Energy News and GE Digital

Electricity Survey

2021 – SURVEY RESULTS

Building a world that works

Introduction

Energy News and GE Digital are delighted to announce the results of the 2021 New Zealand Electricity Survey.

The survey, now in its tenth year, introduced more open-ended questions in response to feedback from past surveys to better capture respondents' thinking.

Thank you to everyone who took the time to complete the survey. We polled the sector on future predictions across a range of dimensions, including how we can decarbonise faster, improve our energy security, engage with customers and look after our workforce. Since 2016 we having been asking for predictions on when specific sector milestones might be reached, it's been fascinating to see opinions change over time. This year we have some subtle changes to report.

- Could it be the shadow of a pumped hydro storage scheme at Lake Onslow that has affected sentiment for predicted new generation assets? Grid-scale solar is seen at the most preferred option this year, and somewhat surprisingly new wind has dropped in popularity, while geothermal and hydro has risen

- The prediction for reaching 500 MW of installed solar has moved forward from 2030 last year to respondents now thinking this will occur by 2024

- Plotting a heat map reveals that we expect most of the east coast of the country to experience average to above average electricity demand growth

Responses to some questions produced strong support for specific scenarios, in other cases a wide range of views were expressed.

- Regarding decarbonisation, there was wholesale agreement that the Government should be incentivising electrification, conversely many different regulatory interventions were suggested to help accelerate activity and deliver results

- The adoption of grid and home batteries was put forward as the primary technology to help decarbonise and improve energy security. However the affordability of batteries is delaying mass deployment

- New geothermal generation was favoured by many to help with the transition away from fossil fuels, and to help with energy security

A breakdown of respondents by organisation type is available on page 18. This year respondents included consultants, distributors and gentailers. The survey questions and range of responses were guided by an advisory panel chaired by John Hancock. The panel members are listed on page 3 and we would like to thank them for their input.

Please email any feedback to irwin.munro@freemanmedia.co.nz . We welcome any and all suggestions for questions, themes and responses for 2022.

Irwin Munro – General Manager

Freeman (publisher of *Energy News*)

GE Digital – Putting Industrial Data to Work

As part of GE, we have a unique opportunity to change the way industry works. Our customers are on the front line of the world's toughest industrial challenges – from enabling more renewable energy on the grid, to reducing emissions, increasing plant productivity, adapting to demand and keeping their teams safe. Our years of hard-won insights in power generation, transmission & distribution and industrial manufacturing mean we're uniquely positioned to help our customers better operate, optimise and analyse their assets.

GE Digital's software manages 40% of global electricity. It has been operating in New Zealand for well over 25 years where its technology manages numerous utility and industrial assets including the national electricity grid, wholesale electricity market, electricity distribution networks and local telecommunications infrastructure. In particular, GE Digital has deep domain capabilities in the following areas of the power sector:

- Transmission – Optimise energy dispatch, grid stability and security. Up to 25% increase in grid utilisation

- Advanced Distribution Management Solutions (ADMS) – Achieve a reliable and resilient distribution network via next-generation control and optimisation capabilities. Up to 30% reduction in SAIFI and SAIDI

- Grid Analytics – Leveraging the power of artificial intelligence and machine learning to maximise Risk Spend Efficiency for today's biggest utility challenges. 'Out of the box' analytics such as grid inertia, vegetation management and visual intelligence deliver significant operational savings

- Power Generation – Using Asset Performance Management (APM) and Operations Performance Management (OPM), transform data into actionable intelligence to achieve 10-40% reduction in reactive maintenance

About Energy News

Energy News is New Zealand's online news and information service for the energy sector. The website (www.energynews.co.nz) was launched in 2008 and now boasts more than 5000 readers every month from 300 subscribing organisations. Its readership consists of New Zealand energy sector organisations and service companies spanning the electricity, oil and gas, petroleum and alternative energy value chain. The subscription-based site provides daily news, executive interviews, opinion and commentary. It also hosts a suite of information resources including two large databases of sector participants and energy resources. Other information tools include 30-minute electricity prices, supply and demand monitoring, petroleum permit deadline summaries and an oil price monitor.

Advisory panel

Kevin Hart – GE Digital Grid

Kevin Hart, an industry veteran with more than thirty years' experience in the energy sector, was previously GE's CEO for New Zealand and Papua New Guinea before taking on his current role of Asia Pacific Regional Leader for GE's Digital Grid business.

