

Meeting Date: 1 June 2023

NORTHERN ENERGY GROUP PRESENTATION

SECURITY AND RELIABILITY COUNCIL

This paper introduces a presentation from the Northern Energy Group, an organisation formed by distribution companies in the upper North Island, on its role in supporting its members to ensure power system security and reliability.

Note: This paper has been prepared for the purpose of the Security and Reliability Council (SRC). Content should not be interpreted as representing the views or policy of the Electricity Authority except where specifically noted.

The Northern Energy Group (NEG)

1.1.1 The SRC has asked the secretariat to provide information on the role of various industry organisations and groups, in supporting power system security and reliability as part of the SRC's *Industry Associations and Groups* theme.

1.1.2 With SRC member input, the secretariat posed a series of questions to the NEG.

The questions:

- (a) *What are the top 3 risks or concerns to security and reliability (including cyber) for your members and what is your organisation's role in reducing those security and reliability risks or concerns? Please include risks or concerns over short-, medium- and long-term horizons.*
- (b) *Does your organisation believe consumers get value for money, in terms of the security and reliability they currently receive from your members? How does your organisation support consumer trust and confidence in the sector more generally?*
- (c) *What are some examples of 'wins' for the industry your organisation has led or supported and how did you collaborate to achieve them? Conversely, what are some examples of areas where security and reliability wins were not achievable due to barriers?*
- (d) *What benefits do you provide to your members, and how? Please give examples of how you ensure the government and regulators make the best choices for the power system and consumers.*
- (e) *What does your organisation do to achieve consistency and minimum standards of security and reliability across its membership group? What are the impediments to consistency and minimum standards?*
- (f) *If you had the opportunity to give the Electricity Authority Board advice about what it can do to support a secure and reliable electricity supply for consumers, what would it be?*

1.1.3 Members are encouraged to raise these or additional questions to the NEG during the presentation, to clarify any points in the presentation and support the SRC's understanding of the NEG's role in supporting power system security and reliability.

1.1.4 A copy of NEG's presentation for the meeting appears in Appendix A to this paper.

1.1.5 A copy of further background information from the NEG appears in Appendix B to this paper.

1.1.6 The presentation notes the NEG's work in *enabling a low emissions economy*. Members may wish to enquire about the specific actions they consider are required to protect system stability.

1.1.7 Members may also be interested in asking more about how the Authority can provide support by way of regulation to *create the space for intelligent innovation and iteration to succeed*.

1.1.8 Members may be interested in asking further about what is needed to support greater access to data for distributors and greater visibility of low voltage networks.

1.1.9 Representatives from the NEG will present and be available for questions.

Questions for the SRC to consider

The SRC is asked to consider the following general questions.

- Q1. What further information, if any, does the SRC wish to have provided to it?**
- Q2. What advice, if any, does the SRC wish to provide to the Authority?**

Appendix A: NEG presentation

Appendix B: NEG - Background material

Agenda

1. Introduction (1 min)
2. NEG case studies (5 mins)
3. Resilience through DG (5 mins)
4. EV charging integration (5 mins)
5. Q+A (15 mins)



Northpower



NEG engagement with Govt.

We engage with government decision makers and collaborate to better meet consumer needs.

Case studies:

- Ministerial engagement = 25% reduction in lines charges
 - Russell Shaw (TopEnergy) shared a success story about Ngāwhā with Minister Shaw. **Within a month MBIE were able to quantify the sequestration** allowing Top to reduce lines charges by 25%
- Pushing for resilience
 - During cyclone Gabrielle, the NEG made daily on the ground updates to decision makers **on outages and community welfare**
 - Advice on supply chain resilience during Covid-19 response
 - Continued engagement with MBIE to resolve vegetation management regulations

NEG submission to MBIE on vegetation management



Strengthen resilience through DG

Solar in Te Tai Tokerau - current state and future potential

- 200MW of grid scale solar under development on the distribution network + 18MW of residential installed.
- This now matches the capacity of the grid to get power out of the area, although 1GW of export capacity exists from Marsden Point south.

Constraint = between Top's point of connection and the grid capacity to move generation out of the region.

Many iwi groups have energy strategies but no capacity now exists to get excess power out. This is a missed opportunity to reduce nodal prices and to enable iwi-led investment in local renewable generation.

