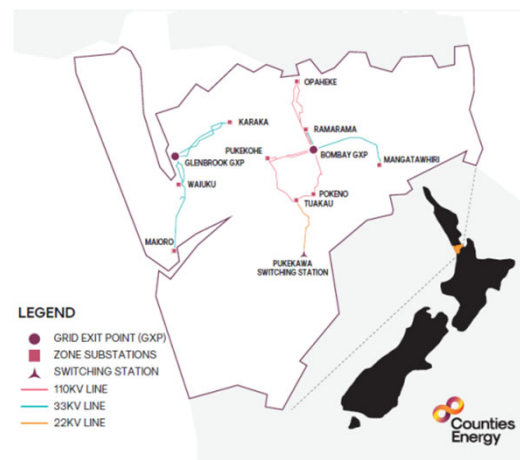


# An innovative approach to providing capacity for High-Power EV chargers using non-network solution

1

## Our Network

- 100% Trust owned
- Distribution network company in South Auckland and North Wairarapa
- Receive power from Bombay & Glenbrook GXPs
- Approx. 47,000 C/Ps



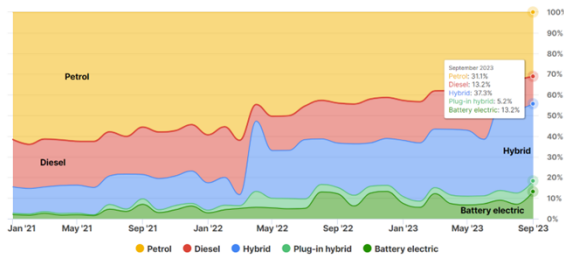
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# 'Why' & Why now?

3

## The way consumer are consuming the electricity is changing

**Market share by fuel type**  
Light vehicle registrations (cars + utes and vans)

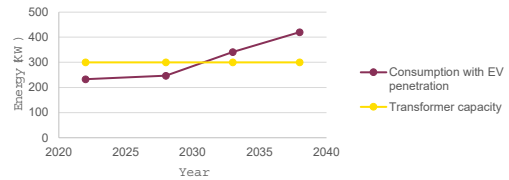


- EV registrations are growing at 60% annually over the past 4 years.

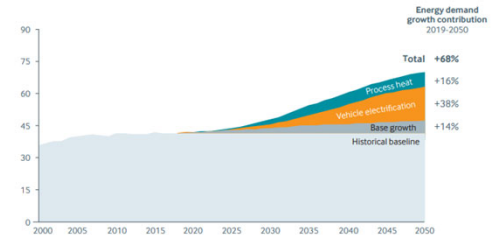
Source: MOT

4

Change in consumption as EV uptake increases



- There is a overloading of the assets
- Voltage issues for the customers
- Phase imbalance



Source: Transpower

## ReVolve - Berm Battery

- 2<sup>nd</sup> life Nissan EV battery cells
- 120kWh industrial BESS
- AS/NZS 4777.2:2020 certified
- Scalable up to 2.4MWh
- Dimensions 2.174 X 1.35 X 1.715
- Safety compliance with IEC standards
- Expected life up to 3000 cycles/8+ years
- Communication - Modbus, Wi-Fi, Ethernet, Cellular 4G/LTE, REST API



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# Opportunity

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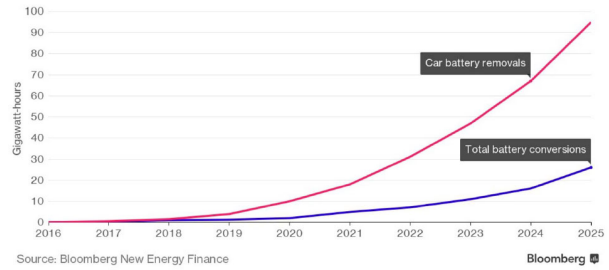
## Why 2<sup>nd</sup> Life battery ?