John Hancock (Chair)

John Hancock is an independent consultant to utility companies and their suppliers. He is the independent chair of the Electricity Authority's Innovation & Participation Advisory Group, a member EECA's Low-Emission Transport Contestable Fund advisory panel and has chaired the advisory panel for this survey since its inception in 2012.

Fiona Smith – Trustpower

Fiona is responsible for the Customer Operations business; this encompasses almost all customer touch points and includes meter reading, provisioning, billing, collections and the Contact Centre. Fiona is a member of the NZ Institute of Directors, and sits on a number of external working parties within the telco and electricity industries.

Andy Burgess – Commerce Commission

Prior to joining the Commerce Commission Andy led the UK Office of Gas and Electricity Markets' (Ofgem) work on electricity access and non-residual charging and the teams dealing with emerging issues such as storage, local energy and electric vehicles.

Karen Frew – Powerco

Karen Frew leads Powerco's Electricity Service Delivery and Operational Teams. She joined Powerco in 2002. Karen holds an electrical engineering degree and diploma in management. She is a chartered engineer with 25 years' experience in distribution, generation and large industrial sectors in New Zealand and the UK.

James Tipping – Electricity Authority

James works across the Authority to bring leadership and excellence to its work programme and to the evidence that underpins the Authority's decision-making. James has more than 17 years' experience working in strategy, analytics, policy and regulatory roles in the energy sector in New Zealand and in Europe. James starts as group manager market strategy/regulation at Vector in January 2022.

Andy Sibley – Simply Energy

Andy came to Simply when it joined forces with Contact in 2020. During his nine years at Contact, his focus on people before process delivered significant business improvements and shifts in culture within the teams he led as Engineering Manager, Head of Operations Support and more recently General Manager Innovations and Ventures.

Catherine Soper – Genesis

Catherine is the GM Government and Regulatory Affairs, and Acting GM Sustainability at Genesis, one of NZ's largest energy companies. This senior role within the company sees her lead work traversing regulatory change in a decarbonising economy, providing advice and analysis on sustainability, innovation and technological change, the Just Transition, energy hardship and security of supply.

Andrew McLeod – Northpower

Andrew joined Northpower as chief executive in 2017 and has a background in infrastructure management and construction management, spanning the electricity, oil and gas, and water utility sectors.

Shailesh Manga – Vector

Shailesh Manga leads Vector's digital team and is responsible for managing the company's digital and IT functions. In his last role, Shailesh worked with some of the world's best known brands including Google, Microsoft, Samsung and LG, helping them deliver innovative experiences.

Steve Rotherham – Energy News

Steve grew up in Christchurch but spent most of his career in Australia. He is a former editor of Perth-based online publication PetroleumNews.net (now known as Energy News Bulletin). He has also held corporate communications roles with the Australian Petroleum Production & Exploration Association and the Australian Automobile Association.

Irwin Munro – Freeman

Irwin is the General Manager at Freeman, which sees him take responsibility for the commercial side of the energy sector products of Freeman, including all events, surveys, stakeholder management and business development.
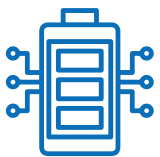
Highlights

Wind loses its puff

Both geothermal and new hydro have gained popularity as the next new generation asset types to build
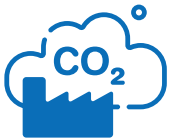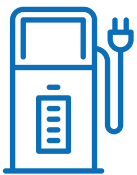
Process heat fuel-switching drives reduction

Switching to renewable fuels for process heat is seen as the priority for industry to help accelerate decarbonisation

Batteries are the next big thing

Batteries highlighted as the means to help with the energy transition and improve energy security, with current costs delaying adoption at scale
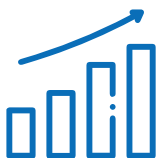
EV influence being constrained

Price and range are barriers to wide-scale EV adoption, which is viewed as the key action for customers to take to help decarbonise the country

Renewable overbuild popular

Many respondents believe overbuilding is the solution to deliver secure 100% renewable electricity by 2030

Large scale and smart demand response

Intelligent demand response referenced as a viable tool to help manage 'dry year' risk, flatten demand peaks and assist with overall energy security