Increasing solar penetration and accessibility:

Challenge

- In the Far North 1/3 of summer demand is now met by domestic solar. However intervention is required to enable core grid upgrades to enable more generation.
- Regulators need to provide certainty for network investments. Currently, investments are being assessed on materiality – by definition, investments of this size cannot fulfil this requirement.

Opportunity – opening up the market

- There is a role for PPAs
- REZ - share cost of upgrades and localise to demand and capacity to increase efficiency
- To unlock the renewable potential in Northland options include:
 - centralised funding for grid upgrades to enable these areas, as used in the Australia.
 - financial underwriting of network upgrades, as was successfully employed for the fibre rollout.



EV charging integration

Challenges, opportunities, regulatory enablers, technology, and DSO

EV charging = challenge and opportunity

- Peak demand forecast to increase 150% by 2050 if not managed. If managed, forecast increase is ~50%
- This represents a significant reduction in capex required and consumer cost
- EVs = new complexity. This requires the right tools and management to ensure EV demand remains within network limits, and, that the system can respond to new complexity.

Demand management = key to reducing cost and ensuring system security.

DSO = key part of the solution

- How do we achieve grid stability in a network with hugely increased DERs?
- Flexforum = focused on the 'how' (flexibility market structure and roles).
- NEG = focused on the 'what' – delivering security and reliability for consumers in a system changed by DER.

Digitalisation and DSO / orchestration at local level, within minimum standards, will be critical for system stability.

I.e., competitive flexibility markets + DOEs = positive consumer outcomes

Regulatory settings for DER

Achieve greater resilience through DG and smart EV integration

What do the regulatory settings need to address in the short, medium, and long term?

Short term:

- Implement REZ pilot – looking to international examples
- Align reg settings for funding of NW solutions and innovation (i.e., cyber security and innovation allowance, IMs review)
- Regulate for smart EV charging
- Expand the DER registry for EV registration per ICP

Medium term:

- Improve regulatory certainty for network integration of DG
- Allow contestable connections
- Accelerate REZs
- Continue to iterate and optimise market settings for DER management and DSO capability

Long term:

- Shift to whole-of-system approach in assessing investments
- National direction for whole electricity system in resource management and planning
- Develop and implement industry-led DSO roadmap

Group discussion and Q+A

Northern Energy Group

All NEG members are directly connected to our consumers through being local and trust owned – this is our strength; we have a long-term view and are hyper focused on our customers.

Policy asks

The consumer benefits of managed charging are clear from Vector's modelling, and Vector's EV trial demonstrated that managed charging delivers high level of customer satisfaction. However, managed EV charging requires urgent support from Government for default off-peak charging and to stipulate managed smart charging requirements.

- One option could be a requirement for customers to purchase a smart EV charger to receive the clean car rebate.



Northpower





Northpower



Introduction & purpose

The Northern Energy Group consists of companies with a track record of taking action and being willing to give things a go.

Across our group you'll see the very best in customer engagement, generation development, systems deployment, field operations, and engaging in practical ways with grass roots communities. Collectively we're all companies who have grown and evolved over the years.

You won't find our people hidden away writing submissions that argue for the status quo, our companies focus on working with our communities and seeking out ways to make a practical difference. We want to prove what works, not argue what might not work.

It's that focus on the future that has brought us together, fostering an approach of open sharing has meant our leadership teams approaches align over time. We like working with each other, together we have access to skills and capabilities equal to the best in the world.

We've got a deeply practical engineering core to ensure we build networks that are up the task, and a belief that what we build needs to reflect how our communities will use these networks over time. Solving Resiliency, affordability, and equity is not just a catchphrase for us– it's our core mission.

We believe regulation has a critical role to play in enabling this approach – it creates the space for intelligent innovation and iteration to succeed.

Prioritising customer interests

Our goal is to lift consumers up together – ensuring that everyone can benefit from Aotearoa New Zealand's energy transition.



Case Study: Waipā Networks

Lowering energy costs through gifting 85,000 LED lightbulbs to our community while providing advice on how to reduce your electricity bill.

Waipā Networks connects consumers from Kawhia on the west coast through to Cambridge and Lake Karapiro – consequently our consumers have a variety of energy needs.

In 2022 we gave away 85,000 LED light bulbs through 27 schools, 14 community organisations and two community events. Each 9 watt light bulb produces the same amount of light as a 100 watt incandescent bulb and will last for up to 30 years. On average, each Waipā home will get five energy efficient light bulbs saving the household about \$112 in electricity per year. In addition to giving away the light bulbs Waipā Networks are providing advice on how households can reduce their electricity costs as well as connecting to our community to further understand their energy needs.

