

Submission on the Energy Demand and Generation Scenarios (EDGS) 2023

Contact details

Name	Privacy of natural persons
Organisation (if applicable)	Jacobs New Zealand Limited
Contact email address	Privacy of natural persons

Privacy statement

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Release of information

Please let us know if you would like any part of your submission to be kept confidential.

- I agree to be contacted by MBIE about any points I have raised or obtain more information about the content of my submission.
- I agree to having quotes from my submission included in the compiled list of next steps.
- I would like to be contacted before the release or use of my submission in the compiled list of next steps that will be published by MBIE after the consultation.
- I would like my submission (or identified parts of my submission) to be kept confidential, and **have stated below** my reasons and grounds under the Official Information Act that I believe apply, for consideration by MBIE.

I would like my submission (or identified parts of my submission) to be kept confidential because... [Insert text]

[To check the boxes above: Double click on box, then select 'checked']

Responses to questions

Instructions for completing this submission template:

- Check relevant box by double clicking on the box, then select 'checked'
- Some questions have sub-parts
- Add any additional comments
- Respond to any or all questions as relevant

Introduction

1 a) Do you agree with the stated purpose of EDGS? (Please select one)

Yes

No

Don't know

b) Why, or why not?

We acknowledge and agree that the founding purpose of the EDGS is to provide an independent set of market development scenarios for Transpower's Investment Test as required in the Capex Input Methodology.

However, we consider that it has a broader purpose of providing clarity to third parties – particularly potential international investors – on the expected path of New Zealand's energy transition. International generation developers and capital houses interested in entering the New Zealand market want confidence that the scenarios that they are considering in their business cases adequately capture the risk they are taking with their capital investment. Without that confidence, international investment at the rate required to achieve our climate change targets is unlikely to occur.

In other jurisdictions, that confidence is provided by a regular report produced by a government agency or independent commission that sets out likely energy futures in enough detail that a third party can undertake analysis specific to the projects being investigated. For example, the Australian Energy Market Operator (AEMO) in Australia produces the Integrated System Plan (ISP) and the Electricity Statement of Opportunities (ESOO) that provide the basis for most electricity market analysis in the National Electricity Market (NEM).

We agree with the EA's recommendation that MBIE produce an Annual Electricity Generation Investment Opportunities report and consider that a robust and comprehensive EDGS underpins that product rather than exists in parallel with it.

The current state in New Zealand is that there are a number of sets of market development scenarios (BEC2060, EDGS 2019, Transpower's variations on EDGS2019, Whakamana i te Mauri Hiko, ICCG), that are produced for various purposes. It is natural that different organisations will want to develop their own scenarios because the drivers or sensitivities of their business encourage exploration of particular dimensions. However, the end effect – from the perspective of the international developer – is one of not having a strong centrally-produced scenario set that is an accepted reference point and – by implication – little national direction on the energy transition journey.

In the New Zealand context, we consider that the EDGS should evolve to fulfill this central role and it is necessary that "providing a comprehensive roadmap for the future of the New Zealand Electricity Market" be an explicit purpose of the project.

2 How do you use EDGS?

We use EDGS assumptions – along with other publicly available information and in-house knowledge – to develop an assumption set for our electricity market models. We then use

those models to provide insights for clients into the value their candidate investments are likely to have in the New Zealand market and, therefore, the revenue they can expect to receive.

We do not use the generation expansion plans or electricity price indicators produced by GEM as they are not fit for our purposes. Generation expansion plans produced by GEM for the EDGS are not generally useable for the alternative purposes, so most analysis that uses EDGS will be using GEM inputs (capital costs, fuel costs, carbon prices, demand forecast) rather than the outputs. We acknowledge that SADEM and GEM are run in an iterative loop until results converge, but it is the exogenous assumptions and the outputs from SADEM that feed into GEM (electricity demand and gas price) that are of most interest for our purposes.

3 a) Do you agree with the frequency of the EDGS? (Please select one)

Yes No (please elaborate below) Don't know

b) If NO, how frequently do you think it should be?

