TRANSPOWER

7 November 2023

Ministry of Business, Innovation and Employment
By email: gastransition@mbie.govt.nz

Gas Transition Plan Issues Paper

We appreciate the opportunity to respond to the Ministry for Business, Innovation and Employment's (MBIE) Gas Transition Plan Issues Paper. Gas-fired generation will be one of a range of resources that will play an important role in the transition to a more renewable electricity system. An orderly transition of gas is therefore paramount to ensure a reliable, affordable transition.

Our submission focuses on Chapter 2 of the Paper. We also provide comments from the perspective of the potential impact on the electric power system.

The current state

New Zealand's electricity system faces both peak and energy demand challenges. Winter-peak demand is increasing, and there is an increasingly tight supply-demand balance to meet current energy needs. As peak demand grows, additional capacity will be needed, and as the contribution from intermittent generation grows so will the need for other resources to maintain supply when there is no wind or sunshine.

Managing security of supply under our current market arrangements

Under the current market arrangements, the electricity industry is responsible for managing security of supply. This role includes investing, contracting and operational planning of:

- generation capability (including the fuel it needs);
- demand-side resources; and
- transmission capability.

Transpower, in its role as the System Operator, is responsible for providing information to the market on security of supply risks to help inform participant decisions to manage these risks. We are also responsible for managing supply emergencies.

Importance of an orderly gas transition to help ensure a reliable and affordable transition to a more renewable electricity system

Gas-fired electricity generation is an important part of the existing generation mix to balance supply and demand and help maintain power system security.[1] Gas-fired generation is one of a range of options to enable an orderly transition to a highly renewable electricity industry. There are no silver bullets. The power system needs to have a range of options that can work across different timeframes to ensure a reliable and affordable transition. If consumers and businesses do not have confidence in a reliable supply of electricity they will be hesitant to invest in electrified technologies. It may be that Aotearoa New Zealand will continue to need gas-fired generation in the system to

[1] In addition to energy and capacity, gas-fired synchronous generation helps to maintain adequate voltage and frequency which is essential for stable operation of the power system.

maintain system stability and address dry year risk until the cost of other renewable technologies make them viable alternatives.

The key points of our submission

The following is a summary of our key points on an orderly gas transition:

- An orderly gas transition is an enabler, along with diverse set of other supply and demand-side options, to get to a more renewable energy supply, while maintaining system reliability and affordability, including reducing the need for extra grid capacity just for peaks.
- Specifically, gas-fired generation can help with peaking, dry year options and power system security[2] with baseload thermal exit. This generation can also manage delays in connecting new renewable generation and batteries (which may be delayed for a variety of reasons including supply chain constraints, consenting/property rights acquisition or delays in transmission build).
- We do not favour approaches that actively incentivise or disincentivise gas use. Active incentives can be to the detriment of other options that could achieve the transition at pace, and in a more affordable way (as well as better utilise resources we already have). Market-based signals, including a well-functioning emission trading scheme (ETS), provides a more durable long-term solution compared to any active disincentives on gas usage.
- We need to get the regulatory and policy frameworks right to support market signals for the uptake of distributed energy resources, energy efficiency and renewables, as well as overcome barriers to the timely roll out of electricity transmission infrastructure.
- These frameworks include market developments that improve incentives for flexible resources, a well-functioning ETS and maturing of the transmission investment test to enable a faster, more certain, and more permissive approach to enabling investment in transmission infrastructure to meet future anticipated increases in electricity demand.[3]
- If specific incentives, outside of market-based approaches, are considered to be required for gas storage, biogas or hydrogen uptakes, the system impact of these would need to be understood and aligned with other incentives provided to other parts of the sector, including for offshore wind.

More detailed analysis of the role of gas in the transition is contained in Appendix B.

Our responses to MBIE's consultation questions are in Appendix A to this submission. Where we have no comment on a question, the question has been deleted.

Please contact Tyler Byers, Senior Strategy Analyst if you have any queries, at tyler.byers@transpower.co.nz.

[2] These include maintaining adequate voltage, frequency and system strength.

[3] See Transpower's submission on 'Measures for Transition to an Expanded and Highly Renewable Electricity System'.

