Appendix 2: Whole of Sector View of Decarbonisation Commitments and Initiatives

All participants that have contributed and provided data to BCG for this report have a number of decarbonisation initiatives underway. This appendix outlines their decarbonisation commitments and details a non-exhaustive list of major initiatives underway to support these commitments, where this information is publicly available. This appendix also incorporates publicly available initiatives from other organisations that did not directly provide data to BCG. The intention of this appendix is to capture the breadth and depth of activity that is underway across the sector.

Contents

1. Decarbonisation Commitments

The 14 contributing and observing sector participants that have provided data to BCG for this report have made commitments to decarbonisation. These have been summarised in the exhibit table below.

Exhibit 1: Selection of decarbonisation commitments from New Zealand electricity sector

	Participant	Commitments
Gentailers	Contact Energy	• Reduce absolute Scope 1 and 2 emissions by 45% by 2026 from a 2018 baseline • Reduce absolute Scope 1 and 3 emissions from all sold electricity by 45% by 2026 from a 2018 baseline • Reduce Scope 3 emissions from use of sold products 34% by 2026 from a 2018 base year • Achieve 95% renewable generation by 2024 and ultimately be 100% renewable
	Genesis Energy	• Reduce emissions in line with a 1.5ºC trajectory (Science Based Target): reduce absolute Scope 1 and 2 GHG emissions by 36%; and reduce absolute Scope 3 GHG emissions from use of sold products by 21%; compared with 2020 baseline • Remove more than 1.2m tons of carbon annually by 2025, from a 2020 baseline, and reduce generation emissions by 36%
	Mercury	• 100% Renewable generation achieved
	Meridian Energy	• Reduce absolute Scope 1 and 2 emissions by 50% by FY30 from a FY21 base year, and gross Scope 3 emissions by 50% within the same time frame • 100% Renewable generation achieved
Generators	Manawa Energy	• Made qualitative commitment: "*Grow renewable generation to support the expected 50 to 70 percent demand growth over the next 30 years from electrification of transport and industry*"
	Lodestone Energy	• Made qualitative commitment: "F*ounded to help the effort to decarbonise NZ's energy sector"* • Sets out mission: *"contribute to NZ's electricity generation market with meaningful solar production"*
	Eastland	• Achieve carbon neutrality by 2030 [Eastland Generation] • Reduce absolute Scope 1, 2 and 3 emissions from all businesses (excl. Eastland Generation) by 21% by 2025 from a baseline FY19 [Eastland Group]
	Nova Energy	• Made qualitative commitment: "*We're committed to providing renewable and reliable energy for today, tomorrow, and the future*" • Made qualitative commitment: *"As New Zealand transitions to a low emissions future, we plan to play a key role in delivering sustainable energy generation solutions*"
Transmission	Transpower	• Carbon footprint reduced 60% by 2030, and a net zero grid by 2050 (controllably scope 1 & 2 emissions from 2005 baseline)
Distributors	Vector	• Net carbon zero operational emissions (scope 1 & 2 excluding electricity distribution losses) by FY30 from a FY20 base year • Science-aligned reduction targets of absolute Scope 1 & 2 GHG emissions (excluding electricity line losses) of 53.5% by FY30 from a FY20 base year
	Unison	• Made qualitative commitment: "*Unison is committed to a vision of leading a sustainable energy future that enables its communities to continually prosper and grow"* • Made qualitative commitment*: "Unison has measured its own carbon footprint is actively exploring opportunities to reduce this to ultimately become carbon neutral"*
	Powerco	• Achieve Net Zero Scope 1 and 2 emissions at 2030 (excl. distribution line losses) • Achieve Net Zero emissions by 2050
	Wellington Electricity	• Made qualitative commitment: *"Wellington Electricity is developing the technology, equipment and resources to ensure the Wellington network has the capacity and capability to deliver [decarbonisation programmes recommended by the CCC]"*
	Orion	• Reduce group operational emissions (excluding distribution losses) by 50% from 2018 levels by 2030, and by 80% by 2050 • Achieve carbon neutrality – excluding electricity line losses – for Group corporate carbon emissions by June 2022

A number of initiatives to support these commitments are detailed in the following section.

2. Decarbonisation Initiatives

This section outlines a non-exhaustive list of decarbonisation initiatives being developed by participants in the energy sector. These initiatives are structured against the 4 key challenge areas of renewable generation, peak flexible resources, dry year flexible resources, and networks introduced in the main report. In addition, 2 opportunity areas of system stability and electrification/retail have been explored. Each of these areas are outlined below.

- **Renewable generation:** Develop new renewable generation at a sufficient pace.
- **Peak flexible resources:** Ensure sufficient flexible generation and demand capacity to meet increasing peak demand.
- **Dry years:** Ensure sufficient flexible generation and demand energy for dry years.
- **Networks:** Develop sufficient distribution and transmission infrastructure (including smart virtual infrastructure) to enable new electrification, generation, flexible capacity, and flexible energy.
- **System stability:** Ensure the energy system is stable and resilient to fluctuations in demand or supply of energy.
- **Electrification/retail**: increase the uptake of electric energy technology, especially in the retail space (including smart demand, electric vehicles, process heat, etc), as well as other sustainable electricity initiatives in the retail space.

A detailed bibliography with the sources of this information is included in Section 3.2, with sources corresponding to the '#' value of each initiative.

2.1 Renewable Energy Generation

Below is a table of publicly available information about projects related to building new renewable generation sources, mostly concerning renewable power stations, but also looking at planned collaborations of pipelines of projects. It details who the project proponent is, an indicative project name, the size of the project (if applicable), its approximate status, and a description of what the project involves. The list is not exhaustive and generally reflects only currently under construction or planned projects, intended to showcase some of the work that is being done to develop new renewable generation and meet the electricity needs of New Zealand.

#	Project Proponent	Project Name	Size	Status	Description
1	Mercury	Turitea wind farm	222 MW	Under construction, partly commissioned	The Turitea wind farm construction includes a new 12km long transmission line connecting the wind farm, via 2 on-site substations, into the National Grid at Transpower's Linton substation. Part of the wind farm has been commissioned.
2	Infratec	Naumai solar farm	4.4 MW	Under construction	The Naumai Solar Farm was purchased by Infratec from Light Year Solar. It has completed its planning and is now 'shovel ready'. The solar farm will have 7,500 solar panels that track the movement of the sun across the day and will provide most of the Ruawai district's daytime energy needs, contributing towards energy independence in Northland.
3	Meridian Energy	Harapaki wind farm	176 MW	Under construction	Meridian Energy is currently constructing Harapaki Wind Farm, with a planned 41 turbines to generate 176 MW of renewable energy.
4	Mercury	Kaiwera Downs wind farm stage 1	43 MW	Under construction	Kaiwera Downs Wind Farm Stage I is being built 15km southeast of Gore in the South Island. Mercury plans to complete construction of Stage 1 of the wind farm with the first 10 turbines operational by the end of 2023. The construction was announced in September 2022 and crews are expected to mobilise on site in October 2022.
5	Far North Solar Farm	Pukenui solar farm	16 MW	Under construction	Pukenui solar farm is a $30 million photovoltaic power station under construction at Pukenui. It is aimed to have 32,000 panels spread over 12 hectares at Pukenui, on the Aupōuri Peninsula, and at peak output will generate 16 MW.
6	Eastland Generation, Proprieters of Taheke 8C & Adjoining	Taheke geothermal project	25 MW	Under construction	The Taheke geothermal power station's first stage was boosted by the Government in 2020. The project aims to develop and unlock the geothermal resource beneath Taheke 8C's whenua.

