

# Vio Island Mini-Hybrid Power System



**Presentation for unlocking mini-grids for sustainable development: June 26-30 June 2023  
Heilala Conference Room SPC Narere Campus Suva Fiji**

# Sunergise Company Profile

Sunergise designs, builds, owns and operates solar power systems for businesses and villages.

**SunLease:** Our business customers enjoy cheaper power and long term savings over the course of 20 year agreements.

**SunAccess:** Our village customers can use reliable pay-as-you-go electricity that reduces household energy spend and improves quality of life.

In four years, we have deployed 13MW of solar in the Pacific region. In 2014 we acquired Clay Energy, a Suva-based EPC provider with 15 years expertise in the region.

## SunAccess: A clean, cost efficient energy solution for rural





# SunAccess – Overview of Service

- **Utility-style Service:** SunAccess is a full service offering which involves constructing or retrofitting village micro-grids by financing, building, operating and maintaining a solar system and batteries that are coupled to an existing generator. Average system is capable of providing power 24/7, with approximately 87% generated by solar and batteries and 13% from diesel.
- **Remote management:** Each customer's power consumption is monitored by a smart meter, which enables remote management and control of the system. When the customer is in credit, the meter enables power to flow. When the credit runs out, the meter locks.
- **Energy savings:** SunAccess requires no upfront down payment on equipment - instead households pay for what they consume, at a per unit rate that is cheaper than kerosene or diesel.

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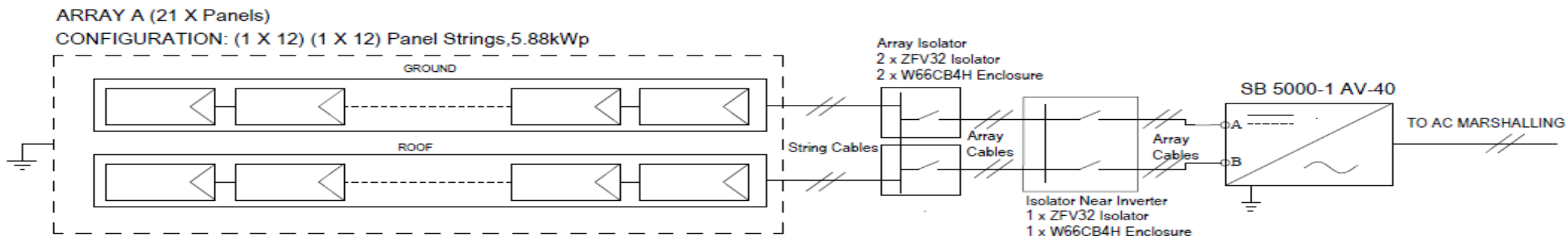
## Homer Design Report

- Homer – refer to pdf document(shared)
- A survey was conducted FLMMA & FREF together with Clay personnel with the villages – FLMMA & FREF together with Clay conducted survey prior to the project implementation and after the commissioning – 12months later
- FREF stands for the Fiji Rural Electrification Fund based in the Ministry of Economy
- FLMMA: Fiji Locally Managed Marine Area Network which connects with communities, government agencies and international partners.

## EPC and O&M

- Nominal Voltage: 48volts DC, 240V AC, 50Hz
  - System Size: 5.88kWp of Solar PV 24\* Sharp ND-245 FD Modules(1string of 12modules ground mount and 1 string of 12modules on generator house/shed roof)
  - Grid Inverter: 1 \* Sunny Boy - SB5.0-1AV-40 918
  - Sunny Islands: 2 \* 6kW Battery Inverters SI8.0H
  - Battery Bank: 48V BAE SECURA GEL 6PVV9000-2V cells (24), 968Ah@C100
  - Backup Generator: Powerlink TLS10-10kVA Standby Diesel Generator, Acoustic 240V,50Hz, 1500RPM Soundproof Generator
  - Energy Metering: Spark Metering Smart System with Thundercloud Base Storage
  - Number of Houses: 43
  - Village Churches: 2
  - Village/Community Hall: 1
  - Kindergarten: 1
  - Total Households: 47
  - Active Households in Village: 44
- 
- Construction of the project was pilot project due to Fiji being the Chair of COP23 in 2018
  - Contract was an EPC & O+M for with various other sites by the Government
  - Design by Clay based on 300W per day per household