The first 5,000 bulbs were distributed with support from Te Wharekura o Ngā Purapura o Te Aroha and Te Awamutu College. Te Wharekura o Ngā Purapura o Te Aroha student Alex Tuhihohepa and teacher Ngawai Aperehama received the bulbs on behalf of their school (pictured left), each family within the school received five bulbs each.

In 2023, Waipā will begin in-home energy assessments – using the lessons learnt from fellow NEG members Northpower and The Lines Company. Through the LED light bulb giveaway, and leveraging the connections we have made in the community, we will be able to deliver greater energy savings to those households who need it most.

Prioritising renewables equity for customers

We believe customers' accessibility to renewable energy solutions belong at the heart of our energy sector



Case Study: The Lines Company community solar initiative

The Lines Company are supporting equitable renewable energy outcomes in the King Country region by challenging how they can support customers, with the deployment of whānau based solar solutions.

Geographically, The Lines Company (TLC) network is vast – encompassing alpine environments, cold climates and many areas with poor housing stock. Socially and economically, significant parts of the network have been identified as amongst the most deprived in the country.

Enabling equitable access to renewable energy resources can make a real difference for people who would normally not have access to the benefits of solar.

Partnering with MBIE through the Māori and Public Housing Renewable Energy Fund, TLC is piloting an energy sharing approach – installing solar panels on roofs and new hot water heating technology, and sharing the energy among Māori communities through a peer-to-peer trading platform.

Alongside the benefits of reduced electricity costs and sharing of energy during peak production times, there are also a number of community wellbeing advantages for the project alongside aiding decarbonisation.

Working with Te Nehenehenui and Tūwharetoa, the 12-month long pilot programmes are targeted to deliver positive financial, health, and wellbeing outcomes for whānau.

Enabling a low emissions economy

Electrification of the economy is essential to respond to climate change – our approach is informed by the key principles essential for delivering an affordable and effective energy system.



Outcomes

Reliable core infrastructure

De-carbonisation

Fair pricing

Electricity services designed for consumers

Contributors

Asset management strategy

Optimising use of existing network infrastructure

Protection of system stability

Enabling demand side participation

Enabling market settings

Standardisation and platforms for efficiency

Climate centric and future focused technical standards

Sector building blocks

Innovation

Collaboration and sharing of expertise

Capable, skilled workforce

Solar in Te Tai Tokerau

Current state and future potential

Across Northland there is currently over 200MW of grid scale solar under development on the distribution networks and over 18MW of domestic installed. In the Far North and some areas of the Mid North this now matches the capacity of the grid to get power out of the area, although 1GW of export capacity exists from Marsden Point south. To achieve a just transition it is essential solar is not just the domain of the wealthy or the first to secure sites. Many iwi groups have energy strategies but no capacity now exists to get excess power out, effectively locking them out of participating in the transition.

Increasing solar penetration and accessibility:

Opening up the market

- No intervention appears necessary for roof top solar, with uptake steady. In the Far North 1/3 of summer demand is now met by domestic solar.
- Government procurement of PPAs would assist with existing large scale projects as this is a blocker for developers proceeding to construction.
- Lack of network capacity constraining further development of grid scale solar.
- Interventions are required to enable core grid upgrades to enable more generation.

REZ

- Current REZ proposal means the further you are from Marsden the greater the costs to export as each generator needs to fund a portion of each upgrade. Close to Marsden requires no upgrades; around Kaitia requires three. This makes generation more attractive closer to existing capacity and highly challenging to developments further afield.
- To unlock the renewable potential in Northland options include:
 - centralised funding for grid upgrades to enable these areas, as used in the Australia.
 - financial underwriting of network upgrades, as was successfully employed for the fibre rollout.





Creating a more efficient and resilient system

We are working proactively to ensure that networks are ready for the future by enabling affordable and equitable electrification of transport while meeting the needs of customers

Case study: Vector smart EV charging trial

Vector's modelling of new demand along the Climate Change Commission's demonstration pathway has found that new demand could three fold increase network capacity requirements by 2050 if this demand is not managed. Smart EV charging and smart hot water control (i.e. DER orchestration) however could reduce peak demand growth by more than 42%. Smart EV charging requires:

- Charging EVs outside of peak periods, by default (as per UK regulation)
- EV chargers having smart capability (an IP address and capability to respond to a signal)
- A digital platform that can dynamically monitor and manage demand (for dynamic rather than static load shifting)

Vector has undertaken a trial of 200 EV smart chargers across Auckland using smart chargers from the Christchurch based start-up, EVNEX, at consumers' homes.