#	Project Proponent	Project Name	Size	Status	Description
	Blocks Incoporation				
7	Contact Energy	Te Huka upgrade	51.4 MW	Under construction - investment approved	Te Huka upgrade involves an additional unit at the existing Te Huka geothermal power station site on Centennial Drive in Taupo, New Zealand, operating 24/7 and producing baseload electricity.
8	Contact Energy	Tauhara geothermal power station	168 MW	Under construction - investment approved	Tauhara Power Station is a geothermal steam turbine station that will be Contact's 6th geothermal power station in the area. Construction began in early 2021 with Tauhara expected to be online late 2023.
9	Mercury	Kaiwaikawe wind farm	~73 MW	Resource consent secured; PPA executed with Genesis; constructability work underway	The proposed Kaiwaikawe wind farm site (previously named Ōmāmari Wind Farm) is approximately 10km north-west of Dargaville. The wind farm was granted resource consent from the Kaipara District Council in March 2022 and will generate approximately 73 MW of renewable wind energy.
10	Mercury	Puketoi wind farm	230MW	Constructability work and consent enhancements progressing	Mercury has consent for a wind farm on the Puketoi Range, 40km south of Dannevirke. The site is fully consented and allows for up to 53 turbines.
11	Ballance Agri-Nutrients and Hiringa Energy	Kapuni Green Hydrogen project	24 MW	Consented	The Green Hydrogen project involves construction of industrial scale hydrogen from an electrolyser, powered by 4 new large wind turbines close to Ballance Agri-Nutrients ammonia-urea plant in Kapuni.
12	Ventus Energy	Taumatatotara wind farm	50 MW	Consented	Taumatatotara wind farm is a planned onshore wind project. It was consented in 2008, with the consent varied in 2011. In 2019 a variation process began again.
13	Ranui Generation	Twin Rivers Solar Farm	24 MW	Consented	Ranui Generation is developing the Twin Rivers Solar Farm after having received consent this year.
14	Channel Infrastructure	Maranga Ra solar farm	27 MW	Consented	Maranga Ra is Channel Infrastructure's fully consented shovel ready solar project, with the potential for on-grid or off-grid solution. It has a rated capacity of 27 MW and will be built on 33 hectares of land adjacent to Marsden Point.

#	Project Proponent	Project Name	Size	Status	Description
15	Infratec	Komata Solar Farm	4.9 MW	Consented	Construction on Infratec's 4.9 MW Komata Solar Farm is expected to begin in 2022.
16	Light Year Solar	Komata North solar farm	4.4 MW	Consented	The 4.4 MW Komata North Solar Farm will have a 7,000 MWh output per year, to be delivered to the Powerco network. The resource consent for this project was granted in late 2021, with construction due to start in Q1 of 2023, and a target of late 2023 for commercial operation.
17	Meridian Energy	Hurunui wind farm	70 MW	Consented	Meridian Energy has consent to construct a wind farm between Omihi and Greta Valley in North Canterbury, 60km north of Christchurch. The Environment Court granted consent for the project in April 2013 for a 10-year period. The proposed wind farm could have up to 31 turbines and generate up to 70 MW. In February 2021 Meridian said that the company wanted to see more demand in the South Island before developing more generation there.
18	Mercury	Kaiwera Downs wind farm stage 2	200 MW	Consented	Kaiwera Downs wind farm stage 2 has been consented, with potential capacity of 200 MW.
19	Mercury	Mahinerangi wind farm stage 2	160 MW	Consented	The Mahinerangi Wind Farm Stage 2 development is located west of Dunedin near Lake Mahinerangi, allowing for up to 100 wind turbines and will be around 160 MW. Consent was granted for Mahinerangi Wind Farm in 2008.
20	Manawa Energy	Northland grid scale solar project	Up to 12 MW	Consented	Northland grid scale solar is a large-scale solar project of up to ~12 MW that has obtained consent, with potential offtake to a large C&I customer.
21	MainPower	Mt Cass wind farm	93 MW	Consented	The Mt Cass Wind Farm will be the largest wind farm in the South Island with a maximum generation output of 93 MW. Mt Cass Wind Farm was the first wind farm project to successfully vary the Resource Management Act (RMA) consent for larger, more technologically advanced turbines.
22	Hydro Developments	Ngakawau Hydro scheme	24 MW	Consented	The Ngakawau Hydro Project is a proposed hydroelectric power station planned on the Ngakawau River in the northern section of the West Coast of the South Island of New Zealand.
23	Eastland Generation, Infratec	Te ihi o te ra solar farm	5.2 MW	Consented	The Te Ihi O Te Ra solar farm will cover 6.1 hectares and consist of 8,000 bi-facial solar panels.

#	Project Proponent	Project Name	Size	Status	Description
					Renewable energy specialists Infratec NZ Limited are the project delivery partners to Eastland. Works are expected to start in October 2022 and are planned to take around 10 months, with the total cost budgeted at $7.9 million.
24	Contact Energy	Tauhara geothermal stage 2	90 MW	Consented	Tauhara stage 2 is expected to build out remaining capacity in the Tauhara field, of 90 MW after 2027.
25	Barrhill Chertsey Irrigation Ltd	Rakaia hydro plant scheme	Likely to remain under 3MW	Consented	The original concept consented by the Ashburton Community Water Trust for Rakaia was for a total generation of 16 MW. The consent to take water is now being utilised by Barrhill Chertsey Irrigation Ltd (BCI) for an irrigation scheme, which has a very modest 0.5 MW mini hydro generation plant associated with it. BCI have indicated that the hydro generation may be increased "over the next decade" but the total generation is unlikely to exceed 3 MW.
26	Harmony Energy	Waikato solar farm	147 MW	Consented	The Waikato solar farm is planned in the Waikato region, covering 182 hectare of a 260 hectare site at Te Aroha West, 140km south of Auckland.
27	Light Year Solar	Morley Road solar project	2.3 MW	Consenting underway	The 2.3 MW Morley Road solar project is located over 3 hectares of farmland in Waiuku south of Auckland. Consenting for this project is underway.
28	Mercury	Ngatamariki OEC5 geothermal project	35 MW	Consent submitted to council	Ngatamariki OEC5 geothermal project is a potential generation development opportunity presented in Mercury's FY22 investor presentation.
29	Lodestone	Lodestone 2 – Kaitaia Solar PV	Total of 229 MW with other Lodestone PV projects	Concept – funding received	Lodestone 2 is their northern most farm, located near Kaitaia. A 62 GWh solar plant, Lodestone Two will have up to 80,000 solar panels and will supply electricity directly to a Top Energy substation, where it will help power the local mill. The project will also incorporate native replanting with just over 7 hectares of the property to be revegetated .