Annually Every two years Every three years Other (please specify)

Scenarios

4 Does the set of four scenarios adequately explore the potential future states that you think will be important? (Please select one)

Yes No Don't know

5 a) Is each scenario's story internally consistent and coherent? (Please select one)

Yes No Don't know

b) If NO, why not?

6 a) Are there other aspects that should be considered in our scenario planning? (Please select one)

Yes No Don't know

b) If YES, please write here:

Uptake of residential and commercial energy storage (including EV batteries actively participating in demand management):

Approaches to long-duration and inter-seasonal/annual storage. The leading edge of the energy transition has moved since EDGS 2019 from being about solar and wind to being about firming solutions. Answers to the questions raised by the NZ Battery project will fundamentally shift the investment case for some types of generation in some locations and many transmission investments. Battery prices, the availability and price of demand response and market changes to encourage long-term storage will be as important as gas and carbon prices and solar and wind capital costs.

Biofuel availability and price: In a highly renewable world, low carbon dispatchable supply will become exceptionally valuable. Our modelling of New Zealand wind resources indicates that extended dunkelflaute events where solar and wind drop to a combined capacity factor of 10% for several days across the country are not particularly rare events. It is unlikely that

battery prices drop to a level where they are an economic mitigation for this risk, so a low-carbon, combustible, storable fuel would provide substantial value. The availability and price of this fuel will be an important dimension in future scenarios.

Physical impacts of climate change: New Zealand climate experts expect that climate will have a material effect on the distribution of precipitation and wind around the country and through the year. The spring melt is likely to play less of a role in the annual cycle and more winter rain is expected to fall in some of the country's largest hydro catchments. These impacts are something that should be included in the modelling in some way, if not altered between scenarios.

Green hydrogen demand: green hydrogen demand is electricity demand. Heavy transport, shipping, or aviation powered by hydrogen will increase electricity demand more than if they are power by batteries or biofuel. Similarly, a greening of current hydrogen feedstock will need to be reflected in electricity demand.

Renewable Energy Zones (REZs): REZs essentially trade-off optimal distribution of generation resources against the certainty and infrastructure build of encouraging co-location of generators. The existence of REZs could materially change the distribution of new wind and solar, thereby shifting the chase for several transmission investments.

Key assumptions

7 Do these assumptions align with the four scenario definitions? (Please select one)

Yes No Don't know

8 a) Do you agree with these assumptions? (Please select one)

Yes No Don't know

b) If NO, please explain or add any specific changes to the table provided below.

If you wish to provide alternative assumptions from those we have identified, please fill out the cells in the table below.

	Variable	Reference	Growth	Constraint	Innovation
General	Carbon price (NZD / t CO ₂ -e)				
	Crude oil price (USD / barrel)				
	Exchange rate (NZD/USD)				
	Real discount rate				
	GDP				
	Population				
Electricity	Gas availability for				

	electricity generation ¹				
	Cost of wind generation				
	Cost of grid solar generation				
Technology uptake	Residential solar PV				
	Electric vehicles				
Electricity demand	Peak demand				
	Demand-side response				
Energy demand	Energy efficiency improvements				

9 a) Do you agree with these process heat assumptions? (Please select one)

Yes No Don't know

b) If NO, why not?

10 What mix of electricity and biomass should we be assuming for process heat fuel-switching in each of our scenarios? Please fill out the table supplied below.

Please fill in what percentages of electricity and biomass you think should be used for process heat in each scenario.

Fuel type	Reference	Growth	Constraint	Innovation
Electricity				
Biomass				

11 What do you think we should be assuming for the **future activity** of large energy users involved in specific industry process heat applications in each of our scenarios?

12 What do you think we should be assuming for the **closure** of large energy users involved in specific industry process heat applications in each of our scenarios?

13 a) Do you agree with our approach to the possible closure of Tiwai Point? (Please select one)

¹ This is how much natural gas is available for electricity generation, not actual levels of usage

Yes No Don't know

b) If NO, why not?

