



COVERSHEET

Minister	Hon Dr Megan Woods	Portfolio	Energy and Resources
Title of Cabinet paper	Managing the phase out of fossil gas and opportunities to repurpose infrastructure for renewable gases: report back and proposed next steps	Date to be published	By 9 June 2022

List of documents that have been proactively released

Date	Title	Author
December 2021	Managing the phase out of fossil gas and opportunities to repurpose infrastructure for renewable gases: report back and proposed next steps	Office of the Minister of Energy and Resources
15 December 2021	Phasing Out Fossil Gas and Repurposing Infrastructure for Renewable Gases: Report Back and Next Steps DEV-21-MIN-0256 Minute	Cabinet Office
20 December 2021	Phasing Out Fossil Gas and Repurposing Infrastructure for Renewable Gases: Report Back and Next Steps CAB-21-MIN-0547.03 Minute	Cabinet Office

Information redacted

YES

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Some information has been withheld for the reasons of confidential advice to Government, and legal professional privilege.

In Confidence

Office of the Minister of Energy and Resources
Cabinet Economic Development Committee

Managing the phase out of fossil gas and opportunities to repurpose infrastructure for renewable gases: report back and proposed next steps

Proposal

- 1 On 6 April 2021, the Cabinet Business Committee requested that I report back to Cabinet, by the end of 2021, on “managing the phase out of fossil gas in the energy system, and on opportunities to repurpose fossil gas infrastructure for renewable gases” [CAB-21-MIN-0099].
- 2 This Cabinet paper constitutes my report back and proposes the development of a Gas Transition Plan along with a number of other complementary proposals. I intend for the Gas Transition Plan to be signalled in the Emissions Reduction Plan.

Relation to government priorities

- 3 The Government declared a climate change emergency on 2 December 2020. In considering this declaration, the Cabinet Business Committee agreed that climate change “demands a sufficiently ambitious, urgent, and coordinated response across government to meet the scale and complexity of the challenge” [CBC-20-MIN-0097 refers].
- 4 Enabling an equitable transition to a low-emission, climate resilient future is also a Government priority. This was emphasised by the Cabinet Business Committee when they noted the intention to “put the climate at the centre of government decision-making” and agreed that “climate change requires decisive action by all levels of government, the private sector, and communities” [CBC-20-MIN-0097 refers].
- 5 The ongoing development of the first Emissions Reduction Plan (ERP) will work towards delivering on the Labour and Green Parties’ agreement to achieve the purpose and goals of the Climate Change Response Act 2002.
- 6 I intend for the proposals in this paper to be complementary to our broader work to act decisively on climate change, and to ensure an equitable transition for fossil gas that mitigates implications for consumer wellbeing and energy security as we transition.

Executive Summary

- 7 On 6 April 2021, the Cabinet Business Committee requested that I report back to Cabinet, by the end of 2021, on “managing the phase out of fossil gas in the energy system, and on opportunities to repurpose fossil gas infrastructure for renewable gases” [CAB-21-MIN-0099].

- 8 My report back is set out in Part One of this paper. My proposed next steps are set out in Part Two.
- 9 Both parts have been informed by the Climate Change Commission’s final advice to Government, a report from the Gas Industry Company (GIC) on gas market settings in the context of the transition to a net zero emissions economy, and a report from a Gas Infrastructure Future Working Group on the potential transition challenges and opportunities for gas infrastructure as we transition.
- 10 In 2020, the use of fossil gas in Aotearoa New Zealand contributed to approximately 10 per cent of our carbon emissions. As set-out in Part One of this paper:
- 10.1 We need to focus on the phase-out of fossil gas to support decarbonisation of the wider economy, and in doing so we need to continue to manage the three dimensions of the energy trilemma energy security, environmental sustainability, and energy equity;
- 10.2 The phase-out of fossil gas will present both short and long-term challenges for balancing the trilemma, including a need to balance continued capital investment with reducing fossil gas use, rising fossil gas prices for consumers, stranded asset risks, and the potential for large transition costs (for both consumers and the Government); and
- 10.3 There are opportunities to repurpose current infrastructure for renewable gases (such as biogas and green hydrogen) to support hard-to-abate sectors, and lower transition costs for fossil gas consumers – but further work is required to understand their potential.
- 11 The primary proposal set out in Part Two is the development of a Gas Transition Plan (the Plan) to articulate the transition pathway for the phase out of fossil gas, and for where and when renewable gases may be required to offset fossil gas use.
- 12 I intend to signal the development of this Plan in the final ERP. The Plan will be a key input into the development of an Energy Strategy. The Plan will focus on the first three Emissions Budget periods, out to 2035, while signalling the longer-term pathway out to 2050. It will be focused and technical, and may include investigating what further interventions may be required to better enable renewable gases (for example, a renewable gas mandate).
- 13 I intend to develop a Terms of Reference (ToR) that will set out the scope, timing and outcomes for the Plan. The ToR will also set out the proposed approach to how the Plan will be developed with iwi and Māori, informed by advice from Te Arawhiti. It will also be important to work closely with industry and other stakeholders, as this will help to build confidence and buy-in to the proposed pathway.
- 14 The ToR will be informed by the feedback received from these groups during the ERP consultation process. I intend to seek Cabinet agreement to the ToR ahead of the publication of the final ERP by 31 May 2022.

- 15 Separately to the development of the Plan, I also propose reviewing the Government Policy Statement on Gas Governance (the strategic guidance for the GIC), and other proposals that will be incorporated into ongoing work in the Energy and Resources Portfolio, for example the on-going work around the transition to 100 per cent renewable electricity.

Background

- 16 On 6 April 2021, the Cabinet Business Committee requested that I report back to Cabinet, by the end of 2021, on '*managing the phase out of fossil gas¹ in the energy system, and on opportunities to repurpose fossil gas infrastructure for renewable gases*' [CAB-21-MIN-0099].
- 17 Part One of this paper constitutes this report pack. Part Two sets out my proposed next steps.
- 18 The report back and proposed next steps have been informed by the Climate Change Commission's (the CCC's) final advice: *Ināia tonu nei: a low emissions future for Aotearoa* which made several recommendations for addressing the fossil gas sector's industry's emissions. These are attached at Appendix One.
- 19 On 13 October 2021, a consultation document was released on proposed policies for inclusion in the Emissions Reduction Plan (ERP), which included several consultation questions on phasing-out fossil gas. I intend for the proposals in this paper, if agreed to, to be signalled in the ERP and for the feedback on the consultation document to be used to inform the implementation of these proposals.
- 20 Two other reports have also informed the report back and proposed next steps:
- 20.1 The Gas Market Settings Investigation Report. This is the final report from an investigation the Gas Industry Company (GIC) performed to ensure that current market, commercial, and regulatory settings that provide for gas availability and flexibility are fit-for-purpose in supporting the transition. I commissioned this report in December 2020, and I received a final report on 1 October 2021;
- 20.2 The Gas Infrastructure Future Working Group – Findings Report. The Gas Infrastructure Futures Working Group (GIFWG) is comprised of fossil gas infrastructure companies and has produced a Findings Report on the future of fossil gas infrastructure in Aotearoa New Zealand. This report was not commissioned by Government and was developed to complement the GIC's report, with a focus on gas infrastructure.
- 21 I have attached the recommendations for both reports at Appendix Two of this paper.

¹ The CCC has adopted the term 'fossil gas' over natural gas. Both of these terms refer to the use of methane gas as a fuel. The term fossil gas is used in this paper to be consistent with the CCC and the terminology intended to be used in the Emissions Reduction Plan.

Part One: Report Back

We need to continue to focus on the phase-out of fossil gas to support decarbonisation of the wider economy

Fossil gas is used across a range of sectors and contributed to approximately 10 per cent of our emissions in 2020.

- 22 Fossil gas is still used in a range of hard to abate sectors (such as high temperature process heat), or by groups where transition costs and risks may be significant (for example, commercial/residential consumers). It also has a role in supporting the electricity system, particularly during years where hydro storage may be low.
- 23 Liquefied Petroleum Gas (LPG) is also co-produced alongside fossil gas. It is sold in a separate market to fossil gas, and is used in rural communities, homes and for things like BBQs. Due to this co-production, the supply of fossil gas affects the availability of LPG (particularly in the North Island).²
- 24 I have attached at Appendix Three an overview of fossil gas consumers and their relative contribution to emissions.

Aotearoa New Zealand is starting from a strong position for phasing-out fossil gas

- 25 We already have a highly renewable electricity system, with renewable generation consistently around 80 to 85 per cent of electricity generated every year (dependent on hydrology).
- 26 Due to Aotearoa New Zealand's abundant renewable resources, we have potential to better enable our deployment of renewable energy. This places us in a different position to some other countries, where replacing coal fired electricity generation with fossil gas generation can offer significant emissions reduction potential.

