THE UNIVERSITY OF QUEENSLAND
AUSTRALIA
CREATE CHANGE

Millaa Millaa Microgrid Feasibility Study

Progress, findings, wins, next steps

Stephen Snow

Long term objective

Improve the resilience of regional Queensland towns affected by cyclones and/or power outages

Millaa Millaa as a pilot for scalable energy resilience solutions (e.g. microgrids) to apply to other small regional towns in regional Queensland

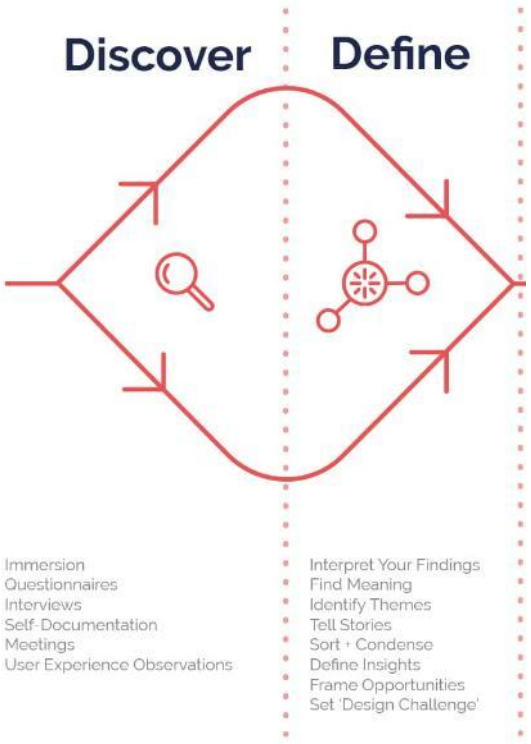
Souce: Pnmm Francis- Millaa Millaa matters

Short term objective

Feasibility study >>> Full costing >>> Construction

UQ value add: social feasibility

Our journey



Stakeholder workshop: ~ 46 people

Introduce project, gather feedback

Discuss options, concerns, opportunities

7 interviews to camera (through ECA Partnership)

10 phone interviews and counting

Living through cyclones- resilience

Online survey- 24 responses

Cairns Today 20°/26°

Cairns Post

Hi, Stephen

My News | Local | Queensland | National | World | Opinion | Business | Entertainment | Lifestyle | Sport

News Tableland

Millaa Millaa microgrid project in feasibility study phase as FNQ leads technology race

FNQ is pioneering the state's microgrid technology as another small town surges ahead with plans for an independent network, with the region leading by example. FIND OUT HOW.

Arun Singh Mann Follow

2 min read June 24, 2022 - 5:00AM The Cairns Post

4 comments

Tableland

RIVERS TO REEF

CLIMATE RESILIENT ALLIANCE

MICROGRIDS INFORMATION SESSION

The Rivers to Reef Climate Resilient Alliance invites councillors and internal stakeholders to learn about the potential of microgrids for resilient, affordable and low emissions energy.

PRESENTATIONS

AIMING FOR GREATER POWER RESILIENCE IN MILLAA MILLAA

University Queensland are working with local proponents, the Millaa Lions Club to prepare a feasibility study outlining an effective way to restore electricity supplies to residents during severe weather.

Presenter: Dr Steve Snow – UQ Postdoc Research Fellow who's worked on building energy literacy, efficiency and assisting users to navigate the Australian energy market.

YARRABAH MICROGRID FEASIBILITY STUDY

The process, findings and next steps. This completed study considered the potential of all energy technologies, including advanced digital technologies such as energy storage, information and communication systems, inverter-based devices, e-mobility (electric vehicles) and charging stations.

Presenters:
Leon Yeatman – CEO Yarrabah Aboriginal Shire Council, an award winning Manager with over 20 years' experience working in the Indigenous Management Sector.

EVENT DETAILS

10AM – 11:30AM
WEDNESDAY 22 JUNE 2022

ATHERTON DISASTER COORDINATION CENTRE
15 VERNON ST
& ONLINE

RSVP – 17 June 2022

Yarrabah Microgrid Feasibility Study

EnergyConnect
Connecting Community through Micro-Grids

In June 2020, the Federal Government announced the successful recipients of Round 1 funding from the Regional and Remote Communities Reliability Fund (RRCRF), which was established to provide funding for feasibility studies for microgrids in regional and remote Australian communities. The Yarrabah Microgrid Feasibility Study which seeks to showcase the potential for Yarrabah, a coastal Indigenous Australian community located south-west of Cairns in Queensland, to be a self-reliant, sustainable microgrid that can be rolled out to other communities was awarded $1.9 million from the RRCRF. The study is due to be complete in early 2022.