- EECA predicts by end of this decade EV sales will be up to 150,000 annually
- No facility in NZ to dispose or recycle EV batteries
- EV batteries have useful capacity when they reach the end of life in a carie. >55% -80% SoH of its original capacity
- Aligns with Counties Energy sustainability targets
- Cheaper than new batteries ie., ReVolve cost around \$800 per kWh while Tesla Megapack costs around \$1040 per kWh
- Provides with an opportunity to put in a more tailored solution
- Asset life - 8+ years



### Plenty of Old EV Batteries Coming Soon

Can be converted to home energy storage



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## Use Cases

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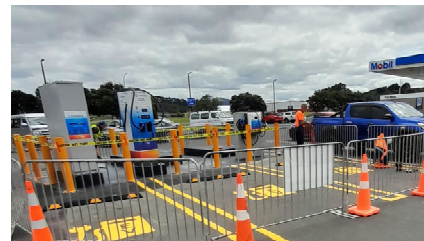
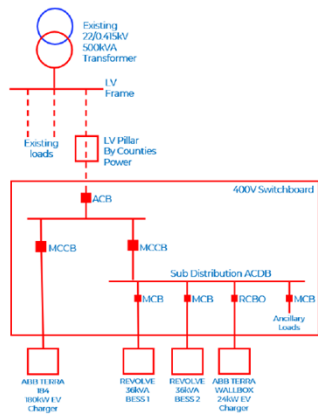


## Use cases

Use Cases	Driver/Motivation	Benefits
Network reliability	<ul style="list-style-type: none"> <li>Network constraints</li> <li>Peak demand and reliability risks</li> <li>Voltage management concerns</li> </ul>	<ul style="list-style-type: none"> <li>Improves network reliability</li> <li>Improved network resilience to impacts of climate change</li> <li>Cheaper electricity for the consumers</li> </ul>
Urban residential development	<ul style="list-style-type: none"> <li>Network planning for future growth/demand</li> </ul>	<ul style="list-style-type: none"> <li>Support increased penetrations of all forms of DG: solar, EVs, etc</li> <li>Support increased installed capacity and export potential</li> <li>Emissions reduction and renewable energy objectives</li> </ul>
Community initiated works	<ul style="list-style-type: none"> <li>Climate change concerns</li> <li>Environmental concerns</li> </ul>	<ul style="list-style-type: none"> <li>Renewable energy objectives</li> <li>Energy self-sufficiency objectives</li> </ul>

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## EV charger buffering support

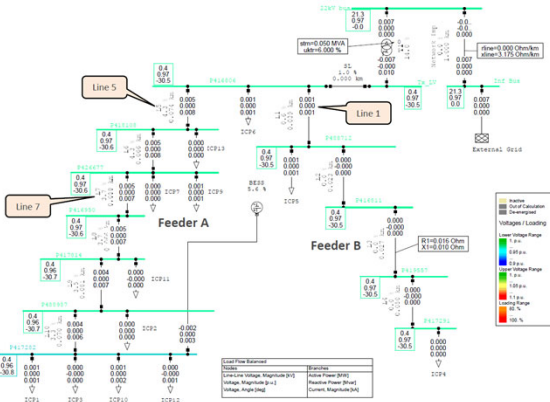


- Spare capacity on a 500kVA transformer is 140kVA
- Charger rating is 1x 180kW and 1x 25kW
- 2x 36kVA Revolve battery pack
- Additional of 72kVA made available for the site
- Better experience for our customers

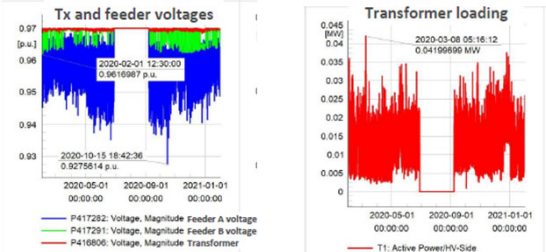
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## Voltage Support