We have started the work needed to support the phase-out of fossil gas

- 27 We began the phase-out of fossil gas from our energy system in earnest by prohibiting new petroleum exploration outside of the onshore Taranaki region, while ensuring that existing fields can continue to operate until the end of their operating lives. This has sent a long-term signal to the industry about the need to transition.
- 28 We have also committed to holding three more rounds of Block Offer (the competitive tender process for awarding permits) under the Crown Minerals Act 1991. Two of these (2018 and 2019) have been completed, with the 2020 round currently underway. **Constitutional conventions**
- 29 The National Direction for Industrial Greenhouse Gas Emissions (GHG) under the Resource Management Act 1991 will seek to improve the efficiency of fossil gas

² LPG is readily imported from overseas to supplement supply. It is primarily imported to support the South Island market, but can also be imported to support the North Island market. This generally occurs in winter to meet peak demand.

used for process heat and encourage investment in low emission alternatives where these are economically viable, while recognising that it will still be required in some applications for some time to come.

- 30 This work will also create a ban on low and medium temperature coal boilers and phase-out existing coal boilers by 2037. This will help ensure that users do not switch from fossil gas to more polluting, but cheaper, coal boilers. There is no phase out date for use of fossil gas and LPG proposed in the National Direction, however the Government has recommended that that National Environmental Standard and National Policy Statement are reviewed five years after coming into force. This means a phase out date for fossil gas could be incorporated into the National Direction at a later date.
- 31 My colleague, the Minister of Building and Construction, is leading the Building for Climate Change Programme which is focused on reducing building-related GHG and ensuring that buildings are resilient to the impacts of climate change. This Programme will assist in reducing the overall level of fossil gas use in our buildings, with the ERP consultation to further inform options as to how to best do this, including through views on the CCC's related recommendations.

As we reduce our reliance on fossil gas, we also need to continue to balance the outcomes for Aotearoa New Zealand's wider energy sector

- 32 Aotearoa New Zealand will need to reduce our reliance on fossil gas to meet our emissions reduction targets. As we do this, we will need to take a system-wide view to minimise implications for how we access energy, and how much it may cost.
- 33 The World Energy Council's energy trilemma index sets out three dimensions that energy systems need to balance:
- 33.1 Energy Security;
 - 33.2 Environmental Sustainability; and
 - 33.3 Energy equity.³
- 34 Aotearoa New Zealand has consistently been ranked among the top in the world across these three dimensions. In 2021, we were ranked as number nine in the world overall.
- 35 Our domestic fossil gas system contributes to our energy security through providing energy diversity (i.e., energy from multiple sources, electricity and gas) which offers resilience benefits. As we do not import fossil gas, we are also not reliant on international markets for supply, but in turn, we cannot readily import it.⁴
- 36 It also supports our electricity system, providing several functions important to the overall system:
- 36.1 Dry year electricity generation;

³ The World Energy Council has renamed energy affordability to be energy equity, to reflect the need to provide universal access to reliable, affordable, and abundant energy for domestic and commercial use.

⁴ Note that we do import LPG, but this is not a ready substitutable for Fossil Gas.

- 36.2 Seasonal firming (i.e., winter electricity peaks); and
- 36.3 Daily/weekly firming of renewables is mainly provided by gas peaking plant
- 37 While work is underway to move towards 100 per cent renewable electricity, and for a renewable replacement to our ‘dry year’ cover (through the New Zealand Battery Project), the timing and pacing of the fossil gas transition needs to work with these initiatives to ensure that security of supply is maintained.
- 38 Other applications of fossil gas, such as use in commercial and residential households will also present challenges, with increasing prices (for example, due to increasing New Zealand Emissions Trading Scheme (NZETS) costs) and other transition costs (e.g., switching of appliances) which may have implications for our performance against the energy equity dimension.

The current fossil gas market is complex

Aotearoa New Zealand's fossil gas supply is provided entirely from Taranaki

- 39 Aotearoa New Zealand's fossil gas supply is provided entirely from Taranaki, with offshore and onshore petroleum fields supplying approximately 300,000 connections.
- 40 New Zealand has a number of fossil gas producers, with three offshore fields at Pohokura, Maui, and Kupe.⁵ The remainder of fossil gas production comes from a number of onshore fields.
- 41 All of the offshore fields approaching the end of their economic lives over the next decade or so. As they decline, this may act to concentrate fossil gas production in fewer fields. This may increase risks associated with individual fields.
- 42 The recent observed market tightness has been driven by gas production decline at New Zealand's major gas field – the Pohokura field. This field has declined in production by over 50 per cent over the past two years due to technical issues. Recent drilling activities, particularly at the Maui field, have helped to alleviate this tightness. Drilling activity to address the technical issues at Pohokura tentatively planned to occur in 2022.

Fossil gas supply development is underpinned by long term gas supply agreements between large consumers and gas producers

- 43 It is estimated that fossil gas producers collectively need to invest, on average, \$200 million per annum into unlocking fossil gas reserves at current consumption rates.⁶
- 44 In recent years there have been significant investments into fossil gas production, with further field development and investment planned. These investments are critical for ensuring that gas reserves can be brought to market.

⁵ The offshore Tui and Maari fields do not commercially produce fossil gas.

⁶ GIC Market Settings Investigation Report, 2021.

- 45 To support these investments, fossil gas producers enter into long-term gas supply agreements with large consumers and retailers to help mitigate risks associated with drilling activities, and to ensure there will be demand for the gas once developed.
- 46 Methanex New Zealand, as the largest consumer of fossil gas (almost 50 per cent), has underpinned investments through a number of large contracts since the mid-2000s. Methanex, at times, has also been able to release fossil gas if required to support electricity demand due to a dry year.

The gas sector operates under a unique co-regulatory model

- 47 The Gas Act 1992 (the Act) provides that Aotearoa New Zealand's gas industry is co-regulated by an approved industry body alongside the government.
- 48 The Government Policy Statement on Gas Governance 2008 (the GPS) sets out the objectives and outcomes that the government wants the GIC to pursue. The GPS outlines that the principal policy objective of the GIC is to: *"Ensure that gas is delivered to existing and new customers in a safe, efficient, fair, reliable and environmentally sustainable manner."*
- 49 Under the Act, the GIC is required to explore industry-led solutions to identified issues, before making a recommendation to the Government that regulations be made.

The gas infrastructure network is regulated by the Commerce Commission

- 50 A high-pressure fossil gas transmission runs the length of the North Island and is operated by First Gas. Some larger consumers, such as Methanex are directly connected to this transmission system. Other consumers are supplied by a network of lower pressure distribution systems that are operated by First Gas, Powerco, GasNet, and Vector OnGas.
- 51 All gas pipeline businesses are subject to Part 4 of the Commerce Act 1986 (Part 4 Regulation) and regulated by the Commerce Commission. Part 4 Regulation is put in place for markets in which there is little or no competition, and little or no likelihood of a substantial increase in competition. This helps to ensure that businesses do not have incentives to reduce quality to maximise profits under their price quality path.

The phase out of fossil gas will present short and long-term challenges

- 52 While our long-term objective for phasing-out fossil gas has been set, the GIC and GIFWC's reports have highlighted that there are a number challenges that the sector will collectively need to address to ensure that we maintain balance across the dimensions of the energy trilemma. Key challenges are discussed below, and a summary table is attached at Appendix Four.

The need for continued investment in gas production while phasing-out fossil gas

- 53 Fossil gas producers and infrastructure providers will need to continue to invest to ensure that fossil gas is available to consumers (particularly larger consumers with different fossil gas demands), while at the same time phasing-out fossil gas. Ensuring that this balancing act is made is a challenge over both the short and long term.
- 54 Gas production is both a function of gas reserves – i.e., what gas has been found under the ground along with on-going investment to extract the gas and inject it into fossil gas infrastructure.
- 55 We are likely to have sufficient reserves to support the transition, but ongoing investment will still be required. Concept Consulting was commissioned by the GIC to undertake a long-term supply and demand scenario analysis out to 2035, and it considered that there are sufficient gas reserves to meet mass market, industrial, and power generation demand until at least 2035. Out to 2027 production could come largely from existing reserves, but beyond 2027 it is likely to require development of contingent resources. This will require additional investment.
- 56 An overview of Concept Consulting’s middle case gas supply and demand study is attached as Appendix Five.
- 57 While investments are continuing currently, the GIC has highlighted that there is a risk that delayed or deferred investments could mean that sufficient reserves are not developed and are unable to support security of supply for electricity generation and major gas users during the transition out to 2030. These are large capital investments that generally require a period of many years for them to make a return. This means that risks around future demand is a key factor in how and if these investments are made.
- 58 The GIC has identified three key factors that are affecting investors’ ability to attract capital to invest, which contribute to the risk of underinvestment:
- 58.1.1 The future demand outlook for gas is uncertain, which reduces investor confidence in being able to earn a return in the longer term. This is made up of the possibilities of large consumers shutting down and uncertainty about how much fossil gas will contribute to the future energy mix;
 - 58.1.2 Decreasing ability to share risks as the size of the industry decreases due to reducing numbers of participants. This increases financial risk exposure for investors, with reduced opportunity for diversification; and
 - 58.1.3 The extent to which policy and regulatory levers will be pulled through the transition and how this may affect the capital return for investors, including changes in both the energy and broader environmental and social context.

