Major Electricity Users' Group

Promoting a robust electricity market

25 August 2024

James Palmer
Secretary for the Environment and Chief Executive
Ministry for The Environment
PO Box 10362
WELLINGTON 6143

Sent via email: ERPconsultation@mfe.govt.nz

Dear James

New Zealand's second emissions reduction plan

1. This is a submission from the Major Electricity Users' Group (MEUG) on the Ministry for the Environment's discussion document "*New Zealand's second emissions reduction plan (2026 – 2030)*"[1] and supporting material published on 17 July 2024.

2. This submission does not contain any confidential information and can be published on Ministry's website unaltered. Members may lodge separate submissions.

3. Our comments are focused primarily on the Energy sector plan. To support this submission, MEUG has commissioned NZIER to prepare a short report that comments on the policies for the second and third emissions reduction plan for energy and the underlying analysis. A copy of NZIER's report is provided in **Attachment 1**.

Support for a net-based approach and least-cost pathway

4. MEUG and our 13 members support New Zealand's target to reduce net emissions of all greenhouse gases to zero by 2050, and the development of both emissions reduction budgets and emissions reduction plans (ERP) to guide the achievement of this target. We welcome the Government's commitment to a least-cost, net-based approach to setting the second emissions reduction plan (ERP2), that ensures all available options and technologies are on the table to help us achieve emissions reductions. We endorse:

   - Government providing a stable environment for climate change policy, to provide certainty for businesses and industry investing in New Zealand.
   - The development of evidence-based policy, which ensures that any government actions are cost effective, have a clear link to addressing underlying policy issues (strong intervention logic) and provide clear benefits for New Zealanders, both now and into the future.

[1] https://environment.govt.nz/assets/publications/climate-change/New-Zealands-second-emissions-reduction-plan-Discussion-document.pdf

5. We support the use of the Emissions Trading Scheme (ETS) as the main mechanism for reducing emissions across ERP2. After a period of ongoing change, we agree that it is critical to restore market confidence in the ETS. We support the Government's commitments to:

   - Not vintage any NZUs held by New Zealand participants.
   - Ensure no differential treatment of forestry NZUs in the ETS.

6. MEUG also endorses the use of complementary policies alongside the ETS, where these are necessary and beneficial for achieving emissions reductions.

Stronger action required to drive progress across energy sector

7. MEUG support's the Government's aspirations for clean energy that is both abundant and affordable (pillar 3 of the climate change strategy). As noted in the discussion document, New Zealand has a predominantly renewable electricity system and the electrification of greater sectors of our economy, such as transport and process heat, can deliver lower emissions for our economy.

8. Electricity[2] is not only a key input for our members' businesses – it supports our regional communities, employs thousands of people in well-paying jobs, and helps pay for the services we all take for granted but that are essential to a dynamic and thriving economy. The electricity system must support industrial manufacturing, production, and businesses to enable this thriving and growing economy. MEUG was established in the 1990s to advocate for electricity sector policy, regulatory and legislative settings that are fit for purpose and support the long-term interests of consumers.

9. MEUG supports the actions put forward in this discussion document but considers that these actions, alongside New Zealand's existing policies, rules and settings for the electricity market will be insufficient to drive the change needed, while still ensuring an affordable and reliable electricity system for households and businesses. In summary

   - MEUG has serious concerns about the **affordability of electricity supply**. Wholesale electricity prices have more than doubled in the last five years significantly impacting businesses. There are concerns over whether consumers are paying a fair or justifiable price and the state of competition in the market. This will hamper the move to greater electrification and the possible emissions savings.

     These concerns have increased significantly over the last month, with New Zealand facing a potential electricity supply crisis, with low wind, low lake levels and reduced gas supply. Wholesale electricity and futures prices have increased considerably (up to an average of $700 per MWh), with several MEUG members and other businesses having to shut down or reduce production in response to these extremely high wholesale electricity prices.

   - It is important that New Zealand continues to have a **reliable electricity supply as we transition to a great proportion of renewables**. The shifting role for thermal generation will need to be carefully monitored and managed, to ensure sufficient peaking and firming capacity during peak periods and dry years.

   - There are also **significant increases forecast for electricity transmission and distribution charges** over the coming five-year regulatory period. More emphasis needs to be placed on optimising the use of networks, smoothing the demand curve, more Time of Use (ToU) tariffs, and encouraging non-network solutions.

[2] And other forms of energy, such as gas, petrol and diesel.

10. We expand on each of these points below, while referencing the Ministry to other relevant submissions made by MEUG.[3] We believe these issues need to be addressed to support the level of emissions reductions sought through both ERP2 and ERP3, and to ensure a well-functioning electricity market that will support us towards the 2050 target.

Affordability of electricity could hamper electrification

11. MEUG has serious concerns about the affordability of electricity supply. As outlined in our Briefing to the Minister of Energy last year,[4] wholesale prices have more than doubled in the last five years, significantly impacting businesses.[5] The Electricity Authority and at least one private investment firm[6] have estimated that consumers are paying between around $1 billion and $2 billion a year more than they would be expected to pay in a workably competitive market. The Market Development Advisory Group3[7] has also warned that market concentration and, as a result, pricing will get worse under a more renewable future – not less.

12. In the last month, the situation has got considerably worse. The electricity supply chain is under considerable strain with low lake levels, lower than average wind generation, and falling gas reserves – these factors have all contributed to a significant lift in both the wholesale electricity price, as well as futures contracts / hedges. As noted above, several businesses have had to alter or shut production, the New Zealand Aluminium Smelter has reduced electricity consumption in line with its demand response agreements with gentailers,[8] Transpower has freed up access to contingent storage in our hydro lakes,[9] and Methanex has stopped production to free up gas for electricity generation.[10]

13. With an increasing disparity between wholesale electricity prices and cost drivers, and given the negative impacts on businesses and productivity, we believe there is merit for further assessment that the electricity market is working as it should. It is important that businesses and consumers believe they are paying a fair or justifiable price for their electricity within a competitive market. Increases in price also have an impact on business decisions around electrifying process heat. In short, it is unrealistic to expect industrial companies to significantly increase their load while the electricity price remains so elevated. These elevated prices also flow through to and impact all electricity consumers across the country.

14. MEUG and our members have raised our concerns directly with Government and officials, and we are currently scoping our own work into whole wholesale electricity pricing, focused on the causes of high prices and potential solutions.[11] We believe that work on market competition and affordability must be prioritised in the short to medium term, to ensure the benefits of a more renewable electricity system can flow through to consumers and lead to reduced emissions.[12] Much of this work falls within the remit of the Electricity Authority, including its work to implement the recommendation of the Market Development Advisory Group final report.[13] We await to see what action the Government will take in this space, to address both the current supply concerns and broader market issues.

