Individual; US\$ 89,100 for 297 working days to implement aspects of the component output and related inputs to the activities and targets outputs.

24	<p>Consulting firm: US\$ 225,600 (including fees, travel expenses and DSA) for 282 working days at US\$ 800 per working day (multiple activities could be conducted by one consulting firm), including:</p> <ul style="list-style-type: none"> • 144 working days for activities under Output 4.1.2: to design and engineer, financial and implementation plans for the most feasible grid stability scheme that will be implemented; (US\$ 115,200) • 38 working days for activities under Output 4.1.3: design a training program for local expert on RET, focusing on those that will be demonstrated and implemented in Niue; design replication and/or scale-up RE/EE projects and prepare implementation plans; (US\$ 30,400) • 100 working days for activities under Output 4.1.4: fully evaluate portfolio of follow-up sustainable energy and LC technology (EE and RE) application projects in other villages; (US\$ 80,000)
25	US\$ 17,200 for car rental and petrol fee, as well as additional and unbudgeted travel expenses, for consultants and project partners.
26	US\$ 34,000 for the organization of three (3) training programs, one (1) for Activity 4.1.2.7 (US\$ 12,000), one (1) for Activity 4.1.2.9 (US\$ 11,000), and one (1) for Activity 4.1.3.1 (US\$ 11,000).
27	<p>US\$ 60,000 for Equipment, Integration and Technical Support, including:</p> <p>For Activity 4.1.2.4: US\$ 20,000 for the RE generation forecasting tool; US\$ 10,000 for the integration into the SCADA system; and US\$ 10,000/year for three (3) years forecasting data and support (yearly subscription for forecasting data services by external database suppliers).</p>
28	US\$ 2,000 for miscellaneous expenses to support the other aspects of the component outputs and as contingency to related inputs to the activities and target outputs. (Internet and phone connections)
29	<p>International consultants: at US\$ 256,200 (including fee, travel expenses and DSA) for 366 working days at US\$ 700 per working day (multiple activities could be conducted by one consultant), including:</p> <ul style="list-style-type: none"> • 150 working days for activities under Output 4.2.1: to design and implement plans of LC technology application; (US\$ 105,000) • 150 working days for activities under Output 4.2.2: successfully installed and operational systems of the implemented demonstrations of sustainable energy and LC technology (EE and RE); (US\$ 105,000) • 66 working days for activities under output 4.2.3: Established and operational energy monitoring and reporting system (all energy forms), and completed and evaluated pilots on its implementation; (US\$ 46,200)
30	Contractual Service – Individual; US\$ 133,650 for 446 working days to implement aspects of the component output and related inputs to the activities and targets outputs.
31	US\$ 22,000 for car rental and petrol fee, as well as additional and unbudgeted travel expenses, for consultants and project partners.
32	<p>Consulting firm: US\$ 45,000 (including fee, travel expenses and DSA) for 50 working days at US\$ 900 per working day, including:</p> <ul style="list-style-type: none"> • 25 working days for Activity 4.2.2.2: assess the transformers/switchgears investment project; • 25 working days for Activity 4.2.2.2: prepare engineering design and implementation plans for the investments on new EE transformers/switchgears.
33	<p>US\$ 1,400,000 for Equipment, Installations, and Support Systems including:</p> <p>For Activity 4.2.2.1: US\$ 150,000 for the LED Streetlights; US\$ 150,000 for the Solar Water Pumps; US\$ 350,000 for the EE Financing Scheme; US\$ 200,000 for the EE Building; and US\$ 20,000 for the M&E System. For Activity 4.2.2.2: US\$ 510,000 for Transformers and Switchgears. For Activity 4.2.2.4: US\$ 5,000 for the Technical Guidance Material. For Activity 4.2.3.3: US\$ 15,000 equipment for the Measuring Devices for the piloting of the EMRS.</p>
34	US\$ 11,000 for audio visual equipment and printing, production costs for documenting and promoting the activities and outputs of the project.
35	US\$ 7,650 for ancillary supplies and miscellaneous provisions to support the other aspects of the component outputs and as contingency to related inputs to the activities and target outputs. (Internet and phone connections)

36	US\$ 20,500 for the organization of the training program for Activity 4.2.3.2
37	International consultants: at US\$ 86,800 (including fee, travel expenses and DSA) for 124 working days at US\$ 700 per working day (multiple activities could be conducted by one consultant), including: <ul style="list-style-type: none"> • 37 working days for activities under Output 5.1: Established and operational energy audit system covering government and commercial buildings and facilities, as well as industrial companies; (US\$ 25,900) • 37 working days for activities under Output 5.2: Established and operational energy (all energy forms) and energy technology database system; (US\$ 25,900) • 50 working days for activities under Output 5.3: Established and operational information exchange network for the promotion and dissemination of knowledge on sustainable energy and LC development; (US\$ 35,000)
38	National Consultants: US\$ 6,000 for 20 working days at US\$ 300 per working day, including: <ul style="list-style-type: none"> • 20 working days for Activity 5.3.2: design, implement and evaluate awareness raising programs on RE/EE projects.
39	Contractual Service – Individual; US\$ 89,100 for 297 working days to implement aspects of the component output and related inputs to the activities and targets outputs.
40	US\$ 8,000 on domestic travels for consultants and partners on consultations, workshops and trainings with communities, key partners, government agencies and stakeholders.
41	US\$ 45,000 (including fee, travel expenses and DSA) for the contractual service company to carry out three (3) surveys for Activity 5.3.2 (US\$ 15,000 each).
42	US\$ 30,000 for two (2) software systems and for management and maintenance of the Database and the Information Platform, for Activity 5.2.1 and Activity 5.3.1 (US\$ 15,000 each);
43	US\$ 15,000 for two (2) information desks (US\$ 5,250 each) and two (2) Awareness Rising initiatives (potentially one at the EE Building and one at school) for Activity 5.3.2 (US\$ 2,250 each).
44	US\$ 20,100 for the organization of four (4) training programs, two (2) for Activity 5.1.2, one (1) for Activity 5.2.3 and one (1) for Activity 5.3.3 (last Training is US\$ 6,000, all others are 4,700 each)
45	Contractual Service – Individual; Project Management Unit to support aspects of the component: (US\$ 72,888) <ul style="list-style-type: none"> • Project Manager (US\$ 28,938), Comms Officer (US\$ 13,565), Finance and Administration Officer (US\$ 15,916) & Project Officer (US\$ 14,469) – to support aspects of all components.
46	US\$ 70,000 costs of professional services consisting of US\$ 10,000 for financial audit fees, US\$ 30,000 mid-term evaluation and US\$ 30,000 for terminal evaluation.
47	US\$ 15,282 – Services to Projects. Costs of providing support services to the project, including procurement of goods and services of USD13,265 and payment processing of USD2,018. Refer to Annex N. Signed LOA for UNDP support services.

XI. LEGAL CONTEXT

The project document shall be the instrument envisaged and defined in the [Supplemental Provisions](#) to the Project Document, attached hereto and forming an integral part hereof, as “the Project Document”.

This project will be implemented by the Ministry of Infrastructure (“Implementing Partner”) in accordance with its financial regulations, rules, practices and procedures only to the extent that they do not contravene the principles of the Financial Regulations and Rules of UNDP. Where the financial governance of an Implementing Partner does not provide the required guidance to ensure best value for money, fairness, integrity, transparency, and effective international competition, the financial governance of UNDP shall apply.

Any designations on maps or other references employed in this project document do not imply the expression of any opinion whatsoever on the part of UNDP concerning the legal status of any country, territory, city or area or its authorities, or concerning the delimitation of its frontiers or boundaries.

XII. RISK MANAGEMENT

Consistent with the Article III of the SBAA *[or the Supplemental Provisions to the Project Document]*, the responsibility for the safety and security of the Implementing Partner and its personnel and property, and of UNDP's property in the Implementing Partner's custody, rests with the Implementing Partner. To this end, the Implementing Partner shall:

- a) put in place an appropriate security plan and maintain the security plan, considering the security situation in the country where the project is being carried;
- b) assume all risks and liabilities related to the Implementing Partner's security, and the full implementation of the security plan.

UNDP reserves the right to verify whether such a plan is in place, and to suggest modifications to the plan when necessary. Failure to maintain and implement an appropriate security plan as required hereunder shall be deemed a breach of the Implementing Partner's obligations under this Project Document.

The Implementing Partner agrees to undertake all reasonable efforts to ensure that no UNDP funds received pursuant to the Project Document are used to provide support to individuals or entities associated with terrorism and that the recipients of any amounts provided by UNDP hereunder do not appear on the list maintained by the Security Council Committee established pursuant to resolution 1267 (1999).

The list can be accessed via http://www.un.org/sc/committees/1267/aq_sanctions_list.shtml.

Social and environmental sustainability will be enhanced through application of the UNDP Social and Environmental Standards (<http://www.undp.org/ses>) and related Accountability Mechanism (<http://www.undp.org/secu-srm>).

The Implementing Partner shall: (a) conduct project and programme-related activities in a manner consistent with the UNDP Social and Environmental Standards, (b) implement any management or mitigation plan prepared for the project or programme to comply with such standards, and (c) engage in a constructive and timely manner to address any concerns and complaints raised through the Accountability Mechanism. UNDP will seek to ensure that communities and other project stakeholders are informed of and have access to the Accountability Mechanism.

All signatories to the Project Document shall cooperate in good faith with any exercise to evaluate any programme or project-related commitments or compliance with the UNDP Social and Environmental Standards. This includes providing access to project sites, relevant personnel, information, and documentation.

The Implementing Partner will take appropriate steps to prevent misuse of funds, fraud or corruption, by its officials, consultants, responsible parties, subcontractors and sub-recipients in implementing the project or using UNDP funds. The Implementing Partner will ensure that its financial management, anti-corruption and anti-fraud policies are in place and enforced for all funding received from or through UNDP.

The requirements of the following documents, then in force at the time of signature of the Project Document, apply to the Implementing Partner: (a) UNDP Policy on Fraud and other Corrupt Practices and (b) UNDP Office of Audit and Investigations Investigation Guidelines. The Implementing Partner agrees to the requirements of the above documents, which are an integral part of this Project Document and are available online at www.undp.org.

If an investigation is required, UNDP has the obligation to conduct investigations relating to any aspect of UNDP projects and programmes. The Implementing Partner shall provide its full cooperation, including making available personnel, relevant documentation, and granting access to the Implementing Partner's (and its consultants', responsible parties', subcontractors' and sub-recipients') premises, for such purposes at reasonable times and on reasonable conditions as may be required for the purpose of an investigation. Should there be a limitation in meeting this obligation, UNDP shall consult with the Implementing Partner to find a solution.

The signatories to this Project Document will promptly inform one another in case of any incidence of inappropriate use of funds, or credible allegation of fraud or corruption with due confidentiality.

Where the Implementing Partner becomes aware that a UNDP project or activity, in whole or in part, is the focus of investigation for alleged fraud/corruption, the Implementing Partner will inform the UNDP Resident Representative/Head of Office, who will promptly inform UNDP's Office of Audit and Investigations (OAI). The Implementing Partner shall provide regular updates to the head of UNDP in the country and OAI of the status of, and actions relating to, such investigation.

UNDP shall be entitled to a refund from the Implementing Partner of any funds provided that have been used inappropriately, including through fraud or corruption, or otherwise paid other than in accordance with the terms and conditions of the Project Document. Such amount may be deducted by UNDP from any payment due to the Implementing Partner under this or any other agreement.

Where such funds have not been refunded to UNDP, the Implementing Partner agrees that donors to UNDP (including the Government) whose funding is the source, in whole or in part, of the funds for the activities under this Project Document, may seek recourse to the Implementing Partner for the recovery of any funds determined by UNDP to have been used inappropriately, including through fraud or corruption, or otherwise paid other than in accordance with the terms and conditions of the Project Document.

Note: The term "Project Document" as used in this clause shall be deemed to include any relevant subsidiary agreement further to the Project Document, including those with responsible parties, subcontractors and sub-recipients.

Each contract issued by the Implementing Partner in connection with this Project Document shall include a provision representing that no fees, gratuities, rebates, gifts, commissions or other payments, other than those shown in the proposal, have been given, received, or promised in connection with the selection process or in contract execution, and that the recipient of funds from the Implementing Partner shall cooperate with any and all investigations and post-payment audits.

Should UNDP refer to the relevant national authorities for appropriate legal action any alleged wrongdoing relating to the project, the Government will ensure that the relevant national authorities shall actively investigate the same and take appropriate legal action against all individuals found to have participated in the wrongdoing, recover and return any recovered funds to UNDP.

The Implementing Partner shall ensure that all its obligations set forth under this section entitled "Risk Management" are passed on to each responsible party, subcontractor and sub-recipient and that all the clauses under this section entitled "Risk Management Standard Clauses" are included, *mutatis mutandis*, in all sub-contracts or sub-agreements entered into further to this Project Document.

XIII. MANDATORY ANNEXES

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Annex A. Multi-Year Work Plan

Work Plan – AREAN Project																
Project Goal: Improved energy consumption index and reduced annual growth rate of GHG emissions in the country's energy supply and energy end-use sectors																
Project Objective: Enabling the achievement of low carbon energy access, sustainable energy, and green growth targets of Niue																
Timeline	Year 1				Year 2				Year 3				Year 4			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Component 1: Improvements in Energy Integrated Development Policy and Planning																
Outcome 1: Improved policy and regulatory frameworks in the application of energy efficiency and renewable energy technologies in the energy end-use sectors																
Output 1.1: Comprehensive policy research, impact analyses and assessment reports on sustainable energy and low carbon (LC) development policies and regulations																
Activity 1.1.1: Conduct assessments to identify gaps and needs in sustainable energy and LC development policies and regulations																
Activity 1.1.2: Define RE/EE areas of competence and gaps to fill of relevant GoN ministries and departments and assess potential synergies																
Output 1.2: Formulated/ revised, approved and enforced policies, implementing rules and regulations (IRRs) and LC standards																
Activity 1.2.1: Revise the Electricity Act and incorporate RE and EE matters																
Activity 1.2.2: Formulate/recommend, approve and enforce policies for independent power producers to connect to the grid, and for the private sector to participate to the energy sector																
Activity 1.2.3: Provide technical assistance in establishing and implementing sectoral codes of conduct, guidelines and standards of operations for the energy industry																
Activity 1.2.4: Draft and implement a waste management plan for RE projects (i.e., batteries, PV panels, incandescent light bulbs, etc.)																
Activity 1.2.5: Conduct integrated development planning and prepare energy integrated development plans for sectors of the national economy involving energy and environmental impacts																
Activity 1.2.6: Establish and implement appropriate energy prices and service quality regulations																
Output 1.3: Completed and fully evaluated policies, IRRs and LC standards, and approved and implemented follow-up plans for their enhancement																
Activity 1.3.1: Evaluation of policies, IRRs and LC standards and drafting of evaluation reports																

Activity 3.1.2: Design suitable financing scheme for supporting widespread application of EE and RE appliances and equipment																				
Activity 3.1.3: Implementation of the designed and approved financing scheme.																				
Activity 3.1.4: Provision of outreach and technical assistance to applicants to the financial support fund (Activity 3.1.3).																				
Output 3.2: Evaluation report on the performance of the established financing instruments																				
Activity 3.2.1: Evaluate the designed and implemented financing instruments and produce an evaluation report																				
Output 3.3: Enhanced financing policies for supporting initiatives on LC development																				
Activity 3.3.1: Review of financing policies on sustainable energy and LC development.																				
Activity 3.3.2: Design and conduct training programs for relevant GoN personnel in sustainable energy and low carbon development financing policymaking.																				
Activity 3.3.3: Formulate, approve and enforce financing policies to support LC development.																				
Activity 3.3.4: Evaluate the enforced financing policies and IRRs.																				
Output 3.4: Competitive market for private sector on RE/EE products and technical skills																				
Activity 3.4.1: Design training programs to improve technical skills of RE/EE service providers																				
Activity 3.4.2: Prepare informative material on RE technologies and EE appliances to increase public awareness and interest																				
Activity 3.4.3: Establish financial and fiscal incentives to encourage RE/EE products																				
Component 4: Climate Resilient and Low Carbon Technologies Applications																				
Outcome 4.1: Climate resilient and low carbon techniques and practices adopted and implemented in the energy supply and energy end-use sectors																				
Output 4.1.1: Completed comprehensive assessments of other applicable LC technologies that can be feasibly implemented in the energy generation and energy end-use sectors to support the timely achievement of the NiSERM targets																				
Activity 4.1.1.1: Assess applicable LC technologies to support the achievement of the NiSERM targets and prepare an assessment report.																				
Activity 4.1.1.2: Evaluate the optimal solar PV power generation inputs into the existing power grid system																				
Output 4.1.2: Completed design, engineering and implementation plans for an expanded solar-diesel hybrid power generation and distribution system																				
Activity 4.1.2.1: Develop comprehensive engineering design and plans for the expanded solar-diesel hybrid power generation and distribution system.																				
Activity 4.1.2.2: Develop comprehensive design, engineering and implementation plans for the most feasible scheme for grid stability improvement.																				
Activity 4.1.2.3: Automate the operations of remote solar PV power system installations and data collection																				

Activity 4.1.2.4: Implement an integrated RE generation forecasting tool to the SCADA system																			
Activity 4.1.2.5: Demonstrate the monitoring, operation and performance of the RE-generation forecasting tool to support with day-ahead planning																			
Activity 4.1.2.6: Optimize the performance of power generation units at NPC powerhouse with solar PV systems integrated into the electric grid																			
Activity 4.1.2.7: Monitor and evaluate the power generation performance at NPC																			
Activity 4.1.2.8: Establish codes and regulation for safe power generation control and load dispatch																			
Activity 4.1.2.9: Design and implement a capacity building program on electricity generation, transmission and distribution O&M																			
Output 4.1.3: Completed design and implementation plans for the replication and/or scale up of demonstrated EE sustainable energy and LC energy projects																			
Activity 4.1.3.1: Train a pool of local experts in energy development and utilization as well as in applying new RE/EE technologies.																			
Activity 4.1.3.2: Design and implement training programs for relevant GoN personnel and stakeholders in RE/EE financing to develop and prepare bankable project proposals.																			
Activity 4.1.3.3: Design the implementation plan for the scale up of RE/EE projects.																			
Output 4.1.4: Fully evaluated portfolio of follow-up sustainable energy and LC technology (EE and RE) application projects in other villages																			
Activity 4.1.4.1: Evaluate RE/EE application projects and produce evaluation reports																			
Activity 4.1.4.2: Assess safe RE/EE waste disposal (i.e., batteries, solar PV panels, incandescent light bulbs, etc.) and prepare an assessment report																			
Activity 4.1.4.3: Assess potential use of municipal waste for energy generation, including safe disposal of final residual waste, and prepare evaluation report																			
Activity 4.1.4.4: Prepare a follow-up action plan based on the evaluation report																			
Outcome 4.2: Enhanced confidence in the viability of climate resilient and low carbon technology applications in the energy supply and demand sectors																			
Output 4.2.1: Completed designs and implementation plans of LC technology application demonstrations																			
Activity 4.2.1.1: Evaluate feasibility of RE and EE demonstration projects and prepare assessment reports																			
Activity 4.2.1.2: Prepare engineering design and implementation plans for the implementation of the selected RE and EE demonstration projects																			
Output 4.2.2: Successfully installed and operational systems of the implemented demonstrations of sustainable energy and LC technology (EE and RE) applications																			
Activity 4.2.2.1: Install and operate the selected RE and EE demonstration projects																			
Activity 4.2.2.2: Prepare the demo project profiles (as case studies)																			
Activity 4.2.2.3: Conduct an overall performance evaluation of the demos																			
Output 4.2.3: Established and operational energy monitoring and reporting system (all energy forms), and completed and evaluated pilots on its implementation																			

Activity 4.2.3.1: Assess gaps in energy data collection (all energy forms and both supply and consumption) and design an energy monitoring and reporting system																		
Activity 4.2.3.2: Design, organize and conduct a training program on energy monitoring and reporting system																		
Activity 4.2.3.3: Design and evaluation of energy monitoring and reporting system pilots																		
Component 5: Enhancement of Awareness on Low Carbon Development																		
Outcome 5: Enhanced levels of awareness and attitude towards climate resilient and low carbon development in the energy supply and energy end use sectors																		
Output 5.1: Established and operational energy audit system covering government and commercial buildings and facilities, as well as industrial companies																		
Activity 5.1.1: Design an energy audit system and facilitate its approval and implementation																		
Activity 5.1.2: Design and train relevant GoN personnel and stakeholders in conducting energy audits																		
Activity 5.1.3: Perform energy auditing of GoN and commercial buildings																		
Output 5.2: Established and operational energy (all energy forms) and energy technology database system																		
Activity 5.2.1: Establish an energy database to store all energy related information and establish a communication plan																		
Activity 5.2.2: Operate and maintain the energy database																		
Activity 5.2.3: Design and implement a capacity building program for Government institutions on the operation and maintenance of the energy database																		
Output 5.3: Established and operational information exchange network for the promotion and dissemination of knowledge on sustainable energy and LC development																		
Activity 5.3.1: Establish an information exchange/sharing platform on sustainable energy and LC development for the general public.																		
Activity 5.3.2: Design, implement and evaluate awareness raising programs on RE/EE projects																		
Activity 5.3.3: Design and implement training programs for relevant GoN personnel and stakeholders (Chamber of Commerce, DoU, NDB and Kiwibank) to inform the general public on advantages of LC technologies																		

Annex B. Monitoring Plan:

The Project Manager will guide the collection of results data per the following monitoring plan:

Monitoring	Indicators	Description	Data Source or Data Collection Methods	Frequency	Responsible for data collection	Means of Verification	Assumptions
Project Goal: Improved energy consumption index and reduced annual growth rate of GHG emissions in the country's energy supply and energy end-use sectors	Reduction in the overall national energy utilization intensity (toe ³⁷ /1,000 US\$ GDP)	This is a measure of how efficiently energy consumption is converted into GDP generation, including RE sources	DoU-Mol, NPC, NBF, Treasury Department	Annually; Reported in DO tab of the GEF PIR	Project Manager and Consultants	Annual energy supply and consumption reports submitted by relevant GoN entities, NPC, NBF, DoU-Mol, and the Treasury Department	Continuous commitment of GoN in efforts to achieve the NiSERM targets irrespective of which party is in power
	Cumulative GHG emission reduction ³⁸ from fossil fuel utilization, tons CO ₂	Cumulative reduction of GHG emissions, over the implementation period of the AREAN Project, attributable to the execution of the RE/EE activities proposed under the Alternative Scenario	DoU-Mol, NPC, NBF, Treasury Department, NDB, Chamber of Commerce	Annually; Reported in DO tab of the GEF PIR	Project Manager and Consultants	Project M&E reports	
Project Objective: Enabling the achievement of low carbon energy access, sustainable energy, and green growth targets of Niue	Cumulative fossil fuel savings ³⁹ due to sustainable energy and low carbon interventions implemented, toe	Cumulative reduction of fossil fuel consumption, over the implementation period of the AREAN Project, due to the application of all EE measures and RE technology (whether implemented by the AREAN project, or not)	DoU-Mol, NPC, NBC, DoT, Treasury department	Annually; Reported in DO tab of the GEF PIR	Project Manager and Consultants	Annual energy supply and consumption reports submitted by relevant entities, NPC, NBF, DoU-Mol and the Treasury Department	Realization of committed co-financing from the national government in the implementation of project activities and monitoring systems
	% RE electricity production	Annual amount of electricity generated with RE power	Dou-Mol, NPC	Annually; Reported in	Project Manager and Consultants	Project M&E and activity reports Trade and commerce reports	

³⁷ Tons of Oil Equivalent (toe) has been calculated by: 1) the kWh of solar PV electricity has been first considered as kWh of electricity from diesel and then converted into GJ of diesel that would have been required to generate those kWh; and 2) the result from the calculation above has been summed up to the balance of total GJ consumed (except from solar PV) and multiplied by the conversion factor between GJ and toe.

³⁸ Since the RE and EE targets will be fully achieved by 2025, and the solar PV installations have a duration of ~25 years, the cumulative GHG emission reductions over the lifetime of the equipment acquired will continue well past the end of AREAN implementation. Annex L shows these estimates in detail. By the end of all equipment lifetime the estimated cumulative GHG emission reductions will be 99,633 tCO₂.

³⁹ Similarly, to the GHG emission reductions, also the fuel savings will continue well past the project implementation, due to the long lifetime of the equipment acquired.

Monitoring	Indicators	Description	Data Source or Data Collection Methods	Frequency	Responsible for data collection	Means of Verification	Assumptions
		generation systems (solar PV installations)		DO tab of the GEF PIR			
	No. of new jobs created in the application of sustainable energy and LC technologies and techniques in the energy supply and energy end-use sectors in Niue	The establishment of a RE/EE market will favor the creation of new service jobs (e.g., repair, installation, waste collection, etc.)	Treasury Department, Chamber of Commerce	Annually; Reported in DO tab of the GEF PIR	Project Manager and Consultants		
Component 1: Improvements in Energy Integrated Development Policy and Planning							
Outcome 1: Improved policy and regulatory frameworks in the application of energy efficiency and renewable energy technologies in the energy end-use sectors	No. of approved and enforced RE and EC&EE policies, and associated guidance and implementing rules and regulations	Policy documents drafted and approved in Niue concerning the application of RE/EE technologies in the energy end-use sectors	DoU-Mol, GoN	Annually; Reported in DO tab of the GEF PIR	Project Manager and Consultants	Documents on RE and EC&EE policies, regulations and energy standards Annual reports from DoU-Mol, NPC, and Bulk Fuels Project M&E and activity reports	Full and continuous commitment and support of the national government in the implementation of energy policies and regulations in the energy and end-use sectors
	No. of formulated and approved policies and regulations incorporated in the country's Energy Act	Policy documents on RE/EE drafted and successively incorporated in the country's reviewed 1960 Electric Power Supply Act	DoU-Mol, GoN	Annually; Reported in DO tab of the GEF PIR	Project Manager and Consultants		
Component 2: Institutional Capacity Building on Low Carbon Development							
Outcome 2: Effective enforcement of plans, policies and regulations, and implementation of programs/projects on the application of climate resilient and low carbon technologies in the end-use sectors	No. of sectoral integrated development plans that are implemented and managed through the established and adopted integrated institutional mechanisms	Development plans and programs for the application of RE/EE technologies in the end-use sectors drafted and implemented through the institutional framework introduced under the AREAN project	DoU-Mol, GoN	Annually; Reported in DO tab of the GEF PIR	Project Manager and Consultants	Documents on the institutional mechanisms Documents on low carbon development processes Annual Reports on the sectoral integrated development plan implementation	Continuous commitment and support by the national government, private sector and public, in general on the successfully implemented institutional arrangements
	No. of low carbon development initiatives facilitated by adopted and enforced institutional	The implementation of the development plans and programs and the introduction of an	DoU-Mol, GoN	Annually; Reported in DO tab of the GEF PIR	Project Manager and Consultants		

Monitoring	Indicators	Description	Data Source or Data Collection Methods	Frequency	Responsible for data collection	Means of Verification	Assumptions
	arrangements mentioned in Indicator 1	institutional framework, as described in Indicator 1 of this Outcome, will facilitate and support the application of low carbon technologies and initiatives in Niue				Project M&E and activity reports	even after the AREAN project completion
Component 3: Improvements in the Financing of Low Carbon Initiatives							
Outcome 3: Increased availability of, and access to, financing for sustainable energy, energy access and low carbon development initiatives in the energy supply and demand sectors	No. of developed and recommended financing schemes/mechanisms with Niue Development Bank for supporting climate resilient and low carbon development initiatives in the country	Financing schemes and mechanisms designed and implemented in coordination with NDB to support the development of RE/EE technologies and initiatives (i.e., high EE household appliances, independent solar PV installations, etc.)	NDB, Treasury Department	Annually; Reported in DO tab of the GEF PIR	Project Manager and Consultants	Documents on the development process for financial schemes Annual Reports on the planned and implemented low carbon development projects that are financed through the adopted financing scheme(s) Project M&E and activity reports	Continuous commitment and support by the national government and financial sector on the implementation of the adopted financing schemes
	No. of small-scale EE projects and RE technology projects financed either through the adopted financing scheme; or by private sector investment	With the establishment of financing schemes and mechanisms, the general public can access loans at low interest rates to finance small scale RE/EE projects; additional initiatives will be financed by funds coming from the private sector	NDB, Treasury Department, Chamber of Commerce	Annually; Reported in DO tab of the GEF PIR	Project Manager and Consultants		
	No. of recommended finance/fiscal policies for supporting initiatives on LC development	Financing and fiscal policy drafted and recommended to provide financial support for the development of RE/EE initiatives	NDB, Treasury Department, Chamber of Commerce	Annually; Reported in DO tab of the GEF PIR	Project Manager and Consultants		
Component 4: Climate Resilient and Low Carbon Technologies Application							

