



ACP MEAs



# Overview of Potential CDM Project Opportunities in Vanuatu

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Department of  
Meteorology and Climate  
Change  
Ministry of Infrastructure  
and Public Utilities  
**Vanuatu**

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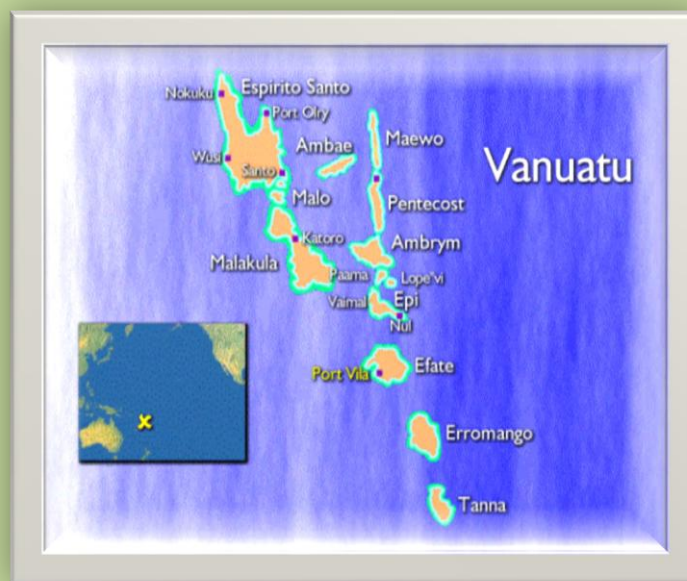
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# 1. About Vanuatu

## 1.1 Location, Population, and Climate Conditions

### Location

Vanuatu is an archipelago of volcanic islands and submarine volcanoes located between latitude 12° and 23° south and longitude 166° to 173° east, some 1,300 km from north to south in the Western Pacific Ocean. It comprises over 80 islands with land area of 12,336 km<sup>2</sup> and a maritime exclusive economic zone of 680,000 km<sup>2</sup>. The two largest islands, Espiritu Santo and Malekula comprise nearly 50% of the total land mass. The total coastline is about 2,528 km long.



Map of Vanuatu

### Population

The estimated population of Vanuatu is 260,505 (Feb 2012.) with an annual population growth rate of 2.6% distributed amongst 36,415 households. Approximately, 16% of the population live in Port Vila and 6% on Luganville, the two main urban centres. This means about 80% of the population live in other provinces and islands, and can be classified as rural.

Table 1. Population in Major Cities of Vanuatu

City	Population	Year
Port Vila	51,319	2012
Luganville	14,427	2012
Port Olry	3,042	2012

### Climate

The climate in Vanuatu varies from wet tropical in the northern islands to dryer subtropical in the south of the archipelago. Average temperatures range between 21°C and 27°C and average humidity ranges between 75% and 80%.

*Table 2. Quick Facts about Vanuatu*

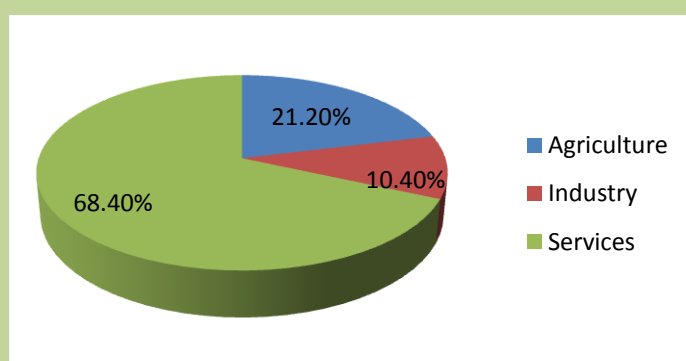
<b>Region :</b>	Oceania
<b>Capital :</b>	Port Vila
<b>Climate :</b>	Tropical; moderated by southeast trade winds
<b>Languages :</b>	English French Pidgin English
<b>Currency :</b>	1 Vatu (VT) = 100 centimes
<b>Holiday :</b>	Independence Day is 30 July (1980), Unity Day is 29 November

## 1.2 Economic and energy profile

### Key Economic Sectors

Vanuatu is considered a Small Island Developing State (SIDS) and a Least Developed Country (LDC). Over the last several years, Vanuatu has become one of the fastest growing economies in the Pacific region driven primarily by agriculture, tourism, construction, and aid inflows. The economy of the country comprises a large smallholder subsistence agricultural sector and a small monetized sector. Small-scale agriculture provides for over 65% of the population while fishing, offshore financial services and tourism also contribute to the government revenues. The main agricultural products are copra, kava (*Piper methysticum*), cocoa, coffee, taro, yams, fruits and vegetables, beef and fish.

