

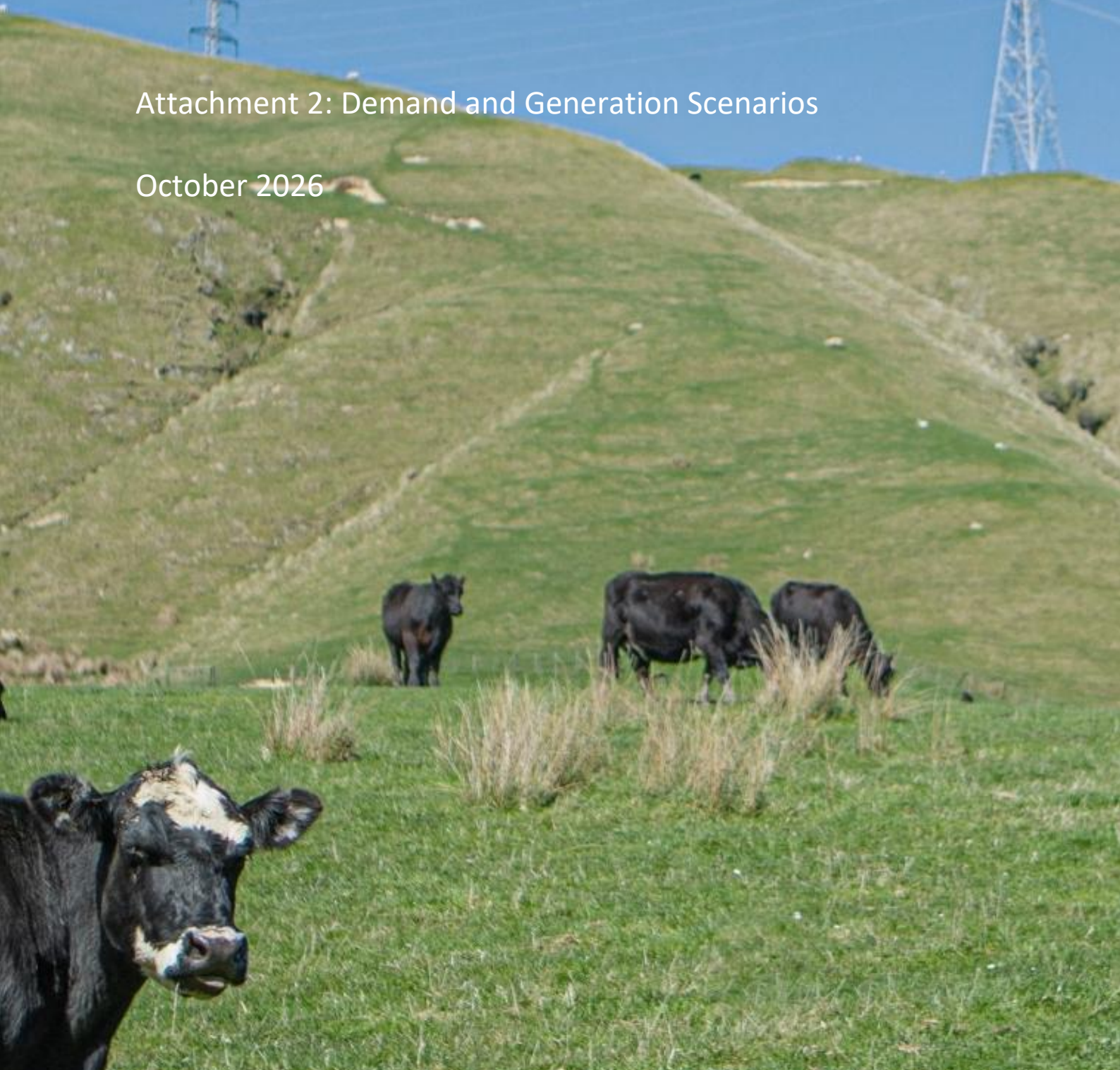


TRANSPOWER

Waikato Regional Interconnection Capacity (WRIC): Major Capex Proposal Shortlist Consultation

Attachment 2: Demand and Generation Scenarios

October 2026



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1 Overview

To apply the regulated Investment Test, we must make assumptions about future demand and generation. This attachment describes the market development scenarios used to model investment benefits for the Waikato Regional Interconnection Capacity (WRIC) Major Capex Proposal shortlist consultation

1.1 Approach to developing market development scenarios

We assess investment options across a range of market development scenarios. Each scenario represents a plausible future electricity system based on a set of demand, generation, and other key assumptions. Considering multiple scenarios ensures the economic assessment is robust to a range of potential futures. Each market development scenario includes assumptions about:

- future electricity demand, including assumptions regarding base demand, electric vehicle (EV) uptake, solar PV uptake, distributed energy storage, etc.
- existing, decommissioned and future new generation connected to the national grid.
- capital and operating costs for existing and future new generation.
- grid-connected energy storage.