Monitoring	Indicators	Description	Data Source or Data Collection Methods	Frequency	Responsible for data collection	Means of Verification	Assumptions
Outcome 4.1: Climate resilient and low carbon techniques and practices adopted and implemented in the energy supply and energy end-use sectors	No. of completed feasibility assessments conducted for planned energy-integrated socio-economic development activities that feature RE and EE technology applications	The feasibility and viability of RE/EE technology applications, which will support socio-economic developments in Niue, is assessed before any funds are disbursed and committed, and results are presented in evaluation reports	DoU-Mol, Treasury Department, NDB, Chamber of Commerce	Annually; Reported in DO tab of the GEF PIR	Project Manager and Consultants	RE/EE technology projects feasibility assessment reports Project M&E and activity reports	Consumers and the private sector fully support and commit to the feasible replication of successful results of the demo projects
Outcome 4.2: Enhanced confidence in the viability of climate resilient and low carbon technology applications in the energy supply and demand sectors	Cumulative amount of energy savings from the successfully installed and operational demonstrations (including replications) of sustainable energy and low carbon technology applications, toe	Cumulative reduction of energy consumption, over the implementation period of the AREAN Project, due to the application of all RE/EE demo activities implemented under the AREAN project and their replication	DoU-Mol, NPC, NBF, Treasury Department	Annually; Reported in DO tab of the GEF PIR	Project Manager and Consultants	Demo RE-based electricity generation and low carbon technology application project profiles Performance and evaluation reports of the demo projects Project M&E and activity reports	As per schedule implementation and completion of demo projects Consumers and the private sector fully support and commit to the feasible replication of successful results of the demo projects
	No. of RE and EE technologies application projects designed and financed for implementation as influenced by the results and outcomes of the demonstrations	Follow-up RE/EE technology implementation projects spurred by the success of the demo projects implemented under the AREAN project	DoU-Mol, Treasury Department, Chamber of Commerce, NDB	Annually; Reported in DO tab of the GEF PIR	Project Manager and Consultants		
Component 5: Enhancement of Awareness on Low Carbon Development							
Outcome 5: Enhanced levels of awareness and attitude towards climate resilient and low carbon development in the energy supply	Incremental no. of energy consumers (e.g., households) that will utilize EE appliances and RE-based energy generating and consuming equipment acquired through AREAN initiatives	Surveys are designed and conducted to establish the number of households that have adopted and purchased RE/EE technologies and measures acquired through the initiative developed under the AREAN project	Department of Statistics, NDB, UNDP-MCO	Annually; Reported in DO tab of the GEF PIR	Project Manager and Consultants	Survey of energy consumption of consumers (e.g., household energy survey) Business registrations of local technical and engineering service	Continuous commitment and support on sustainable energy and low carbon development by the national government

Monitoring	Indicators	Description	Data Source or Data Collection Methods	Frequency	Responsible for data collection	Means of Verification	Assumptions
and energy end use sectors	No. of local firms that can capably provide technical, engineering and maintenance services for sustainable energy and low carbon technology application projects	Establishment of local service firms providing technical, engineering and maintenance services for RE/EE technology applications will be supported by the creation of a RE/EE market facilitated by the implementation of the AREAN project activities	GoN, Treasury Department, Chamber of Commerce, NDB	Annually; Reported in DO tab of the GEF PIR	Project Manager and Consultants	providers that are working on low carbon technology projects Project M&E and activity reports	

Annex C. Evaluation Plan

Evaluation Title	Planned start date Month/year	Planned end date Month/year	Included in the Country Office Evaluation Plan	Budget for consultants	Other budget (i.e., travel, site visits, etc.)	Budget for translation
Mid-Term Review	June 2021	July 2021	Yes	US\$ 22,500 (assuming 20 days for one national and one international consultant)	US\$ 7,500 (assuming twelve-day mission)	None
Terminal Evaluation	September 2023	November 2023	Yes	US\$ 22,500 (assuming 20 days for one national and one international consultant)	US\$ 7,500 (assuming twelve-day mission)	None
Total Evaluation Budget				US\$ 60,000		

Annex D. GEF CCM Core Indicators

GEF Core Indicators at CEO ER [PIMS Number: 6037] [Country: Niue]

I. CORE INDICATOR 6: GREENHOUSE GAS EMISSIONS MITIGATED (METRIC TONS OF CARBON DIOXIDE EQUIVALENT)

GHG emission type	Metric tons CO ₂ -eq (expected at PIF)	Metric tons CO ₂ -eq (expected at CEO ER)	Metric tons CO ₂ -eq (expected at MTR)	Metric tons CO ₂ -eq (expected at TE)
Lifetime direct project GHG emissions mitigated	Refer to footnote (*)	64,357		
Lifetime direct post-project emissions mitigated	Refer to footnote (*)	35,277		
Lifetime indirect GHG emissions mitigated	Refer to footnote (*)	12,595**		

*Total direct and indirect GHG emission reductions = 110,200 tons CO₂

**CO₂ emission reductions during influence period (top-down approach, CF = 1.0)

6.1 Carbon sequestered or emissions avoided in the sector of Agriculture, Forestry and Other Land Use

GHG emission type	Ha (expected at PIF)	Metric tons CO ₂ -eq (expected at PIF)	Ha (expected at CEO ER)	Metric tons CO ₂ -eq (expected at CEO ER)	Ha (expected at MTR)	Metric tons CO ₂ -eq (expected at MTR)	Ha (expected at TE)	Metric tons CO ₂ -eq (expected at TE)
Lifetime direct project GHG emissions mitigated								
Lifetime direct post-project emissions mitigated								
Lifetime indirect GHG emissions mitigated								
Anticipated year	---		---		---		---	

6.2 Emissions avoided

GHG emission type	Metric tons CO ₂ -eq (expected at PIF)	Metric tons CO ₂ -eq (expected at CEO ER)	Metric tons CO ₂ -eq (expected at MTR)	Metric tons CO ₂ -eq (expected at TE)

Lifetime direct project GHG emissions mitigated	Refer to footnote (*)	64,357		
Lifetime direct post-project emissions mitigated	Refer to footnote (*)	35,277		
Lifetime indirect GHG emissions mitigated	Refer to footnote (*)	12,595**		
Anticipated year		2050		

*Total direct and indirect GHG emission reductions = 110,200 tons CO2

**CO2 emission reductions during influence period (top-down approach, CF = 1.0)

6.3 Energy saved (megajoules)

Type of Intervention	MJ (expected at PIF)	MJ (expected at CEO ER)	MJ (achieved at MTR)	MJ (achieved at TE)
Increased RE-based power generation and Increased application of EE technologies		1,454·10 ⁶		

Add rows as needed.

6.4 Increase in installed renewable energy capacity per technology (megawatts).

Type of Renewable Energy	MW (expected at PIF)	MW (expected at CEO ER)	MW (achieved at MTR)	MW (achieved at TE)
solar photovoltaic, and storage		2.543		

II. CORE INDICATOR 11: NUMBER OF DIRECT BENEFICIARIES DISAGGREGATED BY GENDER AS CO-BENEFIT OF GEF INVESTMENT

	Total number (expected at PIF)	Total number (expected at CEO ER)	Total number (achieved at MTR)	Total number (achieved at TE)
Women		Entire Female Population		
Men		Entire Male Population		
Total		Entire Population of Niue		

Annex E. Terms of Reference

This section presents the terms of reference (ToRs) for the key personnel positions for the management of the project implementation. These are the TORs for the Project Management Office (PMO) personnel: a) the Project Manager (PM); b) the Chief Technical Adviser (CTA); and c) the Project Board (PB). In addition, the ToRs for the National Project Director (NPD) and the Project Administration and Finance Officer are also provided.

During the inception phase of the project, the PMO will prepare the TORs for the key personnel requirements for the implementation of the various activities in each of the components of the AREAN Project. These are TORs for consultants/experts/specialists, whose services will be engaged for the implementation of the activities in each project component.

PROJECT MANAGEMENT OFFICE (PMO):

1. PROJECT MANAGER (PM)

The Project Manager will be responsible for organizing, conducting and supervising the day-to-day operation and implementation activities of the AREAN project. The PM will lead the Project Management Unit (PMU) and work closely with the MoI-DoU, the UNDP MCO in Samoa and the regional STA. The services of the PM will be requested for the full duration of the AREAN project implementation phase – four (4) years. The selected candidate will be skilled in LCD technologies and should also have multidisciplinary expertise in RE/EE policy, regulatory and institutional frameworks, and be familiar with RE/EE financing mechanisms and financial/fiscal incentives.

Duties and Responsibilities

- Prepare Quarterly Work Plans and Annual Work Plans and timely submit them for clearance and acceptance.
- Draft, revise and submit Annual Project Reports, GEF Project Implementation Review (PIR) Report, Quarterly Progress Reports, and the Final Project Reports in a timely fashion and assuring high quality.
- Prepare, with assistance of UNDP MCO in Samoa, detailed ToRs for key personnel who will be appointed during the project implementation phase (i.e., members of the Project Management Unit, national and international consultants, contractors, trainers, etc.).
- Organize, supervise and review the work and outputs of the Project Management Unit (PMU) and other appointed key personnel.
- Organize and monitor the progress of all the activities to be implemented under the AREAN project, including:
 - a. Implementation and monitoring of the LCD demos and grid stabilization activities, and procurement of the required equipment.
 - b. Support and supervise the drafting and approval of the RE/EE policy and regulatory framework.
 - c. Support and supervise the establishment and approval of an institutional framework.
 - d. Support and supervise the establishment and approval of financing schemes and financial/fiscal incentives.
 - e. Support and supervise RE/EE capacity building, training programs and awareness rising.
- Take corrective measures for all problems and bottlenecks experienced during the project implementation.

- Liaise with off relevant stakeholders and project partners.
- Organize and conduct workshops and meetings in coordination with MoI-DoU and UNDP.

Required Qualifications and Experience

- Post Graduate degree (master's level, equivalent or higher) in a relevant environmental science or an engineering field (preferably chemical, mechanical, electrical or energy engineering). A bachelor's degree with practical working experience will also be considered.
- A minimum of 10 years of proven relevant, practical working experience managing similar projects. Experience in PICs and SIDS is highly desirable.
- Experience working with government counterparts at high levels.
- Experience technical assistance projects and GEF/UNDP projects, and a strong understanding of UNDP and its mandates, policies and procedures would be an advantage.
- Strong leadership, management and negotiation skills.
- Strong ability to work as part of a team and actively pursuing networking.
- Ability to function effectively in an international, multi-cultural environment.
- Excellent written and verbal communication skills in English.
- Excellent computer skills as well as analytical and problem-solving skills.

2. CHIEF TECHNICAL ADVISOR

The principal responsibility of the Chief Technical Advisor is to provide technical assistance in the implementation of the Project under the National Implementation Mode that would augment the capability of the Implementing Partner and the PMU in coordination with UNDP in order to ensure the achievement of project objectives following the UNDP-GEF performance standards and practices. The Chief Technical Advisor will be contracted on an annual basis, with a possibility of extension, up to the full duration of the project (four years), based on performance.

Duties and Responsibilities

- Assist the National Project Director (NPD), PM and PMU in the specific issues and requirements in project implementation that will be requested to achieve project objectives.
- Assist in the development of relevant Terms of References for all consultants and contractors in coordination with the PM.
- Advise on scheduling, procurement and monitoring issues.
- Provide written advice and comment on policy, regulatory, institutional, financial, technical, and awareness issues.
- Advise on establishing and managing monitoring and evaluation programs for all aspects of the project following the Log Frame of the project and on the preparation and finalization of the Annual Project Report/Project Implementation Review as required by the UNDP/GEF M&E system.
- Advise the UNDP, NPD, PM and PMU and independent evaluators in the conduct of the Mid-term Review (MTR) and Terminal Evaluation (TE), exit strategy and the project closure process and other UNDP-GEF requirements.
- Provide support and inputs to the PM for the preparation of the project final report (including the best practices, lessons learnt etc.).
- Any other relevant tasks as assigned by the NPD and PM.

Required Qualifications and Experience

- Advanced degree (master's level, equivalent or higher) in the field of energy, climate change mitigation, or engineering. A bachelor's degree with practical working experience will also be considered.

- Minimum 10-year experience in managing major RE/EE technology application projects, preferably in PICs and SIDS.
- Proven experience in working on, or contributing to design and development of, climate change mitigation and energy (energy efficiency and renewable energy) projects. Previous experience with the United Nations System, including UNDP-GEF projects is an asset.
- Ability to function effectively in an international, multi-cultural environment.
- Excellent written and verbal communication skills in English.
- Excellent computer skills as well as analytical and problem-solving skills.

3. PROJECT BOARD (PB)

The project board will have responsibility for monitoring of the project at a high level and for providing high-level support and decision-making as needed.

Tasks

- Meeting twice annually, for a total of eight times over the project's four-year lifetime.
- High-level monitoring of project progress particularly in reviewing of outcome-level and objective-level progress of the project.
- Decision-making about major issues facing project that cannot be resolved at the working level.
- Provision of high-level support to push progress in certain areas in which such support can make a difference, such as in policymaking and enforcement and inter-departmental coordination.
- Holding of end of project review to capture lessons learned, discuss opportunities for scaling up and highlighting of project results, and discuss findings of terminal evaluation.

General Qualifications of PB Members

- Roles as senior level officials and managers within government and other organizations.
- Expertise in areas relevant to project, such as power sector, energy, water resources, planning, policy, and finance.

4. NATIONAL PROJECT DIRECTOR (NPD)

The National Project Director will be responsible for week-to-week oversight of the Project Management Unit (PMU) and for providing guidance in strategy to the project. This will be a part-time role. The NPD will follow up with project issues as needed and meet with the project team at least once per week to discuss progress and next steps. The NPD will be a government employee; therefore, the NPD's inputs will be supported through GoN co-financing.

Duties and Responsibilities

- Guidance to the PMU team in implementation, including meetings with project team at least once per week.
- Handling of financial requests and review of financial reports.
- Technical coordination in project implementation with other government stakeholders.
- Liaison for assignment of project responsibilities to Mol-DoU permanent staff.
- Reporting to Project Board on project progress.
- Promoting the project to high level officials to gain their buy-in.
- Representation of the project at important meetings.

Required Qualifications and Experience

- Senior official of Mol-DoU.
- Experience in management of development projects.
- Strong knowledge of the energy sector.
- Experience in policy making, regulatory design, and planning in Niue.

- Knowledge of financial management.
- High level of knowledge of RE and EE technologies.

5. PROJECT ADMINISTRATION AND FINANCE OFFICER

The Project Administration and Finance Officer will be a member of the PMU and work under the guidance of the PM. He/she will look after the day-to-day administrative and financial management matters related to the AREAN project. He/she will support the PM in annual work planning, progress reporting, project monitoring and budget management of project inputs and delivery of its outputs. The Project Administration and finance Officer will be contracted on an annual basis, with a possibility of extension, up to the full duration of the project (four years) based on performance.

Duties and Responsibilities

- General financial and administrative support to the project.
- Assist the PMU in performing budget cycle: planning, preparation, revisions, and budget execution.
- Assist partner agencies involved in project activities, performing and monitoring financial aspects to ensure compliance with budgeted costs in line with UNDP policies and procedures;
- Monitor project expenditures, ensuring that no expenditure is incurred before it has been authorized.
- Assist project team in drafting quarterly and yearly project progress reports concerning financial issues.
- Ensure that UNDP procurement rules are followed during procurement activities that are carried out by the project and maintain responsibility for the inventory of the project assets.
- Perform preparatory work for mandatory and general budget revisions, annual physical inventory and auditing, and assist external evaluators in fulfilling their mission.
- Ensure the project utilizes the available financial resources in an efficient and transparent manner.
- Ensure that all project financial activities are carried out on schedule and within budget to achieve the project outputs.
- Perform all other financial related duties upon request.

Required Qualifications and Experience

- Bachelor's degree in finance, accounting, business, public administration or a closely related field.
- Minimum of 5 years practical experience in administrative functions and financial management of projects. Experience in similar positions with UN agencies and proficiency in Atlas are desirable.
- Experience in providing a streamlined administrative service role to the PMU.
- Demonstrated initiative in carrying out his/her duties and ability to work independently to tight deadlines.
- Knowledge of the energy and power sectors will be a plus.
- Ability to function effectively in an international, multi-cultural environment.
- Excellent written and verbal communication skills in English.
- Excellent computer skills as well as analytical and problem-solving skills.

6. Project Technical Officer

The Project Technical Officer will be a member of the PMU and work under the guidance of the PM. He/she will coordinate and support the implementation of project activities and provide necessary technical input to achieve the project outputs and outcomes. The TPO will serve as the in-house technical expert in the PMU for the effective implementation of project activities. He/She will be

contracted on an annual basis, with a possibility of extension, up to the full duration of the project (four years) based on performance.

Duties and Responsibilities

- Serve as the project's technical specialist and controller (approx. 70% of time)
 - I. Assume the lead in the PMU as the technical and scientific staff to make sure the project activities and products are of the highest technical quality and integrity.
 - II. Provide the necessary advice and guidance to the TA's recruited under the project.
- Project planning, monitoring and implementation
- Participate in the process of quarterly and annual planning of project activities and relaying the completed plans to the PM.
- Work closely with co-funding partners to ensure their activities/programmes are integrated and complementary with those of the GEF project.
- Provide the PM with regular reports in preparation for each PEB meeting noting particularly the progress and achievements made, acknowledging difficulties and proposing possible solutions for consideration and guidance by the PEB.
- Respond to requests for reports on project technical performance from key stakeholders through the PM
- Contribute to the annual Project Implementation Review (PIR)
- Administrative (including financial) responsibilities (approx. 10% of time)
- Assist as required with administrative aspects of the project
- Assist with the preparation of progress and financial reports to UNDP in accordance with the reporting schedules.

Required qualification and experience

- Advanced academic qualification in energy conservation and policy, renewable energy, economics and related fields;
- A minimum of 5 years' experience in implementing development projects in the field of renewable energy, economics, environment or any CC Mitigation discipline, preferably within the UN system or other development agencies. Broad experience working at the central and local levels in Niue.
- Good understanding of the electricity and energy sectors and services in Niue
- Proven ability to work with a variety of people including government officials, international and national NGOs, local stakeholders, experts and consultants, ability to manage budgets, self-motivated, independent, good judgement, ability to work under pressure.
- Excellent interpersonal skills, good communicator at all levels from political decision-makers to grassroots communities, good presentation, networking and partnering competencies, negotiation and facilitation skills.
- Good organizational and planning skills; proven ability to adhere to deadlines; committed to deliver high quality work in a timely manner; flexible and adaptive to challenging work conditions (deadlines, conflicts etc.)
- Excellent communication (oral and written) skills in English. Knowledge of Niue an advantage. Fluency in report writing in English is essential.
- Excellent computer skills (Microsoft Office). Ability to use information technology as a tool and a resource.
- The position will be advertised internationally but preference will be given to a qualified Niue National, all other things being equal.

7. Communications Officer

The Communication Officer will be a member of the PMU and work under the guidance of the PM. He/she will look after the day-to-day communication and awareness matters related to the AREAN project. He/she will support the PM in annual work planning, progress reporting, project monitoring and budget management of project inputs and delivery of its outputs. The Communication Officer will be contracted on an annual basis, with a possibility of extension, up to the full duration of the project (four years) based on performance.

Duties and Responsibilities

- Develop a communication strategy
- Develop a knowledge management plan for the project
- Lead the implementation of the approved communications strategy action plan
- Raise awareness of the project with target audiences for all project components
- Build on the project's digital presence through social media, especially through the Mol website, Facebook and others
- Produce quarterly newsletters or infographic for the project and disseminates to all project partners
- Draft media advisories and press releases
- Liaise with media for press releases and events, establish media connections and aim to get maximum media attention for press releases, special events, press interview either through broadcast or print media
- Compile contents for all planned communication efforts
- Generate ideas and lead development and design of various publicity materials, including web content, brochures and short stories.
- Assist in collecting 'most significant change' stories to support annual reporting and editing project specific and related news updates.
- Regularly update on the impact of the communication activities, including media outreach and online efforts
- Share communication products and updates with UNDP MCO, for regional and global visibility of the project
- Any other tasks related to communication activities in the project

Required qualification and experience

- Bachelor's degree in communications, Journalism, Public Relations or related field
- At least 4 years of experience in generating communications, communication strategies, media operations and advocacy material via various media (i.e. print, video, websites)
- Experiences in development of communication issues and demonstrated experience in communicating climate change and climate change mitigation work tailored to different audiences a distinct advantage.
- Computer proficiency and experience with media software, applications and communication tools.
- Excellent organizational skills, interpersonal communication skill, self-motivated, proactive and reliable with good communication and ability to work in harmony with staff members and technical specialists;
- Excellent in oral and written communication skills in English and Niuean language.

Overview of Technical Consultancies/Subcontracts

Consultant	Time Input	Tasks, Inputs and Outputs
For Project Management		
Local / National Contracting		
Project Manager	200 weeks over 4 years	The Project Manager will oversee the PMU and be responsible for day to day implementation of the project. The Project Manager will be involved full-time with the project. Part of this work (about one-half) will be project management; and the other part will be consulting roles spread across the various project outcomes. Annex E includes the preliminary TOR for the Project Manager's role. Summaries of consulting roles, some of which will be taken up by the Project Manager as will be determined at inception, are given below by outcome.
Chief Technical Advisor	150 weeks over 3 years	The Chief Technical Advisor, under the direction of the Project Manager, will be involved for the last 2 and half years of the project. Part of this work (about one-quarter) will be project management, while the other part will be consulting roles spread across the various project outcomes. Annex E includes the preliminary TOR for the Chief Technical Adviser's role. Summaries of consulting roles, some of which will be taken up by the Chief Technical Adviser as will be determined at inception, are given below by outcome.
Project Technical Officer	200 weeks over 4 years	The Project Technical Officer, under the direction of the Project Manager, will be involved full-time with the project. Part of this work (about one-quarter) will be project management, while the other part will be consulting roles spread across the various project outcomes. Summaries of consulting roles, some of which will be taken up by the Project Technical Officer as will be determined at inception, are given below by outcome.
Project Finance and Administrative Officer	200 weeks over 4 years	The Project Finance and Administrative Officer, under the direction of the Project Manager, will be involved full-time with the project. Majority of this officer's role (about three-quarter) will be project management, while the other part will be consulting roles spread across the various outcomes. Annex E includes the preliminary TOR for the Project Finance and Administrative Officer. Summaries of consulting roles, some of which will be taken up by the Project Implementation and M&E Officer as will be determined at inception, are given below by outcome.
Project Communication Officer	200 weeks over 4 years	The Project Communication Officer, under the direction of the Project Manager, will be involved for the last 3 years of the project. Majority of the Project Communication officer's role (about three-quarter) will be project management, while the other part will be to undertake the Knowledge Management Plan activity.
For Technical Assistance		
Outcome 1		
Local / National Contracting		
National Energy Policy Experts	20 weeks / over 4 years	Under close supervision of the Project Manager (PM) and in coordination with the International Energy Policy Experts, the National Energy Policy Experts will support efforts in improving RE and EE policy and regulatory frameworks. Specific tasks to contribute to achievement of Outcome 1 will be:

Consultant	Time Input	Tasks, Inputs and Outputs
		<ul style="list-style-type: none"> • review of existing policy and regulatory framework in energy supply and end-use sectors, and preparation of a report; • analysis of all key GoN stakeholders to define their roles for the advancement of RE/EE technologies; • formulate and approve rules for independent power producers that want to connect to the grid; • establish and implement energy industry codes to define roles of participants and standard of operations; • draft and implement a waste management plan for RE projects; • develop an integrated plan for energy generation/consumption, environmental protection and required infrastructures; • establish and implement appropriate energy prices and service quality regulations; • evaluation of policies, IRRs and LC standards and drafting of evaluation reports; • develop and implement follow-up action plans based on the evaluation reports drafted in Activity 1.3.1; • design and conduct a training program to teach how to carry out energy planning and technology application management.
International / Regional and Global Contracting		
International Energy Policy Experts	25.2 weeks over 4 years	<p>Under close supervision of the Project Manager (PM) and in coordination with the National Energy Policy Experts, the International Energy Policy Experts will support efforts in improving RE and EE policy and regulatory frameworks. Specific tasks to contribute to achievement of Outcome 1 will be:</p> <ul style="list-style-type: none"> • review of existing policy and regulatory framework in energy supply and end-use sectors, and preparation of a report; • analysis of all key GoN stakeholders to define their roles for the advancement of RE/EE technologies; • TA to the GoN to analyze the implication of the new Electricity Act and, if needed, to amend the Act; • formulate and approve rules for independent power producers that want to connect to the grid; • establish and implement energy industry codes to define roles of participants and standard of operations; • draft and implement a waste management plan for RE projects; • develop an integrated plan for energy generation/consumption, environmental protection and required infrastructures; • establish and implement appropriate energy prices and service quality regulations; • evaluation of policies, IRRs and LC standards and drafting of evaluation reports; • develop and implement follow-up action plans based on the evaluation reports drafted in Activity 1.3.1; • design and conduct a training program to teach how to carry out energy planning and technology application management.
Outcome 2		
Local / National Contracting		
National Legal and Institutional Frameworks Experts	10 weeks / over 4 years	<p>Under close supervision of the Project Manager (PM) and in coordination with the International Legal and Institutional Frameworks Experts, the National Legal and Institutional Frameworks Experts will support efforts in enforcing and implementing approved LCD policies, plans, regulations and programs. Specific tasks to contribute to achievement of Outcome 1 will be:</p> <ul style="list-style-type: none"> • assess current institutional arrangements for the implementation of energy plans and prepare an evaluation report; • establish an operational Government entity that is capable of effectively implementing LCD policies and regulations;

Consultant	Time Input	Tasks, Inputs and Outputs
		<ul style="list-style-type: none"> • formulate and mandate laws to regulate the implementation of LC policies; • design a training program to teach how to integrate institutional mechanisms with other objectives of Niue; • draft and implement guidelines on how to integrate LC developments with energy and other relevant objectives of Niue; • establish appropriate governance mechanisms and performance requirements for SOEs; • develop and implement follow-up action plans based on the evaluation reports drafted in Activity 2.3.1; • prepare and enforce maintenance strategy in RE/EE project designs.
International / Regional and Global Contracting		
International Institutional Frameworks Experts	14 weeks over 4 years	<p>Under close supervision of the Project Manager (PM) and in coordination with the National Legal and Institutional Frameworks Experts, the International Legal and Institutional Frameworks Experts will support efforts in enforcing and implementing approved LCD policies, plans, regulations and programs. Specific tasks to contribute to achievement of Outcome 1 will be:</p> <ul style="list-style-type: none"> • assess current institutional arrangements for the implementation of energy plans and prepare an evaluation report; • establish an operational Government entity that is capable of effectively implementing LCD policies and regulations; • formulate and mandate laws to regulate the implementation of LC policies; • design a training program to teach how to integrate institutional mechanisms with other objectives of Niue; • draft and implement guidelines on how to integrate LC developments with energy and other relevant objectives of Niue; • establish appropriate governance mechanisms and performance requirements for SOEs; • evaluate the adopted institutional framework and produce evaluation reports; • develop and implement follow-up action plans based on the evaluation reports drafted in Activity 2.3.1; • prepare and enforce maintenance strategy in RE/EE project designs.
Outcome 3		
Local / National Contracting		
National RE/EE Financing Mechanism Experts	8 weeks over 3 years	<p>In close coordination with the International RE/EE Financing Mechanism Experts, the National RE/EE Financing Mechanism Experts will strengthen the financing instruments to support LCD initiatives in the energy sector. Tasks will include:</p> <ul style="list-style-type: none"> • design and implement financing instruments for the adoption of RE/EE technologies; • assess the financing instruments designed in Activity 3.1.1 and produce evaluation reports; • formulate and approve financing policies to support the development of LC technologies; • establish financial and fiscal incentives to encourage RE/EE technologies.
International / Regional and Global Contracting		
International RE/EE Financing Mechanism Experts	10.4 weeks over 4 years	<p>In close coordination with the International RE/EE Financing Mechanism Experts, the National RE/EE Financing Mechanism Experts will strengthen the financing instruments to support LCD initiatives in the energy sector. Tasks will include:</p> <ul style="list-style-type: none"> • design and implement financing instruments for the adoption of RE/EE technologies; • assess the financing instruments designed in Activity 3.1.1 and produce evaluation reports; • design training programs in RE/EE financing to develop bankable project proposals;