Uncertainty for owners of gas infrastructure.

- 59 The GIFWG’s Findings Report, considers two future scenarios:

- 59.1 **Scenario One: Infrastructure wind down** | where gas consumption is phased out and gas pipelines are decommissioned in a safe and orderly way, and all consumers switch to other zero (or low) carbon energy sources.
- 59.2 **Scenario Two: Infrastructure repurposing** | where gas consumption transitions from fossil gas to renewable gases (most likely hydrogen, biomethane or some blend of these) and some or all existing pipelines are repurposed to deliver these green gasses to consumers.
- 60 The Findings Report’s analysis suggests that both scenarios are credible and considers that both justify consideration to “*promote the long-term interests of energy consumers, and New Zealand more generally.*” It identifies two main issues for gas infrastructure:
 - 60.1 **End point uncertainty** – The two scenarios above present quite different futures for fossil gas infrastructure owners.
 - 60.2 **Pathway uncertainty** – there is uncertainty about the pathway to achieve either scenario above. This uncertainty may lead consumers and the sector to make decisions, particularly investment decisions that undermine the ability of either scenario to be realised until it is clearer how the transition will work.

The potential retirement of gas infrastructure and other assets ahead of their technical lives

- 61 Investments in gas appliances and infrastructure are long-lived assets, with payback periods on investments sometimes in the order of decades, for example, gas pipelines have a technical life of 60 to 80 years.⁷
- 62 A stranded asset has suffered from unanticipated or premature write-downs, devaluations or conversion to a liability for the owner. The timing and pace of phase-out of fossil gas may mean that assets are retired ahead of their technical lives. This could occur to varying degrees with both scenarios presented by the GIFWG.
- 63 Gas infrastructure companies are concerned around the future of their investments, and potential returns, with potential disincentives to invest in connections, augmentation, and renewals. This could result in assets being abandoned that would otherwise provide strategic value to New Zealand, such as supporting energy security or support the uptake of zero carbon gases.
- 64 Gas consumer behaviour, particularly for smaller consumers, may be influenced by uncertainty about the future direction, for example, some consumers may have ‘fuel anxiety’ and choose to switch to maintain energy supply. Uncertainty about future direction also influences consumer behaviour. For example, the CCC’s original draft proposal to prevent new residential or commercial connections to the gas network by 2025 had an immediate negative impact on demand for gas appliances, even though this proposal did not appear in the final recommendation.

⁷ GIFWG report: Note that under Part 4 regulation, an assumed life of 45 years is adopted for new assets on a prospective basis for the 2017 to 2022 default price pathway, this reflects a weighted average of lives across assets with longer and shorter lives.

The increasing costs for fossil gas consumers

- 65 There are two elements which affect the affordability of fossil gas for consumers:
 - 65.1 The fixed costs of a gas connection; and
 - 65.2 The price of fossil gas per unit volume consumed.
- 66 Due to economics of scale, larger consumers generally pay less per unit of gas than a residential consumer. At the same time, a residential consumer's gas bills are in large part driven by the fixed costs of their connection. Both the fixed and variable components of these bills can be expected to increase:
 - 66.1 NZETS pricing also flows on to the price paid for gas per unit volume. Some gas consumers are more sensitive to these pricing mechanisms and are more incentivised to switch, others, such as residential consumers may be less sensitive to these price signals to switch and therefore experience higher prices for fuel over time.
 - 66.2 As fewer consumers use gas over time, the remaining consumers (some of which may not have the option or otherwise be in a position to switch) are required to cover the fixed costs of the infrastructure. This creates a 'death spiral' effect, where a smaller number of fossil gas are required to cover increasing costs, further driving reduced fossil gas use. This also increases the costs to gas producers to produce fossil gas.

Implications for fossil gas work force

- 67 Both of the scenarios presented by the GIFWG scenarios will have implications for our workforce. This will primarily gasfitters as the largest component of the workforce who are required to physically inspect and replace gas connections/appliances.
- 68 In the wind-down scenario, there are challenges associated with the number of connections that would need to be decommissioned. The pace and timing of this would affect the workforce constraints experienced. This issue may also be compounded by a reducing number of gasfitters, due to uncertainty around the future of this trade as the use of fossil gas diminishes.
- 69 In the scenario where infrastructure is repurposed, additional training and certification is likely to be required to ensure that gas connections remain safe and reliable. This may be particularly the case if green hydrogen is adopted, due to the different appliances required.
- 70 In both scenarios, retraining will be required for gas fitters to ensure that they are appropriately certified or to ensure that the workforce can find other employment. This will be important for managing implications on the overall wellbeing of the fossil gas workforce.

The uncertain transition costs for consumers and the Crown

- 71 As we decarbonise the fossil gas sector it is clear that both a ‘wind-down’ and ‘repurposing’ scenario, as identified by the GIFWG, will incur some cost for consumers and the government. These costs are likely to be on top of costs associated with the use of fossil gas including increasing NZETS prices and increased prices to cover fixed infrastructure costs as the number of consumers decrease.
- 72 These costs are potentially significant and are likely to fall unevenly across consumers, businesses and the Government. A key challenge is estimating these costs, where, and when they may occur. Such types of costs may include:
- 72.1 Costs to consumers of uptakes of the uptake of renewable gases, these are likely to be perceived as a ‘premium product’;
- 72.2 Costs of required infrastructure upgrades for electricity distribution networks to support switching from gas to electricity. These costs are likely to be spread unevenly, based on the current infrastructure in place⁸;
- 72.3 The costs of appliance switching, and the rates required, in a wind down scenario. The Climate Change Commission projected a cost of \$5.3 billion⁹ for switching all residential and commercial users away from gas to electricity; and
- 72.4 Costs to consumers associated with green gas appliances, particularly for switching to hydrogen.
- 73 Further work to set the transition pathway will assist in determining where, when and for who these costs may fall.

There is an opportunity for our existing infrastructure and expertise to be leveraged to deploy renewable gases

- 74 There is a strategic opportunity to leverage our existing infrastructure and expertise to transition the current fossil gas system to ‘renewable gas’ alternatives as we transition.
- 75 Renewable gases do offer benefits which are in the long-term interests of energy consumers, such as diverse energy supply, and affordability (through reduced transition costs). In future, we may not require renewable gases to meet the level of today’s gas demand as the use of gas overall will in part be displaced by other technologies such as electricity, or biomass.

⁸ For instance, the required electrification of gas consumers in Wellington would add approximately 200MW to 300MW to peak demand, and require between \$380 and \$575 million in network upgrades. It is likely that these costs would be passed on to consumers by lines companies (GIFWG Findings Report, 2021).

⁹ In today’s dollars, this represents approximately 175 million per annum out to 2050. There are also workforce concerns associated with this, with a finite number of gas fitters and concerns about the attractiveness of new staff being trained for a declining market (GIFWG Findings Report, 2021).

Biogas and biomethane are proven substitute for fossil gas with potential to reduce emissions in the energy and waste sectors

- 76 Biomethane is a renewable green methane substitute produced by biologically digesting organic waste materials and upgrading the gas produced. Biomethane is produced by ‘upgrading’ biogas through additional processes to create a pure methane product. Both biogas and biomethane offer opportunities to displace current fossil gas use.
- 77 The use of biomethane can help to minimise transition costs as no infrastructure changes, or changes to appliances for consumers, are required. It would likely be used where other technologies do not provide cost-effective abatement or where electricity or other technologies are not a good alternative for other reasons, for example, home barbeques or restaurant kitchens.
- 78 A recent report from Beca, First Gas, Fonterra and the Energy Efficiency and Conservation Authority (EECA) estimated the following:
- 78.1 That up to 1.6PJ of biomethane is economic at current gas prices¹⁰ utilising available feedstocks (primarily municipal waste including source-segregated food wastes)
- 78.2 That by 2050 there may be up to 19PJ of biomethane available per annum, with a price of \$50 to \$60 per GJ. This potential is largely reliant on utilising currently hard-to-utilise feedstocks like animal manure and crop residue. This is sufficient gas to decarbonise both residential and commercial consumers of fossil gas, who consumed 15PJ in 2020.
- 79 A greater use of biogas, and upgrading to biomethane, would also have spill over benefits for the waste sector, via utilisation of organic waste. It is estimated to be able to prevent up to 95 per cent of the disposal carbon emissions associated with that material going to landfill.¹¹

There are opportunities to accelerate the uptake of biogas and biomethane

- 80 Biogas is currently used at wastewater treatment plants, at a small number of industrial sites, and onsite landfill gas capture. I also understand that Nova Energy utilises a very small proportion of biomethane from landfill gas in its private gas networks.
- 81 The generation of biogas and biomethane is limited by feedstock availability – i.e., access to organic wastes at economic prices. There are various sources that could be used including food wastes, animal manures, wastewater treatment sludge, crop residues, and industrial effluents. These sources have different potentials for biogas and biomethane production, and different costs of production.

¹⁰ From MBIE’s energy pricing data, gas prices for June 2020 to June 2021 were as follows for the different groups of users: Wholesale (\$7.10 per GJ), Industrial (\$7.60 per GJ), commercial (\$15.90 per GJ) and residential (\$36 per GJ) respectively. These figures exclude ETS pricing and GST.