Our market development scenarios are based on MBIE's most recent Electricity Demand and Generation Scenarios (EDGS 2024). These scenarios are mostly specified at a national level. We allocate out demand and generation to a substation level using a variety of methods and incorporate relevant customer and industry updates received during 2025. The resulting demand and generation assumptions are set out below.

To simplify the assessment while retaining a broad range of plausible futures, we have modelled three EDGS-based scenarios for the WRIC shortlist analysis. The Environmental scenario is used as the central case because its Waikato 110 kV demand profile sits near the centre of the plausible demand range to 2050. The Constraint and Growth scenarios test lower- and higher-demand futures, respectively.

- **Constraint:** low economic growth, with international trends leaving limited scope for domestic growth or innovation (20% weighting).
- **Environmental:** moderate economic growth, with New Zealand pursuing more ambitious emissions reductions (60% weighting).
- **Growth:** higher economic growth supported by higher immigration (20% weighting).

We have not separately modelled the Reference and Innovation scenarios because as is seen in Figures 1 and 2, their Waikato 110 kV demand profiles are very similar to the Environmental scenario and doing so would require significant additional power system modelling. To reflect the range represented by these three broadly similar scenarios, we have assigned the Environmental scenario a 60% weighting—three times the weighting assigned to each of the Constraint and Growth scenarios—when calculating the weighted Investment Test results.

2 Demand assumptions

This section presents the regional EDGS peak load forecast variations we intend to use for this shortlist investigation.

2.1 Regional forecasts and assumptions

Figures 1 and 2 present the winter and summer peak load forecasts, respectively, and Figure 3 presents the gross energy demand forecast for the Waikato 110 kV region, for each of the five EDGS scenarios. Table 1 and Table 2 present the corresponding winter and summer peak load forecasts in 2030, 2040 and 2050 for the three scenarios we use in our assessment. These are broken down by the factors contributing to that growth:

- **Base growth:** underlying growth in demand driven by factors such as population and economic growth.
- **Step loads:** large demand steps that might appear from new residential or commercial developments.
- **EV:** the uptake of EVs and the “smartness” of their charging.
- **Solar:** the uptake of residential and commercial solar photovoltaic panels.
- **Battery:** the uptake of residential and commercial battery storage packs.
- **Industrial electrification:** the electrification of industrial processes such as the conversion of coal and diesel boilers to electric boilers.

Each scenario has different assumptions¹ for each of these factors that lead to the overall variation in the forecasts. For this investigation, we have focused on the Waikato 110 kV region which is relevant for assessing flows across the 220/110 kV interface currently provided by the interconnecting transformers at Hamilton. Network demand for Waikato 110 kV is the aggregation of demand at the 11 GXPs² that connect in the Waikato region.

Regional forecast refinements

We have used the 2024 EDGS as a basis for the demand forecasts but we have made the following refinements:

- At a national level, we have attempted to align with MBIE’s energy forecasts, but we have not attempted to align with MBIE’s peak load forecasts. We have detailed models that model demand profiles at a GXP level that we believe better capture the impact of the scenarios on peak demand.

¹ Across the scenarios, the compound annual growth rates between 2026 and 2055 range from 0.3% to 1.2%.

² Waikato 110 kV regional demand is the aggregation of demand at the following GXPs: Arapuni 110 kV, Cambridge, Hamilton 11 kV, Hinuera, Hangatiki 110 kV, Hangatiki 33 kV, Kopu, Piako, Te Awamutu, Waihou and Waikino.

- We have also moderated the speed of process heat electrification in early years to be more heavily informed by known potential heat electrification steps rather than scenario-level assumptions about the uptake of electrification.