Appendix A: Transpower responses to the consultation questions

Chapter 2: Transitioning our gas sector	
	How can New Zealand transition to a smaller gas market over time?
1	New Zealand is on course for the *Accelerated Electrification* scenario from our *Whakamana i te Mauri Hiko* modelling. Increased electrification of transportation, industrial processes, commercial and domestic heating and cooking needs will be an important feature of a lower emission future. Demand for electricity is expected to grow as electrification ramps up.[4] This growth will require an increase in electricity supply and networks to supply this increasing need, which will take time. A large proportion of the increased electricity supply will be from intermittent renewable generation. Gas-fired generation will be one of a range of flexible resources expected to play an important role in the transition to a more renewable electricity system. This flexibility is important as it: (a) provides sufficient time for new renewable supply, batteries and networks to come onto the system; and (b) reduces use of higher emission fuels (such as coal) during the transition. A gas market that enables this flexibility, without increasing the security of supply risks, is critical for a transition to a reliable, lower cost and lower emission future.
2	**What is needed to ensure fossil gas availability over the transition period?**
	Gas has many uses, including for industrial and domestic use, and for electricity generation. Our response is focussed on the role for gas investment to maintain security of supply. The current Security of Supply analysis (SOSA) highlights the risks to the supply margins falling below the security standards (as specified in the Code) earlier if there is insufficient investment in gas supply. When the standards are crossed, the economic cost of electricity shortfall would exceed the cost of carrying more reserve capacity (i.e. it is economic to invest in more resources). More renewable generation coming online will help increase the margins provided they come to market on time. Hence ensuring sufficient gas to manage this transition is important to maintain adequate security margins and reduce the risk of electricity shortages. See Appendix B for further details.
	What factors do you see driving decisions to invest or wind down fossil gas production?
3	The uncertainty in gas supply and gas demand would be contributing factors in decisions to invest or wind down. On the supply side there is uncertainty on new finds. The gas required for electricity generation is also uncertain. This requirement is dependent on the rate of electricity demand increase, hydrology and the rate of new renewable generation uptake.
4	**Does the Government have a role in enabling continued investment in the gas sector to meet energy security needs? If yes, what do you see this role being?**
	Under the current arrangements, the market is responsible for ensuring security of supply through the spot market and contracting. We prefer market-based incentives, provided there

[4] See Transpower's latest monitoring report here

Chapter 2: Transitioning our gas sector	
	are sufficient incentives and information to reflect the security of supply risks and ability of electricity market participants to manage these risks. See our key points above on the elements we consider are needed to help improve the market incentives and arrangements.
	Fossil gas and electricity
	What role do you see for gas in the electricity generation market going forward?
5	Gas-fired generation, together with other resources, has an important role for the transition as new renewable electricity generation come online, networks are upgraded, and regulation and business models evolve. Gas-fired generation helps to meet security of supply (reliability of supply) and reduces use of higher emission fuels (e.g. coal). The SOSA highlights the importance of sufficient gas supply to maintain security margins above the security of supply standards during the transition (if there is insufficient renewable electricity generation being built).
	What would need to be in place to allow gas to play this role in the electricity market?
6	Gas has an important role to play in ensuring security of supply and peaking capacity during the transition as more renewable electricity generation comes online. Stable policy and markets are important for large scale private investment. There needs to be sufficient incentives and information to reflect the security of supply risks and ability of electricity market participants to manage these risks. See our discussion, in the body of our submission, on the elements we consider are needed to help improve the market incentives and arrangements. The electricity market settings need to be updated to reflect the increased value of flexible resources (spot market and contracts markets).
	Do you think gas can play a role in providing security of supply and/or price stability in the electricity market? Why / Why not?
7	Yes. The recent annual SOSA indicates the risks to maintaining energy and capacity margins above the standards if there is insufficient alternative renewable generation uptake to meet the growing demand and there is reduced gas availability for thermal generation to make up the difference.
	Do you see alternative technology options offering credible options to replace gas in electricity generation over time? Why / Why not?
8	The SOSA highlights the reduced need for fossil-fuelled electricity generation as more renewable electricity generation comes online. Additional peaking capability is needed, which could also be provided by batteries and demand-response. Sufficient network upgrades and support of the power system will also be needed to ensure voltage, frequency and system strength is maintained with less fossil-fuelled synchronous generation. These upgrades will take time. Until there are sufficient alternative resources, gas-fired generation will play an important role during this transition.

