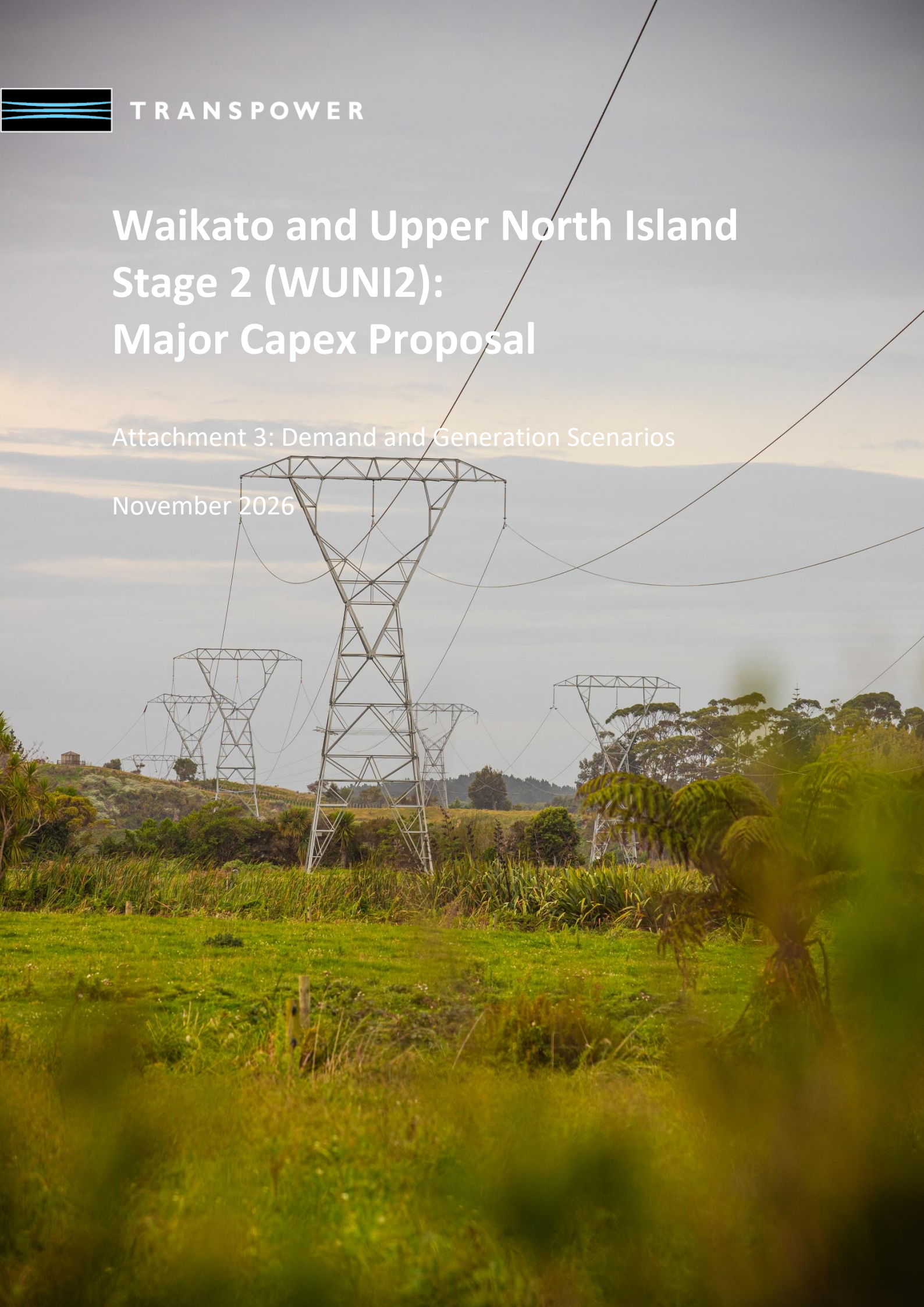


TRANSPOWER

Waikato and Upper North Island Stage 2 (WUNI2): Major Capex Proposal

Attachment 3: Demand and Generation Scenarios

November 2026

Purpose

This Attachment forms part of our Waikato and Upper North Island (**WUNI**) Stage 2 Major Capex Proposal (**MCP**).

The purpose of this Attachment is to provide an overview of the demand and generation scenarios that we have used for our project analysis and application of the investment test in Schedule D of the Capex IM[1] (**Investment Test**). To undertake the Investment Test, we must make assumptions about the future demand and generation in the WUNI region, which drive the need for investment. This Attachment outlines the key demand and generation assumptions underpinning our analysis.

[1] Commission, Transpower Capital Expenditure Input Methodology [2012] NZCC 2

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1 Approach to developing demand and generation scenarios

For investments required to meet the deterministic limb of the grid reliability standards (**GRS**)[2] we use demand and generation scenarios in two ways:

- To set the timing of investment. For example, we use a demand scenario to determine when investment is needed to maintain the N-1 reliability standard set out the GRS.
- To apply the Investment Test. The Investment Test is an economic cost-benefit analysis that requires assumptions to be made about future demand growth and new generation.

We are required to use the market development scenarios produced by the Ministry of Business, Innovation and Employment (**MBIE**) or reasonable variations of those scenarios in our analysis. MBIE's market development scenarios are called the Electricity Demand and Generation Scenarios (**EDGS**).[3] They are updated periodically, most recently in 2019 and 2024.

A market development scenario is an internally consistent set of inputs and assumptions that represents a plausible future of the electricity system. Using market development scenarios ensures that our economic analysis considers a range of different demand and generation futures.

A market development scenario includes assumptions about:

- future electricity demand, including assumptions regarding base demand, electric vehicle (**EV**) uptake, solar PV uptake and distributed energy storage
- existing, decommissioned and future new generation connected to the national grid
- capital and operating costs for both existing and future generation assets
- fuel costs for generation
- fuel and carbon costs associated with generation
- grid-connected energy storage solutions.

Selected Scenarios

To simplify the modelling while using a wide range of demand and generation inputs, we have used three of MBIE's five 2024 EDGS:

- **Reference:** Current trends continue
- **Growth**: Higher economic growth
- **Environmental:** More ambitious reductions in emissions.

We consider three scenarios are sufficient for this project.[4] Consistent with prior investigations and the short list consultation, we have not considered the Constraint scenario due to its very low level of demand growth (in the 2019 EDGS the lowest scenario was labelled as 'Global'). We have also

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2 The deterministic limb of the GRS requires Transpower to maintain at least an N-1 reliability on the core grid.

3 MBIE: Electricity Demand and Generation Scenarios (EDGS)

4 These three scenarios have been used in the Investment Test. For the investment timing, the prudent version of the Environmental scenario has been used. The approach to derive the prudent forecast is explained on page 16.

omitted the Innovation scenario, as it is within the demand growth range of the three selected scenarios in the long run so does not provide additional insights.

Transition from the 2019 to 2024 EDGS

Our analysis has used both the 2024 and 2019 EDGS with several updates and variations. In the short list consultation for Stage 2 of the WUNI Upgrade major capex project (**Stage 2**),[5] we based our analysis on the 2019 EDGS. Due to feedback received in the consultation and continuous work on updating our demand forecast, we decided to update some of our analysis using the 2024 EDGS, including the need dates for investment so that this is based on the latest available forecast. Benefits modelling also utilises the updated demand forecasts, as explained in section 2.1.

Section 2 presents the demand forecasts we have used for this investigation. Section 3 presents our generation assumptions.

[5] Transpower: Waikato and upper North Island (WUNI) stage 2 project short-list consultation

2 Demand Assumptions

2.1 Use of demand forecasts

As mentioned above, for this MCP we have updated some aspects of the short list analysis (which used the 2019 EDGS variations) to use new demand forecasts based on the 2024 EDGS.

