MINISTRY OF BUSINESS, INNOVATION & EMPLOYMENT
HĪKINA WHAKATUTUKI

COVERSHEET

Minister	Hon Shane Jones	**Portfolio**	Resources
Title of Cabinet paper	Crown Minerals Act 1991: Ensuring security of gas supply and regulatory efficiency	**Date to be published**	10 July 2024

List of documents that have been proactively released		
Date	**Title**	**Author**
May 2024	Crown Minerals Act 1991: Ensuring security of gas supply and regulatory efficiency	Office of Minister for Resources
22 May 2024	Crown Minerals Act 1991: Ensuring security of gas supply and regulatory efficiency ECO-24-MIN-0077 Minute	Cabinet Office
15 May 2024	Regulatory Impact Statement: Amendments to the Crown Minerals Act 1991 relating to petroleum exploration and mining	MBIE
16 May 2024	Regulatory Impact Statement: Amendments to the Crown Minerals Act 1991 relating to small-scale non-commercial gold mining	MBIE
14 May 2024	Climate Implications of Policy Assessment disclosure sheet	MBIE

Information redacted **YES**

Any information redacted in this document is redacted in accordance with MBIE's policy on Proactive Release and is labelled with the reason for redaction. This may include information that would be redacted if this information was requested under Official Information Act 1982. Where this is the case, the reasons for withholding information are listed below. Where information has been withheld, no public interest has been identified that would outweigh the reasons for withholding it.

- Legal professional privilege
- Confidential advice to Government
- Commercially sensitive information
- Confidential information entrusted to the Government
- International relations

Climate Implications of Policy Assessment: Disclosure Sheet

This disclosure sheet (CIPA) provides the responsible department's best estimate of the greenhouse gas emissions impacts for New Zealand that would arise from the implementation of the policy proposal or option described below. It has been prepared to help inform Cabinet decisions about this policy. It is broken down by periods that align with New Zealand's future emissions budgets.

Section 1: General information

General information	
Name/title of policy proposal or policy option:	Repealing the offshore ban in the Crown Minerals Act 1991
Agency responsible for the Cabinet paper:	MBIE
Date finalised:	*14 May 2024*
Short description of the policy proposal:	The policy is to give effect to the Government's decision to remove the current ban on new petroleum exploration outside onshore Taranaki, and targeted measures to promote New Zealand's economic development by improving investor confidence and regulatory efficiency for the petroleum sector. More information can be found in the following RIS - Regulatory Impact Statement: Crown Minerals Amendment Act 1991, May 2024

Section 2: Greenhouse gas emission impacts (increase relative to policy counterfactual)

Sector & source	Changes in greenhouse gas emissions in tonnes of carbon dioxide equivalent ($ktCO_2$-e) relative to counterfactual						
	2020–25	**2026–30**	**2031–35**	**2036–40**	**2041–45**	**2046–50**	**Cumulative impact**
Electricity	103	2,292	1,877	4,294	3,236	2,882	14,684
Residential and Commercial	136	1,325	1,432	533	332	247	4,006
Industry	513	1,787	4,771	8,664	11,074	6,072	32,881
Total	752	5,403	8,079	13,491	14,643	9,201	51,570

Section 3: Additional information

Additional information

Choice of model

The emissions presented here have not been prepared using the standard CIPA excel tool as it does not provide the level of detail needed to model the expected changes within the electricity and industrial sectors arising from potential changes in gas usage. For example, the CIPA excel tool models a change in emissions from electricity relative to a change in electricity demand. MBIE sought a model which could be adjusted to reflect how gas is used in the electricity sector for baseload generation, peaking or firming, and demand from industrial users. This level of detail is not captured in the standard CIPA excel tool.

To create a suitable model, a new scenario was established for the gas co-regulator's (The Gas Industry Company - GIC) supply and demand model to evaluate the expected gas supply and demand with associated emissions from the proposed policy. The new scenario is based on the GIC's 'Industry Focus' scenario with changes to the electricity use to increase demand for gas use in firming/peaking generation and dry year support until 2045.

