Key findings of Vector's innovation project: PRISMED

Submission to the Commerce Commission

5th February 2024

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Our submission is in three parts

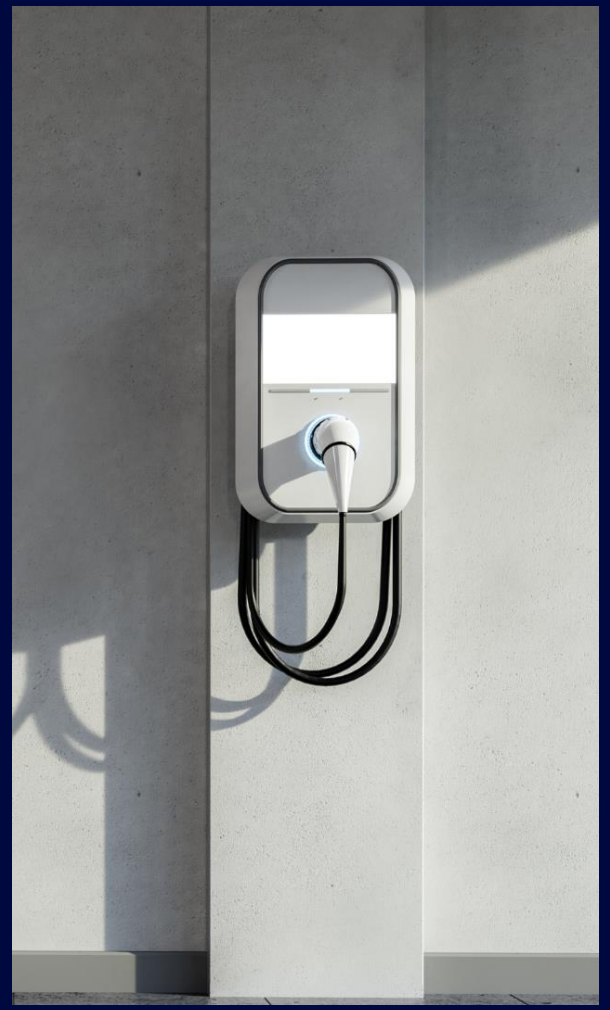
Part 1:
Collection of data

Part 2:
Data management

Part 3:
Consumer outcomes

Executive summary

- On 23rd November 2023, Vector received confirmation that its application, for Project PRISMED (process revolution to integrate smart meter electricity data) for drawdown of the Commerce Commission's (Commission) Innovation Project Allowance (IPA), was successful.
- Vector plans to use the insights from PRISMED for more informed decision-making on new connections and the impact on distribution transformers, especially concerning commercial customers installing EV chargers. By proactively managing demand and optimising network design based on years of data, Vector aims to provide immediate feedback on potential capacity constraints and network upgrades. As we move towards a different phase of energy use, the PRISMED project promises to reduce infrastructure costs, increase network reliability and the quality of electricity service, and ultimately help lower costs for consumers.
- Under paragraph 5(a) of Schedule 5.3 of the Electricity Distribution Services Default Price-Quality Path Determination, Vector is required to submit a report to the Commission that outlines the key findings of that project.
- We are pleased to publish this report on our website here (where our original application can also be found); the report does not contain any confidential information therefore it can be published unamended on the Commission's website.



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Part 1 – Collection of data

Part 1: Collection of smart meter data

Clear and effective communications essential to collecting data

- Aligning the legal aspects of data sharing with the operational realities is key to unlocking the boundaries between parties
- Ensuring Vector, the retailers and the meter electricity providers (MEPs) had the right contracts in place to enable data sharing ensured there was a meaningful commercial arrangement to adhere to
- Appendix C of the default distributor agreement (DDA) must be in place with all retailers, and additionally MEPs and retailers require separate commercial arrangements before MEPs can supply data on behalf of retailers
- The DDA has limited guidelines around the commercial arrangements (including the costs) associated with access to data
- Commercial metering arrangements were set up primarily with retailers in mind and did not necessarily support the needs of EDBs
- With PRISMED, contracts (and data agreements) are in place with retailers covering 99% of the residential installation control points (ICPs) on the Vector network
- Half -hourly consumption (kWh) data is now being made available to Vector on a monthly basis either via the MEPs, or directly from the retailer
- Limited network operational data sets (NODS),) were also made available for the trial phase of the project
- Non-traditional devices, such as Chorus owned ONTs, provide a useful addition to smart meter data for operational purposes

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Part 2 – Data management

Part 2: Data management of smart meter data

Systems must be ready for the volumes of data

- Through project PRISMED a curated data store of kWh has been built, which is updated monthly from data received from both MEPs as well as several retailers
- The curation process involves the data (which is received from multiple sources) being validated, cleansed, standardised, and missing values being interpolated
- The capacity of systems and people capabilities in dealing with extremely large volumes of data are crucial
- Data teams and engineering teams had to work collaboratively to ensure the data cleansing and interpolation was done accurately
- This aim of the exercise was to provide a highly accurate and complete view of the whole of Vector's ICP network
- Through this process we have been able to operationalise the data for the following:
  - Unregistered PV installation detection model.
  - EV detection model.
  - Transformer peak demand model.
  - Replacement of data loggers for the acceleration and optimisation of new connection requests.
- Data governance, privacy and security protocols were introduced which included staff training, ring fencing of data within systems, and cyber security considerations