#	Project Proponent	Project Name	Size	Status	Description
30	Lodestone	Lodestone 1 – Dargaville Solar PV	Total of 229 MW with other Lodestone PV projects	Concept – funding received	Lodestone One is a 120 GWh solar farm located near Dargaville. The farm will contain at least 125,000 panels and include 170 hectares of farming operations. Electricity produced by Lodestone One will be used by the 5,000 residents living along the Wairoa River, with surplus electricity flowing through to Whangarei.
31	Lodestone	Lodestone 5 – Whitianga Solar PV	Total of 229 MW with other Lodestone PV projects	Concept – funding received	Lodestone 5 is near Whitianga, where seasonal demand for electricity closely follows the sun. This 54 GWh farm will have up to 80,000 solar panels and will likely utilise battery storage to help meet evening demand and improve the reliability of the growing network.
32	Lodestone	Lodestone 3 – Waiotahe Solar PV	Total of 229 MW with other Lodestone PV projects	Concept – funding received	Lodestone 3 is in the fertile Waiotahe Valley, east of Whakatane. The 85 GWh solar farm is in one of the sunniest locations in New Zealand and will contain up to 115,000 solar panels. Lodestone 3 will complement Lodestone 4 providing electricity to the greater Bay of Plenty.
33	Lodestone	Lodestone 4 – Edgecumbe Solar PV	Total of 229 MW with other Lodestone PV projects	Concept – funding received	Located near Edgecumbe, Lodestone 4 is a 52 GWh solar plant. The farm will include up to 70,000 panels and will supply electricity to the 1,700 local residents, the local Fonterra dairy plant and other nearby commercial and industrial users.
34	Nova Energy	Rangataiki solar farm	400 MW	Concept (not consented) – stated intention to develop	A 400 MW solar farm has been planned by Nova Energy for the Taupō region. Nova Energy has applied for 2 resource consents from Taupō District Council to construct the project in 3 stages over 6 or 7 years. The solar project will be built in 3 stages of 150 MW, 150 MW and 100 MW.
35	Contact Energy	GeoFutures	168 MW (53 MW net of the 115MW reduction from Wairakei closure)	Development options currently being assessed	GeoFuture is Contact's strategy for continuing and increasing generation from the Wairākei geothermal field to achieve a more efficient utilisation of the geothermal resource for renewable electricity generation purposes and to reduce adverse effects on the Waikato River. The development and operation of the new GeoFuture power stations has an expected commissioning date between 2026 and 2031. The GeoFuture project is not purely additional generation, but is offsetting

#	Project Proponent	Project Name	Size	Status	Description
					declining production from the existing Wairareki field.
36	Meridian	Hawke's Bay wind farm	100 MW	Presented as part of Meridian's development pipeline in September 2022 investor presentation	This wind farm was included as part of Meridian's 2.3 GW pipeline of development options in their September 2022 investor presentation.
37	Meridian	Manawatu wind farm	150 MW	Presented as part of Meridian's development pipeline in September 2022 investor presentation	This wind farm was included as part of Meridian's 2.3 GW pipeline of development options in their September 2022 investor presentation.
38	Meridian	Taranaki wind farm	200 MW	Presented as part of Meridian's development pipeline in September 2022 investor presentation	This wind farm was included as part of Meridian's 2.3 GW pipeline of development options in their September 2022 investor presentation.
39	Meridian	Mt Munro wind farm	60 MW	Presented as part of Meridian's development pipeline in September 2022 investor presentation	This wind farm was included as part of Meridian's 2.3 GW pipeline of development options in their September 2022 investor presentation.
40	Meridian	Auckland solar farm	350 MW	Presented as part of Meridian's development pipeline in September 2022 investor presentation	This solar farm was included as part of Meridian's 2.3 GW pipeline of development options in their September 2022 investor presentation.
41	Meridian	Taranaki solar farm	100 MW	Presented as part of Meridian's development pipeline in September 2022 investor presentation	This solar farm was included as part of Meridian's 2.3 GW pipeline of development options in their September 2022 investor presentation.

#	Project Proponent	Project Name	Size	Status	Description
42	Manawa Energy	Thames solar project	~120 MW	Concept (not consented); consent process commencing	The Thames solar project is a proposed ~120 MW grid connected solar project near Thames, with the consenting process, including community and iwi consultation, commencing.
43	Helios	Whakatane solar project (115MW)	115 MW	Concept (not consented); land rights secured	Helios Energy has confirmed its first development in NZ, an approximately 115 MW solar farm located to the north-east of Transpower's Edgecumbe substation, near Whakatāne. The project has been under active investigation for more than 2 years, and Helios has secured the exclusive right to lease 165 hectares of land for the project. This is the first grid-scale solar development in New Zealand to receive contracted permission to connect to the national grid.
44	Helios	Wairarapa solar project	Up to 100 MW	Concept (not consented); currently under investigation with land lease rights secured	Helios is investigating the potential for a project of up to 100 MW to the south of Greytown in the Wairarapa. They have secured an exclusive right to lease the required land and were making progress on connecting the project to the local electricity network.
45	Island Green Power	Waiterimu solar farm	300 GWh per year (capacity not publicly available)	Concept (not consented)	British-based company Island Green Power want to build a solar farm across 380 hectares in Waiterimu, 22 km north-east of Huntly. If given the green light, the Waiterimu Solar Farm will produce enough electricity to serve up to 40,000 households.
46	Westpower	Waitaha Run Of River Hydro Scheme	20 MW	Concept (not consented)	The Waitaha Hydro Scheme will be a hydro scheme with a small weir.
47	Ventus Energy	Kaimai wind farm	150 MW	Concept (not consented)	Kaimai Wind Farm is an onshore wind power project planned in Waikato, New Zealand.
48	Solar Bay	Kowhai Park (Stage 1)	150 MW in stage 1	Concept (not consented)	Christchurch Airport is committing 400 hectares of its Harewood campus to Kōwhai Park – a new platform for generating renewable energy at scale to enable businesses to transition away from fossil fuels. The Park will scale up over the next 30 years and Phase One will deliver a 220-hectare solar array capable of generating 150 megawatts of electricity (enough to power 30,000 homes, or around 20% of Christchurch's current residential electricity use).
49	NZ Super Fund, Copenhagen	Taranaki offshore wind farm	1 GW	Concept (not consented)	NZ Super Fund and Copenhagen Infrastructure Partners (CIP) are jointly exploring the opportunity to

#	Project Proponent	Project Name	Size	Status	Description
	Infrastructure Partners				develop a 1 GW wind farm off the South Taranaki Bight. NZ Subject to extensive community consultation, environmental considerations and commercial feasibility, the project would see approximately 70 wind turbines installed between 23 and 30km offshore. There is potential for expansion of a further 1 GW in a second stage in the future.
50	Nova Energy	Potential South Island solar farm	300 MW	Concept (not consented)	Nova has purchased land in the South Island with an eye towards constructing a 300 MW solar farm.
51	Meridian Energy	Woodhill (potential) wind project	Not Available	Concept (not consented)	Nga Maunga Whakahii o Kaipara Ngahere has approved the installation of a Meridian Energy wind mast in its privately-owned Woodhill Forest. The 80-metre tall mast would collect data to assess the location's “potential” to be a future wind farm site.
52	Meridian Energy	Ruakaka solar farm	75 MW	Concept (not consented)	Ruakaka Solar Farm is a planned solar farm in Marsden Point, Whangarei. It will be part of the Ruakaka Energy Park which will also house a battery energy storage system (BESS) at least 100MW in capacity.
53	Manawa Energy, Hawkes Bay Airport	Hawkes Bay Airport solar	24 MW	Concept (not consented)	Hawkes Bay Airport and Manawa Energy have entered into a joint venture agreement to confirm the viability of, and then establish and construct, a solar farm at Hawkes Bay Airport. The Project will be the first large scale solar PV installation located on “airside” land in New Zealand allowing Hawkes Bay Airport to be the first in New Zealand to be powered 100% by solar energy.
54	Contact Energy, Roaring 40s	Pipeline of unnamed wind farms	Not Available	Concept (not consented)	Wind generation experts Roaring40s will work exclusively with Contact Energy to develop a pipeline of large-scale wind farm opportunities in New Zealand over the next 6 years, according to the terms of an arrangement announced in 2021.
55	Eastland Generation	Wairoa solar farm	Not Available	Exclusive land use agreements secured; business case currently progressing	Eastland Generation have secured exclusive land use agreements on sites in Wairoa for future solar projects and are now starting to progress the business cases for both.
56	Eastland Generation	Uawa solar farm	Not Available	Exclusive land use agreements secured;	Eastland Generation has secured exclusive land use agreements on sites in Uawa for future solar projects

