Engineer's Workshop:

A Simpson

Preliminary Assessment of RE Potential

1

Planning Process

- Demand Assessment & Forecast
- Resource Inventory & Preliminary Assessment
- Pre-feasibility Study
- Feasibility Study
- EPC
- Operation

Increasing accuracy and Expenses.

At any stage if a project proves not viable technically or economical it must not proceed.

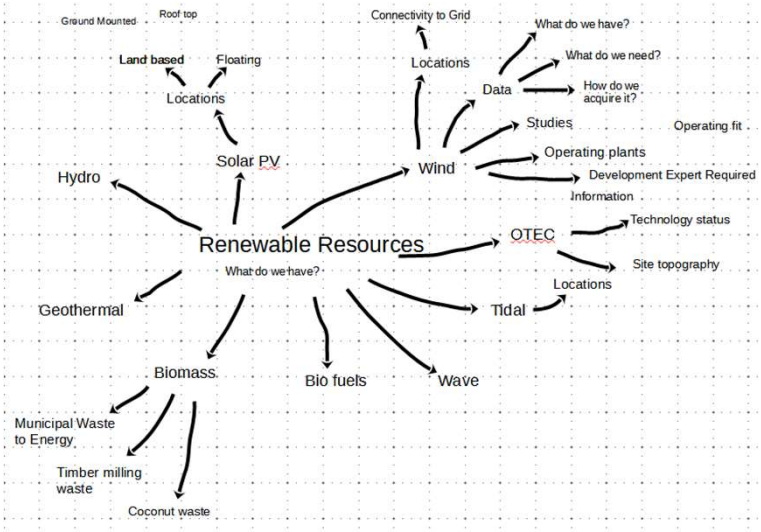
At a later time, it may become economical – e.g., solar PV

IPP could be engaged to develop the RE resource at any stage.

2

Resource Inventory

Brainstorm using the Mind Mapping tool to identify all renewable energy resources.



3

Tonga

Power Potential for Nukualofa

4kwh/kWp <PV Power Potential < 4.05 kwh/kWp

Install 1 MWp Solar PV plant

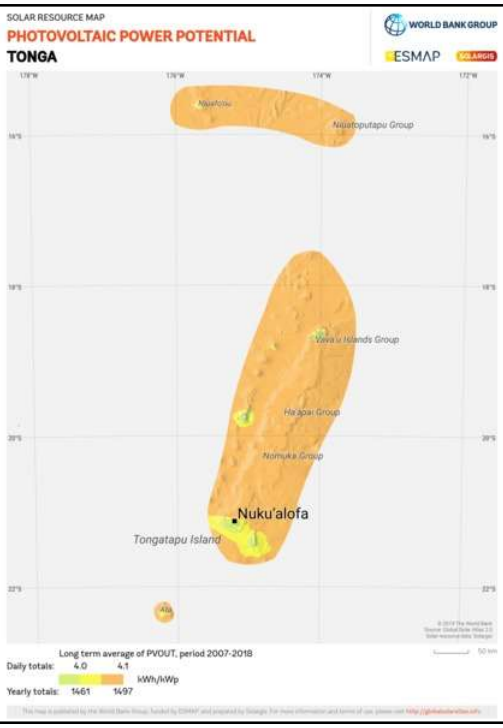
Annual Energy for 1kWp = 1,461 kWh

Capacity Factor = $\frac{1,461}{8760}$ x 100 = 16.67%

Current Installations:

Tonga Solar PV	Capacity	Energy		Capacity Factor	
		2021	2022	2021	2022
	kW	kwh	kwh	%	%
MAAMA MAI SOLAR	1300	1,674,435	1,533,450	15%	13%
Matatoa Solar Farm	2000	2,121,895	2,483,239	12%	14%

https://globalsolaratlas.info/map?c=-21.116851,-175.046539,11&s=-21.193375,-175.183868&m=site&pv=ground,0,18,1000



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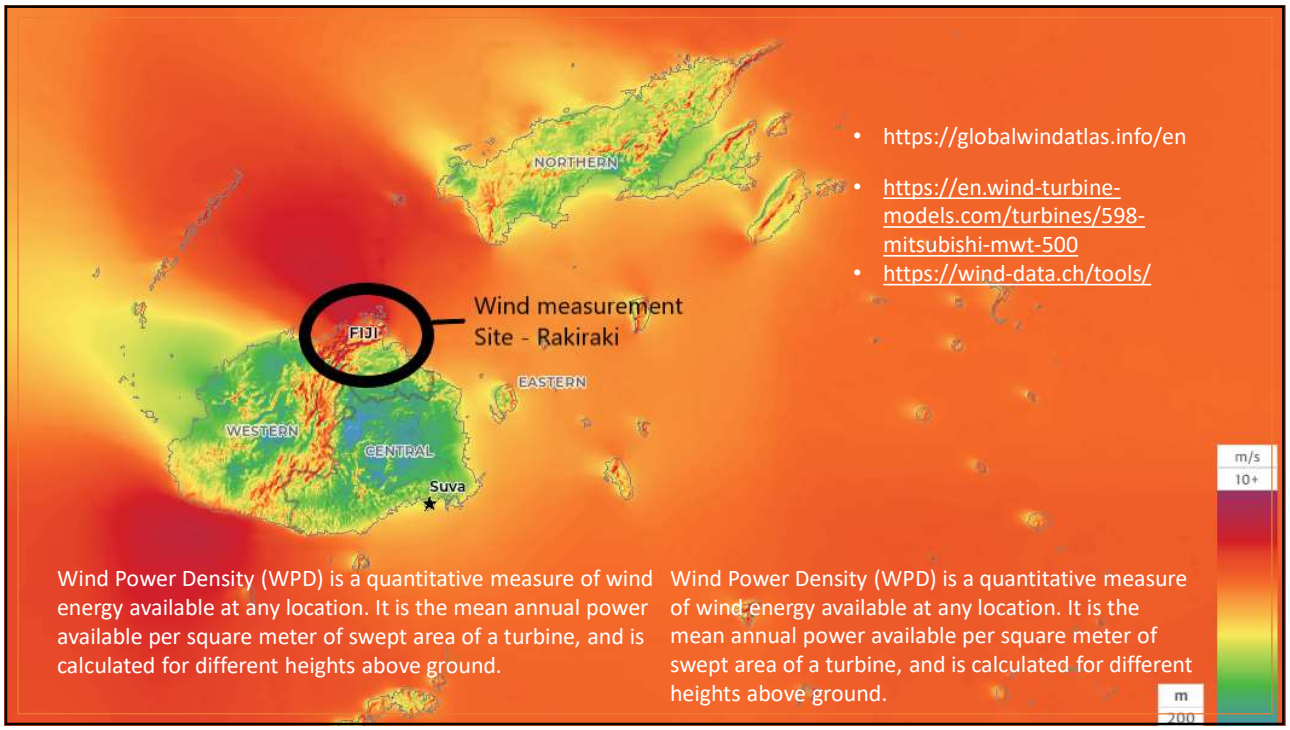