# Vio Island Electrical SLD



## ARRAY DETAIL:

Number of Module : 24  
 Model : Sharp ND-245FB  
 Strings : 2 x 12 Modules  
 Total power : 5.88kWp  
 Max Voc : 447.6VDC  
 Array Isc : 17.24A

## INVERTER DETAIL :

Number of Inverters : 1  
 Inverter Model: 1 x SMA SB5000-1 AV-40  
 Total Inverter Wattage : 5kW

## DC CABLE SCHEDULE:

String Cable - 4mm<sup>2</sup> Solar Cable  
 Array Cable - 6mm<sup>2</sup> Solar Cable

## INVERTER TO SOLAR MARSHALLING AC CABLE SCHEDULE:

5kW - 6mm<sup>2</sup> 2C + E Orange Circular

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MAIN CONTRACTOR :



OVER 15 YEARS OF POSITIVE ENERGY IN THE PACIFIC  
 LOT 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 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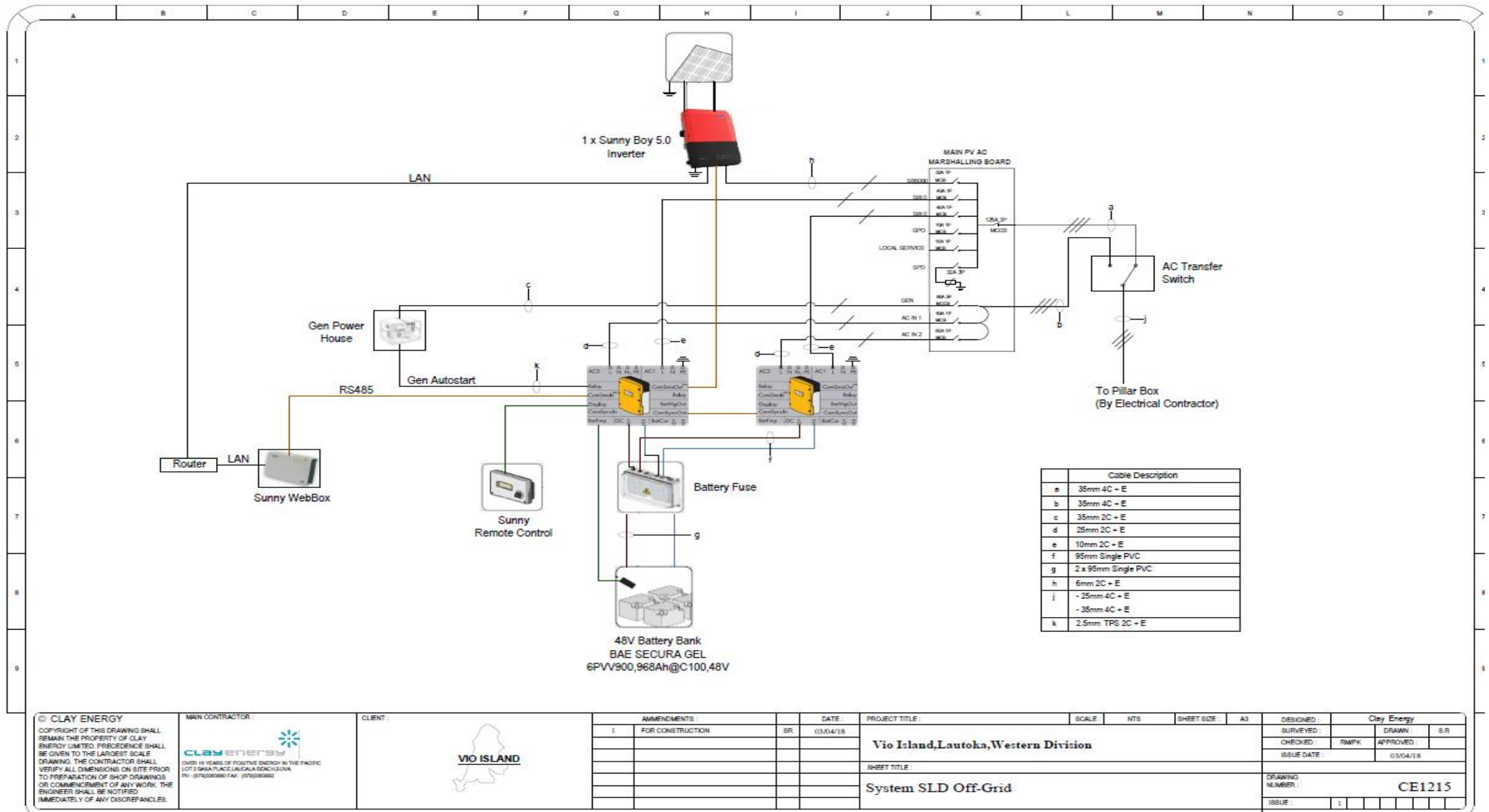


