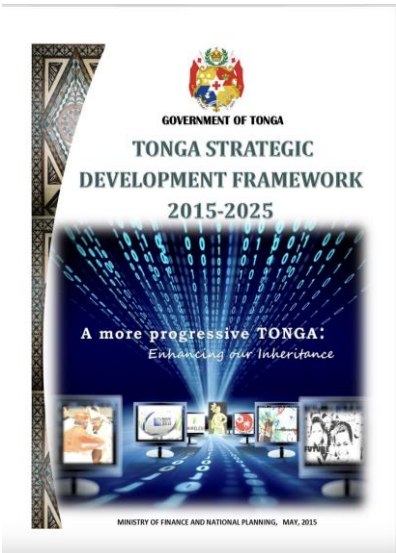
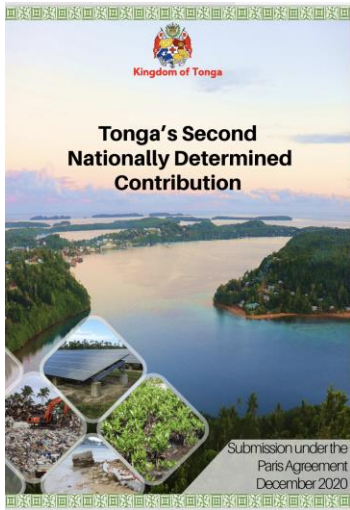
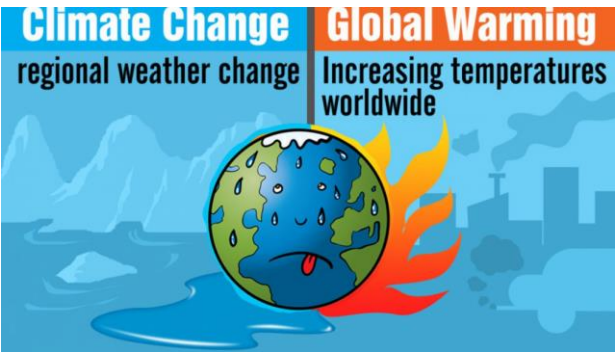




Department of Energy Ministry of MEIDECC

SECONDARY SCHOOL PUBLIC LECTURE





Who Are We?

DEPARTMENT OF ENERGY (Va'a Ma'u'anga Ivi)

Objective (Taumu'a Ngaue)

❖ Reduce vulnerability to fuel price fluctuations and increase security and quality access to modern energy services in an affordable, more coordinated, financially and environmentally sustainable manner.

❖ Energy Legislations (Lao Ma'u'anga Ivi)

○ Tonga Energy Act 2021

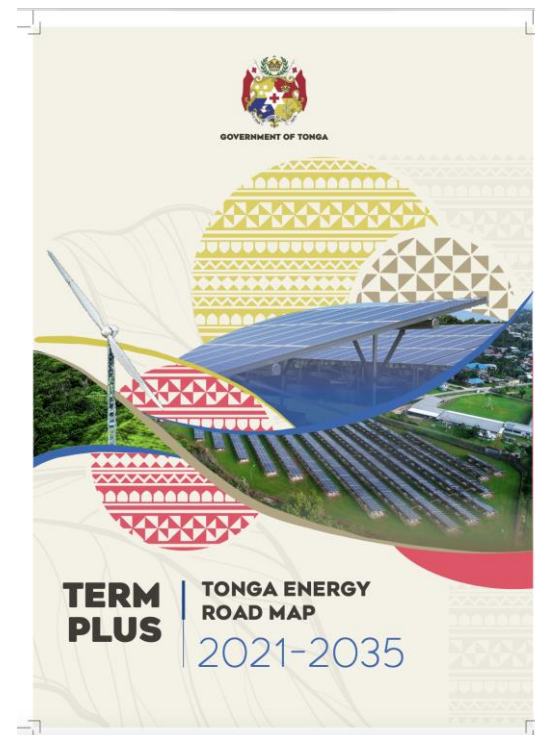
❖ National Plans/Strategies (Ngaahi Palani/Fokotu'utu'u Ngaue)

○ Tonga Energy Road Map Plus (National Energy Policy)

○ Tonga Energy Efficiency Master Plan (TEEMP)