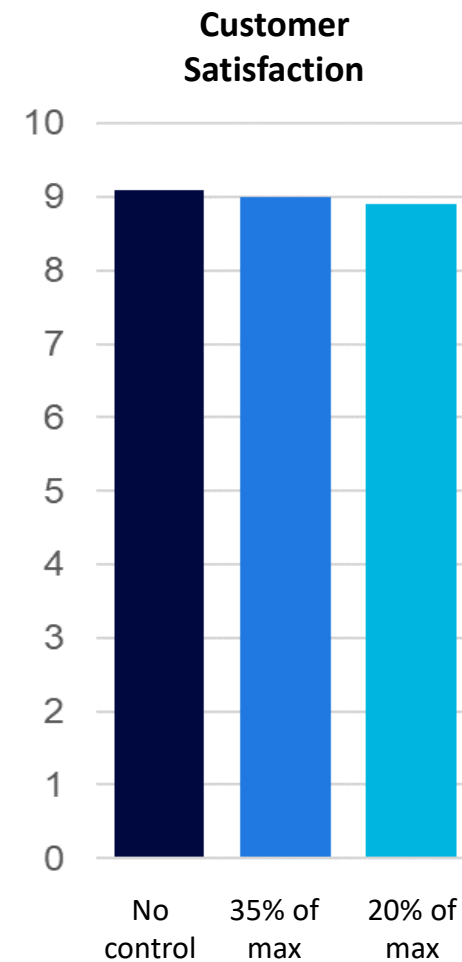
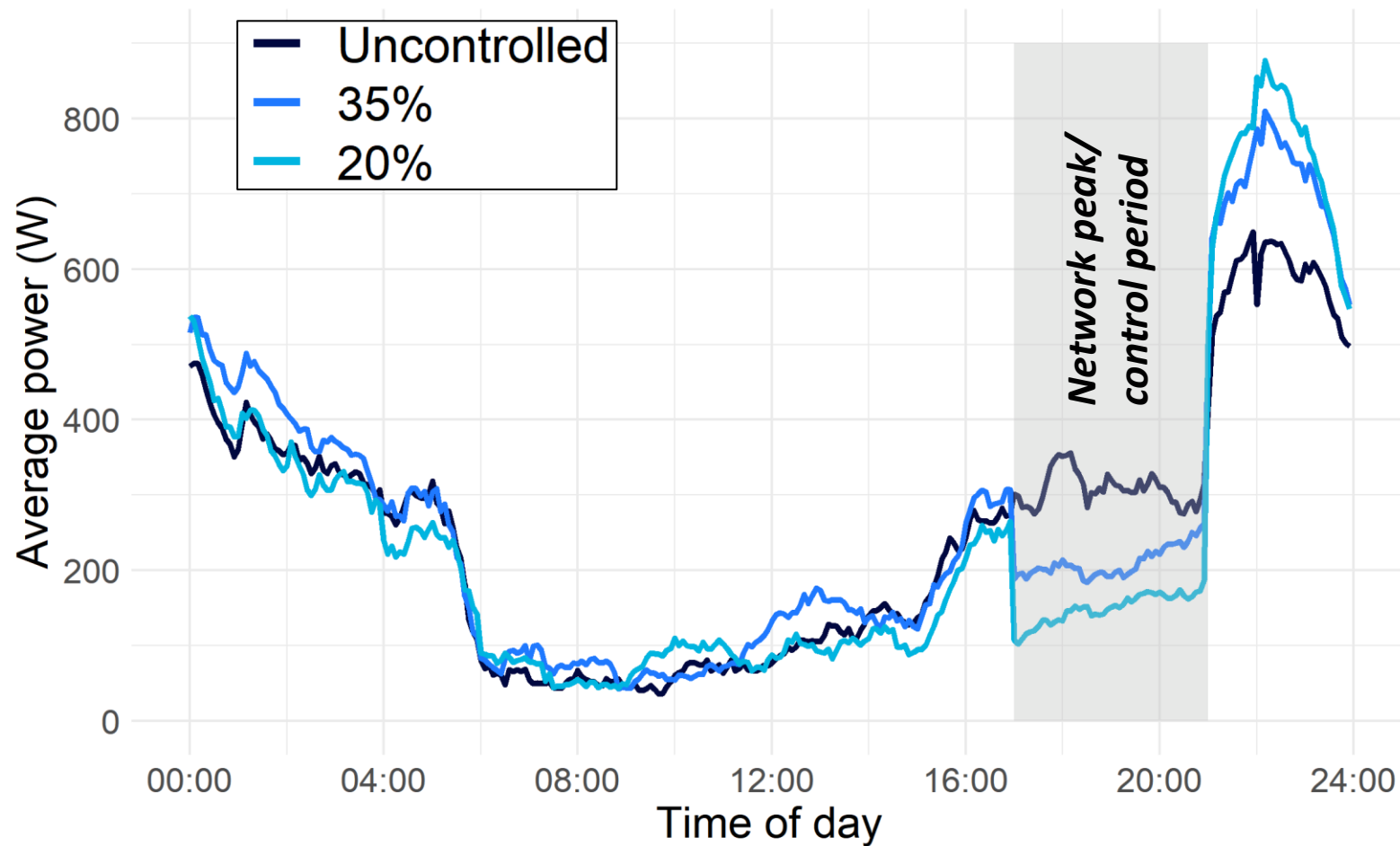
During the course of the trial Vector worked with participants to collect data on their EV charging preferences and to answer the question:

Can we reduce the network impact of EVs without affecting customer experience or satisfaction?

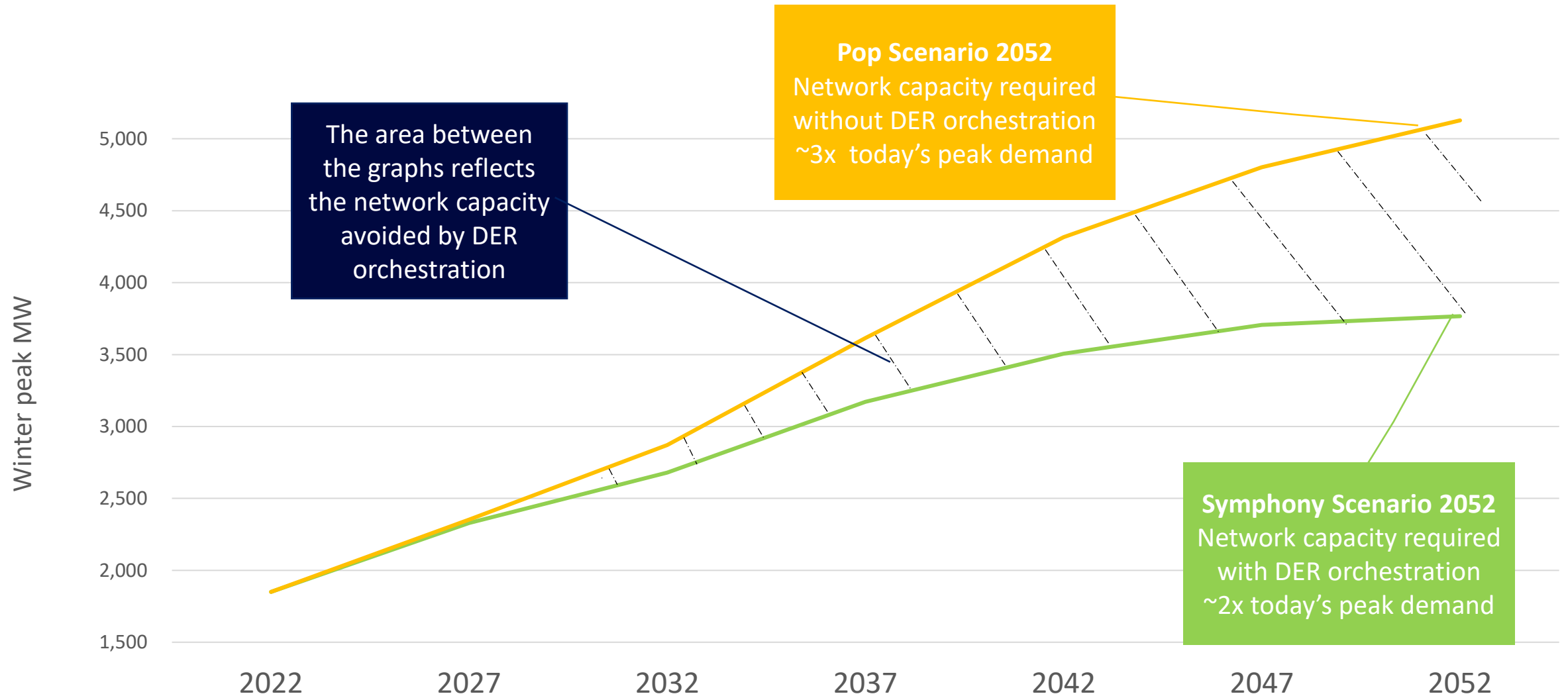
The trial found that consumers enjoy smart charging with 90% of customers in the trial survey satisfied with the service. Specifically, more than 90% of customers rated the speed of charging, ease of usage, and overall satisfaction with their current charging situation (dynamic charging in the context of Vector's smart charger trial) as positive, providing a score between 8-10 for each of these aspects of smart charging.