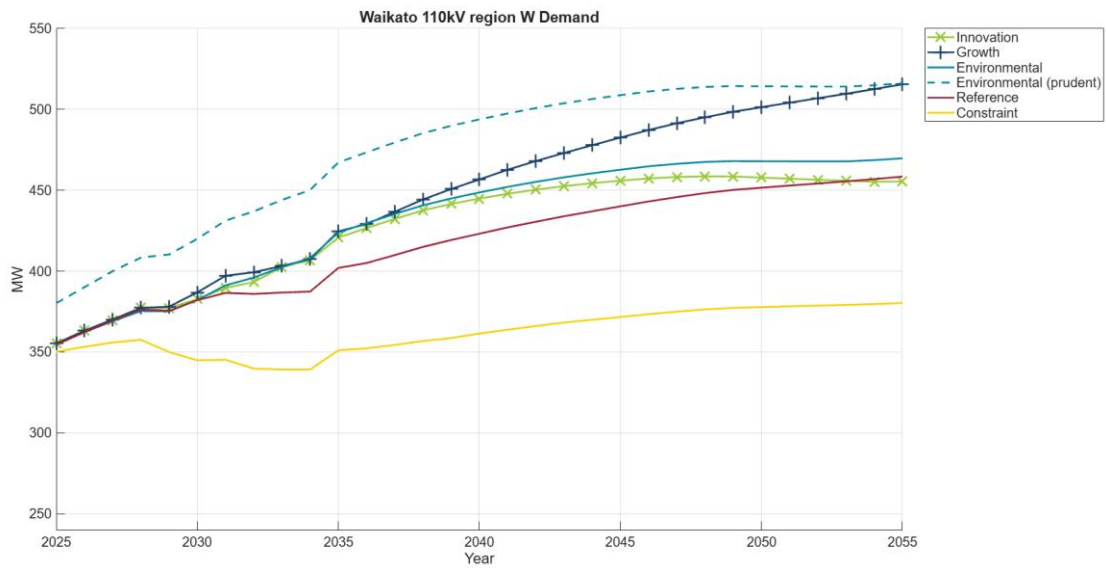


Figure 1: Waikato 110 kV region winter peak load forecast, in MW³

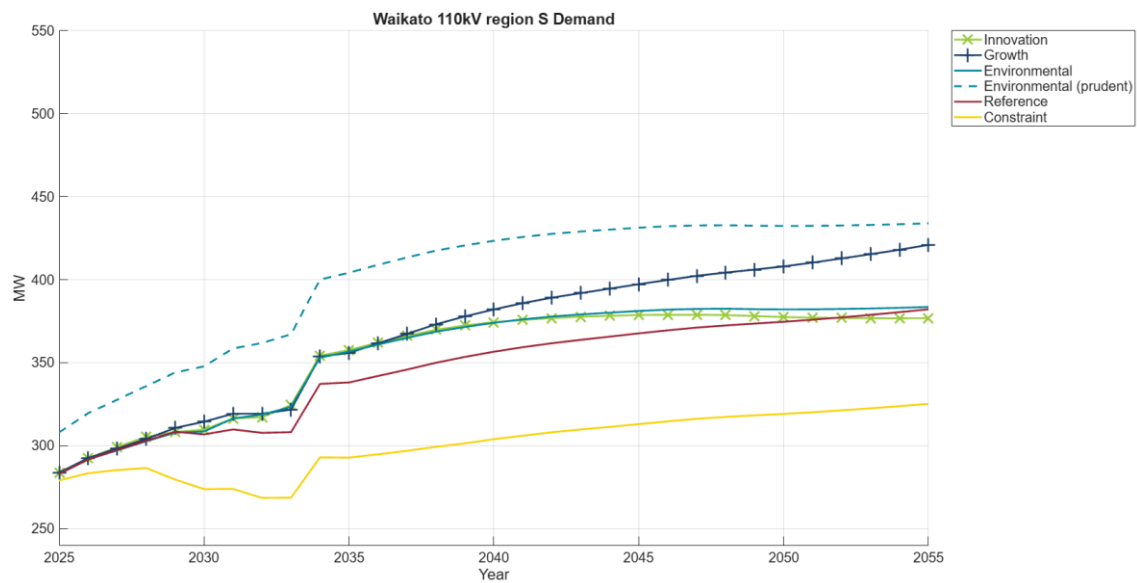


Figure 2: Waikato 110 kV region summer peak load forecast, in MW³

³ The contribution expected from Embedded generation (EG) has been netted off the forecast demand.