Consultant	Time Input	Tasks, Inputs and Outputs
		<ul style="list-style-type: none"> • formulate and approve financing policies to support the development of LC technologies; • design training programs to improve technical skills of RE/EE service providers; • prepare informative materials on RE/EE technologies to increase public awareness; • establish financial and fiscal incentives to encourage RE/EE technologies.
Outcome 4.1		
Local / National Contracting		
National RE/EE Technology Experts	9 weeks over 2 years	<p>In close coordination with the International RE/EE Technology Experts, the National RE/EE Technology Experts will undertake several tasks related to the replication of the demonstrated EE sustainable energy and LC energy projects. Tasks will include:</p> <ul style="list-style-type: none"> • design replication and/or scale-up RE/EE projects and prepare implementation plans; • assess efficiency of RE/EE projects implemented under AREAN and prepare interim and final evaluation reports.
International / Regional and Global Contracting		
International RET and Grid Stability Consulting Firm	56.4 weeks over 3 years	<p>The International RET and Grid Stability Consulting Firm will possess a high level of skills in the assessment of feasible LCT and optimal discontinue renewable electricity inputs into the electric grid, as well as in designing, engineering, financing and implementing plans for the most stable grid stability scheme. Tasks will include:</p> <ul style="list-style-type: none"> • assess applicable LC technologies to support the achievement of the NiSERM targets and prepare an evaluation report; • evaluate the optimal solar PV power generation inputs into the existing power grid system; • review background reports and develop an updated grid stability improvement scheme; • design corrective measures to increase power grid stability and electricity supply reliability; • automate the control system and data acquisition of both existing and new solar PV installations; • design and conduct trials to evaluate the RE-generation forecasting tool and, if needed, implement corrective measures; • implement combined load dispatch control capabilities with energy storage functionalities to optimize fuel consumption; • design performance resting procedures to monitor the efficacy of the power generation units and distribution systems; • establish codes and regulation for safe power generation control and load dispatch; • design a capacity building program on electricity generation, transmission and distribution O&M.
International RE/EE Technology Experts	27.6 weeks over 3 years	<p>The International RE/EE Technology Experts, with some support from the National RE/EE Technology Experts, will undertake several tasks related to the replication of the demonstrated EE sustainable energy and LC energy projects. Tasks will include:</p> <ul style="list-style-type: none"> • design a training program for local expert on RET, focusing on those that will be demonstrated and implemented in Niue; • design replication and/or scale-up RE/EE projects and prepare implementation plans; • assess efficiency of RE/EE projects implemented under AREAN and prepare interim and final evaluation reports; • assess safe disposal of RE/EE waste and ascertain what types of waste can be reused or recycled and prepare a report; • conduct a thorough assessment of municipal waste use for energy generation, including safe disposal of residual waste; • prepare a follow-up action plan based on the evaluation report prepared in Activity 4.1.4.1.
Outcome 4.2		

Consultant	Time Input	Tasks, Inputs and Outputs
International / Regional and Global Contracting		
International Grid Stability Consulting Firm	10 weeks over 3 years	The International Grid Stability Consulting Firm will possess a high level of skills in the assessment, design and implementation plans of transformers investment projects. Tasks will include: <ul style="list-style-type: none"> • assess the project on the installation of transformers/switchgears; • prepare engineering design and implementation plans for the project on the installation of transformers/switchgears.
International RE/EE Technology Experts	73.2 weeks over 4 years	The International RE/EE Technology Experts will undertake several tasks aiming to enhance people confidence in the viability of LCT in the energy sector. Tasks will include: <ul style="list-style-type: none"> • assess the LED streetlights and solar water pumps demo projects; • assess the financing scheme demo project; • assess the EE building demo project; • prepare engineering design and implementation plans for the LED streetlights and solar water pumps demo projects; • prepare engineering design and implementation plans for the financing scheme demo project; • prepare engineering design and implementation plans for the EE building demo project; • prepare a project profile, or case study, of the project on the installation of transformers/switchgears; • prepare a project profile, or case study, of the LED streetlights and solar water pumps demo projects; • prepare a project profile, or case study, of the financing scheme demo project; • prepare a project profile, or case study, of the EE building demo project; • analyze the energy and economic feasibility performances of the project on the installation of transformers/switchgears; • analyze the energy and economic feasibility performances of the LED streetlights and solar water pumps demo projects; • analyze the energy and economic feasibility performances of the financing scheme demo project; • analyze the energy and economic feasibility performances of the EE building demo project; • assessment, design and evaluation of the EMRS; • design and evaluation of EMRS pilots.
Outcome 5		
Local / National Contracting		
National Communication Expert	4 weeks over 2 years	In close coordination with the International IT and Communication Experts, the National Communication Expert will support the project's effort in promotion and dissemination of knowledge on LCT. Tasks will include: <ul style="list-style-type: none"> • design, implement and evaluate awareness raising programs on RE/EE projects.
International / Regional and Global Contracting		

Consultant	Time Input	Tasks, Inputs and Outputs
International Energy Audit Expert	7.4 weeks over 3 years	<p>The International Energy Audit Expert will support the establishment and operationalization of an energy audit system. Tasks will include:</p> <ul style="list-style-type: none"> • design an energy auditing system for energy utilization in government and commercial buildings, and large public users; • evaluate the energy auditing system a year after and make appropriate modifications; • design and train relevant GoN personnel and stakeholders in conducting energy audits.
International IT and Communication Expert	17.4 weeks over 4 years	<p>The International IT and Communication Experts, with some support from the National Communication Expert, will establish and operationalize an energy technology database system, and information exchange network, and will promote and disseminate knowledge on LCT. Tasks will include:</p> <ul style="list-style-type: none"> • establish an energy database to store all energy related information and establish a communication plan; • evaluate the operation of the database a year after and make appropriate modifications; • design a training program on the operation and maintenance of the energy database; • establish an energy information sharing platform where RE/EE data will be stored, processed and made public; • evaluate the operation of the energy information sharing platform a year after and make appropriate modifications; • design, implement and evaluate awareness raising programs on RE/EE projects; • design a training program on how to educate the general public about the advantages of LC technologies.

Annex F. UNDP Social and Environmental and Social Screening Template (SESP)

Project Information

Project Information	
1. Project Title	Accelerating Renewable Energy and Energy Efficiency Applications in Niue (AREAN)
2. Project Number	PIMS 6037
3. Location (Global/Region/Country)	Niue

Part A. Integrating Overarching Principles to Strengthen Social and Environmental Sustainability

QUESTION 1: How Does the Project Integrate the Overarching Principles to Strengthen Social and Environmental Sustainability?
<i>Briefly describe in the space below how the Project mainstreams the human-rights based approach</i>
This climate change mitigation project focuses on the application of low carbon (renewable energy and energy efficiency) technologies for the sustainable development of the island nation of Niue. In general terms, the design and implementation of the project activities will be in line with the principles of human rights-based approach. The implementing partner as well as the project partners acknowledge human rights practices under international law and the application of human rights-related standards in the design and implementation of the project. The project is designed to enhance the availability, accessibility and quality of benefits and services from the application of renewable energy and energy efficiency technologies in supporting the country's sustainable and climate resilient economic growth. And these are for all relevant target groups including those that are potentially marginalized individuals and groups.
<i>Briefly describe in the space below how the Project is likely to improve gender equality and women's empowerment</i>
The proposed GEF project will involve women working in both management and technical departments of the government agencies/institutions in Niue who can play important roles in the design, development and implementation. Among the issues that will be covered will be those that relate to gender equity and women's role, and will cover potential barriers (if any) posed by gender equity issues, and barriers to: (1) Ensuring gender equity and women empowerment in the promotion and implementation of low carbon development; (2) Enhancing opportunities to improve the role and influence of women in the deployment of low carbon technologies and climate change mitigation options, and, (3) The development of gender-sensitive policies in the energy sector and the energy end-use sectors of the country. Lastly, the design and preparation of this project has considered the contributions, impacts and benefits of community based sustainable energy and low carbon (EE and RE) technology applications, including children and indigenous people.
<i>Briefly describe in the space below how the Project mainstreams environmental sustainability</i>
The project will involve the creation of the required enabling conditions that through the adoption of supportive policies/regulations and institutional mechanisms to facilitate the widespread application of sustainable energy and low carbon technologies in the energy generation and energy end-use sectors in Niue. This is to ensure sustainability of the systems and frameworks that will be established under the project. The development of a suitable follow-up action plan for approval and enforcement after project completion will ensure the sustainability of these established systems/frameworks. Since the project is linked and is complementing and supplementing the development and infrastructure plans of the country, e.g., Niue National Strategic Plan; National Integrated Strategic Energy Road Map (NISERM), the sustainability of project outputs will be continued. The proposed project is within the context of sustainable development in Niue, and to ensure the realization of environmental sustainability the design has considered best applicable policies and strategies on conserving the natural environment. In addition to environmental sustainability, the project is in line with sustainable development aspirations that will bring about local benefits mainly through contributions to

improvement of the living conditions of the country's citizens and allows them to contribute more productively to the economy; and, protection of the natural environment; diversification of the resource base of the economy. It is geared towards promoting and supporting RE-based energy systems (for power and non-power applications) as among the key elements for the satisfactory achievement of the energy, environment and development agenda of the country.

Part B. Identifying and Managing Social and Environmental Risks

<p>QUESTION 2: What are the Potential Social and Environmental Risks? <i>Note: Describe briefly potential social and environmental risks identified in Attachment 1 – Risk Screening Checklist (based on any “Yes” responses). If no risks have been identified in Attachment 1 then note “No Risks Identified” and skip to Question 4 and Select “Low Risk”. Questions 5 and 6 not required for Low Risk Projects.</i></p>	<p>QUESTION 3: What is the level of significance of the potential social and environmental risks? <i>Note: Respond to Questions 4 and 5 below before proceeding to Question 6</i></p>			<p>QUESTION 6: What social and environmental assessment and management measures have been conducted and/or are required to address potential risks (for Risks with Moderate and High Significance)?</p>
<p>Risk Description</p>	<p>Impact and Probability (1-5)</p>	<p>Significance (Low, Moderate, High)</p>	<p>Comments</p>	<p>Description of assessment and management measures as reflected in the Project design. If ESIA or SESA is required note that the assessment should consider all potential impacts and risks.</p>
<p>The construction and operation of the demo low carbon technology application projects may pose potential safety risks to local communities.</p>	<p>P= 1 I= 2</p>	<p>Low</p>	<p>This could happen in project installations in areas where compliance to occupational health and safety standards and rules is at low levels or is not strictly enforced and followed.</p>	<p>The selection of demo sites will include safety aspects (occupational and general) as one of the criteria to be considered. Relevant GoN requirements for constructions shall be emphasized in the selection of demo sites. Furthermore, the financing scheme that will be developed shall also consider safety as one of the requirements for eligibility in securing financial assistance.</p>
<p>The operation of the RE technology demos may potentially result in the release of pollutants to the environment due to routine or non-routine circumstances with the potential for adverse local, regional, and/or trans-boundary impacts.</p>	<p>P= 1 I= 2</p>	<p>Low</p>	<p>Potential cases could be: (1) solar PV power generation does not address battery waste disposal; (2) biomass-based energy generation does not properly address</p>	<p>The RE projects that will be developed and implemented will be required to adhere to the standard design practices, which involve considering environmental impacts. RE resource preparation, utilization, and the handling of resulting waste or effluents have their general design requirements and guides that must be complied with. Unless there are specific characteristics of the RE resource, project site, etc., that will require explicit designs, the properly applied standard designs would not make the construction and operation of such facilities release pollutants.</p>

			waste management issues	It will be ensured that the design will not bring about release of materials that would be detrimental to the natural environment accidentally or during disposal.
Social and climate-related risks impact the sustainability of the implementation of the low carbon energy demos that will be implemented direct, and influenced, by the project.	P=3 I=4	<i>Medium</i>	<ul style="list-style-type: none"> • Low level of social acceptance by local communities of renewable energy projects due to benefit-sharing issues. • Climate change hinders full performance of RE-based energy system installations due to disturbance to supply of renewable energy resources and impacts of climate events like flood/drought/landslide. 	<ul style="list-style-type: none"> • As part of the social and environmental safeguard measures, where applicable, the Free, Prior Informed Consent (FPIC) principle will be implemented for the low carbon technology demos that will be implemented. • The design and implementation of the RE-based power generation and other low carbon technology applications shall follow proper engineering and construction design and construction that ensure not only structural integrity but also climate resilience. This applies also in the procurement, design/engineering, installation and operation of the pertinent installations. Climate factors and climate scenario will be considered in the feasibility studies that will be conducted in the potential RE-based energy system demo projects, as well as in the design and engineering of the selected low carbon technology application demos.
QUESTION 4: What is the overall Project risk categorization?				
Select one (see SESP for guidance)			Comments	
<i>Low Risk</i>			<input type="checkbox"/>	
<i>Moderate Risk</i>			<input checked="" type="checkbox"/>	Of eight risks, four are rated as “medium” and four as “low”.
<i>High Risk</i>			<input type="checkbox"/>	
QUESTION 5: Based on the identified risks and risk categorization, what requirements of the SES are relevant?				
Check all that apply			Comments	
<i>Principle 1: Human Rights</i>			<input type="checkbox"/>	
<i>Principle 2: Gender Equality and Women’s Empowerment</i>			<input checked="" type="checkbox"/>	Gender equality and women’s empowerment has been advocated by Niue. The project has been designed and it will be implemented with the idea of enhancing women’s active involvement in the design and implementation of CCM actions in the country’s energy and energy end use sectors.
1. Biodiversity Conservation and Natural Resource Management			<input type="checkbox"/>	
2. Climate Change Mitigation and Adaptation			<input type="checkbox"/>	

	3. Community Health, Safety and Working Conditions	√	Internationally recognized practices in occupational health and safety shall be fully used in the construction and operation of the low carbon technology installations that the project will support.
	4. Cultural Heritage	<input type="checkbox"/>	
	5. Displacement and Resettlement	<input type="checkbox"/>	
	6. Indigenous Peoples	<input type="checkbox"/>	
	7. Pollution Prevention and Resource Efficiency	√	GoN requirements and proper engineering design principles and codes/standards shall be emphasized in the design and operation of the low carbon technology installations that will be supported by the project to mitigate potential pollution.

Final Sign Off

<i>Signature</i>	<i>Date</i>	<i>Description</i>
QA Assessor		UNDP staff member responsible for the Project, typically a UNDP Programme Officer. Final signature confirms they have “checked” to ensure that the SESP is adequately conducted.
QA Approver		UNDP senior manager, typically the UNDP Deputy Country Director (DCD), Country Director (CD), Deputy Resident Representative (DRR), or Resident Representative (RR). The QA Approver cannot also be the QA Assessor. Final signature confirms they have “cleared” the SESP prior to submittal to the PAC.
PAC Chair		UNDP chair of the PAC. In some cases, PAC Chair, may also be the QA Approver. Final signature confirms that the SESP was considered as part of the project appraisal and considered in recommendations of the PAC.

SESP Attachment 1. Social and Environmental Risk Screening Checklist

Checklist Potential Social and Environmental Risks	
Principles 1: Human Rights	Answer (Yes/No)
1. Could the Project lead to adverse impacts on enjoyment of the human rights (civil, political, economic, social or cultural) of the affected population and particularly of marginalized groups?	No
2. Is there a likelihood that the Project would have inequitable or discriminatory adverse impacts on affected populations, particularly people living in poverty or marginalized or excluded individuals or groups? ⁴⁰	No
3. Could the Project potentially restrict availability, quality of and access to resources or basic services, particularly to marginalized individuals or groups?	No
4. Is there a likelihood that the Project would exclude any potentially affected stakeholders, particularly marginalized groups, from fully participating in decisions that may affect them?	No
5. Is there a risk that duty-bearers do not have the capacity to meet their obligations in the Project?	No
6. Is there a risk that rights-holders do not have the capacity to claim their rights?	No
7. Have local communities or individuals, given the opportunity, raised human rights concerns regarding the Project during the stakeholder engagement process?	No
8. Is there a risk that the Project would exacerbate conflicts among and/or the risk of violence to project-affected communities and individuals?	No
Principle 2: Gender Equality and Women's Empowerment	
1. Is there a likelihood that the proposed Project would have adverse impacts on gender equality and/or the situation of women and girls?	No
2. Would the Project potentially reproduce discriminations against women based on gender, especially regarding participation in design and implementation or access to opportunities and benefits?	No
3. Have women's groups/leaders raised gender equality concerns regarding the Project during the stakeholder engagement process and has this been included in the overall Project proposal and in the risk assessment?	No
4. Would the Project potentially limit women's ability to use, develop and protect natural resources, considering different roles and positions of women and men in accessing environmental goods and services? <i>For example, activities that could lead to natural resources degradation or depletion in communities who depend on these resources for their livelihoods and well being</i>	No
Principle 3: Environmental Sustainability: Screening questions regarding environmental risks are encompassed by the specific Standard-related questions below	
Standard 1: Biodiversity Conservation and Sustainable Natural Resource Management	
1.1 Would the Project potentially cause adverse impacts to habitats (e.g. modified, natural, and critical habitats) and/or ecosystems and ecosystem services? <i>For example, through habitat loss, conversion or degradation, fragmentation, hydrological changes</i>	No
1.2 Are any Project activities proposed within or adjacent to critical habitats and/or environmentally sensitive areas, including legally protected areas (e.g. nature reserve, national park), areas proposed for protection, or recognized as such by authoritative sources and/or indigenous peoples or local communities?	No
1.3 Does the Project involve changes to the use of lands and resources that may have adverse impacts on habitats, ecosystems, and/or livelihoods? (Note: if restrictions and/or limitations of access to lands would apply, refer to Standard 5)	No
1.4 Would Project activities pose risks to endangered species?	No
1.5 Would the Project pose a risk of introducing invasive alien species?	No
1.6 Does the Project involve harvesting of natural forests, plantation development, or reforestation?	No
1.7 Does the Project involve the production and/or harvesting of fish populations or other aquatic species?	No
1.8 Does the Project involve significant extraction, diversion or containment of surface or ground water? <i>For example, construction of dams, reservoirs, river basin developments, groundwater extraction</i>	No
1.9 Does the Project involve utilization of genetic resources? (e.g. collection and/or harvesting, commercial development)	No
1.10 Would the Project generate potential adverse trans-boundary or global environmental concerns?	No

⁴⁰ Prohibited grounds of discrimination include race, ethnicity, gender, age, language, disability, sexual orientation, religion, political or other opinion, national or social or geographical origin, property, birth or other status including as an indigenous person or as a member of a minority. References to "women and men" or similar is understood to include women and men, boys and girls, and other groups discriminated against based on their gender identities, such as transgender people and transsexuals.

1.11	Would the Project result in secondary or consequential development activities which could lead to adverse social and environmental effects, or would it generate cumulative impacts with other known existing or planned activities in the area? <i>For example, a new road through forested lands will generate direct environmental and social impacts (e.g. felling of trees, earthworks, potential relocation of inhabitants). The new road may also facilitate encroachment on lands by illegal settlers or generate unplanned commercial development along the route, potentially in sensitive areas. These are indirect, secondary, or induced impacts that need to be considered. Also, if similar developments in the same forested area are planned, then cumulative impacts of multiple activities (even if not part of the same Project) need to be considered.</i>	No
Standard 2: Climate Change Mitigation and Adaptation		
2.1	Will the proposed Project result in significant ⁴¹ greenhouse gas emissions or may exacerbate climate change?	No
2.2	Would the potential outcomes of the Project be sensitive or vulnerable to potential impacts of climate change?	No
2.3	Is the proposed Project likely to directly or indirectly increase social and environmental vulnerability to climate change now or in the future (also known as maladaptive practices)? <i>For example, changes to land use planning may encourage further development of floodplains, potentially increasing the population's vulnerability to climate change, specifically flooding</i>	No
Standard 3: Community Health, Safety and Working Conditions		
3.1	Would elements of Project construction, operation, or decommissioning pose potential safety risks to local communities?	No
3.2	Would the Project pose potential risks to community health and safety due to the transport, storage, and use and/or disposal of hazardous or dangerous materials (e.g. explosives, fuel and other chemicals during construction and operation)?	No
3.3	Does the Project involve large-scale infrastructure development (e.g. dams, roads, buildings)?	No
3.4	Would failure of structural elements of the Project pose risks to communities? (e.g. collapse of buildings or infrastructure)	No
3.5	Would the proposed Project be susceptible to or lead to increased vulnerability to earthquakes, subsidence, landslides, and erosion, flooding or extreme climatic conditions?	No
3.6	Would the Project result in potential increased health risks (e.g. from water-borne or other vector-borne diseases or communicable infections such as HIV/AIDS)?	No
3.7	Does the Project pose potential risks and vulnerabilities related to occupational health and safety due to physical, chemical, biological, and radiological hazards during Project construction, operation, or decommissioning?	Yes <i>(possible, if not mitigated)</i>
3.8	Does the Project involve support for employment or livelihoods that may fail to comply with national and international labor standards (i.e. principles and standards of ILO fundamental conventions)?	No
3.9	Does the Project engage security personnel that may pose a potential risk to health and safety of communities and/or individuals (e.g. due to a lack of adequate training or accountability)?	No
Standard 4: Cultural Heritage		
4.1	Will the proposed Project result in interventions that would potentially adversely impact sites, structures, or objects with historical, cultural, artistic, traditional or religious values or intangible forms of culture (e.g. knowledge, innovations, practices)? (Note: Projects intended to protect, and conserve Cultural Heritage may also have inadvertent adverse impacts)	No
4.2	Does the Project propose utilizing tangible and/or intangible forms of cultural heritage for commercial or other purposes?	No
Standard 5: Displacement and Resettlement		
5.1	Would the Project potentially involve temporary or permanent and full or partial physical displacement?	No
5.2	Would the Project possibly result in economic displacement (e.g. loss of assets or access to resources due to land acquisition or access restrictions – even in the absence of physical relocation)?	No
5.3	Is there a risk that the Project would lead to forced evictions? ⁴²	No
5.4	Would the proposed Project possibly affect land tenure arrangements and/or community-based property rights/customary rights to land, territories and/or resources?	No
Standard 6: Indigenous Peoples		
6.1	Are indigenous peoples present in the Project area (including Project area of influence)?	No
6.2	Is it likely that the Project or portions of the Project will be located on lands and territories claimed by indigenous peoples?	No

⁴¹ Regarding CO₂, 'significant emissions' corresponds generally to more than 25,000 tons per year (from both direct and indirect sources). [The Guidance Note on Climate Change Mitigation and Adaptation provides additional information on GHG emissions.]

⁴² Forced evictions include acts and/or omissions involving the coerced or involuntary displacement of individuals, groups, or communities from homes and/or lands and common property resources that were occupied or depended upon, thus eliminating the ability of an individual, group, or community to reside or work in a particular dwelling, residence, or location without the provision of, and access to, appropriate forms of legal or other protections.

6.3	Would the proposed Project potentially affect the human rights, lands, natural resources, territories, and traditional livelihoods of indigenous peoples (regardless of whether indigenous peoples possess the legal titles to such areas, whether the Project is located within or outside of the lands and territories inhabited by the affected peoples, or whether the indigenous peoples are recognized as indigenous peoples by the country in question)? <i>If the answer to the screening question 6.3 is "yes" the potential risk impacts are considered potentially severe and/or critical and the Project would be categorized as either Moderate or High Risk.</i>	No
6.4	Has there been an absence of culturally appropriate consultations carried out with the objective of achieving FPIC on matters that may affect the rights and interests, lands, resources, territories and traditional livelihoods of the indigenous peoples concerned?	No
6.5	Does the proposed Project involve the utilization and/or commercial development of natural resources on lands and territories claimed by indigenous peoples?	No
6.6	Is there a potential for forced eviction or the whole or partial physical or economic displacement of indigenous peoples, including through access restrictions to lands, territories, and resources?	No
6.7	Would the Project adversely affect the development priorities of indigenous peoples as defined by them?	No
6.8	Would the Project potentially affect the physical and cultural survival of indigenous peoples?	No
6.9	Would the Project potentially affect the Cultural Heritage of indigenous peoples, including through the commercialization or use of their traditional knowledge and practices?	No
Standard 7: Pollution Prevention and Resource Efficiency		
7.1	Would the Project potentially result in the release of pollutants to the environment due to routine or non-routine circumstances with the potential for adverse local, regional, and/or trans-boundary impacts?	No
7.2	Would the proposed Project potentially result in the generation of waste (both hazardous and non-hazardous)?	Yes ⁴³
7.3	Will the proposed Project potentially involve the manufacture, trade, release, and/or use of hazardous chemicals and/or materials? Does the Project propose use of chemicals or materials subject to international bans or phase-outs? <i>For example, DDT, PCBs and other chemicals listed in international conventions such as the Stockholm Conventions on Persistent Organic Pollutants or the Montreal Protocol</i>	No
7.4	Will the proposed Project involve the application of pesticides that may have a negative effect on the environment or human health?	No
7.5	Does the Project include activities that require significant consumption of raw materials, energy, and/or water?	No

⁴³ Potential pollution from waste such as solar batteries, old appliances, transformers and switchgears.

Annex G: UNDP Project Quality Assurance Report

Design & Appraisal Stage Quality Assurance Report

Overall Project Rating: **Highly Satisfactory**

Decision: Approve: The project is of sufficient quality to continue as planned. Any management actions must be addressed in a timely manner.

Project Number: 00117508

Project Title: The projects Objective is to enable the achievement of low carbon energy access, sustainable energy, and green growth targets of Niue.

Project Date: 01-Jun-2019

Strategic

Quality Rating: **Exemplary**

1. Does the project's Theory of Change specify how it will contribute to higher level change? (Select the option from 1-3 that best reflects the project)

- 3: The project has a theory of change with explicit assumptions and clear change pathway describing how the project will contribute to outcome level change as specified in the programme/CPD, backed by credible evidence of what works effectively in this context. The project document clearly describes why the project's strategy is the best approach at this point in time.
- 2: The project has a theory of change. It has an explicit change pathway that explains how the project intends to contribute to outcome-level change and why the project strategy is the best approach at this point in time, but is backed by limited evidence.
- 1: The project does not have a theory of change, but the project document may describe in generic terms how the project will contribute to development results, without specifying the key assumptions. It does not make an explicit link to the programme/CPD's theory of change.

Evidence

Management Response

Refer to Page 15-20 of the draft ProDoc. The report on the proceedings of the LFA workshop shows how the project log frame was developed, and how the log frame embodies the theory of change that the project will facilitate to happen

2. Is the project aligned with the thematic focus of the UNDP Strategic Plan? (select the option from 1-3 that best reflects the project)

- 3: The project responds to one of the three areas of development **work** as specified in the Strategic Plan; it addresses at least one of the proposed new and emerging **areas**; an issues-based analysis has been incorporated into the project design; and the project's RRF includes all the relevant SP output indicators. (all must be true to select this option)
- 2: The project responds to one of the three areas of development **work** as specified in the Strategic Plan. The project's RRF includes at least one SP output indicator, if relevant. (both must be true to select this option)
- 1: While the project may respond to one of the three areas of development **work** as specified in the Strategic Plan, it is based on a sectoral approach without addressing the complexity of the development issue. None of the relevant SP indicators are included in the RRF. This answer is also selected if the project does not respond to any of the three areas of development work in the Strategic Plan.

Evidence

Yes, it links to SP Output 1.4 and Output 1.5. The design of the project is based on the results of a logical framework analysis that involved, among others a situation analysis and barrier analysis of the various issues/concerns regarding the widespread application of RE and EE technologies in meeting the set targets of

the country's energy roadmap. Refer to Produce (page 8)

Relevant

Quality Rating: Satisfactory

3. Does the project have strategies to effectively identify, engage and ensure the meaningful participation of targeted groups/geographic areas with a priority focus on the excluded and marginalized? (select the option from 1-3 that best reflects this project)

- 3: The target groups/geographic areas are appropriately specified, prioritising the excluded and/or marginalised. Beneficiaries will be identified through a rigorous process based on evidence (if applicable.)The project has an explicit strategy to identify, engage and ensure the meaningful participation of specified target groups/geographic areas throughout the project, including through monitoring and decision-making (such as representation on the project board) (all must be true to select this option)
- 2: The target groups/geographic areas are appropriately specified, prioritising the excluded and/or marginalised. The project document states how beneficiaries will be identified, engaged and how meaningful participation will be ensured throughout the project. (both must be true to select this option)
- 1: The target groups/geographic areas are not specified, or do not prioritize excluded and/or marginalised populations. The project does not have a written strategy to identify or engage or ensure the meaningful participation of the target groups/geographic areas throughout the project.
- Not Applicable*

Evidence

Management Response

A stakeholder Plan for the AREAN Project will be formulated and used during the project implementation. The whole population of Niue will be beneficiaries of a more efficient and reliable electricity grid that will be facilitated through the project.

4. Have knowledge, good practices, and past lessons learned of UNDP and others informed the project design? (select the option from 1-3 that best reflects this project)

- 3: *Knowledge and lessons learned (gained e.g. through peer assist sessions) backed by credible evidence from evaluation, corporate policies/strategies, and monitoring have been explicitly used, with appropriate referencing, to develop the project's theory of change and justify the approach used by the project over alternatives.*
- 2: The project design mentions knowledge and lessons learned backed by evidence/sources, which inform the project's theory of change but have not been used/are not sufficient to justify the approach selected over alternatives.
- 1: There is only scant or no mention of knowledge and lessons learned informing the project design. Any references that are made are not backed by evidence.