○ Low Emissions Development Strategy (LEDS)

○ Tonga 2nd NDC



What We Do

ENERGY RELATED - NATIONAL OUTCOME [TSDF II]

A more inclusive, sustainable and balanced urban and rural development across island groups

A more inclusive, sustainable and successful provision and maintenance of infrastructure and technology

ENERGY RELATED - Organizational Outcome [TSDF II]

More reliable, safe, affordable and widely available energy services





What We Do

Energy Outcomes/Targets

❖ TERMPLUS Thematic Area

- Energy Supply
- Energy Consumption
- Electricity Generation and Distribution
- Transportation
- Energy Security
- Energy Resilience
- Gender & Youth
- Data Management





Scalebar

0 2.5 5

kilometers



Everyone needs energy



Where do you see yourself in the future?



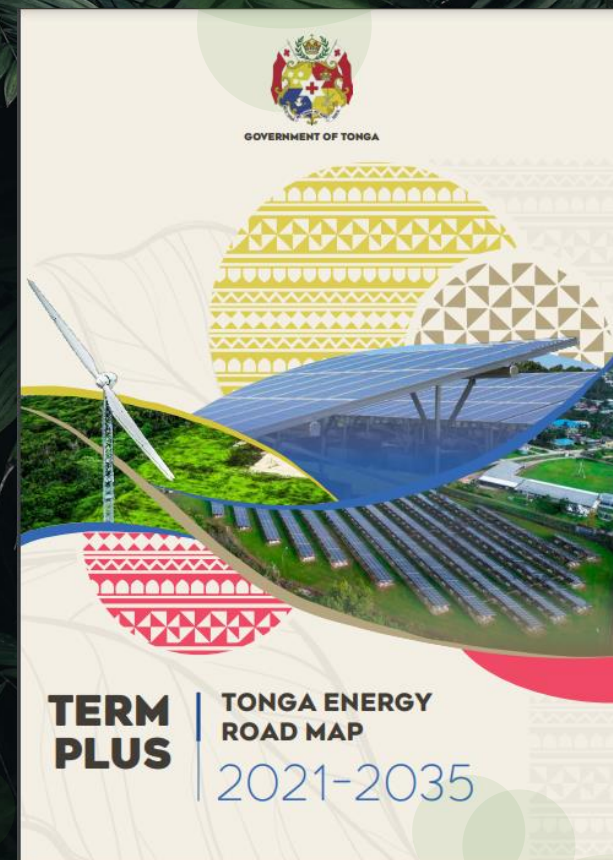


Energy Efficiency in Tonga

	Target	Baseline 2021	2035
Security	Reduction in net oil Imports	2,158 TJ ¹	1,942 TJ Reduced by 10% vs 2018
	Strengthen Energy Security by improving storage	36-day supply ²	45-day supply
Electricity	Electricity generated from renewable energy	12.27% ³	100%
	Improve Demand Side Energy Efficiency	65 GWh total consumption ⁴	Reduction of 40 GWh versus BAU ⁵
	Maintain line losses under 8%	7.4% ⁶	<8%
Transport	Limit growth in oil consumption for road transport (an average of 1.4% per year)	2% per year ⁷	<25% increase

Opportunity	Accumulated ^a Renewable Electricity %	Project Status	Pipeline priority rank	Annual GHG emissions reduction in 2030 (GgCO ₂ e)	Cumulative GHG emissions reduction by 2030 (GgCO ₂ e)
Sunergise 6 MW Solar PV IPP	23.4%	Underway	1	7	42
GET 6 MW Solar PV IPP	34.8%	PPA Signed	1	7	42
2.25 MW China Wind Farm	41.5%	Underway	2	5	30
3.8 MW of Wind IPP ⁹	~50%	Re-Tender or RFT	3	8.5	51
TPL-RFT (34-50 GWh, technology agnostic)	~50-70%	Design	4	~32	126
Nuku'alofa Network Upgrade		Underway and Ongoing	5	0.4	2.4
Improving Intake Quality of Vehicles		Concept	1	9.9	99
Non-motorised Transport		Concept	2	2.2	22
Low Emission Vehicles		Concept	3	17	165

