Submission template

Consultation on Energy Demand and Generation Scenarios (EDGS) 2023

This is the submission template for responding to the consultation document on the Energy Demand and Generation Scenarios (EDGS) 2023. The Ministry of Business, Innovation and Employment (MBIE) seeks your comments by **5pm on Monday, 22 May 2023**.

Please make your submission as follows:

Fill out your details under the **Contact details** section and, if applicable, check the boxes underneath on privacy and confidentiality.

Fill out your responses to the discussion document questions in the section: **Responses to questions**. Your submission may respond to any or all of the questions. Where possible, please include evidence to support your views, for example references to independent research, facts and figures, or relevant examples. If you would like to make other comments not covered by the questions, please provide these in the **Additional feedback** section.

Before sending your submission:

a. delete this first page of instructions; and

b. if your submission contains any confidential information, please:

- State this in the cover page or in the e-mail accompanying your submission, and set out clearly which parts you consider should be withheld and the grounds under the Official Information Act 1982 (OIA) that you believe apply. MBIE will take such objections into account and will consult with submitters when responding to requests under the OIA.
- Indicate this on the front of your submission (e.g. the first page header may state "In Confidence"). Any confidential information should be clearly marked within the text of your submission (preferably as Microsoft Word comments).

Submit your submission by emailing this template as a Microsoft Word document to energyinfo@mbie.govt.nz with **EDGS 2023** in the subject line by **5pm on Monday, 22 May 2023**

Please direct any questions that you have in relation to the submissions process to energyinfo@mbie.govt.nz.

Release of Information

Please note that submissions are subject to the OIA and may, therefore, be released in part or full. The Privacy Act 2020 also applies. MBIE intends to publish a compiled list of next steps on our website at www.mbie.govt.nz. Should you agree to having quotes from your submission included in the next steps, we will ensure that all parts of your submission included does not refer to any names of individuals.

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

Contact details

Name	Privacy of natural persons
Organisation (if applicable)	
Contact email address	Privacy of natural persons

Privacy statement

We collect your personal information (name and email address), in order to identify stakeholders and contact you (if you agree). Providing some information (such as your organisation) is optional, however if you do not provide this information, we may not be able to link your response to the organisation you are representing. We advise caution on the use of free-text boxes, please do not provide more personal information than is required for the purposes of this consultation.

Besides our staff, we may share this information in line with the Privacy Act 2020 or as otherwise required or permitted by law. We keep your information safe by storing your data in folders with limited access. If this information is shared or published, we may need to edit comments to remove personal information.

This information will be held by MBIE. You have a right to ask for a copy of any personal information we hold about you as a result of this consultation, and to ask for it to be corrected if you think it is wrong. If you'd like to ask for a copy of your information, or to have it corrected, please contact us at energyinfo@mbie.govt.nz.

Release of information

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

x☐ I agree to be contacted by MBIE about any points I have raised or obtain more information about the content of my submission.

x☐ 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)

x☐ Yes ☐ No ☐ Don't know

b) Why, or why not?

2

How do you use EDGS?

The EDGS is used in the building industry to look at the relative importance of Operational Carbon emissions versus Embodied Carbon emissions. It has been really problematic using the 2016 and 2109 EDGS in modelling by the Building Research Association of NZ as these are wildly different from the 100% (or at least 95%) renewable generation goals we are now committed to. These previous versions show slow retirement of coal plants and even rebuilding and increased building of new gas plants which are completely incompatible with our climate goals. What this has meant is that there has been a bias towards making buildings energy efficient as a means of lowering their carbon footprint when there should have been a clear focus on lowering embodied carbon emissions at the same time. While making buildings with very low heating energy requirement (and minimal cooling) is obviously what we should be and are doing, we can do that in a low embodied carbon way or a high embodied carbon way. Because of the current distorted EDGS we have been essentially ignoring embodied carbon emissions in our buildings. And whereas operational emissions accrue only gradually over time and diminish towards zero as our grid moves towards 100% renewable, embodied emissions are (almost) all up in the atmosphere before the building is even occupied. This timeliness of emissions reductions is rarely acknowledged at present but is crucial to avoid dangerous tipping points. We really need an EDGS that reflects our climate change obligations. And these obligations are likely to increase not decrease as we realise how quickly climate change is coming at us.

3

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

☐ Yes x☐ No (please elaborate below) ☐ Don't know

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

☐ Annually x☐ 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	x☐ No	☐ Don't know

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

☐ Yes	x☐ No	☐ Don't know

b) If NO, why not?