The next slide demonstrates that the trial delivered this level of customer satisfaction, while reducing the impact of EVs on peak demand.

Managed charging delivered high levels of customer satisfaction



DER orchestration reduces peak demand, resulting in an affordable and equitable transition



The benefits of managed charging

Frontier Economic's analysis on the net-benefits to consumers of a single smart-charger:

"Applying the same inputs of the WESC to produce a per annum estimation finds that a residential smart EV charger adds \$274 p.a.

This is \$274 per annum that consumers do not need to pay in their electricity bill in a year as the result of a single residential smart EV charger.

This accounts for the higher upfront cost of a smart vs a passive EV charger (Frontier Economics estimated this difference in up front capital cost to be \$300NZD).

Much like insulation which comes with a higher capital cost, the overall savings for consumers from the investment outweighs the up-front cost. However, in the case of investing in a smart EV charger this up-front capital cost hurdle is much less than is the case for insulation."

EA's CBA results illustrate the following whole-of-system benefits:

ELECTRICITY AUTHORITY'S CBA RESULTS

	\$ billion, NPV	% total
Resource adequacy – offset thermal peaking	\$0.347	5.06%
Resource adequacy – offset new lines and generation	\$5.9	85.86%
Hydrofiring	\$0.624	9%
Instantaneous reserve	\$0.0007	0.01%
Voltage management	\$0.005	0.07%
Total economic surplus	\$6.9	100%

Reimagining our role as a Distribution System Operator (DSO)

We believe EDBs sit at the heart of a fundamental mindshift required to accelerate towards a low carbon future

Case Study: Counties Energy's thought leadership on DSO

Counties Energy recognise that the change from a Distribution Network Operator (DNO) to a Distribution System Operator (DSO) is an essential one for us to drive performance and resiliency on our network and to create new shared value that unlocks the full energy potential for our communities.

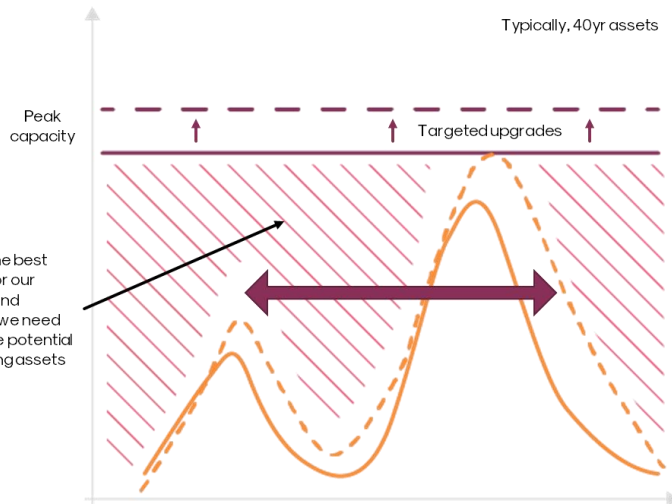
Counties believes that innovative and community-focused DNOs like us are well placed to take on the natural extension of being DSOs; continuing to create and preserve intergeneration value for its customers and communities.

Distributed Energy Resources (DERs) like EV chargers, solar and batteries can be seen as disruptive to the traditional network profiles if left uncoordinated, affecting the traditional network capacity limits of the low voltage network and distribution transformers.

The opportunity is to turn these DERs into flexibility assets and actively orchestrate them in a coordinated way that meets customer expectations and operates within the network capacity envelopes. This will mean that existing transformers, high voltage feeders, zone substations and transmission lines will be better utilized, which is an efficiency gain those savings can be passed on to consumers.