The short list consultation for Stage 2 presented a considerable amount of analysis – both technical system studies and economic studies. Rather than repeat all the analysis for the updated demand forecasts, we focused on updating aspects of the analysis that would be most sensitive to new assumptions about demand. As such we:

- Updated the short-listed grid development plans to reflect updated assumptions about generation availability but continued to leverage and use the peak load forecast we consulted on as part of the short list consultation;
- Updated the benefit modelling to use the 2024 EDGS variations, incorporating 2025 electricity distribution business (**EDB**) information on expected step changes in demand. At the time the benefit modelling began, this was the latest version of the forecast;
- Updated the need dates included in this MCP to reflect the 2024 EDGS variations with 2026 EDB information on expected step changes in demand. This is the most recent available forecast version.

In this way, we have sought to leverage the latest information in the most efficient manner possible.

Below we provide more detail regarding the 2024 EDGS forecasts with 2026 step load information. Details of the forecasts associated with the short list development plans are available from the short list consultation material.

2.2 EDGS 2024 regional forecasts and assumptions

This subsection provides a brief overview of the demand forecast and assumptions for the WUNI region.

Forecast Overview

Figure 1 and Figure 2 present our peak load and energy demand forecasts, respectively, for the WUNI region for each scenario. Table 1 and Table 2 present the summer and winter peak forecasts in 2030, 2040 and 2050 (note that we only present snapshot years in these tables even though the forecast modelling is done for each year out to 2055), broken down by the factors contributing to the growth:

- Base growth – the underlying growth in demand driven by factors such as population and economic growth
- Step loads – new demand that might appear from new developments, such as new commercial and residential 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
- Electrification – the electrification of industrial processes such as the conversion of coal and diesel boilers to electric boilers.

Each scenario has different assumptions for each of these factors, leading to the overall variation in the forecasts. The methodology we have employed to model these components is like that used in recent MCPs such as the Upper South Island upgrade project and the HVDC Link Upgrade Programme. The modelling details of these components are presented and explained in the following sections.

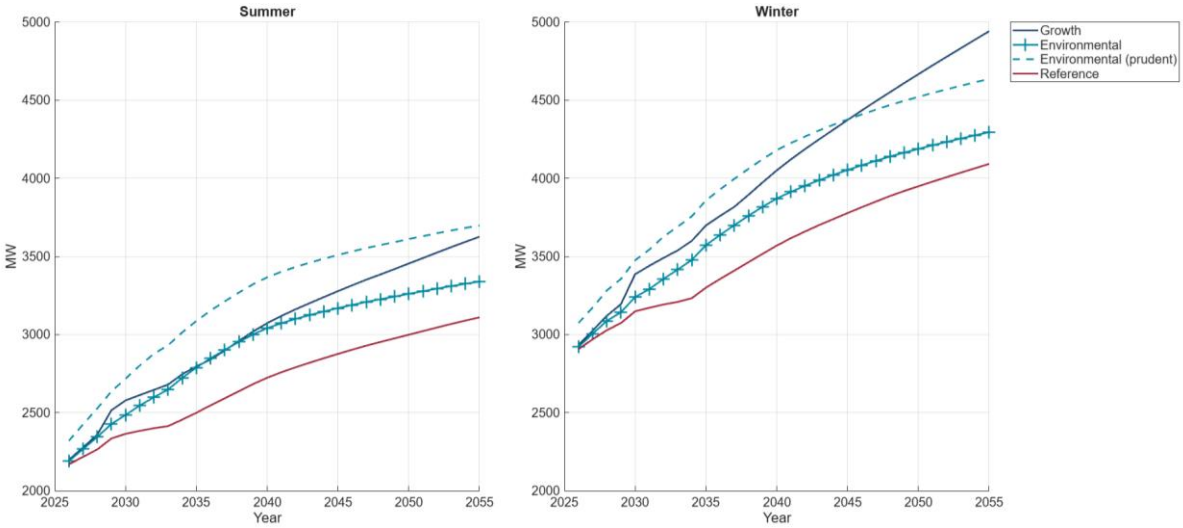


Figure 1: Annual WUNI gross peak load forecast – summer and winter, in MW[6]

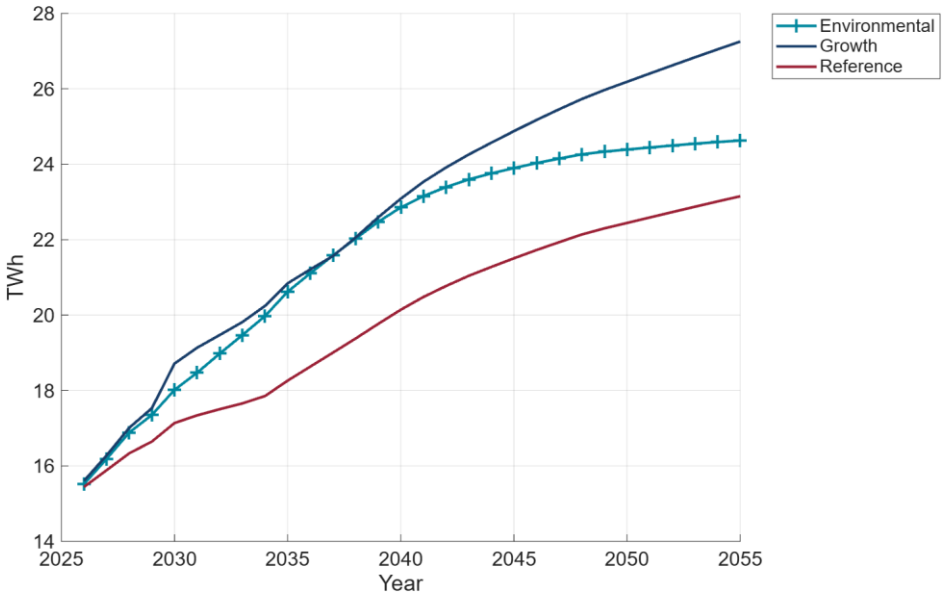


Figure 2: Annual WUNI gross energy forecast, in TWh

[6] The peak load charts (Figure 1) show the prudent Environmental scenario which is used for assessing the investment need dates. The prudent component is only derived for the annual peak load, not for the annual energy which reflects an expected consumption profile across the year, hence it is not displayed in Figure 2.

Table 1: WUNI winter demand forecast assumptions, in MW

Scenarios	Year	Peak	Base	Step loads[7]	EV	Solar[8]	Battery	Electrifi-cation[9]	Data centre
Environmental	2030	3239.5	2865.7	159.3	21.2	0.0	-24.4	41.6	226.7
	2040	3870.5	3046.5	233.8	109.7	0.0	-109.0	327.5	350.7
	2050	4188.1	3220.2	235.9	204.2	-0.2	-252.6	530.5	350.7
Growth	2030	3386.0	2928.4	160.1	27.6	0.0	-25.6	123.3	226.7
	2040	4050.8	3306.1	234.6	154.3	0.0	-117.1	212.2	350.7
	2050	4666.3	3745.1	236.7	304.5	0.0	-232.0	362.0	350.7
Reference	2030	3148.5	2886.1	132.0	20.7	0.0	-19.7	41.6	113.8
	2040	3569.3	3012.7	204.4	134.5	0.0	-64.4	155.4	175.8
	2050	3949.0	3181.4	206.5	285.8	0.0	-138.7	296.8	175.8

Table 2: WUNI summer demand forecast assumptions, in MW

Scenarios	Year	Peak	Base	Step loads	EV	Solar	Battery	Electrifi-cation	Data centre
Environmental	2030	2485.0	2160.4	132.4	23.4	-36.5	-22.4	51.2	165.3
	2040	3040.8	2262.1	197.0	122.5	-29.5	-107.1	319.8	251.6
	2050	3260.5	2337.7	198.2	232.3	-20.6	-235.7	480.6	251.6
Growth	2030	2578.1	2184.0	133.0	30.0	-36.5	-23.2	123.3	165.3
	2040	3072.5	2366.7	197.7	164.4	-35.4	-108.5	219.7	251.6
	2050	3454.6	2569.4	198.9	320.7	-35.8	-205.6	344.1	251.6
Reference	2030	2364.2	2159.1	108.0	23.3	-32.6	-17.0	41.3	83.1
	2040	2723.3	2214.4	169.4	142.2	-31.5	-60.3	159.0	126.3
	2050	2998.8	2281.3	170.6	295.8	-26.8	-124.6	277.0	126.3

Base demand

Base level demand is underlying demand plus increases we expect to occur from factors such as economic and population growth.