Tonga Energy Road Map Plus



Tonga Energy Efficiency Master Plan 2020 - 2030



**Ministry of Meteorology, Energy, Information, Disaster Management,
Environment, Climate Change and Communications (MEIDECC)**

Energy Efficiency vs Energy Conservation

EE means using less energy to complete a task while achieving the same result. Focuses on equipment and technology being used. For example switching to LED lights

Energy Conservation is the decision and practice of using less energy. Focuses on the behavior of people. For example Opening a curtain for daylight instead of switching on a light

Some examples of Current Policies and projects of the DOE for Energy Efficiency

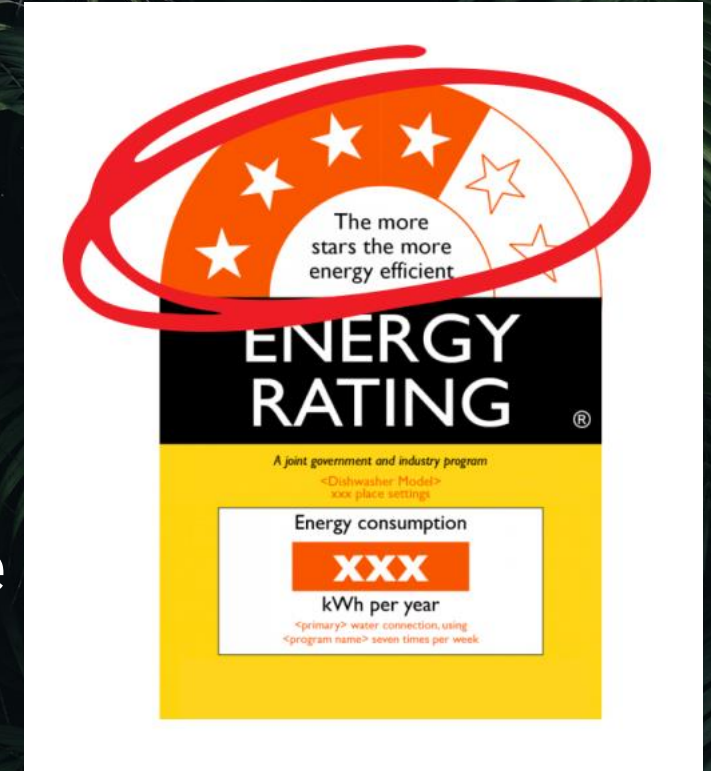
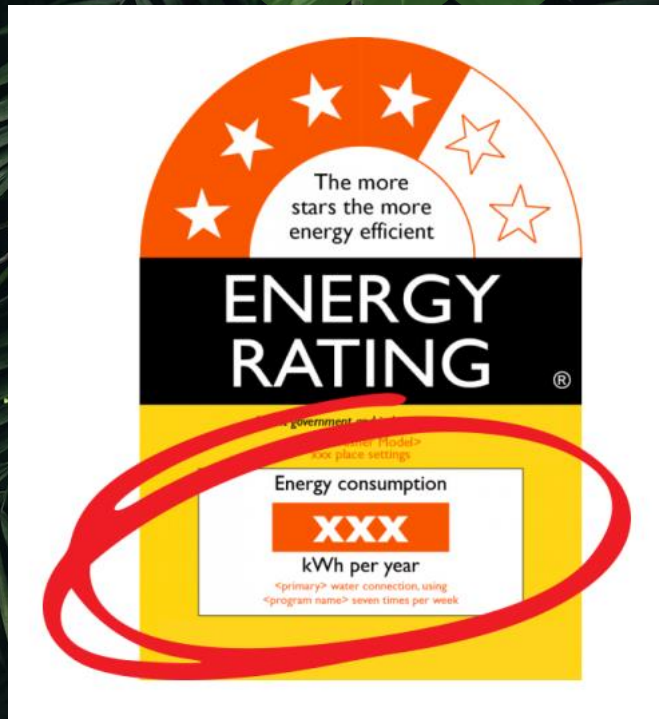
- Implement building standards for resilience and energy efficiency
- **MEPs for equipment and appliances**
- Implement public awareness programs on energy efficiency and conservation

MEPSL: Minimum Energy Performance and Standards

Energy Label shows two important information

1. Star Rating
2. Energy Consumption

The more Stars the more Energy Efficient the appliance consuming less energy.