# Vio Island Reticulation

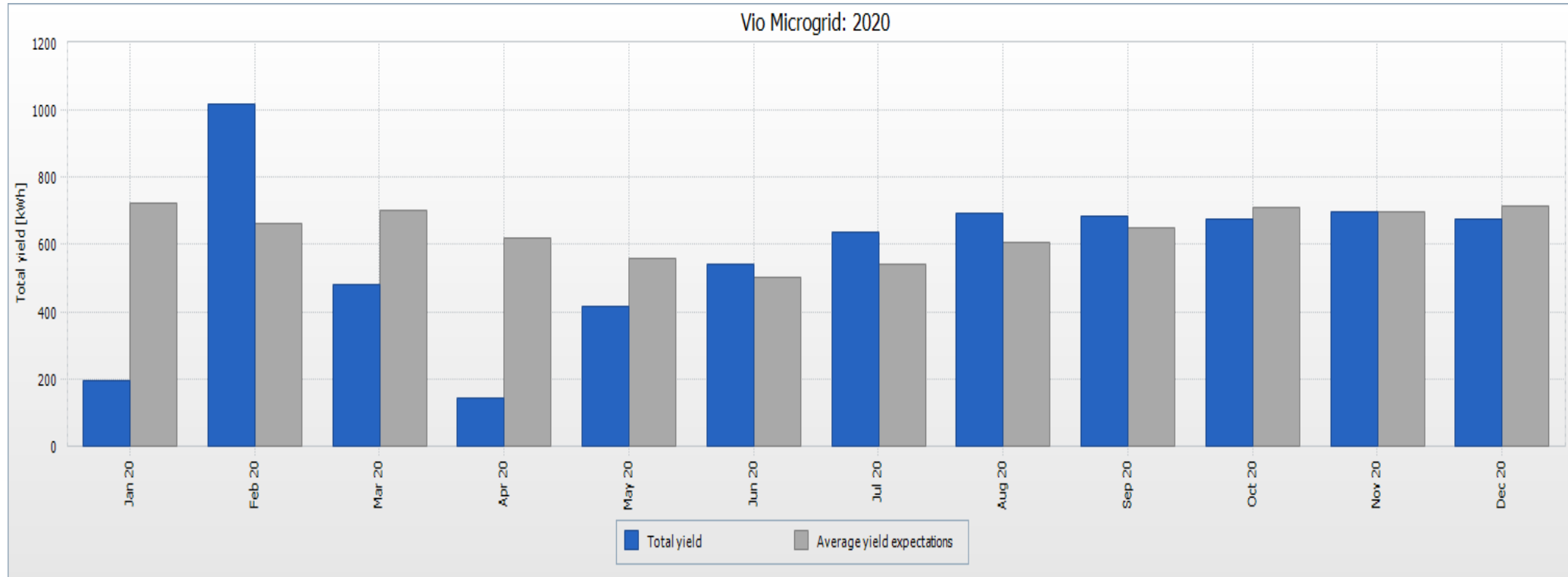




# Vio System Overview



## Vio Solar Energy Generation Yield - Year 2020



	January	February	March	April	May	June	July	August	September	October	November	December	Total
Solar Generation output (kWh)	194.48	1016.51	481.45	144.96	413.92	541.18	635.11	691.13	686.35	675.33	698.5	676.1	6855.02

Total Solar Generation-6855.02kWh

## Solar Generation vs Energy Usage (households) – kWh/month & Excess Usage - 2020

	January	February	March	April	May	June	July	August	September	October	November	December	Total
Solar Generation output (kWh)	194.48	1016.51	481.45	144.96	413.92	541.18	635.11	691.13	686.35	675.33	698.5	676.1	6855.02
Expected Performance Generation per household: 45 houses @ 10kWh/month	450	450	450	450	450	450	450	450	450	450	450	450	5400
Vio Energy Usage ((kWh) from Sparkmetering	432.75469	420.88294	492.69925	89.34647	268.4702	389.8597	472.5038	406.1766	564.3484	643.4148	582.80995	611.17978	5374.4466