World-leading Daintree renewable microgrid signed-off

7 March 2022

Joint media release with Assistant Minister to the Minister for Industry, Energy and Emissions Reduction the Hon Tim Wilson MP and the federal member for Leichhardt the Hon Warren Entsch MP

The Morrison Government is supporting the creation of a world-leading renewable microgrid for the Daintree community in Far North Queensland.

The government has awarded Volt Advisory Group $18.75 million over three years to develop a highly innovative renewable energy microgrid for the Daintree region, supporting more than 200 jobs in Far North Queensland.

The grant is being delivered under the Daintree Microgrid Program, following a feasibility study completed under the $50 million Regional and Remote Communities Reliability Fund.

The renewable energy microgrid will incorporate an 8 MW solar farm, 20 MWh of battery storage and a 1 MW clean hydrogen plant.

In recognition that the Daintree rainforest is in the World Heritage-listed Wet Tropics of Queensland, the project aims to avoid disturbance in the area by deploying the microgrid

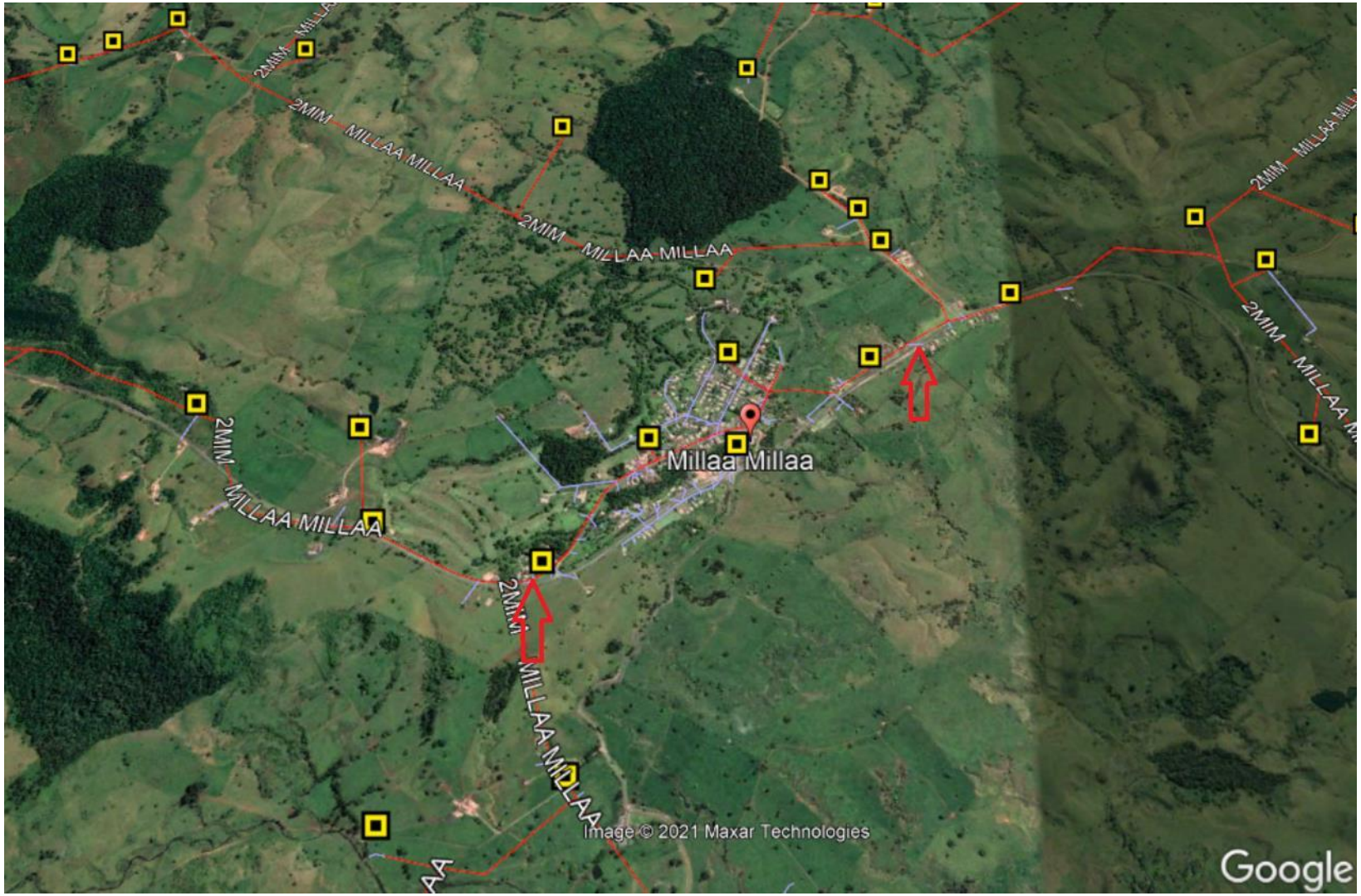
Ministers

The Hon Madeleine King MP

The Hon Ed Husic MP

Senator the Hon Tim Ayres

Option 1- island whole town



1048 kW solar

4.0 MWh battery

1100 kVA generator

Option 2: Island main street transformer

581 kW solar

2.4 MWh battery

420 kVA generator

System design

Household solar + battery- PPA

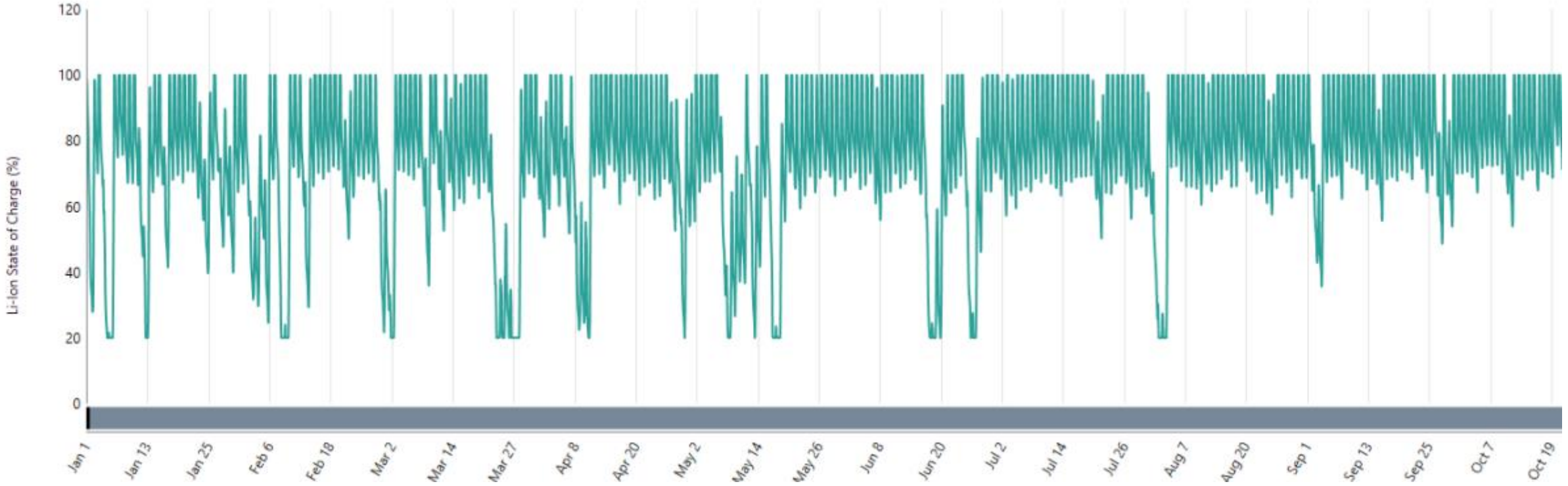
Normal operation

Reduced household electricity bills

Town powered from the grid.

Battery charged from solar, discharges at peak times when spot price is high. Revenue through FCAS and arbitrage.

Battery state of charge (Normal operation)



Microgrid operation

Households with solar/battery = self-reliant

No physical damage to Ergon Network

Battery maintained at full charge throughout cyclone watch.