Well-being key to talent challenge

Looking after, enabling and providing flexibility for existing staff is critical to maintaining business capability and helping attract new talent

Future predictions
## Generation priorities

Question 1

Here are the big (ie >70 MW) generation asset types you thought should be prioritised for development over the next 10 to 20 years to best complement the existing generation mix.
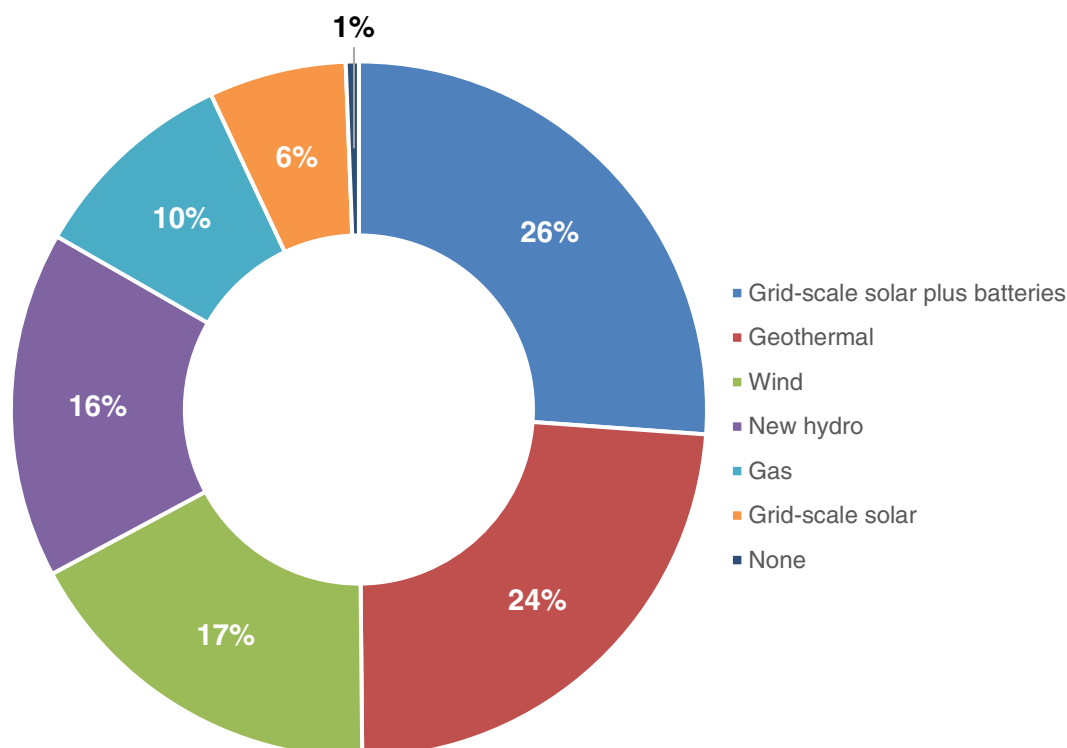
	2020	2021
Grid-scale solar plus batteries – delivers the best system-wide benefits, with global technology costs set to fall materially during the next 10 years	26%	26%
Geothermal – the best form of accessible, reliable baseload power	21%	▲ 24%
Wind – as exemplified by the Waipipi and Turitea developments, it provides the best form of low-cost renewable energy to complement our existing energy mix	29%	▼ 17%
New hydro – delivers the most power at the least cost in the long run	8%	▲ 16%
Gas – plenty of it and it can provide a reliable, flexible backup to our unpredictable renewable generation portfolio	7%	▲ 10%
Grid-scale solar – there is a reason why Lodestone Energy, Todd Energy, Watercare, Mainfreight and Hawke's Bay Airport are investing in this technology, and the larger the asset, the cheaper the cost of generation	6%	6%
None – with energy efficiency measures, and the advent of small-scale, low-cost distributed energy solutions, we don't need to be building any new big assets going forwards	3%	▼ 1%