Excessive kWh energy usage/month by Vio Households	17.245313	29.117062	-42.69925	360.65353	181.5298	60.1403	-22.5038	43.8234	-114.3484	-193.4148	-132.81	-161.1798	
Remarks/Comments			Excessive kWh usage	System was down due to TC Harold			Excessive kWh usage		Excessive kWh usage	Excessive kWh usage	Excessive kWh usage	Excessive kWh usage	



## Revenue Collection for the Year 2020

	January	February	March	April	May	June	July	August	September	October	November	December	Total
Amount in Fijian Dollars	\$763	\$1111	\$760	\$0	\$0	\$0	\$0	\$762	\$864	\$650	\$450	\$738	\$6098

From the Spark metering system, the actual total revenue collected for the year 2020 is FJD\$6098 there were four (4) months where the villages were given FOC energy by FREF due to the TC Harold which caused 1 month of no electricity due to damages sustained and also the covid -19 pandemic in 2020.

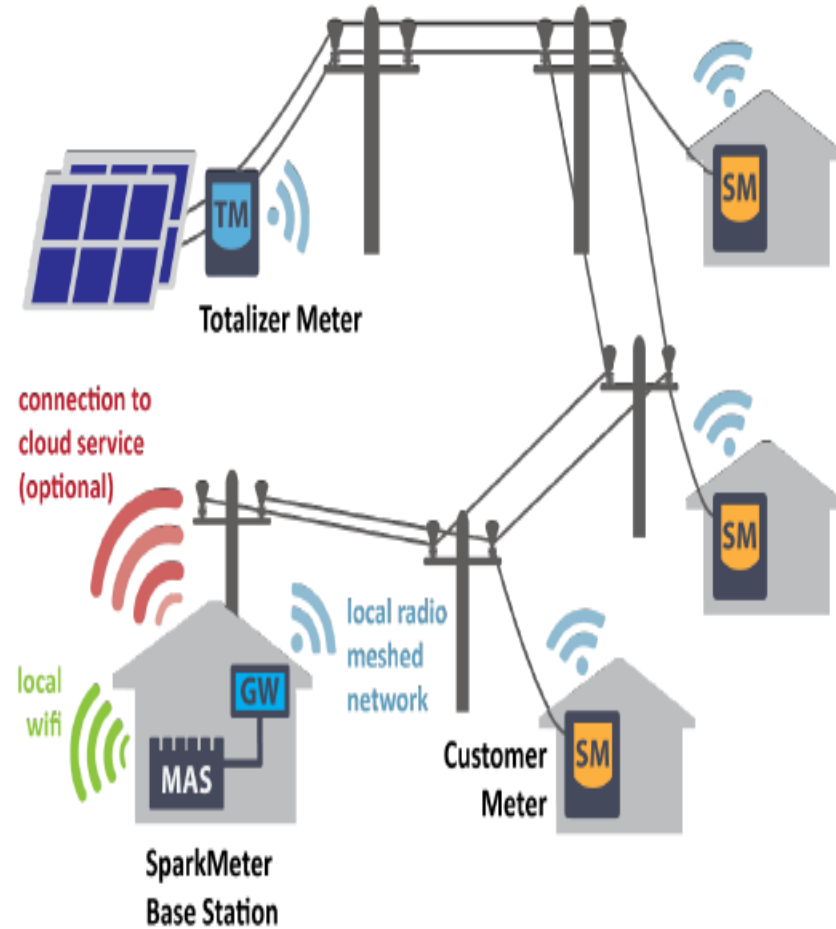
The village operator(husband&wife) collect all monthly for access (\$18/month) system minimum of 10kWh output/month per household) then inform Clay for toping up the houses system in the Sparkmeter Thundercloud.

