

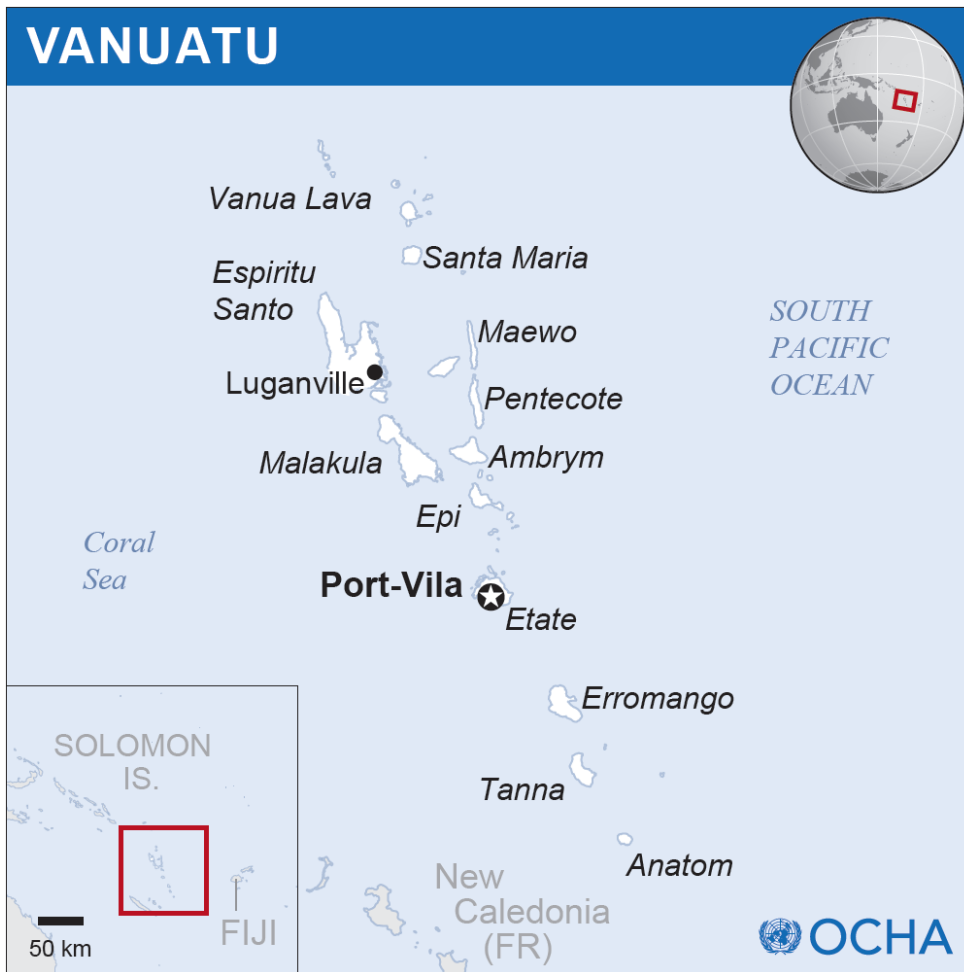


# SCALING UP RENEWABLE ENERGY IN LOW INCOME COUNTRIES (SREP)

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Investment Plan for Vanuatu

# Country Context



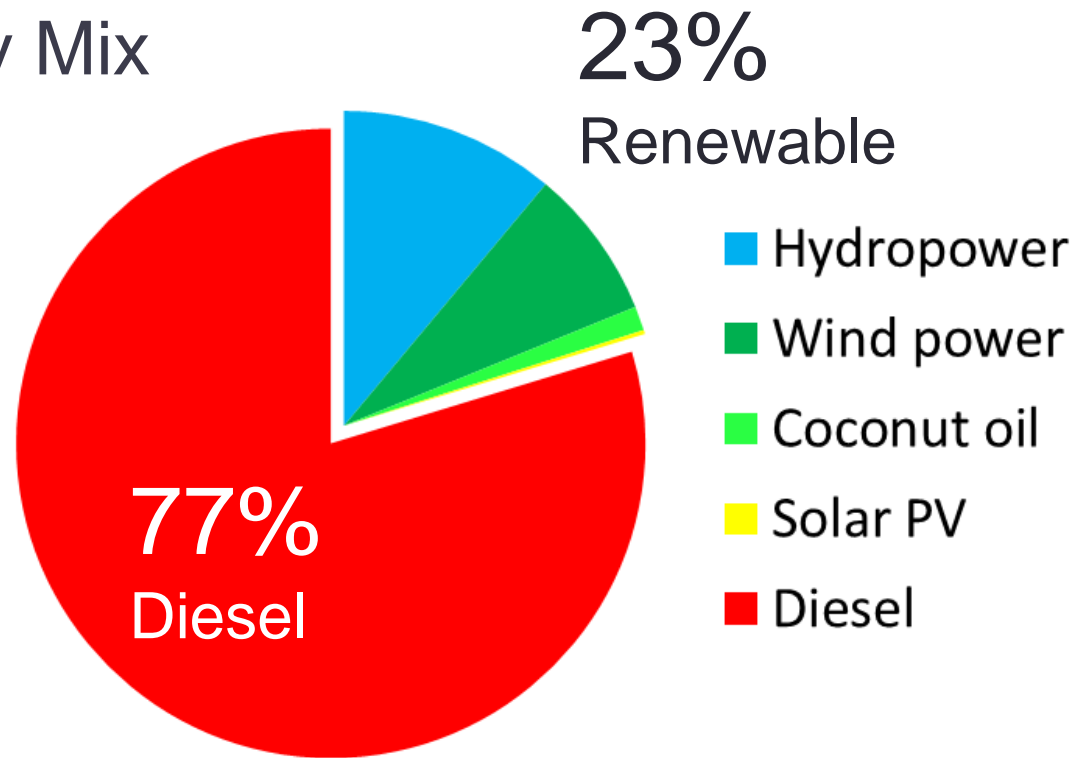
- Population: 270,000
- Over 82 volcanic islands in the South Pacific (65 inhabited)
- 4 islands with grid systems

Map Sources: ESRI, Gov't. of USA, UNCS.

The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by the United Nations. Map created in Sep 2013.