Generation stack

14 What timeline do you believe we should use for the **refurbishment** of existing plants?

Best provided by the operators of those plant

15 What timeline do you believe we should use for the **retirement** of existing plants?

Ideally, retirements would occur endogenously based on the economics of keeping them open – or be explicitly retired due to a policy included in the scenario definition.

16 a) Do you feel your views on the refurbishment or retirement of plants would be affected by scenario? (Please select one)

Yes No Don't know

b) If YES, please provide details.

A 100% renewable scenario could force the retirement of a plant that would otherwise be economic to operate.

A scenario where dry year cover is provided by a centrally backed programme could make a privately-owned thermal plant uneconomic.

17 If you know of any additional plants that need to be considered, please provide information below.

None

18 a) Do you agree with our definition of potential plants? (Please select one)

Yes No Don't know

b) If NO, why not?

19 a) Do you agree with what we have presented in Table 4 in Appendix A of the Consultation document around generic plants? (Please select one)

Yes No Don't know

b) If you have amendments or additional information, please provide details below.

Please publish capital costs and variable and fixed operating costs

20 a) Given the information presented in the Generation stack section and Appendix A of the Consultation document, are there any other generation types that we are missing from our generation stack? (Please select one)

Yes No Don't know

b) If YES, please specify.

Biomass and landfill waste powered generation already exists or is under active discussion, so should be included in the set.

Other options might be unlikely to be economically or politically viable in New Zealand, we consider it important that they remain in the analysis to avoid the appearance of pre-filtering options. These include:

Concentrated Solar Thermal (CSP)

Tidal

Wave

Nuclear

Views on new and emerging technologies

21 How do you envision the cost for new technologies changing in coming years?

22 What do you think the uptake will be like for these new technologies?

EVs will become the preferred new car within a few years and dominate the fleet by 2030. Rooftop solar will continue to grow as will the growth of services that aggregated solar and EV batteries as a grid service for arbitrage and reserves

23 How do you believe New Zealand's green hydrogen industry will develop between now and 2050? What role will hydrogen taken in our electricity system in this time?

We expect New Zealand to develop a green hydrogen supply chain for local use in industrial processes that current use brown hydrogen and hard-to-abate energy uses such as some heavy transport and aviation. We consider it less likely that it becomes an economic option for energy storage (electricity-H2-electricity) in New Zealand due to the low cycle efficiency and relatively strong alternative options we have in New Zealand.

Next steps

24 Which of the below products would you find MOST beneficial? Please rank them from 1 (most beneficial) to 4 (least beneficial).

2 **Electricity Generation Investment Opportunities Report**

3 **Energy Outlook**

1 **Generation Stack Report**

4 **Levelised Cost of Electricity Generation (LCOE)**

[To edit the rankings above: right click on the field "1, 2, 3 or 4", then select 'Update Field']

Additional feedback

25 Do you have any additional feedback that you would like to provide on the EDGS or the options we have proposed? If yes, please provide below.

If the scale of the EDGS cannot be increased significantly to provide a comprehensive roadmap of the future of the New Zealand Electricity Market, we encourage MBIE to focus on producing a comprehensive and robust set of *assumption* scenarios as this data is where both Transpower and third-party stakeholders likely get the most value and we consider them to be the core deliverable required of the EDGS.

Previous EDGS releases have not delivered the information required for Transpower to use them for their intended purpose or for a third party to use them as the basis for their own analysis. Capital costs, fuel costs, and carbon costs were not published in EDGS 2019 and there was limited demand information. It was not possible to use the EDGS for their stated purpose – as market development scenarios to use in an Investment Test – using the published data-books. Therefore, Transpower must have been either developing important assumptions independently – which seems counter to the intention of the EDGS – or asking MBIE to provide additional data – which seems counter to the desire for transparency.

Thank you for the opportunity to provide feedback on this consultation. We look forward to further discussion as your work on the EDGS progresses.

Thank you for completing this submission template, we appreciate you taking the time. We will use your feedback to inform our modelling for EDGS 2023 and will refine the draft assumptions based on feedback received through consultation.