Question 2

We introduced this question in 2016 – asking when the following sector milestones might actually be achieved. It is interesting to see how projections have changed, or not, in the 12 months since the last survey.
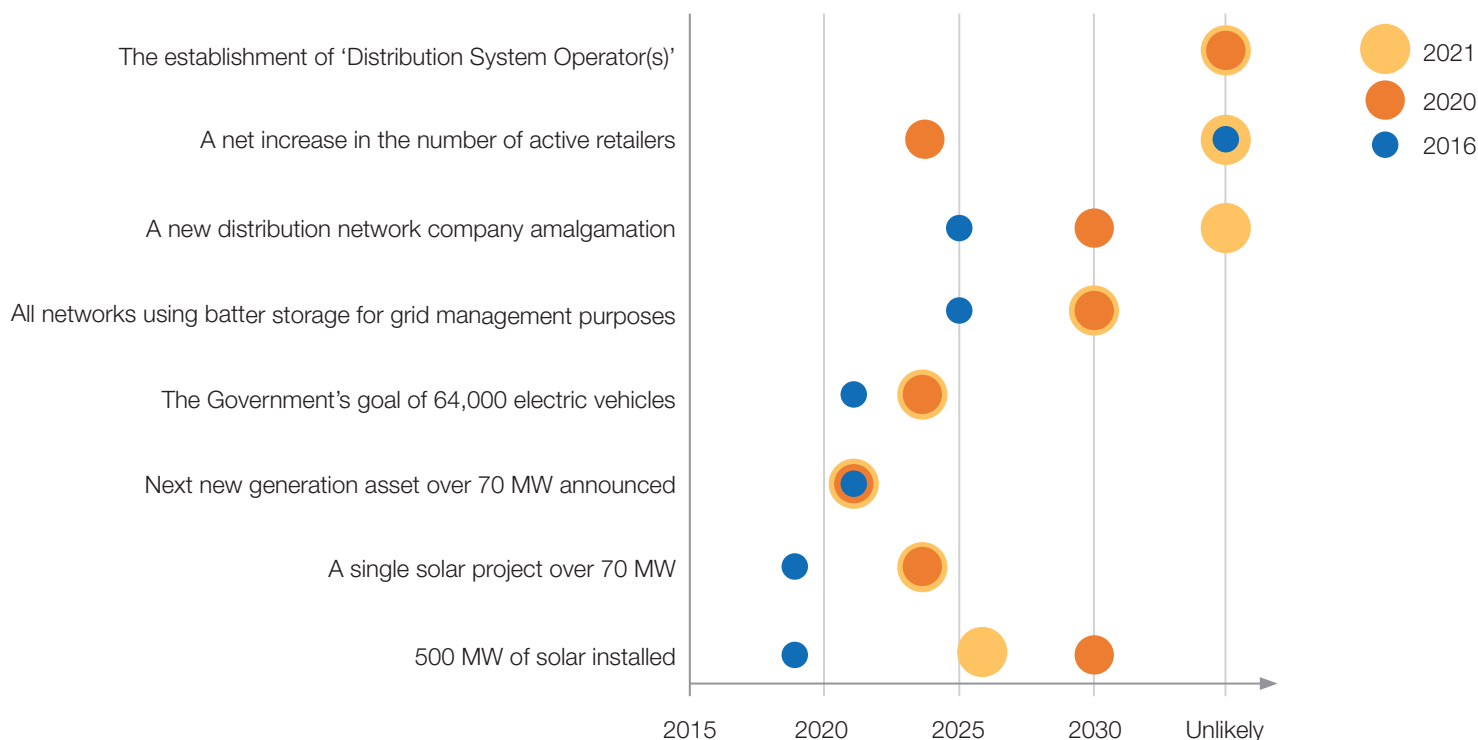
|	**2022**	**2024**	**2026**	**2030**	**Unlikely**
The establishment of 'Distribution System Operator(s)', carrying out a similar role to the transmission system operator	3%	16%	20%	21%	**40%**
A net increase in the number of active retailers	9%	23%	21%	6%	**41%**
A new distribution network company amalgamation	3%	17%	21%	18%	**41%**
All networks using battery storage for grid management purposes	1%	8%	19%	**38%**	34%
The Government's goal of 64,000 electric vehicles(we reached 30,517 EVs in New Zealand at August 2021)***	12%	**56%**	20%	10%	2%
The next new generation asset over 70 MW announced	**61%**	24%	9%	3%	3%
A single solar project of over 70 MW**	14%	**43%**	24%	11%	8%
500 MW of solar installed*	2%	24%	**39%**	27%	8%

*As at the end of August 2021, New Zealand had almost 171 MW of grid-connected photovoltaic (PV) solar power installed, of which 65 MW were installed in the preceding 24 months.
**Lodestone Energy announced 60 MW capacity at Lodestone One near Dargaville in May 2021
***The Government's goal to reach 64,000 electric vehicles by the end of 2021 was set in 2016

Future predictions
Where will the demand be?