This CIPA only estimates the effect of changes in gas emissions from direct gas use in the energy sector (electricity, industrial, residential and commercial). Changes in the volume of gas available will however have a positive secondary effect on other energy sector emissions not modelled here. For example, more gas in the electricity sector should stabilise wholesale electricity price volatility facilitating greater electrification and EV use, and in addition, more gas should reduce coal use in the Huntly power station which is a significant emissions emitter. These second order effects are described qualitatively.

The assumptions for the counterfactual are different from the assumptions underlying the interim projections for ERP2, which are our best estimates of "how we are tracking" towards emissions budgets.

The interim projections for ERP2 are underpinned by the Emissions in New Zealand model (ENZ), a whole of economy model for emissions. ENZ models interdependencies between sectors such as energy and transport. In contrast, the GIC model covers gas only.

One key difference between the two models is that ENZ makes assumptions based on the government's understanding of expected gas supply as at 1 January 2023 and does not reflect recent developments. For example, it does not take in to account the most recent reserves estimates, which are expected to be lower than previously estimated. In comparison, gas supply is constrained in the counterfactual by assuming that only 30% of reserves are developed and then increases this level to 60% in the factual. MBIE officials are engaging with MfE on how to incorporate our updated understanding of gas supply into ENZ and future projections of how we are tracking using that model.

Modelling assumptions and choice of counterfactual

The CCC demonstration path was used as the counterfactual or comparison against different scenarios in the GICs 2023 gas supply and demand modelling. This CIPA does not use the CCC demonstration path as a counterfactual as it has differing assumptions underlying its modelling, making like for like comparisons difficult.

Additional information

Instead, emissions are measured against the GIC 'Supply Headwinds' scenario as the counterfactual. This scenario forecasts a future where current gas supply is challenged and future gas supply is not able to be developed to a great extent. This best reflects the constrained gas supply that exists now and will likely worsen without measures to improve gas exploration and development. Under this counterfactual, additional supply from global markets (e.g. LNG) is not available in quantity though a strong biogas sector is assumed from 2030. In the counterfactual, it is assumed that demand from the industrial, commercial, and residential sectors sharply reduces from 2024 onwards, Methanex does not reopen its Waitara valley plant, and gas use at Motunui-1 and Motunui-2 remains at a reduced level (i.e. does not return to full production and significantly reduces after2034). Additionally, in the counterfactual demand from gas-fired electricity generators is phased out early for both baseload and cogeneration but gas use for peaking and dry year reserve continues under a reducing profile until 2050.

Overall, the counterfactual has a much lower emissions path than the current emissions budget. MBIE considers that the chosen counterfactual is more realistic. The counterfactual portrays a future gas shortage which would have significant consequences both for the electricity sector and the economy. In the electricity sector, gas shortages would lead to higher price volatility and, if severe enough, risk loss of electricity supply. For the industrial sector, loss of a secure gas supply could lead to the closure of major users like Methanex which currently contributes over $800 million to the economy[1] and supports around 3000[2] jobs directly and indirectly in the Taranaki region. Closure or curtailment of other gas reliant industries might also occur so the net loss from a major reduction in gas supply could be over $1 billion per annum.

Emissions outcome

All emissions in the gas sector are covered by the New Zealand Emissions Trading Scheme (ETS). The ETS has a soft cap which means any additional emissions in the gas sector could be offset elsewhere but due to the stockpile this may take time to happen.

The recommended policy option (repealing the offshore ban) has cumulative estimated emissions (from 2024 to 2035) approximately 14,235 $ktCO_2e$ greater than the counterfactual (Supply Headwinds). This includes an estimated 5,403 $ktCO_2e$ more from 2026-2030 (ERP2). The primary cause of the higher cumulative estimated emissions in the factual is not from increased gas usage. Rather this difference arises from a steeper decrease in emissions due to gas shortages in the counterfactual, whereas higher gas usage continues longer in the factual. In both the factual and the counterfactual, gas use and emissions decline from current levels, as follows:

- Gas usage in the counterfactual declines significantly by 2035 and is almost eliminated by 2050, with an emissions reduction of 59% by 2035 and 97% by 2050
- Gas usage in the factual also declines but more slowly, with an emissions reduction of 31% by 2035 (assuming carbon capture and storage (CCS) and 79% by 2050.

These reductions reflect both a reduction in supply and the wider global shift towards new renewable technology and investment.