¹¹ Biogas and Biomethane in New Zealand, BECA, Energy Efficiency and Conservation Authority, Fonterra and First Gas, 2021.

- 82 Incentives put in place internationally include:
- 82.1 the development of a credible green gas certification scheme which enables consumers to ‘certify’ that their gas is green when connected to the fossil gas infrastructure. This is currently underway, with the GIC and the industry working to develop such a scheme;
 - 82.2 central government investment in projects via green investment schemes; and
 - 82.3 guaranteed feed-in tariffs and further taxes on top of the NZ ETS scheme for producers of fossil fuels/heavy emitters of GHGs.
- 83 Other approaches internationally include legally binding biomethane grid injection targets, such as in Denmark which currently meets 20 per cent of its gas supply though biomethane, with a goal to reach 100 per cent by 2050.
- 84 Government support could help to scale-up and accelerate the deployment of biogas and biomethane in the short term. Similar opportunities may exist for the development of bio alternatives to LPG, which will be particularly important for decarbonising the South Island, where fossil gas is not currently available. Further work on the biogas economy will also need to consider opportunities for BioLPG.

Green hydrogen is another green gas that can help displace fossil gas, and reduce our emissions

- 85 Green hydrogen is produced from the electrolysis of water using renewable electricity. There is a great deal of interest both domestically and internationally in the use of green hydrogen across a number of applications, including conversion of heavy transport away from fossil fuels, supporting the electricity system, as a feedstock in industrial processes, and creating export opportunities. Most hydrogen produced is made from coal or gas, with green hydrogen presently being a more expensive product to produce.
- 86 In addition to these applications there is an increasing focus on green hydrogen as a substitute for fossil gas for commercial and residential users.
- 87 Work is currently underway to model potential scenarios for hydrogen development in New Zealand as input into a roadmap that will be developed in 2022 as part of the Energy Strategy. I expect this work to provide a clearer picture around the future supply and demand for hydrogen both for domestic use, and for export.

Switching to hydrogen is more challenging than biogas, but has more potential for scalability due to biogas feedstock limitations

- 88 Biomethane is a readily deployable technology which may be able to meet the needs of smaller consumers, such as the residential and commercial sectors.
- 89 Hydrogen is less technology mature and will require a broader transition to a ‘hydrogen economy’ to support its uptake. However, it can support larger users’ transition away from fossil gas. An example of how these changes may occur is the green hydrogen project at Kapuni which will use renewable electricity to generate hydrogen. This hydrogen offsets the need for fossil gas for the production of urea

from Ballance Agri-nutrients and will support the generation of fuel for hydrogen fuel cell vehicles.

- 90 One of the main challenges will include the need to replace appliances to ensure that these are hydrogen ready. There is ongoing research by gas appliance manufacturers in this area, with research and development focused on appliances that can work with both fossil gas and hydrogen. Rinnai, a major gas appliance supplier in New Zealand, has indicated that hydrogen compliant appliances may only cost up to one per cent more than existing appliances.
- 91 Another challenge for hydrogen is that our current regulatory regimes are designed for the use of fossil gas instead of hydrogen. I am focused on ensuring that any regulatory bottlenecks are removed to ensure we can realise the potential for a hydrogen economy in New Zealand.
- 92 Work is underway to evaluate how fit-for-purpose and consistent with international standards the current regulatory settings for hydrogen are, in order to make most of the opportunities presented by green hydrogen. This work will directly help to inform next steps to ensuring that regulations as they apply to green hydrogen, are fit-for-purpose.

There is potential to repurpose current gas infrastructure for renewable gases

- 93 First Gas, the gas transmission system operator, has released a hydrogen feasibility study. This study focused on assessing the feasibility of hydrogen use to blend with fossil gas by up to 20 per cent by 2035, and the possibility of eventual transition to 100 per cent hydrogen by 2050. I note that the 2050 date in this study reflected First Gas's expected capital funding and operational expenditure constraints rather than a minimum achievable date.
- 94 Depending on the section of the industry, or location, the GIFWG's two scenarios of a wind down and repurpose could occur at the same time. For example, it seems clear that distribution networks would likely remain the best way to supply households with renewable gases.
- 95 It is unclear whether centrally producing hydrogen with injection into a high-pressure transmission system is the most efficient way to transport hydrogen to consumers, as in many circumstances it may be more efficient to produce hydrogen in small quantities closer to demand.
- 96 I expect that as these technologies are developed and deployed the best mechanism for transportation will become clear. I consider that there is option value in ensuring that our gas pipelines continue for such a time to ensure that these options can be developed.

Part Two: Proposals to ensure an equitable phase-out of fossil gas

- 97 Part Two of this paper sets out proposals for further work to respond the CCC, GIC and GIFWG reports. The proposals I seek your agreement on the:

- 97.1 Development of the Plan, including measures to incentivise the uptake of renewable gases
- 97.2 Review the Government Policy Statement on Gas Governance 2008 to ensure that the GIC has the appropriate strategic guidance from Government to support an equitable transition.
- 98 I propose to use the ERP to signal what our future work for transitioning fossil gas will look like during the first Emissions Budget Period.
- 99 Part Two also includes a number of proposals to address recommendations from these groups that I intend to progress through other work in my Energy and Resources Portfolio.

I propose to develop a Gas Transition Plan, alongside the energy strategy

The development of a plan for fossil gas' transition pathway has been recommended by several groups

- 100 The CCC has recommended a plan for managing the diminishing role of fossil gas across the energy system, covering associated consequences for network infrastructure and workforce during the transition (recommendation 20.1.d) (Appendix One refers).
- 101 The GIC and GIFWG have also made recommendations for the development of such a plan, noting that it could potentially be included as complementary to, or part of, proposed Energy Strategy (Appendix Two refers).

I propose to begin the development of a Gas Transition Plan (the Plan) after the ERP is put in place

- 102 I seek your agreement to begin the development of the Plan which is intended to articulate a transition pathway for the fossil gas sector.
- 103 I intend for the Plan to primarily focus on the pathway for the fossil gas transition through the first three Emissions Budget Period out to 2035, including what actions may be required from Government. The Plan will also signal the longer-term pathways for fossil gas out to 2050.
- 104 I propose the Energy and Resources Portfolio to act as the lead for developing the Plan, and on fossil gas phase-out more broadly. I intend to continue work with my colleagues around the future of the use of fossil fuels in buildings, process heat, and the regulation of gas infrastructure under Part 4 Regulation.

The development of the Plan will help to provide greater certainty to enable investments in our fossil gas system to continue to support an equitable transition.

- 105 It is intended to be focused and sufficiently technical to outline a realistic – but suitably ambitious – pathway for the fossil gas industry's transition. The Plan will

also provide a framework for understanding the role of Government, and what tools and levers may be required, to successfully drive the transition.

- 106 I intend to work closely with industry on the development of the Plan to it adequately reflects industry's views on a probable future, as well as build confidence in the transition pathway. My officials will work closely with the GIC to leverage its industry expertise and existing industry relationships for the development of the Plan.

The Plan could be used to set outcomes for the transition away from fossil gas

- 107 I propose to adopt the following draft outcomes for the Plan. These outcomes are intended to signal the longer-term pathway for the fossil gas sector, and help to assist with the noted issues around investment:

<p>Sustainability</p> <p>Aotearoa New Zealand avoids decisions or investments that lock in our reliance on fossil fuels in the long-term.</p>	<ul style="list-style-type: none"> Through the transition, the most emissions efficient fossil fuels are used and other more polluting fuels (i.e., coal, diesel) are avoided, including preferential retirement of more polluting plant (e.g., grid-scale diesel generation). The relevant costs of decommissioning fossil gas infrastructure and repurposing fossil gas infrastructure are fully investigated to determine the overall transition costs; Renewable gases are fully investigated and explored, and if viable, deployed at scale to enable decarbonisation of fossil gas applications that are otherwise difficult to fuel switch; and Investments that lock Aotearoa New Zealand into long-term fossil fuel dependency are avoided, with investments that maintain infrastructure option-value maintained.
<p>Energy security</p> <p>Fossil gas continues to support security of energy supply until it is displaced by renewable alternatives.</p>	<ul style="list-style-type: none"> Fossil gas remains available and flexible to support our electricity system as we shift to 100 per cent renewable electricity and progress the New Zealand Battery Project (such as through gas peaking); Gas infrastructure continues to support energy security through fuel diversity, and supports specific applications where gas is appropriate; and The role of renewable gases in supporting energy diversity is explored, and projects assist in supporting this outcome over time.
<p>Energy Equity</p> <p>Adverse and unexpected effects on fossil gas consumers are prevented or mitigated and consumers retain access to affordable, reliable and abundant energy.</p>	<ul style="list-style-type: none"> Transition costs and risks for consumers and the Government are minimised to the extent possible; Consumers are empowered to understand the long-term pathway for fossil gas, and to make informed decisions about their future fuel needs; Adverse and unexpected impacts on fossil gas consumers and other market participants are avoided, and Government will step in to ensure that consumers are protected, and to ensure uninterrupted and affordable access to energy to meet their energy needs if required; and Access to energy for smaller consumers who need gas (difficult to fuel switch) or it is prohibitively expensive to switch will need to be focused on, as the burden of costs is

	most likely to fall upon these groups with limited impact on our emissions.
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- 108 At this stage I only seek your agreement to these outcomes to guide the initial phase of work. Further consultation with industry, NGOs, the public, and iwi and Māori may help to further refine these outcomes, or reveal additional ones. I also expect that analysis of the results of the ERP consultation document will help to assist with the refinement of these documents.

