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MAGNETIC ISLAND COMMUNITY DEVELOPMENT ASSOCIATION

TOTALLY RENEWABLE MAGNETIC

September 2025

Magnetic Island Microgrid Feasibility Study

Study Overview and Findings

Yurika Agenda

1. Who is Yurika?
2. Magnetic Island Current State
3. What is a microgrid?
4. Key objectives
5. Feasibility study approach
6. Key findings

Who we are

Established in 2016, we're part of Energy Queensland, Australia's largest government—owned electricity company.

Southeast Qld Electricity Distribution Business

Regional Qld Electricity Distribution Business

Energy Solutions Provider – Australia wide

Regional Qld Retailer

Our capabilities

Solar

Electric vehicle charging

Wind farms

Battery Energy Storage

Electricity Networks

Telecommunication

Microgrids

Metering

Electrical Equipment Supply

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Magnetic Island

Magnetic Island is brimming with solar PV energy.

2,500
population

1,950
residential sites

200
business sites

Energy Snapshot

5.3 MW
of solar PV installed

656 sites (31%)
with solar PV installed

5.5 MW
annual peak power
(6-7pm, 2023/24)

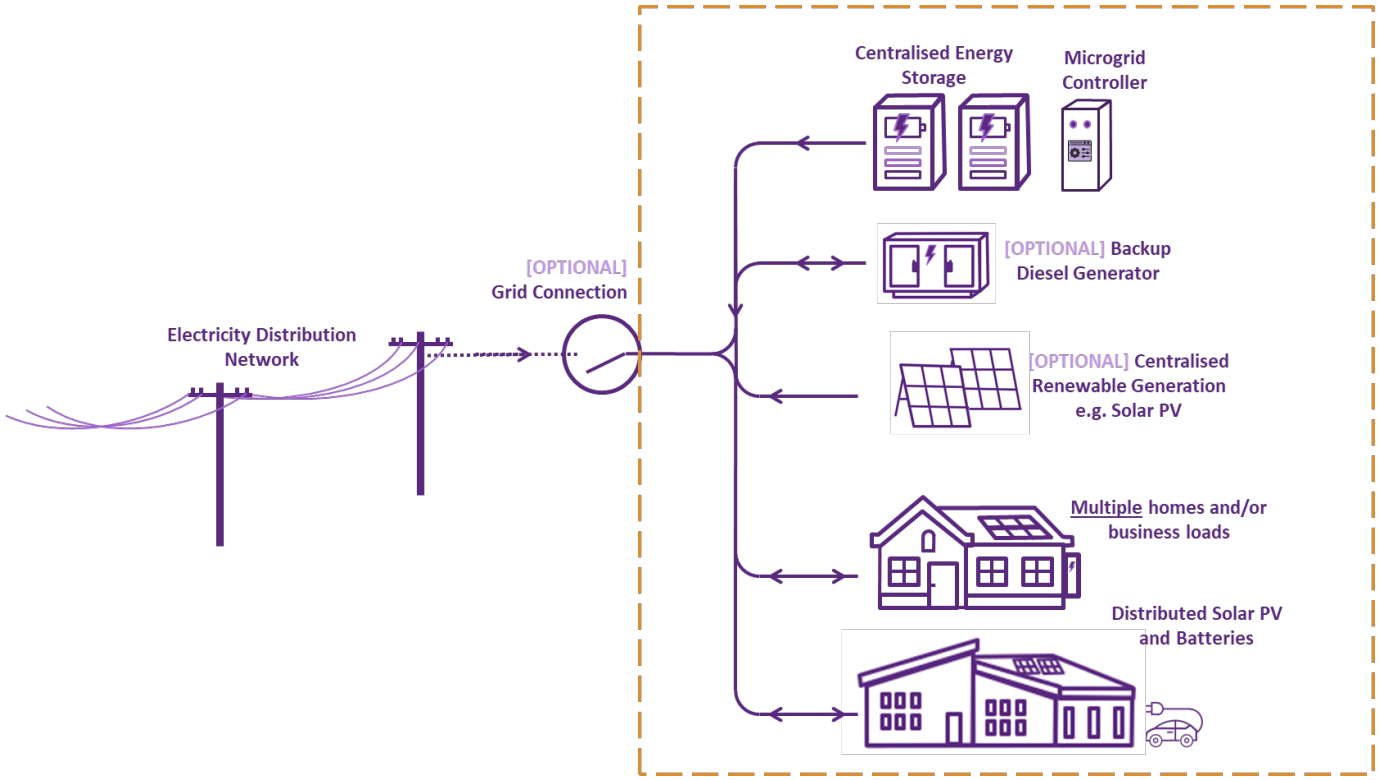
5,494 tonnes CO2-e
GHG emissions saved
from existing solar PV

30 %
energy needs
supplied by
renewable energy

2023/24 reverse flow
first year solar PV energy
flowed from Magnetic Island
to Townsville

What is a microgrid?