Evidence

Management Response

Note that we have been asking the GoN for the ongoing and planned RE and EE projects in Niue. For the past ones, we learn what were done and learn from both the bad and good things that were experienced from these. For ongoing and planned projects- we learn about them because we are going to build on them and subsume some of them in AREAN

5. Does the project use gender analysis in the project design and does the project respond to this gender analysis with concrete measures to address gender inequities and empower women? (select the option from 1-3 that best reflects this project)

- 3: A participatory gender analysis on the project has been conducted. This analysis reflects on the different needs, roles and access to/control over resources of women and men, and it is fully integrated into the project document. The project establishes concrete priorities to address gender inequalities in its strategy. The results framework includes outputs and activities that specifically respond to this gender analysis, with indicators that measure and monitor results contributing to gender equality. (all must be true to select this option)
- 2: A gender analysis on the project has been conducted. This analysis reflects on the different needs, roles and access to/control over resources of women and men. Gender concerns are integrated in the development challenge and strategy sections of the project document. The results framework includes outputs and activities that specifically respond to this gender analysis, with indicators that measure and monitor results contributing to gender equality. (all must be true to select this option)
- 1: *The project design may or may not mention information and/or data on the differential impact of the project's development situation on gender relations, women and men, but the constraints have not been clearly identified and interventions have not been considered.*

Evidence

Management Response

The conduct of Gender Analysis is currently under way. The Gender Analysis report will be completed before final results from the assessment is not yet captured in the ProDoc is signed when approved until it is completed but there is a section in the ProDoc on gender equality and empowering women on page 42 of the draft prodoc

A Gender Analysis will be completed before final prodoc is signed when approved

6. Does UNDP have a clear advantage to engage in the role envisioned by the project vis-à-vis national partners, other development partners, and other actors? (select the option from 1-3 that best reflects this project)

- 3: *An analysis has been conducted on the role of other partners in the area where the project intends to work, and credible evidence supports the proposed engagement of UNDP and partners through the project. It is clear how results achieved by relevant partners will contribute to outcome level change complementing the project's intended results. If relevant, options for south-south and triangular cooperation have been considered, as appropriate. (all must be true to select this option)*
- 2: Some analysis has been conducted on the role of other partners where the project intends to work, and relatively limited evidence supports the proposed engagement of and division of labour between UNDP and partners through the project. Options for south-south and triangular cooperation may not have not been fully developed during project design, even if relevant opportunities have been identified.
- 1: No clear analysis has been conducted on the role of other partners in the area that the project intends to work, and relatively limited evidence supports the proposed engagement of UNDP and partners through the project. There is risk that the project overlaps and/or does not coordinate with partners' interventions in this area. Options for south-south and triangular cooperation have not been considered, despite its potential relevance.

Evidence

Management Response

Most of the project activities build on relevant ongoing and planned sustainable development activities in Niue. Either these are supplemented and strengthened to deliver parallel outputs that contribute to the realisation of the outcomes of AREAN, to these are modified (e.g. enhanced) so that the outcomes of AREAN are realised. Please refer also to pp.42-43 of the Prodoc regarding the South-south and triangular

cooperation aspects of AREAN.

Social & Environmental Standards

Quality Rating: Highly Satisfactory

7. Does the project seek to further the realization of human rights using a human rights based approach? (select from options 1-3 that best reflects this project)

- 3: Credible evidence that the project aims to further the realization of human rights, upholding the relevant international and national laws and standards in the area of the project. Any potential adverse impacts on enjoyment of human rights were rigorously identified and assessed as relevant, with appropriate mitigation and management measures incorporated into project design and budget. (all must be true to select this option)
- 2: *Some evidence that the project aims to further the realization of human rights. Potential adverse impacts on enjoyment of human rights were identified and assessed as relevant, and appropriate mitigation and management measures incorporated into the project design and budget.*
- 1: No evidence that the project aims to further the realization of human rights. Limited or no evidence that potential adverse impacts on enjoyment of human rights were considered.

Evidence

Management Response

The project will facilitate application of low carbon technologies that will contribute to enhancing the quality of life and environment for the citizenry of Niue

8. Did the project consider potential environmental opportunities and adverse impacts, applying a precautionary approach? (select from options 1-3 that best reflects this project)

- 3: *Credible evidence that opportunities to enhance environmental sustainability and integrate poverty-environment linkages were fully considered as relevant, and integrated in project strategy and design. Credible evidence that potential adverse environmental impacts have been identified and rigorously assessed with appropriate management and mitigation measures incorporated into project design and budget. (all must be true to select this option).*
- 2: No evidence that opportunities to strengthen environmental sustainability and poverty-environment linkages were considered. Credible evidence that potential adverse environmental impacts have been identified and assessed, if relevant, and appropriate management and mitigation measures incorporated into project design and budget.
- 1: No evidence that opportunities to strengthen environmental sustainability and poverty-environment linkages were considered. Limited or no evidence that potential adverse environmental impacts were adequately considered.

Evidence

Management Response

The project's SESP was completed and showed the project to have a moderate risk rating. An Environmental and Social Management Plan will be prepared during the first year of the project implementation, and used in the implementation of the relevant project activities.

9. Has the Social and Environmental Screening Procedure (SESP) been conducted to identify potential social and environmental impacts and risks? [If yes, upload the completed checklist as evidence. If SESP is not required, provide the reason(s) for the exemption in the evidence section. Exemptions include the following:

- Preparation and dissemination of reports, documents and communication materials
- Organization of an event, workshop, training
- Strengthening capacities of partners to participate in international negotiations and conferences
- Partnership coordination (including UN coordination) and management of networks
- Global/regional projects with no country level activities (e.g. knowledge management, inter-governmental processes)
- UNDP acting as Administrative Agent

- Yes
- No
- SESP not required

Evidence

Refer to Annex F of the draft ProDoc.

Management & Monitoring

Quality Rating: Highly Satisfactory

10. Does the project have a strong results framework? (select from options 1-3 that best reflects this project)

- 3: *The project's selection of outputs and activities are at an appropriate level and relate in a clear way to the project's theory of change. Outputs are accompanied by SMART, results-oriented indicators that measure all of the key expected changes identified in the theory of change, each with credible data sources, and populated baselines and targets, including gender sensitive, sex-disaggregated indicators where appropriate. (all must be true to select this option)*
- 2: *The project's selection of outputs and activities are at an appropriate level, but may not cover all aspects of the project's theory of change. Outputs are accompanied by SMART, results-oriented indicators, but baselines, targets and data sources may not yet be fully specified. Some use of gender sensitive, sex-disaggregated indicators, as appropriate. (all must be true to select this option)*
- 1: *The results framework does not meet all of the conditions specified in selection "2" above. This includes: the project's selection of outputs and activities are not at an appropriate level and do not relate in a clear way to the project's theory of change; outputs are not accompanied by SMART, results-oriented indicators that measure the expected change, and have not been populated with baselines and targets; data sources are not specified, and/or no gender sensitive, sex-disaggregation of indicators.*

Evidence

Management Response

refer to Page 48 on the Project Results Framework that shows the indicators and project targets. Gender Sensitive indicators are not yet stated since this relies on the results, this is relying on the Gender Analysis work.

11. Is there a comprehensive and costed M&E plan with specified data collection sources and methods to support evidence-based management, monitoring and evaluation of the project?

- Yes
- No

Evidence

M&E plan is on page 50 with all costings.

12. Is the project's governance mechanism clearly defined in the project document, including planned composition of the project board? (select from options 1-3 that best reflects this project)

- 3: The project's governance mechanism is fully defined in the project document. Individuals have been specified for each position in the governance mechanism (especially all members of the project board.) Project Board members have agreed on their roles and responsibilities as specified in the terms of reference. The ToR of the project board has been attached to the project document. (all must be true to select this option).
- 2: *The project's governance mechanism is defined in the project document; specific institutions are noted as holding key governance roles, but individuals may not have been specified yet. The prodoc lists the most important responsibilities of the project board, project director/manager and quality assurance roles. (all must be true to select this option)*
- 1: The project's governance mechanism is loosely defined in the project document, only mentioning key roles that will need to be filled at a later date. No information on the responsibilities of key positions in the governance mechanism is provided.

Evidence

Management Response

Yes, refer to page 56. The PMU is specified except the individuals that are not yet mentioned. The ToR for the Project Board is on page 57.

13. Have the project risks been identified with clear plans stated to manage and mitigate each risks? (select from options 1-3 that best reflects this project)

- 3: Project risks related to the achievement of results are fully described in the project risk log, based on comprehensive analysis drawing on the theory of change, Social and Environmental Standards and screening, situation analysis, capacity assessments and other analysis. Clear and complete plan in place to manage and mitigate each risk. (both must be true to select this option)
- 2: *Project risks related to the achievement of results identified in the initial project risk log with mitigation measures identified for each risk.*
- 1: Some risks may be identified in the initial project risk log, but no evidence of analysis and no clear risk mitigation measures identified. This option is also selected if risks are not clearly identified and no initial risk log is included with the project document.

Evidence

Management Response

Refer to Annex H of the Draft prodoc for the Risk Log

Efficient

Quality Rating: Highly Satisfactory

14. Have specific measures for ensuring cost-efficient use of resources been explicitly mentioned as part of the project design? This can include: i) using the theory of change analysis to explore different options of achieving the maximum results with the resources available; ii) using a portfolio management approach to improve cost effectiveness through synergies with other interventions; iii) through joint operations (e.g., monitoring or procurement) with other partners.

- Yes
- No

Evidence

Yes there is a ToC analysis that shows the outputs and outcomes of the project. the ProDoc also represents

the various activities that will be implemented to deliver each of these outputs. Also refer to the report on the proceedings of the LFA workshop.

15. Are explicit plans in place to ensure the project links up with other relevant on-going projects and initiatives, whether led by UNDP, national or other partners, to achieve more efficient results (including, for example, through sharing resources or coordinating delivery?)

- Yes
- No

Evidence

Yes this refers to the baseline projects on table with the co-financing commitment from Niue Government and other donor partners. refer to page 60

16. Is the budget justified and supported with valid estimates?

- 3: The project's budget is at the activity level with funding sources, and is specified for the duration of the project period in a multi-year budget. Costs are supported with valid estimates using benchmarks from similar projects or activities. Cost implications from inflation and foreign exchange exposure have been estimated and incorporated in the budget.
- 2: *The project's budget is at the activity level with funding sources, when possible, and is specified for the duration of the project in a multi-year budget. Costs are supported with valid estimates based on prevailing rates.*
- 1: The project's budget is not specified at the activity level, and/or may not be captured in a multi-year budget.

Evidence

Refer to Page 65 for the project total budget and work plan

17. Is the Country Office fully recovering the costs involved with project implementation?

- 3: The budget fully covers all direct project costs that are directly attributable to the project, including programme management and development effectiveness services related to strategic country programme planning, quality assurance, pipeline development, policy advocacy services, finance, procurement, human resources, administration, issuance of contracts, security, travel, assets, general services, information and communications based on full costing in accordance with prevailing UNDP policies (i.e., UPL, LPL.)
- 2: *The budget covers significant direct project costs that are directly attributable to the project based on prevailing UNDP policies (i.e., UPL, LPL) as relevant.*
- 1: The budget does not reimburse UNDP for direct project costs. UNDP is cross-subsidizing the project and the office should advocate for the inclusion of DPC in any project budget revisions.

Evidence

The Project has. Letter of Agreement with Niue Government and UNDP with costs for extra services required during implementation as a back up plan using the latest UPL figures

Management Response

Effective

Quality Rating: Satisfactory

18. Is the chosen implementation modality most appropriate? (select from options 1-3 that best reflects this project)

- 3: The required implementing partner assessments (capacity assessment, HACT micro assessment) have been conducted, and there is evidence that options for implementation modalities have been thoroughly considered. There is a strong justification for choosing the selected modality, based on the development context. (both must be true to select this option)
- 2: *The required implementing partner assessments (capacity assessment, HACT micro assessment) have been conducted and the implementation modality chosen is consistent with the results of the assessments.*
- 1: The required assessments have not been conducted, but there may be evidence that options for implementation modalities have been considered.

Evidence

Management Response

Mol have completed their HACT Assessment and are compliant in accordance with UNDP standards

19. Have targeted groups, prioritizing marginalized and excluded populations that will be affected by the project, been engaged in the design of the project in a way that addresses any underlying causes of exclusion and discrimination?

- 3: Credible evidence that all targeted groups, prioritising marginalized and excluded populations that will be involved in or affected by the project, have been actively engaged in the design of the project. Their views, rights and any constraints have been analysed and incorporated into the root cause analysis of the theory of change which seeks to address any underlying causes of exclusion and discrimination and the selection of project interventions.
- 2: Some evidence that key targeted groups, prioritising marginalized and excluded populations that will be involved in the project, have been engaged in the design of the project. Some evidence that their views, rights and any constraints have been analysed and incorporated into the root cause analysis of the theory of change and the selection of project interventions.
- 1: No evidence of engagement with marginalized and excluded populations that will be involved in the project during project design. No evidence that the views, rights and constraints of populations have been incorporated into the project.
- Not Applicable*

Evidence

The Project is designed for the whole of Niue not specific to a certain group.

20. Does the project conduct regular monitoring activities, have explicit plans for evaluation, and include other lesson learning (e.g. through After Action Reviews or Lessons Learned Workshops), timed to inform course corrections if needed during project implementation?

- Yes
- No

Evidence

There is an evaluation plan in annex C and M&E plan to monitor project activities status.

21. The gender marker for all project outputs are scored at GEN2 or GEN3, indicating that gender has been fully mainstreamed into all project outputs at a minimum.

- Yes
- No

Evidence

The Project is a GEN1 until the gender work is completed to determine the true Marker.

Management Response

This will rely on the assessment of the Gender Specialist that is to be completed this quarter 1 of 2019

22. Is there a realistic multi-year work plan and budget to ensure outputs are delivered on time and within allotted resources? (select from options 1-3 that best reflects this project)

- 3: The project has a realistic work plan & budget covering the duration of the project at the activity level to ensure outputs are delivered on time and within the allotted resources.
- 2: *The project has a work plan & budget covering the duration of the project at the output level.*
- 1: The project does not yet have a work plan & budget covering the duration of the project.

Evidence

Refer to page 65 of the ProDoc

Sustainability & National Ownership

Quality Rating: Satisfactory

23. Have national partners led, or proactively engaged in, the design of the project?

- 3: National partners have full ownership of the project and led the process of the development of the project jointly with UNDP.
- 2: *The project has been developed by UNDP in close consultation with national partners.*
- 1: The project has been developed by UNDP with limited or no engagement with national partners.
- Not Applicable

Evidence

The Project Document development has been done in closed collaboration with the focal points in Niue PMCU and MOI units. All the data and information used were from the Niue Government counterparts.

24. Are key institutions and systems identified, and is there a strategy for strengthening specific/comprehensive capacities based on capacity assessments conducted? (select from options 0-4 that best reflects this project):

- 3: The project has a comprehensive strategy for strengthening specific capacities of national institutions based on a systematic and detailed capacity assessment that has been completed. This strategy includes an approach to regularly monitor national capacities using clear indicators and rigorous methods of data collection, and adjust the strategy to strengthen national capacities accordingly.

- 2.5: A capacity assessment has been completed. The project document has identified activities that will be undertaken to strengthen capacity of national institutions, but these activities are not part of a comprehensive strategy to monitor and strengthen national capacities.
- 2: *A capacity assessment is planned after the start of the project. There are plans to develop a strategy to strengthen specific capacities of national institutions based on the results of the capacity assessment.*
- 1.5: There is mention in the project document of capacities of national institutions to be strengthened through the project, but no capacity assessments or specific strategy development are planned.
- 1: Capacity assessments have not been carried out and are not foreseen. There is no strategy for strengthening specific capacities of national institutions.
- Not Applicable

Evidence

Under Componen 1- Activity 1.3.3, it highlights the need for a capacity assessment of relevant GoN personnel to determine the needs and gaps to fill in the area of energy planning and management of Tech applications.

25. Is there is a clear strategy embedded in the project specifying how the project will use national systems (i.e., procurement, monitoring, evaluations, etc.,) to the extent possible?

- Yes
- No
- Not Applicable*

Evidence

The project implementation will be based on National Implementation Modality therefore all national processes of the Government of Niue are to be applied unless additional service is required of UNDO through Procurement, which can be done under the LoA.

26. Is there a clear transition arrangement/ phase-out plan developed with key stakeholders in order to sustain or scale up results (including resource mobilisation strategy)?

- Yes
- No

Evidence

The AREAN project includes activities that will deliver Output 4.1.3: completed design and implementation plans for the replication and/or scale up of demonstrated EE sustainable energy and LC energy projects; and Output 4.1.4 Fully evaluated portfolio of follow-up sustainable energy and LC technology (EE and RE) application projects in other villages

Quality Assurance Summary/PAC Comments

Overall, the current draft of the ProDoc includes most of the required major items that have to be complied with in UNDP-GEF project design and documentation. Nonetheless, it lacks specific items that relate to gender equity. This is expected to be rectified with adjustments that have to be made (where relevant) based on the results of the ongoing Gender Analysis (including Action Plan) work in Niue. The Stakeholder Consultation Plan will also be developed as part of this work. The project does not have yet a detailed procurement plan but this is confirmed to be completed before submission of the ProDoc to GEF. The Project's ESMP will also be completed during Year 1 of the project implementation.

Annex H. UNDP Risk Log

OFFLINE RISK LOG

Project Title: Accelerating Renewable Energy and Energy Efficiency Applications in Niue (AREAN)	Project ID: 00117508	Date: 7 Feb 2019
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#	Description	Date Identified	Type	Impact & Probability	Countermeasures / Management Response	Owner	Submitted /updated by	Last Update	Status
1	The project activities may not be fully implemented due to inadequate local capacity	March 2017	Technical, Operational	P = 2 I = 4	<p>Prevention: GoN will set up a capable project team comprised of competent local and international experts to expand the capacity of the local community people in the implementation of the relevant project activities. The proposed project will be coordinated closely with other relevant projects in the country mainly to make use of potential synergies in the management of the project implementation. This is in addition to the support from UNDP-Samoa MCO that GoN can request.</p> <p>Alleviation: UNDP-Samoa MCO, with the agreement of the implementing partner will manage and expedite the procurement process for external personnel that will work on the project activities. Potential modification of activities to allow for expeditious implementation will be done.</p>	PMU, DoU, PMCU	Project Development Team	June 2018	No Change
2	The pre-identified and other anticipated co-financing for specific activities of the project may not be available on a timely manner	March 2017	Financial	P = 1 I = 4	<p>Prevention: GoN assurance of co-funding shall be confirmed and secured prior to project launching. The project team will closely monitor and ensure the timely availability of co-financing from project partners and co-financers during project implementation.</p> <p>Alleviation: Reallocation of budget to support the implementation of activities that will be affected by</p>	PMU, PMCU	Project Development Team	June 2018	Reducing

#	Description	Date Identified	Type	Impact & Probability	Countermeasures / Management Response	Owner	Submitted /updated by	Last Update	Status
					the delays in the availability of co-financing. In case co-financing will not happen, potential modifications of activities can be done to allow delivery of alternative outputs that are still contributing to the achievement of the relevant outcomes. Together with the NPD conduct follow-up meetings with co-financer, or alternatively find and negotiate with other potential co-financers.				
3	The follow-up/through work needed to sustain the achieved outcomes, and this may not happen	March 2017	Operational, Financial	P = 3 I = 2	<p>Prevention: As part of the project activities, the development of a sustainable follow-up plan will ensure that follow-through from the key stakeholders (e.g., GoN) will happen by involving them in the planning process itself and getting their commitments when signing off on the plan implementation. The sustenance of the outcomes that are realized during of project implementation will form part of the follow-up plan.</p> <p>Alleviation: Agreement and regular follow up with the project partners involved in the implementation of completed activities in the sustained application of the systems/frameworks that will be established and operationalized by the project.</p>	PMCU, DoU-MoI	Project Development Team	June 2018	No Change
4	RE-based energy generation (power and non-power purposes) installations can be seriously affected by adverse climate-related events	March 2017	Environmental	P = 2 I = 4	<p>Prevention: It is already common in international design and engineering practices, as well as in the construction/installation of RE-based energy generation units to follow proper engineering and construction design and construction that ensure not only structural integrity but also climate resilience. This applies also in the procurement, design/engineering, installation and operation of the pertinent installations.</p>	DoU, NPC, PMU, PMCU	Project Development Team	June 2018	No Change

#	Description	Date Identified	Type	Impact & Probability	Countermeasures / Management Response	Owner	Submitted /updated by	Last Update	Status
					Alleviation: Depending on the extent of the impacts of the adverse climate-related events, appropriate modifications in the installations (and budget) will be done. Potential reduction in the number of installations, or replacement with alternative demos will be done while considering the need to ensure the resulting interventions are still contributing to the realization of the project outcomes.				
5	Villages may not support the project implementation	March 2017	Operational, Organizational	P = 1 I = 3	Prevention: The coordination of the project implementation with the project partners will be the main responsibility of DoU-MoI and is expected to be supported by other departments of MoI. MoI good standing and rapport will be put to good use to actively promote the implementation of this project and ensure the support of the villages. Alleviation: In the first place, select villages that are willing to support the project. In case selected villages will withdraw support during the project implementation, the demos will be redesigned for implementation within and in the fringes of the national capital.	DoU-MoI PMCU	Project Development Team	June 2018	Reducing
6	The recommended policies and regulations of the project by the pertinent GoN agencies may be delayed in approval and enforcement	March 2017	Political, Regulatory	P = 1 I = 3	Prevention: Advocacy campaigns will be included in the project to gain adequate support from the regulatory bodies on the adoption of the recommended policies and regulations. UNDP will assist if necessary. Alleviation: PB meetings and special meetings with the pertinent GoN agencies will be conducted to discuss and determine what it will take for the agencies to expedite the approval and enforcement of the recommended policies and IRRs and come up with the appropriate actions to resolve the	PMU, PMCU	Project Development Team	June 2018	No Change

#	Description	Date Identified	Type	Impact & Probability	Countermeasures / Management Response	Owner	Submitted /updated by	Last Update	Status
					issues/problems. Thereafter implement the action points accordingly.				
7	Change in national government administration may potentially reduce government support to the project	March 2017	Political	P = 1 I = 2	<p>Prevention: DoU-Mol and other GoN departments involved in the project will monitor political dynamics and will try to resolve any misunderstanding within the project. If warranted, UNDP executive management intervention may be required.</p> <p>Alleviation: PB meetings and special meetings with the implementing partner and GEF OFP will be conducted to discuss courses of actions to take to sustain GoN's support to the project and carry out such plans accordingly.</p>	DoU-Mol PMCU	Project Development Team	June 2018	No Change
8	Further reduction in petroleum fuel prices will reduce interest in RE-based power generation	March 2017	Strategic	P = 1 I = 3	<p>Prevention: While the project has no control on the petroleum fuel prices, the project's awareness raising interventions are expected to sustain the overall interest of the country in transforming their power generation system to RE-based systems even when the petroleum fuel prices are relatively low.</p> <p>Alleviation: Although the petroleum fuel prices are currently in on an uptrend, which is good for RE promotion and application, in case prices go down, the project will emphasize the need to take advantage of the energy, environment and economic benefits of RE, and the country's obligation towards the realization of its CCM targets in its NDC to ensure that the interest of GoN in low carbon development is sustained.</p>	DoU, NPC, NBF, PMCU	Project Development Team	June 2018	No Change

Annex I: Results of the Capacity Assessment

Summary of the Objective and Risk Rating Profile for Niue Ministry of Infrastructure

HACT Micro Assessment of Niue Ministry of Infrastructure

Submitted as a separate file.

Annex J. Additional Agreements



GOVERNMENT OF NIUE
OFFICE OF THE SECRETARY TO GOVERNMENT
P O Box 40, Alofi, NIUE | Phone: +683 4228
Email: Niue.Secgov@mail.gov.nu

30th April 2019

UNDP Resident Representative
UNDP Multi-Country Office for Cook Islands, Niue, Samoa & Tokelau
One UN House, Tuanaimato
Samoa

The UNDP GEF Executive Coordinator
304 E 45th St
9th Floor, New York, NY 10017
United States of America

Dear Sirs;

LETTER OF SUPPORT FOR CO-FINANCING GEF 6 "ACCELERATING RENEWABLE ENERGY AND ENERGY EFFICIENCY APPLICATION IN NIUE" PROJECT.

We are pleased to confirm our support for the proposed GEF 6 project "Accelerating renewable energy and energy efficiency application in Niue (AREAN)". This co-financing will be in the form of **cash USD\$15,706,000** and **USD\$1,900,000 in-kind** contribution for the total value of **USD\$17,606,000** for the implementation of specific activities on setting up policies, institutional arrangements, capacity building, implementation of additional solar photovoltaic power generation and distributions systems and demonstration of cost effective application of renewable energy (RE) and energy efficiency (EE) technologies, all of which are meant to facilitate the achievement of the RE and EE targets set in the country's strategic energy road map (NiSERM). This also includes in kind contribution from the Project Management and Coordination Unit and the Ministry of Infrastructure in the form of staff time and office space for the duration of the project.

The Government of Niue's support to the AREAN Project is described in detail in the AREAN Project Document and associated budget. We assume that all of its direct costs associated with delivering the outputs described in the Project Document as co-financing for the AREAN Project.

Yours faithfully,

Peleni Talagi
Acting Secretary of Government



5th February 2019

Dr. Naoko Ishii
Chief Executive Officer and Chairperson
Global Environment Facility
1818 H Street, NW, MSN G6-602
USD, Washington D

Dear Dr Ishii,

Subject: Co-financing letter for the GEF Project "Accelerating Renewable Energy and Energy Efficiency Applications in Niue (AREAN)"

UNDP is pleased to confirm USD \$100,000.00 as cash co-financing to support the "Accelerating Renewable Energy and Energy Efficiency in Niue (AREAN)" project to meet its GEF project objective which is to enable the achievement of low carbon energy access, sustainable energy and green growth targets of Niue in accordance to its NDC and national strategic plans

The committed co-financing will complement the co-financing from the Government of Niue. UNDP is fully committed to work with Government of Niue for the successful implementation of the AREAN project.

Yours sincerely,

A handwritten signature in blue ink, appearing to read 'Pauli Moana Luamanuvae', is positioned above the typed name.

Pauli Moana Luamanuvae
UNDP Officer in Charge

For Multi- Country Office for Samoa, Cook Islands, Niue & Tokelau

Annex K: Energy Scenarios

K.1 Status Quo of the Energy Sector in Niue

Niue satisfies over 99% of its energy needs with imported fossil fuels and only generates locally less than 1% of its energy (solar energy and biomass). Table K.1 below summarizes the breakdown of the primary energy supply by energy source and fuel type over the period 2009-2017. Kerosene used for air transport is treated as both an energy import and export, since it is basically employed for international flights to and from New Zealand.

This large dependence on imported energy not only impacts significantly on the country's expenditures, imported fuels accounted for 15.3% of GDP in 2011 (NiSERM), but also exposes Niue to severe risks of energy disruption if the monthly shipment is delayed due to adverse weather conditions, especially during the cyclone season (November through April). Niue receives fossil fuels supplies via ship from New Zealand every 28 days. Currently, the country has 14 days of fuel supply security (defined as the number of days the following shipment can be delayed before Niue runs out of fuel reserves).

Table K.1: Niue Primary Energy Supply by Energy Source (NiSERM)

Primary Energy Supply (GJ)	2009	2010	2011	2012	2013	2014	2015	2016	2017
Local Generation*									
Solar PV Electricity	0	241	247	232	240	240	240	240	240
Solar Thermal (hot water systems)	16	16	16	16	16	16	16	16	16
Biomass**	532	532	532	532	532	532	532	532	532
Total Local Energy Generation	548	789	795	780	788	788	788	788	788
Imported Energy									
ADO (power generation)	29,523	28,074	31,879	33,674	36,460	36,502	37,125	37,496	38,452
ADO (land transport)	12,671	11,075	11,221	11,023	10,391	9,757	9,710	9,322	9,042
ADO (other uses***)	3,474	3,034	3,072	3,019	2,845	2,677	2,613	2,587	2,613
Petrol	20,193	19,478	23,069	25,071	27,525	30,050	31,350	32,500	35,000
Kerosene (aviation)	19,220	15,072	16,156	15,915	21,211	22,001	25,870	27,954	31,193
Kerosene (other uses)	56	48	61	121	22	69	42	11	24
LPG	1,328	1,183	1,299	1,415	1,551	1,628	1,597	1,707	2,049
Total Imported Energy	86,465	77,964	86,757	90,238	100,005	102,684	108,307	111,577	118,373
Total Primary Energy (GJ)	87,013	78,753	87,552	91,018	100,793	103,472	109,095	112,365	119,161

*: 2016-2017 values are estimates

** : Biomass is used for residential cooking

***: Water transport is bundled with other uses

K.2.1 Land Transport Sector⁴⁴

The energy consumption in the land transport sector, as shown in Table K.2, has been increasing yr./yr. at a nearly constant pace, except for a couple of years, of ~5% over the period 2011-2017. Specifically,

⁴⁴ In this section air transport is excluded, because as stated above, kerosene for air transport is treated as both an energy import and export; therefore, it has a nil net impact. Water export is also excluded, because 99% of energy consumption in the energy transport sector (excluding air) is for land, and only 1% energy use is for water transport (data that the NiSERM includes in "ADO – other uses"), sector for which no activities are planned by the GoN.

demand for Automotive Diesel Oil (ADO) has been declining, but this reduction has been more than compensated by a larger increase in petrol consumption.

