

Vector's EV Smart Charging Trial

Project

A trial of electric vehicle owner charging behaviours covering approximately 200 EV owners in Auckland.



Objectives

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

- Share real world data on residential customers' current EV charging behaviour
- Understand customer satisfaction with network managed smart charging
- Demonstrate network integration of EV charging while maintaining customer satisfaction
- Inform EV connection and standards guidelines.

Why is this important?

The Climate Change Commission has recommended an aggressive transition to Electric Vehicles (EVs) to meet New Zealand's decarbonisation goals.

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.

This trial will:

- Provide understanding of when and for how long people plug in their EVs at home;
- Find 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;
- Find out how people feel about EV charging when subject to fixed schedule or dynamic smart charging methods.

Details of the trial:

- Participants: 200 EV users across Auckland (including Waiheke)
- Duration of trial: 24 months
- EV charger install: Vector installed a 7kW EV smart charger at each participants' home.
- Trial output:
 - » Vector worked together with participants to collect data on their EV charging preferences and get a clearer understanding of how EV smart charging can satisfy their expectations.
 - » The trial also studied whether optimising EV charging schedules could help alleviate peak demands on the network. Participants were split into three groups and, over the trial period, were served different smart charging scenarios at different times.

Key findings

Overall the EV smart charging trial demonstrated that smart charging can successfully integrate EVs into the network while delivering customer satisfaction. The trial has also filled a critical gap in international research about how customers feel about managed smart charging.

• Managing Demand Peaks

The EV smart charging trial has shown that clever charging algorithms can reduce electricity demand during peak hours without affecting customer satisfaction.

• Customer Behaviour

Customers who aren't engaged in their power bills are more likely to charge during peak time, while those who are engaged are more likely to charge off-peak.

(By engaged customers, we mean those that know about off-peak pricing even if they're not necessarily signed up to cheaper rates overnight or an 'hour of free power')

• Customer satisfaction

Customers were consistently happy for us to manage their EV charging as long as they were topped up and ready to go when they needed them. They showed increasing recognition of the better outcomes for society as a whole from smart charging, such as more affordable electrification and decarbonisation.

• Impact of EV charging

Under current EV charging behaviour, each EV charger installed will add about 1kW of load on the bigger parts of the system (including transmission and generation). In contrast low voltage networks will be affected about 2-7 times more, depending on their size. This is because within a smaller group, it is more likely they'll be coming home at the same time and therefore plugging in to charge.