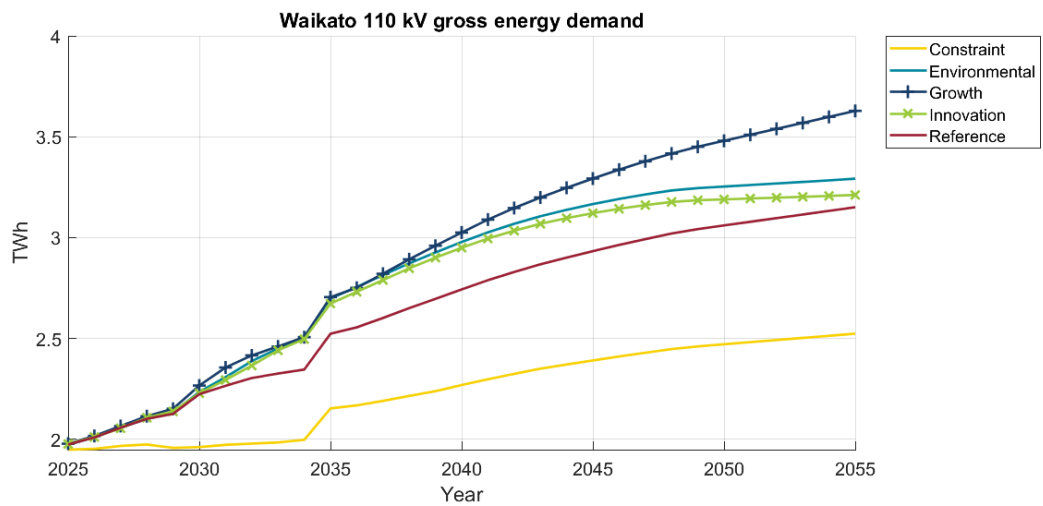


Figure 3: Waikato 110 kV region gross energy demand forecast, in TWh³

Table 1: Waikato 110 kV region winter peak demand forecast, in MW

Scenarios	Year	Peak ⁴	Base	Step loads ^{5,6}	EV	Solar	Battery	Industrial Electrification ⁷
Growth	2030	386.9	377.1	14.8	3.3	-2.2	-1.8	15.1
	2040	456.7	430.6	11.3	16.5	-4.1	-9.8	40.2
	2050	501.3	448.5	11.3	33.1	-5.7	-15.8	58.9
Environmental	2030	382.2	373	14.8	2.6	-2.3	-1.8	10.5
	2040	448.6	410.8	11.3	12.1	-5.2	-12.5	58.3
	2050	467.9	410.8	11.3	22.9	-7.0	-24.5	81.9
Constraint	2030	344.8	367.6	-9.2	2.0	-1.7	-1.7	0.1
	2040	361.4	381.6	-20.0	12.2	-2.5	-6.9	20.4
	2050	377.8	367.8	-20.0	29.4	-2.9	-8.5	35.6

⁴ Embedded generation (EG) has been netted off from peak and base. It is about 9.8MW across all scenarios for all years listed in winter.

⁵ We give the maximum demand of each step load instead of their demand at the time of the Waikato 110 kV peak. This gives a clearer indication of the variation in step loads between scenarios.

⁶ Load shifts from the 110kV to the 220kV network are included in this figure such that it reduces and is negative in some scenarios. Refer to Table 3, Te Awamutu row for details.

⁷ A specific industrial electrification step load has been included as industrial electrification in this table but is listed in the steps table below. Refer to Table 3, Te Awamutu row for details.

Table 2: Waikato 110 kV region summer peak demand forecast, in MW

Scenarios	Year	Peak ⁸	Base	Step loads ⁶	EV	Solar	Battery	Industrial Electrification ⁷
Growth	2030	314.4	299.7	13.3	4.6	-4.4	-1.4	15.1
	2040	382.0	322.8	8.7	20.8	-10.8	-7.1	65.2
	2050	408.0	321.9	8.7	38.2	-11.8	-9.9	78.6
Environmental	2030	308.5	297.3	13.3	3.4	-4.9	-1.5	12.3
	2040	374.0	310.5	8.7	14.4	-11.9	-9.7	79.9
	2050	382.1	300.6	8.7	27.5	-15.0	-18.0	96.7
Constraint	2030	273.8	294	-8.2	2.8	-3.8	-1.3	0.1
	2040	303.9	294.2	-19.0	15.7	-8.0	-5.7	44.7
	2050	319.1	279.2	-19.0	34.4	-7.0	-7.2	57.0

⁸ EG has been netted off from peak and base. It is about 6.2 MW across all scenarios for all years listed in summer.