# Energy Sector Context

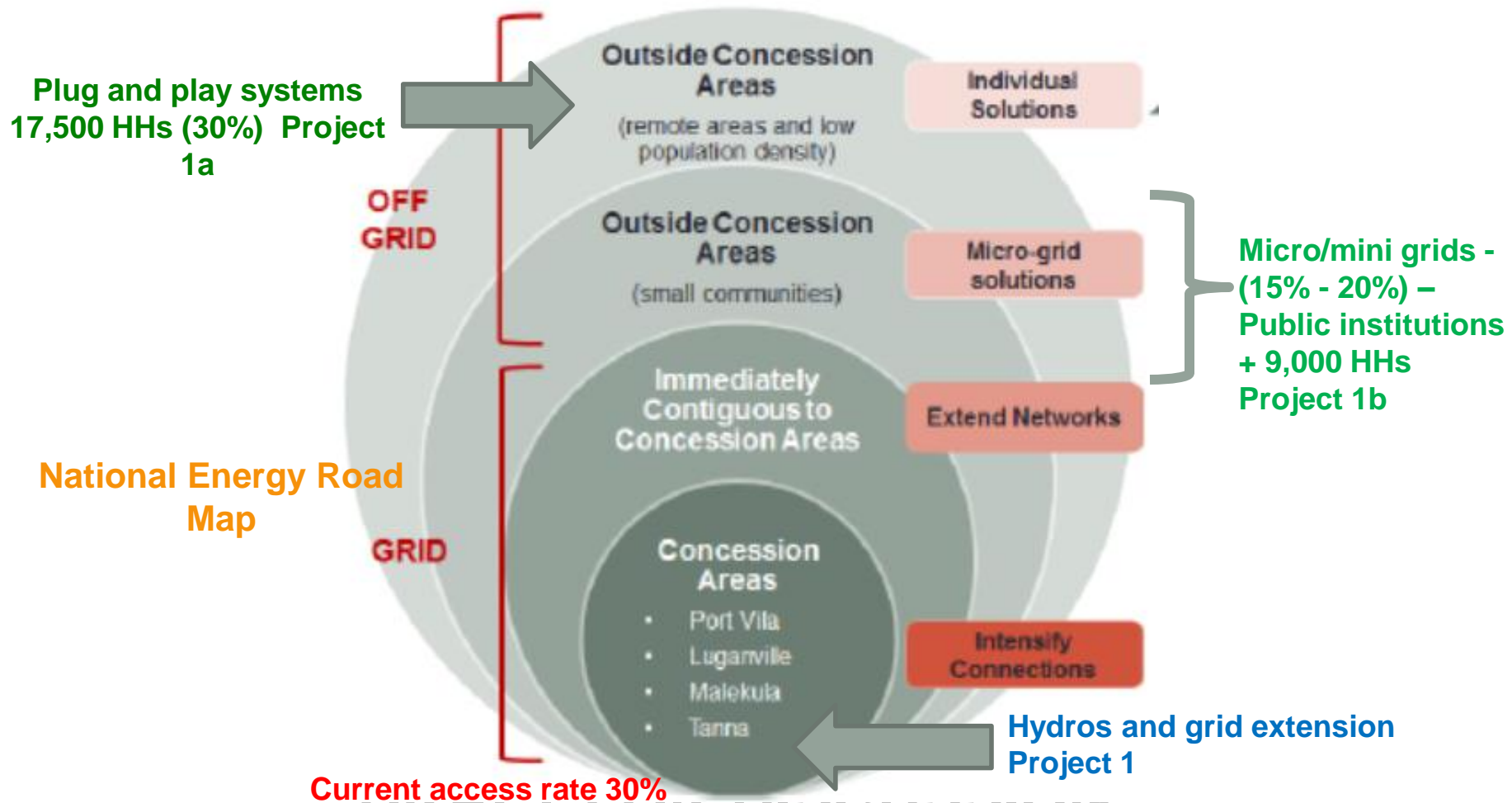
## Vanuatu Energy Mix



- **No fossil fuel reserves**
- Heavy reliance on Diesel
- **73%** of households **without access** to electricity

# Vanuatu rural electrification program

*increasing access from 30% to over 80% with renewable energy*



# Renewable Energy Potential – Grid connected

TECHNOLOGY	DESCRIPTION
Small Hydropower	One existing plant (1.2 MW). 6 GWh potential from identified additional projects on Santo and Malekula. Good for baseload power.
Solar PV	Good solar resources. 130 kW installed, additional 510 kW roof & ground mounted and 1.3 MW ground mounted planned.
Biofuel	Some existing diesel generators partially fueled by coconut oil (CNO). However, this is heavily reliant on sustainable production of CNO, which has large price variability.
Biomass	Wood residue insufficient for even a 100 kW gasifier. May be potential for use of coconut husks but difficult to gather (lack of roading, etc.)
Wind	Currently 11 turbines with 3 MW capacity. Several potential sites, but uncertainty regarding wind resource. Good sites often located distant from roading/distribution infrastructure.
Geothermal	No existing plants. 2 x 4MW project proposed but drilling not yet commenced. Very good source of baseload power.

# Renewable Energy Potential – Off-grid

## TECHNOLOGY

## DESCRIPTION

### Pico Solar lanterns

Small solar / battery system integrated in a lantern, with power output usually about 1-10 W. Provides an entry-level solution to rural home lighting.

### Solar systems for buildings

Solar panels, batteries and lights that can be installed throughout a dwelling. Step up from solar lanterns as a more permanent lighting solution for multiple rooms. Can be fixed or “plug and play”.