Counties Energy has developed a set of guiding principles as part of its DSO Strategy that help guide the DSO transition.

Strategically, creating a 'stretch' in network capacity through smart network orchestration
e.g. dynamic voltage control using LV visibility, etc.



Also utilising spare capacity with flexible DER and commercial arrangements
e.g. dynamic operating envelopes, flexibility tariffs, etc.

Northern Energy Group collaboration

Deep Trust– coordinated and leading asset management / field deployment management and deep trust between companies has helped us traverse Covid-19.

Collaborative Insight – Transparent and honest sharing of learnings from trials and new technology.

Standard technical platforms - Sharing technical standards for distributed generation, driving consistency in the emerging market for Distributed Energy Resources (DER).

Collective Action - Advancing a shared work programme with focus areas on: electricity supply standards for DERS, including EVs; pricing models; the provision of network hosting capacity information; communications; and future sector strategy / horizon scanning.





Collaborating to create better experiences for customers

Transparent and honest sharing of learnings from trials and new technology

Case study: Northpower putting the customer at the centre

In 2018 Northpower embarked on establishing a customer center of excellence, to enhance all aspects of the customer journey, support the uptake of renewable energy and customer adoption of emerging technologies, as well as provide practical help to those looking to lower their electricity bills. Changes have included:

- Targeted customer outreach programme targeting those most in need with practical energy saving advice, in home assessments and energy saving devices to help households reduce their total energy costs. Assisted by several funding rounds from the Support for Energy Education in Communities (SEEC) programme, this programme has so far delivered estimated yearly savings of \$801 per household for over 1000 households.
- Process improvements at all key touchpoints of the customer journey for all services (including new connections, distributed generation connections and outage management). Monthly customer satisfaction surveys are used to identify pain points and improve outcomes for customers. Supported by a new Customer Relationship Management system (CRM), which provides visibility and a seamless, digital experience.
- Establishment of a technical advisory group of local solar providers and electrical inspectors to share best practice, technical advice, and recommend improvements.

Collaboration with NEG members has underpinned many of these improvements. Together with Top Energy and Counties Energy, all three EDBs have implemented the same CRM system, sharing learnings and platform changes, which has optimised the system across all three organisations. Collaboration with Top Energy to align new connection technical standards has made it easier for electricians working across the neighbouring networks.

Customer satisfaction scores are high, with 2022's independent survey showing 92% of residential customers are satisfied or very satisfied with Northpower. However, we know that customer needs are changing, and we continue to engage with our community to understand how we can support them in the areas of energy hardship, energy efficiency and new technologies.

Unlocking intelligent customer service with smart meters

We undertake deeper customer conversations on our service, and what reliability, affordability and sustainability means to them



Case Study: Empowering customers using smart metering data during faults

Counties Energy's award winning INDI platform delivers automated LV fault identification and servicing, communicating real-time messaging to customers along with systematic logging and dispatching of crews for faults using smart meter data.