*Figure 1. GDP Share by sector (Data released on February 2012)*



*Table 3. Vanuatu - Macroeconomic Data*

	2008	2009	2010	2011
Real Gross Domestic Product (GDP) (VT billions)	34.951	36.104	37.188	38.596
Real GDP Growth Rate (%)	-1.6730	3.300	3.000	3.787
Inflation Rate (from GDP Price Deflator) (%)	5.793	4.520	3.699	-0.8870
Exchange Rate US Dollars (VT/\$)	101.330			

### Energy Consumption

In Vanuatu commercial energy consumption is entirely dependent on imported petroleum. Transport accounts for about 52% of total internal petroleum consumption; power generation, 33%; the domestic sector (9%), while the commercial/industrial sector accounts for only 5% of

commercial energy. There is no evidence of any real energy shortage in the economy and growth till date.

### **Electrification**

An estimated 27% of the Vanuatu population has access to electricity. Access rates in the main urban centres of Port Vila and Luganville are relatively high at about 75%, dropping off considerably in rural areas. Power is supplied to the main urban areas of Port Vila, Luganville, East Malekula and Tanna under a concession arrangement to a private power company UNELCO (subsidiary of the SUEZ group). The power generation in Vanuatu is prominently from diesel fired generators. Since Vanuatu is not having indigenous sources of fossil fuels, cost of power generation is high.

Vanuatu has taken steps to improve regulation and expand access to electricity. The 2007 Utility Regulatory Authority Act strengthens regulatory oversight of the power and water sectors. The performance of UNELCO is monitored by this Act and any cost savings is passed on to consumers. In the same year, the government issued the National Energy Policy and Rural Electrification Master Plan to help expand access to electricity in rural areas. The decision to regulate electricity generation is a welcome development, and the government has already sought international assistance to implement it. A number of development partners are helping Vanuatu to reduce power costs by developing renewable energy projects, improving the energy intensity of the economy through demand-side management; and providing financial support for clean energy projects.

## **2. Climate Change and CDM in Vanuatu**

Vanuatu is among the countries in the Pacific region that are most vulnerable to the risks of climate change, climate variability and sea level rise. The livelihood of people and economy are inter-woven, shaped and driven by climate sensitive sectors. The effect of climate and sea level change are already very real and pose a tangible threat to the future socio-economic well-being of Vanuatu.

Climate change is likely to impact on all sectors that are pertinent to the sustainable development of Vanuatu. As a Least Developed Country (LDC), the country will be severely constrained financially and in terms of human and institutional capacity, to meet the challenges of this additional stress. For the people of Vanuatu, their livelihood and social structure are inextricably linked to the natural environment and its resource base. Any perturbations to this availability of natural resources will have a direct bearing on the poverty levels and the very survival of the people. Changes to the traditional social system, coupled with any decrease in food security and water availability, could lead to deterioration of social systems and law and order.