Question 3

Allowing for the influences of Covid-19, including working from home and the steps being taken to decarbonise the economy we asked respondents what electricity demand growth will look like across the country. Here is what they thought.

Electricity demand growth by region

- Little to average
- Average to above average
- Above average to high
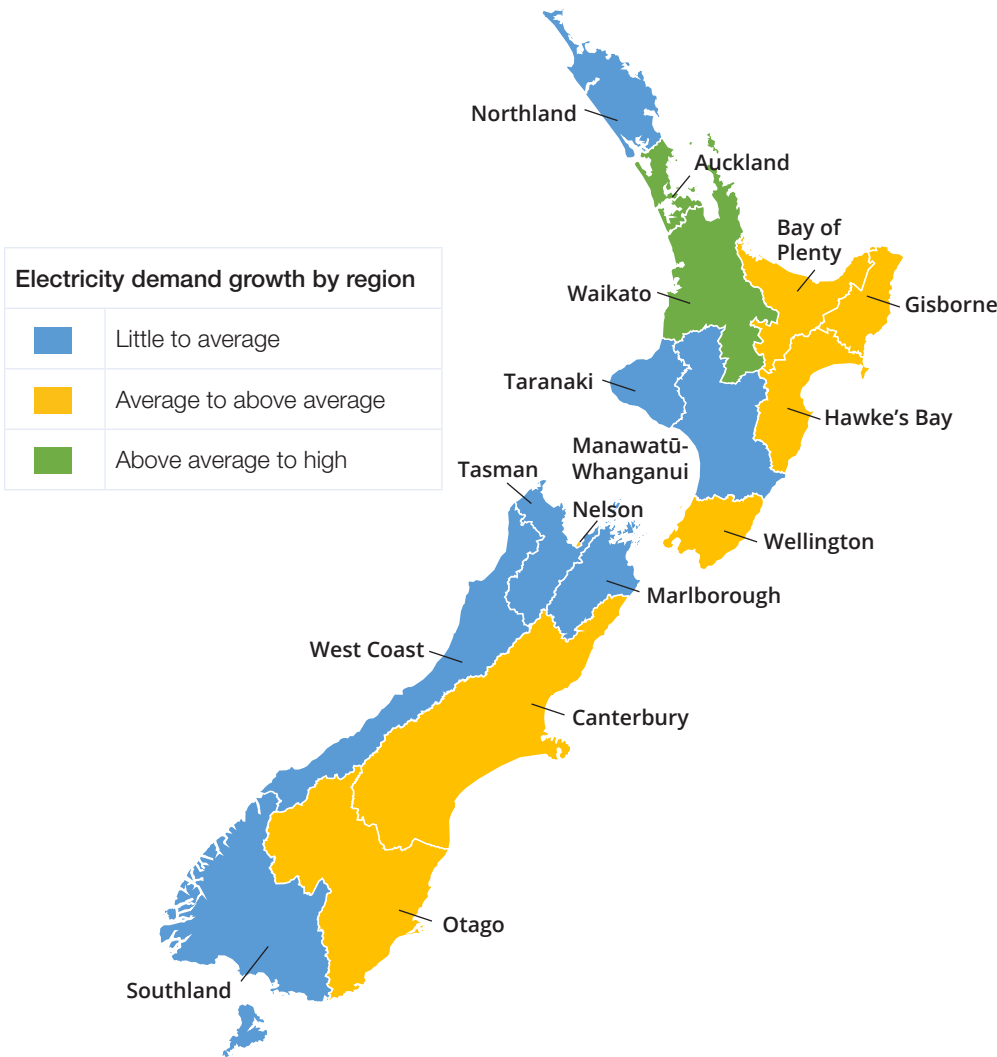
Electricity demand growth by city area and type	
Larger cities – inner suburbs and CBD	Average
Larger cities – outer suburbs	Average to above average
Regional cities and towns	Average

Question 4

What single thing could each of the following players do to help us decarbonise faster?

