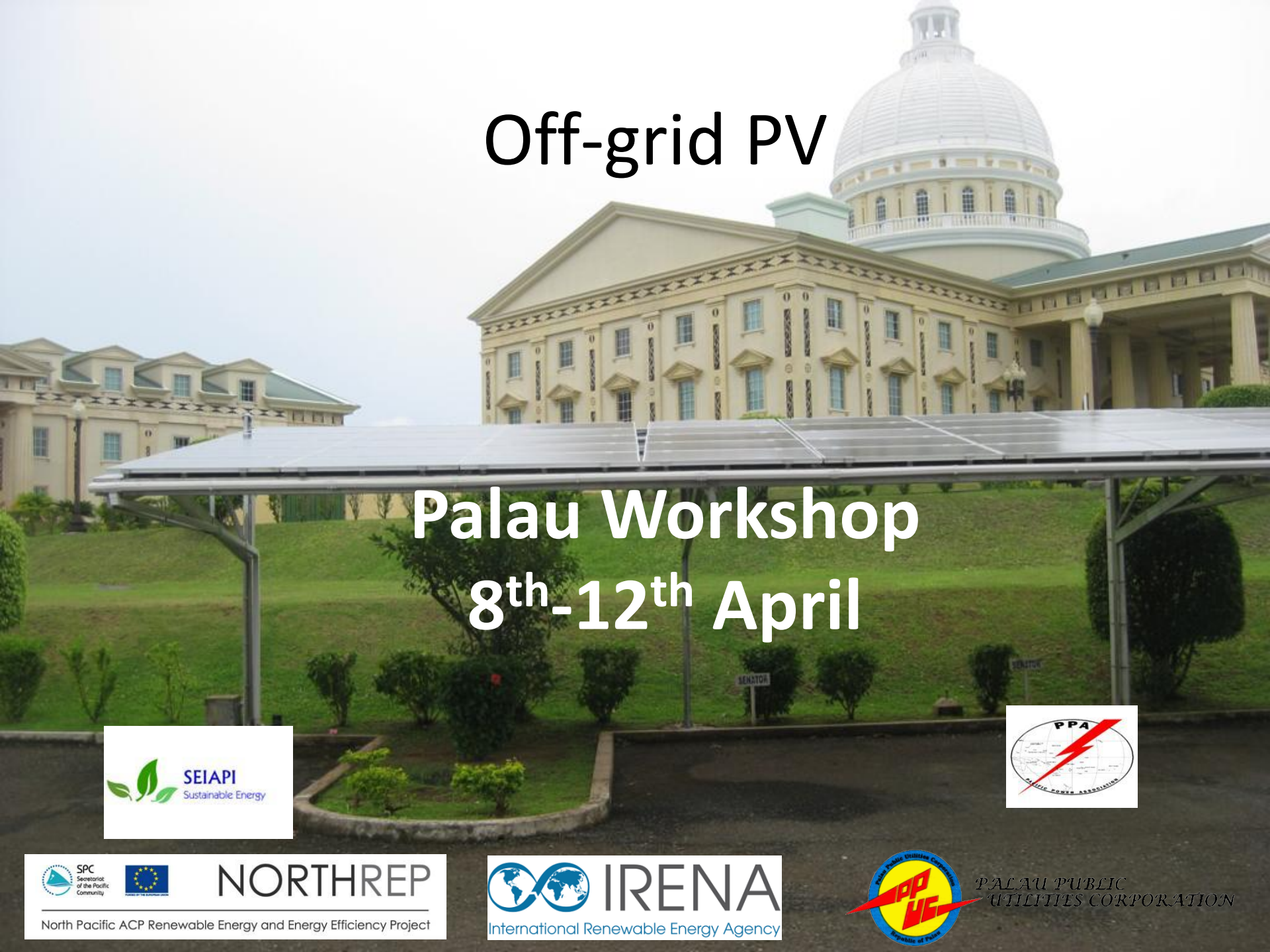


Off-grid PV

Palau Workshop
8th-12th April

SEIAPI
Sustainable Energy

PPA
Pacific Power Association

SPC
Secretariat of the Pacific Community

NORTHREP
North Pacific ACP Renewable Energy and Energy Efficiency Project

IRENA
International Renewable Energy Agency

PPUC
Palau Public Utilities Corporation
Republic of Palau

PALAU PUBLIC UTILITIES CORPORATION

Introduction

- Maintenance:
  - We will cover basic requirements for each product.
  - Always follow manufacturers recommendations

- Fault Finding: We will look at simple faults

Maintenance Schedule and Log Books

- Documentation supplied to the customer
  - booklet which contains maintenance log sheets for each of the equipment supplied