Microgrid components:



- ☑ Does it supply multiple houses and/or business?
- ☑ Can it operate independent of the main electricity grid?

Microgrid key differentiating factors:

- Objectives
- Single or multiple land parcels
- High voltage or low voltage distribution
- Operating model
- Electricity distribution infrastructure owner
- Centralised asset owner/s
- Distributed asset owner/s

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Key Objectives

Yurika worked with MICDA to understand the key drivers of the microgrid feasibility study.

MICDA's high level objectives:

1. MAXIMISE RENEWABLE ENERGY
2. MAXIMISE ECONOMIC BENEFIT/ VALUE
3. MINIMISE POWER OUTAGES

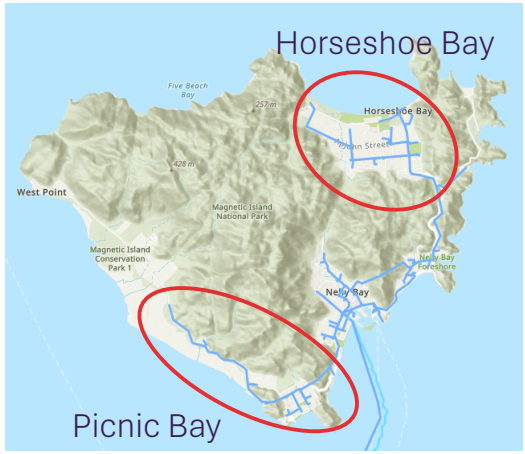
Study approach

Yurika conducted the feasibility study considering many solutions to achieve MICDA's objectives

Feasibility

- Technical
- Financial
- Legal & Regulatory
- Environmental
- Operational
- Stakeholder

Villages



Specific locations within villages?

Technology

Battery Storage

Rooftop Solar

Ground Mount Solar

High Voltage or Low Voltage?

Ownership

Distributed

Residents

Businesses

Centralised

Community entity

Energy Qld entity

Townsville City Council

Other?

Method:

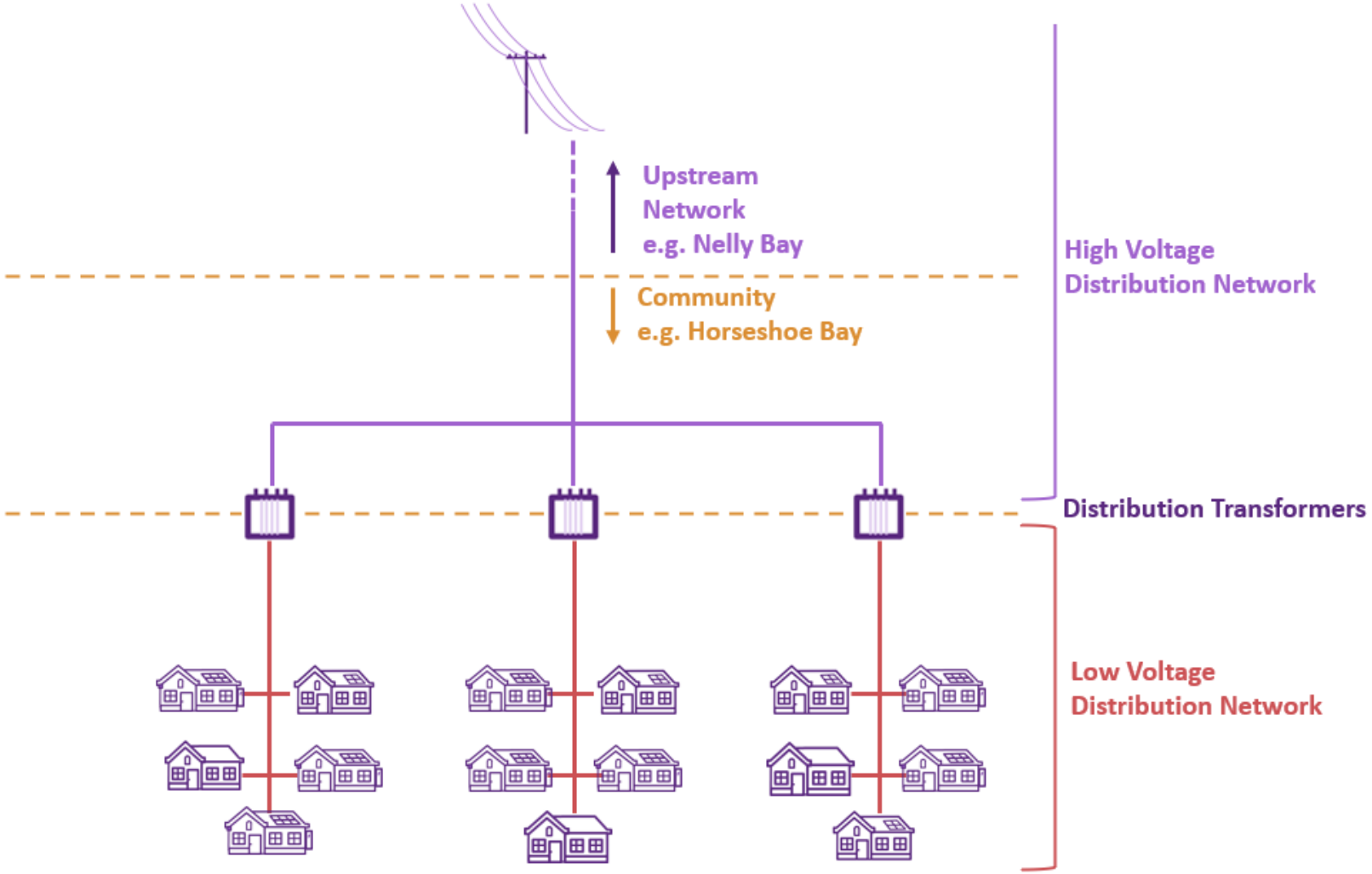
5 High level solution concepts
microgrid & non-microgrid