Players	Action to accelerate decarbonisation	
Industry	Electrify process heat	An overwhelming number of respondents thought the electrification of process heat was the number one priority for industry to decarbonise faster. In parallel with this electrification, many suggested the removal of coal from the fuel mix. Two other clearly identified themes from the survey answers were for more industry collaboration and energy efficiency initiatives.
Government	Provide incentives	Providing incentives across the board for decarbonisation (for EV adoption, fossil fuel replacement, electrification and bioenergy development) was the most popular action respondents thought the Government could take. Respondents also thought the Government should provide certainty with clear policies (timing , scale and scope). Adjusting the price of carbon was also identified as a means to accelerate the change.
Regulators	Adjust market settings	Respondents' suggestions for the regulators were by far and away the most diverse. However, in broad terms, adjusting market settings was number one, with a range of specific suggestions (from regulation and rule changes, and spot market function to market competitiveness). Pricing was also highlighted as a lever for change. In concert with pricing, supporting incentives and innovation were also flagged.
Technology	Adopt grid and home batteries	Affordable battery storage came in as the most popular technology to help decarbonise at both the grid and home level. Other technology marked as a priority were demand side management, distributed energy resources solutions and green hydrogen development.
Customers	Buy an EV	Purchasing an electric vehicle (EV) was favoured by respondents as the number one action customers could do to help reduce emissions. Not far behind purchasing an EV was the need for more energy literacy and awareness and a drive for more energy efficiency (eg home insulation, less travel, load management and efficient appliances).

Questions 5 and 6

By international comparison having 29 EDBs for a population of 5 million could be considered excessive. In every survey we ask when a possible future amalgamation will occur based on the assumption that bigger is better and consolidation will deliver benefits.

Rather than pose the amalgamation question again, we asked respondents to rank the following opportunities for EDB collaboration to deliver better outcomes.

	Score	
Future functional capability e.g., DSO	3.73	Most impactful
Existing functional capability	3.37	
Workforce coordination	3.07	
Access to talent	2.70	
Ownership	2.14	Least impactful

Other areas identified for potential collaboration, but not ranked, were:

- Shared services approach for back-office and asset management
- Connection and management of distributed generation
- Collective procurement of equipment and technology
- Standardisation of equipment and procedures
- New technology trialling or research
- Standardised cost reflective pricing
- Health and safety management
- Demand response/flexibility
- Cyber threat mitigation
- Technology sharing

Questions 7 and 8

The current Government is committed to achieving 100% renewable electricity generation by 2030. Current back-up and peaking generation are typically supplied by fossil-fuelled thermal plant.

Here is what respondents thought should be prioritised from the supplied list to enable a smooth transition away from natural gas, while avoiding its premature exit.

	Score	
Batteries	4.16	Most impactful
Capacity market	3.73	
Higher lake levels	3.67	
Pumped hydro	3.24	
Hydrogen	3.17	
Biogas/ Biofuel	3.04	Least impactful

Other unranked suggestions to help with the energy transition included:

- Better demand response / demand side management / demand side flexibility
- Build overcapacity in the renewable generation market
- Use domestic batteries and solar to curb peak load
- Maximise geothermal generation
- Wider hydro operating ranges (as ranked third above)
- Utilise CCS to mitigate gas use
- Increase energy efficiency

Questions 9 and 10

The Government of the day set an aspirational target in 2016 to have 64,000 electric vehicles on the road by the end of 2021. Currently New Zealand appears to be on a straight-line track and will fall short of the 2016 target (we had reached 30,517 EVs in New Zealand as of August 2021). We asked respondents to rank the factors listed below according to how likely they were to accelerate EV adoption.

What will accelerate EV adoption in cities

	Score	
Purchase price	6.15	Most likely
Technology and range	4.95	
Total cost of ownership	4.14	
Availability – supply	3.92	
Fast charging	3.71	
Utes	2.61	
Regulations	2.52	Least likely

What will accelerate EV adoption in the regions

	Score	
Purchase price	5.63	Most likely
Technology and range	5.30	
Utes	3.89	
Total cost of ownership	3.81	
Availability – supply	3.54	
Fast charging	3.50	
Regulations	2.33	Least likely

Question 11

Cabinet has approved funding to investigate pumped hydro against other possible energy storage solutions to New Zealand's dry-year electricity challenge. The NZ Battery Project will provide comprehensive advice on the technical, environmental and commercial feasibility of pumped hydro and other potential energy storage projects.

