

Project Proposal

Solar Home Standalone (SHS) Systems for Funaota, Nukufetau, Tuvalu

Map 3: Example of an island with a big lagoon – Nukufetau



Source: <http://www.tuvalu.islands.com/maps/maps-index.htm>

Tuvalu Electricity Corporation (TEC)
July 2017

1. THE INVESTMENT

Project Title: Solar Home Standalone (SHS) Systems for Funaota

Location: Funaota, Nukufetau, Tuvalu

Sector: Energy

Executing Authority: Ministry of Public Utilities and Infrastructure (MPUI)

Implementing Agency: Tuvalu Electricity Corporation (TEC)

Project Background and Justification

The islet of Funaota is about 8 miles from the main island of Nukufetau and has been proposed by the Falekaupule (Island assembly) for business venture where it consists of a Committee, selected by the Falekaupule, and they are responsible for the overall management of the project. The team leader is part of this committee and he is responsible for the daily management and operation.

The aim of this development is to increase consumption of local food production to minimize the dependency of people on imported food. The project is also looked at opportunities to develop subsistence employment for the people and consequently to encourage them to continue living in the island.

On Funaota, there are infrastructures that have been established, an oil mill where resident have engaged in producing coconut oil and the by-product, they used it as pig feeds. The piggery, they used the pig waste as manure for the vegetable garden. They also had 3 farms of sea clam on the islet.

There are five families living on the islet to operate the project. The project has started for sometimes, and the families have earned monies from this development. The product they produce on Funaota are sold locally at the main island of Savave. The selling of their products are on weekly basis, and the amount received from the selling, part will be deducted for the family's wages and the rest will be deposited to the special account set up at the National Bank of Tuvalu.

There is no electricity on the island and there are plans to extend the business venture to sell fish, pork meat, vegetables, and others not only to the main settlement of Nukufetau but across the horizon to the Funafuti market, the seat of government. So to maintain the quality and freshness of these products, thus require cooling storage facilities to be established on the islet of Funaota.

As the business venture grows, more people will be living on the islet. With that it will become necessary to have infrastructures for the establishment of a school, a church, a community hall and health clinic.

The Government of Tuvalu through the Ministry of Home Affairs and Rural development requested the Tuvalu Electricity Corporation (TEC) for the establishment of a reliable and continuous power supply for the island of Funaota, Nukufetau.

On the 19th of June 2017, a TEC Senior Officer travelled to Nukufetau to conduct a scoping mission of Funaota with the aim of collecting all the necessary information needed for the establishment of a reliable and continuous power system for the islet.

With the distance of the Funaota from the main settlement of Savave, it is necessary to have a High Frequency (HF) radio for regular communication.

Project Objective

The Project aims to reduce the reliance on fossil fuels for electricity generation on Funaota. This is consistent with the priorities and strategies – Chapter 8 Falekaupule and the Outer Islands – of the National Strategy for Sustainable Development 2015 – 2020 (Te Kakeega III), which is to improve the well-being of the Tuvaluan people living in the outer islands by promoting the use of renewable energy resources through the implementation of cost effective, equitable, reliable, accessible, affordable, secure and environmentally sustainable energy systems.

The implementation of the Solar Home Standalone (SHS) Systems propose for Fonaota is a step towards achieving the above objective.

Project Description

The project has four key areas as detailed below:

Components	Details
Installation of SHS systems and HF radio at Fugaota	SHS system for the 5 households and a larger capacity system to provide power supply for the machineries and cooling storage facility. Also the installation of HF radio communication system.
Capacity Development	Mobilises additional resources to develop the capacity of TEC to maintain and provide technical support to the operations of SHS systems.
Educational and Awareness Enhancement	Feasible, practical and visible use of renewable energy for remote islands.
Monitoring and Evaluation of the Project	To assess the overall performance of the project over a 12-month operation following installation and commissioning.