#	Project Proponent	Project Name	Size	Status	Description
				business case currently progressing	and are now starting to progress the business cases for both.
57	Meridian Energy	Bunnythorpe (potential) solar project	Not Available	Early Stage Concept (not consented); land option acquired	Meridian is continuing assessment for potential solar sites, acquiring a land option near Bunnythorpe.
58	HES Aotearoa (Hive Energy, Ethical Power and Solar South West JV)	Pipeline of solar assets across NZ	Estimated 350 MW	Early Stage Concept (not consented)	Hive Energy, Ethical Power and Solar South West (SSW) have launched a new joint venture to develop PV solar assets across New Zealand, called HES Aotearoa Ltd. The company expects to develop a pipeline of nearly 350 MW of utility scale PV solar assets across the country.
59	Genesis, Fotowatio Renewable Ventures (FRV)	Pipeline of large-scale solar farms	Up to 500 MW	Early Stage Concept (not consented)	FRV's platform has entered a joint venture with Genesis Energy aiming to develop up to 500 MW of solar PV capacity, with first generation in FY25 and full volume by FY27.
60	Contact Energy, Lightsource bp	Pipeline of grid-scale solar generation projects by 2026	175 MW[1]	Early Stage Concept (not consented)	New Zealand energy company Contact Energy and global solar developer Lightsource bp will collaborate on a series of grid-scale solar generation projects under a new 50/50 joint venture. They will source, develop, and construct multiple solar farm projects in various locations across New Zealand, aiming to create up to 380 GWh (equivalent to 175 MW assuming a 25% capacity factor) ofaffordable electricity annually by 2026.
61	Consortium of BlueFloat, Energy Estate, Elemental Group	4 unnamed offshore wind projects in Taranaki, Southland and Waikato	Up to 5 GW	Early Stage Concept (not consented)	The consortium unveiled at the 2022 Wind Energy Association Wānanga plans to develop 4 offshore wind projects across Aotearoa in Taranaki, Southland and Waikato with the potential to generate up to 5 GW of power.
62	Manawa Energy	Solar project north of Auckland	Up to ~100 MW	Early Stage concept (not consented)	In their annual shareholder meeting presentation in 2022, Manawa mentioned a potential solar project north of Auckland in their development pipeline

2.2 Peak Flexible Resources

Below is a table of publicly available information about projects related to ensuring sufficient flexible generation and demand capacity to meet increasing peak demand. It details who the project proponent is, an indicative project name, the size of the project (if applicable), its rough status, and a description of what the project involves. The list is not exhaustive and is intended to showcase some of the work that is being done to support flexible electricity generation and demand capacity.

#	Project Proponent	Project Name	Size	Status	Description
63	solarZero, Transpower	Virtual Power Plant	Not applicable	Live	solarZero has announced that their fleet of batteries have been added into Transpower's demand response programme. The power made available from solarZero's fleet of batteries will perform as a Virtual Power Plant, connecting households to solarZero with the potential to provide power
64	Tiwai Point aluminium smelter	Demand response program	Not applicable	Live	The Tiwai Point aluminium smelter is able to flex demand by small amount in "real time" to meet intra–day peaks. The contract between Meridian and the smelter contains a 250 GWh 'Smelter Demand Response' provision which Meridian can trigger at low hydro levels, requiring it to reduce load. There may be opportunity for Tiwai Point to increase flexible demand response in future.
65	Genesis, Karit	South Wairarapa Virtual Power Plant	Not applicable	Live	Genesis are partnering with Christchurch-based technology start-up Karit to deliver a virtual power plant platform for its customers. A virtual power plant aggregates and coordinates the energy produced or stored in homes and businesses. At times of high wholesale prices or grid constraints, it can provide an alternative source of power and reward customers in the process.
66	Contact Energy	Battery concept	100 MW	Concept, under assessment	Contact Energy has completed the economic assessment of a 100MW battery. It states there will be a "Decision on North Island battery by end of 2023, for delivery in 2024".
67	Contact Energy	Demand Flex program	Targeting 100 MW demand response capacity by 2025	Live	Demand flexibility provides a more sustainable option than ramping up electricity generation to balance the grid. Contact's demand flex program gives greater control over when selected equipment at a site uses. Contact has also signed an agreement with Lake Parime to supply 10 MW of renewable electricity to operate the planned

#	Project Proponent	Project Name	Size	Status	Description
					low-emissions data centre. The agreement includes some level of flexible demand response.
68	Infratec, WEL networks	Utility scale Battery Energy Storage Systems (BESS)	35 MW	Under construction	Infratec and WEL Networks are preparing to construct a 35 MW BESS. This will provide the opportunity for more renewable generation to be installed, with the large-scale battery able to store energy from a range of renewable sources including wind and solar.
69	Meridian Energy	Ruakaka Energy Park BESS	At least 100 MW	Consented	Alongside a planned solar farm, the Ruakaka Energy Park will house a BESS with a capacity of at least 100 MW.
70	Aurora Energy, solarZero	Flexible residential solar and battery systems	Not applicable	Available for Upper Clutha residential properties; business services are planned in future	Aurora Energy partnered with solarZero in 2021 to trial non-network alternatives to building new electricity infrastructure. It means solar panels and battery storage installed by solarZero on customers' properties could be called upon when the load on the network increases. This would replace the demand of new powerlines as demand increases; rather, a network of homes with solar panels, batteries and smart computing power would be able to provide power back to the electricity network.
71	Fonterra	Organic industrial battery	500 kW	Trial underway	Fonterra is trialling a battery storage system at its Te Rapa dairy factory, using organic compounds that act as metals. Since installation late last year, they have cycled the battery daily, supporting dairy shed operations for 10 months. The battery is used for peak shaving during milking and refrigeration, when the factory's electricity use is at its highest.
72	Nova Energy	Otorahonga gas plant	360 MW	Consented	Otorahonga gas plant is a 360 MW gas-fired power station proposed for the Otorohanga district, south of Hamilton. It is expected to occupy around 5.6 hectares, and the plant would be able to start up and stop quickly to meet peak demand for electricity.

2.3 Dry Year

Below is a table of publicly available information about projects related to ensuring flexible generation and demand capacity for dry years – years when less hydroelectric generation is available. It details who the project proponent is, an indicative project name, the size of the project (if applicable), its approximate status, and a description of what the project involves. The list is not exhaustive and is intended to showcase some of the work that is being done to support flexible electricity generation and demand capacity in dry years.