We model base demand by combining national and island level base demand energy forecasts informed by the 2024 EDGS, with GXP level peak base demand forecasts from EDBs. We use a reconciliation approach where we develop half-hourly GXP demand profiles that sum nationally and by island to align with national and island level EDGS base demand forecasts. This approach ensures that the aggregated demand profiles are consistent with the national and island levels, while also maintaining strong alignment with GXP-level forecasts. GXP-level forecasts provided by EDBs are

7 The numbers presented here are the maximum demand of each step load, rather than their demand at the time of WUNI peak. This gives a clearer indication of the variation in step loads between scenarios.

8 The solar contribution to the peak is generally zero in winter due to an evening peak except for a small part of the forecast when the peak moves earlier in the day.

9 Includes dairy electrification.

given higher weighting in the reconciliation process in early years to place higher value on nearer term information from EDBs. Modelling demand profiles is important as factors such as EV charging and residential/commercial battery use will have a significant impact on future peak demand.

Figure 3 shows the resulting base peak demand forecasts for the WUNI region. The high base growth in the Growth scenario reflects high economic and population growth assumptions from MBIE.[10] Overall, the growth of the base peak is modest, with 0.6-1.3% compound annual growth rate (CAGR) from 2026 to 2055. Additional growth comes from customer steps and our scenario uptake assumptions of process heat and EVs as discussed below.

Table 3: Base CAGR from 2026 by scenario

	Environmental	Growth	Reference
2030	0.8%	1.2%	0.8%
2040	0.7%	1.3%	0.6%
2050	0.6%	1.2%	0.6%

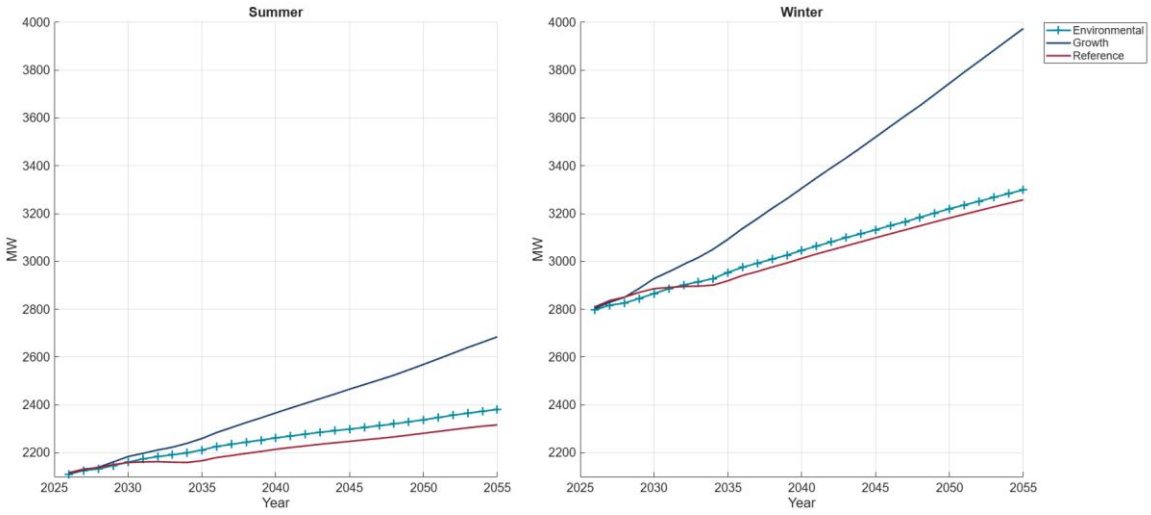


Figure 3: Base peak demand growth for the WUNI region, in MW

Step loads

New step loads are expected to play a major role in driving growth in the region over the next 10 years. These are new developments expected to occur in the region that will lead to a step increase in electricity demand. Table 1 shows that step loads contribute up to 240 MW to peak load growth by 2040, with datacentres contributing an additional up to 350 MW by 2040.

We model step changes by assigning a half-hourly demand profile to each step change based on the type of demand expected (e.g., industrial, residential) and then scaling so that the peak of the profile

[10] Electricity Demand and Generation Scenarios: Results summary July 2024 p11, Table 1. The spread of our total electricity demand by scenario is similar to MBIE's result in p39, Figure 22.

aligns with the expected peak demand of the step load. We then add this profile to the existing forecast demand at the GXP where the step is expected.

The step load information was primarily collected from EDBs and industrial companies as part of the preparation of the 2026 Transmission Planning Report. This information contained information about the size, profile and likelihood of the step change. Each step load is given a half-hourly profile consistent with the type of load and expected consumption pattern. We vary the inclusion of the step loads in each scenario based on the information we receive about its likelihood. Step loads with a probability above 60% are included in the Reference scenario, steps with a probability above 50% in the Environmental scenario, and steps with a probability above 40% in the Growth scenario.

Where a step load appears to be also captured in another modelled component (e.g., process heat) we reduce the other modelled component by the size of the step change to reduce the chance of double counting.

Table 4 lists the major new developments in the region we are aware of and have incorporated into our scenarios.

Table 4: Step loads in the WUNI region

Step load	GXP	Scenarios added
Various data centre loads	Henderson, Silverdale, Takanini, Albany 33 kV, Penrose 33 kV	Environmental & Growth; partially in Reference
Electric furnace commissioning	Glenbrook 33 kV (NZ Steel load only), Glenbrook - NZ Steel load and gen	All scenarios
Tainui Group Holdings development in Ruakura	Hamilton 33 kV	All scenarios
Fonterra TA generator decommissioning	Te Awamutu	Environmental & Growth
Various industrial development in Auckland	Mangere 33 kV, Pakuranga, Wiri	All scenarios
Various E-transport developments in Auckland	Liverpool Street, Hobson Street, Wairau Road, Mangere 33 kV, Pakuranga, Henderson, Takanini, Mt Roskill 22 kV	All scenarios
Various commercial development in Auckland	Penrose 33 kV, Liverpool Street, Hobson Street	All scenarios
New residential – council plan	Bombay 110 kV	All scenarios
Various industrial development in Waikato	Kopu, Waikino	All scenarios
Reswax Awanui - Stage 1 - 3	Kaikohe 110 kV	Environmental & Growth
KiwiRail development	Southdown 25 kV, Penrose 25 kV	All scenarios
IDF Developments, Subdivision, Purerua - stages 1 - 5	Kaikohe 110 kV	Environmental & Growth
Kaipaki 2	Cambridge	All scenarios
Pencarrow 2	Cambridge	All scenarios

Figure 4 and Figure 5 show the maximum demand each step load can contribute to the WUNI peak demand from non-datacentre and datacentre, respectively. Environmental and Growth peak have the same step contribution from datacentre and non-datacentre load. The actual step contribution to the WUNI peak is less, due to the nature of modelling the step loads using profiles.