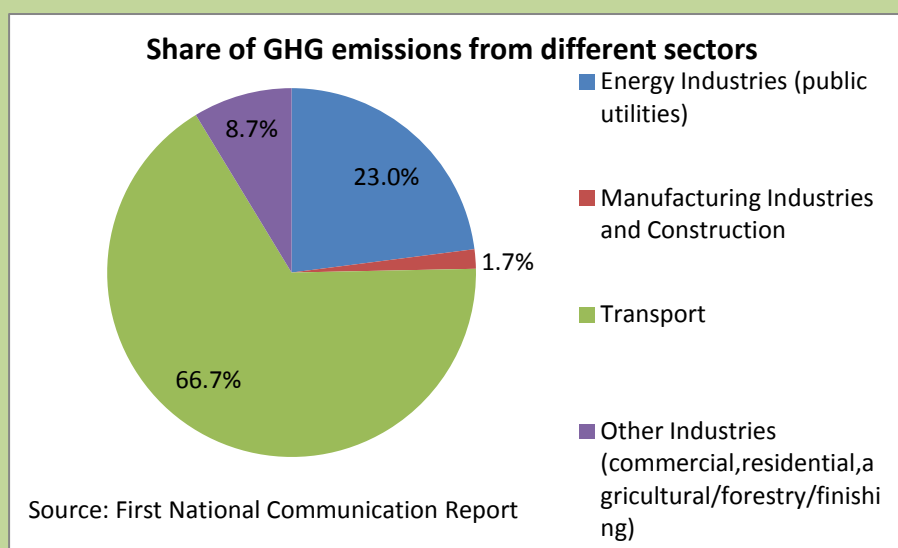
Overall, the country is extremely vulnerable to natural disasters. According to the Commonwealth Vulnerability Index, Vanuatu ranks as the world's most vulnerable country out of 111 developing countries assessed. Due to this high vulnerability, Vanuatu is still accorded UN-listed least developed country (LDC) status despite a per capita GDP above the LDC threshold.

## 2.1 Main sectors for GHG emissions

The Vanuatu assessment of GHG emissions employs IPCC 1996 guidelines and the relevant OECD and IEA guidelines. In all cases the IPCC guidelines default emission factors and conversion coefficients are used.

The National Greenhouse Gas inventory focuses on energy, transport, agriculture, land-use and forestry sectors. This decision reflects the small volume of solvent and other product use in Vanuatu; the small size of Vanuatu's industrial sector; the lack of information about GHG generation from these sectors; unreliable reporting formats; the lack of previous work to characterise waste generation; and the relative quantity of GHG emitted by various sectors and the global warming potential of gases produced.

*Figure 2. Share of GHG emissions from different sectors*



## 2.2 Mitigation of Greenhouse Gases

The following sectors are considered strategic to GHG reduction in Vanuatu:

- **Power Generation through Renewable Resources:** Vanuatu is well endowed with renewable energy sources such as hydro, solar, biomass, wind, and coconut bio-fuel and geothermal. These resources offer considerable potential to provide Vanuatu with a diverse energy supply sources and reduce its dependence on imported fossil fuels.
- **Energy Efficiency and Conservation in transport, lighting, buildings, industries and supply side energy efficiency:** Energy efficiency is an area where Vanuatu can make immediate, low-cost emissions reductions.
- **Solid Waste Management:** There is no waterborne sewerage system in any part of Vanuatu including main urban areas. In urban areas the majority of households use latrines that flush to septic tanks. Almost 50% of rural households have a pit latrine, many of which are open pits. In the urban areas the proximity of unhygienic sanitation facilities to both formal and informal water sources is a significant concern. Sludge collection and disposal, for all Efate Island is done by commercial operators. The collected sludge is transported by tankers and discharged into a pit within Bouffa sanitary landfill to the east of Port Vila.



Potential mitigation opportunities exist through avoiding methane emissions by anaerobic decomposition of sludge through methane capture and utilization.

- Biofuel usage in Transport: Vanuatu is heavily dependent on petroleum fuels for all its transportation needs. Government of Vanuatu under National Energy Policy aims to promote and encourage research, development and sustainable use of biofuels in transportation.
- Use of renewable energy sources for rural electrification: Under Vanuatu National Energy Policy Framework goal for rural electrification is provision of electricity to 20% of the rural population by year 2017.
- Forestry: Forests are converted to agricultural land due to the need for small-scale subsistence farming, or for cattle grazing as a response to the international demand for Vanuatu's high- quality beef. Infrastructure and tourism development as well as large scale agriculture along the coastlines force the former occupants to move inland and convert more forests for the livelihoods.

### **2.3 Clean Development Mechanism (CDM) in Vanuatu**

Vanuatu is classified as a non-Annex I country under the United Nations Framework Convention on Climate Change (UNFCCC). The country has ratified the Kyoto Protocol in 2001. The Republic of Vanuatu has appointed a Designated National Authority (DNA) to fulfil its obligations under the Kyoto Protocol, thereby supporting the implementation of investment projects in Vanuatu under the Clean Development Mechanism (CDM) that will lead to the reduction of greenhouse gases regulated by the Kyoto Protocol.