Maintenance
Solar Arrays and Modules

- Clean modules (regularly as required)
- Check array structure for loose mounting connections (when on site)
- Check inter-module cables and other cables for mechanical damage (when on site)
- Check total array output voltage and current and compare to what would be expected under the existing conditions. (when on site)

Maintenance
Solar Arrays and Modules: Log Book

Date	Cleaned Modules	Checked Array Structure	Checked Array Cabling Mechanical	Checked Array Cabling Electrical	Output Voltage	Output Current	Regulator Check	Comments

Fault Finding
Solar Modules and Arrays

1. Modules are now shaded for some reason eg trees grown
2. Modules or parts of them are covered in dirt, bird dropping etc or are damaged
3. There is a loose connection in the wiring system or a hot joint has occurred and the cable has failed

Maintenance Regulators

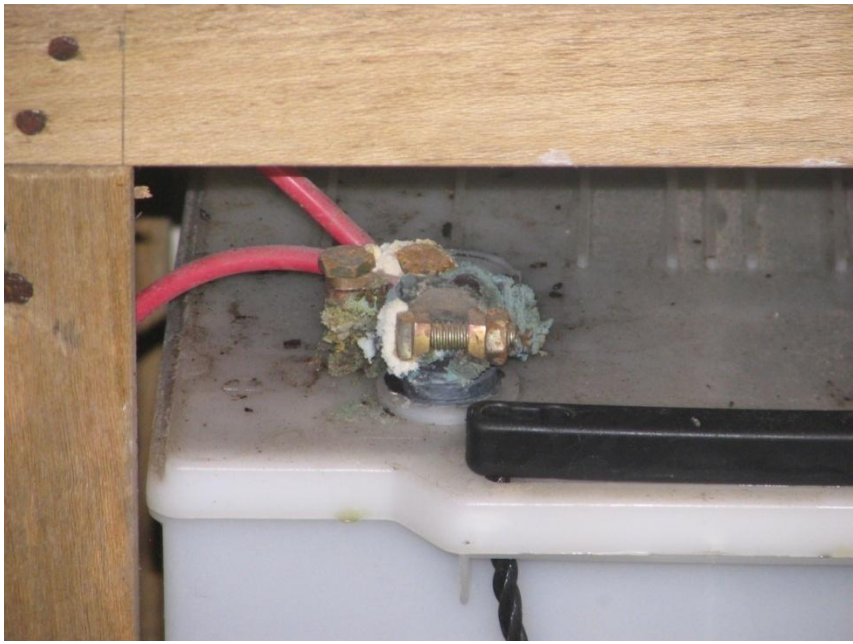
- Keep the unit clean and minimise dust. Clean when required
- Ensure the unit is not “invaded” by insects and spiders.
- Ensure all electrical connections are kept clean and tight

Fault Finding Regulators

- Many of today's regulators microprocessor controlled
  - can require extensive programming on commissioning
- Installer or maintainer of systems MUST be familiar with the regulator

Maintenance
Batteries (regularly)

- Read & record the specific gravity (wet cell batteries) (Note some manufacturers require this monthly for warranty)
- Check battery inter-cell connections and cable terminations for looseness and corrosion.



Maintenance
Batteries (regularly)

- Check for damage of battery cases.
- Check electrolyte level
- Check and record cell voltage level

Maintenance
Batteries: Log Book

DATE					
Battery Voltage					
Cell 1	S G				
	Volts				
	Temperature				
Cell 2	S G				
	Volts				
	Temperature				
Cell 3	S G				
	Volts				
	Temperature				
Cell 4	S G				
	Volts				
	Temperature				
……					
Cell X	S G				
	Volts				
	Temperature				
Interconnections OK?					
Battery Cases OK?					
Comments					

Maintenance
Inverter

- Keep the unit clean and minimise dust. Clean when required
- Ensure the unit is not “invaded” by insects and spiders.
- Ensure all electrical connections are kept clean and tight

Fault Finding
Inverter

- Commonly used inverters microprocessor controlled
- If the inverter is not providing an AC voltage it has failed.
- Possible faults
  - Simple loose connection
  - Circuit breaker failure
  - Faulty power board or boards

Maintaining System Integrity

- For the individual components to work as a system they have been interconnected by both power cables and control cables.

- Essential to undertake a visual check on the whole system to ensure no potential threat to the performance and/or safe operation of the system.

Troubleshooting the Whole System

- General complaint:
  - I don't have any power!
- Possible reasons:
  - Failure of any one (or more) particular item
  - Failure of the interconnection wiring between the system components
  - The customer using more power than the system was originally designed for

Remember….

- Completing the installation and commissioning is only a small part
- The real challenge starts after that:
  - Keeping the system going for the next 20+ years!