Energy Calculator: Demonstration

The following is the estimated average electricity usage for this appliance along with the cost of the electricity over varying spans of time.

Electricity usage	Cost	Time span
3.6 kWh	\$3.28	per day
25.2 kWh	\$22.93	per week
109.6 kWh	\$99.72	per month
1,315 kWh	\$1,196.56	per year

This calculator assumes there are 30.44 days in a month and 365.25 days in a year on average.

Typical appliance:

Refrigerator

▼

Appliance power:

750

watt [W]

▼

Use/run at:

20

% capacity

?

Usage:

24

hours per day

▼

Electricity Price:

\$0.91

per kWh

Calculate

▶

Clear



Benefits of MEPSL

1. To combat high national fuel bills and growing demand for electricity from the household sector
2. Limit the influx of sub-standard energy-efficient appliances into the local market
3. Risk of becoming a dumping ground for white goods from developed industrialized nations.

Possible Pathways into the Energy Sector

SUBJECT	FURTHER STUDIES
Mathematics, Physics, Science	Electrical Engineering Renewable Energy Engineering
Accounting, Economics	Climate Finance Energy Finance
Chemistry	Petroleum Engineering
Computer	Energy Data
Geography, Social Science	Energy Studies



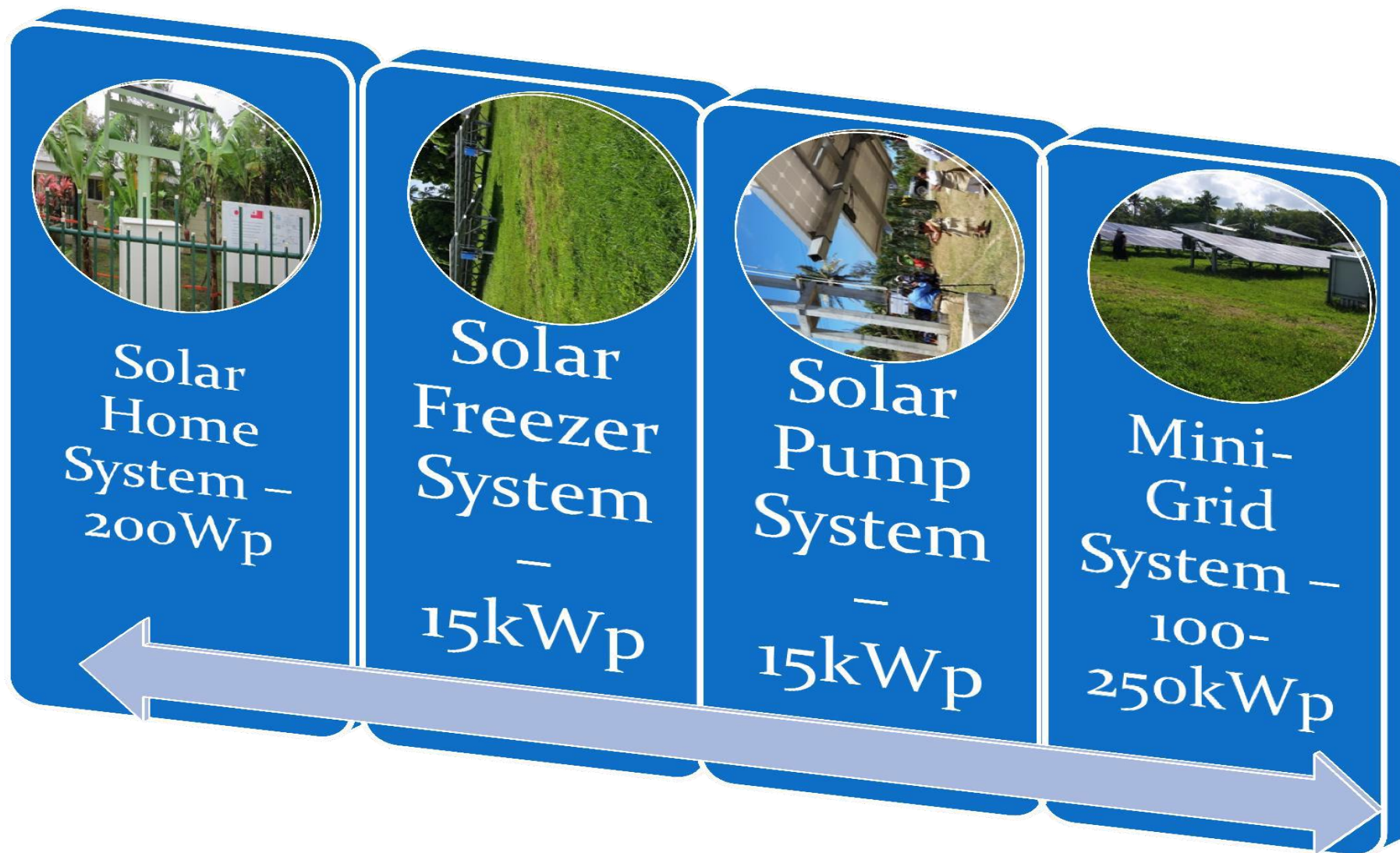
Renewable Energy in Tonga



Renewable Energy Resources

- Solar
- Wind
- Biomass
- Tidal Power
- Wave

Solar Electricity Generation



Ha'apai Solar Project



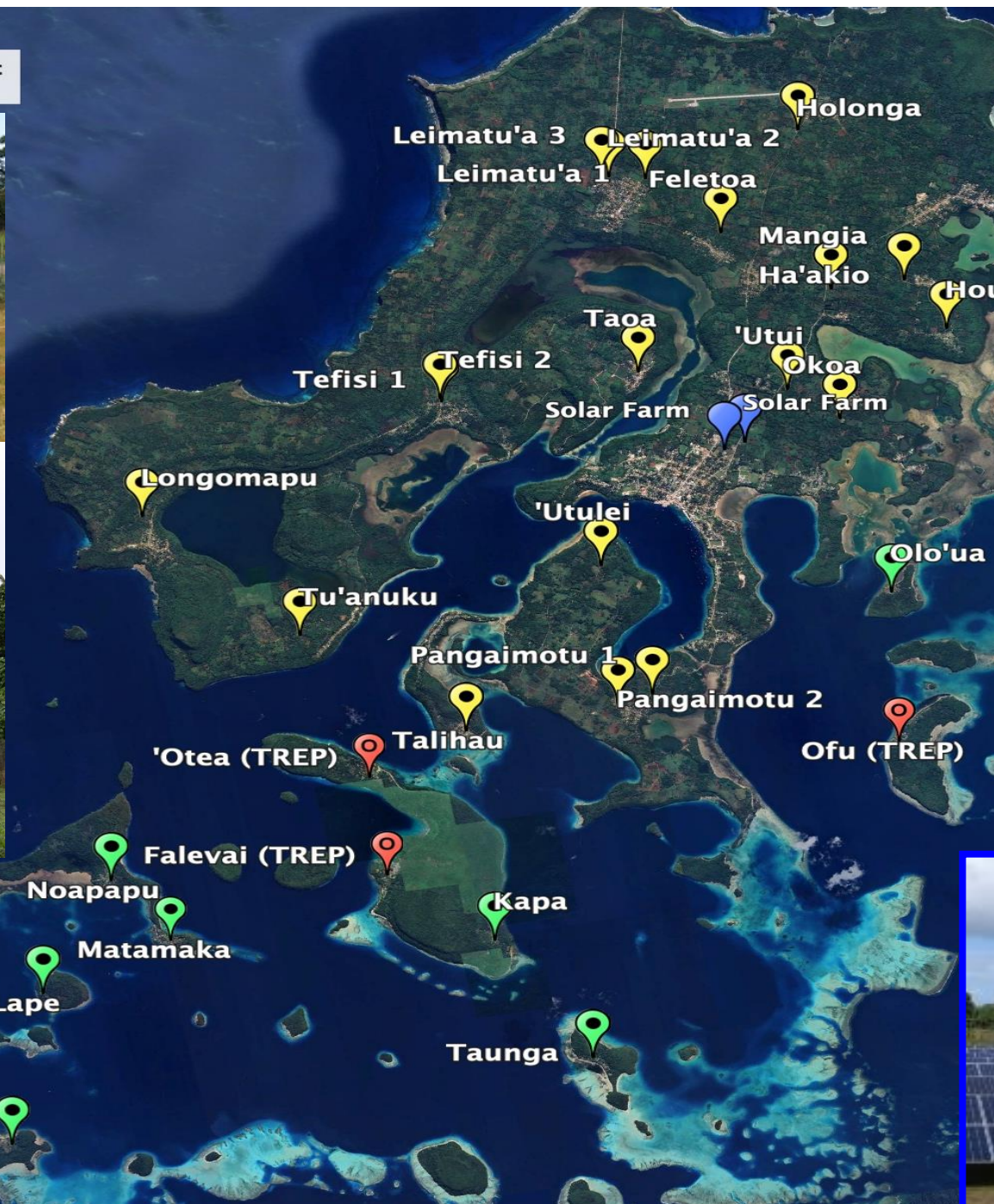
Solar Water Pump



Vava'u Solar Project



th




- Legend
- Solar Farm
 - Solar Home Systems & SFS
 - Solar Minigrid Systems & SFS
 - Solar Pump Systems