#	Project Proponent	Project Name	Size	Status	Description
73	Gas Industry Company (GIC)	Planned demand response potential	Not applicable	Potential discussions ongoing	The GIC has outlined the importance of planned demand response by Methanex to be available at large enough volumes to enable gas flexibility for New Zealand's electricity system, increasing security of electricity supply.
74	Ministry of Business, Innovation and Employment	New Zealand Battery Project (NZBP)	Not applicable	Funding approved, Phase 1 of the project underway	NZ Cabinet has approved funding to investigate pumped hydro andother possible solutions to New Zealand's dry year electricity problem. The NZBP will provide comprehensive advice on the technical, environmental, and commercial feasibility of pumped hydro and other potential energy storage projects (Lake Onslow pumped hydro is one option as part of the NZBP).
75	Genesis Energy	Huntly biomass modification	Not applicable	Under trial, with unit conversion considered but not confirmed	Genesis Energy has started trialling the burning of black wood pellets in Huntly Power Station, New Zealand's largest power plant and the only one still burning coal. The company is understanding the potential for converting the remaining Rankine units at the power station to wood pellets.
76	Ropu Matatau (consortium led by Mott Macdonald)	Lake Onslow – Pumped hydro storage project	~1000 MW capacity ~5,000 GWh energy storage	Feasibility investigation underway	Rōpū Matatau plans to assess a pumped-hydro storage facility on Lake Onslow, New Zealand. The project could help power the country during dry years when conventional hydro power plants struggle to generate electricity and fossil fuels are currently needed to compensate.
77	Genesis Energy	Gas energy storage investigation	Not applicable	Submission made to Gas Industry Company's (GIC) Gas Market Settings Investigation	Genesis Energy, in 2021, submitted a response to a GIC investigation into the gas market. Within, they detail the point of view that energy storage, in particular natural gas, will play an important role in the transition to a net-zero economy. It can be a lower emission fuel that

#	Project Proponent	Project Name	Size	Status	Description
					supports the electricity generation of a hydro-dependent system, especially to manage dry years, seasonal demand shifts, and other variations in system demand and supply.
78	Genesis Energy	Market Security Options (MSO)	Not applicable	Details sent to market participants	Genesis Energy is offering other generators, big power users, and electricity retailers a means to protect themselves from volatile prices and possible shortfalls in renewable generation. It has called for indications of interest in its new MSO, which will allow them lock in a guaranteed power supply to the thermally fired Huntly station when additional generation is needed.
79	Contact Energy, Meridian	Southern Green Hydrogen	~600 MW+	Concept (not consented)	Contact Energy and Meridian Energy have been seeking registrations of interest to develop the world's largest green hydrogen plant. Green hydrogen is a promising energy source to decarbonise sectors such as heavy transportation and industrial processes that currently rely on fossil fuels. As of September 2022, Woodside and Fortescue have entered final negotiations to lead the facility's production.

2.4 System Stability

Below is a table of publicly available information about projects related to ensuring that the electricity system is stable and resilient to fluctuations in demand or supply of energy. It details who the project proponent is, an indicative project name, the size of the project (if applicable), its approximate status, and a description of what the project involves. The list is not exhaustive and is intended to showcase some of the work that is being done to support the resilience of the electricity system.

#	Project Proponent	Project Name	Size	Status
80	Transpower	Future Security and Resilience	Summary report and 10-year roadmap are completed and published (Phase 1/2), with delivery (Phase 3) planned in late 2022-2023	This project forms part of the Authority's response to the Government's Electricity Price Review to examine the security and resilience of electricity supply. It aims to address the transition to a low-emissions energy system, and develop a shared understanding and roadmap among New Zealand power system stakeholders about opportunities and challenges in maintaining electricity security as New Zealand transitions to zero carbon.
81	Transpower	Waikato Upper-North Island Voltage Management (WUNIVM)	Phase 1 underway	Transpower commenced work on the first phase of its WUNIVM project in 2020. The project is needed to manage potential changes in generation and/or demand in the region to manage voltage stability. The first phase involves the installation of a grid stability device at Transpower's Hamilton substation costing approximately $60 million.
82	Transpower	Voltage support program	Request for Proposal released	Transpower has released a Request for Proposal (RFP) for a Non-Transmission Solution to provide voltage support in the Waikato and Upper North Island, following a successful Request for Information (RFI) on possible solutions last year. This will help ensure voltage stability on the national grid, ensuring electricity supply to the Waikato and Upper North Island remains stable and reliable. A battery is one possible solution to meet this need.

2.5 Networks

Below is a table of publicly available information about projects related to developing sufficient distribution and transmission infrastructure to enable new electrification, generation, and flexibility. It details who the project proponent is, an indicative project name, the size of the project (if applicable), its approximate status, and a description of what the project involves. The list is not exhaustive and is intended to showcase some of work that is being done to support network development.

#	Project Proponent	Project Name	Status	Description
83	Powerco	Smart EV Charging Project	Launched in 2020 as a 3-year project, currently live	The Smart EV Charging Project was launched in late 2020; Powerco's aim is to collect data on how people in NZ charge their electric vehicles at home so that the company can "prepare its electricity network for an EV future". Powerco recruited 80 EV drivers from across its electricity network and installed Evnex EV smart charging units into their homes; the company uses these chargers to collect information about participants' charging habits and see their impact on our electricity network.
84	Orion	Upper South Island load management (USILM)	Live	The project is operated by Orion and works with the co-operation of all distributors in the region. During periods of high electricity demand, the system sheds household hot water cylinder load throughout the region using ripple control. In a grid emergency, the system can reduce water heating load on the grid rapidly to help avoid area-wide power outages.
85	Vector	Symphony strategy	Live	Symphony Strategy is focused on leveraging new innovation and technology to achieve agility in response to uncertainty and deliver greater efficiency for customers long-term. Symphony provides a blueprint for the Vector group to lead the creation of intelligent and affordable energy systems.
86	Vector, X (formerly Google X)	Vector/X partnership	Partnership is ongoing	Vector Group announced a strategic collaboration with X, the moonshot factory, in September 2021 which will include virtualising New Zealand's largest electricity network, run by Vector in Auckland. Vector and X are working together on network virtualisation and simulation technology as part of their shared vision to reimagine the design, management, and operation of electricity networks; get ahead of increasing demand for clean energy; and transform the network in order to support decarbonisation.

#	Project Proponent	Project Name	Status	Description
87	Vector, AWS	Vector/AWS partnership	Partnership is ongoing	In 2020, Amazon Web Services (AWS) announced a multi-year strategic alliance with Vector to jointly develop the New Energy Platform (NEP). Initially, the NEP will leverage the breadth and depth of AWS services to rapidly collect and analyse data from more than 1.6 million IoT-connected Vector advanced meters deployed across New Zealand and Australia. The insights collected by the NEP will help Vector enable energy and utility companies to develop tailored product and pricing solutions for their customers based on their energy consumption habits.
88	Vector	EV Smart Charging Trial	Trial complete	Vector ran a 24-month trial, with 200 EV users across Auckland, that involved installing an EV smart charger at each participant's home. The main objectives were to better understand EV charging behaviour and preferences, customer perceptions of managed smart charging, and how smart charging solutions can provide flexibility for integrating EVs into the network.
89	Transpower	Te Mauri Hiko, Whakamana i Te Mauri Hiko, Electricity Roadmap (and associated) Reports	Reports have been developed and released publicly	In 2018, Transpower launched Te Mauri Hiko - Energy Futures, which examined a range of electricity supply, demand and future technology scenarios. In March 2020, Transpower launched Whakamana i Te Mauri Hiko - Empowering our Energy Future, setting out the generation and transmission investment needed, along with ten essential steps to enable this. In February 2021, the company built on this, publishing their Electrification Roadmap. It draws on the work of many experts to set out policy options across transport and process heat to deliver significant, rapid and cost-effective emissions reductions. These are 3 notable reports among others published by the company.
90	Energy Networks Association	Network Transformation Roadmap (including Distributed Energy Resources Connection standards)	Roadmap has been developed and released publicly	The Network Transformation Roadmap (NTR) was formally launched in April 2019 by the Electricity Networks Association (ENA), in anticipation of the role EDBs will play as key enablers of decarbonisation. It sets out the pathways EDBs need to follow to support a low carbon future, focused on delivering safe and economic supply of electricity consumers. As of 2022, the NTR has been updated to further support networks adapting to changes in how electricity is generated, delivered, and used, and in much greater volumes.