Damage to Ergon Network

Battery hard-wired into core businesses

Charging hub established

Benefits: Three levels of resilience

Normal operation

Improved power quality

Renewable power for Millaa Millaa

Subsidised household solar/battery

Direct hit (e.g. Cyclone Larry)

Power to key stores (e.g. Tobins)

Charging hubs for those without power

Blackout without cyclone damage

Fully functional town (Option 1) or main street (Option 2)

Charging hubs for those without power

Answers

Why solar?

Best levelized cost of energy, immediately feasible

Why ground-mounted?

Option 1: 1048 kW / 173 customers = 6.1 kW per customer

Option 2: 582 kW / 63 customers = 9.2 kW per customer

Shading (more shading), roof pitch, orientation, renters, consent

Why do we still need diesel backup?

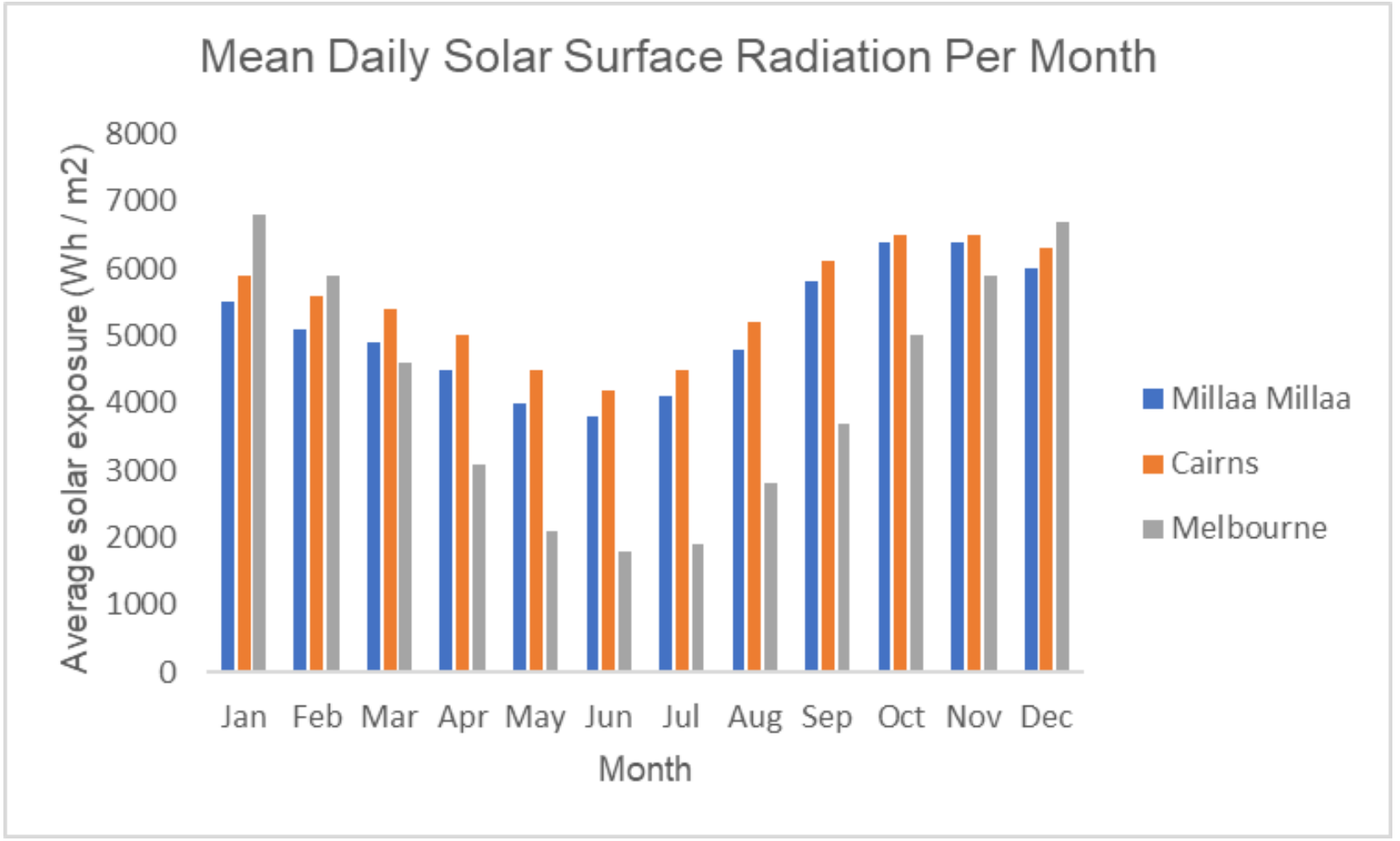
Autonomy post-cyclone

What happens to the battery at end of life?

