Battery Trials

Counties Power's battery energy storage projects

EEA Asset Management Forum

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COUNTIES POWER

Who is Counties Power?

We own and operate the electricity network in the southern Auckland area

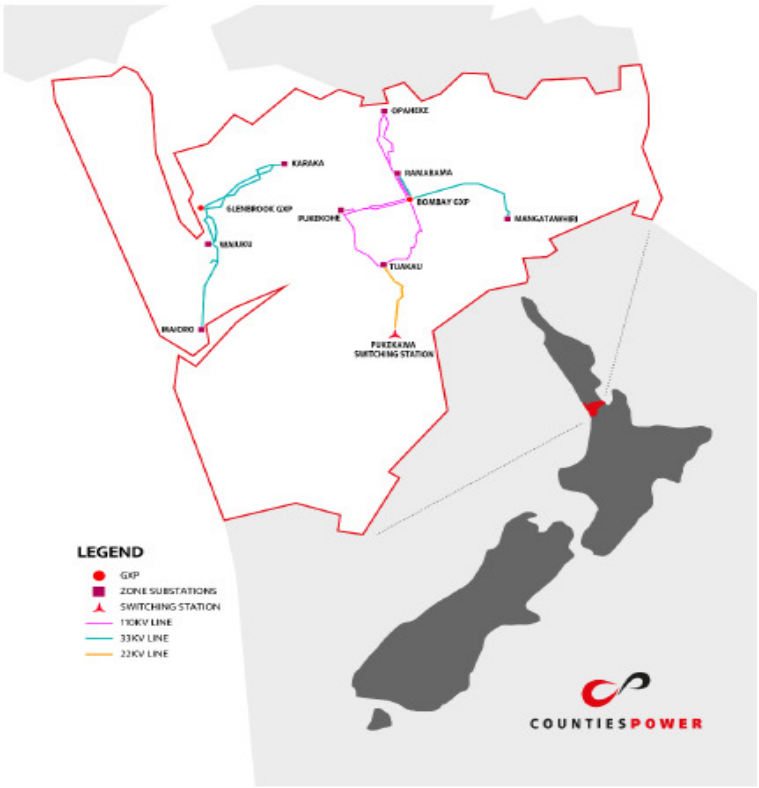
We have urban centres in Papakura, Pukekohe, Waiuku, Tuakau and Pokeno

Network is over 70% rural overhead by length, low density away from town centres

Approximately 41,000 connections - significant growth (3% per annum – 1,200 ICPs)

100% consumer trust owned

Exempt from price-quality regulation



A bit about our network

- Capacity investment in the core over the past 20 years
- Large, and rapid growth will bring localised constraints
- Growth is occurring in some areas without capacity
- Consumer's quality of supply expectations have changed
- Remote communities have increasing expectations around the level of service they receive
- We have advanced meter infrastructure

The case for batteries

What it can do

- Ancillary services (reserves, frequency)
- Demand side management – load reduction
- Voltage support
- Peak demand management – peak reduction
- Time deferral of load – peak shifting
- Storage and firming of renewable energy

Where it can be located

- Grid Scale – substation, power station
- Localised – street, large factory
- Distributed – homes and businesses

The beneficiaries

- Generators
- Transmission operators
- Distribution operators
- Retailers
- Consumers

They can solve lots of problems, in lots of different places… but at a cost

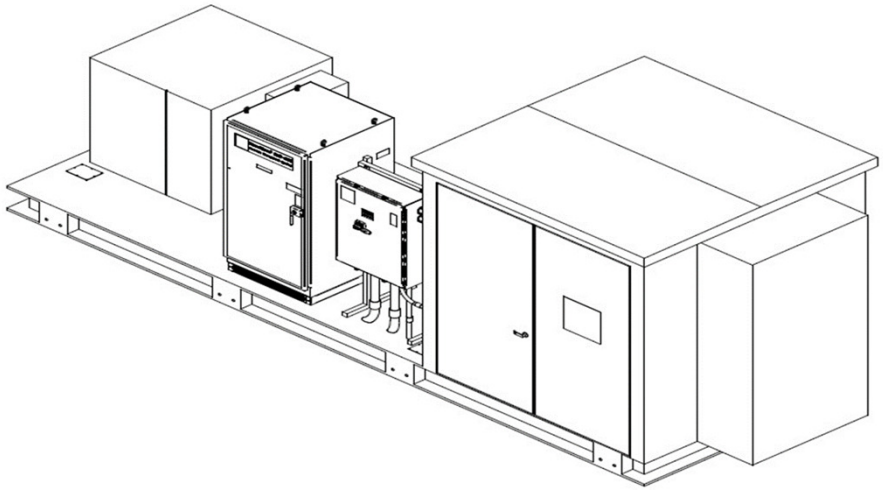
What is our ‘big’ battery project?

Battery energy storage system rated for 250kW output with 500kWh storage capacity

Connected to our Tuakau substation at 22kV, fully metered and integrated with our SCADA system

Electropar/S&C Electric were selected after a tender and technical evaluation process

Delivery and install from June 2017



The ‘big’ battery in real life

S&C Electric, Franklin WI

What is our ‘little’ battery project?

3.6kWh of Enphase modular battery storage

Installed at the Counties Power office in Pukekohe in late 2016

Connected to our 15kW rooftop solar array (Enphase inverters)

Trial to understand the value of storage, storage coupled with solar, and production and consumption patterns of a commercial site

Why are we playing with batteries?