Through the development of the Plan, I intend to work on an approach to setting milestones for phasing out fossil gas in the Plan

- 109 Through the development of the Plan, I intend to work with the sector to take an approach to setting milestones for the phase-out. These could include feasibility studies for alternative fuels, years in which certain policy measures may be put in place, or for when certain sections of infrastructure are able to be repurposed.
- 110 I do not intend to set firm phase-out dates for gas in the ToR for the Plan, but I intend that as the Plan is developed whether these are desirable and achievable will be investigated.
- 111 I recognise that we need to provide clear milestones on the transition pathway to both drive the transition and provide guidance to the sector. However, at the same time these milestones need to be achievable, positively contribute to long-term emission reductions (avoiding switching to coal) and balance the need to manage the three dimensions of the energy trilemma.

As part of the Plan, I intend to develop a view of the strategic role of renewable gases, and what initiatives may need to be place to ensure Aotearoa New Zealand reaches its renewable gas potential

- 112 Renewable gases may have a strategic role in reducing, or replacing, the use of fossil gas in hard-to-abate applications (such as high temperature process heat), or in other applications where transition costs may be large. Part One of this paper has made clear that further work is required to better understand our potential to deploy these gases, the timing within which these can be deployed, and what further interventions may be required to drive their uptake.
- 113 As part of the Plan, I seek your agreement to conduct further work around the potential of these renewable gases to support the phase-out of fossil gas. It provides an opportunity to build momentum for the renewable gas industry in Aotearoa New Zealand.
- 114 Feedback from the ERP consultation document will also help create a better understanding for the level of interest from industry, public, and iwi and Māori. Consultation feedback on the level of support the Government should provide for the development of low emissions fuels (e.g., bioenergy and hydrogen) will also help to inform this work. This feedback will be incorporated into the scope of the renewable gases component of the Plan. It is also intended that this work would be

complementary to the measures taken as part of the development of the Hydrogen Roadmap.

- 115 I consider that there are a number of mechanisms which warrant further investigation:
- 115.1 a renewable gas mandate, setting targets for grid injection of renewable gases over time;
 - 115.2 feed-in tariffs which help guarantee revenue streams for investors, or renewable gas supply contracts;
 - 115.3 investment grants to help address upfront capital costs required for plant investment;
 - 115.4 restrictions on organic waste which could enable greater use of biogas and provide significant co-benefits for emissions reduction across both the waste and energy and industry sectors; and
 - 115.5 ensuring that gas appliances sold are compatible with hydrogen to minimise asset stranding risks for consumers.
- 116 While further work is required, these measures may assist in driving private sector investment into these renewable gases – particularly at the commercial scale. One area where further work is required is to understand how renewable gases can help to support the non-energy users of fossil gas who transform natural gas into other products (for example, Ballance Agri-Nutrients and Methanex). As significant fossil gas consumers, consideration will need to be given to how these businesses can transition to renewable gases.
- 117 Investigating further measures to incentivise uptake of renewable gases will also enable us to respond to the GIC and GIFWG’s recommendations to do further work on the uptake of renewable gases.

I propose to develop a Terms of Reference (ToR) to guide the scope and approach to the Plan, which could be published alongside the ERP

- 118 Should you agree to develop a Plan, I will work to develop a ToR. I will also perform targeted engagement with stakeholders will help to ensure that the Plan addresses the right issues, and achieves the desired outcomes noted above.
- 119 I intend to use the feedback received through the ERP consultation process to inform the ToR. We have sought the public’s views on the outcomes, scope, timeframes and approach to the development of a plan for managing phase out of fossil gas. This feedback will also help to identify the appropriate level of engagement with iwi and Māori as the plan is developed.
- 120 The GIC has indicated that it wishes to be involved in the development of the Plan, alongside MBIE. I intend to further consider the extent to which the GIC will be involved in the plan as part of the development of the ToR.

- 121 I intend to seek your agreement to the ToR at the appropriate time in 2022 so that it can be published alongside the final ERP.

Relationship between the proposed Energy Strategy and the Plan

- 122 I have publicly signalled that I intend to develop a broad energy strategy, as recommended by the CCC. This work is intended to begin after the ERP has been published by 31 May 2022. I see the Plan as complementary to the Energy Strategy.
- 123 I intend for the Plan to be focused tightly on the transition pathway for the fossil gas sector, and the role for renewable gases to support a successful transition. Given the more limited scope of the Plan, I consider that it may be able to be completed while the Energy Strategy is still being developed.
- 124 My intention is that this Plan will be used as an input to assist in the development of the Energy Strategy.

Focus on fossil gas over other fossil fuels

- 125 As I noted earlier, the fossil gas sector is capital intensive and is an interconnected market structure. Investments are made with a payback period sometimes in the magnitude of decades. This means that decisions made now can have long-term strategic impacts on the fossil gas sector. These long-term strategic decisions and complex market structure means that now is an appropriate time to develop a fossil gas transition plan.
- 126 Other fossil fuels, such as coal, have a different market structure. Coal, for example, is readily importable into the country and does not require specific infrastructure to convey to consumers. A range of Government policies are reducing the use of coal across a range of sectors and reducing the level of domestic coal supply.
- 127 I note that coal imports in the last couple of years have been unusual and driven by gas supply constraints and dry year conditions. I do not expect such high levels of coal-fired electricity generation to be seen in Aotearoa New Zealand again.

- 128 Constitutional conventions

I propose to review the Government Policy Statement on Gas Governance 2008

- 129 Effective governance of the fossil gas industry will be important for ensuring that opportunities presented by the transition are realised, and the impact of challenges on the outcomes desired from the transition are well managed.
- 130 Government influences the direction and strategy for the GIC through a Government Policy Statement. The current GPS was last issued in 2008 and reflects the thinking of the time around the need to ensure that the fossil gas sector is well regulated in a growing market.

- 131 It is clear that this market will require rapid change to ensure that we can meet our emissions reduction obligations, and to ensure that the transition meets the outcomes set out above. The GIC will play an important role in supporting the industry to transition, and for ensuring that the regulatory regime for the fossil gas industry can evolve.
- 132 I propose to engage with targeted stakeholders on whether amendments to the GPS are necessary and desirable. I will report back to Cabinet in 2022 on what changes may be required to the GPS to ensure it is fit-for-purpose.

I intend to address other recommendations as part of our broader work programme

- 133 There are a number of GIC and GIFWG recommendations for further work that I will progress outside of the Plan, as part of my wider work programme.

I intend to address electricity system recommendations alongside work to increase our renewable electricity generation

- 134 The Government has set an ambitious target of 100 per cent renewable electricity by 2030, and initiated the New Zealand Battery Project to identify and develop solutions to addressing New Zealand's 'dry year' problem.
- 135 In its report the GIC found that commercial arrangements for gas to support electricity in dry years are insufficient. Current fossil gas contracting does not appear to be sufficient to cover the large volume of gas required for dry winters over the transition period.
- 136 In response, the GIC has recommended a co-ordinated work stream on how security of energy supply can be ensured for electricity generation, with:
- 136.1 GIC focused on what gas producers and major users have agreed to provide and can provide; and
- 136.2 The Electricity Authority considering what is required (potentially including regulatory tools) to ensure participants have committed access to the fuel and generating plant they need to ensure security of electricity supply.
- 137 I consider that there is merit to conducting further work around this to ensure that security of supply is maintained as we transition.
- 138 I propose to further work around how fossil gas support dry year cover separately to the Plan. I consider that this work will be better addressed alongside work around achieving the 100 per cent renewable electricity target by 2030, and the New Zealand Battery Project.

I intend to commission the further work to investigate some of the GIC's recommendations

- 139 The GIC's report has made a number of recommendations for joint work between officials and the GIC. Where appropriate, I intend to commission the GIC,

consistent with the process provided for under the GPS, to investigate the following recommendations:

- 139.1 Information availability to help enable participants and users to predict and plan better
- 139.2 How gas can support NZ's energy needs that cannot be met by electricity, including:
 - 139.2.1 whether appropriate incentives are in place for those who need to use gas to avoid, and where that is not possible, to at least reduce their emissions; and
 - 139.2.2 exploring the viability of emissions capture and storage in New Zealand.
- 139.3 Consideration of whether any additional mechanisms (or changes to/clarifications of existing mechanisms) are needed to ensure gas is available to industrial users in specified, unexpected tight situations.
- 140 I expect to commission the GIC to begin this work after the ERP has been put in place, and the ToR for the Plan published.