The DNA is proposed to be established in the Vanuatu Meteorological & Geo Hazards Department, with the National Advisory Committee on Climate Change (NACCC), an interdepartmental committee made up of senior officers from across government and mandated by the Council of Ministers, Government of Vanuatu as overseeing body to issue binding recommendations for the DNA when answering requests for issuing of Letters of No Objection (LNO) or Letter of Approval (LOA).

The DNA Operational Guideline has been endorsed by the NACCC and is currently awaiting approval by Council of Ministers, which is expected to be completed in June 2012. Contact details for the Vanuatu DNA is on the back-cover of this booklet.



### 3. Potential CDM Project Opportunities

#### 3.1 Port Vila Biogas Project

##### Background

The sanitation system in Port Vila is largely decentralized, consisting of privately managed household and commercial septic tanks for the collection of human waste. These allow the decomposition of the waste but the process leaves sludge as a by-product. Periodically the residual sludge is removed by private service providers through tankers and disposed of at a site designated and maintained by the Port Vila Municipality.

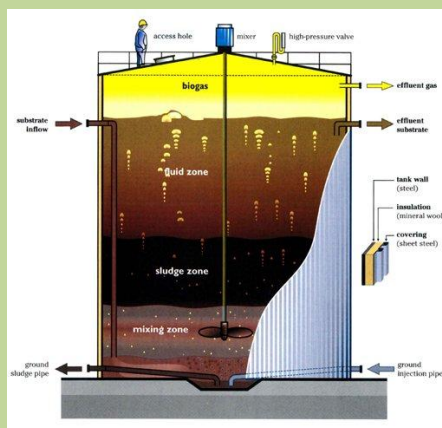


Figure 3. Typical Anaerobic Digester for Municipal Sludge

##### Project Description

The proposed project aims at providing safer sanitation services to all the residents of greater Port Vila. The existing highly unsatisfactory sludge disposal method shall be replaced by installing a well-designed and properly managed anaerobic sludge treatment facility. The biogas generated will be captured and utilized for electricity generation at a new site to be purchased, close to port Vila Golf and Country Club. On an average, it is estimated that 138,000 m<sup>3</sup> of biogas will be generated annually which is estimated to generate 275 MWh of electricity per year. The estimated project cost for this phase is US \$7.7 million.

##### CDM Aspect

The proposed project activity will reduce CH<sub>4</sub> emissions from avoided open anaerobic treatment of sludge and CO<sub>2</sub> emissions from avoided equivalent diesel based electricity generation. The estimated annual emission reductions from the project activity are 4200 tCO<sub>2</sub>e. Project activity meets the criteria's of additionally for Micro Scale project activity.

##### Project Schedule

The project is expected to be operational by 2015. The first CER delivery is expected in 2016.

##### Contact Information

The project proponent is Port Vila Municipality /Ministry of Infrastructure and Public Utilities, Government of Vanuatu. The contact details are as follows:

Contact Person: Willie Watson

Address: Public Works Department, George Pompidou C/o PO Box 472, Port Vila, Vanuatu

Telephone/Fax: +678 26351

## 3.2 Brenwe River Mini- Hydropower Project in Malekula, Vanuatu

### Background

Electricity supply throughout Vanuatu is dominated by diesel generation, resulting in very high tariff. The power supply in Malekula island (second largest island in Vanuatu) where the proposed project is planned is limited, which constraints the economic development on the island

### Project Description

The proposed project activity is a run-of-river hydropower project. The proposed hydropower station will be located in the Brenwe River in the North West of the Malekula Island, Malampa Province.



*Figure 4. Brenwe Small Hydro Power Project proposed Site in Malekula, Vanuatu.*

The project will have installed capacity 1200 kW and will have 20 KV transmission lines for a distance up to 30 km. The project is expected to stimulate economic development in the region and support development of local industry like agriculture and fishery.

### CDM Aspect

The project activity would contribute to reduction of CO<sub>2</sub> emissions that in the absence of the project activity would have been generated by addition of otherwise happened by diesel fired power plants. The estimated annual emission reductions from the project activity are 4,241 tCO<sub>2</sub>e. Project activity meets the criteria's of additionally for Micro Scale project activity.