2 Actionable concepts for detailed analysis

1 Feasible solution that clearly achieves MICDA's key objectives

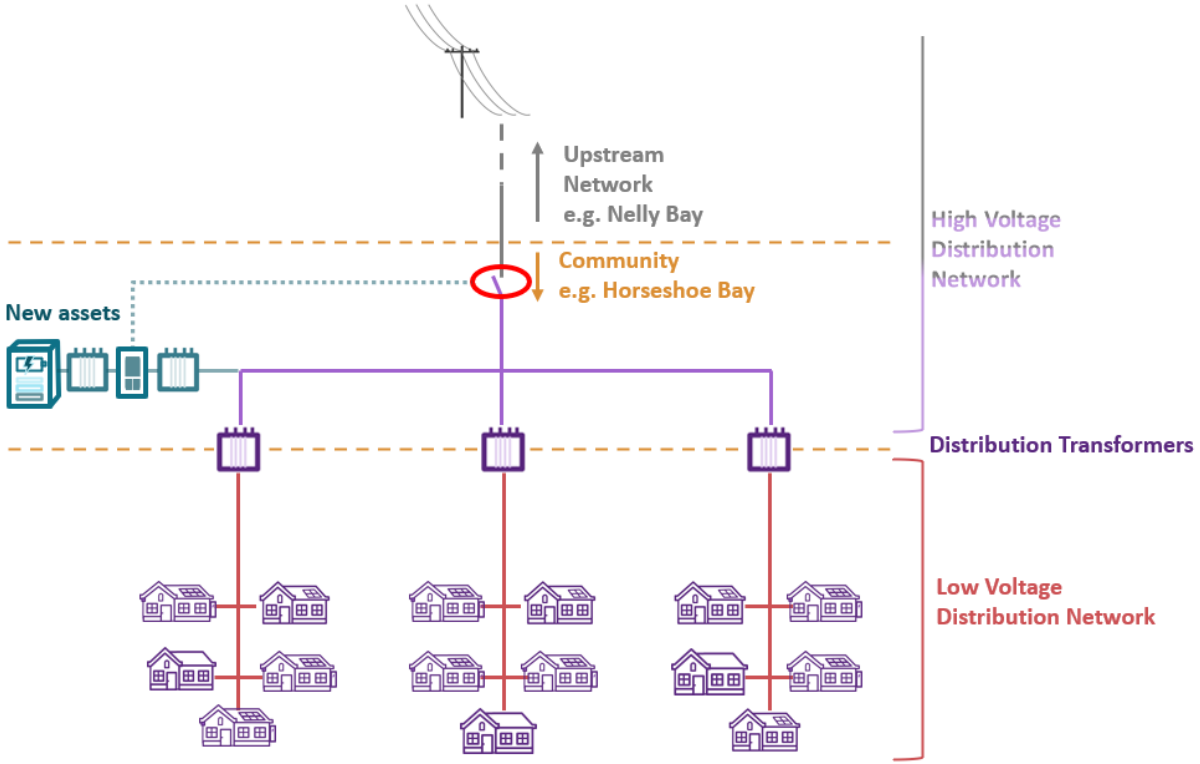
Feasibility study overview

The typical network arrangement...