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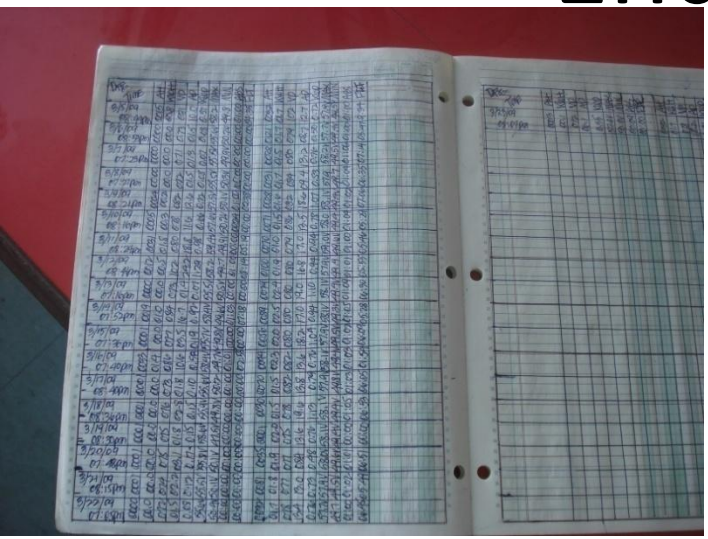
End-user training



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Keep Batteries Clean!

- Batteries are expensive
- Terminal corrosion
- Short circuit
- Short life time

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Electrolyte checking and topping up

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Important!

- Have Maintenance Schedule
- Keep a Log Book
- Keep the system Clean

- High Maintenance Components:
  - Batteries
  - Generators
  - Pumps

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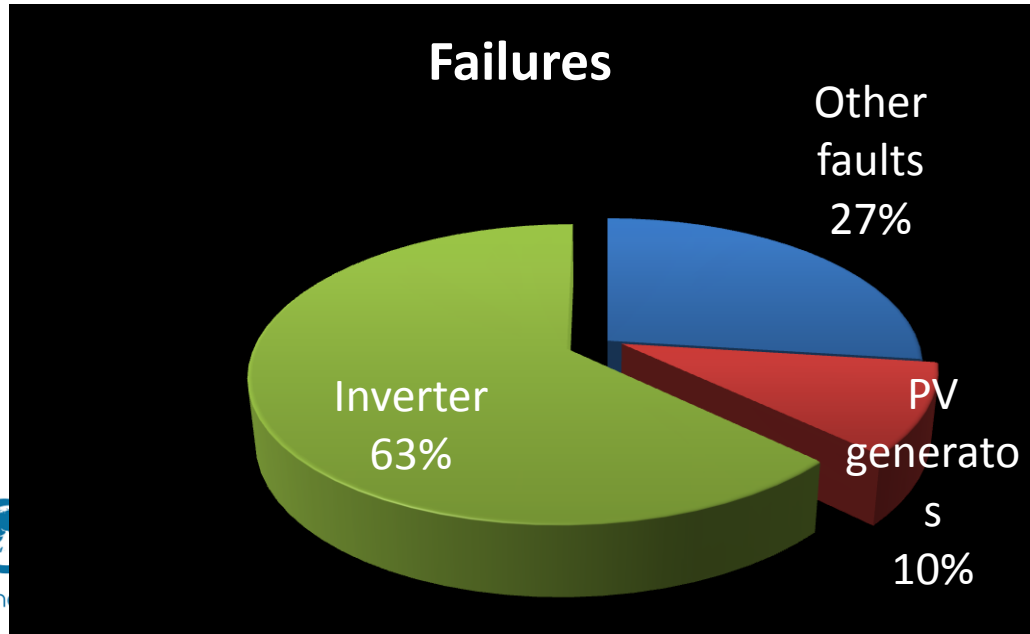
Troubleshouting

- Practical kits and Experience
- Knowledge of Components' operation
- Understanding of the whole system
- Common sense, logic and intuition



Monitoring & Datalogging

Info	
Last Update	10-04-2010
Time	7:31 PM
Running since	2008/7/10
Running days	817
Running hours	19608
Running minutes	1176480
Application version	1.4.3.1

Totals	Today	Before
Kwh1	11.8	1812.3
Kwh2	10.9	1574.9
Total	22.7	3387.2

FX Inverters	1
Inverter Current	0 A
Charger Current	0 A
Buy Current	2 A
Sell Current	0 A
AC Input Voltage	121 V
AC Output Voltage	122 V
Operation Mode	Pass Thru
Error Mode	No errors
AC Mode	AC Use
Misc Mode	Unknown
Warning Mode	No warning
Battery Voltage	49.6

MX Chargers	1
Charger Current	0 A
Panel Current	0 A
Panel Voltage	8 V
Daily Kwh	11.8
Aux Mode	Disabled
Error Mode	None
Charge Mode	Silent
Battery Voltage	49.5

mySolarLog.com
What's Your Solar Power Today?