At the time of preparation of the Niue Strategic Energy Road Map (NiSERM) for 2015-2025 a yearly ADO decline of 3.0% and a yearly petrol increase of 6.0% had been forecasted until 2018. If these forecasted trends will continue throughout 2025, one can project the trends for land transport sector energy demand under a Business-as-Usual (BAU) scenario. Tables K.3 and K.4 summarize such forecasts in terms of energy content (in GJ) and fuel volumes (expressed in 10³ liters), respectively.

Table K.2: Land Transport Sector (NiSERM)

Land Transport Fuels (GJ)	2009	2010	2011	2012	2013	2014	2015	2016	2017
ADO (land transport)	12,671	11,075	11,221	11,023	10,391	9,757	9,710	9,322	9,042
Petrol	20,193	19,478	23,069	25,071	27,525	30,050	31,350	32,500	35,000
Total Land Transport (GJ)	32,864	30,553	34,290	36,094	37,916	39,807	41,060	41,822	44,042
yr./yr. change (%)		(-7.0)	12.2	5.3	5.0	5.0	3.1	1.9	5.3

Table K.3: Land Transport Sector Forecasts (GJ) - BAU

Land Transport Fuels (GJ)	2018	2019	2020	2021	2022	2023	2024	2025
ADO (land transport)	8,771	8,508	8,252	8,005	7,765	7,532	7,306	7,087
Petrol	36,988	39,207	41,560	44,053	46,697	49,498	52,468	55,616
Total Land Transport (GJ)	45,759	47,715	49,812	52,058	54,461	57,030	59,774	62,703

Table K.4: Land Transport Sector Forecasts (10³ L) - BAU

Land Transport Fuels (10 ³ L)	2018	2019	2020	2021	2022	2023	2024	2025
ADO (land transport)	243	236	229	222	215	209	202	196
Petrol	1,154	1,224	1,297	1,375	1,457	1,545	1,637	1,736

In 2014, a census on motor vehicles owned in Niue indicated that a total of approximately 1785 motor vehicles were registered, with the following breakdown: a) 31% cars; b) 24% vans; c) 23% light trucks; and d) 21% motor vehicles and scooters. GoN has set a goal for 2020 to have approximately 1% high fuel-efficient vehicles, which might comprise fully electric vehicles (EVs), hybrid cars, or new fuel-efficient vehicles with an engine of less than 1,300 cc.

The government has already started to incentivize this switch by waiving the import duties on such fuel-efficient vehicles. Presently, there are three second hand electric vehicles privately owned, while GoN owns an Electric Light Fun (ELF) vehicles, a small sized PV powered EV used primarily for demonstration purposes, which was donated by IUCN (International Union for Conservation of Nature). Currently, the government has budgeted the purchase of 8 additional new EVs. In Section K.4 below the potential for further penetration of high fuel-efficient vehicles until 2025 will be explored, together with its implication in terms of a switch in energy source used, from fossil fuels to electricity, which will inevitably impact on electricity consumption and the 80% target of electricity generated with renewable sources.

Electricity Sector

The only two types of power generation technologies currently utilized by the local utility, NPC (Niue Power Corporation), are diesel generators and solar PV panels. The country owns four diesel GenSets

for a combined power generation capacity of 2,084 kW. One of them is used to provide the base load throughout the day, a second GenSet is in stand-by and provides peak loads, which generally occur in the evening from 8:00 pm to 9:00 pm (in 2014 peak demand reached 590 kWh), a third generator is kept as a back-up, and it kicks-in in case of malfunction of one of the other two GenSets. The fourth generator is usually rotated for maintenance.

In the period 2009-2016, Niue has also introduced several solar PV installations for a combined power generation capacity of 343 kWp, initially equipped with 200 kWh of lithium-ion battery capacity. Although the share of intermittent solar PV power generation was relatively low, also supported by batteries for electricity storage, the national grid has soon displayed severe issues of grid instability, which has been analyzed by DNV Kema in their 2012 report. However, the grid stability issues are yet to be solved and the provisional solution has been to disconnect most of the solar PV panels from the national grid. Early 2018, NPC has installed an additional 200 kWp of solar PV panels, donated by Japan as reparation for some faulty panels previously acquired from Mitsubishi with installation costs supported by the government of New Zealand.

Presently, NPC is planning on reconnecting all the PV installation to the grid, although the basic instability issues will be only faced and resolved as part of the proposed project. The battery bank has been decommissioned, but not disposed of yet. The problems of grid instability have significantly contributed to instill in most people distrust towards this technology and has since hampered the development of PV installations in the private sector, which only accounts for few small sized installations (2-5 kWp), all off-grid.

The breakdown in terms of billed electricity demand in 2014 is the following: a) commercial sector 43%; b) residential sector 37%; and c) governmental sector 20%. Unbilled electricity refers to public services, such as streetlights and water pumping. Niue, until recently, also had issues with unpaid bills, which amounted to NZ\$ 0.50M (~US\$ 0.35M) in 2014, blamed by insolvent customers on faulty meters that allegedly gave wrong readings. GoN is solving this problem through the installation of prepaid meters, which is scheduled to be completed late 2018/early 2019.

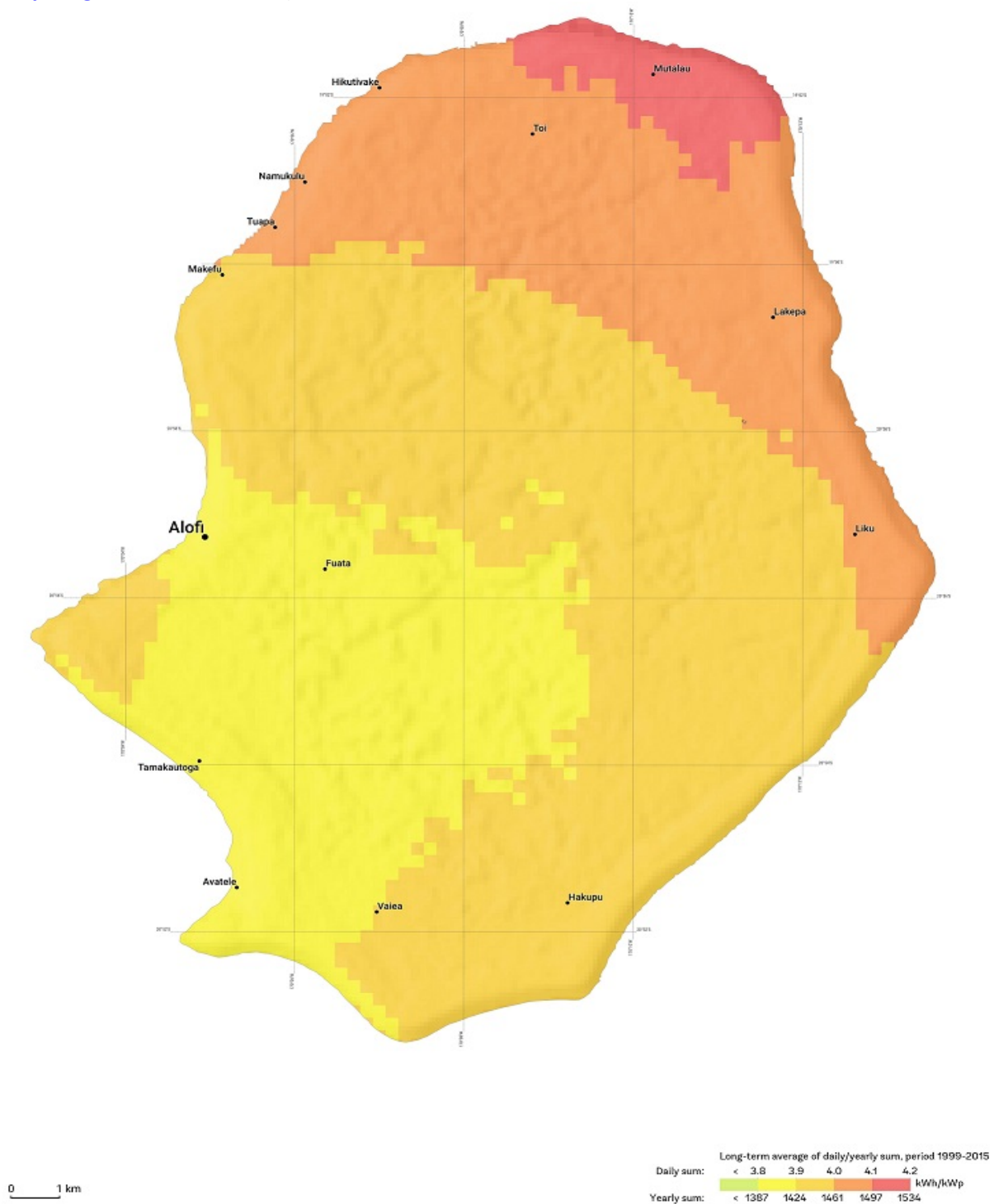
As shown in Table K.5, since the first solar PV installations in 2010, this technology has always contributed only ~2.0% to the total electricity needs, with the balance provided with the diesel GenSets.

Table K.5: Power Generation Sector (NiSERM)

Power Generation (GWh)	2009	2010	2011	2012	2013	2014	2015	2016	2017
Power from Diesel GenSets	3.138	3.081	3.201	3.265	3.285	3.160	3.324	3.357	3.443
Power from Solar PV	0	0.067	0.069	0.064	0.067	0.067	0.067	0.067	0.067
Total Power Generation (GWh)	3.138	3.148	3.270	3.329	3.352	3.227	3.391	3.424	3.510

Figure K.1 below shows that the annual potential photovoltaic production for Niue, averaged over the period 1999-2015, is in the 1390-1530 kWh/kWp range (World Bank).

Figure K.1: Niue Long-Term Daily & Annual Average Photovoltaic Production (World Bank - <https://globalsolaratlas.info>)



Let's consider an optimal location at the high end of the range capable of achieving an annual electricity generation of 1500 kWh/kWp. In addition, let's take into consideration that there will be some downtime due to maintenance and repair, and that the actual yearly power generation is 1400 kWh/kWp. If all the 543 kWp presently installed would be grid connected the potential contribution of solar PV electricity generation to Niue's demand would be the following:

$$543 \text{ kWp} \cdot 1400 \text{ kWh/kWp/year} = 760,200 \text{ kWh/year}$$

This would represent approximately 22% of the total electricity that was generated in 2017. Niue does not have annual growth estimates, but it has forecasted electricity demand growth over multi-year periods. The expected demand growth is 33% over the period 2009-2020, and 75% over the period 2009-2025. Table K.6 shows the yearly growth forecasts, under a BAU scenario (the PV installations are still considered largely off-grid until the instability issues have been properly resolved) distributing the expected demand growth over the time period of reference (the yr./yr. growth assumption is also shown in Table K.6).

Table K.6: Power Generation Sector Forecasts - BAU

Power Generation (GWh)	2018	2019	2020	2021	2022	2023	2024	2025
Power from Diesel GenSets	3.632	3.832	4.043	4.288	4.548	4.823	5.116	5.426
Power from Solar PV	0.067	0.067	0.067	0.067	0.067	0.067	0.067	0.067
Total Power Generation (GWh)	3.699	3.899	4.110	4.355	4.615	4.890	5.183	5.493
yr./yr. change (%)	5.4	5.4	5.4	6.0	6.0	6.0	6.0	6.0

Home cooking using LPG (to replace electric stove cooking) is also considered, since Niue has a proposed target to increase the use of LPG (Niue uses a blend of Propane/Butane in 60/40 proportion based on volume) for domestic cooking under the “LPG Rehabilitation Programme”. Therefore, the current and forecasted use of LPG, will contribute to the decline in electricity demand. Over the past decade, Niue has shifted back and forth between these two energy sources. Table K.7 shows the LPG consumption for domestic cooking.

Table K.7: LPG Consumption for Domestic Cooking (NiSERM)

	2009	2010	2011	2012	2013	2014	2015	2016	2017
LPG for Domestic Cooking (GJ)	918.0	818.2	898.1	978.1	924.1	891.3	852.0	852.0	852.0

K.3: Estimated Primary Energy Supply and GHG Emissions – Business-As-Usual Scenario

The annual growth in primary energy supply is based on forecasts on energy demand made by GoN and its relevant ministries and departments. Business-As-Usual scenario is defined as expected growth due to continued changes in population, living habits and commercial activities if none of the energy targets set by GoN is pursued and achieved. This latter scenario will be described in Section K.4 and it is labeled as Alternative Scenario.

For all those energy sources for which no estimates have been made or for which there is no expectation of growth or decline under a BAU scenario, constant values compared to 2017 or alternatively the latest year in which energy supply was measured. The following assumptions have been made:

1. Power Generation: the INDC presented at the 2015 Paris UNFCCC meeting, Niue forecasts an increase in electricity generation of 33% over the period 2009-2020, and 75% over the period 2009-2025. Since most of the activities planned in the 2015-2025 NiSERM have not started yet, in the estimates below, more focus has been posed on the longer-term expectations.
2. Automotive Diesel Oil: this fuel is used for three main purposes, namely: a) power generation; b) land transport; and c) other uses. NiSERM has estimates for the period 2015-2018 of 2.0% growth, 3.0% decline, and 0% change for the three sectors, respectively. These percentage changes have been used as basis also for the annual estimates until 2025.

3. Petrol: similarly, to ADO, the NiSERM also provides 2015-2018 growth estimates of 6% increase for the use of petrol for land transport, growth expectations that have been used as basis also for the estimates until 2025.
4. LPG: this energy source has a dual use in Niue, for domestic and for commercial use. The largest changes have been recorded in the latter, due to increasing commercial activities connected to the flourishing touristic sector. NiSERM forecasted an 8.0% annual increase over the 2015-2018 period. Since the major changes in domestic uses will be related to the adoption of more LPG stoves (considered under the Alternative Scenario), it is assumed that the expected growth in LPG use will be entirely absorbed by the commercial sector, and once again have extended these estimates until 2025.

Table K.8 below reports our estimates in primary energy supply by energy source until 2025 under the BAU scenario. As mentioned earlier, since jet fuel is treated both as an import and an export, it will not be included in this table.

For the same BAU scenario, the estimated GHG emissions that Niue is releasing into the atmosphere when burning its fossil fuels is estimated. The mass of CO₂ released by each fuel type has been taken from the USA government website: www.eia.gov. The results, which will be used as basis for comparison with the Alternative scenario to determine the GHG emission reductions due to the AREAN project, are reported in Table K.9. Emissions from the agricultural sector in terms of soil release of GHGs (i.e., CH₄ and N₂O are not included in the estimates).

Table K.8: Niue Estimated Primary Energy Supply by Energy Source (GJ) – BAU

Primary Energy Supply (GJ)	2018	2019	2020	2021	2022	2023	2024	2025
Local Generation								
Solar PV Electricity	240	240	240	240	240	240	240	240
Solar Thermal (hot water systems)	16	16	16	16	16	16	16	16
Biomass	532	532	532	532	532	532	532	532
Total Local Energy Generation	788	788	788	788	788	788	788	788
Imported Energy								
ADO (power generation)	40,567	42,798	45,152	47,889	50,791	53,869	57,133	60,595
ADO (land transport)	8,771	8,508	8,252	8,005	7,765	7,532	7,306	7,087
ADO (other uses)	2,639	2,665	2,692	2,719	2,746	2,773	2,801	2,829
Petrol	36,988	39,207	41,560	44,053	46,697	49,498	52,468	55,616
Kerosene (other uses)	24	24	24	24	24	24	24	24
LPG (domestic use)	852	852	852	852	852	852	852	852
LPG (commercial use)	1,210	1,223	1,236	1,249	1,263	1,277	1,291	1,305
Total Imported Energy	91,051	95,277	99,768	104,791	110,137	115,825	121,875	128,308
Total Primary Energy (GJ)	91,839	96,065	100,556	105,579	110,925	116,613	122,663	129,096
yr./yr. change (%)		4.6%	4.79%	5.0%	5.1%	5.1%	5.2%	5.2%

Table K.9: Niue Estimated GHG Emissions (tCO₂) – BAU

GHG Emissions (tCO ₂)	2018	2019	2020	2021	2022	2023	2024	2025
Local Energy Sources								
Solar PV Electricity	0	0	0	0	0	0	0	0
Solar Thermal (hot water systems)	0	0	0	0	0	0	0	0
Biomass	49	49	49	49	49	49	49	49
Total Energy Sources Emissions	49	49	49	49	49	49	49	49
Imported Energy Sources								
ADO (power generation)	2,813	2,968	3,131	3,321	3,522	3,735	3,962	4,202
ADO (land transport)	608	590	572	555	538	522	507	491
ADO (other uses)	183	185	187	189	190	192	194	196
Petrol	2,500	2,650	2,809	2,977	3,156	3,345	3,546	3,759
Kerosene (other uses)	2	2	2	2	2	2	2	2
LPG (domestic use)	52	52	52	52	52	52	52	52
LPG (commercial use)	73	74	75	76	77	78	78	79
Total Imported Energy Emissions	6,231	6,520	6,827	7,171	7,537	7,926	8,340	8,781
Total GHG Emissions (tCO₂)	6,280	6,569	6,876	7,220	7,586	7,975	8,389	8,830
yr./yr. change (%)		4.6%	4.79%	5.0%	5.1%	5.1%	5.2%	5.2%

K.4: Energy Growth, GHG Emissions and GHG Emissions Reductions - Alternative Scenario (All Targets Achieved)

GoN has set several goals for the energy sector in general as well as the electricity sub-sector. These targets are summarized in Table K.10. The values and years used for both targets and baseline are taken from the NiSERM. Since GoN is significantly behind schedule for the implementation of the initiatives promoted in the NiSERM for the Energy Efficiency target (or decline in electricity demand) more emphasis has been put on achieving the longer-term target (15% electricity demand reduction by 2025) rather than the shorter-term target (10% electricity demand reduction by 2020).

Table K.10: GoN Energy and Power Sector Targets (NiSERM and updates from GoN)

Target	Target Year	Baseline
Generate 80% of electricity with renewable sources	2025	2% in 2014
Reduce electricity demand by 10%	2020	BAU
Reduce electricity demand by 15%	2025	BAU
Reduce power station losses to 4.5%	2020	5.2% in 2011
Reduce power station losses to 4.0%	2025	5.2% in 2011
Increase the power generation efficiency of the diesel GenSets to 4.0 kWh/L	2020	3.77 kWh/L (2014)
Introduce 1.0% of fuel-efficient vehicles	2020	0% in 2014
90% of households use LPG for cooking	2025	34% in 2014
Keep the average forced outage below the regional average of 5.4%*	2020	
Keep SAIDI < 200 min/customer, the regional average goal*	2020	

*: Baseline values for these two targets have not been measured

To estimate the changes in energy supply under the Alternative Scenario, additional information was obtained from developing partners and GoN officials, and several assumptions have been made, which are here summarized:

1. To reach the target of 80% electricity generated from RE sources, NZHC has committed in 2017 a first tranche of NZ\$ 5.0 million (~US\$ 3.5 million), which includes the installation of 600 kWp of solar PV panels. In addition, 3.1 MWh of batteries will also be acquired.

Early in 2018, NZ has also pledged a second tranche of approximately the same amount to help Niue achieve its target. The exact total capacity that will be installed during this phase has not been determined yet and it will also depend on the battery capacity that will be procured (the objective is to add 5.0 MWh of storage capacity). It is estimated that this should bring Niue to achieving approximately 55% RE electricity production by 2025 (provided that all other goals are achieved).

NZHC has commented that in case this financial effort is not enough to achieve Niue's goal, they are willing to provide further financial support. It is estimated that an additional 750 kWp of solar PV panels will have to be installed by 2025 in order to meet 80% of electricity demand with RE. These additional solar PV panels are distributed into five 150 kWp installations over the period 2021-2025. The total installation can be distributed differently, if the total stays at 750 kWp, a portion of which will be covered by the rooftop PV systems from the demo described in Annex L (Section L.2.3). The estimates take into consideration the expected electricity demand growth, all energy targets achieved, and all projects and demos described below completed; changes in station and transmission losses have also been considered.

2. Niue has set two Energy Efficiency (EE) targets through electricity demand reduction: a) 10% reduction by 2020; and b) 15% reduction by 2025. These estimates focused on the longer-term target, since the initiatives in this area have not been very aggressively pursued. The reduction of electricity demand will be achieved through the establishment of financing schemes for the adoption of efficient lighting and household appliances, as well as reduction in energy consumption in government and commercial building. Furthermore, Niue is completing a switch to net metering, which has usually the dual purpose of guaranteeing that there will be no unpaid bills and it also causes a better electricity consumption management.
3. DNV KEMA, during their grid instability analysis, among other data have measured station losses of 5.19% at NPC powerhouse, which are deemed too high and should be reduced to 4.5% by 2020 and 4.0% by 2025. In addition, the power generation efficiency of the diesel GenSets has declined from 4.29 kWh/L in 2009 to 3.77 kWh/L in 2014. Since Niue uses among the best diesel quality available in the Pacific region and the diesel GenSets are regularly maintained and in good conditions (one was replaced in 2010), these two improvements can be achieved with better control and dispatch of the electricity load throughout the day.
4. The adoption of 1% fuel efficient vehicles by 2020 comprise Electric Vehicles (EVs), hybrid cars and new cars with engines smaller than 1,300 cc. Our estimate has been the most conservative in terms of electricity demand growth, which is assuming that the 1% of fuel efficient is all EVs. Currently in Niue there are already 3 EVs and other 8 have been budgeted by the government. Furthermore, it is assumed that the adoption of EVs continues past 2020 and set at 5% EVs the target for 2025.
5. The installation of solar PV powered LED streetlights as well as solar water pumps, as designed in two of the proposed demo projects described below will also impact the demand of electricity, and they have been included in the estimates. Although both the lampposts and the water pumps will be grid-connected to guarantee their functioning even in the event of extended bad weather, most of the electricity consumed will be generated by the integrated solar PV panels.
6. Lastly, the gradual switch from electricity to LPG for domestic cooking has also been incorporated in our estimates. The target set by 2025 is 90% of households using LPG for domestic cooking with the remaining 10% coming from traditional biomass.

The assumptions made to determine the power generation forecasts under the alternative scenario in Table K.11 are: a) 80% power generated from RE sources; b) 5% EVs penetration; c) 90% LPG stoves

for domestic uses; d) 4.0% power station losses; e) new transformers reduce by 65% the core losses of distribution (NiSERM states the core losses are 48.3% of the distribution losses, which account for 4.7%); f) implementation of a solar water pump demo project; g) implementation of the solar powered LED streetlights demo project; and h) 15% EE through electricity demand reduction.

Table K.11: Power Generation Sector Forecasts (GWh) – Alternative Scenario

Power Generation (GWh)	2018	2019	2020	2021	2022	2023	2024	2025
Power from Diesel GenSets	3.632	2.167	1.389	1.120	1.036	0.949	0.876	0.807
Power from Solar PV	0.067	1.600	2.440	2.650	2.860	3.070	3.280	3.490
Total Power Generation (GWh)	3.699	3.768	3.829	3.771	3.896	4.020	4.156	4.298
Solar PV (%)	1.8	42	64	70	73	76	79	81
Solar PV Installed & Connected (kWp)		1,143	1,743	1,893	2,043	2,193	2,343	2,493

Table K.12 uses the same power generation estimates to calculate the liters of diesel that will be used annually. In addition to all the assumptions used for Table K.11, in Table K.12 it is also assumed that the target to bring back up the electricity generation efficiency of 4.0 kWh/L of diesel is achieved. The stiff decline, especially for the first two years, is due to the installation of solar PV systems, which will replace a large portion of diesel consumption in the power generation sector.

Table K.12: DFO to Meet the Power Generation Sector Forecasts (L) – Alternative Scenario

	2018	2019	2020	2021	2022	2023	2024	2025
DFO for Power Gen. – Alt. Scen. (L)	1,124,071	541,838	347,208	280,093	258,965	237,365	218,906	201,861

Over the years Niue has switched back and forth between electric stoves and LPG stoves. At the end of 2010, 314 gas stoves were distributed through an EDF-9 project, and in 2011 about 2/3 of domestic stoves were LPG. In 2012, half of the LPG users for domestic cooking decided to switch back to electric stove, which at that point represented nearly 60% of all domestic stoves. GoN has set a target to switch back all electric stoves to LPG by 2025, a decision supported by the decline in LPG prices. The remaining 10%, as shown in Table K.13, will continue to use traditional cooking fuels, such as biomass and wood.

Table K.13: Number of Households per Energy Source Forecasts – Alternative Scenario

# of Stoves	2011	2012	2018	2019	2020	2021	2022	2023	2024	2025
LPG Stoves	320	160	163	219	276	308	340	372	404	437
Electric Stoves	116	276	281	224	167	135	103	71	39	0
Other (i.e., biomass)	41	41	42	42	42	42	42	42	42	42
Total # of Stoves	477	477	485	485	485	485	485	485	485	485

Table K.14 summarizes the primary energy supply forecasts under the alternative scenario, while Table K.15 shows the GHG emissions for the same scenario. Table K.15 also contains annual and cumulative GHG emission reductions achieved by implementing all the activities described in the AREAN project (i.e., comparing the Alternative Scenario to the BAU Scenario). Since the life expectation of solar PV installations is ~25 years, while cars life expectation is about 15 years, cumulative GHG emissions reductions have been calculated considering EVs to last for 15 years, and PV installations and home cooking to last for 25 years (the latter increases GHG emissions if electricity is obtained from solar PV, therefore represents a conservative estimate). These long-term estimates are summarized in Table K.16.

Table K.14: Niue Estimated Primary Energy Supply by Energy Source (GJ) – Alternative Scenario

Primary Energy Supply (GJ)	2018	2019	2020	2021	2022	2023	2024	2025
Local Generation								
Solar PV Electricity	240	5,761	8,785	9,541	10,297	11,053	11,809	12,565
Solar Thermal (hot water systems)	16	16	16	16	16	16	16	16
Biomass	532	532	532	532	532	532	532	532
Total Local Energy Generation	788	6,309	9,333	10,089	10,845	11,601	12,357	13,113
Imported Energy								
ADO (power generation)	40,567	19,561	12,535	10,112	9,349	8,569	7,903	7,288
ADO (land transport)	8,771	8,465	8,170	7,860	7,561	7,274	6,998	6,733
ADO (other uses)	2,639	2,665	2,692	2,719	2,746	2,773	2,801	2,829
Petrol	36,988	39,207	41,560	44,053	46,697	49,498	52,468	55,616
Kerosene (other uses)	24	24	24	24	24	24	24	24
LPG (domestic use)	852	1,147	1,448	1,615	1,783	1,951	2,118	2,286
LPG (commercial use)	1,210	1,223	1,236	1,249	1,263	1,277	1,291	1,305
Total Imported Energy	91,051	72,293	67,664	67,633	69,423	71,367	73,603	76,080
Total Primary Energy (GJ)	91,839	78,602	76,997	77,721	80,268	82,968	85,960	89,193
yr./yr. change (%)		(-14.4)	(-2.01)	0.9	3.3	3.4	3.6	3.8

Table K.15: Niue Estimated GHG Emissions & Yearly and Cumulative Reductions (tCO₂) – Alternative Scenario

GHG Emissions (tCO ₂)	2018	2019	2020	2021	2022	2023	2024	2025
Local Energy Sources								
Solar PV Electricity	0	0	0	0	0	0	0	0
Solar Thermal (hot water systems)	0	0	0	0	0	0	0	0
Biomass	49	49	49	49	49	49	49	49
Total Energy Sources Emissions	49	49	49	49	49	49	49	49
Imported Energy Sources								
ADO (power generation)	2,813	1,356	869	701	648	594	548	505
ADO (land transport)	608	587	567	545	524	504	485	467
ADO (other uses)	183	185	187	189	190	192	194	196
Petrol	2,500	2,650	8,809	2,977	3,156	3,345	3,546	3,759
Kerosene (other uses)	2	2	2	2	2	2	2	2
LPG (domestic use)	52	70	88	98	108	119	129	139
LPG (commercial use)	73	74	75	76	77	78	78	79
Total Imported Energy Emissions	6,231	4,923	4,595	4,587	4,705	4,833	4,982	5,146
Total GHG Emissions (tCO₂)	6,280	4,973	4,645	4,637	4,754	4,883	5,031	5,196
Yearly GHG Reduction (tCO₂)	0	1,596	2,231	2,583	2,831	3,092	3,358	3,634

Cumulative GHG Reduction ⁴⁵ (tCO ₂)	0	1,596	3,828	6,411	9,242	12,335	15,693	19,327
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Table K.16: Niue Estimated Long-Term Cumulative GHG Emission Reductions (tCO₂) – Alternative Scenario

GHG Emissions (tCO ₂)	2030	2035	2040	2045	2050
Cumulative GHG Reduction (tCO ₂)	37,497	55,667	73,788	90,359	99,633

Table K.17 below shows the potential fossil fuel savings under the alternative scenario. The numbers in red/parenthesis represent savings (both ADO for power generation and land transport), while LPG consumption is expected to increase due to the adoption of LPG stoves for domestic uses. The other fossil fuels are not included since their consumption is the same under the BAU and Alternative Scenario.