Portion of battery revenue >> Replacement fund.

Battery recycled

Answers


Mean Daily Solar Surface Radiation Per Month
Average solar exposure (Wh / m2)
8000
7000
6000
5000
4000
3000
2000
1000
0
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Month
Millaa Millaa
Cairns
Melbourne

Feasibility study

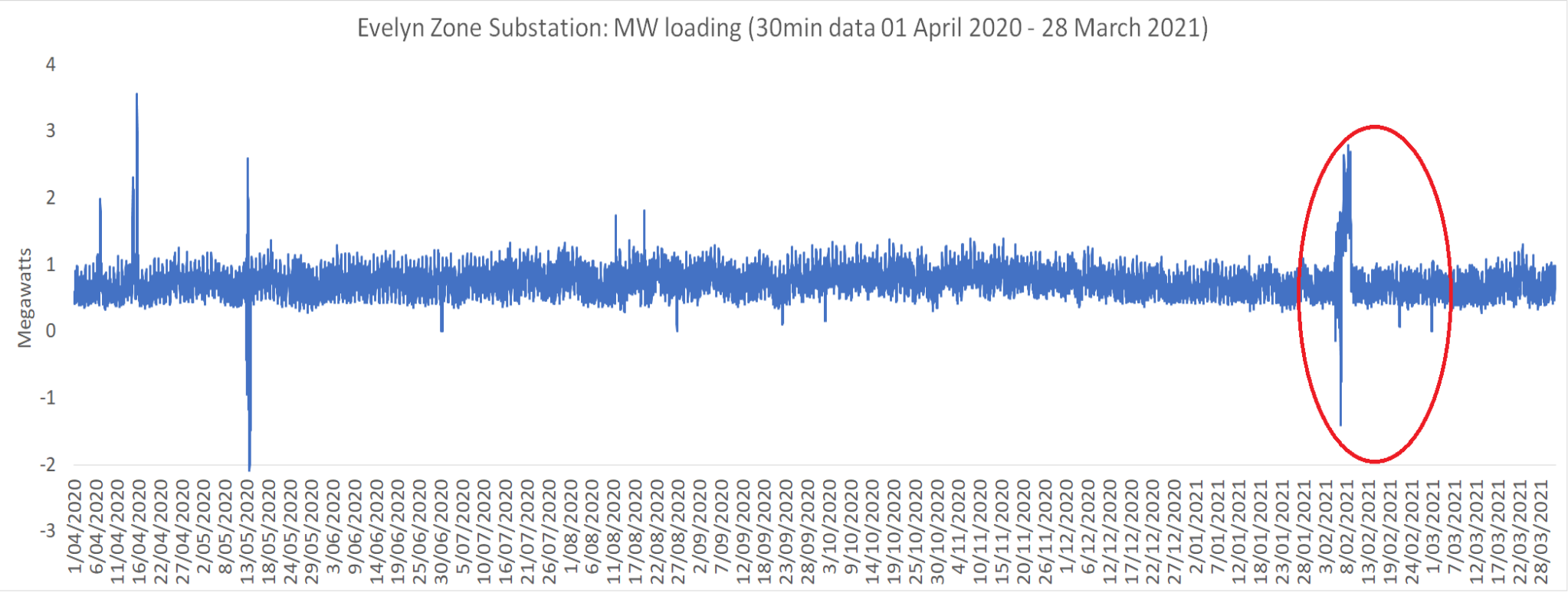
Socially feasible

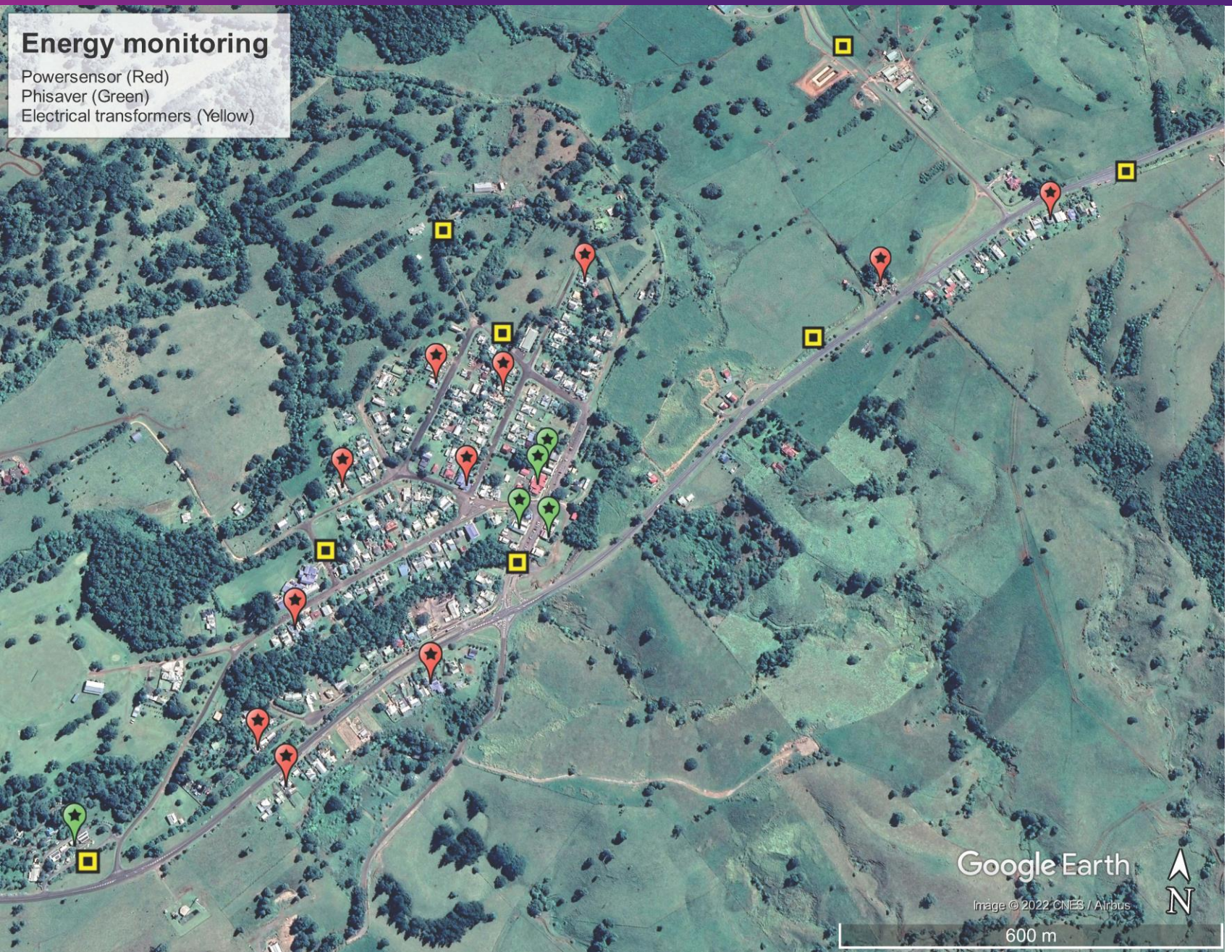
Technologically feasible

Regulatorily feasible