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[3] These comments were also outlined to the Climate Change Commission in our recent submission on the fourth emissions budget advice, http://www.meug.co.nz/node/1366, 31 May 2024
[4] http://www.meug.co.nz/node/1331
[5] https://www.ea.govt.nz/documents/2243/Promoting-competition-in-the-wholesale-electricity-market.pdf
[6] https://businessdesk.co.nz/article/energy/some-doing-rain-dances-as-hydro-lakes-shrink
[7] https://www.ea.govt.nz/documents/1006/MDAG_-_Price_discovery_in_a_renewables-based_electricity_system_-_options_paper.pdf
[8] https://cdn.sanity.io/files/jhthdezs/production/9888005b036530a4478d6f2312074c898c5878c1.pdf
[9] https://www.transpower.co.nz/news/transpower-gives-industry-additional-flexibility-manage-emerging-electricity-supply-risks
[10] https://www.energynews.co.nz/news/gas/165202/methanex-gas-deals-win-win-win
[11] http://www.meug.co.nz/node/1384
[12] See MEUG submission on future of the power system here: http://www.meug.co.nz/node/1358
[13] https://www.ea.govt.nz/news/general-news/authority-finalises-response-to-mdag-report/

Ensuring a reliable electricity supply through the transition

15. MEUG believes that it will be important to carefully manage the energy transition, as we increase the level of renewable electricity generation while reducing the role of thermal generation in the electricity system.[14] It will be important to address[15] the:

    - Supply risk for this winter and next, given the substantial increase in frequency of trading periods when the available supply is tight (or insufficient) compared to projected electricity demand and normal reserve requirements. The potential shortage on 10 May 2024[16] is illustrative of how tight the system can get during peak periods during winter.
    - Risk of operational coordination problems and risk of insufficient investment in additional flexibility resources such as additional fast-start thermal plant.
    - Commercial incentives for maintaining existing thermal plant for dispatching into the market, the need for fast start gas peakers, and the availability of fuel as natural gas supplies decrease and investigation into renewable alternatives is only in early stages.
    - Technical issues that are likely to arise in a system with greater use of inverter-based resources such as wind generation and solar photovoltaic (frequency keeping etc.).

16. We believe the transition to greater renewables, while ensuring sufficient thermal firming, should be progressed as a priority workstream for the Electricity Authority. It will require coordinated input from many stakeholders to ensure we find the best solutions, ensure the right market conditions and settings, and maintain security of supply throughout the next decade.

Investment in electricity transmission and distribution

17. Considerable investment is needed in both the electricity transmission and distribution system to support greater electrification of our economy and to continue to provide consumers with a secure and reliable electricity system. However, this investment will come at a significant cost, with the recent Commerce Commission's draft decisions for Transpower and regulated electricity distribution businesses (EDBs) forecasting substantial increases in charges for the next five years (2025 to 2030):

> *"The Commission is proposing to set Transpower's maximum allowable revenues at a total of $5.8 billion for the next five years. This represents an increase of 43% compared to the previous five years. However, the Commission's proposed revenue smoothing means annual increases are capped at 15% in each of the first two years and 5% for the remaining three years of the regulatory period….*
>
> *For local lines companies subject to revenue limits, the Commission is proposing to set the maximum allowable revenues at a total of $12 billion. This represents an increase of 50% compared to the previous five years. However, revenue smoothing means increases are approximately 24% on average for the first year, before rising gradually over time."*[17]

18. While it is important to invest in the network, MEUG has been advocating for a stronger focus on:

    a. The varying performance of electricity distribution businesses (EDBs) when it comes to managing demand and innovation across the country's distribution networks.

[14] http://www.meug.co.nz/node/1303
[15] As discussed in this MEUG submission: http://www.meug.co.nz/node/1298.
[16] https://www.transpower.co.nz/news/new-zealanders-asked-reduce-power-use-tomorrow-morning
[17] https://comcom.govt.nz/news-and-media/media-releases/2024/commission-balances-necessary-investment-in-electricity-networks-against-rising-consumer-prices

b. The need to address the "bias to build" by EDBs. We need to look at how we can greater incentivise all EDBs to develop non-network / non-traditional solutions and first optimise the use of the current network (by flattening peak demand) before investing in more infrastructure.

19. As outlined in our April 2024 submission to the Electricity Authority, MEUG believes that further work must be done to understand why some EDBs are performing better and innovating, and why others may not be or at a slower place. It is also concerning if there are increasing differences in the performance of exempt versus non-exempt EDBs.[18] MEUG supports all EDBs providing a relatively level playing field for its consumers and supporting greater electrification and demand growth across the country. We consider that both the Commission and the Electricity Authority have a role to play here, to look at what levers are available under the Part 4 regime and Electricity Industry Participation Code to drive performance.

20. Secondly, MEUG recommends that the Authority and the Commerce Commission strongly focus on how we can better encourage EDBs and Transpower to fully optimise the use of the transmission and distribution networks and develop non-traditional solutions, before seeking to build additional infrastructure.

21. We consider that the current system for electricity infrastructure has a strong "bias to build" – EDBs and Transpower have continuously built "poles and wires" infrastructure to meet a relatively steady growth in demand, with assets historically sized to meet a network's peak capacity. The Part 4 regulatory model for both Transpower and EDBs is largely based around the Regulated Asset Base (RAB), which influences the revenue that a regulated entity can earn and the subsequent prices that will be charged onto consumers.

22. MEUG believes that more must be done to "flatten or smooth" the demand curve, rather than continuing the practice of building networks to deal with the ever-increasing peak demand on infrequent winter evenings. We note that system peaks have increased in recent years with 6 of the top 10 record demand peaks occurring in winter 2023. Flattening the demand curve over a 24-hour period can involve several options, including:

    a. Greater use of time of use pricing.

    b. Addressing the disparity between pricing approaches for distribution and transmission pricing.

    c. Incentivising greater use of non-tradit8inal / non-network solutions to meet network demand.

    d. A stronger focus on ensuring that Transpower and EDBs have fully optimised the use of the existing network, before getting approval to build new assets.

23. Our April 2024 submission referenced above outlines our views and recommendations on each of these areas. We believe work in this space is essential to enable the level of emission savings sought through New Zealand's emissions budgets, both now and out to the fourth emissions budget.

Addition comments on Energy sector plan

24. In addition to the comments above, MEUG also has the following points on the development of the Energy sector plan for the ERP2.