Niuafo'ou RE Project

Legend

 Niuafo'ou Solar Minigrid System

Niuafo'ou Solar Minigrid System



Niutopotapu RE Project

Legend

 Niutopotapu Hybrid System

 Solar Home Systems

Tafahi



Niutopotapu Hybrid System



Solar Home Systems



Solar Freezer Systems



Solar Pump Systems





Solar Minigrid Systems



Biomass - Biogas





Solar Street Light Systems





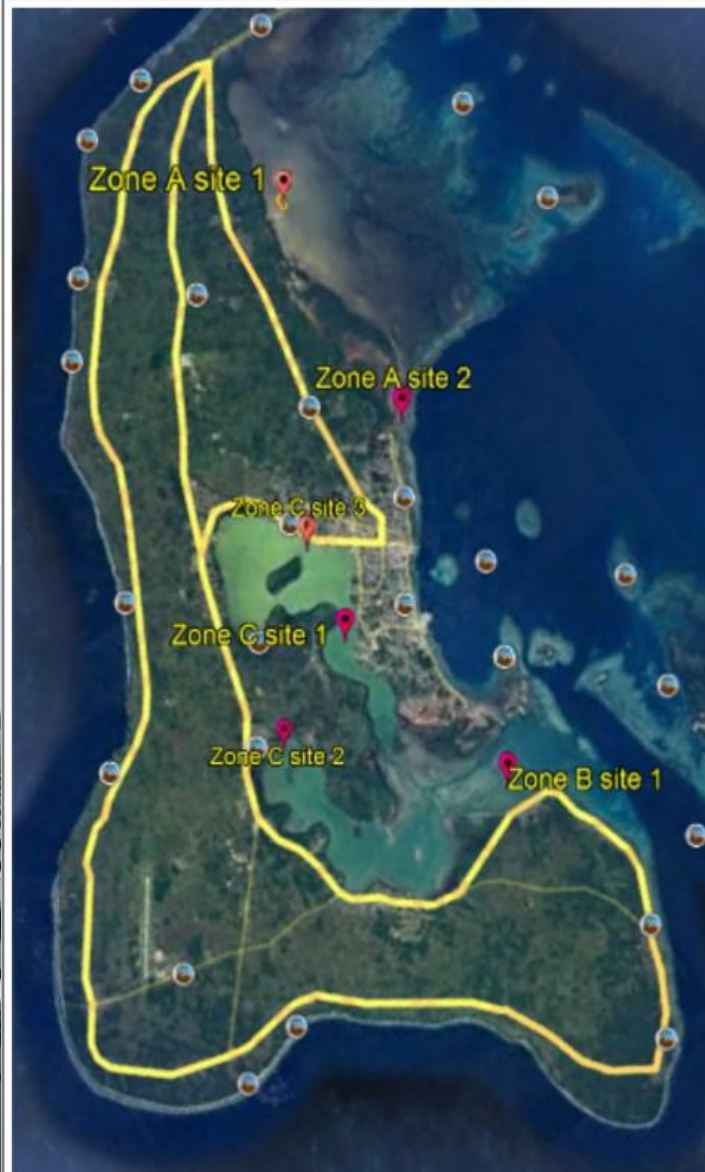




Wind Energy



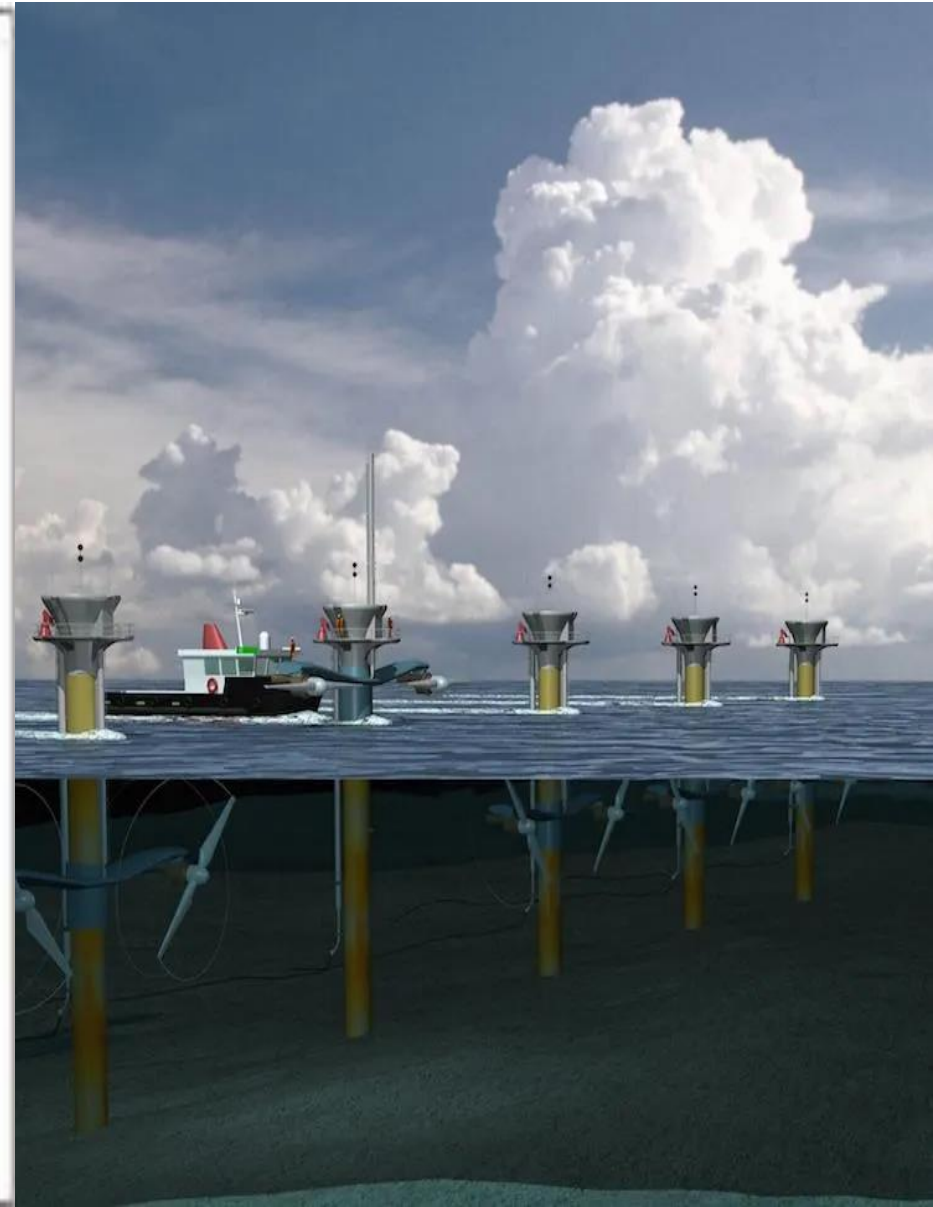
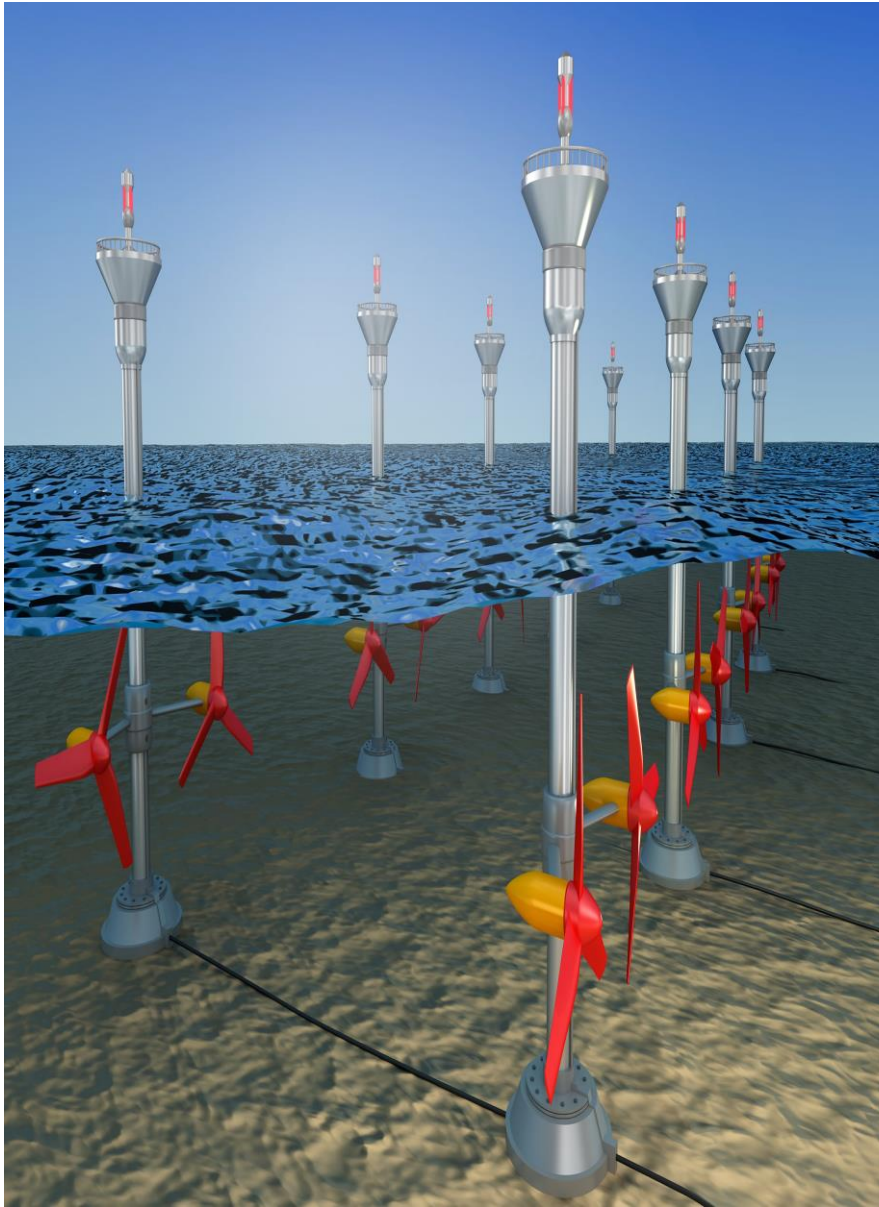
Floating Solar



In Tonga, the following sites were proposed:

- Zone A: north of Tonga
 - Site 1: Nuknuku
 - Site 2: Nukualofa west (Sopu)
- Zone B: near Makaunga
 - Site 1: Nukuleka
- Zone C: South of Nukualofa and Vaini
 - Site 1: Popua
 - Site 2: Vaini
 - Site 3: Nukualofa south (Havelu)

Tidal Power





Potential for Tidal Energy Study for the inlet at Vaipua Passage – Vava'u

- *The study was undertaken by the Auckland University of Technology in conjunction with the Tonga Power Limited and the Tonga Department of Energy.*
- *Project went through estimation, measurement and analysis of the tidal stream resource at the site that could be suitable for the installation of Tidal Energy System.*
- *Study concluded that there is no potential at the selected site to be harnessed and developed further for commercial power generation purposes.*
- *Project has Completed*



Wave Energy

Feasibility Study: POSSIBLE ALTERNATE WAVE PARK SITES

ALT 1: 10MW 15KM OFFSHORE

ALT 2: 40 MW (+) 22KM OFFSHORE



RE Hardware Recycles





Malo 'Aupito