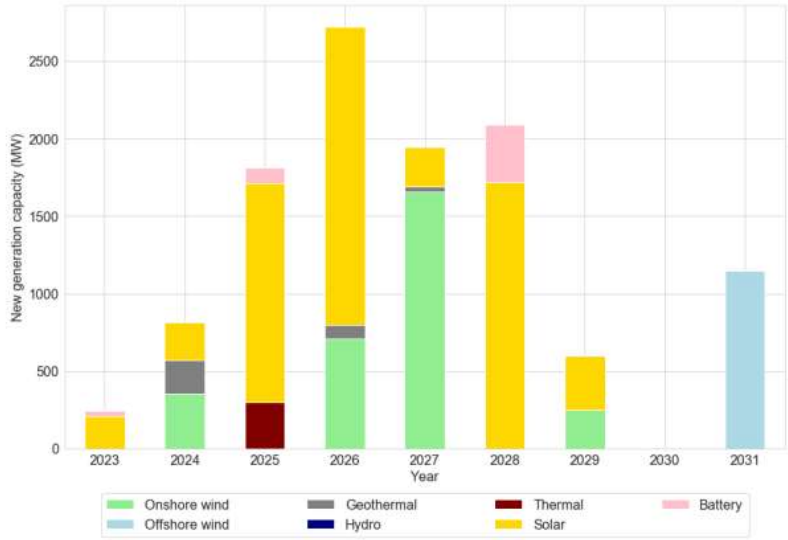
Chapter 3: Key issues and opportunities	
	Renewable gases and emissions reduction technologies
	Do you see biogas being used as a substitute for fossil gas? If so, how?
9	Green hydrogen may be part of the diverse set of options in the future.
	On a scale of one to five, how important do you think hydrogen is for reducing emissions from fossil gas use? Why do you think this?
10	We consider there are opportunities to improve the market incentives and settings, as discussed in the body of our submission. These improvements would signal the system and value the system needs. The future supply pipeline is primarily renewable generation which will, over time, reduce the need for fossil-gas electricity generation (which may include low-emission alternatives).
	Carbon Capture, Utilisation and Storage
	Do you see any risks in the use of CCUS?
11	Increased storage will increase the flexibility of the gas supply. This increased flexibility will help in ensuring sufficient gas-fired generation, even as this generation becomes more uncertain (as more renewable electricity generation comes online in the future and the electricity system transitions away from gas-fired generation). Other forms of demand-side flexibility may also exist to help maintain security of supply.
	Options to increase capacity and flexibility of gas supply
	What should the role for government be in the gas storage market?
12	One of the risks is the increased exposure to world events and global supply issues which could have flow on effects on local gas and electricity markets.

Appendix B: More detailed analysis

An orderly gas transition is an important component of our transition to a more renewable energy system

The proportion of renewable generation in New Zealand has been trending upwards from 2008 and is expected to continue to increase.[5] The majority of the potential future electricity generation pipeline is expected to be renewable, as discussed in our annual security of supply assessment (SOSA) (see Figure 1).

Figure 1: New supply project timeline for the 2023 Annual Security of Supply Assessment's reference case (excludes domestic solar photo voltaic and batteries)



Our annual SOSA also highlights the importance of:

- an orderly reduction of gas for electricity generation; and
- the role of gas as part of the diverse set of resources needed to meet the system energy and capacity margins during the transition.[6]

Table 1 below shows the year the energy and capacity security margins fall below the security standards under the SOSA reference case (which assumes some gas development) versus a future state where there is reduced gas availability for electricity generation (e.g. due to reduced gas investment and reduced gas demand flexibility from industrial gas users when needed for electricity generation).

[5] This increase is consistent with previous analysis undertaken by Transpower (see Whakamana i Te Mauri Hiko).

[6] The energy and capacity margins reflect the resource adequacy standards developed by the Electricity Authority. Being above the standards imply a lower risk of unplanned demand curtailment due to insufficient supply and demand-side resources.

Table 1: Comparison of security margin crossings for reference and low gas availability sensitivity under different resource supply conditions

Supply pipeline scenario	Winter energy margin		Winter capacity margin	
	Reference	Low gas availability for electricity generation	Reference	Low gas availability for electricity generation
Stage 1: Existing and committed resources	2028	2027 (1)	2026	2026
Stage 2 = Stage 1 + Consented and on-hold	2032	2027 (5)	2028	2027 (1)
Stage 3 = Stage 2 + consented on-hold and requiring reconsent	>2032	2027 (>5)	2029	2027 (2)
Stage 4 = Stage 3 + resources where consent is expected	>2032	>2032	>2032	2028 (4)

Table 1 highlights the security margins being breached earlier if there is reduced gas availability for electricity generation. The margins crossing the standards implies increased likelihood of load curtailment. For the winter energy margins, the impact of reduced gas availability in breaching the security margins earlier is reduced when the signalled new renewable resources are built (Stage 4). This situation is not expected for the winter capacity margins because there are insufficient peaking resources in the planned supply pipeline of market participants to compensate for the reduced availability of peaking gas-fired generation.

