

Vector's EV Smart Charging Trial

Project

An ongoing trial of electric vehicle owner charging behaviour, begun in 2019 and covering approximately 200 EV owners in Auckland. The trial uses algorithmic EV charging with chargers that are fully integrated into Vector's DERMs platform.



Objective

To improve understanding of the factors impacting network peak demand from EV charging:

- Share real-world data on residential customer's current EV charging behaviour
- Demonstrate the value in system optimisation through demand management
- Understand customer satisfaction with network managed smart charging
- Demonstrate network integration of EV charging while maintaining customer satisfaction
- Inform EV Connection and Standards Guidelines.

Benefits

EV network integration will have a significant impact on energy affordability and reliability. With the right access and awareness, EDBs will be able to use a DERMs platform to efficiently prioritise the right resources at the right time to meet the increased demand from the electrification of transport.

Why is this important?

The Climate Change Commission has recommended an aggressive transition to Electric Vehicles (EV) to meet NZ's decarbonisation goals alongside other customer side transformations like more renewable energy and improved efficiency

Within the electricity networks that power our cities and communities, the impacts of local EV clustering – where there are several EVs near each other on the same street – may add considerable load during peak times as they are charged at home in the evenings. This could result in the need for costly network upgrades. Local electricity distribution businesses cannot currently see if this is happening, as there is no notification to EDBs when EVs are introduced at a home.

How will Vector's Smart Charging Trial help address the problem?

'Smart charging' is the use of demand management techniques to optimise overall energy consumption.

While Vector is learning more and more as the trial progresses, already we have:

- Developed an understanding of when and for how long people plug in their EVs at home
- Found out how effective fixed schedule (limiting EV charging rate during peak times) and dynamic (charging rate adjusted based on data from aggregated smart meters and EV chargers) smart charging methods are
- Heard how people feel about EV charging when subject to fixed schedule or dynamic smart charging methods.

Initial findings

Customer behaviour findings so far:

- Flexibility to shift EV charging is available for charging sessions longer than 5 hours
- Some customers use in-vehicle charging timers to delay the start of charging until 9pm, potentially creating a prolonged peak
- Network impacts will be more pronounced at the LV level where load is less diversified.

Smart Charging Works

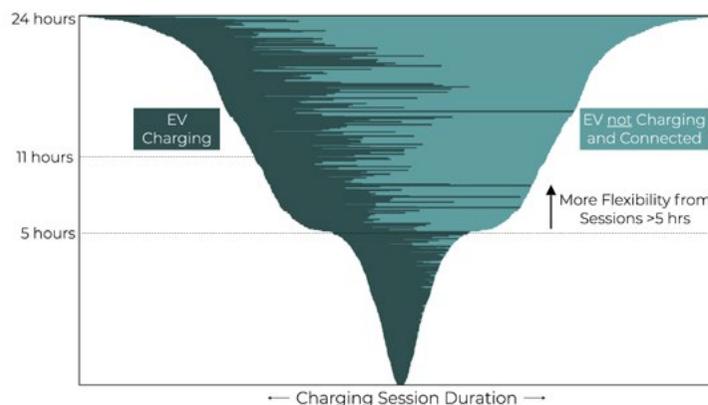
- Initial stages of the trial successfully reduced peak demand using smart charging methods, but the fixed schedule method introduced risks of secondary peaks
- Customers are very satisfied with smart charging methods used to date
- Access to smart meter data and EV registration data help networks identify regions in the low voltage network impacted by early adoption of EVs.

Benefits of research

While the trial is providing ongoing learning, already we have confirmed the following, which will be useful inputs into future EV charging considerations:

- Smart charging algorithms deliver seamless network integration and high customer satisfaction
- With demand response and demand flexibility playing an increased role in the electricity system of the future there is a need to coordinate demand side solutions, such as smart EV charging, to manage secondary peak impacts on networks
- Pairing EV charging data with smart meter data provides insight to low-voltage network impacts especially from EV clustering and updates assumptions used in scenario modelling.

The next stage of the trial includes investigations of dynamic smart charging methods that optimise EV charging across a suburb or feeder with high EV saturation and mitigate the risk of secondary peaks.



Unmanaged Charging Sessions October-December 2019
Majority of sessions can shift charging for system flexibility and still fully charge EV