    - There is clearly a continued need and role for natural gas in our energy system to support the transition and ensure security of supply. However, we consider that actions are needed to address the current high level of sovereign risk associated with both gas production and infrastructure. Greater cross-party support around policy would ensure

[18] As raised in the following MEUG submissions: http://www.meug.co.nz/node/1340 and http://www.meug.co.nz/node/1355

a more stable regulatory and policy environment.

- We support providing a level playing field for all potential energy types and generation for use within New Zealand. It is important that we have a robust regulatory framework for these fuels, while also looking to align with other jurisdictions where possible.
- MEUG considers that much greater work needs to be done to remove barriers and incentivise demand response from a broader range of consumers, from industrial and commercial consumers through to individual households. We have long advocated for demand-side participants to be able to receive a form of payment that reflects the full benefits of the service provided and reflects the costs to the participant (i.e., lost production).
- We support the adoption of a regulatory framework to enable development of CCUS in New Zealand.[19]
- We support a continued focus on energy efficiency, to ensure that households and businesses are getting the most out of New Zealand's energy supply.
- We support the development of a long-term whole-of-energy strategy to decarbonise New Zealand's transport, industrial, primary, commercial, and residential sectors, as recommended by the BusinessNZ Energy Council.
- We support a review of Part 4 of the Commerce Act 1986 to ensure that regulated businesses within the energy sector have a framework that is fit for purpose, given the rate of change and the transition ahead.

25. We consider that the discussion document and supporting materials are light on robust analysis and cost benefit analysis, to enable stakeholders to understand the impacts that the proposed policies may have. We would welcome further discussion on the supporting evidence for energy actions for ERP2 and how we can ensure that we develop an effective plan that will drive real emissions reductions over the coming period.

Next steps

26. If you have any questions regarding our submission, please contact MEUG on 027 472 7798 or via email at karen@meug.co.nz.

Yours sincerely

Karen Boyes
Major Electricity Users' Group

[19] See MEUG submission here: http://www.meug.co.nz/node/1385

NZIER
NEW ZEALAND INSTITUTE OF ECONOMIC RESEARCH

Emissions Reduction Plan 2026 to 2030

Comment on Energy assumptions and forecasts

NZIER report to MEUG

25 August 2024

About NZIER

NZIER is a specialist consulting firm that uses applied economic research and analysis to provide a wide range of strategic advice.

We undertake and make freely available economic research aimed at promoting a better understanding of New Zealand's important economic challenges.

Our long-established Quarterly Survey of Business Opinion (QSBO) and Quarterly Predictions are available to members of NZIER.

We pride ourselves on our reputation for independence and delivering quality analysis in the right form and at the right time. We ensure quality through teamwork on individual projects, critical review at internal seminars, and by peer review.

NZIER was established in 1958.

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Key points

The Emissions Reduction Plan 2026 -2030 (ERP2) proposals for energy will not make a material contribution to the achievement of the Government goals for a more reliable or affordable electricity supply or promote electrification of industrial process heat over the ERP2 period or beyond for the following reasons:

- The proposed initiatives are high level , indirect and slow acting. The core measure supporting 'Electrify New Zealand' is to accelerate consenting processes so that more renewable generation can be built. This solution presupposes that consenting costs and delays were the sole binding constraint on the construction of renewable energy. ERP2 does not assess the expected impact of the change to consenting on the timing of investment in renewables, despite recent examples from the COVID-19 (Fast-track Consenting) Act 2020 and Natural and Built Environment Act 2023.
- Expansion of renewable wind and solar generation does not improve the affordability or the reliability of the electricity supply without an accompanying policy to deliver reliable and low-cost firming of the intermittent output provided by wind and solar.
- In addition to the flow-on effects of recent very high wholesale electricity prices into futures contract prices[1], delivered electricity prices are increasing because of increases in the cost of transmission and distribution under the price quality paths for 2025 to 2030 currently being reset by the Commerce Commission.
- The modelled carbon cost of $50 to $70 per tonne of CO2e is similar to the range over which the market has recently operated and will not lower the cost of thermal generation and therefore will not lower the impact of the thermal generation costs on wholesale electricity prices.

The two other key ERP2 policies that potentially affect the affordability and reliability of electricity are '10,0000 public electric vehicle (EV) chargers' and 'carbon capture, utilisation and storage (CCUS)'.

- The capacity of the '10.000 public EV chargers' is not stated in the policy but achieving this target could potentially increase electricity demand during the day which would place additional demand on scarce controllable generation capacity and fuel required for firming of renewables.
- Carbon capture, utilisation and storage (CCUS) is in the early stages of development. Assuming that the measure is successful, its main initial impact seems to be to encourage the use of Maui East gas and lower emissions from geothermal fields. The availability of Maui East gas may improve the outlook for the supply of gas and reduce the need to burn coal for thermal electricity generation. However, the policy does not comment on the outlook for the cost of gas supply to electricity generation.

[1] The futures prices affect the average prices high volume electricity users are likely to face for electricity and flow though to commercial and residential consumers over a three-year period.

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1 Scope

1.1 Overview

This report comments on policies for the emissions reduction plan for the periods 2026 to 2030 (ERP2) and 2031 to 2035 (ERP3) for the energy sector in the Discussion Document[2], Technical Annex[3] and excel spreadsheets including Emissions in New Zealand (ENZ) results[4]. The ENZ results report the emissions drivers for baseline and low and high scenarios in detail but only reports aggregate emissions reductions for the new policies. This makes it difficult to make precise statements about what the ERP2 Policies are expected to deliver.

> *The Ministry for the Environment will publish official projections based on agency models later this year, which will provide an updated baseline projection for ERP2. This is expected to produce different results from those using the ENZ model.* [5]

The report 'Economic Impact of New Zealand's Second Emission Reduction Plan'[6] is not covered by this report.

1.2 Focus on energy

Chapter 5 of the Discussion Document describes the ERP2 initiatives for energy in general terms, with information on specific initiatives in various sections of the Technical Annex.

The Government 'work underway' described in Chapter 5 to 'ensure security of New Zealand electricity supply', 'promote the affordability of New Zealand's electricity supply' and 'enable energy efficiency and smarter electricity system' (see page 54) is unlikely to deliver material improvement in the affordability or reliability of electricity supply over the ERP2 period. The Technical Annex provides more detail on three specific measures: streamlined consenting processes, more public EV chargers and CCUS. Our comments focus on:

- The likely effect (timing and materiality) of the interventions for 'Energy' and '10,000 public EV chargers' and CCUS proposed in 'Appendix 2 Intervention logic mapping'
- The relevance and consistency of the assumptions for 'Industry and Energy' in Appendix 1: Baseline assumptions to the current state of the wholesale market.