### Project Schedule

The project will be implemented over a period of two years, inclusive of detailed design, procurement and construction activities. It is expected to be commissioned by 2014. The first CER delivery is expected in 2015.

### Contact Information

The project proponent is Department of Energy under the Ministry of Lands and Natural Resources (MLNR), Government of Vanuatu. The contact details are as follows:

Contact Person: Leo Moli / Benjamin Jesse

Address: Department of Energy, PMB 9067, Port Vila, Vanuatu

Telephone/Fax: +678 25201/+678 5333840

Email Address: lmoli@vanuatu.com.vu, benjaminjes@gmail.com

### **3.3 Wambu Hydropower Project, Santo Island, Vanuatu**

#### **Background**

The Espiritu Santo Island (largest island in Vanuatu) where the proposed run-of river hydro project is planned is virtually un-electrified except for town of Luganville (second largest town after Port Villa in Vanuatu). The town of Luganville is supplied with grid connected electricity which is supplied by Vanuatu Utilities and Infrastructure Ltd (VUI). The electricity comes from a diesel power generator based on Luganville and from the Sarakata Hydro Power Station.

#### **Project Description**

The proposed Wambu River Mini Hydro Scheme is located West of provincial capital Luganville in Santo Island. Project will have an estimated power generating capacity of 4 MW and equivalent annual energy production of 18.35 GWh.



*Figure 5. Wambu Small Hydro Power Project proposed Site in Santo Island, Vanuatu*

The project activity will help island of Espiritu Santo to meet its increasing load demand and to reduce reliance on diesel power during the daytime and also aid development in neighbouring island Aore.

#### **CDM Aspects**

The project would contribute to reduction of CO<sub>2</sub> emissions that in the absence of the project activity would have happened by diesel fired power plants for equivalent electricity generation. The estimated annual emission reductions from the project activity are 11,569 tCO<sub>2</sub>e.

Project activity meets the criteria's of additionally for Micro Scale project activity.

#### **Project Schedule**

The project will be implemented over a period of three years inclusive of detailed design, procurement and construction activities. The project is expected to be commissioned by 2015. The first CER delivery is expected in 2016.

#### **Contact Information**

The project proponent is Department of Energy under the Ministry of Lands and Natural Resources (MLNR), Government of Vanuatu. The contact details are as follows:

Contact Person: Leo Moli / Benjamin Jesse

Address: Department of Energy, PMB 9067, Port Vila, Vanuatu

Telephone/Fax: +678 25201/+678 5333840

Email Address: lmoli@vanuatu.com.vu, benjaminjes@gmail.com

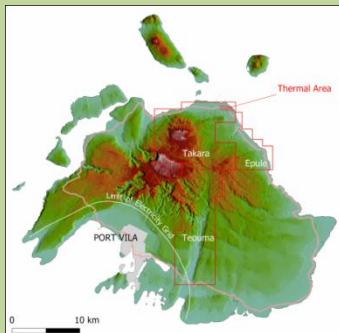
### 3.4 Efate Geothermal Power Project Phase 1

#### Background

Electricity supply throughout Vanuatu is dominated by diesel generation resulting in very high tariff. Vanuatu's national electrification rate is only some 28%, reflecting low affordability and accessibility. The country needs additional generation sources to meet its increasing power demand and to foster economic development. Geothermal power is not only less costly than other generation alternatives, but also yields positive net economic benefits.

#### Project Description

The proposed project activity is the construction and operation of a 5 MW geothermal power station. The Efate (Phase 1) geothermal power generation project, located at Takara springs on Efate island of Vanuatu, will be constructed and operated by Australian geothermal company Kuth Energy Ltd.



*Figure 6. Geothermal Tenements for the Proposed Efate Geothermal Power Project in Vanuatu.*

Based on the various studies carried out and considering the resource temperatures at Takara a binary cycle technology has been identified as the most appropriate technology for the project. The electricity will be exported by a transmission system which would comprise a 11/60 kV generation substation, a single 60 kV transmission circuit and 60/20 kV interconnection substation at Tagabe.