#	Project Proponent	Project Name	Status	Description
91	WEL Networks	Transformation to DSO model	Transition is underway, with DSO strategy and roadmap created	WEL Networks is currently transitioning to a DSO model. Their transition, and plans for transition, have been recognised at the Electricity Engineers Association National Conference 2022, with their strategy and roadmap winning People's Choice Best Paper Award.
92	Counties Energy	Distributed Systems Operator (DSO) transition	Transition is underway, with guiding principles and vision created	Counties Energy sees that the change from a Distribution Network Operator (DNO) to a Distribution System Operator (DSO) is an essential one to drive performance and resilience on our network and to create new shared value that unlocks the full energy potential for our communities. Enhanced DSO capabilities will provide customers with the freedom to access a wider range of energy choices as active participants of the low carbon transition.
93	Counties Energy and GE Digital	Advanced distribution management project	Live	As part of its DSO transition, Counties Energy has partnered with GE Digital to speed up digital transformation for improved grid operations. Counties Energy will deploy an advanced distribution management system (ADMS) from GE Digital and combine it with the company's existing geographic information system (GIS) for network reliability, efficiency and flexibility. The project will enable the utility to leverage grid and consumer data to enhance the resiliency of the energy network.
94	Wellington electricity, Greensync	EV Connect project	Draft roadmap and consultation documents have been released, project is underway	EV Connect will establish the foundations required to support electric vehicle charging at scale and help manage peak electricity demand on Wellington Electricity's network. It will be rolled out over 3 stages in collaboration with the industry. This will address opportunities for dynamic electric vehicle connection technologies and enhance the visibility of electric vehicles (EVs) connected to a network.
95	Transpower	Demand response platform	Proof of concept complete, with next steps involving transmission, market participation, and market development underway	Transpower ran a demand response program with a Flexibility Management System as part of continued investigation and proof of concept programmes between 2007 and 2020. The long-standing work programme achieved numerous goals including increasing awareness of demand response. In 2020 Transpower noted it has ~230MW enrolled in its demand response program.
96	Transpower	Net Zero grid pathways	Phase one underway	Net Zero Grid Pathways covers Transpower's plans and investments on the backbone of New Zealand's

#	Project Proponent	Project Name	Status	Description
				electricity transmission grid to meet the challenge of enabling the electrification of the economy and the nation's decarbonisation targets. This includes connecting new renewable generation and maintaining a secure and reliable supply of electricity.
97	Powerco	Smart Grid Trial	Trial underway	As of Powerco's 2022 Asset Management Plan Update, the company has an upcoming installation of distributed energy resources (DER) in a suburb to assess the impact of DER on network performance and to test various energy management software solutions.
98	Powerco	Wireless Power Transmission	Trial underway	Wireless Power Transmission is a future technology trial testing the transmission of power via radio frequency. A laboratory trial was completed successfully, and a field trial is planned next.
99	Powerco	Fault anticipation	Trial underway	Powerco has installed ten devices that monitor high frequencies signals on conductors to identify network issues (e.g., vegetation overgrowth, line clash, cracks in conductor, etc.) to provide notification before a fault is encountered.
100	Powerco	Low Voltage monitoring	Trial underway	Since March 2020, Powerco has been running a project to improve the visibility and performance of its low voltage network. The company has installed ~430 specialised low voltage monitoring units in transformers in Taranaki, Palmerston North and Tauranga; the units feed data back to Powerco's Network Operations Centre (NOC), providing visibility of what's happening on the low voltage network in these areas, in real time. The NOC team can then use this information to see any outages on the low voltage network and proactively and more efficiently restore power for the customer.
101	Powerco	Network-wide Long Rage Wide Area Network (LoRaWAN) communications network	Trial underway	Powerco intends to use LoRaWAN technology for communications; to achieve this objective, it plans to develop a network of LoRaWAN gateways around our Packet Transfer Network system. A roll-out of a LoRaWAN network across the Powerco footprint commenced in FY22, which will continue in FY23. The next phase will involve research and analysis on various network and asset sensors that will be rolled out and connected to this network - forming a key platform for Powerco's Internet of Things strategy.

#	Project Proponent	Project Name	Status	Description
102	Transpower	Renewable Energy Zones (REZ)	Consultation submissions are being considered, with confirmation of next steps to be announced in late 2022. If confirmed, construction is estimated to start in 2024	Transpower is considering the concept of REZs and a potential pilot project in Northland. A REZ is a way of connecting new renewable electricity generation and major electricity users to the electricity network and can quickly increase renewable energy supply and its use. There is around 11 GW of wind and solar generation that investors may consider building in the next 30 years. Around 5 GW of this generation is in regions where currently, high connection costs or the first mover disadvantage could inhibit investment. REZs could enable access to this generation.

2.6 Electrification/retail

Below is a table of publicly available information about projects related to increasing the uptake of electric energy technology, especially in the retail space. It also includes other sustainable initiatives related to energy within the retail space. It details who the project proponent is, an indicative project name, its approximate status, and a description of what the project involves. The list is not exhaustive and is intended to showcase some of the work that is being done to support increased electrification.

#	Project Proponent	Project Name	Status	Description
103	Vector	Auckland transport EV partnership	Partnership is ongoing	In January 2020, Auckland Transport (AT) and Vector announced a Memorandum of Understanding (MoU) to explore the impacts of a full implementation of electrified busses. The MoU is a direct response to AT's Low Emission Bus Roadmap, published last year, that outlined its commitment to have all new buses in Auckland being electric from 2025, with the whole fleet fully electric by 2040.
104	EECA	State Sector Decarbonisation Fund - electrification projects	Live	The State Sector Decarbonisation Fund aims to reduce carbon emissions in the State sector through targeted investments. Within they have granted investment to 35 projects aimed at electrification of fleet vehicles across government departments, health, and education sectors in New Zealand. They have also invested in 19 projects aimed at replacing coal and gas boilers with low emission alternatives, including several biomass boilers. Other projects include lighting upgrades, chiller replacements, improving energy efficiency, and a solar PV generation project on the roof of Parliament.
105	NZ Govt/CEM	EV 30@30 initiative	Live	New Zealand joins clean Energy Ministerial Electric Vehicle Initiative. The Electric Vehicle Initiative (EVI) has a collective target of at least 30 percent of new vehicle sales by 2030. EV registrations in New Zealand have grown at an exponential rate since 2013 and recently passed the 8,000 mark. Membership of the EVI will link New Zealand into international best practice around EVs including policy, research and information sharing.
106	NZ Transport Agency	Clean Car Programme	Live	The Clean Car Programme is built on the Clean Car Standard and Clean Car Discount, among other initiatives. The Discount focuses on influencing vehicle demand through rebates and cost reduction of low emission vehicles, whilst the Standard on influencing vehicle supply through setting a