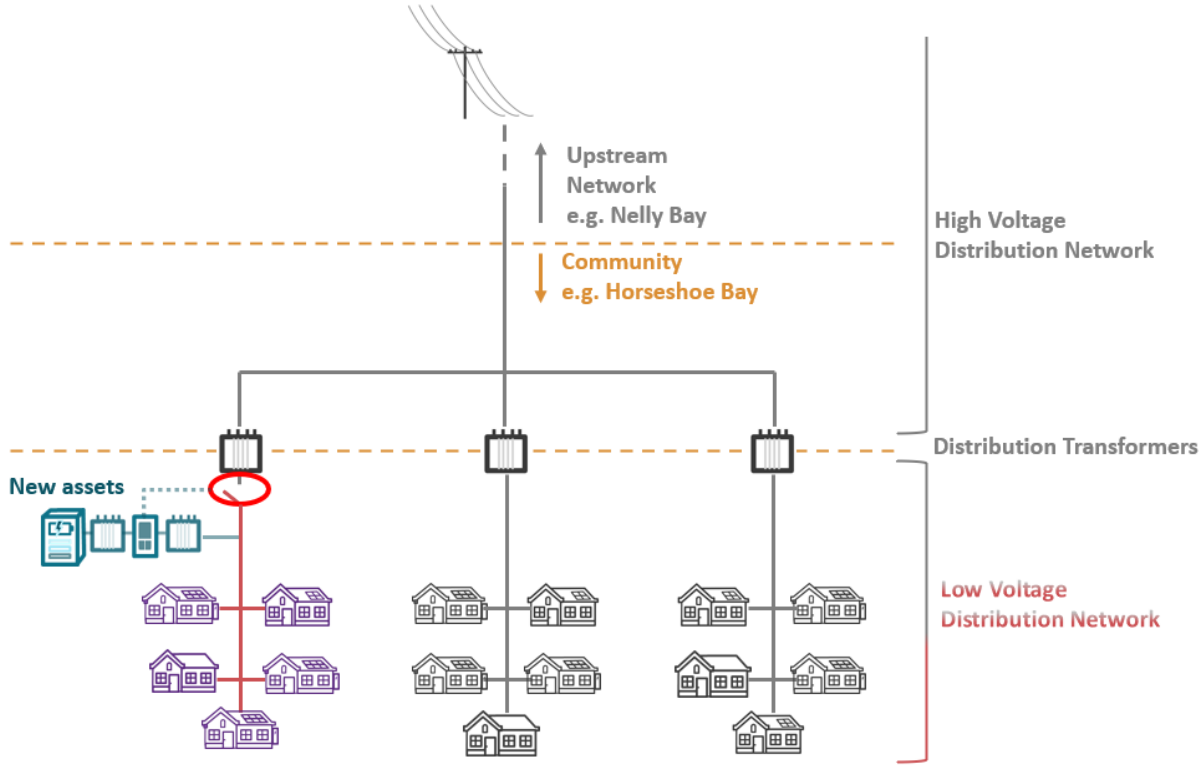


Feasibility study overview

Solution concepts (microgrid) considered…



High voltage (HV) community microgrid – grid outage



Low voltage (LV) community microgrid – grid outage

Key findings

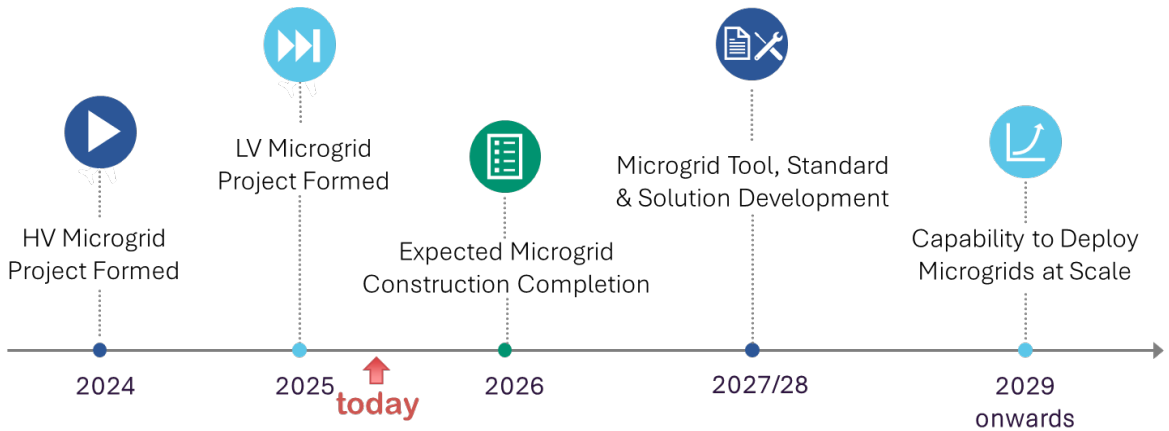
Network-owned (battery) microgrid solutions are developing in QLD…

Ergon Energy Network's first battery-based microgrid pilot projects (2)

Why?