We asked what industry solutions (including the use of existing assets with green fuels) could provide back-up as we increase our reliance on generation affected by dry, calm and cloudy conditions. Here are the key ideas respondents came up with:

- Multiple small-scale solutions spread over the country (batteries, pumped hydro, new generation)
- Incentives for investment in microgrid technology/distributed generation
- New wind, solar, geothermal overbuild close to projected demand
- Provision for increased lake storage (more water level flexibility)
- Pumped hydro development in the right places (but not Onslow)
- Grid-scale batteries (chemical), gravitational storage, hydrogen
- Demand response/demand flexibility (large scale and smart)
- Hydrogen/ammonia storage in depleted gas fields
- Biomass pellets/biofuels for Huntly and look at CSS
- More geothermal generation for base load
- Let the market decide – capacity market
- Off-peak incentives for business
- Biofuel peakers instead of gas
- Incentivise energy efficiency
- Green hydrogen peakers

In many cases, a combination of the ideas above was proposed by respondents.

Energy security
Who makes the call?

Questions 12 and 13

The blackouts that occurred on Monday 9 August 2021 highlighted the weaknesses within the current system to shed load. The event saw 34,000 customers lose power during one of the coldest nights of the year. The following options were ranked by respondents from most desirable to least to improve system management.

	Score	
Greater use of commercial and residential demand response	3.67	Most impactful
Dedicated industry comms platform	3.49	
Annual load-shedding exercise	2.98	
An independent system operator	2.51	
More renewable generation	2.40	Least impactful

Other unranked options proposed to improve system management included:

- Market changes/reform (eg clear rules for participants in response to grid emergencies)
- Improved communication from the system operator down to the customers
- Use intelligent load control for water heating or something similar
- Regular testing and refinement of emergency response systems
- Mandate rooftop solar for all new residential builds
- Ensure fast start thermal peakers are available
- Update system management technology
- Build more secure generation
- Improved forecasting models
- Use of grid-scale batteries
- Utilise a capacity market

Customer engagement and trust
Partners?

Questions 14 and 15

How does the industry make it easier for small, non-expert customers to participate in the design of future products and services? The following ranking shows respondents' views on who should initiate this participation, from the most preferred to the least.

	Score	
Retailers	2.91	**Most preferred**
Customer themselves	2.67	
New entrants	2.36	
Distributors	2.06	**Least preferred**

Here are some of the suggestions respondents had on the type of engagement industry could have with non-expert customers to help develop new products or services:

- Analysis of customer usage to identify valuable new savings opportunities (eg interruptible load opportunities)
- Web-based pricing and supply optimisation tools that fit in with DSO technology
- Incentives for customers to develop micro grids within communities
- Make bidirectional meters standard, not an additional upgrade
- Engagement and education through NGO/NFP advisors
- Reward feedback from customers about concerns
- Buy back of exported solar at spot market prices
- Web-based information portals, road shows
- Digital campaigns and competitions

Question 16

The Government has recently followed up one of the Electricity Price Review recommendations, and appointed an Energy Hardship Expert Panel. With energy poverty being a complex issue, we asked respondents to rank a list of interventions according to those they thought could make the most positive impact.

Dwelling weather tightness and insulation	Most impactful
Energy efficiency education	
Clear communication of energy use and costs	
Linking to social welfare agencies	
Linking to energy efficiency programme	
Improved general budgeting education	
Special pricing	Least impactful

Other unranked suggestions put forward were:

- Help Kāinga Ora – Homes and Communities identify stock to upgrade from meter analytics

- Wholesale prices need to be more competitive, so electricity costs are lower

- Use mart meter derived analytics to communicate savings opportunities

- Address root cause of poverty (harder, but more effective long term)