Table K.17: Niue Estimated Fossil Fuel Savings - Alternative Scenario

Primary Energy Supply (Lt.)	2019	2020	2021	2022	2023	2024	2025
ADO (power generation)	(643,876)	(903,795)	(1,009,789)	1,127,106)	1,232,362)	1,348,041)	(1,467,792)
ADO (land transport)	(1,179)	(2,281)	(4,015)	(5,629)	(7,129)	(8,520)	(9,809)
LPG (domestic use)	10,628	21,445	27,479	33,513	39,547	45,581	51,615

The total storage capacity that will be acquired with the NZ funds is 8.1 MWh (or 8,100 kWh) and the technology chosen is the lithium-ion PowerWall 2 produced by Tesla. PowerWall 2 provides a 100% Depth of Discharge (DoD), which means the full storage capacity can be used. According to our power generation estimates, in 2025 electricity demand will be ~4.3 GWh for the entire year (Table K.11), or ~12,000 kWh/day. On average 2,400 kWh/day will be generated with the GenSets and 9,600 kWh/day with solar PV panels.

As assumed in Section K.2.2, based on the World Bank Solar Atlas (<https://globalsolaratlas.info>), solar PV panels generate on average power for approximately 4 hours a day. If the distribution of electricity consumption is constant throughout the day (it is higher during the day time, therefore our assumption is conservative), in those 4 hours 2,000 kWh will be used. This means that of the 9,600 kWh generated by the solar PV systems 2,000 are used directly and the difference, 7,600 kWh, is stored in the batteries, whose capacity of 8,100 kWh is therefore enough.

⁴⁵ Includes also the replication activities that the GoN will have to implement in order to achieve all the NiSERM targets.

Annex L: Description of EC&EE and LC Demonstrations

L.1 Investment Type Activities

L.1.1 Enhanced Integrated Solar-Diesel Hybrid Power Generation and Distribution.

This investment activity is aimed at increasing the installed power generation capacity (kW) from solar PV systems to a level that will generate electricity close to the target 80% RE electricity set in the country's NiSERM. The design and engineering of the new systems to be added in the existing power grid will be carried out, including the preparation of the implementation plan for the installation of the additional solar PV systems. The new solar PV systems will be integrated into the existing power grid to bring the level of RE-based power generation up to about 55% of the national electricity production. The technical and operational specifications of the expanded system will be established, and the installation scheme will be engineered to meet the target %RE electricity level. The sizing of the required solar PV system will be determined, as well as the accompanying components (e.g., inverters and power conversion equipment, batteries (e.g., Li-ion Powerwall II Tesla batteries) for electricity storage, and new distribution system equipment (i.e., transformers and switchgears) to prevent potential problems (i.e., grid instability) when electricity from the additional installed new solar PV systems are fed into the power grid.

The specific actions that will be carried includes the following: a) installation of new 800 kWp solar PV system; b) installation of purchase of 9 transformers and switchgears (Ring Main Unit – RMU); c) capacity building for NPC personnel; d) installation of 750 kWp of inverters and power conversion equipment; e) installation of 3.15 MWh Li-ion Powerwall II Tesla batteries for electricity storage; and f) interventions towards the stabilization of the electric grid, which involves the installation of new transformers in the power grid and enhanced controls (SCADA) that will ensure the reliability of the expanded system and optimal load dispatch of both the existing and newly installed power generation assets.

Activity 1: Enhanced on Integrated Solar-Diesel Hybrid Power Generation and Distribution.	
Baseline Case: Installation of additional solar PV power generation system without adequate provisions for grid stabilization	Location: Whole Island
LC Technology Application: High energy efficient transformers and switchgears, Enhanced SCADA system for optimal load dispatch	
Activity Description: This activity involves the installation of new solar PV systems to increase the %RE electricity generation in the country up to 55%. The design and engineering of the new additional solar PV power generation systems will be carried out, including the preparation of the installation plans. The technical and operational specifications of the expanded system will be established, and the installation scheme will be engineered to meet the target %RE electricity level. The sizing of the required solar PV system will be determined, as well as the accompanying components (e.g., inverters and power conversion equipment, batteries (e.g., Li-ion Powerwall II Tesla batteries) for electricity storage, and new distribution system equipment (i.e., transformers and switchgears) to prevent potential problems (i.e., grid instability) when electricity from the additional installed new solar PV systems are fed into the power grid. The new distribution system equipment will stabilize and increase the reliability of Niue's power grid, especially after the new solar PV systems will be connected to the grid ⁴⁶ . The installation of new transformer and	

⁴⁶ The equipment provided through the NZ Project will not be enough to stabilize the power grid. Based on a feasibility study previously undertaken, additional transformers, to replace the existing ones, are necessary to stabilize the grid and improve its reliability. The feasibility study indicates that new transformer and switchgear units will be required.

switchgear units in the existing power grid shall be based on an assessment that will determine the exact number, appropriate location and capacity of the units to be installed. It will also involve the installation of improved system control (SCADA) for load dispatch optimization. Capacity building on the safe and proper operation and maintenance of the improved transmission and distribution system and power generation system is also included.					
Expected Results: Niue’s electric grid is stable and reliable to operate up to a level that can accommodate 80% of the power generation provided by intermittent renewable energy sources.					
Economic Feasibility: In addition to cost savings, this activity also provides additional advantages which are not financially quantified, such as: improved stability and reliability of the electric grid; improved safety working condition of NPC staff; and reduced environmental impact of oil leaking into the ground.					
Investment Cost, US\$	Annual Energy Savings, toe	Annual GHG Emission Reduction, tCO ₂	Annual Energy Cost Savings, US\$	Economic Feasibility	
				NPV, US\$	IRR, %
7,190,000	933 ⁴⁷	2,934	2,865,000 ⁴⁸	15,862,000 ⁴⁹	35.1 ⁵⁰

L.1.2 Renewable Energy and Energy Efficiency Technologies Applications in Residential/Commercial Sector

The purpose of this activity is threefold: 1) demonstrate the economic viability of the use of EE and RE technology appliances, devices and equipment (e.g., EE lighting devices, EE appliances, energy efficient cars and residential/commercial rooftop solar PV installations through financing schemes, which will also contribute to remove the financial barriers that hamper the use of RE/EE technologies; 2) contribute to the achievement of the 15% EE improvement by 2025 by favoring the adoption of high energy efficiency household appliances and efficient lighting; and, 3) contribute to the establishment of a local market for RE/EE technologies both during the project implementation stage and afterwards for solar PV installers, PV and EVs service providers, and retailers of RE/EE technologies.

Niue has currently in place a high energy efficiency household appliances rebate program with the Low Carbon Islands Project through IUCN. The program was established in early 2017 with a budget of US\$ 80,000 and has no deadline for the disbursement of the available budget. The only appliances covered by the rebate program are refrigerators, freezers and washing machines. The scheme is accessible to both private houses and commercial activities, with a limit of two appliances for each participant, and it offers a fixed rebate rate of 25% with no trade-in option. Alternatively, people can choose not to get a rebate, but a loan to purchase the appliance at 0% interest rate.

To date this rebate program has not been very successful and only about half of the funds have been spent. Consultations with local stakeholders have highlighted several reasons for the shortcomings of this initiative; the last two are interconnected with one another:

- a. NDB and Kiwibank have not properly advertised the initiative to the general public.

⁴⁷ The portion of the electricity savings due to the high energy efficient transformers is a percentage of total demand. If demand grows, so it does in absolute terms the amount of electricity saved with the new transformers. Here we are making a very conservative assumption keeping the electricity savings constant (due to a 0 growth, or a demand growth compensated by improvements in energy efficiency)

⁴⁸ Based on the current estimated electricity cost in Niue of NZD 1.13/kWh (USD 0.80/kWh), including GoN subsidy.

⁴⁹ Based on a very conservative discount rate of 10% (as suggested by SPREP)

⁵⁰ Based on lifespan of the equipment, which is 30 years for the transformers and 25 years for the solar PV systems.

- b. Niueans do not fully understand the mid- to long-term financial advantages of purchasing high efficiency appliances since no information pamphlet showing the electricity savings vis-à-vis with low energy efficiency appliances were prepared.
- c. Upfront disbursements for energy efficiency appliances are very high. This regardless of possibility to ask for a loan at 0% interest.

There is interest to expand the rebate program and possibly add other appliances, such as air conditioners, solar water heaters, efficient lighting, and electric bikes; however this has to be accompanied by activities that can expand people participation into it (it is particularly important that model and size of the appliances available for purchase through the scheme are properly selected, to attract consumers). This would help Niue to achieve a portion of the energy efficiency target set in the NiSERM.

As part of this major activity, pamphlets comparing energy and financial savings of high EE appliances and lighting vs low efficiency ones will be prepared to show customers the advantages of EE technologies (for example compare a 3.5- or 4.0-star freezer versus a 2.0 or a 2.5 star one, common ratings for this appliance as reported in a recent household energy survey⁵¹). The pamphlets shall compare the upfront prices of the two appliances (including the rebate for the energy efficiency one) and show the potential electricity and money savings and the payback period for the investment in more efficient appliances. The comparison between low and high efficiency appliances will also be used to establish an adequate rebate rate. If a 25% rebate does not provide a fast and satisfactory economic advantage, higher rates will be considered to attract more participants. An additional rebate, for example another 5.0%, will be extended to those participants who trade in old inefficient appliances. A budget for the safe disposal of these old appliances will be set aside. The awareness raising activities that will be implemented under Component 5 of the AREAN project (such as flyers, radio commercial, informative material at public offices and schools, etc.) will also support the promotion of high EE technologies.

The household energy survey shows that over 50% of the surveyed appliances (for which it was possible to determine the energy efficiency rating) have a low star rating of 2.5 stars and below; this translates into an estimate of approximately 250 households. If these appliances are replaced with efficient appliances with a star rating of 4.0 stars the potential annual electricity savings is estimated to be approximately 250,000 kWh (www.energywise.govt.nz/tools/running-costs-calculator/#/). Similarly, using the number and power capacity of incandescent and halogen light bulbs present in households (a total estimated 1,800 low-efficiency light bulbs) and replacing them with LED light bulbs, an additional annual electricity savings of over 50,000 kWh could be achieved. Lastly, although surveys for commercial appliances are not available now, one can conservatively estimate a grand total of ~400,000 kWh of electricity savings per annum including also the commercial sector and other appliances. This would be more than 11% of total electricity savings based on current power generation, or over 9% based on 2025 power generation estimates. The balance of the electricity demand reduction will be achieved via follow up programs, as well as changes in consumer behavior promoting initiatives to save electricity demand in all sectors, residential, commercial and governmental.

For this activity, the only option that will be made available to the public is the 25% fixed rebate plus the additional 5% trade-in discount; the 0% interest rate loan option will not be offered. Based on appliances prices in New Zealand and assuming approximately half of the potential electricity demand reduction will be pursued (~5% EE) and achieved through this program an estimated budget of ~US\$

⁵¹ “Niue 2018 Household Electrical Appliances, Lights, and End-use Survey – Process and Findings”, Thomas Lynge Jensen, UNDP Pacific – Fiji Office, 2018.

240,000 would be needed, which will allow electricity demand to be reduced by 200,000 kWh/year for 15 years (the average lifespan of an appliances or LED light bulb). Since the discount covers only 30% of the prices, the total people's disbursement is US\$ 560,000. The calculations do not include the existing LCF financing scheme.

The GoN has also set a target in the NiSERM to switch 1% of the country total fleet of motor vehicles (or 50 vehicles) to high fuel efficiency vehicles. The GoN has already budgeted the purchase of 8 EVs that the GoN (see Section 3.2.1). In addition, the government has also established to waive the import duties on high fuel-efficient vehicles (which includes EVs, hybrid cars, and conventional internal combustion engines 1,300 cc or smaller). Finally, since the GoN has already purchased 3 second-hand EVs, they are also installing a few fast-charging electric stations.

To encourage the general public to invest in high fuel-efficient vehicles (including EVs and hybrid cars and excluding conventional internal combustion engines, regardless of the engine power capacity). Considering the current high price of EVs and hybrid cars, it is anticipated that second-hand cars will be purchased, and for that the only option extended to the public is for a flat 30% rebate.

The price paid by the GoN for the second-hand cars delivered to Niue is in the NZ\$ 10,000-14,000 range. Assuming all participants to this scheme will also purchase second-hand EVs at an average price of US\$ 10,000/car, and considering the 30% rebate, this translates into a discount of US\$ 3,000/car. If the scheme aims to support the purchase of 20 vehicles (half of the 40 vehicles still required to reach the 50 vehicles target set in the NiSERM, considering the already purchased plus those planned by the GoN), the total budget required for this component of the demo is US\$ 60,000. Once again this covers 30% of the total costs, while the people's investment will be US\$ 140,000.

To estimate the energy savings associated with this component of the demo, it is assumed that on average each car will be driven for 7,000 km/year (based on approximately 20 km per day). Due to the road conditions and aging of the cars, we assume that fuel consumption is 10 km/L, which translates into 700 L/year per car or 14,000 L/year for all 20 cars. On the other hand, energy efficiency for the EVs is assumed at 20 kWh/100 km (a conservative assumption, considering that new cars only require 15 kWh/100 km, to consider that the cars will be acquired second-hand; for the same reason the lifespan of the cars is assumed to be only 10 years). To drive the same 7,000 km/year each EV will require 1,400 kWh/year, for a total of 28,000 kWh/year for all 20 cars. Based on the diesel genset power generation of 4 kWh/L of diesel (the goal set in the NiSERM), these 28,000 kWh are equivalent to 7,000 L of diesel per year. The difference between the two figures (14,000 L/year – 7,000 L/year) of 7,000 L/year is the volume of diesel⁵² saved by purchasing the EVs instead of conventional cars.

Another aspect of the financing scheme is for promoting residential and commercial rooftop solar PV installations. Since the cost of electricity is high, for this financing scheme a flat 20% rebate will be provided. If each installation will be on average 5 kWp with no batteries, at the cost of US\$ 10,000 per system, setting a budget of US\$ 50,000 for the entire component will allow financing 25 PV systems. During installations, different size systems can be considered, establishing a ceiling of US\$ 15,000 per single installation. Since this portion of the demo only considers a rebate that covers 20% of the capital investment, the total investment from the public is US\$ 200,000.

The total budget requested from GEF for this program is US\$ 350,000 (US\$ 240,000 for the EE appliances and lighting; US\$ 60,000 for the EVs; and US\$ 50,000 for the rooftop PV systems). On the other hand, the total investment from the public is US\$ 900,000 (US\$ 560,000 for the EE appliances and lighting; US\$ 140,000 for the EVs; and US\$ 200,000 for the rooftop PV systems).

⁵² Price of diesel or gasoline at the gas station is currently NZ\$ 2.65/L.

Activity 2: Renewable Energy and Energy Efficiency Technologies Applications in the Residential/Commercial Sector					
Baseline Case: LCF financing scheme and the planned purchase of 8 EVs by the GoN				Location: Selected Villages	
LC Technology Application: High EE household appliances and LED lighting; fuel efficient cars (EVs and hybrid cars); and residential/commercial rooftop solar PV systems.					
Activity Description: Design and implementation of a financing scheme for encouraging and assisting consumers in the residential/commercial sector to purchase and use EE appliances and RE equipment. The coverage of appliances and equipment will be more than those covered in the existing LCF financing scheme in Niue. The financing will be extended to include high fuel efficiency cars and rooftop solar PV systems.					
Expected Results: Completed and successful implementation of financing scheme to remove financial barriers to the widespread use of low carbon technologies (EE and RE); achieving the improvement in EE target set in the NiSERM; and contribute to the creation of a local market for RE/EE technologies.					
Economic Feasibility: EE appliances and LED lighting will allow saving 200,000 kWh/year, or US\$ 158,000/year (at a cost of NZ\$ 1.13/kWh and an exchange rate of 0.7 US\$ = 1 NZ\$) for 15 years. Fuel efficient vehicles will save an estimated 7,000 L of diesel/year, or US\$ 13,000/year (at a price of NZ\$ 2.65/L of diesel, petrol has the same price, and an exchange rate of 0.7 US\$ = 1 NZ\$) for 10 years. The PV systems will generate 175,000 kWh/year, or US\$ 138,000/year (at a cost of NZ\$ 1.13/kWh and an exchange rate of 0.7 US\$ = 1 NZ\$) for 25 years.					
Investment Cost ⁵³ , US\$	Annual Energy Savings, toe	Annual GHG Emission Reduction, tCO ₂	Annual Energy Cost Savings, US\$	Economic Feasibility ⁵⁴	
				NPV, US\$	IRR, %
900,000	102	322	310,000 ⁵⁵	1,498,000	34.1

L.2 EE & RE Technologies Demonstrations

L.2.1 Demo 1: Integrated⁵⁶ Solar Powered LED Street Lighting

Niue has an inadequate system of public street lampposts scattered along the over 200 km of roads that surround and cut through the island. To improve the safety in villages, on the roads and along sea-tracks, GoN has set in the NiSERM a target of introducing 300 new integrated solar powered LED street lights, which will not be enough to provide all the needed public illumination, but it will add to the few existing conventional streetlights.

The GoN does have a recurring budget in place, funded by NZAid, for the management of its assets, including the roads. However, the budget cannot cover all the interventions that Niue requires, and considering the unsafe conditions of several of its roads, their repair and maintenance has been considered a higher priority for safety concerns. During consultation with the department of transportation, it has been indicated the need to get more streetlights deployed.

⁵³ This is the portion of investment provided by the public

⁵⁴ Calculations for the NPV and IRR take into consideration the different duration of the benefits for the three components of this demo.

⁵⁵ This will drop to US\$ 297,000 after 10 years (benefits from efficient cars will terminate) and to US\$ 138,000 after 15 years (benefits from EE appliances and LED lighting will terminate).

⁵⁶ Here "Integrated" refers to the fact that all equipment (solar PV panels; LED light; rechargeable battery; pole; and cables and control system) is assembled into one integrated system.

If Niue is to meet its need to increase the distribution of street lights with conventional light poles, this would increase the electricity demand from NPC. Furthermore, the power consumption for public illumination is not metered and not billed, impacting the financial deficit of GoN. Implementation of integrated solar PV street lights with batteries is becoming quite diffused throughout country islands in the Pacific region. Tonga, Nauru, the Federated States of Micronesia and Tokelau are only few examples of country islands that have adopted or have planned to adopt this kind of technology. A preliminary assessment shall be conducted in coordination with the Department of Transportation, about the exact locations where to install the lampposts and determine the adequate power for each LED bulb.

All lamp posts shall be purchased from the same vendor, not only to obtain bulk discounts on purchase and freight, but also because it would be easier to keep in stock spare parts and to train local electricians in maintaining and repairing this kind of technology. Some vendors even ship free of charge single unit to be tested on location. With the advancement in LED and solar PV technologies, prices for integrated solar powered LED street lights have come down significantly over the past few years, and the total estimated cost of 300 100-W lampposts, including shipment, installation, spare parts and training of electricians for their O&M is US\$ 150,000.

It is also recommended that, although unbilled, electricity consumption for public illumination is metered, both for the old lampposts as well as the new LED street lights that will be installed (the net balance between electricity fed to the grid and drawn from the grid) since this information is useful to measure the power distribution losses.

Demonstration 1: Integrated Solar Powered LED Street Lighting	
Baseline Case: GoN recurring annual budget for infrastructure maintenance, which includes also roads.	Location: Selected stretches of main coastal road
LC Technology Application: Integrated solar powered LED streetlights	
<p>Demo Description: This is aimed at improving the quality of street lighting to not only increase safety but also save on streetlighting energy usage. The solar powered street lights that will be used in this demonstration are accessorized with batteries, since the panels will generate electricity during daytime when public illumination is not needed, and therefore must be stored for the night hours. Although the sizing of the solar panels is done to assure that the power generated daily is enough to provide electricity throughout the night, there might be cloudy and rainy days when the batteries will not be fully charged. For this reason, the lamp posts must be still grid connected, to guarantee their proper operation in any conditions. Hence, this demo must be large enough to test also grid stability if electricity is drawn from the grid⁵⁷. On average, the street lights will draw a relatively small amount of electricity from the grid, and in other cases can even feed the grid with surplus power generated.</p> <p>The power capacity of LED street lights is in the 70-100 W range and they operate on average approximately 10 hours a day. This means, that if 300 lampposts with a capacity of 100 W each are installed, the total potential power capacity would be 30 kW, which can be absorbed by the overcapacity of NPC in case of electricity withdrawal from the grid, for a total of maximum 300 kWh in a night.</p>	
Expected Results: Improvements in public illumination and safer conditions for both drivers and pedestrians.	
Economic Feasibility: The analysis is based on 300 lampposts, 100 W each, operating 365 days a	

⁵⁷ In any case, since these will be adding to the grid a source of intermittent power generation, the street lights will affect the grid stability and this possibility must be accounted for in the design of the power grid, especially for the control and dispatch of electricity loads.

year for 10 hours a day, for a total of ~110,000 kWh/year. Assuming 10% of the electricity will be drawn from the grid (when bad weather conditions will not allow the batteries to be recharged), use of solar LED streetlights would save a total of ~99,000 kWh/year, which are equivalent to US\$ 78,000/year (currently electricity has a cost of NZ\$ 1.13/kWh, and an exchange rate of 1 NZ\$ = 0.7 US\$).

The economic feasibility analyses are based on the lifespan of the solar PV panels of 25 years. Over this period other components will have to be replaced, specifically: batteries must be replaced 2 times; LED light bulbs and electronic components must be replaced 1 time.

Investment Cost, US\$	Annual Energy Savings, toe	Annual GHG Emission Reduction, tCO ₂	Annual Energy Cost Savings, US\$	Economic Feasibility	
				NPV, US\$	IRR, %
150,000	25	80	78,000	439,900	51.5

L.2.2 Demo 2: Retrofit of Buildings with Energy Efficiency and Renewable Energy Technologies

The purpose of this demo project is to show to the general public that every building can be retrofitted to incorporate EE and RE technologies to reduce its carbon footprint and concomitantly save money by reducing the electricity use.

This demo is particularly important because it will help overcome a big hurdle in the widespread adoption of EE/RE technologies, which is people’s diffidence towards these technologies. In fact, because of severe grid instability issues caused by solar PV systems, Niueans have grown very skeptical towards solar PV panels, with nearly no penetration in the private sector. Presently, there are only four solar PV installations privately funded and all are kept off-grid, with no financial incentives for the owners, such as net metering or feed-in tariffs. In addition, high-efficiency household appliances are perceived as too expensive, because the advantages of electricity, and therefore money, savings when compared to less efficient appliances has not been clearly explained to the people. Finally, the retrofitted building will allow to showcase RE/EE measures yet to be introduced in Niue. The possibility to show in a real setting the functioning and advantages of these technologies will help stimulate investments in this sector.

The first step of this activity would be the selection of a demonstration building, preferably a public building where all Niueans have access to and can visit. This choice should also take into consideration the current investment plans of the GoN into its edifices, in order to use such project as a baseline for our proposed, GEF funded incremental activities. Although an existing building would be the preferred choice, the GoN is not retrofitting any of its structures. There is however a plan to build a new Assembly and Cabinet building, the Fale Fono. Therefore, for this demo instead of retrofitting an existing building it will be retrofitted the existing design of a building.

The site of the new Parliament House will be inland, far from the western coast where the current building is located and highly exposed to severe natural events and to cyclones, as during Cyclone Heta in 2004. While state-of-the-art resilient and adaptation measures are incorporated in the building design, RE technologies and EE measures have not been adequately included and adopted.

Based on the existing design of the Fale Fono, the suggested interventions are the following;

1. Grid-connected, roof-mounted solar PV panels including a battery energy storage system. According to the NiSERM data, the Government is responsible for ~20% of the electricity

consumption, or 700,000 kWh/year based on the 2017 data. Although a breakdown of the electricity consumption for each building is not available, let's assume the Government building utilizes about 10% of the total electricity consumed by the Government sector, or 70,000 kWh/year. Since this is just a demo project, we do not need to provide 100% of the electricity needs with solar PV panels plus battery storage. We can estimate that approximately a solar PV system of 25 kWp (equivalent to 35,000⁵⁸ kWh/year) and a storage capacity of 54 kWh (equivalent to 4 Tesla Powerwall 2.0⁵⁹ battery packs) will be enough to satisfy 50% of the estimated electricity needs. This intervention can serve two purposes: a) it will show the reliability of grid connected solar PV systems (provided that the grid instability issues are concomitantly removed as amply explained in this proposal); and b) together with the introduction of financial and fiscal incentives, such as net-metering and feed-in tariffs as well as discounted or waived import duties, it can help demonstrate, supported by informational material explaining the monetary advantages of owning a PV power generation system.

2. All the appliances will be upgraded to high energy efficiency. These include the following: a) inverter type air-conditioning system; b) freezer; c) refrigerator; d) washing machine; e) dish washer; f) LED lights; and g) solar water heater. Some of these technologies have been already acquired by several households; however, it is important to show all of them working together. Similarly, to the PV system discussed above, informational material prepared for the EE scheme can be made available here.
3. Niue enjoys a warm tropical weather year-round, which suggests painting the exterior walls with light colors, which absorb less sun heat. This benefit can be further augmented by selecting special paint with infrared-reflective pigments, which significantly reduce heat absorption (a wall painted with light color, reflective paint reaches ~40 °C versus the ~80 °C of a wall painted with a dark color, conventional paint). Other measures will include natural ventilation, windows and roof shading with trees, and layered construction materials for walls that provide insulation and do not overheat.
4. To optimize the energy consumption and reduce the CO₂ emissions of the Fale Fono, a Building Energy Management System (BEMS) will also be incorporated. By connecting all appliances, lighting and electricity powered devices to a centralized system will allow to measure, control and optimize the overall energy consumption. The collected data is then used to manage and optimize the building's electricity consumption allowing to save energy and money, whilst reducing the CO₂ emissions. In addition, since a BEMS can be controlled remotely, the data could be used in the future for the development of a smart grid.
5. Lastly, because of the roof-mounted PV panels, the building foundation and the electric wiring must be reinforced to support the heavier weight and for safety reasons.

The estimated budget to turn the Fale Fono in an energy efficient building is US\$ 200,000.

Demonstration 2: Retrofit of Buildings with Energy Efficiency and Renewable Energy Technologies	
Baseline Case: Construction of the new Parliament House (Fale Fono)	Location: Fonuakula, Alofi
LC Technology Application: Rooftop solar PV system with battery storage; All-in-one application of high EE appliances and lighting; Infrared-reflective pigments painting; Natural ventilation; Windows and roof shading; layered walls; and Building Energy Management System.	
Demo Description: The design of the new Parliament House will have all the modern features (external and internal) of an EE building. This demo is to showcase the retrofit design of the planned new Parliament House to include all possible applicable EE and RE technologies and	

⁵⁸ 25 kWp · 1400 kWh/kWp/year = 35,000 kWh/year

⁵⁹ <https://instylesolar.com/blog/2018/02/08/battery-review-tesla-powerwall-2-0/>

measures to turn the Fale Fono into a completely EE structure. Some of the incremental activities are not new for Niue (i.e., PV system and the EE appliances), while others will be showcased in this demo for the first time (i.e., battery storage for a private PV system, and all other proposed LC technologies and measures as listed above). The most important feature that is demonstrated here is the integrated application of feasible and applicable EE and RE technologies and measures in building design, construction and operation.

Expected Results: The main purpose of this demo project is to show to the general public that an energy efficient building is technically sustainable and reliable as well as financially viable. This will spur people to retrofit their homes and commercial buildings with all or only part of the EE/RE technologies and measures here proposed.

Economic Feasibility: The PV systems will generate 35,000 kWh/year, or US\$ 27,600/year (at a cost of NZ\$ 1.13/kWh and an exchange rate of 0.7 US\$ = 1 NZ\$) for 25 years. The Fale Fono will have an estimated annual electricity consumption of 70,000 kWh. Assuming all other measures will allow an energy efficiency improvement of up to 15% (the same targeted by the GoN) relative to the original envisioned design, the expected annual electricity savings would be about 10,500 kWh, or US\$ 8,300/year for 30 years (appliances will have to be replaced half way through).

Investment Cost, US\$	Annual Energy Savings, toe	Annual GHG Emission Reduction, tCO ₂	Annual Energy Cost Savings, US\$	Economic Feasibility	
				NPV, US\$	IRR, %
200,000	12	37	35,900	102,700	17.1

Potential No. of Replications: 250 Households

L.2.3 Demo 3: Solar Energy Use in Water Pumping Systems

Niue has a large underground water lens that provides water for all uses. Recently, there have been concerns raised by the users about several potential contamination sources, namely: a) salty water infiltrations from the bottom; b) potentially harmful elements leaking from landfills and waste disposal areas; and c) contamination through old piping systems (this was the case for the drinking water bottling facility during the field mission for this project).

Niue's water distribution system is made of about 20 bore pumps, over 50% of them are at least 20 years old, distributed around the island with power capacity in the 1.5-5.0 kW range (the majority are either 2.2 kW or 3.7 kW). The bore pumps transfer the water from the underground basin to overhead water tanks that distribute water to the dwellings by gravity. Electricity for water pumping is not billed nor efficiently metered and it is a loss in the balance taken by GoN.