The 2 x First Nations communities in FNQ are on the edge of the network experience <u>frequent power outages</u>

	Mossman Gorge	Jumbun
Network level	High voltage	Low voltage
Key Objective	Reduce power outages	
Electricity Bill	No change	
Supply Scale	180 people	100 people



Considerations for Magnetic Island

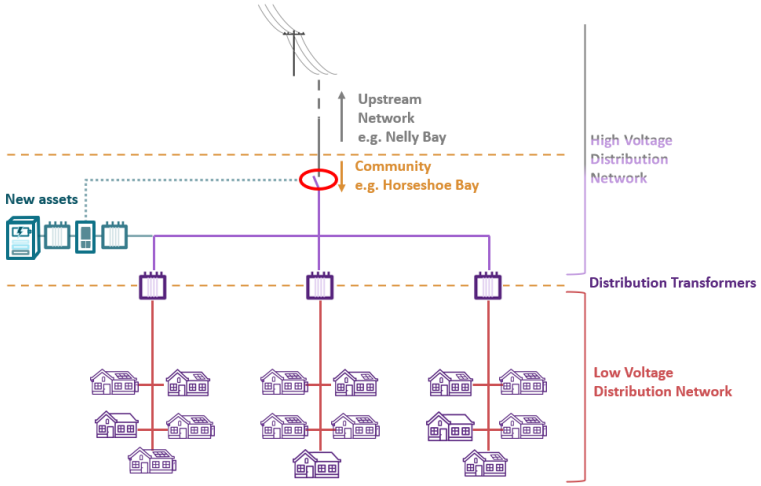
- Ergon Network will not have a solution to deploy in other communities until at least 2029
- If Ergon Network deploy more, locations with higher-than-average power outages will be prioritised
- Ergon Network have advised they have a satisfactory electricity network on Magnetic Island for at least the next 5 years
- Recent Magnetic Island Ergon Network upgrade projects will help reduce power outages

Magnetic Island network upgrade | Ergon Energy

Key findings

Privately-owned microgrids can have significant economic & regulatory barriers…

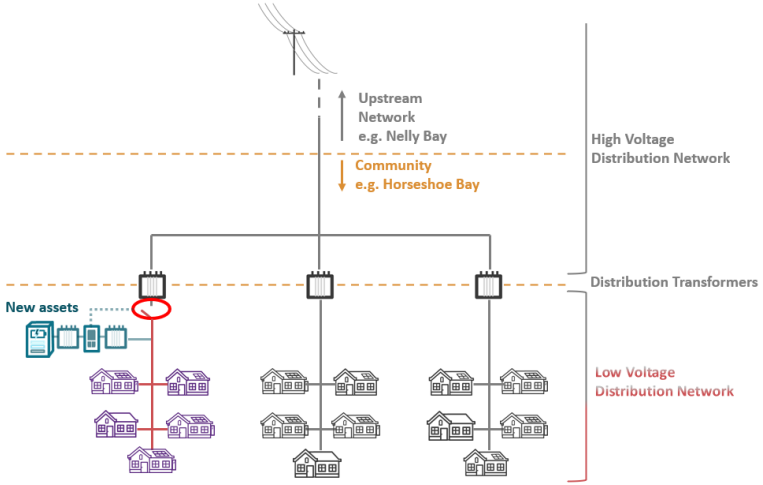
High voltage community microgrid



The microgrid owner is required to:

- Be a distribution business if microgrid supplies beyond your land and if electricity supply is the main business.
- Buy high voltage network from Ergon Energy Network (if willing to sell).
- Only operate network, not sell energy. A separate retailer would be needed.

Low voltage community microgrid



The microgrid owner is required to:

- Buy low voltage network from Ergon Energy Network (if willing to sell) or construct new network.
- Get permission from Ergon Energy Network, Townsville City Council and impacted homes and businesses.
- Get the appropriate registration or exemptions to operate network that supplies others and sell energy.

Meet Objectives?

1 MAXIMISE RENEWABLE ENERGY

Yes, by Solar Soaking
Adding a centralised battery will increase local use of solar energy.