#	Project Proponent	Project Name	Status	Description
				government target that regulates importers to reduce CO2-e emissions.
107	ThunderGrid	EV charging	Live	Thundergrid is a company focused on Electric Vehicle Charging. They offer end-to-end service design and implementation package, from fleet reviews and infrastructure audits to business case development and billing.
108	Simply Energy	Demand Flexibility program	Live	Demand Flexibility gives businesses greater control over when selected equipment at their site uses electricity, by automatically switching it off when the grid needs extra support.
109	PowerNet	St John EV Shuttle Trial	Live	PowerNet has installed 4 EV charging stations around Southland as part of a St John EV health shuttle trial. St John is transitioning its Southland health shuttle fleet to lower emissions vehicles and as part of this they are trialling EV health shuttles. To support St John and electrification of transport, PowerNet has agreed to sponsor 4 charging stations at St John's Winton, Otautau, Invercargill, and Bluff stations.
110	Octopus Energy	KrakenFlex	Live	KrakenFlex is a cloud-based platform that controls distributed energy assets with machine learning and artificial intelligence to match supply and demand.
111	Meridian	Electric car plan	Live	Electric Car Plan is a day/night plan, which means payment rate varies between day and night. The night rate is lower than their other day/night power plans, so it costs even less to charge a car overnight.
112	Mercury	EV fuel package	Live	Mercury offers a 20% off your electricity usage between 9pm-7am every night for 2 years for plug-in vehicle owners.
113	Mercury, Lime	Electric 'micromobility' partnership	Live	Lime offered free e-bike and e-scooter rides up to $5 to more than 300,000 New Zealanders in 2020. The initiative, to celebrate Lime partnering with local electricity provider Mercury, is aimed at getting more people moving around their cities sustainably. Mercury also became Lime's national electricity partner, helping to power Lime charging warehouses across the country.
114	Mercury	EV leasing	Live	Mercury Drive helps people get behind the wheel of an EV without up-front commitment or costs, insulates from depreciation shocks and takes away the hassle and cost of maintenance and insurance. Mercury has teamed up with Snap Rentals for the initiative, which is

#	Project Proponent	Project Name	Status	Description
				now live for Mercury customers based in Auckland. In 2020, Mercury added 50 EV a month, or a total of about 400 vehicles, to its Mercury Drive fleet at a cost of $6 million, following a successful 2-year trial.
115	Genesis	EVerywhere	Live	Everywhere encourages EV usage through increasing flexibility and accessibility to the ChargeNet EV charging network. At participating charging stations, participants pay Genesis their Energy EV plan's 'per KWh' day and night rates, instead of ChargeNet's per minute + per kWh pricing.
116	Genesis, Evnex	EV Sync	Live	Genesis, through its own in-house software development, has added EV Sync, an intelligent feature that connects the smart chargers to its Energy IQ app enabling customers to schedule and automate the most cost effective and emissions-friendly times to charge.
117	Enel X	DR smart energy solutions	Live	Enel X DR programs provide payments to large energy consumers that agree to reduce their energy demand during times of electricity grid stress. Enel X helps large energy consumers earn money by reducing demand on the grid.
118	Genesis	EV Plan	Live	Genesis offers discounted night rates to incentivise consumption at off-peak times.
119	WoolWorks New Zealand	WoolWorks high temperature heat pump and process heat optimisation	GIDI funding received	Installation of an air-sourced high temperature heat pump to replace a natural gas boiler and improve the overall process heat efficiency of the Napier site through heat exchanger optimisations.
120	Blue Sky Meats (NZ)	High temperature heat pump	GIDI funding received	This project will implement a new high-temperature heat pump, located at their primary processing facility near Invercargill.
121	DB Breweries Limited	Waitemata Brewery high temperature heat pump	GIDI funding received	The installation of high temperature heat pump (HTHP) will deliver 85°C hot water to tunnel pasteurisers and the site's high temperature hot water ring main. By leveraging the efficiency that HTHPs deliver, heat recovered from the refrigeration plant will be significantly reducing the consumption of natural gas. supplied to the HTHP
122	Auckland Meat Processors	Hot water gas boilers to dual high	GIDI funding received	Decommissioning of two existing gas-fired hot water boilers and installation of high-temperature heat pumps to supply

#	Project Proponent	Project Name	Status	Description
		temperature heat pump system		90°C water to process operations. Heat will be captured from site refrigeration systems and recovered.
123	Talley's Limited	Pulsed electric field technology	GIDI funding received	The project will reduce steam consumption by improving potato pre-heating. It will be implemented at Talley's main vegetable processing facility in Ashburton
124	ANZCO Foods Limited	ANZCO Canterbury Beef Processing Plant High Temperature Heat Pump	GIDI funding received	Installation of a 1MW High Temperature Heat Pump to reduce coal fired steam generation and provide hot water for processing at the ANZCO Canterbury Beef Processing Plant.
125	Alliance Group Limited – Mataura	Mataura High Temperature Heat Pumps and Mechanical De-watering.	GIDI funding received	This project includes a heat pump system and mechanical sludge drying, which combined will removed almost all steam load. This will make it economically feasible to replace the highly inefficient coal boiler with a small diesel boiler used only for peaking.
126	Alliance Group Limited – Lorneville	Alliance Lorneville Electrode Boiler Project	GIDI funding received	This project will use a 16 MW electrode steam boiler to provide steam and hot water for meat processing, displacing significant coal use with renewable electricity
127	Van Lier Nurseries	Decarbonisation of boiler process heat	GIDI funding received	Heated glasshouses are required with high carbon emitting natural gas boilers providing the heat. The project aims to replace the boilers with a low carbon heat pump alternative
128	New Zealand Sugar Company Limited	NZ Sugar – New Evaporator and Mechanical Vapour Recompression (MVR) Project	GIDI funding received	Replacing the existing Evaporator and Thermal Vapour Recompression (TVR) system with a new Evaporator and Mechanical Vapour Recompression (MVR) system for steam demand reduction and 10% fuel switching from natural gas to electricity.
129	Silver Fern Farms	Pareora Hot Water Heat Pump Project	GIDI funding received	This project is to install a high temperature heat pump at the Pareora site to preheat hot water for the processing plant, shifting heating load away from the existing coal boiler.
130	Goodman Fielder NZ	Longburn High Temperature Heat Pump Project	GIDI funding received	Installation of a High temperature heat pump using waste heat from refrigeration units to reduce LPG consumption by 1,200tCO2/annum (25% of site CO2 emissions).
131	Silver Fern Farms	Finegand Heat Recovery and Heat Pumping Project	GIDI funding received	This project will reduce water flows across the site, capture waste heat from the refrigeration plant, and install high temperature heat pumps to collectively