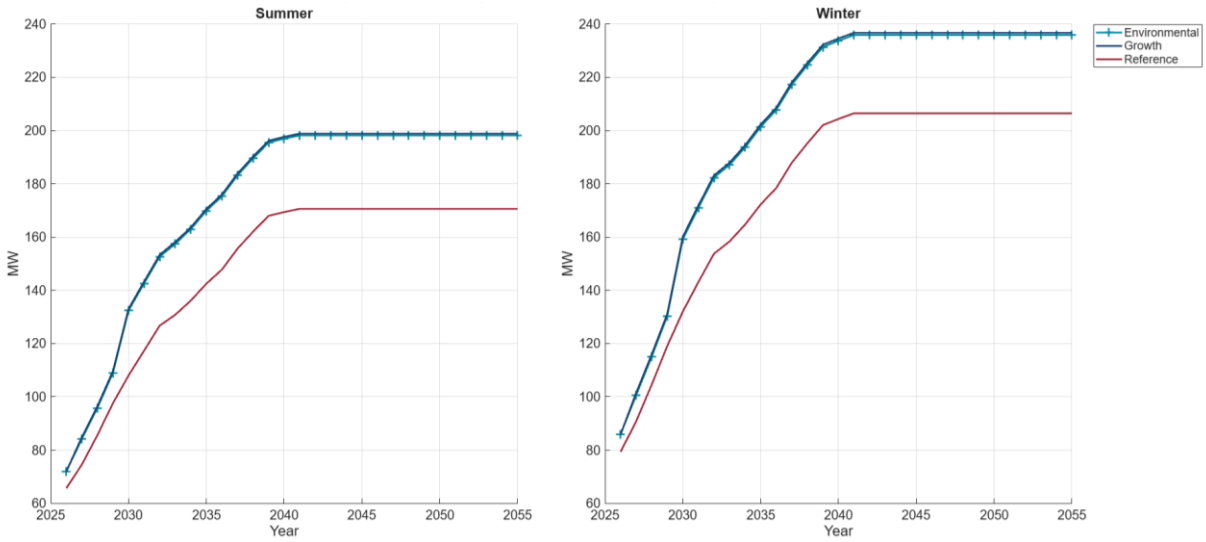


Figure 4: Peak contribution of non-datacentre step loads, in MW

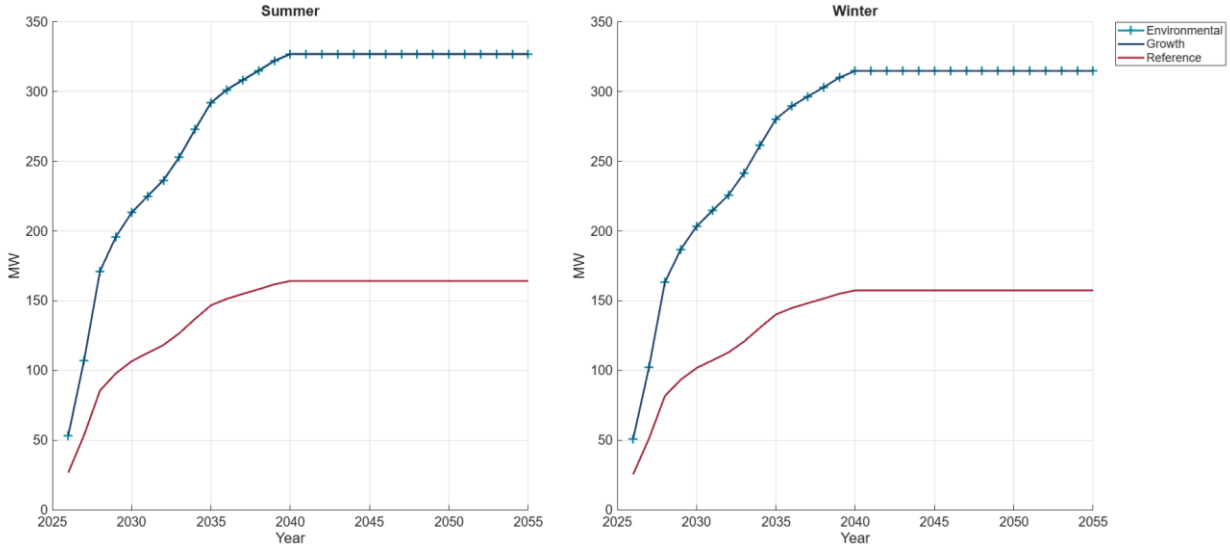


Figure 5: Peak contribution of datacentre step loads, in MW

Electric vehicles

We have aligned our national EV assumptions closely with the 2024 EDGS. We model the impact of EVs by first adopting the assumed national uptake rates of EVs (broken into light, and heavy categories) as given by each 2024 EDGS scenario. National uptake rates are then allocated at a regional level using the light passenger vehicle kilometres travelled in each region, and at a GXP level using the number of relevant installation control points (**ICPs**) behind each GXP. In Table 5 we show the approximate number of EVs across each scenario in the WUNI region.

Table 5: Approximate number of EVs contributing to WUNI demand, by scenario and year[11]

	Environmental	Growth	Reference
2030	148,200	160,100	105,700
2040	868,600	979,600	726,700
2050	1,648,000	1,947,900	1,543,900

For peak demand forecasts, it is also critical to make assumptions about when EVs will be charged. We model the timing of EV charging by assuming some proportion of EVs have a fixed profile (e.g., they tend to charge after work or when it is convenient) and the remaining proportion have a "smart" profile, and charge in a way that avoids regional peaks. In our demand forecasting models, the charging of "smart" EVs is moved to avoid peak periods. In this way, "smartness" reduces the growth of our peak demand forecasts.

We have aligned our "smartness" assumptions with the 2024 EDGS scenario assumptions. The high, medium and moderate smartness of Environmental, Growth and Reference reflect the fast uptake, reference and base scenario MBIE uses for the three scenarios[12]. Table 6 summarises the "smartness" assumptions for all scenarios.

Table 6: EV smartness assumptions, by scenario, by 2050[13]

	Environmental	Growth	Reference
Proportion smart charging	60%	50%	40%

Figure 6 and Figure 7 show the resulting megawatt contribution that fixed and smart EV charging each make to the WUNI peak demand. As is demonstrated, "smart" EV charging is very effective in avoiding peak periods, with a contribution of less than 30 MW under all scenarios. Note that in Figure 7 the amount of smart charging at the time of peak flattens towards 2050 in winter. This is due to the dynamic nature of how smart EVs are modelled and the time of the WUNI peak moving. That is, the peak time is moving to a time during the day that has relatively less smart charging.