2 MAXIMISE ECONOMIC BENEFIT/ VALUE

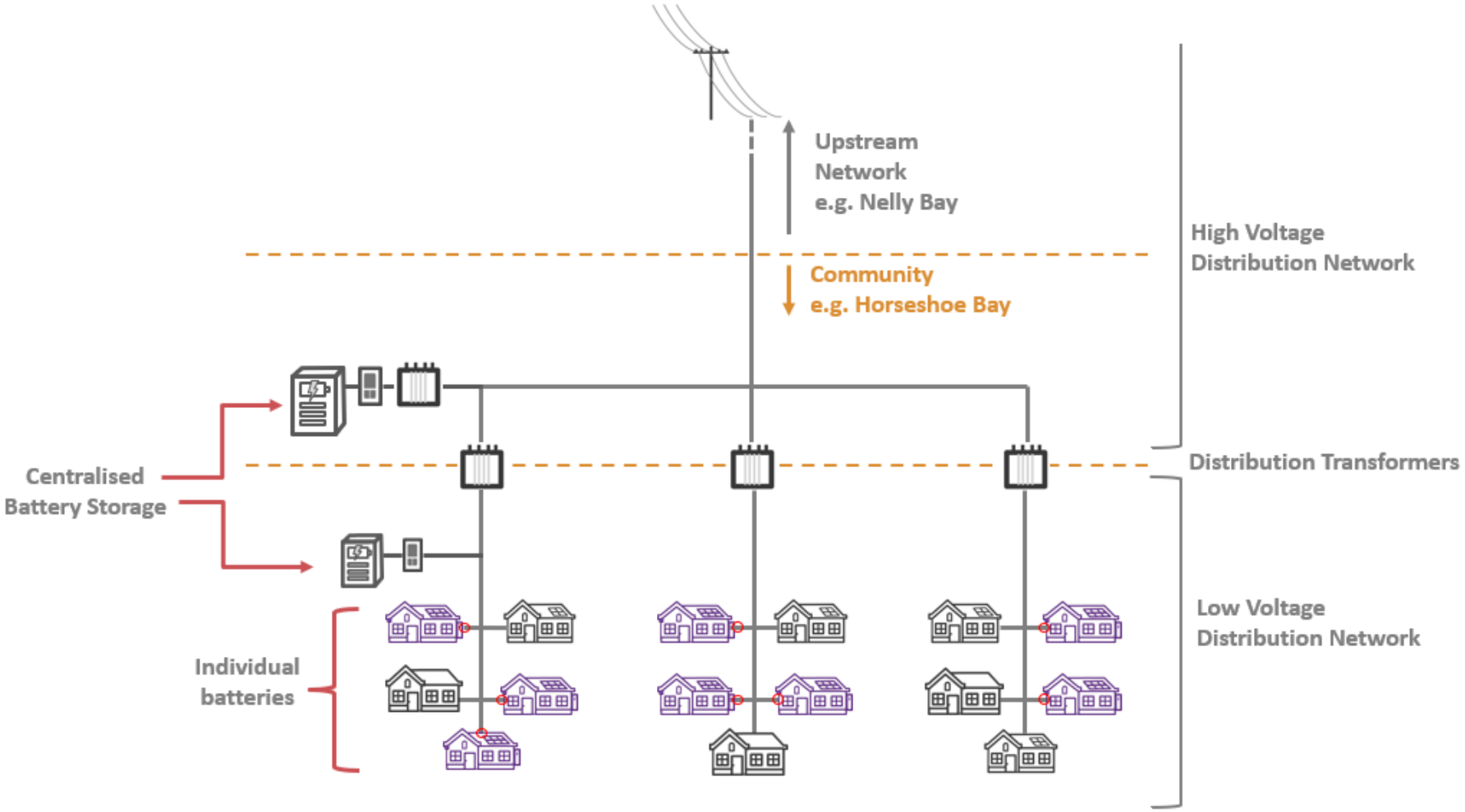
No
No clear profit to offer discounted electricity to homes and businesses.

3 MINIMISE POWER OUTAGES

Sometimes
Will provide backup power, unless a fault/ planned work causes an outage within the microgrid.

Feasibility study overview

Solution concepts (non-microgrid) considered…

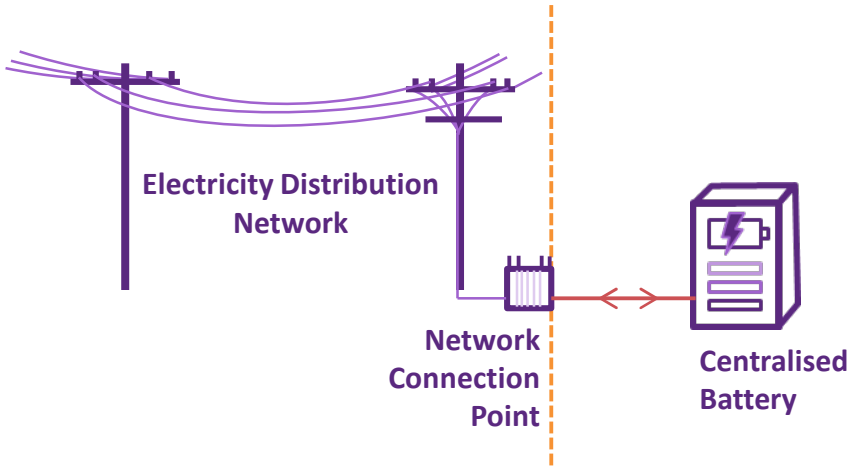


Centralised Battery and/or individual home/business batteries – grid outage

Key findings

Privately-owned centralised battery storage is a step towards a microgrid…

Centralised Battery Solution



Solution: 1 MW / 2 MWh Battery

Capital cost: $3.2 million

Limitation: no backup power

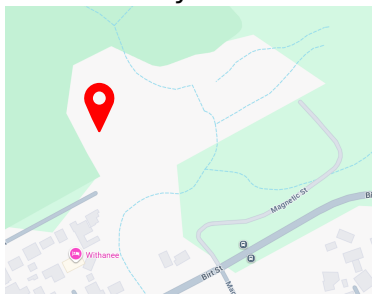
Battery use: Retailer to monetise battery power

Annual Revenue: $145k +

Sites Investigated:

Horseshoe Bay Park

Picnic Bay Landfill



Key Barriers:

1. **Limited and/or uncertain revenue**
2. **Capital cost of new network connection**
3. **Ongoing network connection fees and operational limits**
4. **Finding a suitable site to locate the battery & associated costs**
5. **Insurance challenges**

Meet Objectives?