- https://globalwindatlas.info/en
- https://en.wind-turbine-models.com/turbines/598-mitsubishi-mwt-500
- https://wind-data.ch/tools/

Wind Power Density (WPD) is a quantitative measure of wind energy available at any location. It is the mean annual power available per square meter of swept area of a turbine, and is calculated for different heights above ground.

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5

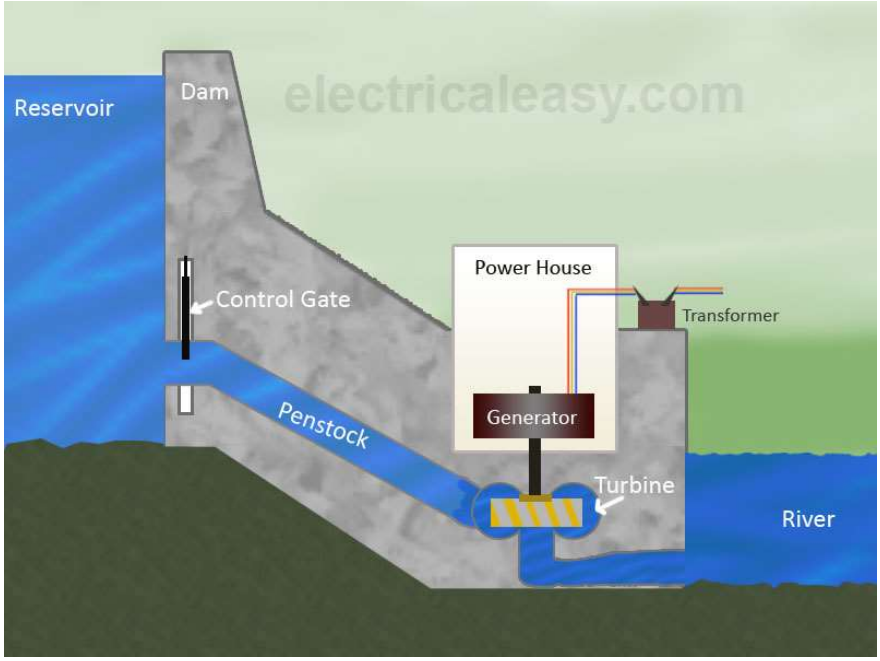
Niutoua Wind Farm	Capacity (kw)	Energy (kwh)	Capacity Factor (%)
Jul 2019 to Jun 2020	1.3	2,624,892	23%
Jul 2020 to Jun 2021	1.3	2,943,518	25.8%
Jul 2021 to Jun 2022	1.3	1,312,250	12.5%
Jul 2022 to Mar 2023	1.3	822,610	9.6%

6

Hydro electric Power

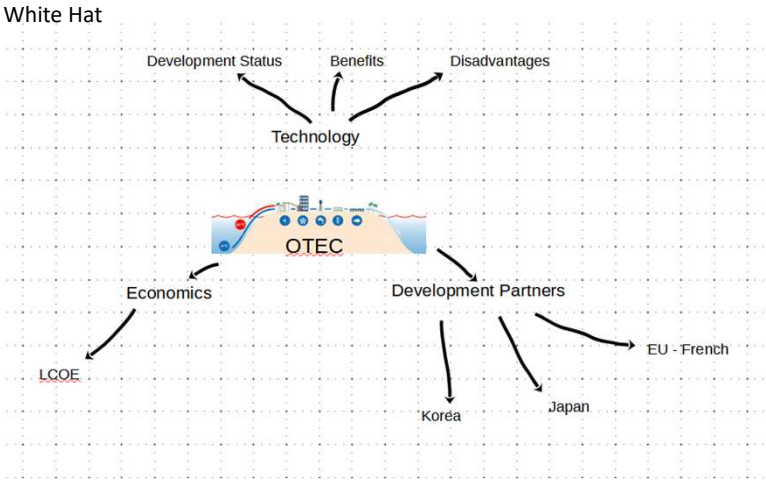
- Power (W) = 9810 x Q x H

Data Needs:
- Rainfall
- Catchment area
- Stream flow
- Penstock loss
- Generator efficiency



Information to determine status of a project.

- PMI thinking.
- Data available – preliminary, accuracy, need to acquire
- Previous reports
- What data is required & Who is to be responsible for collecting data?
- What equipment do we need to collect data?
- Which development partner might be interested is assisting?
- Fit in RE strategy.

Research on OTEC

White Hat