11 Assuming each EV travels an average of 12,000 km annually, and has an efficiency of 0.19 kWh/km

12 Electricity Demand and Generation Scenarios: Results summary July 2024 p15 Table 2.

13 NZGP1 Scenarios Update December 2021

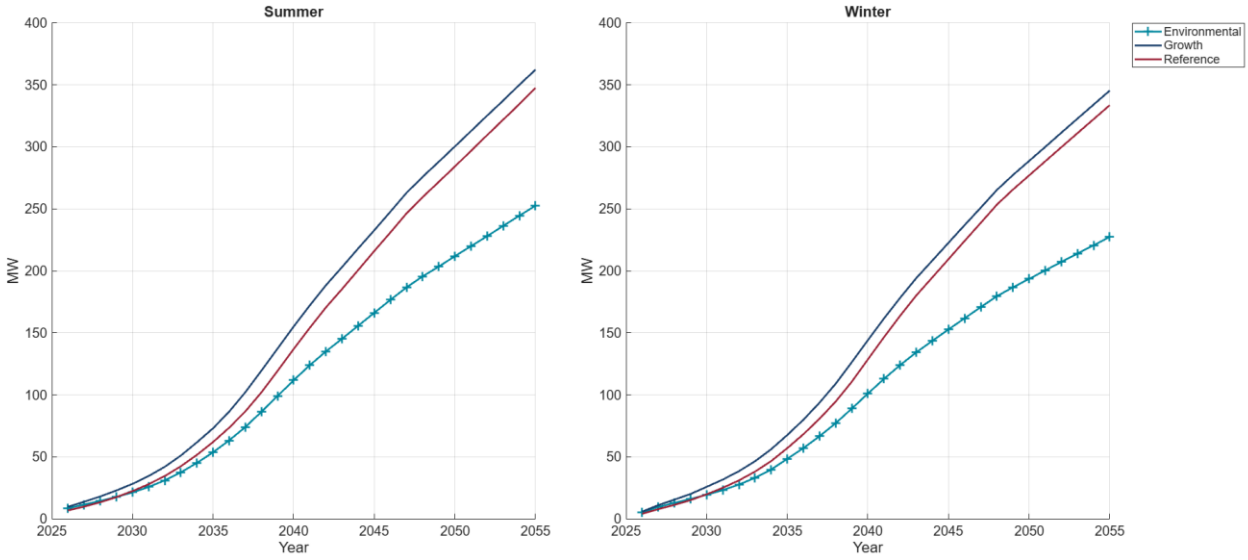


Figure 6: Peak contribution of fixed electric vehicle charging, in MW

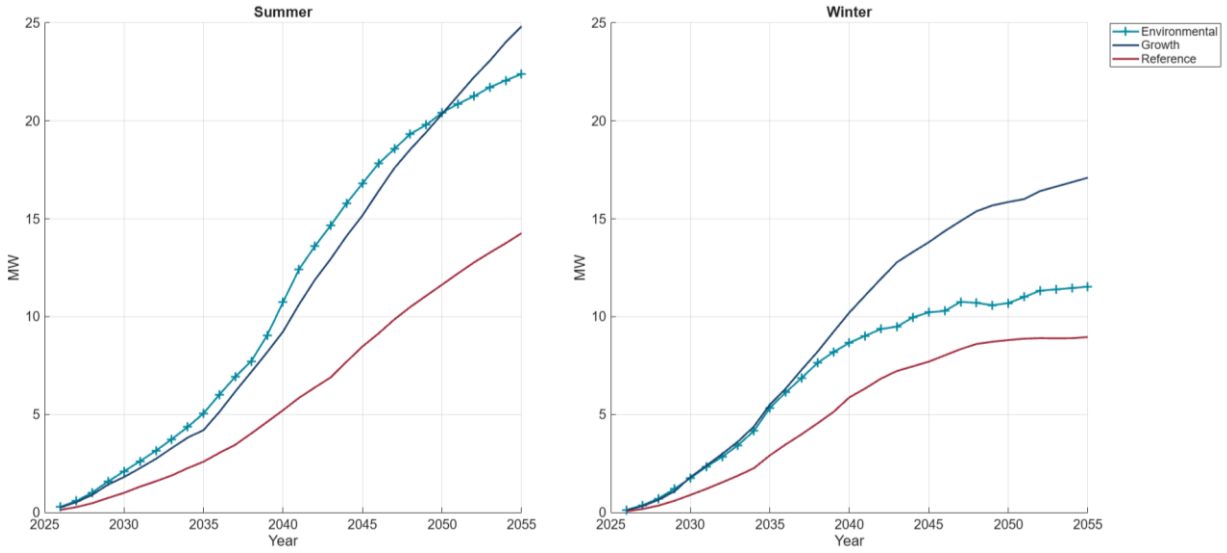


Figure 7: Peak contribution of smart electric vehicle charging, in MW

Solar uptake

We have increased the national level of solar uptake in the scenarios from that given in the 2024 EDGS to reflect:

- the strong uptake in distributed solar evidenced in the Electricity Authority's EMI data.
- our Te Kanapu[14] work that had much higher levels of distributed solar.

Increasing the amount of solar uptake has had the effect of reducing the electricity demand served from the grid.

14 Developing the Grid Blueprint | Transpower

We allocate the national uptake rates to a GXP level using the number of ICPs behind each GXP and the solar propensities for each region. In Table 7 we give the number of solar installations in the WUNI region for each scenario.

Table 7: Approximate number of solar installations in the WUNI region, by scenario and year

	Environmental	Growth	Reference
2030	46,200	46,000	41,300
2040	124,900	117,100	92,400
2050	232,300	180,100	158,800

We use solar irradiance data at a regional and hourly level to estimate the amount of solar generation that is being produced at a half-hourly level.

Figure 8 shows the contribution of new residential/commercial solar installations to WUNI energy demand. Note that solar generated electricity reduces the amount of electricity needing to be supplied to the GXPs (i.e., solar uptake reduces demand forecasts during the times of day it can produce electricity). As shown in Table 1, solar output reduces the winter peak by only a very small amount as peak demand tends to be at night.

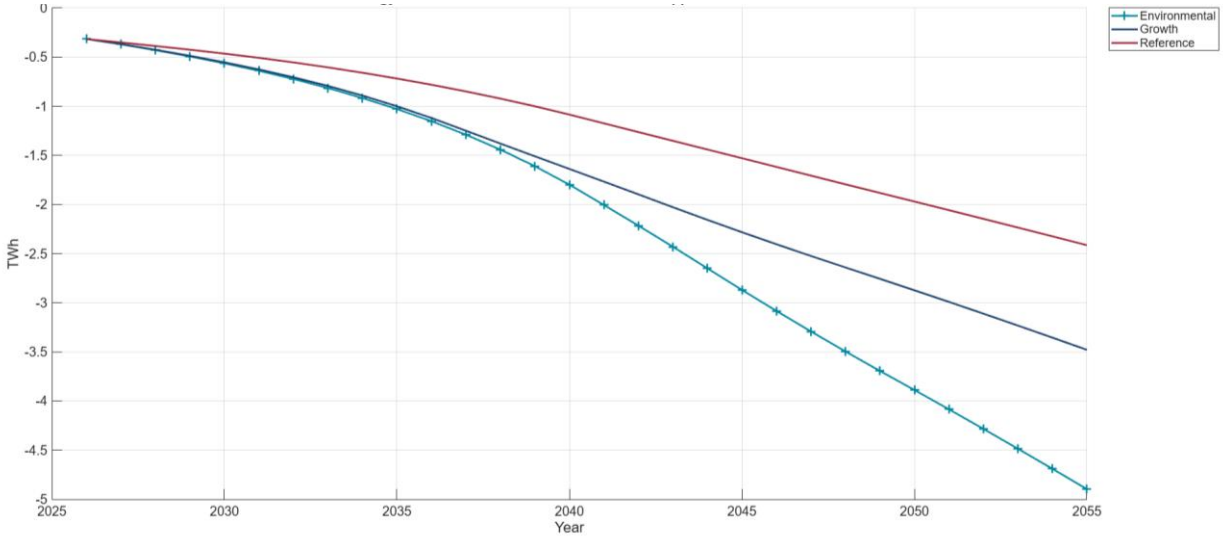


Figure 8: Distributed solar generation (negative contribution to WUNI energy demand), in TWh

Battery uptake

We have associated battery uptake with a percentage of solar uptake, as shown in Table 8. We assume that the battery allocation at a GXP is the same as the solar allocation. We also assume that a small fraction of EV battery capacity is available to reduce peak demand. In Table 9 we show the number of batteries in the WUNI region for each scenario. The total amount of storage available for peak shaving from each installation starts at around 14.2kWh and saturates at the values given in Table 8.

Table 8: Battery installation proportion, by scenario, by 2050

	Environmental	Growth	Reference
Proportion solar installation with battery	55%	60%	40%
Battery capacity per installation (kWh)	22.2	21.2	20.9

Table 9: Approximate number of battery installations in the WUNI region, by scenario and year

	Environmental	Growth	Reference
2030	15,700	16,400	13,400
2040	53,800	58,100	33,500
2050	100,500	93,400	57,300

We assume batteries are charged in trough periods and discharged in peak periods in such a way as to reduce the overall peak demand. In our modelling, batteries are assumed to reduce the daily peak load at a GXP.

Figure 9 shows the resultant contribution of new residential/commercial batteries to the WUNI region peak demand.