They then directly deposit all monthly collections into FREF's and advise FREF & Clay

Out of the total designed for 47 households – 3 households have not been active since day 1, thus only 44 households are currently active

There is an increase in energy usage by the villages in terms of their monthly access + top ups for excess energy usage as shown in the table above.

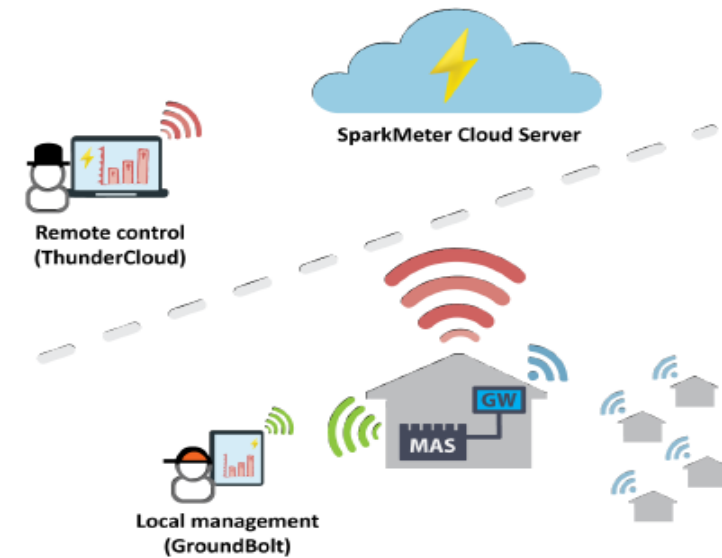
# Sparkmeter Smart Metering System



## Ground(Bolt) or (Thunder)Cloud, or how to manage your system

To manage the metering system, users can connect locally through wifi to the MAS, or remotely through the cloud (subject to the availability of an internet connection at the Base Station). SparkMeter's local software that runs on the MAS is called GroundBolt. Our cloud-based software is called ThunderCloud. Most actions can be performed from either interface, and SparkMeter offers two levels of access: the Operator and Vendor user roles.

Access to ThunderCloud service is granted through a Software as a Service (SaaS) subscription.



	Users & Roles	Meter Management	Tariff Management	Electricity Sales	Reporting
<b>OPERATOR</b> 	<ul style="list-style-type: none"> <li>- view info</li> <li>- create &amp; edit</li> </ul>	<ul style="list-style-type: none"> <li>- view info</li> <li>- create &amp; edit*</li> </ul>	<ul style="list-style-type: none"> <li>- view info</li> <li>- create &amp; edit</li> </ul>	<ul style="list-style-type: none"> <li>- give or sell credits to vendors</li> <li>- sell on behalf of a vendor</li> </ul>	all
<b>VENDOR</b> 	--	<ul style="list-style-type: none"> <li>- view info</li> <li>- reset error</li> </ul>	--	<ul style="list-style-type: none"> <li>- sell credits to end-users</li> </ul>	all

\* including manual connect/disconnect, reset error. Meters can only be created on GroundBolt.