We also comment on the current conditions in the wholesale market with respect to both prices and reliability of supply, how they discourage electrification and how the underlying

[2] Ministry for the Environment. 2024. *New Zealand's second emissions reduction plan (2026–30): Discussion document*' available at https://environment.govt.nz/publications/new-zealands-second-emissions-reduction-plan-discussion-document/

[3] Ministry for the Environment. 2024. New Zealand's second emissions reduction plan (2026–30): Technical annex to the discussion document. Available at https://environment.govt.nz/publications/new-zealands-second-emissions-reduction-plan-technical-annex-to-the-discussion-document/

[4] 'ENZ results used for the Tech Annex', available at https://environment.govt.nz/assets/2024-07-ERP2-results-summary-for-consultation-document.xlsx

[5] Discussion Document, page 9. This paragraph in the report also explains that the ENZ model was used to model the ERP2 baseline because the cross-government models could not be re-run in time. The ENZ model has also been used by the Climate Change Commission for its advice including its Demonstration Pathway.

[6] Principal Economics Limited in collaboration with The Centre of Policy Studies and Infometrics Limited, May 2024, '*Economic Impact of New Zealand's Second Emission Reduction Plan, REPORT TO 'Ministry for the Environment*' available at https://environment.govt.nz/assets/Economic-impact-of-Emission-Reduction-Plan-2-Principal-Economics-Limited-230524-Final-Preliminary-Report-1.pdf

problems will not be addressed by the measures proposed in the ERP 2026-30. This analysis is supported by:

- A high-level comparison of the most recent Climate Change Commission modelling for electricity generation and average prices with the recent out-turn.
- A high-level estimate of the increased requirement for firming capacity as the proportion of electricity suppled from wind and solar generation is increased.

2 Emissions Reduction Plan 2026 to 2030

2.1 Discussion Document

The Discussion Document summaries the ERP2 key policy proposals for 'interim projected abatement' are summarised in Table 0.1 along with their projected effect on emissions. The ERP2 strategy is based on 5 pillars which are to be delivered by:

- System plans to: strengthen the New Zealand Emissions Trading Scheme (ETS) and fund climate change mitigation.
- Sector plans for: energy, transport, agriculture, forestry and wood processing, non-forestry removals[7] and waste.

The chapters on the system and sector plans include a description of work and initiatives in addition to the key policies listed in Table 0.1.

2.1.1 ERP2 Discussion Document Table 0.1 – key policies and abatement

The key ERP2 polices for energy are reproduced in Table 1 below with a brief comment on the contribution of the policy. There is minimal description of the causal chain between the measure and the expected outcome, the time required for the measure to have an impact, quantification of the intermediate objective or strong evidence that the policy removes a binding constraint on the intermediate objective for these policy proposals.

[7] Other methods of carbons sequestration that do not rely on planting trees and include coastal vegetation management, bioenergy with carbon capture. See Discussion Document page 84

Table 1 Key policies proposed for ERP2

Emissions reductions measured in million tonnes of carbon dioxide equivalents (Mt CO_2e)

Policy	Contribution to ERP2	Interim emissions reduction (Mt CO_2e)		Comment
		ERP2	ERP3	
Electrify NZ – reduce consenting burden	Faster and cheaper consents for renewable electricity generation will support greater investment in renewable electricity capacity and grid infrastructure.	0.1	1.6	Presumably will be delivered through the Fast Track Approvals Bill. Strongest benefit to reconsenting existing generation. Impact on new generation is minimal.
Investigate carbon capture and storage (CCUS)	Reduce barriers to carbon capture, utilisation and storage (CCUS), including by establishing a monitoring and liability regime and exploring NZ ETS treatment of CCUS.	1.4	3.2	Very fast and substantial impact for a policy that will require regulation and industry setup. No discussion of whether CCUS or production cost is the binding constraint on the use of new gas discoveries .
Target 10,000 electric vehicle (EV) chargers by 2030	Facilitate private investment in EV charging infrastructure, and review Government co-investment approach to ensure it is fit for purpose and targeted to the area where market barriers exist.	0.01	0.2	Delivers a small increase in EV uptake. No obvious consideration of the additional demand for capacity (potentially 380 to 800 MW) created by the by the use of more public EV chargers during the day or how this will affect system ability to meet peak demand.

Source: Discussion Document, Table 0.1, page 15

2.1.2 ERP 2 Chapter 5

The energy pillar for ERP2 is 'Pillar3: Clean energy is abundant and affordable' . The approach to delivering Pillar 3 is described in Chapter 5 and is based on driving '*investment in renewable energy using the ETS and cutting red tape'* (making consent processes cheaper and faster) in support of the Government's goal to double renewable energy (by 2050).[8]

Chapter 5:

- Identifies the share of CO_2 emissions from sectors that are well suited to electrification (stationary energy used in buildings, food processing (low and medium heat) and light and medium duty vehicles) [9]
- States the Government is committed to '*providing the regulatory certainty and a credible, level playing field to enable private investment in energy*.'[10] and with respect to energy supply in general (including comment on gas supply), '*The Government's role is to provide certainty for the private investment that maintains a secure supply of energy*'[11]

[8] Paraphrased from Discussion Document' page 27.

[9] Discussion document page 50

[10] Discussion document page 51

[11] Discussion document page 52

- Refers to 'Electrify NZ', states that details of the work programme will be released soon and notes that *'Industry, businesses and households need a secure and affordable electricity supply to choose to switch to electric technologies, …. more efficient use of electricity and greater deployment of smart devices … will …. reduce the need for future upgrades of electricity generation and networks …. coal and gas to meet peak demand'*[12]
- Lists work the Government has underway to ensure security and promote affordability of the electricity supply and enable energy efficiency and a smarter. The initiatives are summarised in Table 2 below.