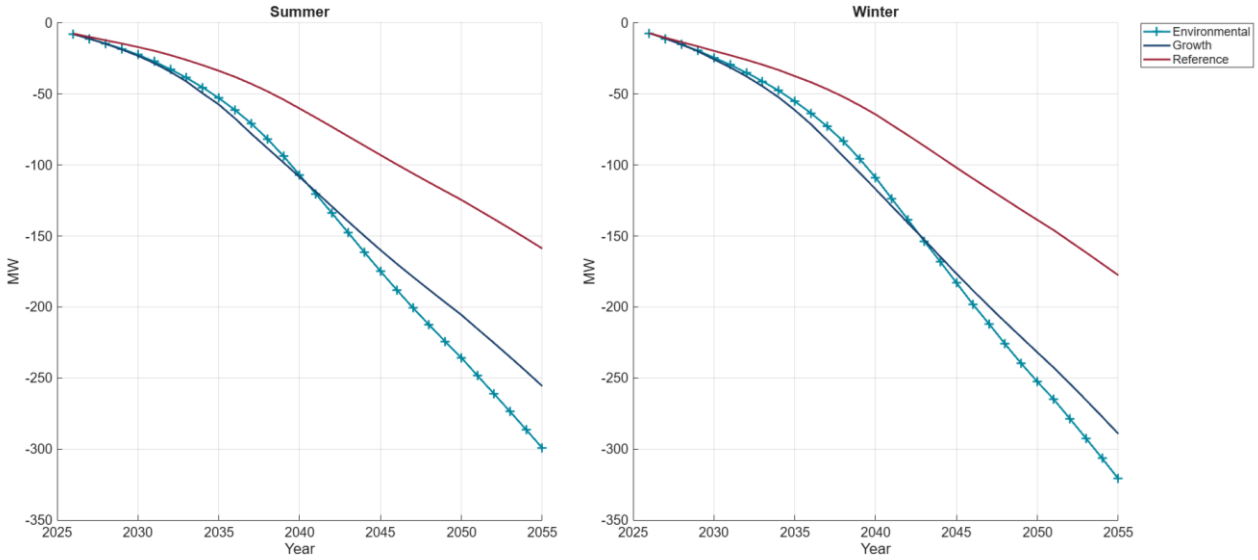


Figure 9: Peak contribution of distributed batteries discharging, in MW

Process heat

We have reduced the speed of process heat electrification from that in the 2024 EDGS. The 2024 EDGS has a significant acceleration in process heat electrification in the early 2030s. This was driven by the assumed s-curves growth pattern of heat electrification. This resulted in very high levels of nearer term growth. We have flattened the uptake to be more linear but have retained the longer-term level of heat electrification with our scenarios growing to similar levels by 2055. We have made

this change so that nearer term growth is driven more by known process heat electrification step loads than underlying assumptions about the shape of s-curves.

We model heat electrification by allocating national totals for different temperature heat electrification to a region using data on energy use by sector, fuel type and technology. We allocate the heat load at a GXP level using boiler databases, knowledge of major plants on the grid and by identifying any step loads which are electrifying process heat.

Figure 10 shows the resultant contribution of new process heat electrification to the WUNI peak demand.

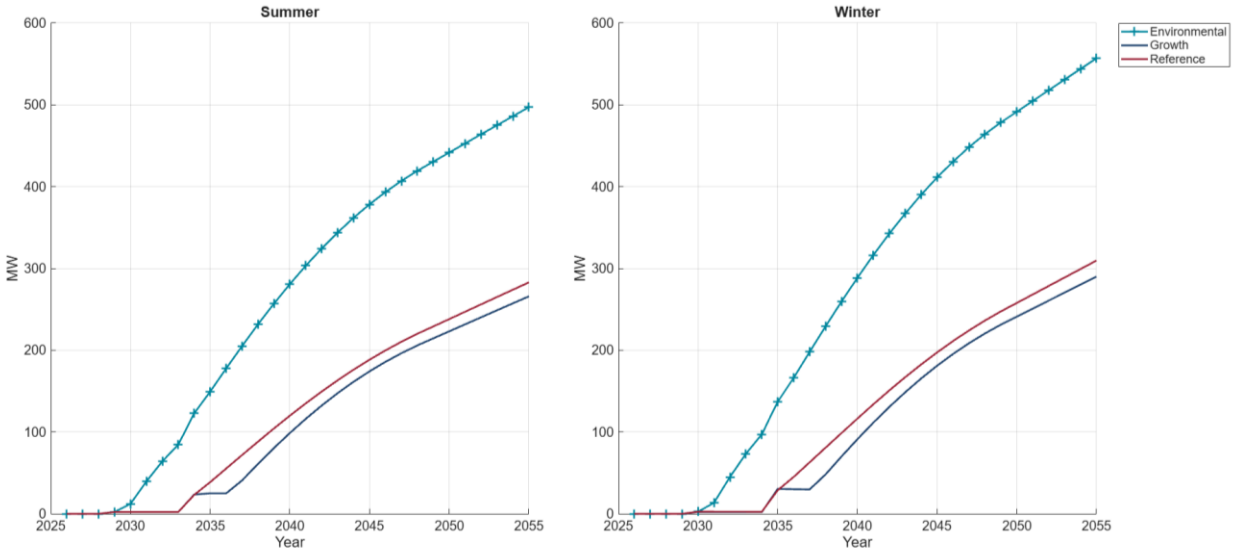


Figure 10: Peak contribution of electrified process heat, in MW

Prudent forecast

As a prudent asset manager, we want to invest in a timely manner to ensure we can supply demand in all but the most unusual circumstances. While the forecasts outlined above take account of many of the potential drivers of growth in the WUNI region, they do not account for the potential for peak demand to be high due to an unusual event, such as a cold weather event.

To address this concern, we have produced a prudent forecast by adding a prudent component to the Environmental forecast outlined above. We have used this forecast to inform our investment timing only, while in the investment test, the expected forecast scenarios are used.

To derive the prudent component, we have:

- Used regression analysis to regress historical peak demand against time.
- Determined the expected value and regression statistics associated with the variance of the regression fit.
- Calculated the ratio of the expected value to the 10% probability of exceedance value.
- Applied the ratio to the Environmental forecast.

We have based the prudent forecast on the Environmental scenario. It includes step loads with a 50% or greater likelihood of occurring and higher levels of electrification but equally has high levels of solar and battery uptake that tends to put downwards pressure on the forecast in the longer-

term. We consider that it represents a reasonable central scenario on which to add a prudent component to inform the timing of investment.

This is illustrated in Figure 11. The prudent component adds 5% to the peak load in 2026 growing to 7% in 2030 reflecting the greater level of uncertainty further into the future.

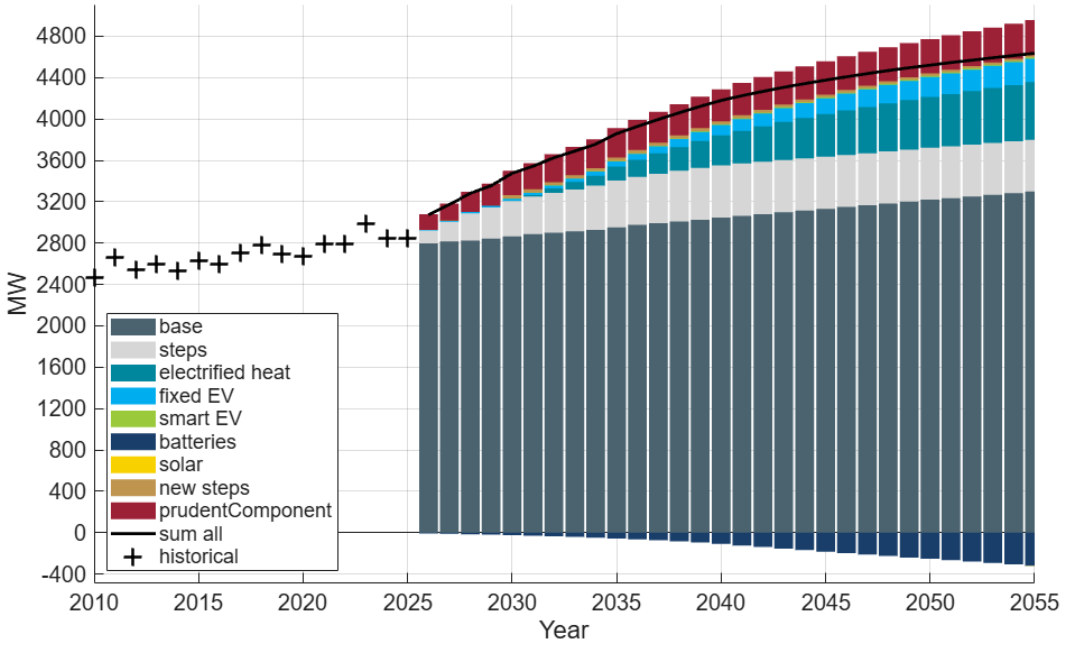


Figure 11: Prudent Environmental planning forecast broken down by component, in MW