## Service & Annual Maintenance

- The annual maintenance is carried out annual by CE such as generator service: air cleaner filter and fuel & oil change.
- Servicing of solar panels-cleaning & washing, grid & battery inverters, batteries, DC wiring and AC wiring reticulation, house meter inspections, system communications and Spark-meter:base station service, antennas and at the houses.
- Main Distribution Boards, pillar boxes & general reticulation

## Challenges Faced

- Logistics in transportation of equipment due to island, no forklift, access road in the village for delivery of equipment to Power House.
- Total number of houses drops from initial total numbers
- Revenue collection fluctuates every month and not consistent, thus less than anticipated annual target-\$10k
- Energy use increase by the villages when the system went into commercial operation-Sept 2019
- Use of fuel (litres) increased due to load and unfavorable weather conditions (rainy)
- There were some additional houses that came 2 years later for connection to the mini-grid.
- Training all villages or some to understand – light bulbs & wattages, one of the houses, the family bought a DC bulb and connected it to the batten holder(240V-AC) and it blew where they should have contacted the village operator.



# EFL Certification



Regulatory Unit

RU2/05

## Electrical Certificate for Compliance and Registrations

NO. C .....

for construction, installation, alterations or repair of any installation, or of any wires, fittings, equipment or apparatus forming part of an installation, or of any addition to or extension of an installation, at or about any premises connected or intended to be connected to the electricity supply.

### CUSTOMER INFORMATION- PLEASE PRINT CLEARLY

Name of Customer: Fiji Rural Electrification Fund (FREF) Phone: C/- Sunergise Fiji Limited  
Address of installation: Vo Island (located off Lautoka Wharf), Lautoka, Fiji  
Postal Address of Customer: Box 2395, Government Buildings, Suva, Fiji

### WORK DETAILS

No. of lighting points: 166 No. of socket outlets: 94 No. of water heaters: \_\_\_\_\_  
No. of air conditioning units: \_\_\_\_\_ No. of induction motors: \_\_\_\_\_ Others (specify): \_\_\_\_\_

#### Description of work done:

- SW LED Lights X 166 & 94 X Single GPO
- Prepaid Meter SM6DR (See attached manual & installation plan) X 47
- Totaliser Meter SM200E X 1 installed on powerhouse

It is necessary that all relevant tests are carried out by the electrical contractor and results are recorded here:

Visual examination: \_\_\_\_\_ Earth continuity: \_\_\_\_\_ Bonding: \_\_\_\_\_  
Polarity: \_\_\_\_\_ Insulation Resistance: \_\_\_\_\_ MΩ  
Others: \_\_\_\_\_

Attach installations drawings and particulars of all lamps, motors and other consuming devices connected to the installation as the result of the work. Particulars refer to product specification and approval numbers.

### CERTIFICATE OF WORK

I hereby declare drawing that the above electrical work has been carried out in accordance with the requirements of Subsidiary Legislation regulation 45 the Electricity Act Cap. 180.

Signature of Authorised Person 	Print Name & Wireman's Licence No. Kinivuwai Koro - Licence No.: 1829 expiry 15/08/2022
Company Name & Seal Clay Engineering T/A Clay Energy OF 	Contractors Licence No. Licence No.: 273
Date <u>17/10/2018</u>	Contract Phone No. +679 9988925

### INSPECTION DETAILS

I certify that the inspection has been carried out in accordance with the requirements of Subsidiary Legislation regulation 47 of the Electricity Act Cap. 180.

Name <u>MANUELL MALOCA BAI</u>	Signature 	Date <u>23/4/19</u>
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CUSTOMER COPY - THIS IS AN IMPORTANT DOCUMENT AND SHOULD BE RETAINED

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## Vio Photo Gallery



Vinaka

**Q & A**

**???**