There is no scenario that I can see that assumes degrowth along with increased technology uptake and decreased cost of wind and solar. And perhaps more importantly a scenario that includes all electricity users being essentially on the spot market and what that does for peak demand - it would massively change it. And because it is peak demand that drives the building of new plant this massive peak lopping would mean we can get by with far less new generation. You must take into account electric vehicles being able to not just take power from the grid in the dead of night when there is a surplus but also feed back into the grid at times of peak demand and be handsomely paid for this (noting here that Flip the Fleet has found that the primary battery degradation mode of lithium batteries in cars is through simple calendar degradation, not cycling. What this means is that if it has neglibile effect on your battery and you buy power to feed into your car battery in times of low demand very cheaply and sell back into the grid at high prices why wouldn't you? Some of these cars could also be plugged in during the day and harvest low power prices from the big solar buildout and put that back into the grid for the evening and morning peaks.

Additionally I don't know that you have a scenario with increasing use of domestic log burners for winter heating and or winter water heating. I would just briefly note here that the fuel use of log burners is carbon neutral and is often offcuts and thinning's that would otherwise rot and emit the carbon swiftly anyway. It is a completely different situation to overseas where they are burning old growth forests for biomass. Here in NZ a 30 year old pine tree is an old tree. Secondly there is now a widespread availability of cheap ultra low emission logburners. Thirdly the particulate emissions from logburners are often lumped in with the particulate emission from fossil fuels, but they are significantly different. The original Health and Air Pollution in NZ, HAPINZ study, found a 400% difference in dose-response for summer particulates (almost all fossil fuels) to winter (domestic wood burning dominated at that time) The environment court ruling on the Southern Link new arterial road proposal for Nelson found that particulates from logburners were significantly different from diesel particulates with the latter having 10x the Poly Aromatic Hydrocarbons adsorbed to their surfaces and the made up of significantly smaller particles that get further into the lungs and may pass into the blood. Fourthly, the use of these logburners at precisely the time the grid is struggling under peak load is particularly valuable as is the provision of winter hot water use. Fifthly as climate change progresses,and wild weather events become more regular, resilience from grid outages will be more and more important. Log burners give us that resilience, not just for

heat but also for use as a cooktop in emergency and I' d suggest many also providing hot water.

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

x☐ Yes ☐ No ☐ Don't know

b) If YES, please write here:

As above: two things with the scenarios you have proposed: Peak lopping through the inevitable moving of pretty much everyone to variable pricing and secondly the use of Electric Vehicle batteries as storage devices to shift not just demand away from the peaks but also supply into the peaks. But additionally there is a scenario not adequately covered by your proposals; That is one where climate change obligations have to be significantly increased due to last ditch efforts to mitigate climate change and previous efforts not amounting to much. In this scenario we can' t even think about anything other than a rapid and complete phase out of fossil fuels. And I would argue this is the more likely scenario

Key assumptions

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

x☐ Yes ☐ No ☐ Don't know

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

☐ Yes x☐ 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)*	20323 $65 2035 $300 2050 $500	20323 $65 2035 $300 2050 $500	20323 $65 2035 $300 2050 $500	20323 $65 2035 $300 2050 $500
	Crude oil price *(USD / barrel)*				
	Exchange rate *(NZD/USD)*				
	Real discount rate				
	GDP				Lower than reference
	Population				
Electricity	Gas availability for				

	electricity generation[1]				
	Cost of wind generation	Low	Low	Low	Low
	Cost of grid solar generation	Low	Low	Low	Low
Technology uptake	Residential solar PV				
	Electric vehicles				
Electricity demand	Peak demand	Lower	Medium	Much Lower	Much Lower
	Demand-side response	High	High	High	High
Energy demand	Energy efficiency improvements				

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

x☐ 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?

That carbon emission issues will become more and more important. They will be forced into early changes to low emissions

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?

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

Emitters won't be subsidised in their emissions as they currently are by given free ETS units. They will be forced to close or move to low emission modes more quickly than most presently expect

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

☐ Yes x☐ No ☐ Don't know

b) If NO, why not?

What you may not be taking into account is the method of making aluminium that Tiwai is set up for is inherently very carbon emissions intensive and will be necessarily replaced by much less carbon intensive ways of making aluminium (At Tiwai big carbon anodes are eaten away in the process of making the aluminum (emitted as CO2), so even though the electricity powering it is very low carbon the total process is high carbon. This high carbon way of making aluminium is incompatible with a 1.5° C world. Whilst changing the Tiwai plant over to the new low carbon production methods is possible it is unlikely given the costs of demolition etc just to get back to a clean site, combined with being on the other side of the world from aluminium markets and not having the bauxite here in NZ. So I think it is very likely Tiwai will stop making aluminium.