I also recommend we progress work around economic regulation of gas infrastructure businesses as we transition

- 141 Two issues have been identified by GIC and the GIFWG:
 - 141.1 Short term: The Commerce Commission is required to reset the gas price-quality paths by 31 May 2022. This work is currently underway, and the Commerce Commission has recently received submissions on an Issues Paper. There are concerns about whether this framework is fit-for-purpose in the context of an uncertain future for natural gas pipeline businesses, in terms of wind-down or repurposing.
 - 141.2 Longer term: Consider whether the overall regime is fit-for-purpose in the context of transformation change for the industry.
- 142 Although officials advise that the Commerce Commission is likely to be able to manage the short term issues, further work needs to be done to determine whether intervention, such as changes to Part 4, would better address these challenges over the long term.
- 143 I will work with the Minister of Commerce and Consumer Affairs on considering these matters, but this work will be conducted separately to the Plan.

Timing

- 144 I intend to publish the ToR for the Plan alongside the ERP in May 2022. The ToR will include the timing of the development of the plan, which is influenced by the scope of this plan and the consultation approaches identified.
- 145 My proposed timeline for developing the ToR, and other key actions, is as follows:

Step	Timing
Cabinet decision on proposals in paper	November 2021
Targeted engagement with Industry on ToR for Plan	November 2021 to April 2022
Emissions Reduction Plan Published and Budget announced	May 2022
GIC GPS consultation	Q2/3 2022
Commissioning other GIC work streams	Q1 2022

Financial Implications

- 146 There are no direct financial implications associated with this paper, but the proposals may have financial implications in future.
- 147 The costs of transitioning away from fossil gas have been estimated to be approximately \$5.3 billion for commercial and residential users for decommissioning their gas connections. There have also been estimates for upgrading electricity networks in order to meet this new electricity demand. These costs are dependent on the dependent on the timing and scale of the transition required.

Legislative Implications

- 148 There are no direct legislative implications associated with this paper, but the proposals in this paper may result in future legislative implications.

Impact Analysis

Regulatory Impact Statement

- 149 Impact analysis requirements do not apply, and a Regulatory Impact Statement has not been prepared.

Climate Implications of Policy Assessment

- 150 Climate Implications of Policy Assessment (CIPA) does not apply.

Population Implications

- 151 The costs to the population for transitioning is dependent on the pace, scale and ability to leverage existing infrastructure for renewable gases.
- 152 Of the current 300,000 gas connections, the vast majority are residential consumers. Residential gas consumers skew towards higher income groups, young families, and families with stretched budgets, and heavily away from rural groups. Preliminary analysis suggests that approximately 19 per cent of these consumers fall into the

deciles 8 to 10 of the Environmental Health Intelligence New Zealand deprivation index.¹²

- 153 The phase down of fossil gas may disproportionately affect these groups, with limited ability for these consumers to afford switching to electricity, or due to other barriers that may be in place. As an indication of transition costs for a household, Kainga Ora estimates that it costs, on average, around \$8000 per residence to convert its properties from gas to electricity. In addition, increasing fossil gas costs due to the factors highlighted in this paper (such as rising ETS pricing) may exacerbate existing fuel poverty issues.
- 154 The proposals in this paper are intended to help further quantify these issues, and develop an approach to managing these.

Human Rights

- 155 The proposals in this paper are not inconsistent with the New Zealand Bill of Rights Act 1990 and the Human Rights Act 1993.

Consultation

- 156 Ministry for the Environment, Ministry for Primary Industries, the Treasury, Te Puni Kōkiri, Te Arawhiti and the Ministry for Foreign Affairs and Trade. The Department of Prime Minister and Cabinet has been informed.

- 157 Legal professional privilege
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Communications

- 159 The proposals in this paper are intended to be signalled as part of the final ERP. I intend to align media engagement with the broader communications relating to the ERP as it is released.

¹² Page 34, GIFWG Findings Report, 2021. Based on analysis of ICP data from Powerco, First Gas and Vector.

Proactive Release

- 160 I intend to proactively release this paper with appropriate redactions consistent with the Official Information Act 1982 alongside the release of the ERP.

Recommendations

The Minister for Energy and Resources recommends that the Committee:

- 1 **Note** that on 6 April 2021, the Cabinet Business Committee requested that I report back to Cabinet, by the end of 2021, on managing the phase out of fossil gas in the energy system, and on opportunities to repurpose fossil gas infrastructure for renewable gases [CAB-21-MIN-0099];
- 2 **Note** that Part One of this Cabinet paper constitutes the report back, and Part Two my proposed next steps;
- 3 **Note** that report back and proposals in this paper are informed by:
 - 3.1 The Climate Change Commission (CCC) in its final advice *Ināia tonu nei: a low emissions future for Aotearoa*, made a number of recommendations in relation to the fossil gas sector, including the development of a plan for managing phase out of fossil gas;
 - 3.2 The Gas Industry Company (GIC) has provided its final report into whether our current fossil gas market, commercial, and regulatory settings that provide for gas availability and flexibility are fit-for-purpose in supporting this transition; and
 - 3.3 The Gas Infrastructure Futures Working Group (GIFWG), which has produced a 'Finding Report' on the future of gas infrastructure in New Zealand as we transition.

Part One: Report Back

- 4 **Note** that the findings of my report back are as follows:
 - 4.1 Aotearoa New Zealand needs to focus on the phase-out of fossil gas to support decarbonisation of the wider economy, and in doing so we need to continue to manage the three dimensions of the energy trilemma energy security, environmental sustainability, and energy equity;
 - 4.2 The phase-out of fossil gas will present both short and long-term challenges for balancing the trilemma, including a need to balance continued capital investment with reducing fossil gas use, rising fossil gas prices for consumers, stranded asset risks, and the potential for large transition costs (for both consumers and the Government); and
 - 4.3 There are opportunities to repurpose current infrastructure for renewable gases (such as biogas and green hydrogen) to support hard-to-abate sectors, and lower transition costs for fossil gas consumers – but further work is required to understand their potential.

Part Two: Proposals to ensure an equitable phase-out of fossil gas

Developing a Gas Transition Plan

- 5 **Agree** to develop a Gas Transition Plan that will set out the transition pathway for the fossil gas sector, and include further measures the Government will put into place to ensure an equitable transition;
- 6 **Agree** that the Gas Transition Plan will also focus on where renewable gases can strategically support hard-to-abate consumers and assist in mitigating overall transition costs;
- 7 **Note** that developing a Gas Transition Plan has been recommended by the Climate Change Commission, Gas Industry Company, and Gas Infrastructure Futures Working Group;
- 8 **Note** that the Gas Transition Plan is intended to be a technical and focused plan that will act as an input into the development of a broader Energy Strategy;
- 9 **Note** that the Gas Transition Plan will focus on the first three Emissions Budget periods, out to 2035, while signalling the longer-term pathway out to 2050;
- 10 **Agree** to, pending further consultation and analysis of ERP consultation feedback, the following desired outcomes being included in the Gas Transition Plan:
 - 10.1 Sustainability: Aotearoa New Zealand avoids decisions or investments that lock in our reliance on fossil fuels in the long-term;
 - 10.2 Energy Security: Fossil gas continues to support security of energy supply until it is no longer required; and
 - 10.3 Energy Equity: Adverse and unexpected effects on fossil gas consumers are prevented or mitigated and consumers retain access to affordable, reliable and abundant energy.
- 11 **Note** that I will investigate the desirability of setting milestones, such as phase-out dates, in the Gas Transition Plan;
- 12 **Note** that I consider the development of a Gas Transition Plan is part of a broader cross-portfolio work on phasing-out fossil gas, and there is a need to ensure that coordinated and integrated decision making;
- 13 **Note** that I intend to work with other portfolios, including Building and Construction, Environment and Commerce and Consumer Affairs on gas phase-out matters relevant to their portfolios as this Gas Transition Plan is developed;
- 14 **Legal professional privilege**

- 15 **Agree** that the Minister of Energy and Resources will develop a Terms of Reference for the Gas Transition Plan, and report back to Cabinet in 2022 ahead of publication of the final ERP;
- 16 **Note** that ERP consultation feedback will inform the Terms of Reference, including how iwi and Māori will be involved in the Gas Transition Plan development;
- 17 **Note** that the Gas Transition Plan will be developed closely with industry to ensure a realistic, but ambitious pathway for transition is developed;
- 18 **Note** that the Gas Transition Plan will also consider measures to better enable the deployment of renewable gases in New Zealand, aligned with the Hydrogen Roadmap;
- 19 **Note** that the Gas Transition Plan will also consider the role of renewable gases for non-energy users of fossil gas (such as Methanex), this work is intended to align with our broader work around industrial policy;
- 20 **Agree** to signal the development of the Gas Transition Plan in the Energy and Industry component of the ERP;
- 21 **Note** that I consider that the Terms of Reference could be published alongside the final ERP in May 2022;