Economically feasible

Whole of feeder outages

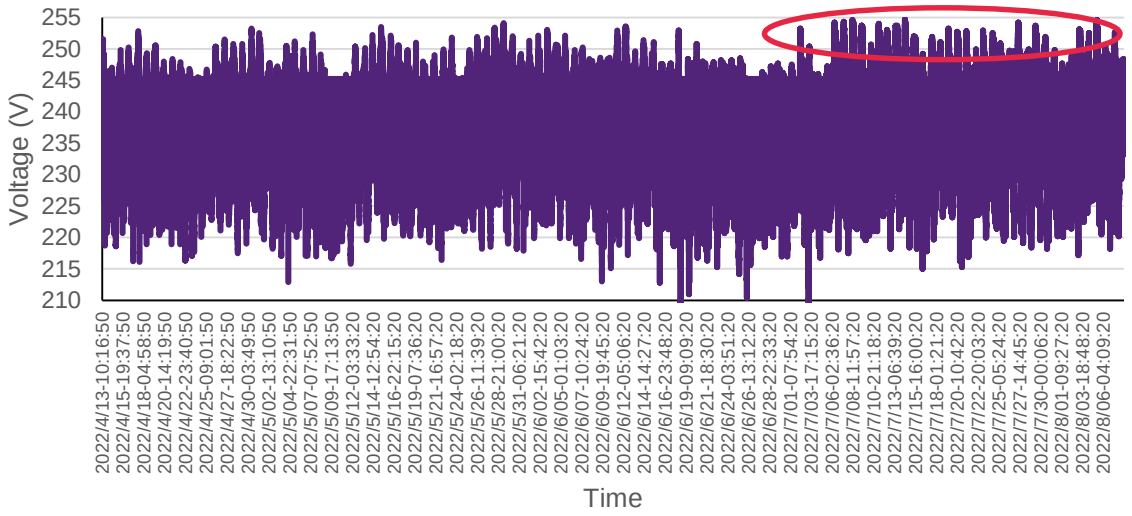


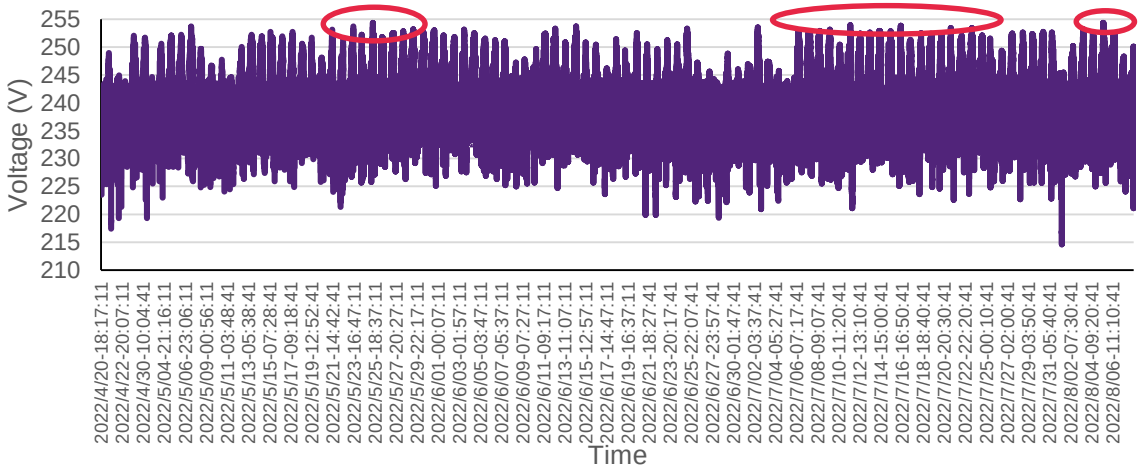


Outage analysis

Date - Time	House ID	Duration (sec)
2022/4/13 - 18:03	r4w	7.47
2022/4/16 - 04:50	r4w	8.48
2022/4/22 - 15:47	Zly	10.44
2022/4/28 - 18:33	Zly	4.78
2022/4/29 - 01:48	Zly	15.42
2022/4/29 - 15:07	r4w	389.31
2022/4/29 - 20:10	Zly	19.11
2022/4/30 - 06:38	r4w	5.65
2022/5/01 - 12:16	EqL	34.41
2022/5/10 - 16:24	**r4w**	**72.02**
2022/5/10 - 16:24	**EqL**	**71.98**
2022/5/10 - 16:24	**Ziy**	**72.90**
2022/5/10 - 18:59	**r4w**	**3416.73**
2022/5/10 - 18:59	**EqL**	**3416.65**
2022/5/10 - 18:59	**Ziy**	**3416.72**
2022/5/16 - 10:01	EqL	15.37
2022/5/19 - 08:58	Ziy	181.46
2022/5/19 - 09:08	Ziy	5972.45
2022/5/21 - 13:33	CeY	16.74
2022/5/22 - 17:03	0gg	6.56
2022/5/23 - 16:15	Ziy	732.05
2022/5/24 - 06:32:	CeY	7.87
2022/5/24 - 16:47	Bqv	9.13