2.2 Step loads

Table 3: Step loads in the Waikato 110 kV region, in MW

GXP	Year	Constraint	Environmental	Growth
Te Awamutu - Embedded generator decommissioning (2033) - Dairy electrification (10 MW in 2030 in all scenarios except Constraint; 5 MW in 2031 in Growth) - Waikeria Prison loads - Load shift to Hautapu (all scenarios; 12.7 MW in 2030 and 18.5 MW in 2036 and beyond) - Residential development and growth	2030	-10.1	5.3	5.3
	2035	-15.8	-0.5	2.6
Waikino - Industrial 15 MVA load (2029-2032) - Waihi Beach wastewater plant	2030	0.6	7.9	7.9
	2035	0.6	14.4	14.4
Waihou - Industrial dairy (boiler electrification) - Load shift 4 MW from Piako (2025) - Industrial dairy (EV tanker charging)	2030	10.9	12.1	12.1
	2035	10.9	12.1	12.1
Cambridge - Offloading Cambridge to other zone substations fed from Hautapu GXP	2030	-9.9	-9.9	-9.9
	2035	-14.9	-14.8	-14.8
Kopu - Commercial residential and industrial development	2030	0.7	5.1	5.1
	2035	0.7	5.5	5.5
Hamilton 11 kV - University, transport hub, and innovation park - Commercial and residential development - Load shift 5 MW to Hamilton 33 kV (2029)	2030	0.5	2.0	2.0
	2035	0.4	2.0	2.1
Hangatiki 33 kV - EV stations	2030	0.0	1.3	1.3

- Food processing	2035	0.0	1.3	1.4
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3 Generation assumptions

This section presents information relating to the generation assumptions that we are using for this project and identifies any proposed departures from the Assumptions Book v3.0. The Assumptions Book sets out Transpower’s standard modelling assumptions, including those relating to existing, committed and potential generation, plant decommissioning, generation costs, and fuel and carbon prices. We use these assumptions as a starting point and identify any project-specific variations in this attachment. Generation assumptions are aligned across the project’s power system and economic modelling.

The investment need for this project is driven primarily by growth in regional peak demand, the capacity of the Hamilton interconnecting transformers, and the ability of generation within the region to supply that demand under N-1 conditions. The assessment is not materially affected by the location or quantity of future generation elsewhere in New Zealand and therefore only considers generation connected to the Waikato 110 kV network.

3.1 Existing and committed generation

For existing generation, we assume that a combined minimum of 150 MW from Mercury Energy’s Arapuni and Karapiro hydro stations will be available during peak demand periods. This assumption was made based on Mercury Energy’s advice⁹ that 150 MW is an appropriate combined minimum when calculating net peak load on the Waikato 110 kV network. We also include the recently commissioned Lodestone Energy Pāmu Rā ki Whitianga Solar Farm (23.75 MW) and Harmony Energy Tauhei Solar Farms (150 MW). These peak demand periods are expected to occur in winter, around dawn or after sunset, so we assume little or no contribution from the region’s solar generation during these periods.

3.2 Potential generation

Assumptions regarding new generation are based on OptGen generation expansion schedules developed as part of our recent work on the Huntly–Ōtāhuhu A reconductoring project¹⁰. This

⁹ [Mercury submission - Waikato Regional Interconnection Capacity Project.pdf](#)

¹⁰ [Huntly–Ōtāhuhu A reconductoring project | Transpower](#).

project also utilised the 2024 EDGS scenarios and Assumptions Book v3.0 inputs. The generation expansion model determines a capacity expansion plan from these candidate projects based on a least-cost optimisation condition (i.e., the capacity expansion plan provides the lowest cost mix of generation that can meet demand).

The recently consented Piako Solar Farm (Meridian Energy, 110 MW) is the only new generation project within the Waikato 110 kV network identified by OptGen and is assumed to proceed in all scenarios except the Constraint scenario. We have manually included two Waikato 110 kV generation projects that our assessments have indicated are likely to proceed. These projects are outlined below.

Table 4: Additional Waikato generation projects added to each EDGS scenario

Plant	MW	GXP	Scenarios included			Detail
			Constraint	Environ.	Growth	
Waihou BESS	100	Waihou			Y	Harmony Energy Waihou BESS 2030
Hinuera Solar/BESS	68/68	Hinuera			Y	Harmony Energy Hybrid Solar/BESS 2032

Q5. Do you consider our demand and generation assumptions appropriate for this investigation?

Q6. Are you aware of any additional information that could materially affect our electricity demand forecast or generation assumptions?

Q7. Do you agree with our proposal to use the Assumptions Book v3.0 variations as the basis for the investigation’s generation scenarios?