Review of the Government Policy Statement on Gas Governance 2008

- 22 **Note** that the GIC will be important for working with industry on the phase-out plan and increasing the uptake of renewable gases;
- 23 **Note** that the GIC is directed by the Government Policy Statement on Gas Governance 2008, which may require updating to reflect the transition required of the sector;
- 24 **Note** that officials will begin targeted engagement with stakeholders on potential amendments to the Government Policy Statement on Gas Governance 2008, and I will report back to Cabinet on potential amendments in the second half of 2022;

Responding to other recommendations from the Gas Industry Company and the Gas Infrastructure Futures Working Group

- 25 **Note** that the GIC and GIFWG recommended a number of other pieces of work, in addition to the Gas Transition Plan;
- 26 **Note** that the GIC's other recommendations include:
 - 26.1 A set of three interrelated workstreams to improve commercial arrangements so that sufficient volume and flexibility of gas supply is in place far enough in advance to promote security of supply for electricity (energy & capacity), as follows:

- 26.1.1 Identify what gas producers and major users have agreed to / can deliver to generators and major users over the medium to long term, including planned demand response arrangements and gas storage;
- 26.1.2 A related focus on the role of Methanex in supporting electricity security of supply through the transition; and
- 26.1.3 The Electricity Authority considering current limitations to dry year cover in its response to any problems it identifies in relation to thermal fuel availability and security of supply in its ongoing reviews.
- 26.2 Information availability, including reporting of gas reserves and resources under the Crown Minerals Act 1991;
- 26.3 Future of economic regulation under Part 4 of the Commerce Act 1986; and
- 26.4 Considering whether additional mechanisms are desirable to ensure gas is available to industrial users in unexpected tight situations.
- 27 **Note** that I intend to progress recommendation 26.1 above alongside work on the New Zealand Battery Project and achieving our 100 per cent renewable electricity goal;
- 28 **Note** that I will commission the GIC, consistent with the process provided for under the Government Policy Statement on Gas Governance, to work with officials to address issues in recommendations 26.2, 26.3 and 26.4 above;
- 29 **Note** that the GIFWG provided a number recommendations that will be considered as part of the development of an energy strategy;
- 30 **Note** that both the GIC and GIFWG recommended a review of the economic regulation of fossil gas pipeline businesses under Part 4 of the Commerce Act 1986; and
- 31 **Note** that I will work with the Minister of Commerce and Consumer Affairs on considering gas issues as they relate to Part 4 of the Commerce Act 1986, but this work will be conducted separately to the Gas Transition Plan for the fossil gas sector.

Authorised for lodgement

Hon Dr Megan Woods

Minister of Energy and Resources

IN C O N F I D E N C E

Appendix One: List of recommendations from the Climate Change Commission relating to fossil gas

<p>Recommendation 20: Develop an energy strategy to decarbonise the energy system and ensure the electricity sector is ready to meet future needs</p>	<ul style="list-style-type: none"> • Developing a renewable energy target • Managing the phase-out of fossil fuels including phase out of fossil gas in the energy system • Enabling fast paced build of new renewable generation and phasing out coal for electricity generation • Ensuring the electricity system is capable and technology ready • Supporting development and deployment of low-emissions fuel options such as bioenergy and hydrogen • Determining how to eliminate fossil gas use in residential, commercial and public buildings. Actions should include: <ul style="list-style-type: none"> ○ Setting a date to end the expansion of pipeline connections in order to safeguard consumers from the costs of locking in new fossil gas infrastructure. ○ Evaluating the role of low-emission gases as an alternative use of pipeline infrastructure. ○ Determining how to transition existing fossil gas users towards low-emissions alternatives.
<p>Recommendation 21: Reduce emissions from industry</p>	<ul style="list-style-type: none"> • Outlining a plan for actions required to decarbonise the industrial sector, including: <ul style="list-style-type: none"> ○ Accelerating industry switching to low-emissions fuels for process heat and uptake of energy efficiency measures ○ Ensuring no new coal boilers are installed and setting a timetable for the phase out of fossil fuels used in boilers
<p>Recommendation 22: Upgrading existing buildings and constructing new buildings that are low emissions</p>	<ul style="list-style-type: none"> • Upgrading existing buildings and constructing new buildings that are low emissions, healthier and climate resilient. Measures should include: <ul style="list-style-type: none"> ○ Encouraging construction based on low-emissions designs and practices to reduce building energy use and embodied emissions.

Appendix Two: List of recommendations from the Gas Industry and the Gas Infrastructure Futures Group

<p>Gas Industry Company Market Settings Investigation</p> <p>Two key recommendations:</p> <p>Recommendation 1: Gas Transition Plan</p> <p>Develop a Gas Transition Pathway to support improved investment confidence. We propose this workstream would be jointly managed by GIC and MBIE and should involve input from industry and a range of stakeholders.</p> <p>This could feed into a broader Energy Strategy and will enable early focus in an area where it is needed (given the strategies for electricity and coal are relatively clear).</p> <p>Recommendation 2: Commercial Arrangements for electricity security of supply</p> <p>A set of three interrelated workstreams to improve commercial arrangements so that sufficient volume and flexibility of gas supply is in place far enough in advance to promote security of supply for electricity (covering both energy and capacity):</p> <ul style="list-style-type: none"> • A GIC-led workstream focused on what gas producers and major users have agreed to/can deliver to generators and major users over the medium to long term, including carrying out more regular supply and demand studies; assessing the likely costs and availability of gas-related options to support electricity security of supply; and potentially facilitating arrangements between industry participants where necessary. • A related focus on the critical role of planned demand response by Methanex in supporting electricity security of supply through the transition, as the only option likely to be readily available at sufficient scale in the short term, and without some of the challenges facing other options in the medium to longer term. • The Electricity Authority is considering current limitations to dry year cover in its response to any problems it identifies in relation to thermal fuel availability and security of supply in its reviews of the energy industry's management of the 2021 dry hydro sequence and tight gas market; the events of 9 August 2021 (the Phase 2 review); and electricity wholesale market competition. <p>Four Minor recommendations:</p> <p>An additional four dedicated work streams in relation to the following will improve the operation of the gas sector during the transition:</p> <ul style="list-style-type: none"> • Information availability to help enable participants and users to predict and plan better, involving four sub actions: <ul style="list-style-type: none"> ○ Continuation of GIC's information disclosure work; ○ Earlier release of MBIE's petroleum reserves data, and consideration given to more frequent collection and publication; ○ More regular gas supply and demand studies; and ○ work to ensure the major risks to secure gas supply and their impact are better understood. • Review of Part 4 of the Commerce Act and its application to gas networks, including joint work by MBIE, Comcom and GIC: <ul style="list-style-type: none"> ○ considering whether the current framework is fit for purpose, in the context of the Commerce Commission's upcoming price-quality path reset, input methodology review, and targeted information disclosure review (currently underway by the Commerce Commission) ○ considering whether changes are needed to the overall regime in an industry undergoing transformational change, where consumers have an interest in the maintenance of the network for security of supply. • How gas can support NZ's energy needs that cannot be met by electricity, including:

- development of ‘renewable gases’ (including hydrogen and biofuels);
- whether appropriate incentives are in place for those who need to use gas to avoid, and where that is not possible, to at least reduce their emissions; and
- exploring the viability of emissions capture and storage in New Zealand.
- Joint GIC/MBIE workstream considering whether any additional mechanisms (or changes to/clarifications of existing mechanisms) are needed to ensure gas is available to industrial users in specified, unexpected tight situations.

Gas Infrastructure Future Working Group Findings Report

Short Term Recommendations:

- keep open the option of repurposing gas pipelines in the long-term interest of energy consumers, consistent with CCC’s advice.
- Use the next 12 months to: consider the option of repurposing gas pipelines in the long-term interest of energy consumers; consider low cost actions that it could take to maintain or improve this option, and avoid, unless considered necessary, actions that would limit this option.
- Part 4 regulation:
 - Along with the Commerce Commission, start to consider the future economic regulation arrangements.
 - Consider either amending Part 4 to defer the timing for when the Commerce Commission needs to determine the next default price path (DPP) for the gas infrastructure businesses or issuing a Government Policy Statement to help clarify the policy direction that the Commerce Commission should consider when determining that price path.
- consider support to accelerate development of the hydrogen and biogas industry and improving the optionality for future gas pipeline repurposing.
- actively contribute to and guide further industry-led analysis, including on:
 - the impact of falling demand and revenues (e.g., on financial sustainability); and
 - the processes, resources and likely costs required to implement the wind down scenario.

Longer term recommendations (next three years):

- when responding to the CCC’s recommendation to develop a national energy strategy, ensure that any such strategy is principle-led and recognises interdependencies within the energy sector and with other sectors.
- consider the role of public funding to support transition to either scenario.