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Part 3 – Consumer outcomes

Part 3: Consumer outcomes

A common platform with real-time data to contextualise our network in one place

Enhanced connections process

- Visibility of connection sites and constraints has meant more efficient and meaningful communications with customers seeking new connections
- We have more confidence in the available capacity of site locations making decision making for customers much quicker
- Overall, this has meant quicker and less costly site investigations bringing down connection costs and enhancing customer service

Understanding transformer loading

- Individual customer demand profiles from smart meter data can be used to create an accurate view of the distribution transformer load profile
- Half-hour load profiles have been built for all distribution transformers on the network for the past 3 years.
- Having access to detailed distribution transformer demand profiles allows for significantly more efficient decisions on the wider network peak demands

Customer outage visibility

- One of the key use cases of PRISMED was to obtain granular customer outage visibility at individual ICP level
- The ability to accurately locate low voltage faults means a more pro-active response (without having to rely on customers reporting outages themselves)
- This speeds up our response and avoids truck rolls where we are able to verify faults through data and not inspection

For EDBs, continuous and consistent visibility into how all consumers use energy throughout the day is crucial for building a network that can handle peak demand and adapt to major changes, such as the transition away from fossil fuels

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Case study: Meter ping trial

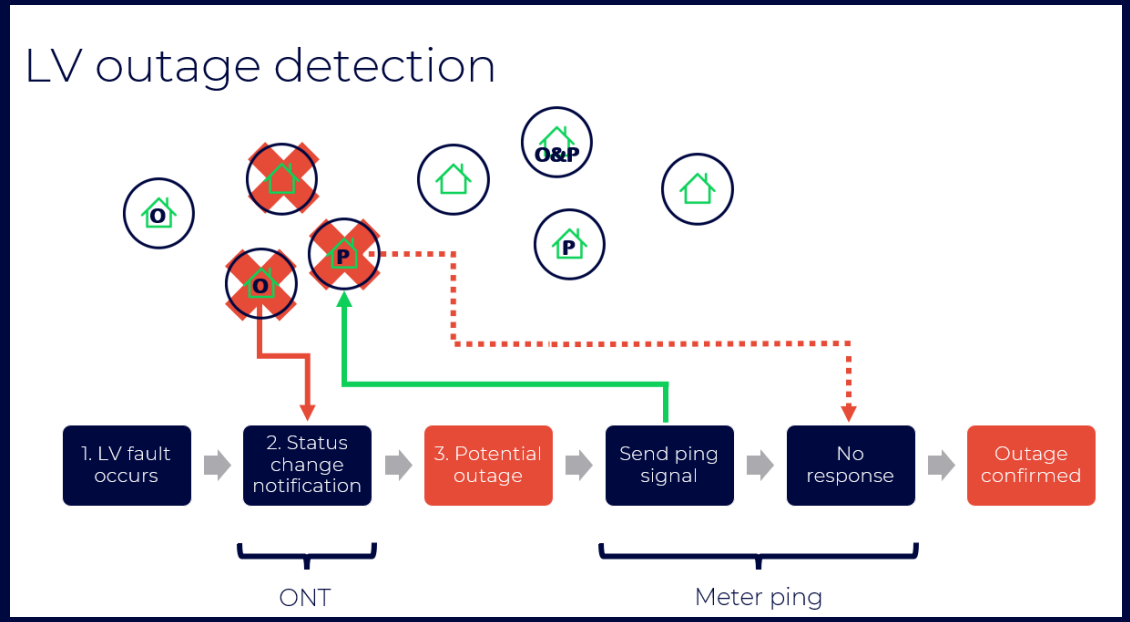
One milestone in project PRISMED was our meter ping trial.

Vector has +600k ICPs in the Auckland region. Of those, approximately 180k have the ability to be part of a meter ping solution, which uses a mobile phone network to send a small signal to the meter to check its status.

To complement the approach, we have also investigated the viability of leveraging, ONT data to detect LV outages. ONT technology uses the fibre network to send a signal about whether an ICP's modem is 'ON' or 'OFF', an alternative method for indicating a possible LV outage.

The overall project thus covered three distinct phases:

Phase 1: Determining the coverage of pingable meters
Phase 2: Developing a logic for pinging and evaluating the results
Phase 3: Developing a logic for using ONT data and evaluating results



"Meter": equipment that measures the amount of electricity consumed by an ICP/household

"Ping": sending a cell signal to the meter. If there is electricity, the meter will return a signal, otherwise it won't

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Case study: Meter ping trial [cont.]

- We tested a variety of ways to filter the ONT signals and eventually were able to filter to detect clusters of outages that were previously only detected AFTER a customer had called us
- For the ping technology, our best trial achieved up to 95% accuracy
- Many trials had lower accuracy (perhaps due to the rate of the pinging, the geographic location, or other factors), so there is still work to be done for greater consistency but as a proof of concept, it was successful
- The meter ping and ONT trials confirmed how we might move forward using the two technologies in tandem