In 2017, an assessment on several water pumping facilities has evidenced that since water consumption is not charged to consumers there is a lot of waste in households, especially with external taps often left open. In addition, the state of maintenance of the water distribution system is inadequate with many control sensors not working (these sensors should communicate to the bore pumps that the overhead water tanks are full and therefore the pumps should shut down until the level drops to a determined lower level). Lastly, consumption is constantly increasing, with the growth driven by the flourishing tourism industry.

As mentioned in the "Baseline Projects" Section 3.2.1, the GoN is implementing the Water Strategy Plan. Due to budget limitations, only a portion of the activities needed to improve capacity building in the water sector, reduce the energy consumption and achieve the water sector targets specified in

the NiSERM will be implemented. Therefore, we are proposing this demo project in the water sector to support the GoN in the achievement of its targets.

To lower electricity consumption and consequently reduce GHG emissions associated with the use of diesel fuels for power generation, the replacement of the older bore pumps, a total of 10, with solar PV water pumps is suggested. These replacement systems must include also storage batteries to assure the functioning of the solar pumps during night time. Naturally, considering the importance of guaranteeing water supply during periods of extended bad weather as well, when the solar PV systems do not provide the nameplate capacity, these pumps must be grid-connected. Also, in case of over-generation of electricity, this can be fed to the electric grid and reduce power generation from NPC.

The proper sizing of the solar PV powered pumps (pump, solar PV systems and battery storage units) will be assessed, and to avoid waste of water and electricity, all control systems will be checked and those defective will be either repaired or replaced. For this demo activity all the equipment shall be procured from one qualified vendor to reduce the number of spare parts and to simplify the training of the water department staff to maintain the new equipment. Furthermore, grid stability issues will also be taken into consideration since similarly to other solar PV systems, these pumps would be also sources of intermittent electricity on the electric grid. Having a demo consisting of 10 solar water pumps should be large enough to test the grid stability as well).

The electricity consumption for water will be measured (the net balance between electricity fed to the grid and electricity drawn from the grid), regardless of if it will be billed or not, since it will help to keep track of total consumption and therefore measure distribution losses.

Considering the total number of solar pumps needed and their size, their shipment and installations, and spare parts and staff training, a budget of US\$ 150,000 is estimated for this activity.

Demonstration 3: Solar Energy Use in Water Pumping Systems	
Baseline Case: The GoN Water Strategy Plan. Implementation of specific water system improvement projects as part of the initiatives to achieve the water sector targets in the NiSERM.	Location: Selected villages
LC Technology Application: Solar water pumping system	
Demo (Alternative Case) Description: The demo is for showcasing the application of solar PV water pumps in village water supply and distribution systems. The existing water pumps, preferably the oldest currently installed unless there are some faulty ones, will be replaced with solar water pumps. To avoid waste of water and electricity, all control systems will be checked and those defective will be either repaired or replaced. The pumps will have battery storage and will be grid-connected to guarantee water distribution even when bad weather prevents batteries from being fully charged. This demo is large enough to test also the grid stability during situations when the pumps are drawing electricity from the grid.	
Expected Results: Reduced diesel consumption for electricity generation and avoidance of water wastages	
Economic Feasibility: The analysis is based on 5 solar water pumps with a power capacity of 2.2 kW and 5 solar pumps with a power capacity of 3.7 kW. Each pump will operate on average 8 hours a day for 365 days a year, for a total of 86,000 kWh/year. Assuming 10% of the electricity will be drawn from the grid (when bad weather conditions will not allow the batteries to be recharged), use of water solar pumps would save a total of 77,500 kWh/year, which are equivalent to US\$ 61,300/year (at a current electricity cost of NZ\$ 1.13/kWh, and an exchange rate of 1 NZ\$ = 0.7 US\$).	

The economic feasibility analyses are based on the lifespan of the solar water pumps and panels of 25 years. Over this period batteries must be replaced 2 times; electronic components must be replaced 1 time.

Investment Cost, US\$	Annual Energy Savings, toe	Annual GHG Emission Reduction, tCO ₂	Annual Energy Cost Savings, US\$	Economic Feasibility	
				NPV, US\$	IRR, %
150,000	20	63	61,300	40.4%	347,400

Potential No. of Replications: 10

Annex M: GHG Emission Reduction Estimates

The GHG emission reductions that are attributable to the AREAN Project are based on the most recent version of the Calculation Guide for GEF Project Greenhouse Gas Emission Reduction, as well as the 2008 Manual for Calculating GHG Benefits of GEF Projects: Energy Efficiency and Renewable Energy Projects.

1. Basic Assumptions

- a. The GHG emission reductions that would be attributable to the SPIRES Project are derived from specific project activities that involve the installation, operation and maintenance of RE and EE technology equipment, devices and appliances. These include activities involving the facilitation of the design, engineering, installation, operation and maintenance of RE-based power generation systems; power grid system installations for maintaining grid stability; control equipment (e.g., SCADA) in the power generation system that will manage the system operation to ensure grid stability and optimal load dispatch; and the utilization of energy efficient equipment used in the residential, commercial, institutional and transport sectors of the country.
- b. The other sources of GHG emission reductions that would be attributable to the SPIRES Project are from the expected replications (and scale-up) of what will be demonstrated under the AREAN Project. These will be implemented by stakeholders and citizens of the country that will hopefully be influenced by the various capacity development and awareness raising activities of the AREAN Project, as well as enabled by the supportive policy and institutional regimes that will be set up under the project. These will be similar RE-based energy generation and use projects and EE technology application projects that will either be funded by the project owner/implementer and/or by the national government or by project's partner bank/financing institution (Kiwibank) making use of market-based financing and incentive schemes that the project.
- c. The emission factor used in calculating the GHG emissions associated from the application of RE-based power generation is 0.786 kg/kWh. This is based on power generation using diesel fuel oil.
- d. Table L1 summarizes the estimated annual and incremental direct GHG emission reductions from specific project activities that involve GEF-supported application of feasible RE and EE technology equipment, devices and appliances:

Estimated Direct Emission Reductions (DER) from AREAN Project Activities

Table M.1: CO₂ Emission Reduction from RE & EE Technology Applications⁶⁰

Project Activity	Estimated Annual Diesel Reduction (toe)	Estimated Annual Emission Reduction (tCO ₂)	Life Time (Yrs.)	Estimated Lifetime Diesel Reduction (toe)	Estimated Incremental Lifetime Direct Emission Reduction (tCO ₂)	
					DER (during AREAN) ⁶¹	DER (Lifetime)
Solar PV Power Generation	433.0	1,360.6	25	10,824	4,762	34,016
Grid Stabilization	29.6	93.6	30	894	193	2,809
LED Streetlights	25.4	79.8	25	635	160	1,994
EE Building - Fale Fono ⁶²	11.73	36.8	25 (RE)	306	74	964

⁶⁰ Although AREAN will last 4 years, DER during AREAN depends on when the demos are completed

⁶¹ This assumes that the demo projects are operating during the last 2 years of the AREAN Project.

⁶² About 77% of energy and GHG emission savings are from installed RE features (solar PV power systems) of the demonstration building, and the rest from incorporated EE features.

Project Activity	Estimated Annual Diesel Reduction (toe)	Estimated Annual Emission Reduction (tCO ₂)	Life Time (Yrs.)	Estimated Lifetime Diesel Reduction (toe)	Estimated Incremental Lifetime Direct Emission Reduction (tCO ₂)	
					DER (during AREAN) ⁶¹	DER (Lifetime)
			30 (EE)			
Fale Fono – EE	2.73	8.5	30	81	17	255
EE Scheme – Appliances	51.5	162.0	15	773	324	2,430
EE Scheme – Rooftop PV	45.1	141.7	25	1,127	283	3,543
EE Scheme – EVs	8.1	25.6	10	93	66	293
Solar Water Pumps	20.0	62.8	25	499	126	1,569
Low Carbon Fund	8.6	27.0	15	129	54	405
Station Losses Reduction	6.0	18.0	30	180	54	540
Existing PV ⁶³	195.9	615.7	25	4,897	2,463	15,392
Total				20,485	8,611	64,357

Table M.2: Additional CO₂ Emission Reduction Needed to Achieve All NISERM Targets

Follow-up Project	Estimated Annual Diesel Reduction (toe)	Estimated Annual Emission Reduction (tCO ₂)	Life Time (Yrs.)	Estimated Lifetime Diesel Reduction (toe)	Estimated Follow-up Lifetime Direct Emission Reduction (tCO ₂)	
					DER (during AREAN)	DER (Lifetime)
PV to Reach 80% ⁶⁴	225.5	708.7	25	5,637	510	17,717
Balance to 15% EE ⁶⁵				7,344	121	17,377
Additional EVs	5.8	18.3	10	58	0	183
Total				13,040	631⁶⁶	35,277

2. CO₂ Emissions Reduction Estimates

Direct CO₂ Emission Reductions (DER)

Within the project intervention period, several project activities involving the design, installation, operation and maintenance of energy system applications of RE and EE technologies that will be carried out. Among these are the installation of additional solar PV power generation units that will be integrated into the existing NPC power grid. Also, among these are demonstrations of cost-effective applications of RE and EE systems such as streetlighting and water pumping and supply, as well as the application of energy efficient energy consuming appliances and equipment (including electric vehicles). It is expected that from these project interventions energy consumers in the country will be convinced and influenced to replicate and apply the showcased RE and EE technologies on their own.

The above tables show that the estimated cumulative direct emission reductions (DER_{EOP}) during the AREAN Project implementation is about 8,611 tons CO₂. The lifetime direct emission reductions (DER_{LIFETIME}) is about 64,357 tons CO₂. These are directly attributable to the AREAN Project because the activities that brought about and enabled the generation of these emission reductions are all part and parcel of the AREAN Project.

⁶³ PV panels already installed, but the grid stabilization activities implemented by AREAN will allow to reconnect them to the grid

⁶⁴ The estimated total solar PV system capacity that is needed to reach 80% electricity from RE is 625 kWp. The NZHC pledged to fund this additional PV systems

⁶⁵ 15% EE equals 0.8 GWh electricity demand reduction based on 2025 estimates; 0.225 GWh are reduced with the EE – Appliances demo and the Low Carbon Fund baseline project, the GoN will have to reduce the additional 0.575 GWh

⁶⁶ These are assisted by AREAN and will be achieved during AREAN lifetime

- **DER_{EOP}** = Direct CO₂ emission reductions due to AREAN Project intervention (cumulative by end-of-project) = 8,611 tons CO₂
- **DER_{LIFETIME}** = Direct CO₂ emission reductions due to AREAN Project intervention (cumulative during the lifetime) = 64,356 tons CO₂

It is expected that there are demo replications during the AREAN project implementation. Such projects will be assisted, when and where requested either in the project conceptualization, design, engineering, securing of financing, installation, commissioning, operation and maintenance. The lifetime emission reductions from such replication/scale-up projects are also considered directly attributable to the AREAN Project. This is **DER_{LIFETIME} of Replications**.

DER_{LIFETIME} of Replications = DER_{FROM REPLICATIONS ASSISTED BY AREAN AND IMPLEMENTED DURING AREAN}

Total Lifetime DER = DER_{LIFETIME} + **DER_{LIFETIME} of Replications**

Direct Post-Project CO₂ Emission Reductions (DPPER)

Lifetime DPPER = DER_{FROM REPLICATIONS ASSISTED BY AREAN BUT IMPLEMENTED AFTER AREAN} = 64,356 + 35,277⁶⁷ = 99,633 tons CO₂

Consequential CO₂ Emission Reductions (CER)

The GoN has a program to encourage Niuean citizens living abroad to come back to, and live again in, the country. Such program also encourages such citizens to also set up businesses in the country. To realize and sustain the achievement of that program’s objective the necessary infrastructures must be put in place and that would lead to an increase demand for energy. Nonetheless, the current growth trend in the country is at best constant in the next 5 years. In that context and considering all the RE and EE projects that will be implemented during the AREAN project implementation period and as follow-ups intervention to achieve all the targets stated in the NiSERM, the expected magnitude of Lifetime Consequential Emission Reductions would be at best moderate. The following table summarizes what could be the most likely potential replication projects that the GoN could implement after the completion of the AREAN Project.

Table M.3: Consequential CO₂ Emission Reductions (CER) from RE/EE Projects During the Influence Period

Replication Project	Estimated Annual Diesel Reduction (toe)	Estimated Annual Emission Reduction (tCO ₂)	Life Time (Yrs.)	Estimated Lifetime Diesel Reduction (toe)	Estimated Consequential Emission Reduction (tCO ₂)
Solar PV (600 kWp) ⁶⁸	216.5	680.3	25	5,412	17,008
EVs (300 cars) ⁶⁹	108.2	274.6	15	1,623	4,118
LED Streetlights (300 lamp posts) ⁷⁰	25.4	79.8	25	635	1,994

⁶⁷ 631 tons of CO₂ will be achieved during the lifetime of AREAN

⁶⁸ The 2,493 kWp installed during AREAN will provide the 80% of electricity needs by 2025. Considering that 20% of electricity will still be generated with diesel generators and taking into consideration the electricity demand growth past year 2025, the installation of additional 600 kWp of Solar PV systems is a realistic assumption.

⁶⁹ This would represent ~30% of total cars, or ~15% of total vehicles. Since this relatively large number of EVs will also increase electricity demand, we recommend implementing Solar PV Powered Electric Car Charging Stations.

⁷⁰ This would cover urban areas and sea-tracks but not the entire road system in Niue.

Replication Project	Estimated Annual Diesel Reduction (toe)	Estimated Annual Emission Reduction (tCO ₂)	Life Time (Yrs.)	Estimated Lifetime Diesel Reduction (toe)	Estimated Consequential Emission Reduction (tCO ₂)
Solar Water Pumps (10 pumps) ⁷¹	20.0	62.8	25	499	1,569
EE Improvements ⁷²	51.5	162.0	15	773	2,430
Total				8,942	27,120

The total potential consequential CO₂ emission reduction during the influence period, i.e., 10 years starting from AREAM Project completion, is 12,595 tons. Since these CO₂ emission reductions are from the operation of replication projects, i.e., the same RE and EE technology applications as those implemented in AREAN, that the GoN is expected to be implementing, these amounts are attributable to the AREAN Project. In that regard, the causality factor is 1, i.e., GEF contribution is critical.

Consequential CO₂ Emission Reduction (Top-Down Approach) = Emission Reduction during Influence Period (ER₁₀) * Causality Factor = 12,595 * 1.0 = 12,595 tons.

Table M.4: Summary of CO₂ Emission Reductions

CO ₂ Emission Reduction Type	Quantity, tCO ₂
End-of-Project Direct CO ₂ Emission Reduction (DER _{EOP})	9,242 ⁷³
Lifetime Direct CO ₂ Emission Reduction (DER _{TOTAL})	64,357
Lifetime Direct Post Project CO ₂ Emission Reduction (DPPER _{TOTAL})	35,277
Total Lifetime Direct CO ₂ Emission Reduction (LDER _{TOTAL})	99,634
Lifetime Consequential CO ₂ Emission Reduction - TD Approach (CER _{TDA})	12,595

Total Lifetime Direct and Indirect (i.e., consequential) CO₂ Emission Reduction = 99,634 + 12,595 = 112,229 tons CO₂

⁷¹ This would convert the entire water distribution system of Niue into solar water pumps.

⁷² The additional EE measures have been assumed to be of the same size as the EE scheme proposed by AREAN.

⁷³ About 7% of this total end-of-project emission reductions are from the AREAN Project-assisted replications that are implemented during the AREAN Project implementation period.

Annex N: Description of UNDP Country Office Support Services (Letter of Agreement)

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Attachment

DESCRIPTION OF UNDP MULTI-COUNTRY OFFICE SUPPORT SERVICES FOR THE PROJECT "ACCELERATING RENEWABLE ENERGY AND ENERGY EFFICIENCY APPLICATIONS IN NIUE (AREAN)"

- Reference is made to consultations between the Ministry of Infrastructure (MoI) in Niue and officials of UNDP with respect to the provision of support services by the UNDP Multi-Country Office for the nationally managed project "Accelerating renewable energy and energy efficiency applications in Niue", referred to as "the Project".
- In accordance with the provisions of the letter of agreement signed on 21st March 2016 and the programme document, the UNDP Multi-Country Office shall provide support services for the Project as described below.
- Support services to be provided:

Support services	Estimated schedule for provision of services	Cost to UNDP of providing such support services (USD, per unit)	Estimated Amount (USD)
1. Procurement of goods and services			
a. Recruitment of consultants (advertising, short listing, interview)	20 during lifetime of the project	As per UPL: US\$ 357.75	US\$ 7,155
b. Procurement of low value equipment (<US\$100,000); identification, selection, issue purchase order and follow-up	24 during the lifetime of the project	As per UPL: US\$ 190.77	US\$ 4,578
c. Procurement involving a contract, assets and procurement committee (<US\$100,000); identification, selection, contracting/issue purchase order and follow up	2 during lifetime of the project (for example procurement of high tech spatial survey and information system)	As per UPL: US\$ 766.17	US\$ 1,532
2. Payment Process		As per UPL:	
a. Direct payments (disbursement only)	40 payments during the lifetime of the project	US\$ 33.74	US\$ 1,350
b. New vendors created for payment	20 vendors during the lifetime of the project	US\$ 33.42	US\$ 668
3. Organization of Training and Workshops Travel arrangement	During project lifetime when required by the Implementing Partner	As calculated according to staff timesheets and actual costs for those services, following UNDP policies and procedures	Amount annually estimated in advance in the AWP, and charged to project budget based on real

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			services provided and their actual costs charged to non GEF fund (estimated cost US\$10,000)
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Total estimated cost (except #3) : US \$15,283.00


- Description of functions and responsibilities of the parties involved:

This Project is implemented through UNDP's National Implementation Modality (NIM), with the Ministry of Infrastructure (MoI) as the designated national executing agency ("Implementing Partner") of the project. MoI shall have the technical and administrative responsibility for applying Global Environment Facility (GEF) inputs in order to reach the expected Outcomes/Outputs as defined in the project document, is responsible for the timely delivery of project inputs and outputs, and in this context, for the coordination of all other responsible parties, including other line ministries, local government authorities and/or UN agencies.

UNDP serves as the Implementing Agency for this project. Services requested by the Implementing Partner in support of achieving project Outcomes will be provided by staff in the UNDP Multi-Country Office in Samoa. Recovery of costs for such services will be calculated based on actual costs, in accordance with UNDP's Cost Recovery Policy. When determining actual costs is not possible, or when it is specifically indicated, the Universal Price List / Local Price List will be applied. The Annual Work Plans will specify in more detail the requested services and their associated cost on a yearly basis. In addition, the Implementing Partner may also request those services on ad hoc basis.


Additional support services to the Project will be provided only upon request to UNDP from the Implementing partner based on this LoA.

Agreed by:
Implementing Partner


Peleni Telagi
Acting Secretary to Government
Niue

18/04/2019
(Date/Month/Year)

Agreed By:
United Nations Development Programme


DocuSigned by:
Ram Iyer
7221010E0E4F0482
Ram Iyer
UNDP Resident Representative a.i.
For Multi-Country Office for Cook Islands, Niue,
Samoa and Tokelau

5/1/2019
(Date/Month/Year)



GOVERNMENT OF NIUE
MINISTRY OF NATURAL RESOURCES
DEPARTMENT OF ENVIRONMENT – FAAHI GAHUA TAKATAKAIMOTU
 Fonuakula, Alofi, NIUE Phone: (683) 4021 Email: Haden.Talagi@mail.gov.nu

To: Ram Iyer
 Resident Representative
 UNDP Samoa Office

21st May, 2019

Dear Mr. Iyer,

Subject: Endorsement of the Request for Provision of Project Support Services under National Execution – “Accelerating Renewable Energy and Energy Efficiency Applications in Niue (AREAN) Project” (GEF ID 9752 / PIMS 6037)

In my capacity as GEF Operational Focal Point for Niue Island, I endorse the request by the lead government agency for the above project, Ministry of Infrastructure (MOI) to UNDP for the direct project support services as elaborated below.

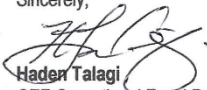
<i>Support Services</i>	<i>Schedule for the provision of the support services</i>	<i>Cost to UNDP of providing such support services</i>	<i>Method of payments to UNDP</i>
1. Procurement of Goods & Services 2. Process payments 3. Organisation of Trainings & Workshops	During project implementation	Total cost per requested service category	Monthly, Quarterly, Annually and/or direct charge to project budget at the time of the service(s)
	Total USD\$	\$ 15,283.00	

This support service is requested in reference to the signed Letter of Agreement (LOA) between the Government of Niue and UNDP.

I affirm that the provision of such services shall be in conformity with both GEF and UNDP regulations, rules, policies and procedures, and be codified in detail through a Standard Letter of Agreement between UNDP and the Government of Niue for the provision of support services. The government shall retain overall responsibility for the nationally managed program or project through its designated institution as mentioned above.

We look forward to our continued collaboration in this project.

Sincerely,


Haden Talagi
 GEF Operational Focal Point
 Director- Department of Environment
 Ministry of Natural Resources
 Government of Niue
 Niue Island

Annex O. List of People Consulted

During the Project Development Team field mission in Alofi Niue, from May 22nd to June 5th, 2018, the following stakeholders have been consulted (in chronological order):

1. Mr. Andre Siohane, Director General – Ministry of Infrastructure – andre.siohane@mail.gov.nu
2. Mrs. Felicia Talagi, Project Management Support Officer – Project Management Coordination Unit – felicia.pihigia@mail.gov.nu
3. Dr. Josie Tamate, Director General – Ministry of Natural Resources: – josie.tamate@mail.gov.nu
4. Mr. Deve Talagi, Director of Utilities – Ministry of Infrastructure – deve.talagi@mail.gov.nu
5. Mr. Speedo Hetutu, Former Power Manager – Niue Power Corporation – speedo.hetutu@mail.gov.nu
6. Mr. Haden Talagi, Acting Director of Environment – Ministry of Natural Resources – haden.talagi@mail.gov.nu
7. Ms. Natasha Tohovaka, Senior Project Coordinator – Ministry of Natural Resources – natasha.tohovaka@mail.gov.nu
8. Ms. Rossy Mitiepo – Director of Niue Met Services – Ministry of Natural Resources – rossy.mitiepo@mail.gov.nu
9. Ms. Rae Finlay – Business Development Manager/CEO – Niue Chamber of Commerce – rae@niue.nu
10. Ms. Charlotte Pihigia, Environment Officer – Ministry of Natural Resources – charlotte.pihigia@mail.gov.nu
11. Mr. Haggard Tongatule, Environment Officer – Ministry of Natural Resources – haggard.tongatule@mail.gov.nu
12. Mr. Wayne McCaughan, General Manager of Niue Commercial Entities Ltd. (Niue Development Bank and Kiwibank Agency) – Commercial and Trading Arm – wayne@niuedevelopmentbank.com
13. Mr. Gabriel Varea, (Niue Development Bank and Kiwibank Agency) – gabriel@niuedevelopmentbank.com
14. Mr. Andre van Der Walt, Deputy High Commissioner – NZ High Commission in Niue – andre.vanderwalt@mfat.gov.nz
15. Ms. Sonya Talagi, Director of Transport – Ministry of Infrastructure – sonya.talagi@mail.gov.nu
16. Mr. Poitogia Kapaga, Financial Secretary – Treasury Department and Planning – poi.kapaga@mail.gov.nu
17. Ms. Gaylene Tasmania, Director General – Ministry of Social Services – gaylene.tasmania@mail.gov.nu
18. Ms. Peleni Talagi, Solicitor General – Crown Law – peleni.talagi@mail.gov.nu
19. Mr. Poi Okesene, Director of Agriculture, Forestry & Fisheries – Ministry of Natural Resources – poi.okesene@mail.gov.nu
20. Ms. Emi Hipa, Head of External Affairs, Office of the Secretary of Government – emi.hipa@mail.gov.nu
21. Mr. Samson Nelisi, Reticulation Manager – Niue Power Corporation – samson.nelisi@mail.gov.nu
22. Mr. Huipunu Paola, Generation Manager – Niue Power Corporation – huipunu.paola@mail.gov.nu
23. Ms. Sina Hekau, National Consultant and Attorney at Hekau Attorneys at Law – kaheaeva@gmail.com
24. Mr. George Valiana, General Manager of Niue Bulk Fuel – Commercial and Trading Arm – george.valiana@mail.gov.nu
25. Mr. Darren Tohovaka, Secretary of Justice, Department of Justice, Lands and Survey – darren.tohovaka@mail.gov.nu
26. Mr. Richard Siataga, Technical Officer, Department of Justice, Lands and Survey – richard.siataga@mail.gov.nu
27. Mr. Justin Kamupala, Secretary to Government, Office of the Premier – justin.kamupala@mail.gov.nu

Annex P: Stakeholder Analysis and Engagement Plan

A. Stakeholder Analysis

1. Purpose

This analysis is for identifying project stakeholders who can be engaged as partners to deliver specific objectives of the project and subsequently develop a Stakeholder Engagement Plan (SEP). The roles and responsibilities of the pertinent stakeholders are identified, including their perception of likely benefits, risks and impacts of the project. This is also to assess how to mitigate risks on stakeholders as a result of the project implementation.

2. Policies and Requirements

The SEP is a requirement under the GEF Policy on Stakeholder Engagement. The GEF requires meaningful stakeholder consultations whereby stakeholders can express their views on project plans, benefits, risks, impacts and mitigation measures that may affect them. The GEF Policy also requires that all relevant stakeholders are involved as early as possible in the preparation process and continue throughout the project cycle.

3. Consultation Methods

The design and development phase of the AREAN Project involved several consultations with institutional stakeholders and potential stakeholders in the villages. Potential project demo sites were identified based on the assessment of the suitability and effectiveness of the planned demonstrations. Institutional stakeholders were identified based on roles and functions and area of interest (technical, legislative, development, informational, training, financing, sustainability, monitoring and evaluation) in the energy sector. The initial list of stakeholders was derived from the logical framework analysis (LFA) workshop. Thereafter, as the consultations proceeded new stakeholders are identified and included in the final list of stakeholders. The consultations attempted to capture the stakeholder's views on the project plan, benefits, risks, project impacts and mitigation measures that may affect the stakeholders. The specific consultations and assessments occurred during the time of the LFA workshop, and during the mission of the project development team in Niue.

Below is a summary of stakeholder engagement activities during the project development phase:

- Telephone calls to stakeholders to organize meetings, follow-up with appointments and provide further information for stakeholders
- Email exchange with stakeholders to provide further information on project scope, demonstrations and value-adding initiatives for the project
- Attendance in specific meetings with the PMCU staff and the identified potential co-financers, and implementers of identified baseline project to learn about potential synergies from such projects and share project information
- Stakeholder consultations
- Field visits and focus group discussions on project plans, benefits, risks, impacts and community interest and engagement
- Focus group discussion with women on gender roles related to the planned project activities, benefits, risks, impacts and interest and engagement

4. Project stakeholders

The following stakeholders were identified as having interest, experience, capacity, networks and potential benefits corresponding to the goals and objectives of the AREAN Project:

4.1 Government Ministries and Departments

- a. *Department of Utilities – Ministry of Infrastructure (DoU-Mol)*: DoU is the government entity that has control of the energy-related state-owned enterprises, such as NPC and NBF. DoU has been designated as the implementing partner for AREAN and therefore it will assume a leadership role during project implementation providing guidance and supervision. DoU staff will cooperate closely with the project implementation management team throughout the entire duration of the project and for all activities. DoU will be responsible for communication and coordination with the office of the national GEF OFP and UNDP and will liaise with villages during implementation of the demo projects. Lastly, they will provide data inputs on plans and programs of the country concerning the energy provision in the public infrastructure, transport and communications projects of the government.
- b. *Department of Transportation – Ministry of Infrastructure (DoT-Mol)*: DoT will be involved in the activities that will facilitate the adoption of high energy efficiency cars, especially electric vehicles and hybrid cars. Furthermore, as responsible for Niue's roads, it can provide valuable guidance to select the best locations for the solar powered LED streetlights. Similarly, to most stakeholders involved, staff members will be trained through some of the programs that will be planned and delivered under AREAN.
- c. *Treasury Department*: The role of the Treasury Department will be pivotal for the approval and enforcement of fiscal and financial incentives to support the development of RE and EE technologies. Electricity price revision and extension of energy subsidies will be also undertaken by this department.
- d. *Relevant GoN Ministries and Departments*: All relevant GoN ministries and departments (e.g., Ministry of Natural Resources; Department of Agriculture, Fisheries and Forestry; Ministry of Social Services; Department of Statistics; Department of Water Resources; Niue Met Services) and stakeholders will be involved during AREAN implementation activities. Their services, expertise and database of information will be especially useful for the success of the demonstration projects, for capacity building and awareness rising around RE and EE technologies. Staff members will be involved in several training initiatives.