### Micro-grids and nano-grids

Small networked systems that supply electricity to multiple buildings ranging from several buildings to entire communities. Can utilize a variety of generation technologies including wind, solar, hydro, or diesel/biofuel.

# SREP IP for Vanuatu

- SREP IP develop by GoV in collaboration with the WB
- SREP IP worth of \$14 M
  1. Rural Electrification Project (\$7 M)
  2. Small Hydro Project (\$7 M)
- Two (2) Public Consultation Workshops (Options Paper and Draft final IP)
- Cabinet Endorsement of the SREP IP in October 2014

# Rural Electrification Project (\$7 M SREP)

TECHNOLOGY	PROJECTS	DESCRIPTION
Standalone solar	Plug and play solar PV systems	<p>Electrification of approximately 17,500 households, 2000 community halls and 230 aid posts. PV systems of 5 to 30 W peak capacity.</p> <p>Will provide feasibility studies and TA and project management support to DoE</p>
Microgrids	Standalone solar or Microgrids for households and public institutions	<p>Provide electricity to homes and institutions (including 35 health centers, 250 primary schools, and 20 secondary schools) through standalone solar systems and/or microgrids.</p> <p>Will provide feasibility studies and TA for business model and transaction advisory</p>



# Small Hydro Project (\$7 M SREP)

TECHNOLOGY	PROJECTS	DESCRIPTION
Small Hydropower	Brenwe Hydropower	400 kW hydropower plant including related transmission
	Sarakata Hydropower Extension	300 kW extension to existing plant, including related transmission capacity upgrade
	Malekula grid extension	Distribution extension to 450 households, schools and business's (Larevet to Unmet to Leviam)
	Luganville urban grid extension	Distribution extension to 1,500 households, schools and businesses within the Luganville urban and peri-urban areas and between Luganville and Port Olry.