#### CDM Aspects

The baseline scenario for this project is diesel based electricity generation with very high operational costs due to high costs of diesel. The estimated annual emission reductions from the project activity are 19,237 tCO<sub>2</sub>e. Project activity meets the criteria's of additionally for Micro Scale project activity.

#### Project Schedule

The tentative project schedule is as below:

First Slim hole drilling: August 2012

Start of Construction: June 2013

Commissioning: 2015

### **Contact Information**

The project proponent is Department of Energy under the Ministry of Lands and Natural Resources (MLNR), Government of Vanuatu. The contact details are as follows:

Contact Person: Tim Hewatt

Address: C/- Barrett & Partners, 1<sup>st</sup> Floor, B & P House, Lini Highway, Port Vila, Vanuatu

Telephone/Fax: +678 7744657/ +678 22317

Email Address: tim.hewatt@kuthenergy.com

## **3.5 Efate Geothermal Power Project Phase 2**

### **Background**

The Takara license area has a conservative geothermal power potential of 9.6MW. Following successful implementation of first unit (5 MW gross) it would be followed by a second unit (5 MW gross). The project will be constructed and operated by Australian geothermal company Kuth Energy Ltd.

### **Project Description**

The project will utilize the same binary cycle technology as in first phase.

The baseline scenario for this project is diesel based electricity generation with very high operational costs due to high costs of diesel. The estimated annual emission reductions from the project activity are 19,237 tCO<sub>2</sub>e. The project is expected to start operation in 2019.

### **CDM Aspects**

The baseline scenario for this project is diesel based electricity generation with very high operational costs due to high costs of diesel. The estimated annual emission reductions from the project activity are 19,237 tCO<sub>2</sub>e.

Project activity meets the criteria's of additionally for Micro Scale project activity.

### **Project Schedule**

The tentative project schedule is as below:

First Slim hole drilling: August 2012

Start of Construction: June 2017

Commissioning: 2015

### **Contact Information**

The project proponent is Department of Energy under the Ministry of Lands and Natural Resources (MLNR), Government of Vanuatu. The contact details are as follows:

Contact Person: Tim Hewatt

Address: C/- Barrett & Partners  
1<sup>st</sup> Floor, B & P House, Lini Highway  
Port Vila, Vanuatu

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Email Address: tim.hewatt@kuthenergy.com

### 3.6 Disseminating Solar Lamps and Efficient Cook Stoves in Pacific Island Countries

#### Background

The domestic energy supply for the vast majority of rural households in Pacific Island Countries is limited to kerosene lamps for lighting and open fire systems wherein woody biomass is burnt for cooking.



*Figure 7. Women Using Open Fire cooking system*

#### Programme Description

The proposed Programme of Activity (PoA) aims to replace kerosene lamps with portable solar lighting systems and inefficient open fire cooking system with efficient cook stoves.

The proposed PoA will be implemented and coordinated by Green Power. Green Power is ‘for trading’ arm of Vanuatu Renewable Energy and Power Association (VANREPA); a non profitable organization. Green power primary focus is **to** import and sell solar lights and efficient cook stoves in Vanuatu and other neighbouring PICs. Program is a voluntary action by Green Power and is not required by law in any of the country where program will be implemented.

The program will be rolled out initially in four Pacific Island Countries, namely: Papua New Guinea (PNG), Solomon Islands, Fiji and Vanuatu.



*Figure 8. Solar Lamp and Efficient Cook Stove planned to be disseminated under the PoA*

### **CDM Aspects**

In the absence of this program the baseline scenario would be continued usage of kerosene lamps for lighting and inefficient open fire system for cooking. The increased efficiency of the stove and reduced kerosene usage will reduce carbon emissions to the atmosphere as well as reduce harmful emissions known to have negative health impacts.. The programme lifetime will be 28 years and is expected to generate 725,177 tCO<sub>2</sub>e over period of 10 years.

### **Project Schedule**

The first CPA under the programme will be rolled out in Vanuatu

The tentative project schedule is as below:

Earliest Program starting date : June 2013

Expected first year of CER delivery: 2014

### **Contact Information**

Green Power will be the Programme coordinating/managing entity. The contacts details are detailed below:

Contact Person: David Stein

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Telephone: + 678 24610

Email Address: [solarsolutions@vanuatu.com.vu](mailto:solarsolutions@vanuatu.com.vu)



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