2.3 Updates to the 2024 EDGS

As referred to above, our forecasts are largely based on the 2024 EDGS assumptions with some variations that include:

- 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;
- We have made updates to reflect EDBs' expectations of base demand growth and new step loads;
- We have increased the amount of distributed solar and batteries in the scenarios to be consistent with recent higher levels of uptake and longer-term views from our Te Kanapu project;
- We have moderated the speed of process heat electrification.

We consider these variations are reasonable and defendable. A national level comparison of our 2024 EDGS variations with the 2024 EDGS is provided in Appendix B.

2.4 GXP forecasts

More detailed information relating to the forecasts assumed at each GXP in the WUNI region is provided in the accompanying spreadsheet.

3 Generation assumptions

This section presents information relating to the generation assumptions used in the benefit modelling detailed in Attachment 7.

3.1 Basis of our assumptions

We have based our generation assumptions on the BBC Assumptions Book v3.0 (**Assumptions Book**)[15] with some variations as listed in Appendix C.

3.2 Existing and committed generation

The WUNI region has over 3.4 GW of existing and committed generation capacity, with over 75% located in the Waikato region. The distribution of this generation in June 2026 is shown in Figure 12. We assume that most existing and committed generation will continue operating throughout the period covered by this study. The exceptions are the generating plants expected to retire. Thermal retirement dates vary by EDGS scenario, as detailed in Section 2.3.4.9 of the Assumptions Book.

Existing generation is assumed to be available from the start of the study period in 2025. Committed generation projects are assumed to begin operating according to their publicly reported development schedules, with expected commissioning dates between 2025 and 2028. The criteria used to classify a project as committed are set out in the Assumptions Book. These projects are listed in Table 10. Several of the projects listed in that table have been classified as committed since the Assumptions Book was finalised. Variations from the Assumptions Book are in Appendix C.

Note that the generation assumptions in this part of the analysis differ slightly from the assumptions used for assessing the investment need as laid out in Attachment 2. The benefit modelling, based on the assumptions presented here, is relevant for the calculation period which starts after the commissioning of the last asset in Stage 2.

[15] Assumptions Book | Transpower. The Assumptions Book is relevant to calculating and adjusting benefit-based charge allocations under the transmission pricing methodology (**TPM**) and is not binding in the Investment Test context. However, the Assumptions Book contains some useful modelling inputs and assumptions we choose to use in the Investment Test to maximise consistency between the calculation of electricity market benefits (in the Investment Test) and net private benefits (under the TPM).

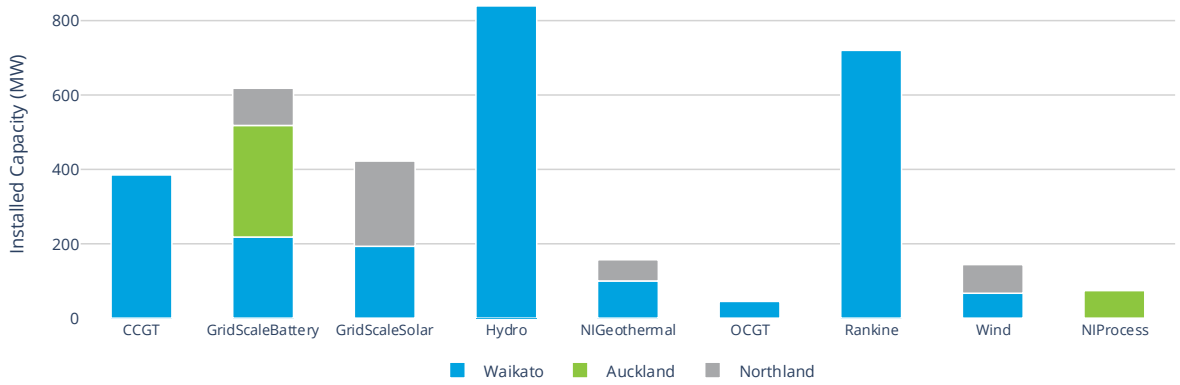


Figure 12: Committed and existing generation per technology in the WUNI region

Below we list generation that we have considered as committed for the purposes of completing the benefit modelling for the investment options.

Table 10: Modelled WUNI committed generation

Type	Modelled Transmission Node[16]	Name	Capacity (MW)	Year
GridScaleBattery	BRB220	Ruakaka	100	2025
GridScaleSolar	KOE110	S_TwinRivers	24	2025
GridScaleSolar	HLY220	S_Taiohi	22.4	2025
GridScaleSolar	MTO110A	S_GoldenStai	17.6	2025
GridScaleSolar	KOE110	S_Pukenui	19.5	2025
GridScaleBattery	HLY220	HLY_BESS	102.1	2026
GridScaleBattery	GLN220	GLN_BESS	100	2026
GridScaleSolar	WHU110	S_Tauhei_s2	147	2026
GridScaleSolar	KPU066	S_Whitianga	23.8	2026
Wind	MPE110	W_Kaiwaikawe	77	2026
GridScaleBattery	HLY220	HLY_BESS_s2	100	2027
GridScaleBattery	GLN220	GLN_BESS_s2	200	2027
GridScaleSolar	BRB220	S_Ruakaka	130	2027
GridScaleSolar	DVK110A	S_Dannevirk1	17	2027
GridScaleSolar	EDG110	S_Tihori	115	2027
GridScaleSolar	WPW110A	S_Ongaonga0	26.1	2027
GridScaleSolar	BPE110	S_Tahuna	20	2028
GridScaleSolar	HPI220	S_Glorit	150	2028
Wind	WPR066	W_MtCass	94.6	2028
Wind	KPI110	W_Kapuni	24	2028

[16] We model the AC transmission network down to 66 kV in SDDP (the software we use for generation dispatch simulation). Generation which connects below this level is represented at a nearby model node.

3.3 Future generation

The WUNI region has significant potential for the development of different generation projects. The potential generation projects in our stack are listed in the Assumptions Book.

Attachment 7 provides more details of how we have used the generation stack to produce generation expansion plans and then modelled the dispatch of generation to calculate the market benefits associated with the investment options.

Appendix A: National Demand Forecasts

While the focus of this investigation is on the WUNI region, we have developed a full set of forecasts for the rest of New Zealand.

Figure 13 and Figure 14 present national demand forecasts consistent with the model runs we used to create the Stage 2 forecasts. As noted above, the Environmental (prudent) component of the forecast has been used in connection with establishing investment need dates. The prudent component is only derived for the annual peak load, not for the annual energy which reflects an expected consumption profile across the year, hence it is only shown in Figure 13 and not in Figure 14.