1 MAXIMISE RENEWABLE ENERGY

✓ **Yes, by Solar Soaking**
Adding a centralised battery will increase local use of solar energy.

2 MAXIMISE ECONOMIC BENEFIT/ VALUE

✗ **Not directly**
No clear business case to share benefit of with community

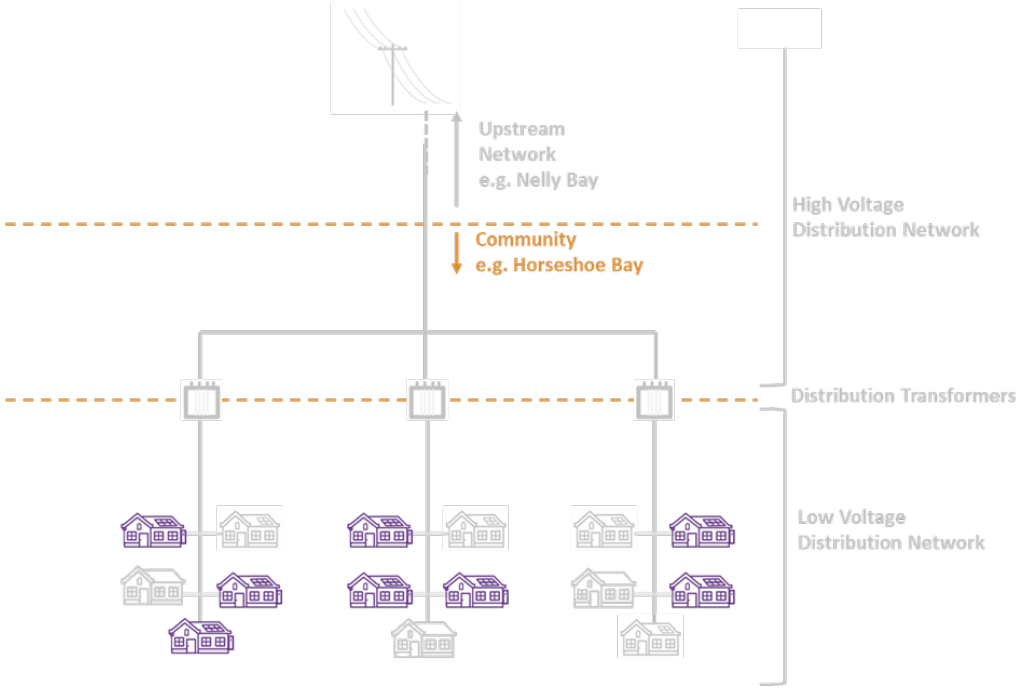
3 MINIMISE POWER OUTAGES

✗ **No**
Does not operate during a grid outage.

Key findings

Individual solar and battery is the most beneficial solution ….

Rooftop Solar
&
Battery (with backup capability)



Individual home/business batteries – grid outage

Advantages:

- Federal Government 'Cheaper Home Batteries Program'
- Can provide backup power to total load if sized and configured correctly
- Full ownership and control of solution and benefit
- Time-of-use tariffs (different cost at different times of day) and behaviour change can enable more savings

Disadvantages:

- Can be a high capital cost for an individual
- Some are locked out (e.g. renter, unsuitable roof etc.)
- Cannot share benefit or trade energy with neighbours
- Providing back up power to a large site is more costly and complex

Meet Objectives?

1 MAXIMISE RENEWABLE ENERGY

Yes
Additional solar and/or a battery to increase use of solar locally.

2 MAXIMISE ECONOMIC BENEFIT/ VALUE

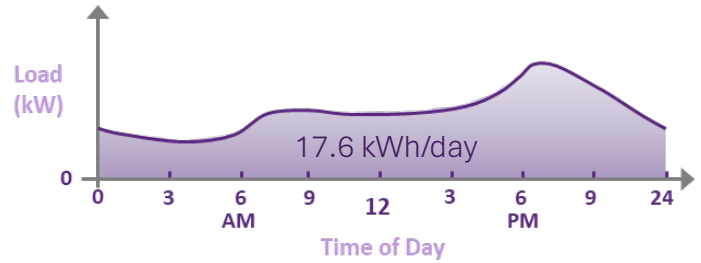
Yes
Direct savings on electricity bill.

3 MINIMISE POWER OUTAGES

Yes, if configured
Residential or commercial batteries can provide backup to part or all load.