[12] Discussion document page 53

Table 2 Government work underway on Pillar 3

Key tasks allocated for each area of Pillar 3

Area	Task	Comment
Security of supply	Enabling environment for investment in gas production – including enabling CCUS	Aside from CCUS allowing use of Maui East Gas and reducing geothermal emissions, there is no comment on the impact of this policy on the outlook for gas supply of prices or availability.
	Reduce severe weather damage to infrastructure – including regulations to increase separation between trees and powerlines.	No further quantification of the impact of severe weather damage or the benefits of the proposed policy.
	Enable new fuels and technology – including improved market access for grid scale batteries and demand response.	Grid-scale batteries are already under construction. Their contribution to managing peak demand risk is limited by modest capacity, high cost and potentially different regulatory approaches electricity distribution businesses (EDB) and other owners.
Promote electricity affordability	EA will work to ensure electricity markets are as efficient as possible, to get the best price for consumers	Nothing specific in these policies to say what the EA can or will do to increase the supply of controllable flexible generation, let alone lower wholesale prices.
	Enabling innovation to create a least cost transition path and new ways for consumers to save.	No further detail in the rest of the document.
	Minimise the impact on those least able to pay – including support for Warmer Homes programme	No further detail in the rest of the document.
Energy efficiency and a smarter electricity system.	Strengthen energy efficiency and demand flexibility regulatory regimes	Energy efficient programmes are well established. The chapter does not explain what strengthen means. Industrial demand flexibility is in place but further expansion is hampered by the gap between the cost to industry of scaling back production and the value offered by the market for curtailment of industrial demand. Much more work is required to develop meaningful new residential demand response than changing regulatory regimes.
	Enable standards to be set for devices with demand flexibility capability.	This avoids a potential future problem with increased severity of peak demand as use of EV chargers and other devices increases.
	Explore tariff redesign to encourage residential uptake of rooftop solar and batteries	No comment on what contribution residential solar and batteries could make to reduction of peak demand.

Source: NZIER

2.2 Technical Annex

The Technical Annex provides three sets of information that are relevant to this report:

- Baseline modelling of the emissions projections under ERP2 without the new policies described in Table 0.1 of the Discussion Document. The ERP2 modelling is compared to previous climate change modelling for both the generation stack and electricity generation output below in section 2.2.1
- The projected impact of the potential policies that may be introduced as part of ERP2 on the level of emissions for energy and other sectors. The emissions projections are presented as a change in emissions over the length of ERP2 and ERP3 and are not accompanied by any modelling of the assumed supporting change in generation mix or output. The potential polices for energy are those described in Table 0.1 of the Discussion Document. The measures outlined in Chapter 5 and summarised in Table 2 above are not associated with a quantified impact on emission reductions.
- Assumptions for the baseline ERP2 modelling, a description of the intervention logic for each of the policies and the assumptions used for modelling the impact of the potential policies described in Table 0.1 of the Discussion Document on the emissions projections.

Essentially the Technical Annex describes the modelling of the baseline emissions and the energy sector without including the impact of the proposed key policies. Neither the Discussion Document nor the Technical Annex provide a direct quantitative estimate of the impact of the potential policies on either the level or mix of electricity generation.

For example:

- The comments on streamlined consent processes do not include a comparison of the reduction in consenting costs to the recent increase in the cost of wind and renewables or an estimate of how much the changes (lower cost and faster consenting times) might increase construction of grid scale solar and wind farms compared to the ERP2 baseline.
- As already noted, the comments on increasing the number of publicly available EV chargers to 10,000 does not include either an estimate of the increased daily load or energy required but does include an assumption about faster take-up of EVs.
- The description of the CCUS policy suggests it will make an additional supply of gas (from Maui East and Kapuni) available and a substantial part of this additional supply will be used by Methanex to increase production toward capacity (rather than mothball its plant). However, it does not comment on:
  - The price at which this new supply would be available to Methanex.
  - How a more certain future for Methanex will improve the affordability and reliability of gas supply for existing thermal electricity generation.
  - Whether the change in gas market conditions would be expected to either delay the planned retirement of existing thermal capacity or encourage the construction of new thermal capacity.

2.2.1 Comparison with previous generation forecasts

The ERP2 Discussion Document refers to the need to double renewable generation by 2050 to meet the demand for electrification of light vehicle transport and low to medium industrial process heat. However, neither the Discussion Document or the Technical Annex quantify the size and scope of the change in electricity wholesale prices or generation that is required in over 2026 to 2035. The following tables give an indication of the gap between generation capacity modelled as part of the 2021 and 2022 Climate Change Commission 'Demonstration Path' and the baseline modelling for ERP2 and ERP3 (the modelled outlook excluding ERP2 policy changes).

The average wholesale electricity prices modelled in the Climate Change Commission (CCC) advice for 2021 and 2022 were both below $100 per MWh for nearly all of the period 2025 to 2035, compared with recent (over the first 6 months of 2024) average wholesale prices of in excess of $150 per MWh and futures prices at or above for this level for contracts over the next two years. The CCC generation modelling was based on the expectation that the lower levelized cost of electricity of new renewables (primarily wind and solar) would lower wholesale electricity price over time.

The percentage increase in electricity generated from 2025 to 2035 under the Climate Change Commission (CCC) advice (22 to 25 percent)[13] is much more rapid than under the ERP2 baseline (8 percent):

- CCC 2021 advice: 40.3 TWh in 2025 to 44.7 TWh in 2030 and 50.3 TWh in 2035.
- CCC 2022 advice: 44.7 TWh in 2025 to 48.8 TWh in 2030 and 54.7 TWh in 2035.
- ERP2 advice: 39.3 TWh in 2025 to 39.8 TWh in 2030 and 42.01 TWh in 2035.

The differences in expected growth in generation output between these plans are reflected in the differences in the modelled construction of renewable generation in the CCC advice and ERP2 as shown in the following tables.

Table 3 shows that ERP2 and CCC advice use similar modelling of home solar but that there is a substantial difference between the CCC advice 2022 modelling for utility solar and both CCC 2021 advice and ERP2. The difference in utility solar capacity in 2035 of just over 1,500 MW between the CCC 2022 and ERP2 modelling is equivalent to about 2.6 TWh of generation.

[13] The CCC modelling for both 2021 and 2022 almost doubles renewable generation in 2050 compared with 2025.

Table 3 Renewable generation capacity - home and utility solar

Capacity in MW

	Solar – home			Solar utility		
Year	CCC 2021	CCC 2022	ERP2	CCC 2021	CCC 2022	ERP2
2022	44	31	229	0	16	0
2023	78	62	303	0	55	0
2024	114	99	351	0	55	118
2025	156	139	399	0	133	295
2026	203	184	445	0	133	295
2027	253	232	492	0	168	295
2028	307	283	539	0	404	295
2029	362	335	586	200	460	295
2030	420	390	634	200	860	295
2031	481	449	682	400	1,010	295
2032	549	510	730	400	1,210	367
2033	610	568	778	500	1,460	485
2034	674	629	827	950	1,710	597
2035	741	693	876	950	2,210	708

Source: NZIER

Table 4 shows that ERP2 and CCC advice use similar modelling for geothermal capacity but that there is a substantial difference between the CCC advice (2021 and 2022) modelling ERP2 modelling for wind generation capacity. The difference in wind generation capacity in 2035 between ERP2 and:

- CCC 2021 of just over 1,455 MW is equivalent to about 5.1 TWh of generation
- CCC 2022 of just over 1,190 MW is equivalent to about 4.2 TWh of generation.