- Take people in energy hardship out of the market

- Help or subsidies for insulation costs
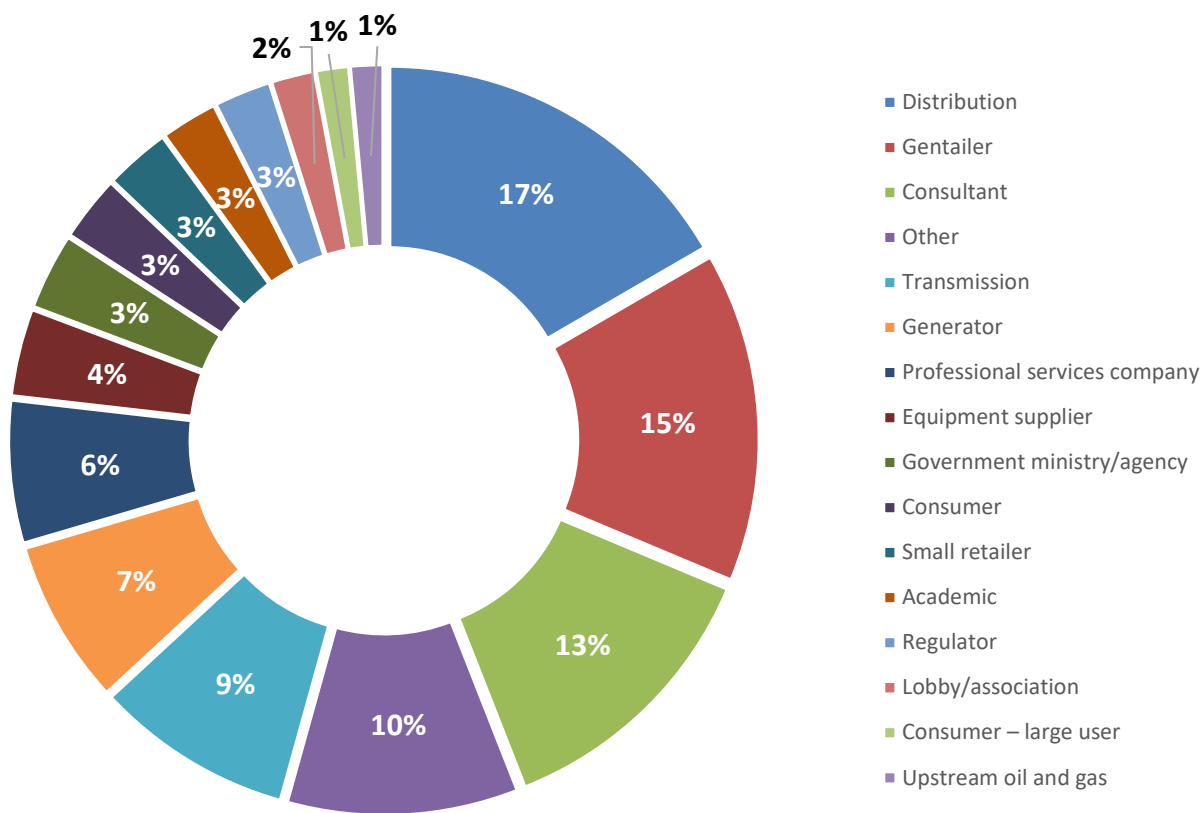
- Use weekly billing

Question 17

In 2020 the sector told us the greatest human-centred issue it faced was finding and attracting talent. Twelve months later, with border restrictions still in effect, we wanted to know what the sector has been doing to maintain a talent pipeline. The following actions to help with talent acquisition were ranked from most impactful to least.

	Score	
Ensuring the well-being of existing staff	4.07	**Most impactful**
Re-skilling existing staff	3.23	
Utilising remote workers and digital technologies	3.10	
Looking for collaborative opportunities to share resources	3.02	
Utilising micro-credentials	1.67	**Least impactful**

Other suggestions to improve the talent pipeline, in no specific order, were:

- Utilise existing talent to improve diversity at governance and senior leadership levels
- Offer flexible working arrangements and options to retain older staff
- Incentivise and expand graduate engagement and attraction
- Have a staff retention strategy and support upskilling
- Support secondments
- Sponsor mentors

Survey respondents
Participants by organisation type

Legend:
- Distribution — 17%
- Gentailer — 15%
- Consultant — 13%
- Other — 10%
- Transmission — 9%
- Generator — 7%
- Professional services company — 6%
- Equipment supplier — 4%
- Government ministry/agency — 3%
- Consumer — 3%
- Small retailer — 3%
- Academic — 3%
- Regulator — 2%
- Lobby/association — 1%
- Consumer – large user — 1%
- Upstream oil and gas — 1%