4.2 Special Government Agencies

- a. *Project Management and Coordination Unit (PMCU)*: PMCU, a department under the Premier's office, will provide centralized project management services, coordinate project management activities, and facilitate stakeholder relationships.
- b. *Niue Development Bank (NDB) and Kiwibank*: The NDB and the Alofi branch of the Kiwibank are currently managing the IUCN financing scheme to promote high energy efficiency household appliances. The two financial institutions will be engaged during the AREAN implementation period for several awareness raising and information dissemination activities related to RE/EE technologies. The expertise of the NDB and Kiwibank personnel will also be requested for the establishment of financial and fiscal incentives aiming to create a RE/EE market in Niue.

- c. *Crown Law*: Responsible for the provision of legal comments on project agreements and documents for projects.

4.3 Private Enterprises

- a. *Niue Power Corporation (NPC)*: NPC, newly established as state owned enterprise, manages all assets and is responsible for the generation and distribution of power generation in Niue. NPC role will be critical in the implementation of all AREAN's activities related to grid stabilization, installation of RE power generation systems and ancillary equipment. Its management and staff will work closely with the implementation management team to provide information, support and it will be the recipient of several training programs.
- b. *Niue Bulk Fuel (NBF)*: Like NPC, this SOE manages the imports and distribution of fossil fuels into Niue. With a shift towards RE/EE technologies, the day-to-day operation of this unit will be highly affected by the implementation of AREAN activities (especially in terms of diesel imports). NBF will provide valuable information and support to AREAN and its staff will be recipient of some of the training programs.
- c. *Niue Chamber of Commerce*: The Chamber of Commerce has expressed its intention and willingness to partner with AREAN to support the creation of a local market for RE and EE technologies and services. Specifically, the Chamber is interested in sponsoring and help organizing programs to train repair and service providers in technologies new to Niue and that will be adopted under AREAN, such as electric vehicles and hybrid cars. Expertise of the Chamber of Commerce personnel will also be requested when financial and fiscal incentives to stimulate the creation of a local RE/EE market. Finally, the Chamber of Commerce will also help promote awareness raising activities by providing information about RE/EE technologies to the general public.

4.5 Non-Governmental Organizations

- a. *Village/Community Leaders*: The 14 village councils will be consulted for the selection of the location of some of the LC technology demos (such as for the LED streetlights and for the solar water pumps) and for the subsequent project implementation. Furthermore, the village councils and community leaders will play a crucial role for the planning and replication of the RE/EE technologies demonstrated under AREAN.
- b. The project will also involve civil society organization such as the Women's Group and all organizations related to the preservation of Niue's heritage.

4.6 Donor funded projects

- a. *Government of New Zealand (GoNZ)*: New Zealand, through its diplomatic mission, is supporting GoN efforts in meeting its target of 80% electricity generation from RE sources by 2025. GoNZ is financing two consecutive US\$ 3.5 M (NZ\$ 5.0 M) projects for the implementation of solar PV panels, solar battery storage banks, power conversion systems, a portion of the required transformers and switchgears, NPC personnel training, and several remediation interventions of the existing generation and network assets. During stakeholder consultations, NZHC has pledged

additional GoNZ financial support, if needed, to reach the 80% RE target. Several AREAN activities, especially those relevant to the grid stabilization, are incremental activities tailored around New Zealand's sponsored baseline projects. For the grants and typology of initiatives, NZHC is a primary partner for the implementation of the AREAN project.

- b. *European Developing Fund (EDF)*: EDF has sponsored several energy-related projects in Niue. Specifically, EDF-11 is supporting the completion of the underground electric grid and they are also sponsoring the acquisition of additional power transformers and switchgears (still not enough to achieve NPC total needs). The project relevance to AREAN is for contributing to the stabilization of the electric grid.
- c. *AusAid/NZAid*: The two agencies are currently sponsoring the activities that will lead to the establishment and operation of a waste recycling system that will serve the entire country and will encompass solid waste as well as waste water.

Stakeholder Classifications

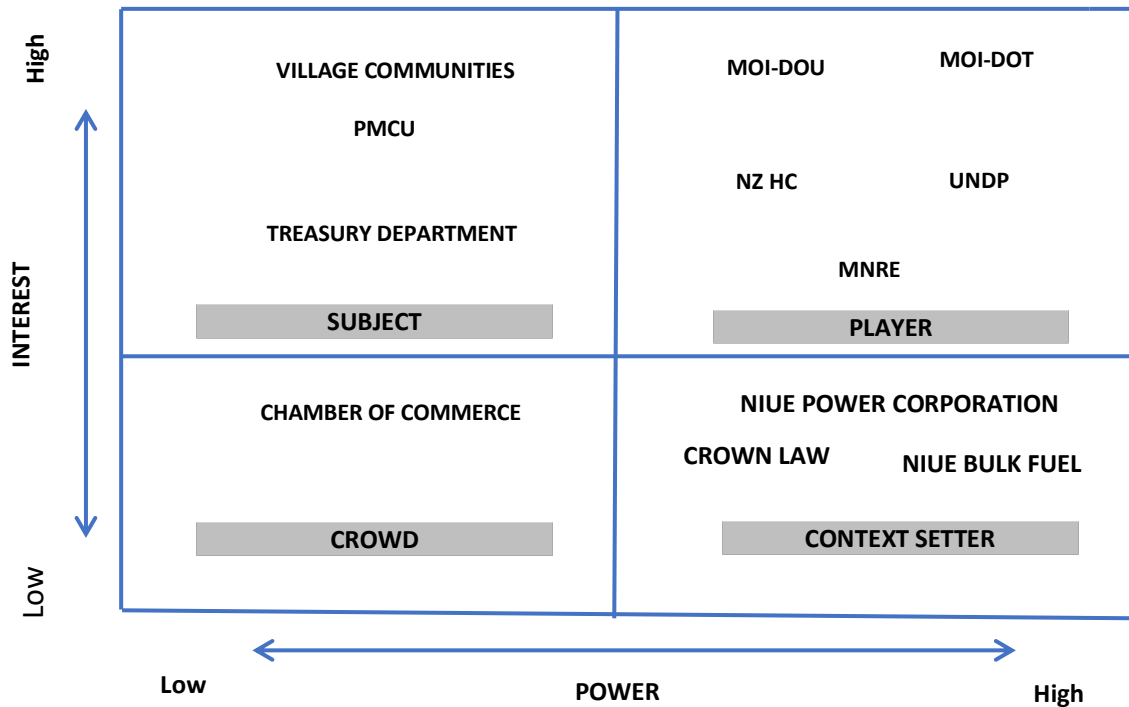
Players - Stakeholders categorized as '*players*' have high interest and high power to influence decisions in the project. The key players in this project are the major financiers, potential financiers, policy custodians and key executing agent, GEF focal point and key implementing agent in the project implementation. Adequate resources should be used to actively engage, consult and mobilize key player stakeholders when it matters for project success in implementation. This category of stakeholders shall be engaged in decision making responsibilities and render advice to the project when required. There are many key players in the project, and they may at times have opposing views on critical decision-making areas for the project. Grievances that might arise with, amongst or between key players must be treated with caution and managed at the advisory level immediately. Key players should be kept well informed about the project's progress in implementation on a timely manner.

Subjects - Stakeholders categorized as '*subjects*' have high interest and low power to influence decisions in the project. This category of stakeholder plays a key role in project implementation. They would require close guidance, monitoring and evaluation of their work performance against target outputs on a timely manner. Engagement of these stakeholders would ideally involve MOU's with executing agent where needed. Enough resources should be used to coordinate their work in order to avoid duplication, overlaps and omissions. Grievances must be managed to avoid impacts on implementation. Given the possibility of overlapping roles especially in capacity building component, mutual agreements must be reached with stakeholders on the details of their activities and implementation approach of the activities specified and their engagement must be legally binding through an MOU or LoA with UNDP.

Crowd - Stakeholders categorized as '*crowd*' have low interest and low power to influence decisions in the project. Engagement of crowd stakeholders can be kept at a minimum. However, crowd stakeholders may form alliance with '*players*', '*subjects*' and '*context setters*' to influence their decisions or interests on a certain issue, hence their views are important to gauge alliance support.

Context Setters - Stakeholders categorized as '*context setter*' have low interest in specific concepts of the project but still have high power to influence decision in the project in key areas of collaboration. Engagement of context setters must be well moderated and highly consultative to avoid absence of engagement that may stall progress. Context setters must be properly consulted and rightly engaged to maximize contribution to the project.

Below is the Power-Interest Grid analysis. This illustrates the level of influence, importance and involvement of groups and institutions with vested interest in renewable energy, energy conservation and energy efficiency in the country. Not all the stakeholders assessed that have interest in the AREAN Project have power to influence decisions. The grid shows the position of individual stakeholders and the relations between or amongst them to identify and anticipate where potential stakeholder conflicts may arise and how to understand and manage stakeholder conflicts more effectively.



B. Stakeholder Engagement Plan

Table P.1: Stakeholder Engagement Plan

Project stakeholder	Stakeholder Interest	Roles and responsibilities in implementation	Means of engagement in the project	Engagement schedule during implementation
GEF	GHG emission reduction	Project financing	Annual reporting	Yearly
UNDP	Sustainable Development	Project implementation	Project procurements, finance management and resource mobilization	Daily
PMCU	Socio-economic development	Project management	Project management, project finance management	Daily
			Reporting to UNDP	As required
MOI (DOU & DOT)	GHG emission reduction	Primary implementing	Access GEF funding	As required

Project stakeholder	Stakeholder Interest	Roles and responsibilities in implementation	Means of engagement in the project	Engagement schedule during implementation
		partners for AREAN Project (DoU); Demonstration activity partner (DoT)	Reporting to PMCU & UNDP	As required
			Project Board Meetings	Quarterly/Mid-Term
			Project Monitoring and Evaluation	As planned
MNRE	Climate change mitigation	Provide advisory services and monitoring of project execution and implementation	Project Board Meetings	Quarterly
			GEF funding advice	As required
			Project Mid-Term Evaluation	As planned
TREASURY DEPT.	Socio-economic development	Provision of project co-financing	Project Board meetings	As scheduled
			Demo implementation	As scheduled
CROWN LAW	Good governance	Legal advice to project	Project Board meetings	As scheduled
CHAMBER OF COMMERCE	Economic development	Demonstration activity partner	Project Board meetings	As scheduled
VILLAGE COMMUNITIES	Socio-economic development	Support implementation of project in selected villages	Reporting lines	Quarterly
NIUE POWER CORPORATION	Regulation, generation and distribution of electricity; sustainability of electricity production and distribution	Support implementation of components 1, 2 and 4	Project Board Meetings	Quarterly
			Knowledge Management	As required
			Implementation of electricity generation and distribution project activities	As required
NIUE BULK FUEL	Regulation, supply and distribution of petroleum fuels	Support EE project activities	Project Board Meetings	Quarterly
			Knowledge Management	As required
			Implementation of EE fuel use project activities	As required
NIUE DEVELOPMENT BANK (KiwiBank)	Development and commercial banking business	Support EE project activities	Project Board Meetings	Quarterly
			Knowledge Management	As required
			Implementation of EE Appliance project activities	As required
Donor Partners (NZHC)	Project impacts, climate financing, networking	Build synergies across projects and expand on RE development in Niue	Donor meetings	Yearly

C. Proposed budget for stakeholder engagement

Stakeholder Engagement Activities	Quantity	Unit of measure	Unit Cost (USD)	Estimated Cost (USD)
Project Inception Meeting	1	Meeting	8,000	8,000
Board Meetings	20	Meeting	500	10,000
Steering Committee Meetings	20	Meeting	500	10,000
Monitoring and Evaluation	10	Mission	3,800	38,000
Knowledge Management Meetings	20	Meeting	500	10,000
Communication Strategy	1	Document	10,000	10,000
Website	1	Website	25,000	25,000
Trainings (Training of Trainers; Short Courses)	5	Sessions	3,000	15,000
Promotion and awareness	10	events	2,000	20,000
TOTAL				\$146,000

Annex Q: Annual Targets

	Indicators	Baseline (Year 0)	Year 1	Year 2	Year 3	Year 4
Project Goal: Improved energy consumption index and reduced annual growth rate of GHG emissions in the country's energy supply and energy end-use sectors	Reduction in the overall national energy utilization intensity (toe/1,000 US\$ GDP)	0.109	0.097	0.095	0.091	0.089
	Cumulative GHG emission reduction from fossil fuel utilization, tons CO ₂	0	1,713	4,108	6,579	9,242
Project Objective: Enabling the achievement of low carbon energy access, sustainable energy, and green growth targets of Niue	Cumulative fossil fuel savings due to sustainable energy and low carbon interventions implemented, toe	0	568	1,361	2,277	3,281
	% RE electricity production	1.8%	42%	64%	70%	73%
	No. of new jobs created in the application of sustainable energy and LC technologies and techniques in the energy supply and energy end-use sectors in Niue	0	1	3	5	8
Component 1: Improvements in Energy Integrated Development Policy and Planning						
Outcome 1: Improved policy and regulatory frameworks in the application of energy efficiency and renewable energy technologies in the energy end-use sectors	No. of approved and enforced RE and EC&EE policies, and associated guidance and implementing rules and regulations	0	1	2	2	2
	No. of formulated and approved policies and regulations incorporated in the country's Energy Act	0	1	2	2	2
Component 2: Institutional Capacity Building on Low Carbon Development						
Outcome 2: Effective enforcement of plans, policies and regulations, and implementation of programs/projects on the application of climate resilient and low carbon technologies in the end-use sectors	No. of sectoral integrated development plans that are implemented and managed through the established and adopted integrated institutional mechanisms	0	1	1	2	2
	No. of low carbon development initiatives facilitated by adopted and enforced institutional arrangements mentioned in Indicator 1	0	1	2	3	4
Component 3: Improvements in the Financing of Low Carbon Initiatives						
Outcome 3: Increased availability of, and access to, financing for sustainable energy, energy access and low carbon development initiatives in the energy supply and demand sectors	No. of developed and recommended financing schemes/mechanisms with Niue Development Bank for supporting climate resilient and low carbon development initiatives in the country	0	1	1	2	2
	No. of small-scale EE projects and RE technology projects financed either through the adopted financing scheme; or by private sector investment	0	1	2	4	6
	No. of recommended finance/fiscal policies for supporting initiatives on LC development	0	1	2	2	2
Component 4: Climate Resilient and Low Carbon Technologies Application						
Outcome 4.1: Climate resilient and low carbon	No. of completed feasibility assessments conducted for planned	0	1	2	3	4

techniques and practices adopted and implemented in the energy supply and energy end-use sectors	energy-integrated socio-economic development activities that feature RE and EE technology applications					
Outcome 4.2: Enhanced confidence in the viability of climate resilient and low carbon technology applications in the energy supply and demand sectors	Cumulative amount of energy savings from the successfully installed and operational demonstrations (including replications) of sustainable energy and low carbon technology applications, toe	0	0	0	184	368
	No. of RE and EE technologies application projects designed and financed for implementation as influenced by the results and outcomes of the demonstrations	0	0	1	3	5
Component 5: Enhancement of Awareness on Low Carbon Development						
Outcome 5: Enhanced levels of awareness and attitude towards climate resilient and low carbon development in the energy supply and energy end use sectors	Incremental no. of energy consumers (e.g., households) that will utilize EE appliances and RE-based energy generating and consuming equipment acquired through AREAN initiatives	0	10	40	100	160
	No. of local firms that can capably provide technical, engineering and maintenance services for sustainable energy and low carbon technology application projects	0	0	1	2	3

Annex R: Gender Equality Analysis

Gender Analysis for the “Accelerating Renewable Energy and Energy Efficiency Applications in Niue” (AREAN) Project

Summary

Context Analysis

The Niueans have been experiencing substantive changes in their lives over the past couple of decades. The lifestyle of a typical family is characterized by men acting as the household heads responsible for livelihoods while women stayed home and took care of family members. This lifestyle has become less common since Niue has shifted to monetary economy. Many women have jobs or run their own businesses. Food can be purchased from shops if one has income. Access to Auckland has become easier, too. The population of Niue is small (under 1,600) and are generally well-educated. Niueans are also well-travelled. Internet access is available, and people particularly young women and men are constantly exposed to new information through the internet. Many young people return from overseas (mainly New Zealand) after obtaining higher education and training. They are also bringing new or different values to communities.

A quick assessment of gender equality in Niue suggest a higher level of gender equality in the country. There is also gender parity in education in Niue. Girls in Niue tend to be slightly ahead of boys in educational achievement. More boys drop out from school than girls. More girls are applying for scholarships. Girls are also increasingly interested in STEM subjects. The Government is trying to keep boys in school by providing a more diverse range of subjects, including IT, enterprises development, etc. Niue has updated its school curriculum to address gender stereotypes. All primary school teachers are female. At the high school level, there are male and female teachers.

Women are well-represented in senior management level in the public service, although occupational segregation between men and women exists.

Women are under-represented in some professions such as firefighting and trades. But many women are actively engaged in the Village Councils as elected members.

Niue is currently leading the Pacific as the country with the highest percentage of women in the National Parliament at 25% (5 out of 20). However, no female MPs are in the current cabinet. Women have been represented in Parliament since the Niue Legislative Assembly was first established in 1974. Today’s 25% representation is the highest, and the level of representation has been uneven.

There are female Pastors and Deacons, although the situation varies from village to village. In some villages, women are not allowed to take up the role of Deacons.

Over 70% of businesses in Niue are owned by women. However, laws to protect women at workplace in the private sector are non-existent. The range of benefits available to female employees in the Public Service are not available to women in the private sector.

Women and men participate in the non-agricultural sector. In Niue, women and men are generally engaged in multiple functions. Families typically grow own crops in their family fields. Traditionally in Niue, there has been a clear division of labor in agriculture and fisheries. However, with modern technology and improved educational opportunities for girls and boys, the rationale for this division

of labor no longer applies. The one area where women's exclusion is strongly observed is canoe fishing. Only men can make and use canoes. Women may join canoe races as part of sporting events.

When it comes to health care, there are free reproductive health services. The status of maternal health is noted to be relatively good with no cases of women dying in childbirth since the early 1980's. Births usually take place at the hospital. Niue has a health referral system to New Zealand. There are female and male nurses, but no female doctors in Niue.

Substantial efforts to raise awareness in communities about gender equality and women's equal rights have been made in Niue through donor-funded development projects and partnerships. Communities have also been engaged in awareness raising relating to maternal health. Public Service employees have been participating in workshops and conferences overseas, including in relation to gender equality and women's empowerment.

Niue is not a UN member state, but eligible to ratify the Convention on the Elimination of All Forms of Discrimination against Women (CEDAW). Niue had agreed to the CEDAW, but only through ratification by New Zealand. In 2001, a recommendation was made for Niue to undergo a CEDAW compliance assessment to identify the extent to which Niue meets CEDAW indicators, with a focus on legislative compliance and non-discrimination. A draft report highlighted significant shortcomings in existing legislation. For example, there are no constitutional protections against discrimination on the grounds of sex. The Constitution was established during colonial times and has not been updated to keep pace with changes in New Zealand law. The gaps and challenges are noted in the draft national policy on gender equality. The draft policy identifies specific constraints related to the lack of awareness on gender equality, including a lack of technical capacity in undertaking the work, limited availability of sex-disaggregated data, the absence of systems to coordinate and monitor gender mainstreaming efforts, and inadequate funding to progress the work. Niue is not reviewed under the Universal Periodic Review (UPR) process due to its non-UN member state status.

There is no dedicated entity within the government system to address gender equality challenges in Niue. The focal point for domestic violence is the Police.

While the prevalence of domestic violence has not been surveyed, data from the police and health services indicate that both physical and psychological abuse are present in Niue, although most cases go formally unreported. Anecdotal evidence suggests that the community response to violence tends to be managed within the village or extended family network. On the rare occasions when complaints of sexual violations are made, they have either been withdrawn by the family (not the victim), or political intervention has been made on the offender's behalf and caused the case to be dropped. There are safe houses and counselling support services in Niue.

Progress in addressing this is underway with the drafting of the Family Law Bill which offers protection from family-based violence for women and children. The Government of Niue, with support from SPC's Regional Rights Resource Team is developing the legislation and have held a series of consultations with stakeholders.

There are few laws to support women in Niue. In 2001, a recommendation was made for Niue to undergo a CEDAW compliance assessment to identify the extent to which Niue meets CEDAW indicators, with a focus on legislative compliance and non-discrimination. A draft report highlighted significant shortcomings in existing legislation. For example, there are no constitutional protections against discrimination on the grounds of sex. The Constitution was established during colonial times and has not been updated to keep pace with changes in New Zealand law. The gaps and challenges are noted in the draft national policy on gender equality. The draft policy identifies specific constraints

related to the lack of awareness on gender equality, including a lack of technical capacity in undertaking the work, limited availability of sex-disaggregated data, the absence of systems to coordinate and monitor gender mainstreaming efforts, and inadequate funding to progress the work.

Key Statistics Leadership and Decision Making (from the Pacific Women Shaping Pacific Development website)

- 25 per cent of Niue's National Parliament is made up of women (5 out of 20 members).
- 38.2 per cent of management and decision-making positions are held by women.
- 61 per cent of women participate in the labour force (includes formal and informal economy).
- 8 per cent gender gap in the labour force participation rate (male to female).
- Data from the police and health departments indicate both physical and psychological abuse are present in Niue.
- Niue adopted CEDAW when New Zealand ratified in 1985. Niue's draft policy on gender equality recommends that a CEDAW compliance assessment be undertaken.
- 22.6 per cent is the contraceptive prevalence rate of women aged between 15-49.
- 100 is the Gender Parity Index for secondary school enrolment (gross) in 2014 – for every 100 boys enrolled, there were 100 girls enrolled.

Note: Statistics in this section are from the Asian Development Bank (2016) Gender Statistics: The Pacific and Timor-Leste report unless otherwise stated.

Possible implications for the AREAN Project

External factors have greatly contributed to the progress in gender equality in Niue over the last 20-30 years. The sustainability of the progress depends on how the notion of gender equality has taken its roots in the fabrics of society. Social changes influencing gender equality in Niue have been largely resulting from external factors and their direct/indirect consequences, rather than being evolved from within.

Only 30 or so years ago women were not allowed to speak directly in community meetings and in churches. Today there are many occasions where women are asked to speak in front of the congregations. However, the perception that women are not expected to be vocal remains in society.

Currently, the number of women in the Parliament is the highest in the history of Niue. Whether or not this will continue, or the number of women in the Parliament will increase, is uncertain.

In order to support the continued progress and to prevent the gains so far from being lost, the project should make explicit reference to the following in its planning and implementation:

- Facilitate involvement of both women and men in the use and benefits of new technologies introduced by the project.
- Facilitate compliance of the project with the UNDP standards in procurement procedures to ensure transparency in selecting private enterprises engaging in the project. If required, take measures to ensure opportunities are equally accessible for women and men, and that no one will be left behind.
- Make linkages between the potential of the project to promote economic opportunities / improved livelihoods for women and potential positive influence of women's economic empowerment over reducing domestic violence.

- Facilitate the protection of the rights of female workers in the private sector, particularly in the areas impacted by the project, and align the project's practices with the relevant international standards.
- Facilitate equal participation of women and men in the project implementation at all levels. Proactively providing opportunities to have some role in the project implementation for female students studying STEM subjects could be considered.

Annex S: Procurement Plan

Project Annual Workplan Activity or Task	Budget Code/ Child Code	Position/Title	Cost Per Year	No. of years	Total Cost	Y1-'19	Y2-'20	Y3-'21	Y4-'22	Recruitment Procedure	Level Type	Duration Type
Outcome 1- Output 1.1, 1.2, 1.3	71300	National Energy Policy Experts	\$ 7,500	4.00	\$ 30,000					Tender	National Consultant	Part-time
Outcome 1- Output 1.1, 1.2, 1.3	71200	International Energy Policy Experts	\$ 22,050	4.00	\$ 88,200					Tender	International Consultant	Part-time
Outcome 2- Output 2.1, 2.2, 2.3	71300	National Legal and Institutional Frameworks Experts	\$ 3,750	4.00	\$ 15,000					Tender	National Consultant	Part-time
Outcome 2- Output 2.1, 2.2, 2.3	71200	International Institutional Frameworks Experts	\$ 12,250	4.00	\$ 49,000					Tender	International Consultant	Part-time
Outcome 3- Output 3.1, 3.2, 3.3, 3.4	71300	National RE/EE Financing Mechanism Experts	\$ 4,000	3.00	\$ 12,000					Tender	National Consultant	Part-time
Outcome 3- Output 3.1, 3.2, 3.3, 3.4	71200	International RE/EE Financing Mechanism Experts	\$ 9,100	4.00	\$ 36,400					Tender	International Consultant	Part-time
Outcome 4.1- Output 4.1.3, 4.1.4	71300	National RE/EE Technology Experts	\$ 6,750	2.00	\$ 13,500					Tender	National Consultant	Part-time
Outcome 4.1- Output 4.1.3, 4.1.4??	71200	New budgetline 96.6k - 138 working days (split from contractual service) --> International RE/EE Technology Experts??	\$ 32,200	3.00	\$ 96,600					Tender	International Consultant	Part-time
Outcome 4.1- Output 4.1.1, 4.1.2, 4.1.3, 4.1.4	72100	International RET and Grid Stability Consulting Firm	\$ 75,200	3.00	\$ 225,600					Tender	Contractual Service	Part-time
Outcome 4.2- Output 4.2.1, 4.2.2, 4.2.3	71200	International RE/EE Technology Experts	\$ 64,050	4.00	\$ 256,200					Tender	International Consultant	Part-time
Outcome 4.2- Output 4.2.2	72100	International Grid Stability Consulting Firm	\$ 15,000	3.00	\$ 45,000					Tender	Contractual Service	Part-time
Outcome 5- Output 5.1	71200	International Energy Audit Expert	\$ 6,475	4.00	\$ 25,900					Tender	International Consultant	Part-time
Outcome 5- Output 5.2, 5.3	71200	International IT and Communication Expert	\$ 15,225	4.00	\$ 60,900					Tender	International Consultant	Part-time
Outcome 5- Output 5.3.2	72100	Consulting firm to carry out three (3) surveys	\$ 15,000	3.00	\$ 45,000					Tender	Contractual Service	Part-time
Distributed across Outcomes and PMU	71300/71305	Communications Officer	\$ 25,000	3.00	\$ 75,000					Tender	Local consultant	Full-time
Distributed across Outcomes and PMU	71400/71405	Project Manager (PM)	\$ 40,000	4.00	\$ 160,000					Tender	Professional Services	Full-time
Distributed across Outcomes and PMU	71400/71405	Project Officer	\$ 20,000	4.00	\$ 80,000					Tender	Professional Services	Full-time
Distributed across Outcomes and PMU	71400/71405	Finance Officer & Admin Officer	\$ 22,000	4.00	\$ 88,000					Tender	Professional Services	Full-time
Distributed across Outcomes and PMU	71400/71405	Chief Technical Adviser	\$ 45,000	2.50	\$ 112,500					Tender	Professional Services	Part-time
PMU	71200/ 71205	Mid-term evaluation Consultant	\$ 30,000	1.00	\$ 30,000					Tender	International Consultant	Part-time
PMU	71200/ 71205	Terminal evaluation Consultant	\$ 30,000	1.00	\$ 30,000					Tender	International Consultant	Part-time
PMU	71300/ 71305	Project Audit Experts	\$ 10,000	3.00	\$ 30,000					Tender	Govt Audit Office	Part-time
Total	Total				\$ 1,604,800							

Annex T: Knowledge Management Plan

The knowledge management system that will be employed in the proposed GEF project will consist of the conduct of training courses for pertinent personnel in the energy and utilities sector, as well as those in the village communities that will participate in the project activities. Coordination with the implementers of ongoing climate change and energy projects will be carried out to determine potential synergies in the knowledge management activities, particularly in the approach and methodologies that will be applied. Based on the preliminary assessments made during the scoping mission to develop this PIF, it is necessary to setup a capable project team comprised of competent local and international experts to expand the capacity of the local community people in the implementation of the relevant project activities. In addition, there will be special training for people who will be tasked to operate and maintain the various demo RE-based energy systems (power and non-power) that are part of the project. Among these are the operations personnel in NPC particularly in operating and maintaining on-grid solar PV power generation systems, and in addressing grid stability problems. Among the outputs of this project is an established and operational information exchange network for the promotion and dissemination of knowledge on low carbon development within and outside of the country (including other PICs and SIDS). Part of the project activities will be the establishment and operationalization of an energy supply and consumption monitoring and reporting, database to be housed in the DOU. This aspect of knowledge management, which involves the drawing on of information from a wide variety of sources, will be implemented, not only for the purpose of the country's energy planning but also to achieve an organized usage of knowledge about the energy situation in the country. This will be made possible through the information exchange network that will be established and operationalized under the project. With such network, data/information on lessons learned and best practices in the application of low carbon development techniques and practices, as well as implementation of sustainable energy and low carbon technologies specifically in small island settings, can be obtained from other PICs and SIDS, and applied to specific situations and localities in the country. The results of the project activities will also be disseminated to other PICs and SIDS through the information exchange network.