To learn…

- To understand the impact residential and commercial PV and storage combinations may have on the network usage characteristics
- To develop batteries as an option in the solution toolbox – c.w. conventional network investments
- To develop our control systems to optimise the use of batteries, hot water load control, and other demand side energy resources or loads on our network
- To test and verify our assumptions about the value stack and possible investment deferral and value add service opportunities for batteries
- To understand the operation, maintenance and co-ordination requirements of battery storage on the network over time

It's an application trial, not a technology trial

Why are others doing energy storage?

Observations from the rest of the world

- USA and UK. Subsidised (DoE, LCNF). Not always a standalone business case for it.
- Ancillary services market can have significant value (PJM)
- Firming of renewables on larger grids (store now, use later)
- Vertically integrated utilities – more slices of the value stack
- Remote areas are more remote (Australia, USA)
- Deferral of capital investment (where cost >> than battery)

Many of the reasons batteries make financial sense (or at least produce a positive business case) elsewhere in the world don't apply in New Zealand, so what does?

The trial value proposition for us

Initial use case based on the following three value streams

Peak demand reduction
- Savings in Transpower charges
- Deferral of network augmentation

Ancillary services
- Instantaneous reserves

Energy trading (a by-product)
- Difference in energy prices between charging (off peak) and discharging (peak)

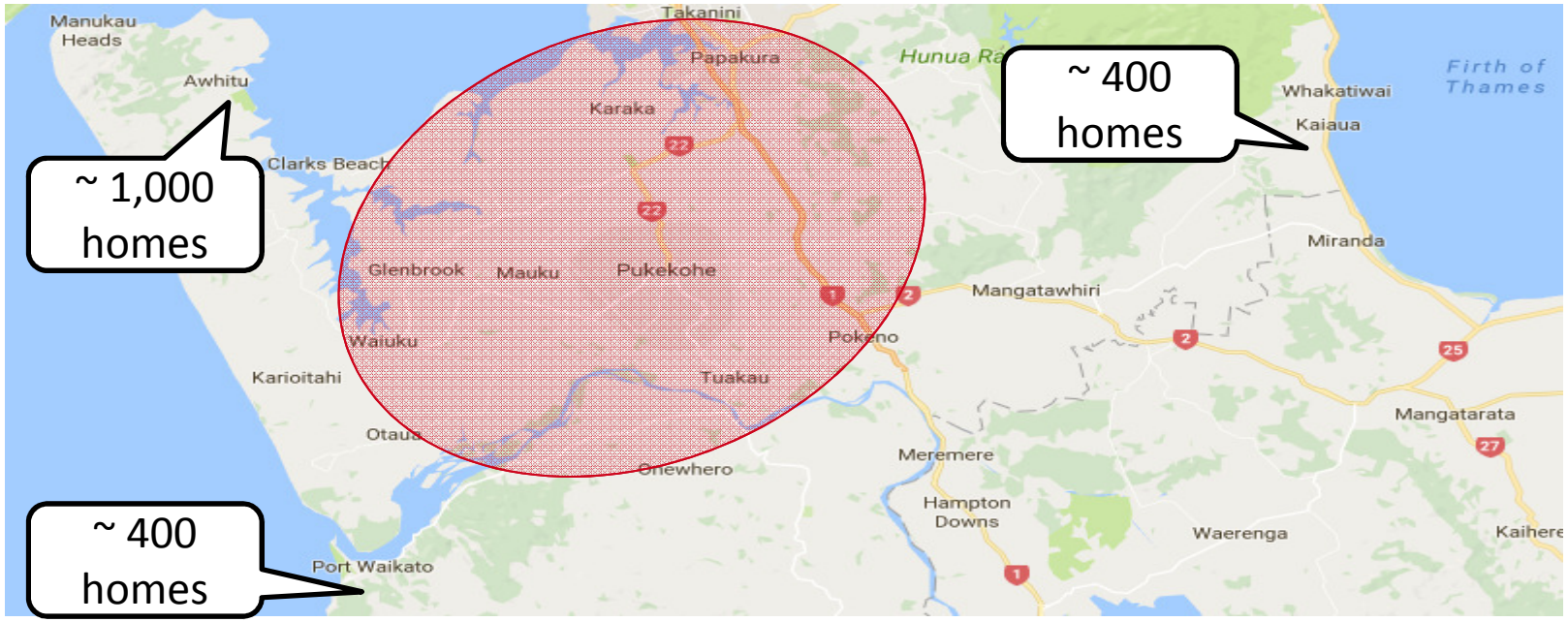
Other benefits include reactive support (statcom like), installation and maintenance learnings, control and operational systems development

Future value

- Addressing localised capacity constraints
- Distributed energy resources will become a cost effective alternative to traditional poles and wires investment
- Power quality improvements – industrial area schemes
- Supporting remote areas – communities with single supply line (n-security)
- Changing world – safety at work – not keeping the network live to work on resulting in more circuit outages

Some use cases in the near future

- Renewables integration
- Security and capacity augmentation
- Voltage support
- Remote community benefits



Challenges ahead

- The regulatory environment – economic, market, safety, technical
- Maximising value through co-ordination
- New technology, new skills needed
- New asset category to manage – what do we need to do?
- Operational procedures and risks

Conclusion

Batteries are going to be part of our future, however…

1. They won't necessarily replace the existing grid
2. The price has to come down to meet or beat the alternatives
3. The regulation has to be appropriate
4. We have to learn how to use and maintain them
5. They have to be used in a way that maximises value for "NZ, Inc"
6. As an industry we have to collaborate to get the best outcomes