ERP2 does not provide an estimate of how much the proposed reduction in resource consent cost and decision times will increase the available wind and solar capacity by 2035.

Table 4 Renewable generation capacity -wind and geothermal

Capacity in MW

	Wind			Geothermal		
Year	CCC 2021	CCC 2022	ERP2	CCC 2021	CCC 2022	ERP2
2022	1,034	1,002	809	1,019	1,019	1,012
2023	1,210	1,254	912	1,169	1,171	986
2024	1,210	1,254	1,186	1,169	1,171	1,040
2025	1,210	1,314	1,231	1,169	1,171	1,169
2026	1,210	1,544	1,231	1,169	1,251	1,183
2027	1,210	1,710	1,231	1,169	1,251	1,195
2028	1,210	1,810	1,231	1,169	1,363	1,195
2029	1,470	1,910	1,231	1,169	1,363	1,195
2030	1,772	2,094	1,231	1,169	1,363	1,195
2031	2,002	2,094	1,231	1,169	1,363	1,195
2032	2,102	2,414	1,268	1,249	1,363	1,198
2033	2,324	2,414	1,336	1,249	1,363	1,204
2034	2,508	2,644	1,406	1,249	1,363	1,211
2035	2,939	2,675	1,484	1,249	1,363	1,219

Source: NZIER

ERP2 does not provide a forecast or modelling assumption of the wholesale electricity prices for the Baseline, let alone as a result of the proposed policies.

Table 5 Wholesale electricity price

Time weighted average price in $ per MWh and electricity output in GWh

	Price ($/MWh)		Output (GWh)	
Year	CCC 2021	CCC 2022	CCC 2021	CCC 2022
2021	68.96	134.66	43.0	43.5
2022	69.73	132.10	43.2	43.4
2023	70.96	102.34	43.6	43.8
2024	72.26	100.87	44.1	44.2
2025	72.46	96.82	40.3	44.7
2026	72.62	90.45	41.1	45.3
2027	72.77	84.08	41.9	46.1
2028	72.15	82.98	42.7	46.9
2029	72.53	84.86	43.6	47.8
2030	73.95	87.23	44.7	48.8

Source: NZIER

However, the CCC 2021 and 2022 advice did include assumptions for wholesale electricity prices and electricity generation (see Table 5) in the ENZ spreadsheets. The electricity price modelling assumes that the wholesale electricity price falls to the levelized cost of electricity for new wind and solar generation. In both CCC 2021 and 2022 wind and solar deliver the increased output and replace most of the existing thermal and deliver lower wholesale prices. This has not been consistent with the recent experience in the market. The ERP2 Baseline does not comment on this disparity.

2.2.2 Modelling assumptions

The ERP2 Discussion Document and Technical Annex do not identify specific reasons for the difference in the modelled outlooks for generation output and capacity between the CCC advice and ERP2, but makes two observations about the effect of resource consent processes on the construction of new generation:

- The problem definition for resource consenting is: *The Infrastructure Commission estimated that New Zealand is on track to miss between 11 per cent and 15 per cent of the emissions reductions required from the energy and transport sectors by 2050 due to consenting delays, and a 50 per cent reduction in projected consent processing times is required from 2028 to meet New Zealand's net zero targets by 2050. New Zealand Infrastructure Commission The Waihanga. Infrastructure consenting for climate targets. Retrieved 5 July 2024.*[14]
- The policy modelling assumption for the change to consenting processes is: *Assume a halving in consenting costs (about 2% to 5% of capital costs) for renewables generation but no change to completion time of new build. Base consenting cost assumptions ($ per kW): hydro $116; geothermal $98; onshore wind $116; offshore wind $139; solar $69.*[15]

A reduction in consenting delays and costs will remove disincentives to construction of large projects but the comments do not estimate the contribution of resource consent delays and costs to the current market situation. Consenting delays do not seem to be binding constraint on investment in the transmission and distribution network – shortage of skilled labour and competition for specialist equipment seem to be the binding constraint on the deliverability of the substantial investment in the network proposed by both Transpower and the electricity distribution businesses.

2.2.3 EV charger impact on peak demand

Making 10,000 EV chargers available for public day time charging has the potential to increase the daytime peak demand by 380 to 800 MW based on the following assumptions:

- All the chargers are used to their full capacity simultaneously.
- The number of chargers increase from 1,248 (the number reported[16] by the Energy Efficiency and Conservation Authority (EECA)) up to March 2024 to 10,000 by 2030 – ana increase 8,752.

[14] Ministry for the Environment. 2024. 'New Zealand's second emissions reduction plan (2026–30): Technical annex to the discussion document., Appendix 2: Intervention logic mapping' page49

[15] Ministry for the Environment. 2024. 'New Zealand's second emissions reduction plan (2026–30): Technical annex to the discussion document., Appendix 3: Assumptions used in policy modelling' page 63

[16] See 'EECA Public EV Charger Dashboard' available at https://www.eeca.govt.nz/insights/data-tools/public-ev-charger-dashboard/

- The distribution of additional chargers by capacity follows the same distribution of the capacity of chargers already installed.
- The lower and upper bands of the capacity classification used by EECA are used as an estimate of the lower an upper capacity of all the chargers in that class. (For the capacity class '175-475 kW (ultra-rapid multi-phase)' the upper limit is assumed to be 300 kW rather than the 475 kW reported on the EECA 'Public EV Charger Dashboard' and stated in Table 6. This adjustment is based on inspection of the data for individual chargers reported with the EECA dashboard.

Table 6 EV charger

Analysis of capacity data

Capacity band	Number of chargers	Share
3-10 kW (slow single phase)	148	11.9%
11-24 kW (moderate multiphase)	292	23.4%
25-74 kW (fast multiphase)	468	37.5%
75-174 kW (rapid multi-phase)	207	16.6%
175-475 kW (ultra-rapid multi-phase)	133	10.7%
Total	**1,248**	

Source: NZIER

Currently winter demand has peaks in the early morning (6:30 am to 8:30 am) and evening (5:30 pm to 8:00 pm) with a trough between these two peaks. Roughly speaking:

- Full use of 380 MW of EV charger capacity during the day would keep demand levels near the morning peak during the day and fill in most of the trough.
- Full use of 800 MW of EV charger capacity during the day would create a new peak during the day that was at above the morning and evening peak.

