

# Kayangel Hybrid System Description

Information for the Government of Palau, 27/6/17

## What is proposed

- A solar PV ground-mounted array located on the water collection area (shown in Figure 1), approximately 200 m north of the power station (location shown in Figure 2). The system will be designed to have little or no impact on the existing water collection activity on the site.
- A small concrete building (or similarly environmentally protected enclosure or shelter) located adjacent to the solar PV array next to the existing small building and within the existing fence. This will house a bank of batteries and control equipment. The building will be suitable for the equipment to be housed and suitable for the 25-year life of the project. The building will be designed to contain any leaks.
- The solar PV and battery system will connect to the existing power system at the water collection area.
- PPUC and the Kayangel power house operator will be able to monitor the system remotely.

## How it works

When there is sunlight the solar PV array will power the island's electricity system. If there is more power from the PV than is needed, the excess power will be used to charge the battery bank. If there is less power from the PV than is needed, the remainder will be drawn from the battery bank. If the battery bank is approaching "depletion" the diesel generator will run.

## Features of the proposed system

- Significant diesel fuel savings (indicative range 30 to 50%)
- Reduced running time of diesel generators
- Low maintenance requirements of the solar PV-battery system
- Reliability. The type of system selected will be proven and reliable in the Pacific Island environment. MFAT already has considerable experience with solar PV-battery systems in other remote locations. Even if the whole solar PV-battery system failed, the diesel generation could take over. Conversely if the diesel failed, the solar PV-battery system could supply the island for approximately 10 hours per day on average (depending on insolation levels) or longer if supply was limited to critical loads.
- Manufacturer warranties will be at least 10 years on all equipment. Solar panels typically have a 25-year warranty.
- The choice of battery type will consider the cost and practicality of removal, recycling and replacement of the batteries at the end of their useable life. The type of battery selected for the project will be established as part of the bid process.

## Why a battery system

Without batteries:

- a diesel generator would always need to be running
- to allow any contribution from solar PV, additional small diesel generators would be required
- the diesel saving due to the solar PV would be limited to a low level

Battery systems are proven in the Pacific. Comparable example projects include:

- Four projects in the northern islands of Tuvalu
- Tokelau
- Four projects in the northern Cook Islands
- Three projects in the southern islands of Tuvalu
- Five projects in the southern Cook Islands
- Four projects in the Solomon Islands
- Many projects in Fiji.



Figure 1 Proposed Site for the solar PV ground-mount Array

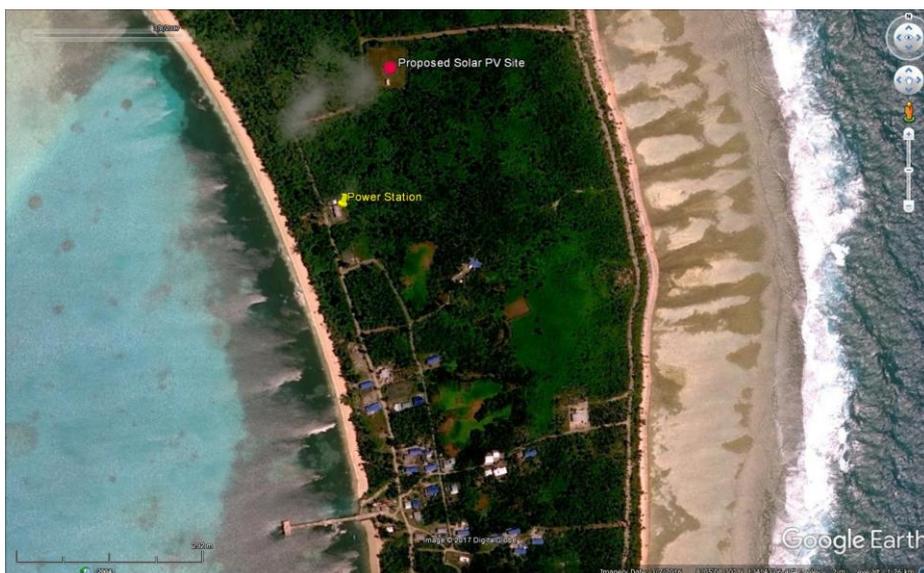


Figure 2 Location of Proposed Solar PV Site on Kayangel

## Probable requirements

- ESIA with particular regard to any impact to water collection
- Geotechnical study for foundations

## EPR has requested from PPUC the following information:

- Written confirmation of the availability of the water collection site for solar PV array and a building for the battery system and controls
- Design/drawings of the water collection system
- Status and details of generator paralleling project in the power house
- PPUC's best estimate of delivered cost of diesel to Kayangel