Project Cost

SHS System Costing

No.	Description	Qty	Price (USD)	Comments
1	Solar Home Standalone (SHS) Systems and accessories	5	30,000	Price includes battery enclosure
2	SHS Systems to power the machineries and cooling storage facility (16-Panel Kit)and accessories	1 set	60,000	
3	Training & Installation Manuals	To suit	3,500	
4	Awareness Programme – Radio Tuvalu	To suit	1,000	
5	Signage & Labelling as per AS/NZS	10 sets	2,000	
6	Freight from overseas to Fiji	1	4,000	
7	Freight & insurance from Fiji to Funafuti	1	6,000	
8	Installation supervision & training	1	7,500	
9	Monitoring and Evaluation	To suit	2,000	
10	5% contingencies		5,800	
	TOTAL		\$121,800	

Telecommunication Costing

No	Description	Qty	Cost/Item	Total
1	HF radio and accessories	2	12,000	24,000
	Solar PV and accessories	2	15,000	30,000
2	Installation		5,000	5,000
	5% contingencies			2,950
			TOTAL	\$61,950

Other Interventions

The project is not done in isolation and there is a similar intervention that was implemented for the island of Niulakita and the islet of Funafala, Funafuti which recently commissioned earlier this year, 2017.

The project provides electricity to all households, church buildings, school and health clinic. The project also provides a cooling storage facility for business venture to enable the residents to raise their standard of living. These interventions have been strategically implemented to avoid duplication and promote cooperation and collaboration towards the development of Tuvalu.

Project benefits

The principal benefits of the Project will be the reduction in fuel consumption, reliable and secured electricity supply for the islet for economic development of Funafuti.

The Project will provides power supply for Funota and thus will (i) minimise the reliance on diesel oil, (ii) reduce the risk of marine species from oil spills, (iii) improve standard of living and promote local economic development.

Project Viability

The Tuvalu Electricity Corporation is currently feeling the impacts of the rising oil prices. This project will lead to a reduction of TEC oil bills as diesel oil is displaced by renewable energy and energy efficiency improves.

Project Implementation and Management

Component 1: Installation and Commissioning of SHS Systems Expected Result – SHS systems installed and operational at Fugaota	
<i>Indicative Activities</i> 1.1 Scoping mission to Funaota 1.2 Develop system design and tender documents for the supply and installation of the solar PV systems. 1.3 Procure, install and commission the SHS systems.	Have specialists to design, install and train the local technicians
Component 2: Capacity Development Expected Result – Local capacity developed to maintain and operate the installed SHS systems	
<i>Indicative Activities</i> 2.1 Conduct training and refresher courses for local engineers and technicians. 2.2 Exposure visits to other larger SHS systems with other interventions.	Local capacity to maintain and sustain the action
Component 3: Educational and Awareness Enhancement Expected Result – Increased visibility and understanding of SHS system and renewable energy issues in Tuvalu.	
<i>Indicative Activities</i> 3.1 Upgrade of TEC website – posting of action results, reports, etc. 3.2 Local Media Coverage – radio broadcasts	A vigorous awareness programme will contribute to the “buy-in” and effectiveness of the overall action.
Component 4: Monitoring and Evaluation Expected Result – Increased visibility and understanding of renewable energy issues in Tuvalu.	
<i>Indicative Activities</i> 4.1 Assess the operational performance of equipment.	A proper monitoring and evaluation process ensures the sustainability of the project

Project Sustainability

Sustainability of the project requires political will, institutional reform, improved infrastructure planning and management, effective regulations and legislation, cost control and financing.

The anticipated associated risks and possible contingency measures are presented in the respective components in the Table below:

Component 1: Installation and Commissioning of SHS Systems	
<i>Risk(s)</i>	<i>Mitigation Strategy</i>
Duplication of activities by other initiatives	Regular dialogue with indicated partners and other key stakeholders at the regional and national levels.
Component 2: Capacity Development	
Lack of resources to continuously provide the training	Incorporate capacity development activities as part of yearly staff development programme
Component 3: Educational and Awareness Enhancement	
Impact of awareness and public relation work is notoriously difficult to measure. There is a risk that information is not understood by the audience.	Local expertise will be used and where possible local languages will be used.
Component 4: Monitoring and Evaluation	
Negligence may result in premature failure of the project	Devise and institute monitoring and evaluation procedures.

Project Outputs

The project outputs are; (i) minimise the use of diesel fuel for power generation, (ii) reduce Tuvalu's GHG emissions, and (iii) secured power supply for Funaota.

Financing Mechanism

This proposal has been structured to seek funding for the implementation of SHS system and HF radio for Funaota islets over the period of 2017-2018. The 11/2-year term is seen as a crucial period for the energy sector particularly with the achievement of the 100% renewable energy target by 2020.

The proposal has an estimated overall cost of **US\$183,750** over 11/2-year period.