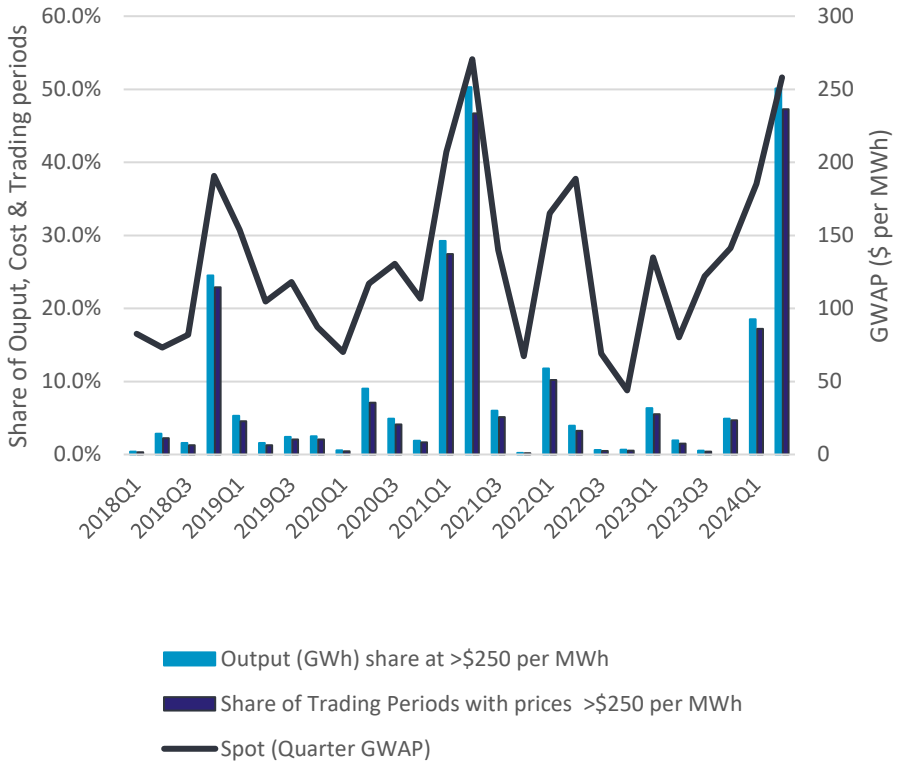
3 Wholesale market response to lack of firming

3.1 Recent electricity price volatility

Quarterly generation weighted average prices (GWAP) have varied between $50 per MWh and $270 per MWh over the period 1 Jan 2018 to 30 June 2024 as shown in Figure 1below. The key features of the data are:

- Wholesale prices have averaged just under $130 per MWh over the period shown in the chart, with quarterly average prices above this $130 per MWh for 12 of the 26 quarters and above $100 per MWh for 17 of the last 26 quarters.
- Spikes in average quarterly prices in 2019 Q1, 2021Q1 to 2021Q2, 2022Q1 to 2022Q and 2023Q4 to 2024Q2 are associated with a share of the number of trading periods with prices above $250 per MWh above 10 percent of trading periods.

Figure 1 Wholesale electricity price volatility



Source: NZIER

Analysis of the distribution of average wholesale prices during price spike periods suggest two price distribution patterns:

- Across the board lift - a generalised period of high wholesale prices across most trading periods such as 2018Q4, 2021Q1 to 2021Q2 and 2024Q1 to 2024Q2 (and still continuing) where more than 20 percent of trading periods had average prices above $250 per MWh.
- Low price periods squeezed out – a reduction in the proportion of trading periods with low prices below 50 percent without a substantial increase in the share of trading periods with prices above $250 per MWh such as 2019Q1, 2022Q2.

3.2 Challenge of firming renewables

This section provides a simplified example the challenge of firming wind generation based on a coarse (measured in half hourly trading periods) description of the variation in wind output over the quarter ended 30 June 2024.

The key challenge in using wind to meet electricity demand are:

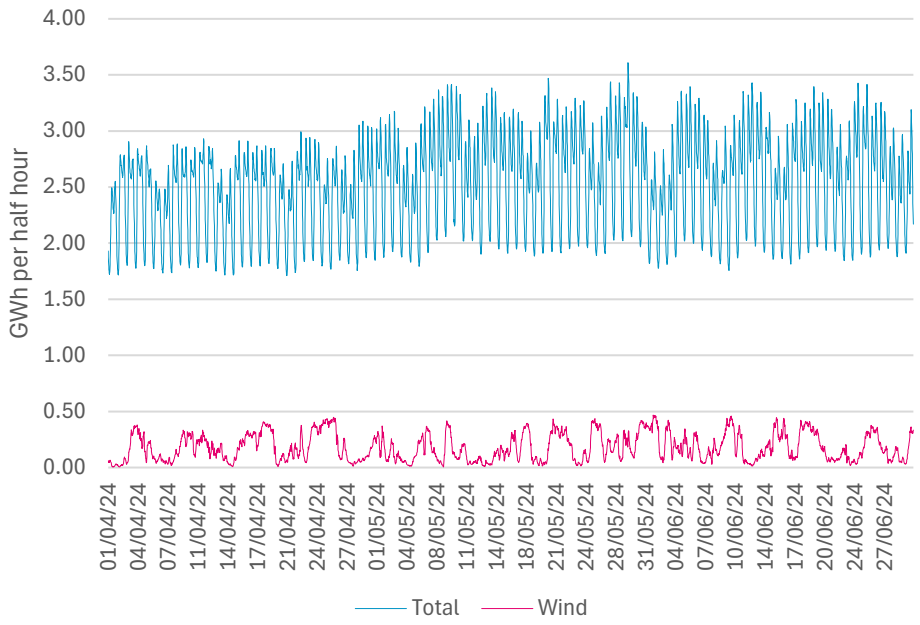
- Wind output averages tend to be similar across all half hour periods which means on average the output does not vary with the daily cycle of electricity demand (see Figure 2).
- Output per half hour can vary widely which means that there can be a substantial requirement for firming at peak and shoulder periods (see Table 7)

- The change in output from one half hour to the next is modest (see Table 8). Nearly all of the changes are within +/- 0.04 GWh. This means wind generation can remain at relatively low levels for an extended period and firming capacity has to be available for an extended period.

Total generation output is a proxy for the total demand that was met by combining baseload and variable generation to meet a fluctuating demand. Barring unforeseen outages, the output from the geothermal, hydro and thermal is predictable and controllable. The following chart and tables illustrate the additional difficulty of using variable wind generation to help meet a fluctuating demand.