Key findings

Typical Arrangement – Residential



BEFORE

Flat Rate Tariff 11

No solar

4.5 kW solar

6.6 kW solar

AFTER

90% of load supplied by renewable

+ 6.6 kW solar + Battery

6.6 kW solar
+ 10 kWh battery

+ 2.1 kW solar + Battery

6.6 kW solar
+ 10 kWh battery

+ Battery only

6.6 kW solar
+ 10 kWh battery

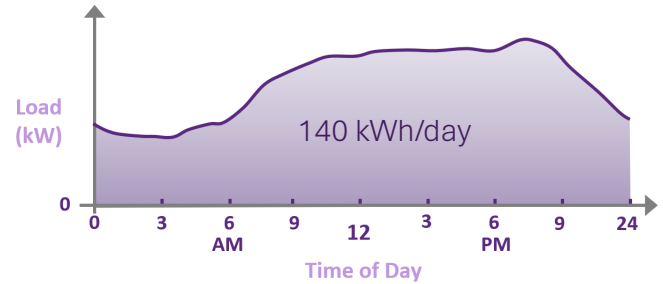
RESULTS (10 YRS)

	No solar	4.5 kW solar	6.6 kW solar
Flat Rate Tariff 11	$9,200 capital cost $2,150 (86%) Year 1 bill savings 4.6-year payback	$6,970 capital cost $960 (71%) Year 1 bill savings 8.3-year payback	$5,950 capital cost $590 (56%) Year 1 bill savings no payback
Time-of-use Demand Tariff 14C	$9,200 capital cost $2,320 (93%) Year 1 bill savings 4.2-year payback	$6,970 capital cost $1,120 (83%) Year 1 bill savings 6.8-year payback	$5,950 capital cost $780 (73%) Year 1 bill savings 8.7-year payback

NOTE: Results will vary with differing loads and capital costs.

Key findings

Typical Arrangement – Small Business



BEFORE

Flat Rate Tariff 20

No solar

+ 30 kW solar + Battery

10 kW solar

+ 20 kW solar + Battery

AFTER

55% of load supplied by renewable

30 kW solar

+ 30 kWh battery

30 kW solar

+ 30 kWh battery

RESULTS (10 YRS)

Flat Rate Tariff 20

$32,760 capital cost
$11,590 (68%) Year 1 bill savings
3.0-year payback

$27,870 capital cost
$6,825 (55%) Year 1 bill savings
4.3-year payback

Time-of-use Energy Tariff 22E

$32,760 capital cost
$12,710 (74%) Year 1 bill savings
2.8-year payback

$27,870 capital cost
$7,890 (64%) Year 1 bill savings
3.8-year payback

NOTE: Results will vary with differing loads and capital costs.

Key findings

Individual solar and batteries can have a varying payback

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Example Scenario:

Residential

No solar

6.6 kW solar

+ 10 kWh battery

ERGON ENERGY RETAIL Flat Rate Tariff 11

Simple Payback Scenarios

Capital Cost ($) (excl. GST)	Electricity Consumption (kWh)						
$ 17,600	10.8	10.5	8.9	8.5	8.2	7.9	7.7
$ 16,400	10.0	9.8	8.3	7.9	7.6	7.3	7.1
$ 15,200	9.2	9.0	7.6	7.3	7.0	6.8	6.5
$ 14,000	8.4	8.2	7.0	6.7	6.4	6.2	6.0
$ 12,800	7.6	7.5	6.3	6.1	5.8	5.6	5.5
$ 11,600	6.9	6.7	5.7	5.5	5.3	5.1	4.9
$ 10,400	6.1	6.0	5.1	4.9	4.7	4.5	4.4
$ 9,200	5.4	5.2	4.5	4.3	4.1	4.0	3.9
$ 8,000	4.6	4.5	3.9	3.7	3.6	3.4	3.3
$ 6,800	3.9	3.8	3.3	3.1	3.0	2.9	2.8
Per year →	4,200	5,300	**6,400**	7,500	8,600	9,700	10,800
Per day →	11.5	14.5	17.5	20.5	23.6	26.6	29.6

Annual Savings → (Tariff 11)	$ 1,800	$ 1,850	$ 2,150	$ 2,240	$ 2,320	$ 2,400	$ 2,480
Typical QLD Household Size →							

Key Findings

Concept comparison summary & conclusion

Key Objectives	Microgrid	Centralised Battery	Individual Solar & Battery
1 MAXIMISE RENEWABLE ENERGY	**Yes, by Solar Soaking** Adding a centralised battery will increase local use of solar energy.	**Yes, by Solar Soaking** Adding a centralised battery will increase local use of solar energy.	**Yes** Additional solar and/or a battery to increase use of solar locally.
2 MAXIMISE ECONOMIC BENEFIT/ VALUE	**No** No clear profit to offer discounted electricity to homes and businesses.	**Not directly** No clear profit to share benefit of with community	**Yes** Direct savings on electricity bill.
3 MINIMISE POWER OUTAGES	**Sometimes** Will provide backup power, unless a fault/ planned work causes an outage within the microgrid.	**No** Does not operate during a grid outage.	**Yes, if configured** Residential or commercial batteries can provide backup to part or all load.

Thank You

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