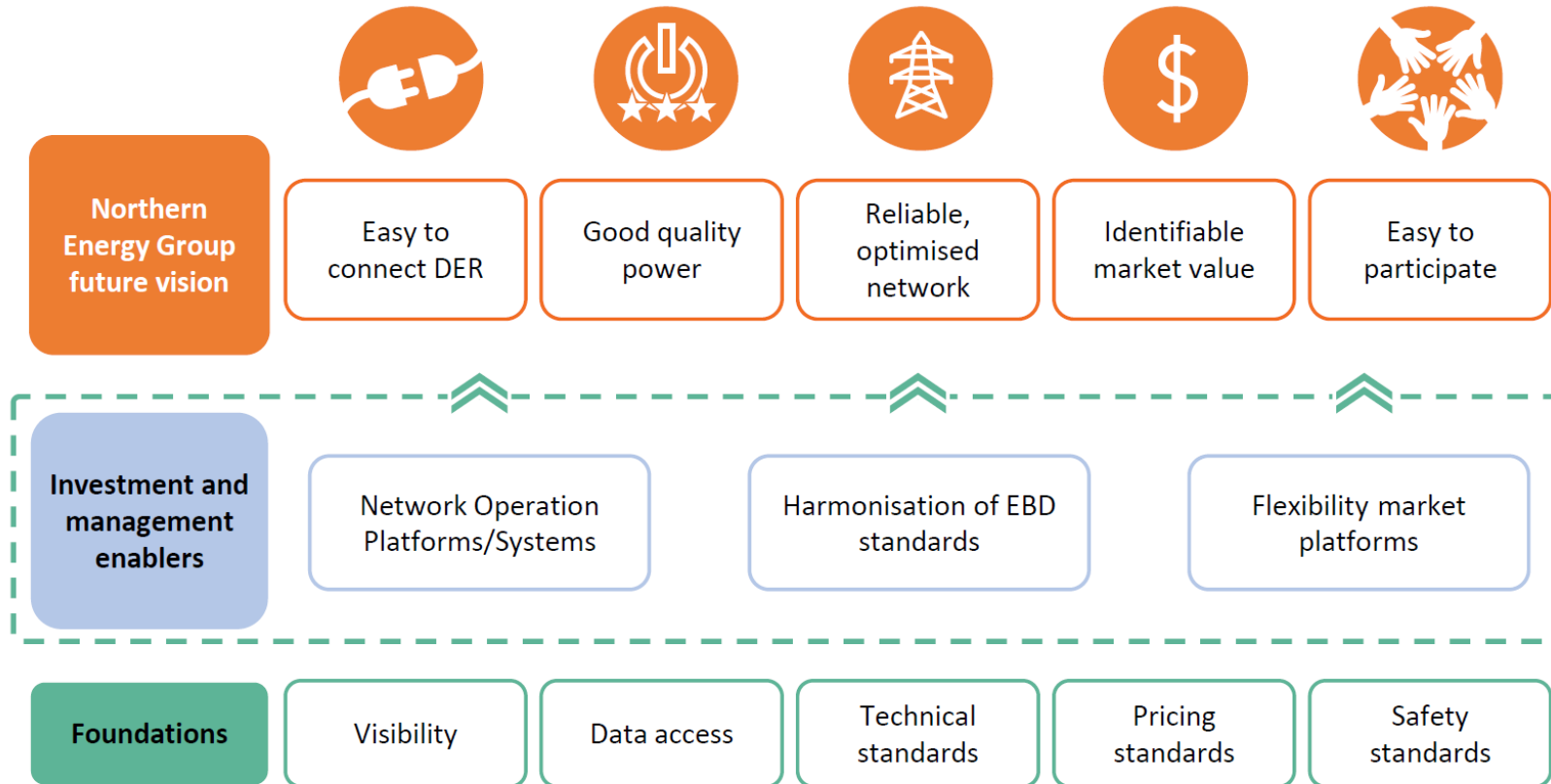
Counties Energy has utilised its smart meter data and a complex algorithm to automatically check weekly if one of its 44,000 customers is experiencing voltage faults. In a typical week 3 to 5 customers are identified as having voltage issues. Counties Energy's smart meter platform (INDI) then automatically mobilises the Company's field teams to quickly find and repair the fault. This is critical because voltage faults related to faulty neutrals can result in exposed metal potentially becoming livened. This exposes consumers to risk if they touch things like plumbing, taps, and the outer casing of metallic appliances such as toasters or washing machines. Most of the time the customer is unaware of the fault and associated risk.

This work has identified that the voltage faults were almost always caused by corroded, or loose overhead connectors or fuse holders, usually where copper connections have been connected historically to aluminum conductors leading to accelerated bimetallic corrosion. This problem is further exacerbated in coastal areas such as the western coastline of the Counties Energy network.

Prior to this new approach, and as currently standard in the industry, it was only possible to respond to these faults in a reactive manner, triggered either by lines down, loss of power, or other safety concerns highlighted by customers or public in the area. This greatly increases the risk of incidents due to public involvement. As a result of this work Counties Energy won the 2021 Electricity Engineers' Association Public Safety Award for this voltage detection.

Roadmap for the future

Our focus is on building the foundations of a new energy future **for our customers**



Customers and communities are at the centre of our vision for the future energy sector. This is how we plan to lift consumers up together.

Conclusion

Northern Energy Group

All NEG members are directly connected to our consumers through being local and trust owned – this is our strength; we have a long-term view and are hyper focused on our customers.

Policy asks

The consumer benefits of managed charging are clear from Vector's modelling, and Vector's EV trial demonstrated that managed charging delivers high level of customer satisfaction. However, managed EV charging requires urgent support from Government for default off-peak charging and to stipulate managed smart charging requirements.

- One option could be a requirement for customers to purchase a smart EV charger to receive the clean car rebate.



Northpower