Generation stack

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

No comment

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

It is unconceivable that the fossil plants wont face early retirement due to our climate obligations which will only become more severe. There are multiple ways of dealing with peaking (noting that peaking is currently done by hydro anyway and other comments here about using EV batteries for peaking in what is really a virtual power plant dispersed across the grid): 1. Adding turbines to existing dams so they can be run harder in peak times and hold water back at other times – one of the Clutha stations already has this capacity built in, for others it would be more expensive but possible, 2. Using some existing stations for pumped hydro to soak up surplus generation from solar midday and wind whenever – eg Pukaki-Tekapo (the canal between two is apparently laid so flat it can run water the other way – so you can pump up from Pukaki to the canal and then up from the canal to Tekapo) and 3. For dry years we gradually ramp up Geothermal stations to cover that dry year, temporarily depleting the fields and then let them recover by ramping down in normal years.

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

x☐ Yes ☐ No ☐ Don't know

b) If YES, please provide details.

But this is not adequately covered by the scenarios - you really need a scenario where climate change obligations have to be significantly increased due to last ditch efforts to mitigate climate change and previous efforts

not amounting to much. In this scenario we can't even think about anything other than a rapid and complete phase out of fossil fuels. And I would argue this is the more likely scenario

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

Battery EV virtual power plants – all CHademo plug equipped EVs have had this capability built in (apart from the first year or so of Nissan Leafs) – so this is (virtually) all the Nissan Leafs in the country (and those still flooding in), all Mitsubishi EVs and PHEVs. And now newer EVs are coming in and will in future pretty much all have this capability – I think BYD cars coming in now have this capability. So when you add up using just say 40% of their battery capacity injecting into the grid at peak times I think you will find that a substantial amount (note here that progressively EVs have much bigger batteries (24kWh Leafs were standard in the late 2010s, now cars with batteries less than twice that size are rare) yet the average amount of driving per day is unchanged so the residual power at the end of the day able to be fed into the grid at the evening peak is significantly more, even if they were used that day. What is the size of this virtual power plant?, well I did some back of envelope figures a year or so ago – it will be much more now, but then we had some 15,000 used Nissan Leafs in NZ, if we assumed 10kWh from each leaf* then this is 150MWh of peak power. This can be compared to the celebrated 200MWh Tesla battery in South Australia. And just to note here that you can't compare this to 150MWh of solar power that will never actually achieve this actual rating and never at peak grid requirements. Likewise the compares with 150MW of wind is spurious as you can't depend on this for peak power - it might correspond to it occasionally but generally not

* The First Nissan Leafs that came out had 24kWh batteries, next model had 30kWh, New shape ones have 40-64kWh so assuming 10kWh from every Leaf is surely not too far out for this back of an envelope calculation

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

☐ Yes x☐ No ☐ Don't know

b) If NO, why not?

No you need to include virtual power plants from the aggregation of battery EVs around the country (putting power into the grid at just peak times and in a distributed way meaning lines upgrades are not needed or delayed)

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 x☐ No ☐ Don't know

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

No as above you haven't included virtual peak power plants from EV batteries. If the size of this virtual power plant is already over 150MWh or power available at peak times, this will rapidly increase over the following years as EV numbers continual to increase exponentially and all new EVS are likely to have this grid feedback capability. It may even be that its power companies interest to fund the wallboxes to enable this back feeding into the grid rather than investing in new generation. I'd note

here that proportion of EVs entering the country today is already at the rate that the Climate Commissions assumed wouldn't be reached till 2032.

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)

x☐ Yes ☐ No ☐ Don't know

b) If YES, please specify.

Virtual power plants from EV batteries as mentioned above

Views on new and emerging technologies

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

The cost decreases in technology, particularly electronics has almost always been underestimated. At present the "wallboxes" that enable Chademo equipped Electric Vehicles like Nissan Leafs to feed back into the grid is some $10,000 I understand, but this is likely to exponentially decrease

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

See above where the proportion of EVs entering the country today is already at the rate that the Climate Commissions assumed wouldn't be reached till 2032. I think we shouldn't underestimate these

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?

Hydrogen has long been and will continue to be a smokescreen for serious action to eliminate fossil fuels. Do to such inherent poor round trip efficiencies – electricity to hydrogen, hydrogen back to electricity it will continue to be a chimera, a mirage suited only for niche applications

Next steps

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

1, 2, 3 or 4 **Electricity Generation Investment Opportunities Report**

1, 2, 3 or 4 **Energy Outlook**

1, 2, 3 or 4 **Generation Stack Report**

1, 2, 3 or 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.

No I think I've said it all above

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.