#	Project Proponent	Project Name	Status	Description
				heat water, which can be used within the plant
132	Silver Fern Farms	Belfast Hot Water Heat Pump Project	GIDI funding received	The project involves installing a high temperature heat pump to pre-heat hot water for the processing plant, reducing coal consumption
133	Alliance Group Limited	Pukeuri Heat Pump Project	GIDI funding received	This project involves heat capture from a refrigeration plant to produce high temperature water using industrial heat pumps to dispalce coal use
134	AFFCO New Zealand	SPM Malvern Boiler to Heat Pump converserion	GIDI funding received	This project involves replacing a coal fired boiler with high temperature heat pumps
135	ANZCO	Kokiri electric boiler and high temperature heat pump	GIDI funding received	The project will install a 1.5 MW electric hot water boiler and a 1 MW high temperature heat pump to provide hot water for processing at the ANZCO Kokiri Processing Plant.
136	Bremworth Carpet and Rugs Ltd	High temperature electric heat pump hot water	GIDI funding received	The project will use high efficiency electric heat pumps to replace existing high carbon emitting natural gas fired boilers on the Napier site.
137	Canterbury Spinners Ltd	Heat recovery and process heat electrification	GIDI funding received	The decarbonisation of Canterbury Spinners' process heat plant involves process heat electrification and heat recovery.
138	Winstone Wallboards Ltd	Process electric heating from solar energy	GIDI funding received	The project involves installing 3.4 MW of electric heating equipment to utilise solar generated electricity to displace gas in Winstone Wallboards' new manufacturing facility.
139	CWF Hamilton & Co Ltd	Conversion from liquefied petroleum gas (LPG) based aluminium melting to electric	GIDI funding received	Several existing LPG fired smelters will be replaced with electric furnaces at the company's Christchurch site.
140	Synlait Milk Ltd	Electrode boiler maximisation	GIDI funding received	Synlait installed NZ's first electrode boiler in March 2019 for its new liquids factory. They plan to maximise their use of it by connecting it to their main site and upgrading electrical supply so that the boiler can run at tis maximum rated capacity of 12 MW.
141	Mataura Valley Milk Limited	Project Recharge	GIDI funding received	New Zealand's first high pressure electrode boiler (15 MW) will be installed to replace all current coal fired heat duties on a Mataura Valley Milk site making it 100% electrified. The project includes transmission upgrades on and offsite to support the new electrical load.

#	Project Proponent	Project Name	Status	Description
142	The Tasman Tanning Company Ltd	Replacing natural gas heated leather dryers	GIDI funding received	Electric (infrared) leather dryers will replace natural gas heated steam leather dryers in a finishing plant.
143	Meadow Mushrooms Ltd	Replacing diesel boiler with electric boiler	GIDI funding received	Meadow Mushrooms aims to replace a diesel boiler with a 2.5 MW electric resistive boiler.
144	Pacific Coilcoaters	Decarbonisation of painting process through electrification	GIDI funding received	The company aims to replace existing gas-fired ovens and oxidisers with electric ovens and upgrade of electricity supply infrastructure.
145	Woolworks NZ Limited	Electrode boiler, high temperature heat pump, and demand reduction	GIDI funding received	This project involves utilisation of low carbon technologies, including an electrode boiler, to replace a 6 MW coal fired steam boiler.
146	Alliance Group Limited	Lorneville electrification opportunities, including Electrode Boiler Project	GIDI funding received	This project involves process heat demand reduction and electrification at a meatworks plant. This project will use a 16 MW electrode steam boiler to provide steam and hot water for meat processing, displacing significant coal use with renewable electricity.
147	ChargeNet	Hyper-rapid EV charging network expansion	Funding provided, roll-out is underway	ChargeNet has received co-funding for 3 hyper-rapid EV charger projects in the Waikato, Wellington, and Queenstown. Charge Net will install two 300kW hyper-rapid EV chargers at each site, allowing charging for up to 6 EVs at the site simultaneously.
148	NZ Govt	School coal boiler replacement program	Underway	Thanks to a $10 million dollar investment, all remaining coal boilers in New Zealand schools will be replaced with renewable electric (or wood biomass) heating sources by 2025 reducing carbon emissions by around 35,400 tonnes over 10 years.
149	NZ Govt	Public transport decarbonisation	Underway	In January 2021, the Government announced it is committed to decarbonising the public transport bus fleet. By 2025, the Government will only allow zero-emission public transport buses to be purchased. This commitment targets complete decarbonisation of the public transport bus fleet by 2035. The Government will engage with the sector about how the $50 million fund is spent, and how barriers to decarbonisation can be overcome in the fastest, most economically efficient way.
150	NZ Govt	Freight decarbonisation	Underway	The green freight project, which was initiated in April 2019, looks specifically at the role alternative green fuels (electricity, green hydrogen and biofuels)

#	Project Proponent	Project Name	Status	Description
				could play in reducing emissions from heavy vehicles carrying freight on New Zealand's roads. The project is focused on heavy trucks involved in road freight because they account for nearly 25% of all greenhouse gas road transport emissions.
151	Meridian energy, DataGrid	South Island data centre	Land acquired, filing application to begin construction	DataGrid acquired 43 hectares in south New Zealand for a hyperscale facility. Partnering with Meridian Energy, the facility will be the first hyperscale data centre in the area. The facility will draw energy from the Manapouri hydropower scheme, which is due to have a large surplus once the Rio Tinto aluminium smelting facility at Tiwai Point closes in 2024.
152	Meridian energy	Zero EV charging network	Under construction	The Zero EV charger network will be one of the biggest destination charging networks in Aotearoa New Zealand. Meridian partnered with Wellington City Council and Hutt City Council to expand their network. They will be installing charging stations at locations throughout Wellington and Hutt cities. The plan is for around 100 chargers to be installed across the greater Wellington region. In addition to that, they will be installing over 200 chargers around the country.
153	Hiringa Energy	Green Hydrogen Refuelling Network	Under construction	Hiringa is building a green hydrogen production and refuelling network across New Zealand focused on the heavy transport sector. The first 4 stations are to be located in Hamilton, Palmerston North, Auckland and Tauranga, and are due to be operational in 2023.
154	Meridian	Process heat electrification programme	Open to Expressions of Interest from commercial and industrial customers	The Process Heat Electrification Programme offers businesses competitive pricing, long-term price certainty, and funding support to electrify their process heating systems. The first three projects of Meridian's Process Heat Electrification Programme saw the energy company work with 3 companies targeting the removal of more than 15,000 tonnes of carbon emissions from their process heat production per year.

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4.Glossary

Term	Description
AC	Alternating Current
AMP	Asset Management Plan
ADMS	Advanced Distribution Management System
AT	Auckland Transport
AWS	Amazon Web Services
BCI	Barrhill Chertsey Irrigation
BESS	Battery Energy Storage System
CIP	Copenhagen Infrastructure Partners
CO2-e	The unit for measuring the climate impact of the greenhouse gases and stands for tonnes of carbon dioxide equivalent. Each of the different greenhouse gases has a different impact on the atmosphere, so a weighting is given to the other gases so that we have an idea of the overall impact of greenhouse gases emitted.
DER	Distributed Energy Resources
DNO	Distribution Network Operator
DR	Demand Response
DSO	Distribution System Operator
EDB	Electricity Distribution Business
ENA	Electricity Networks Association
EV	Electric Vehicle
EVI	Electric Vehicle Initiative
FRV	Fotowatio Renewable Ventures
GIC	Gas Industry Company
GIDI	Government Investment in Decarbonising Industry
GIS	Geographic Information System
GW	Gigawatt
GWh	Gigawatt hours
HTHP	High Temperature Heat Pump
HVDC	High Voltage Direct Current
IoT	Internet of Things
JV	Joint Venture
KWh	Kilowatt hour
LoRaWAN	Long Range Wide Area Network
LPG	Liquefied Petroleum Gas
MoU	Memorandum of Understanding
MSO	Market Security Options
MW	Megawatt

Term	Description
NEP	New Energy Platform
NTR	Network Transformation Roadmap
NZBP	New Zealand Battery Project
PV	Photovoltaic
REZ	Renewable Energy Zone
RFI	Request For Information
RFP	Request For Proposal
RMA	Resource Management Act
SSW	Solar South West
USILM	Upper South Island Load Management
WEL Networks	Formerly Waikato Electricity Networks
WUNIVM	Waikato Upper-North Island Voltage Management