# Responsiveness to SREP Criteria (1/2)

CRITERIA	STANDALONE SOLAR & MICROGRIDS	SMALL HYDROPOWER
Increased capacity from RE	Electrification of households and public institutions currently without access using PV systems of 5-30 W.	+ 700 kW of new hydropower capacity on Espiritu Santo or Malekula.
Increased access through RE	Electrification of 17,500 households, 2000 community halls, 230 aid posts and a number of public buildings	Access to renewable energy where currently only kerosene (or pico solar) is used for lighting.
Low emission development	Displaces kerosene currently used extensively for lighting and diesel used by some public institutions.	Displaces diesel and CNO currently used for generation.
Affordability and competitiveness	Lower cost for lighting than kerosene and lower levelized cost for electricity than diesel generation.	Lower cost than new diesel generation.
Productive use of energy	Rural electrification creates extensive opportunities for productive energy use.	Better reliability, security of supply, and access.

# Responsiveness to SREP Criteria (2/2)

CRITERIA	STANDALONE SOLAR & MICROGRIDS	SMALL HYDROPOWER
<b>Economic, social &amp; environmental impact</b>	Reduced emissions, reduced levelized cost for lighting and electricity. Improvements in refrigeration of food, medicines and vaccines. Improved emergency preparedness for natural disaster. Pollution prevention.	
<b>Economic. &amp; financial viability</b>	Most viable options for many areas due to geography, topography, popn distribution, & limited grid access.	Lower cost than new diesel generation.
<b>Leverage of resources</b>	Investments from the private sector, MDBs, and government are estimated to leverage 1.4 times the amount contributed by SREP.	
<b>Gender</b>	Off-grid electrification offers benefits for women	Better security and reliability of supply and improved access of electricity.
<b>Co-benefits of RE scale-up</b>	Increased employment opportunities for microgrids and hydropower projects. Reduced levelized cost of lighting and electricity. Pollution prevention. Improved access to lighting and communication.	

# Transformative Impact

## CURRENT (2012)

## ESTIMATED 2020

MALEKULA



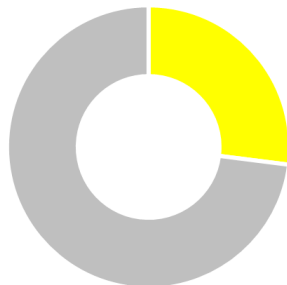
**32%**  
Renewable  
(CNO)



**95%+**  
Renewable\*  
(Hydro + CNO)

■ Renewable  
■ Diesel

COUNTRY  
WIDE



**27%**  
Access to  
electricity



**90%**  
Access to  
electricity\*\*

■ With access  
■ Without access

\*The overall NERM target for grid connected areas of Vanuatu is 65%, to which the SREP projects will contribute a small percentage. However, the impact of a new hydro plant on either of Malekula (shown above) or Santo will be transformative for that island.

\*\*electricity access includes lighting only access in rural areas (excludes pico solar lanterns). Note that the "quality of electricity" will vary, as a large proportion will not be grid connected);

# Financing plan

<u>SREP Project</u>	SREP	MDB Responsible	Gov. of Vanuatu	MDBs	Private Sector (Equity)	Other	Total
Off-Grid Solar and Micro-grids							
Plug and play solar systems		WB			3.1	3.1	6.2
SHS, micro and mini grids	5.0		1.5	2.0	2.0		10.5
Technical assistance and project management	1.2					1.6	2.8
Feasibility studies and preparation	0.8						0.8
Subtotal: Off-Grid Solar and Micro-grids	7.0		1.5	2.0	5.1	4.7	20.3
Small Hydropower Projects							
Investment in Sarakata and/or Brenwe	7.0	ADB	1.9	5.0	0.0	0.0	13.9
Subtotal: Small Hydropower Projects	7.0		1.9	5.0	0.0	0.0	13.9
Grand Total	<b>14.0</b>		<b>3.4</b>	<b>7.0</b>	<b>5.1</b>	<b>4.7</b>	<b>34.2</b>
SREP Leverage	<b>1.4</b>						