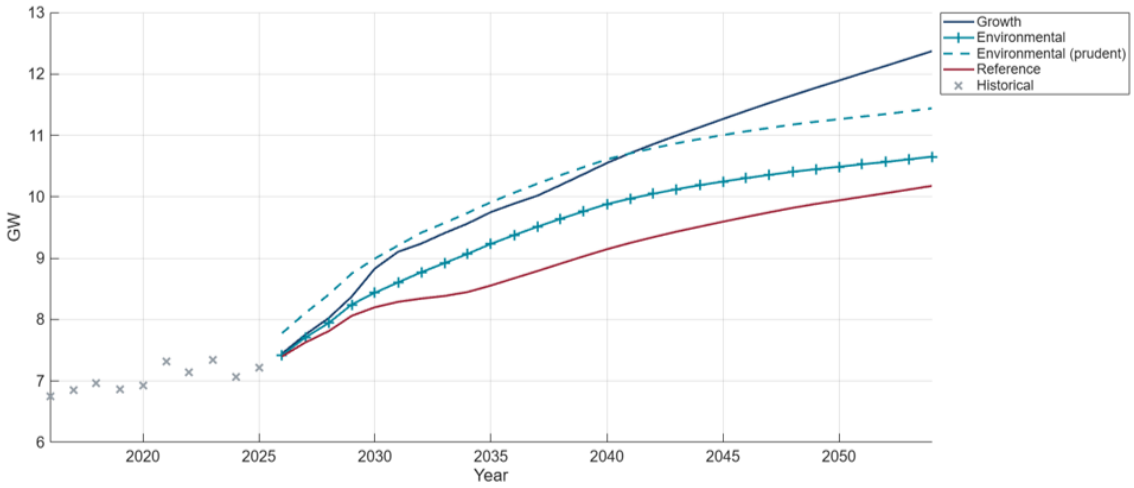


Figure 13: National peak load forecast, in GW

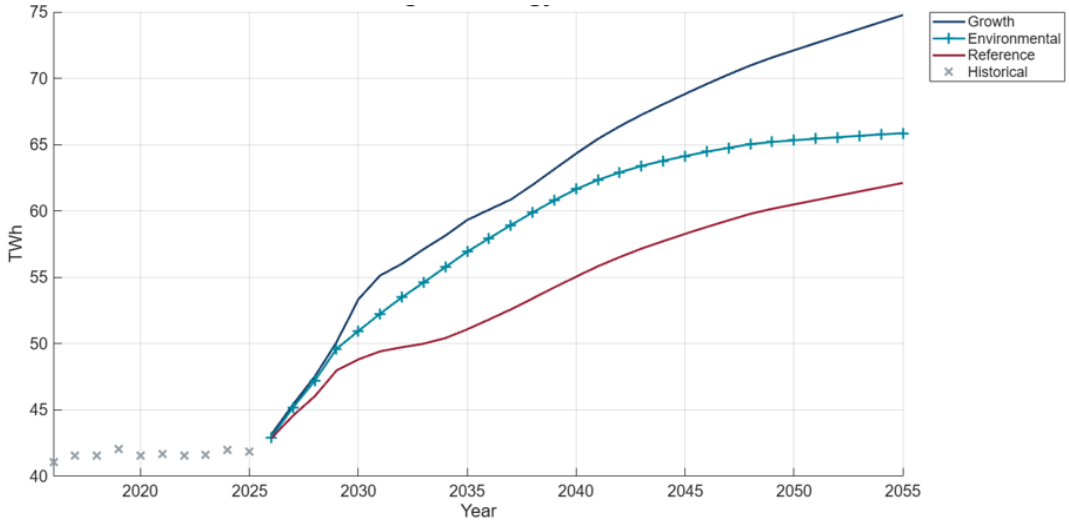


Figure 14: National energy demand forecast, in TWh

Appendix B: 2024 EDGS Variations

As outlined above, while we have aligned our demand forecasts closely with the 2024 EDGS, we have made several changes where we consider better information is available or where we consider a change is needed. We consider these changes are reasonable variations of the 2024 EDGS. Below we summarise the extent of the variations by scenario and demand forecasting component.

Table 11: Comparision of MBIE EDGS and Transpower variations

	MBIE 2024 EDGS	Transpower 2025 variation	Transpower 2026 variation
Base energy demand 2050 (TWh)			
Constraint	39.4	40.8	40.8
Environmental	44.6	46.2	46.2
Growth	48.3	50	50
Innovation	43.6	45.2	45.2
Reference	43.5	45	45
Base peak load 2050 (GW)			
Constraint	Not specified	6.1	6.1
Environmental		6.7	6.6
Growth		7	7
Innovation		6.6	6.5
Reference		6.5	6.5
Data centre consumption 2050 (TWh)			
Constraint	0.9	0.5	1.4
Environmental	1.8	2.6	3.7
Growth	3	2.6	5
Innovation	4.6	4.2	6.4
Reference	1.8	2.6	2.4
EV consumption 2050 (TWh)			
Constraint	6.6	6.3	6.2
Environmental	9.6	9.2	9.1
Growth	11.3	11	10.8
Innovation	10.1	9.8	9.7
Reference	8.9	8.6	8.5
Fuel switching consumption 2050 (TWh)			
Constraint	6.7	4.4	4.4
Environmental	12.6	10.5	10.5
Growth	9	8.1	8.1
Innovation	13.7	12.1	12.1
Reference	7.8	6.4	6.4
Solar capacity 2050 (TWh)			
Constraint	1	1	1.7
Environmental	2.8	2.8	6.4
Growth	1.9	1.9	4.7
Innovation	2.8	2.8	6.4

Reference	1.5	1.5	3.3
Total electricity demand 2050 (TWh)			
Constraint	53.6	53.9	54
Environmental	68.6	72.4	74.4
Growth	71.7	75.6	78.8
Innovation	72.1	77.6	79.1
Reference	62.1	66.3	65.2

Appendix C: Assumptions Book Variations

As outlined above, we have made a small number of changes from our published and consulted on Assumptions Book. Most of these variations relate to updated information that has become available since the time it was published or to better model the benefits associated with the investment options. The Assumptions Book variations that we have made are as follows:

- As consulted on as part of the short-list consultation, AC losses for the WUNI region and the rest of the North Island were adjusted from the approach outlined in the Assumptions Book. This adjustment is described in Attachment 7.
- As consulted on as part of the short-list consultation, we have applied a maximum capacity build constraint of 440 MW in Northland and 640 MW across Northland and Huapai to reflect export constraints from the Northland region. The generation stack includes a large amount of generic capacity in this region, but a significant amount of transmission investment would be required to enable it to be exported southward.
- Several generation projects have become committed since the Assumptions Book was finalised. The following represent deviations from the committed generation assumptions in Section 2.3.8.2 of the Assumptions Book:
    - Tauhei battery energy storage system (**BESS**) was removed from the committed project stack because we consider the BESS project status should not be treated as equivalent to the associated Tauhei solar project. Consistent with the treatment of other non-committed BESS projects, Tauhei BESS was represented through generic grid-zone BESS assumptions, rather than as a committed project.
    - 200 MW BESS at Glenbrook by Contact (HLY_GLN_s2) is now treated as committed.
    - 100 MW BESS at Huntly by Genesis (HLY_BESS_s2) is now treated as committed.
    - 115 MW Solar Farm at Edgecumbe by Genesis (S_Tihori) is now treated as committed.
    - 150 MW Solar Farm at Huapai by Contact/Lightsource (S_Glorit) is now treated as committed.
    - 94.6 MW Wind Farm at Waipara by Genesis/Yinson (W_MtCass) is now treated as committed.
    - 17 MW Solar Farm at Dannevirke by Bright Fern (S_Dannevirk1) is now treated as committed.
    - 26.1 MW Solar Farm at Waipawa by Lodestone/Centralines (S_Ongaonga0) is now treated as committed.
    - 20 MW Solar Farm at Bunnythorpe by Kiwisolar (S_Tahuna) is now treated as committed.
    - 24 MW Wind Farm at Kapuni by Hiringa Green Hydrogen Project (W_Kapuni) is now treated as committed.

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