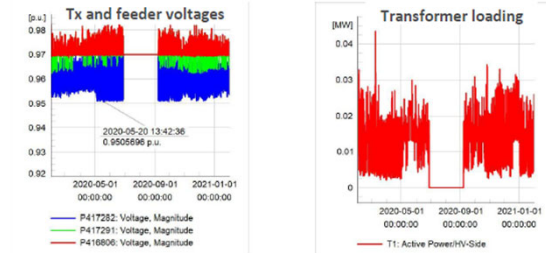
- Loading on a 50kVA transformer is 42kVA
- Developed a LV network model on Digsilent PowerFactory



- Without BESS The voltage at the extremities of the feeder dropped to 0.928 pu during peaks



- With BESS the voltage improved by 2.3 percent to 0.95 pu



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# Our Findings

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## Our finding

### Milestone

- Fire and emergency response plan
- Design compliance with Waikato District Plan
- Successful assembly of the battery packs
- Lab testing at Counties HQ

### Challenges

- Auckland Unitary plan classifies the activity as discretionary activity and requires a resource consent
- Some of the shipping lines do not ship the 2<sup>nd</sup> life batteries

### Learnings

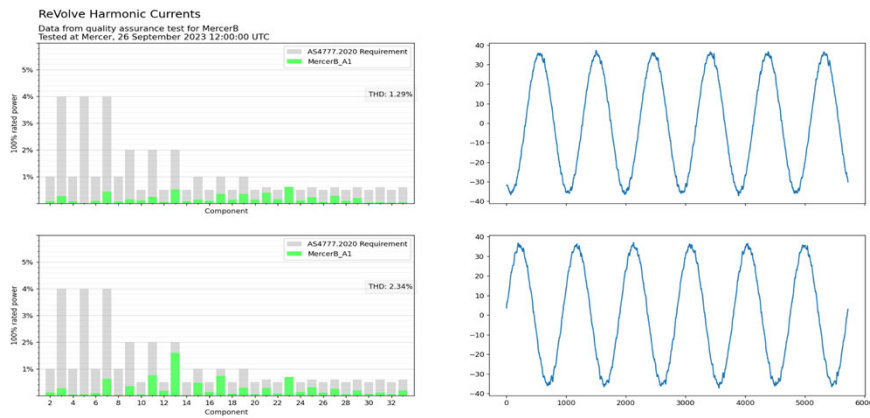
- Impact on delivery timeline
- Early engagement with planners to validate any council requirements.

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## Harmonics

Complies with AS4777.2:2020 requirements for current harmonics



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## Charge and Discharge Cycle

Adjustable power rate limit (W gra) with a default setting for increase and decrease rate of 16.67% of rated power per minute which is a nominal ramp rate of 6 minutes.



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## Rollout strategy



### Testing

- Performing lab test which includes in port/export operations, dem and response, islanding mode and back up operations
- Factory acceptance testing



### Council & Regulatory requirements

- Fire and emergency response plan
- Acoustic testing
- Compliance with council unitary plan
- Meeting network standards
- AS 4777.2:2020 compliance certification



### Operations

- Training for the operators
- Maintenance process in place



### Field trial

- Deploy unit into the field
- Monitor operations for 1 year
- Develop lesson learnt report
- Network wide deployment depending on the use cases

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## Further opportunities

- Can be an alternative to a diesel generator for events
- Support customers in remote, outage-prone areas by providing back up power and improving reliability of supply
- Participate in spot price arbitrage in the wholesale electricity market helping to place downward pressure on electricity prices
- Support the local distribution network and help to defer expensive infrastructure upgrades.
- Community battery banks e.g., Ausgrid community batteries, PowerBank community battery storage, WesternPower - expanding benefits to the customers who may not otherwise be able to install this technology themselves.

Ausgrid community batteries



Western Power community batteries



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# Questions

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