2. TUVALU

The Country

Tuvalu formerly known as the Ellice Islands, is a Polynesian island nation located in the Pacific Ocean, about midway between Hawaii and Australia and about 1100 km north of Fiji. Tuvalu consists of five atolls and four reef islands. The atolls are Funafuti, Nanumea, Nui, Nukufetau and Nukulaelae, while Nanumaga, Niutao, Vaitupu and Niulakita are single islands. Approximately 58% of the population of Tuvalu are located in Funafuti on which the capital of Tuvalu. The total land area is 26km² and the EEZ is 900,000km² in area. Tuvalu's legal tender is the Australian dollars. The languages in the country are Tuvaluan (Polynesian) and English. The 2012 census indicates 42% of the population are living in the outer islands.

Economy

Tuvalu is very small atoll economy with the prosperity of the economy hampered by limited natural resources, few industries, and limited export opportunities. Subsistence farming and fishing are the main economic activities. Commercial license fee earnings, remittances from overseas workers, official transfers, and income from the Tuvalu Trust Fund (TTF) and the Falekaupule Trust Fund (FTF) have provided the country with the main sources of income. Tuvalu is very dependent on external assistance with development aid amounting to over 33% of GDP.

Political/Legal

In 1975 the Ellice Islands became the separate British colony of Tuvalu. Tuvalu gained independence on 1st October 1978. The government of Tuvalu operates as a parliamentary democracy mirrored on the British system of Government.

The Electricity Act 1996 has been further supported and strengthened by the enacted New Public Enterprise Act 2009 which emphasis that every Trading Enterprise shall be operated as a successful business.

3. ELECTRICITY SECTOR

Capacity

Tuvalu had total installed diesel capacity of 1.8MW with 755kW of solar PV grid-connected and 1.2MW of PV Off-grid systems in the outer islands. At present 28% of the power generation mix is taken up by renewable energy, in particular solar PV.

Electrification

Currently 100% of the population has access to electricity. The total number of electricity consumers as of March 30, 2017 was 2,249.

Electricity Tariff

Tuvalu had a differential tariff and became effective since 2008. There has not been any changes to the existing tariff since its adoption.

	Block	Outer Islands	Funafuti
Domestic	1-50kWhr	0.29	0.30
	51-100kWhr	0.38	0.39
	Above 100kWhr	0.55	0.56
Commercial		0.55	0.56
Government		0.55	0.56

Policy & Plans

Tuvalu has developed its Renewable Energy and Energy Efficiency Master Plan (REEEMP) to achieve its target of 100% renewable energy for power generation by 2020. The Plan sets out the way forward to generate electricity from renewable energy and to develop an energy efficiency programme in Tuvalu.

Tuvalu has two stated goals:

- To generate electricity with 100% renewable energy by 2020
- To increase energy efficiency on Funafuti by 30%.

To meet this target, Tuvalu must develop 6 MW renewable energy electricity generation capacities. The initial capital cost of solar arrays, wind turbines and batteries to replace the current energy demand is estimated to be AUD\$52 million.

4. Tuvalu Electricity Corporation (TEC)

Background

TEC is an incorporated entity under the Tuvalu Electricity Corporation Act 1991. Under this Act, TEC is authorized to generate and distribute electricity to all parts of Tuvalu. Presently, TEC supplies electricity to the eight islands of Tuvalu. The Act further states that TEC has the “sole and exclusive right to supply electricity for sale within any supply area”. Where TEC is unable to provide a reasonable supply of electricity (Section 6.2 of the Act) arrangement may be made for a license to supply to be issued to a third party.

Financial Performance

During 2016 TEC recorded a net operating loss of AUD\$1.5million on total income of AUD\$4.2million out of which income generated from electricity sales was AUD\$3.2million. Out of total expenses of AUD\$5.7million, imported fuel contributed AUD\$2.1million or 37% of total expenses. As end of December 2016 the corporation had gross fixed assets of AUD\$2.6million. The total equity of the corporation was AUD\$0.988million and the debt to equity ratio of 0.9.

HIGHLIGHT OF TRANSECTIONS

- » Strong rationale for solar due to high cost of diesel.
 - » Feasibility Study completed
 - » Strong Government of Tuvalu commitment for development of renewable energy to meet goal of 100% renewable energy by 2020.
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Contact Person:

Mr Mafalu Lotolua
Tuvalu Electricity Corporation (TEC)
Ministry of Public Utilities and Industries (MPUI)
Funafuti, Tuvalu
Tel: (688) 20352/20357/20358
Email: mafaluloto2@gmail.com