Figure 2shows that current wind generation is a small component of the total generation. While fluctuation in total output was dominated by a regular daily and weekly pattern, the wind output is often out of step with this pattern.

Figure 2 Total and wind farm generation



Source: NZIER

Over the quarter ended 30 June 2024:

- Wind output was about 790 GWh (7.2 percent) of total output of 11,000 GWh,
- The maximum change in total output from one half hour to the next was 302 MWh
- The maximum change in wind output from one half hour to the next was 98 MWh.
- The maximum change in wind from one half hour to the next was 32 percent of the maximum change in total output.

Table 7 Wind output per half hour - quarter ended 30 June 2024

Output reported in 0.04 GWh bands with a maximum output of 0.47 GWh

Output band (GWh)	Number of half periods		Total output (GWh)	
	Count	Share	Volume	Share
<= 0.04	449	10.3%	11.8	1.5%
>0.04 and <= 0.08	781	17.9%	46.8	5.9%
>0.08 and <= 0.12	582	13.3%	57.4	7.3%
>0.12 and <= 0.16	451	10.3%	63.0	8.0%
>0.16 and <= 0.20	360	8.2%	64.6	8.2%
>0.20 and <= 0.24	316	7.2%	69.8	8.8%
>0.24 and <= 0.28	281	6.4%	73.2	9.3%
>0.28 and <= 0.32	372	8.5%	112.1	14.2%
>0.32 and <= 0.36	278	6.4%	94.9	12.0%
>0.36 and <= 0.40	330	7.6%	124.8	15.8%
>0.40 and <= 0.44	144	3.3%	60.0	7.6%
>0.44	26	0.6%	11.8	1.5%
Total	**4,370**		**790.1**	

Source: NZIER

Table 8 Half hourly change in wind output - quarter ended 30 June 2024

Output reported in 0.04 GWh bands

Output band (GWh)	Number of half periods	
	Count	Share
>-0.16 and <= -0.12	0	0.0
>-0.12 and <= -0.08	2	-0.2
>-0.08 and <= -0.04	57	-2.7
>-0.04 and <= 0.00	2,197	-20.7
>0.00 and <= 0.04	2,062	21.0
>0.04 and <= 0.08	47	2.5
>0.08 and <= 0.12	4	0.4
>0.12 and <= 0.16	0	0.0

Source: NZIER

The maximum change in wind output from one half hour period to the next of 98 MW would require 196 MW of firming capacity and is a gross estimate of the maximum firming capacity required to cover one half hour period of the current level of wind generation. A more thorough estimate of the need for firming would consider the length of time that wind output would remain at low levels. The

4 Response to consultation questions

Table 9 Chapter 5 Consultation questions

Questions 5.1. to 5.3

Question	Comment
5.1 What three main barriers/challenges that are not addressed in this chapter do businesses face related to investing in renewable electricity supply (generation and network infrastructure)?	Credible action to translate the very high wholesale electricity price signals. Lack of firming capacity to offset variation in the supply of renewables and lack of market instruments to allow the price of this firming capacity to be set competitively. A credible assessment of the options to increase affordable and reliable firming capacity in line with the expected growth in need as both demand for electricity and the reliance on wind and solar to meet that demand increase. A detailed description of measures to design and develop demand response instruments and markets that are credible and affordable alternative to building generation and transmission capacity to cover fluctuations in wind and solar generation.
5.2 How much will the Government's approach to driving investment in renewable energy support businesses to switch their energy use during 2026–30 (the second emissions budget period)?	Increasing investment in renewables will make little difference to ERP2 objectives without additional measures to address both the high wholesale prices and reduced reliability that seem to accompany increased reliance on wind and solar generation without an accompanying increase in firming capacity.
5.3 What three main barriers/challenges do businesses and households face related to electrifying or improving energy efficiency, in addition to those already covered in the discussion document?	Rising energy prices, increased price volatility and reduced reliability of supply. The elevated wholesale prices over the past three years are being reflected in elevated futures prices which are used to set the cost of electricity for large users and also feed through with a lag to retail energy prices. In addition, the recent increases in weighted average cost of capital and inflation are feeding through into the five-year price quality path resets for Transpower and electricity distribution businesses (EDB). These increases in the return on existing capacity will be augmented by the increase in capital expenditure planned by both Transpower and EDB to increase network capacity and develop capability to manage distributed energy resources and demand response.

Source: NZIER

Table 10 Chapter 5 Consultation questions

Questions 5.4 to 5.8

Question	Comment
5.4 How much will existing policies support private investment in low-emissions fuels and carbon-capture technologies?	Indeterminate. In the absence of measures to provide affordable firming capacity for renewables and reduce wholesale electricity prices, electrification of process heat is likely to be slow. The ERP2 baseline does not describe in detail how quickly CCUS could be adopted, what it might cost or how it would address the current gas market supply issues. The gas supply issues include existing field outputs declining faster than expected and uncertainty about the continued operation of Methanex which has 'underwritten' previous
5.5 What three main additional actions could the Government do to enable businesses to take up low-emissions fuels and carbon-capture technology?	The main problem that needs to be addressed to enable affordable and reliable electricity supply is facilitating market solutions to the firming of renewables and management of dry year risk. The current high wholesale prices are not encouraging retention of existing thermal firming capacity, let alone development of new firming capacity. Aside from increased investment in renewables, the main response by gentailers to market conditions and climate change policy are: • Proposals to switch from fossil fuel to biomass which is likely to be more expensive and initially less reliable than fossil fuel. • Increased use of batteries which are not well suited to meeting the extended periods of firming required for wind and solar.
5.6 If you are an electricity generator, please explain and/or provide evidence of how Electrify NZ could affect projects already planned or underway.	NA
5.7 If you are an electricity generator, please explain and/or provide evidence of how Electrify NZ could increase the likelihood that new projects will be investigated.	NA
5.8 Please provide any additional feedback on the Government's proposals to reduce emissions in the energy sector and the industrial processes and product use sector.	The ERP2 Discussion Document and Technical Annex do not provide the basis for commenting on the Government's proposals because they do not fully describe the mechanism by which they will change the outcomes forecast in the ERP2 Baseline. The proposals also do not the address the increasing divergence between the output profile that can be provided by: • Generation assets with a falling proportion of controllable output as most of the new capacity is wind or solar and baseload thermal is retired. • Demand pattern with higher daily and seasonal peaks than now, along with increased daytime shoulder and overnight 'offpeak' demand from EV charging..

Source: NZIER