Appendix Three: Overview of current fossil gas consumers and contribution to emissions

Type of consumer	Description	% of fossil gas consumed (2020)	% share of total emissions (2018)
Petrochemical/Non-Energy Use	Non energy use of fossil gas includes chemical manufacturing where the fossil gas is used as a feedstock. The major user in this category is Methanex which is the largest user in New Zealand by quite a margin. ¹³ Gas is also used for the production of synthetic fertilisers by Ballance Agri-nutrients.	26.1	1.8
Electricity generation	Fossil gas generation currently has three main roles in the electricity system: <ul style="list-style-type: none"> • Dry year electricity generation which is addressed through coal and fossil gas fired generation; • Seasonal firming (i.e., winter electricity peaks) which are mainly provided by coal, fossil gas and hydro • Daily/weekly firming of renewables is mainly provided by fossil gas peaking plant (alongside hydro). 	30.4	3.0
Industrial	Used to support a range of low, medium and high process heating needs for a range of industrial consumers, for example, dairy factories, pulp and paper and Steelmaking. Methanex is also included in this category for emissions related to its process heating requirements.	35.1	2.9
Commercial	Supplies heating needs to a range of commercial consumers, including space heating, direct heating for restaurants and low temperate process heat requirements (Approximately 15,600 consumers)	4.5	0.6
Residential	Supplies energy for space heating and cooking for a range of households geographically spread across the North Island. There are approximately 276,500 households, or an estimated 762,000 consumers.	4.1	0.5

¹³ Note that non-energy consumers of fossil gas also have gas consumption that falls under the industrial sector (for process heat applications). Data is presented in this way to align with how emissions data is reported. Methanex's total consumption of gas is in the order of approximately 40 to 50 per cent of all gas supplied.

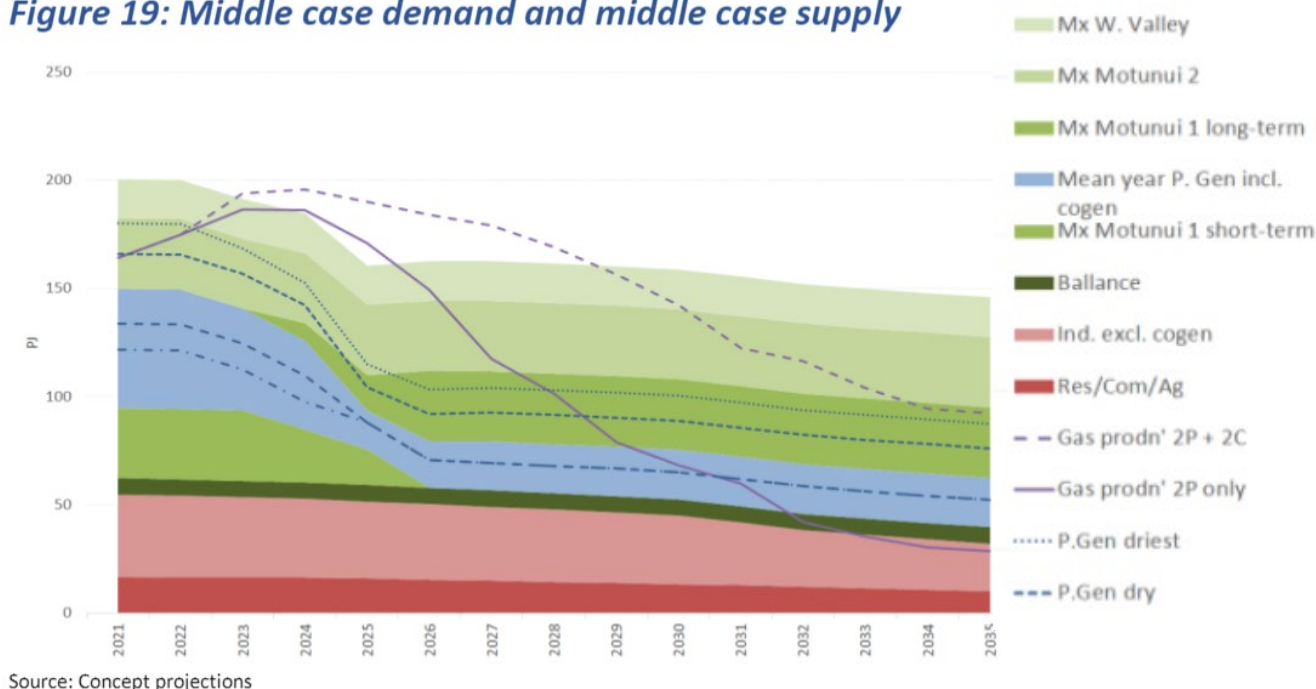
Appendix Four: Overview of short- and long-term challenges for phasing out fossil gas

Challenges for fossil gas market segments	Short-term (First CCC Budget Period, 2021 - 2025)	Long-term (From Second CCC Budget Period, 2025- c 20.35)
Gas Producers Source: GIC Report	GIC expects current investment conditions to ease in 2023/2025, but there are risks around demand uncertainty from larger users in the short term which may undermine ability to enter into long-term contracts.	Capital Investment risks: <ul style="list-style-type: none"> • Uncertainty of future demand from larger users, which may undermine ability to enter into long-term contracts and result in insufficient investment to support security of supply. • Decline in number of producing gas fields concentrates risks around gas reserves. • Uncertainty around the transition pathway and what regulatory or policy levers may be pulled to support the transition.
Gas consumers Source: GIC report/Gas Infrastructure Report	<p>Asset stranding risks, with potential for different gas appliance and infrastructure investment delayed until there is greater certainty about transition pathway.</p> <p>Uncertainty regarding future financial viability of gas infrastructure may result in the infrastructure owners increasing prices in the short term.</p> <p>Increasing carbon prices and a potentially smaller market will increase fossil gas costs for consumers, with increased risks of fuel poverty.</p> <p>Risks that gas availability may result in other fossil fuels being used to dry year electricity capacity.</p>	<p>Material cost impacts for consumers, impact would be significant for vulnerable consumers (e.g., shifting from gas to renewable heating and cooking sources for residential consumers).</p> <p>Businesses will need to balance the cost of transitioning with the ongoing viability of business, which may affect wider economic outcomes – exacerbating fuel poverty.</p> <p>Risks of disrupted or loss of energy supply (especially where supply ceases before consumers are able to transition).</p> <p>As number of users declines, fixed network costs will be spread over less consumers, increase those consumers costs.</p> <p>To enable an alternate energy to substitute for gas is likely to require significant investment, which will be passed on to consumers by lines companies (in the case of electricity).</p> <p>A wind-down scenario would require a coordinated plan to minimise impacts on workforces, safety and ancillary sectors.</p>
Gas infrastructure	Stranded asset risks, with potential disincentive to invest in connections, augmentation, and renewals.	Winding down the existing fossil gas pipelines will adversely affect gas consumers, but it is unclear the scope for and cost of mitigation.

<p>Source: GIC/ Gas infrastructure Report</p>	<p>Issues around whether, and how Part 4 regulation should apply to a market as it evolves during decarbonisation.</p> <p>Uncertainty regarding the feasibility of alternative fuels may delay investment to facilitate the transition.</p>	<p>There are technical and cost challenges for repurposing transmission pipelines for hydrogen, which may be significant.</p> <p>Challenges for businesses to retain workforce for wind down scenario, and corresponding challenges for size of workforce to install electricity and other appliances.</p>
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Appendix Five: Concept Consulting Long Term Gas Supply and Demand Scenarios – Middle Case Demand and Middle Case Supply (2021 – 2035)

Figure 19: Middle case demand and middle case supply



- 1 Key observations from the middle case supply/demand projections:
 - 1.1 In the early part of the period (2022 and 2023) there is some easing relative to the tight market conditions in 2021. This is driven by a projected modest increase in gas supply capability compared to 2021. However, the system would still be tight, especially in a dry year.
 - 1.2 Out to around 2029, gas supply capability from 2P reserves would be sufficient to fully satisfy demand for mass market, industrial (excluding petrochemical) and average power generation use. If higher gas demand in dry years is accounted for, this would reduce to 2028. This assumes a 'just in time' approach to balancing supply and demand. In reality, a supply buffer is likely to be needed to reliably cover peak deliverability requirements. These factors would be expected to bring forward the time when new sources of supply are needed to be around 2027.
 - 1.3 From 2022 to 2025, gas supply capability from 2P reserves has significant headroom to support gas use for petrochemical manufacturing. The improving headroom reflects the combined effect of a projected modest supply recovery and falling gas demand for power generation. Beyond around 2025, petrochemical demand would need to progressively scale back unless new supply is developed from contingent resources.

- 1.4 If 2C contingent resources can be commercially developed as assumed in the middle case, there would be sufficient gas to supply significant levels of petrochemical gas demand as well as all other gas use.

Outlooks under alternative demand cases

- 2 The Concept report also provided a summary of how different demand cases would affect the projections, assuming middle case supply:
 - 2.1 Under all demand cases, gas supply from 2P reserves would be sufficient to satisfy mass market, industrial (excluding petrochemical manufacturing) and power generation usage (mean year) until around 2026.
 - 2.2 Under all demand cases there is headroom to support significant gas use by petrochemical manufacturers until mid-decade, and well beyond if contingent resource is developed.
 - 2.3 The main effect of alternative demand cases is to swap gas use between power generation and petrochemical production. For example, if the Tiwai smelter continues to operate beyond 2024 that will reduce gas available for petrochemical production and vice versa.