

Pre-Assessment Technical Report (OIREP project)

Report Date: 12 January, 2025

Facility Name: OIREP(Ha'apai) SOLAR HYBRID SYSTEMS

Address: Ha'ano, 'Uiha, Ha'afeva and Nomuka(Ha'apai)

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1. Introduction

The Department of Energy planned to execute pre-assessment site visit to Ha'apai OIREP islands. The prime purpose of the mission is to provide an opportunity to gather updated information, hence, conducting physical assessment to identify technical or capacity gaps, and inform the scope and deliverables for the consultant who will be engaged to support follow-up activities and training. This Energy Systems Technical Report outlines the findings and assessment resultant conducted on the four solar hybrid energy systems at Ha'apai on 02 to 09 December, 2025. The report provides a summary of energy system overview, the current condition of the energy systems, any issues identified, and recommendations for continued operation and performance optimization.

The pre-visit assessment focused on ensuring the energy systems, including PV arrays with modules, PV inverters, battery inverters, batteries, cluster box, switch gears, computer, generator, air conditioning, exterior switch gears and transformers, are running efficiently. This document will serve as a reference for future improvement planning and operational decision-making.

2. Energy Systems Overview

- **System Type:** Solar hybrid systems
- **Grid voltage:** 240V single phase and 415V three phase
- **System Components:** Ha'ano
 - PV Modules – 384 units, 24 strings (16 modules), 102kWp PV peak power
 - DC/AC Inverters – 4 units (25kW power)
 - Bi-directional battery inverters – 18 units (6kW power each)
 - Battery cells – 144 units, 218kWh
 - Multicluster box – 1 unit
 - Generator diesel – 100kVA/80kW (designed: 63kVA/50kW)
- **System Components:** 'Uiha
 - PV Modules – 384 units, 24 strings (16 modules), 102kWp PV peak power

- DC/AC Inverters – 4 units (25kW power)
 - Bi-directional battery inverters – 18 units (6kW power each)
 - Battery cells – 144 units, 260kWh
 - Multicluster box – 1 unit
 - Generator diesel – 100kVA/80kW (designed: 63kVA/50kW)
- **System Components: Ha'afeva**
 - PV Modules – 240 units, 12 strings (20 modules), 102kWp PV peak power
 - DC/AC Inverters – 4 units (25kW power)
 - Bi-directional battery inverters – 12 units (6kW power each)
 - Battery cells – 96 units, 192kWh
 - Multicluster box – 1 unit
 - Generator diesel – 100kVA/80kW (designed: 45kVA/36kW)
- **System Components: Nomuka**
 - PV Modules – 384 units, 12 strings (20 modules), 102kWp PV peak power
 - DC/AC Inverters – 4 units (25kW power)
 - Bi-directional battery inverters – 18 units (6kW power each)
 - Battery cells – 144 units, 260kWh
 - Multicluster box – 1 unit
 - Generator diesel – 100kVA/80kW (designed: 63kVA/50kW)

3. System Performance Monitoring Assessment

Ha'ano

Major Equipment	Status	Comments
Power Supply Stability	Unstable	First priority is to fix the computer.
PV Modules	Unclean with 3 broken modules	Need to clean up modules in every 6 monthly basis and replace the four modules
PV Inverters	2 good inverters with 2 on and off	Need to inspect and test the on/off inverters

Battery inverters	One is off	Need to inspect and test if not replace
Battery cells	Indicator lights are always on	Need to inspect and test
Multi-cluster box	Not in good condition	A Specialist is needed for this
Switch Gears	One broken contactor switch	Replace
Transformers	Excellent	Work well
Generator Operation	Fully Functional	Operators had to maintain the services
Fence	Rusty and broken	Need to replace fence's wire

'Uiha

Major Equipment	Status	Comments
Power Supply Stability	Unstable	A combination of different technical weaknesses and equipment faulty
PV Modules	Unclean	Need to clean up modules in a 6 monthly basis
PV Inverters	2 good inverters with 2 on and off	Need to inspect and test the on/off inverters
Battery inverters	Work well	Keep it up
Battery cells	Work well	Keep it clean from dirty
Multi-cluster box	Not in good condition	A Specialist is needed to check and inspect
Switch Gears	One broken contactor switch	Replace
Transformers	Excellent	Work well
Generator Operation	Fully Functional	Operators had to maintain the services
Fence	Barbed wire is rust	Need three rolls of wire

Ha'afeva

Major Equipment	Status	Comments
Power Supply Stability	Unstable	A combination of different technical weaknesses and equipment faulty
PV Modules	Unclean	Need to clean up modules in every 6 monthly basis and replace the four modules
PV Inverters	2 good inverters with 2 faulty inverters	Need to replace inverters
Battery inverters	Work well	Keep it up
Battery cells	Work well	Keep it clean from dirty
Multi-cluster box	Not in good condition	A Specialist is needed to check and inspect
Switch Gears	One broken contactor switch	Replace
Transformers	Excellent	Work well
Generator Operation	This is a NEMO generator with the capacity is too high.	Need to replace
Fence	Barbed wire is rust	Need three rolls of wire

Nomuka

Major Equipment	Status	Comments
Power Supply Stability	Unstable	A combination of different technical weaknesses and equipment faulty. The first priority is the computer
PV Modules	Unclean Four broken PV modules	Need to clean up modules in every 6 monthly basis and replace the four modules
PV Inverters	3 good inverters with 1 faulty inverter	Need to replace faulty one
Battery inverters	One is off and four are in orange colour	Keep it up

Battery cells	Work well	Keep it clean from dirty
Multi-cluster box	Not in good condition	A Specialist is needed to check and inspect
Switch Gears	One broken contactor switch	Replace
Transformers	Excellent	Work well
Generator Operation	This is a NEMO generator with the capacity is too high.	Need to replace with the advice from Specialist
Fence	Barbed wire is rust	Need three rolls of wire

4. Safety and Compliance

Inspections Required to be Conducted:

- Verified proper grounding and protection of all electrical equipment of the system.
- Verified proper grounding and protection of households wire installations
- Tested generators under load conditions to ensure reliability.
- Inspected all energy systems for compliance with local energy regulations and safety standards.

Compliance Status:

- Meets National Electrical Code (NEC) standards.
- Complies with local environmental regulations for renewable energy systems.

5. Recommendations for Future Maintenance

- Conduct a daily operational check of the system to make sure all components are performed to optimal output.
- Perform the bi-weekly fight against the nature vs system
- Produce a monthly story of the system (report writing)
- Perform every six-month cleaning and maintenance of every surfaces
- Perform annual cleaning and maintenance of all structures.
- Conduct and verify the grounding and protection of the system's network and household's installations.

- Consider installing additional renewable energy sources to improve system sustainability.

9. Conclusion

The OIREP solar hybrid systems at Ha'apai had been successfully pre-assessed and the result and findings were populated into the tables as an essential information for the consultant scope of work and deliverables which set from the term of reference.

The energy demands currently grew at a faster-than-average pace, as the consumption of electricity rose a rate of more than 100 percent. To secure the affordability of the system to cater the demand growing at a particularly rapid pace the increase in system capacity is also mandatory.

For continued system reliability to cater the tremendous increasing of energy demands and adopt climate issues, it is recommended increase the systems current capacity, of each system to implement additional PV arrays and add more battery units to outfit the long-term energy demand. The generator significantly is there for a standby. Future recommendations focus on improving energy efficiency and sustainability, with an emphasis on renewable energy sources and backup power reliability.

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