A disorderly transition, where there is insufficient gas for generation, would introduce risks to both energy and capacity if there are insufficient alternative resources already in the market. This transition would result in reduced reliability (increased chance of load curtailment), increased emissions and costs if more coal-fired generation is needed to make up for the reduced gas availability. If alternative renewable resources are delayed in coming to market this reduced reliability, increased cost and emissions could persist for extended periods, potentially compromising the energy transition given the importance of electricity in the decarbonisation of the wider economy.

The right mix of incentives, policy and regulation is needed to help facilitate an orderly transition

Our preference is to get the regulatory and policy frameworks right to support market signals. We consider this approach is more durable in the long-run. Appropriate frameworks and market signals would enable a more orderly transition and promote a diverse set of options, including uptake of distributed energy resources, energy efficiency and renewables, as well as overcome barriers to the timely roll out of electricity transmission infrastructure.

These frameworks and market signals include market developments that improve incentives for flexible resources, a well-functioning ETS and maturing of the transmission investment test to enable a faster, and more certain and more permissive approach to enable investment in transmission infrastructure to meet future anticipated increases in electricity demand. Transpower's views on the transmission investment test are covered in more detail in our response to the *Measures for transition to an expanded and highly renewable electricity system* paper.

Market developments to value flexibility, improve contracting and information to signal risks
There are several work programmes and market initiatives being considered by the Electricity Authority and its Market Development Advisory Group (MDAG). These programmes include the Future security and Resilience work programme (FSR), Winter 23 initiatives, as well as MDAG's project looking at Price Discovery in a Renewables-Based Electricity System project (MDAG project).

We consider several market developments being considered as part of these work programmes will be important to improve the incentives for new flexible resources, as well as improve the information in the market to help participants better understand future risks and take action. Such action could include contracting or investing. These initiatives are summarised in table 2 below, including their potential impact on facilitating an orderly gas transition.

Table 2: Summary of market-based incentives and improved information that we believe could help facilitate a gas transition

Initiative	**Reference**	**Intention**	**Impact on gas transition**
Standby ancillary service	EA Winter 23 initiative (Option F) MDAG project (Option A4)	Increase the incentives for flexible resources (including supply and demand-side)	Increase investment in peaking resources, reducing the impact on winter peak margins if fossil-fuelled peaking resources reduce in the future.
Update shortage price values	EA Winter 23 initiative (Option I) MDAG project (Option A3)	Increase the incentives for flexible resources (including supply and demand side)	Increase investment in peaking resources, reducing the impact on winter peak margins if fossil-fuelled peaking resources reduce in the future.
Publishing information on the pipeline of new developments, energy and capacity adequacy	MDAG project (Option B3)	Increase visibility of information on future investments and risks	Improve the information to the market on the state of future investment and potential future risks for the market to contract/invest (such as decline in margins from early exit of fossil-fuelled generation).
Reducing risks of disorderly thermal transition	EA FSR work programme (Option G: introducing minimum notice period for plant capacity reductions) Not preferred by the EA, but potential back-stop options: (Option I: contingent contract obligations Option J: strategic reserve Option K: short-term emergency reserves)	Reducing uncertainty in the market from the risks of a disorderly thermal exit. Option G increases information in the market. Options I, J and K go a step further and propose a mitigation measure if such a disorderly thermal exit risk were to become a reality.	Option G: Improves information in the market on the time-to-closure. This option reduces risks of a disorderly exit, as could be the case if there is insufficient gas for electricity generation or the price of gas increases such that it accelerates the exit of thermal generation. Reducing this uncertainty would provide the market more time to find measures to mitigate the negative effects of a disorderly exit (such as contracting with demand-response or investing in batteries to reduce the exposure to peak supply/demand shortfalls) Options I, J, and K could provide sufficient incentives to contract with alternative or existing fossil- fuelled generation. If existing fossil-fuelled generation is contracted it could potentially increase the certainty for investment in gas supply for electricity generation.
Improving demand side flexibility	EA (RTP) – Dispatch notified participation	Reduce barriers to demand-side	Increase the presence of the demand-side in the market. This presence would reduce the need for

Initiative	Reference	Intention	Impact on gas transition
	MDAG project (Option C1) Improve monitoring and information of demand-side flexibility and incentives to increase its uptake (Option C1), which we support together with Option C5 in relation to funding for demand-side trials	participation in the spot market. MDAG: Improve monitoring and information of demand-side flexibility and incentives to increase its uptake.	other resources, including the need for fossil-fuelled peaking generation.
Security of supply information to industry stakeholders should reflect changes to the market and system	Market insight paper by the system operator.[7]	Highlight the changing security of supply risks as we transition to a more renewable system	Improve the information to the market on the state of future investment and potential future risks for the market to contract/invest (such as a decline in margins from early exit of fossil-fuelled generation).

[7] See here.