Voltage analysis





216 V – 230V – 240V

Feasibility study

Socially feasible

Technologically feasible

Regulatorily feasible

Economically feasible

Regulatorily feasible

Battery/inverter

STWM1175 Standard for HV Embedded Generation Connection

Solar

Queensland Solar Farm Guidelines
State Planning Act 2016 – impact assessable

DNSP vs Private operation

AER electricity NSP Registration Exemption Guideline - Version 6 - 1 March 2018

Feasibility study

Socially feasible

Technologically feasible

Regulatorily feasible

Economically feasible

Economically feasible

CapEx + OpEx - Operational revenue = Net loss

Option 1 (island whole town): -$359,974 per annum

Option 2 (island main street): -$217,570 per annum

Contributors to operating deficit

Microgrid protection, switchgear, SCADA integration

Solar farm design, access, rent, earthworks, tracking

ARENA RAMPP FUNDING DOES NOT REQUIRE COST-POSITIVITY

Next steps

Submit feasibility study

Discuss non-microgrid options

While the feasibility study is under consideration by ARENA, is there are there further funding streams to be explored?

Group discussion

Non-microgrid alternatives

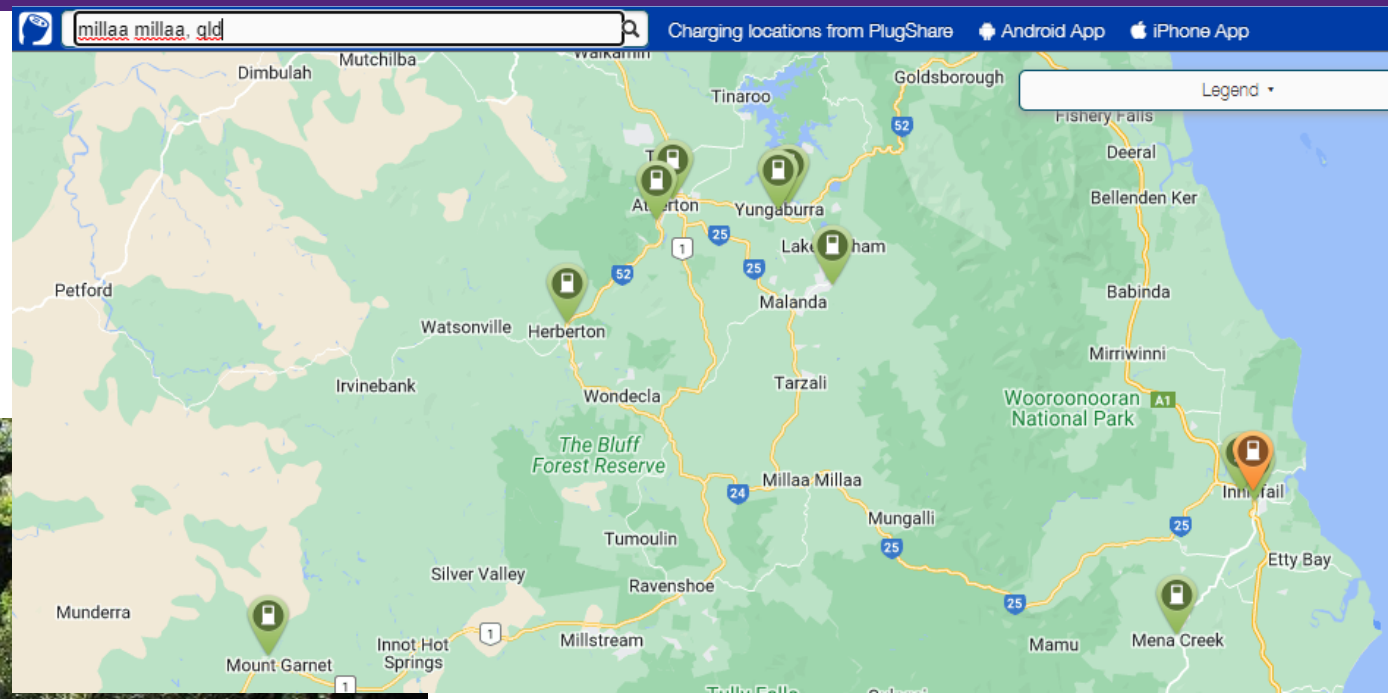
Households with solar/battery

Grid connect battery = SAPS for single business

Charging hub established

Warwick

Millaa Millaa



Lack of fast car chargers in the area

Funding avenues

North Queensland Recovery and Resilience Grants

Queensland Resilience and Risk Reduction Fund

Energy Consumers Australia (ECA) Research and Advocacy Grants

Advance Queensland

Thoughts…?

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Thank you

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