[1] Methanex data from a PWC (2018) estimate of the contribution of Methanex to the economy.

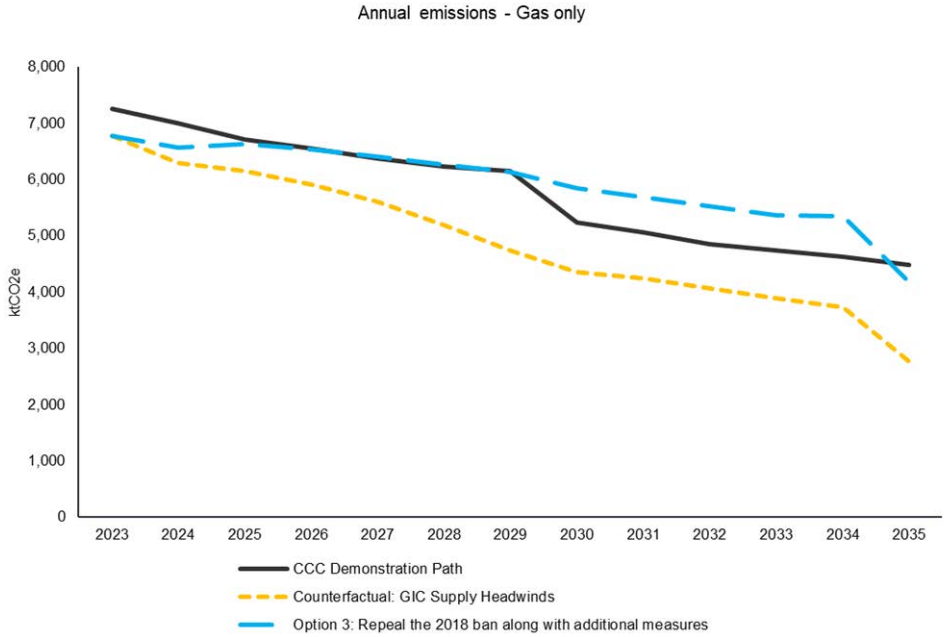
[2] Submission to MBIE Gas Transition Plan (2023) which cites a PWC (2018) report as estimating that there are more than ten times as many indirect jobs supported by Methanex activities than direct employees.

Additional information

A consequence of adopting a counterfactual scenario which has a lower emissions path than the CCC demonstration path, is that it accentuates any greater emissions relative to the counterfactual. This effect is illustrated in the following table which shows the counterfactual compared to the factual and the Climate Change Commission (CCC) demonstration path.[3]

Emissions budget	Counterfactual vs CCC demonstration path	Counterfactual vs predicted policy outcome
EB1	-984 $ktCO_2e$	752 $ktCO_2e$
EB2	654 $ktCO_2e$	5,403 $ktCO_2e$
EB3	3,027 $ktCO_2e$	8,709 $ktCO_2e$

The following graph illustrates the modelled differences between the emissions paths of the CCC demonstration path, the factual (the policy) and the counterfactual.



[3] The Climate Change Commission demonstration path is based on the emissions budgets and emissions reduction plans determined under the Climate Change Response Act 2002.

Additional information

All three lines in the graph above depict declining gas usage in the industrial, commercial, residential and electricity sectors over time. It can be seen that the predicted policy outcome is very close to the CCC demonstration path or emissions budget over the period 2025 to 2030 (ERP2) but has higher emissions after 2030 (ERP3) due to higher industrial gas use. Changes in slope in the factual and counterfactual around 2035 reflect an assumption that CCS is effective for about 30% of major industrial gas use around this time.

The projected annual emissions for the energy and industry sector in the current emissions reduction plan (ERP1) are 18.1 $MtCO_2e$ (18,100 $ktCO_2e$) with estimated reductions of 2.7 to 6.2 $MtCO_2e$ (2,700 to 6,200 $ktCO_2e$). The factual outcome is 984 $ktCO_2e$ below the CCC demonstration path in ERP1 or 752 $ktCO_2e$ above the counterfactual. The reason the factual emissions are lower than the CCC Demonstration path in ERP1 is largely because of differing assumptions over industrial gas use during this period.

These differences highlight the importance of choosing the right benchmark to compare the emissions outcome. The reason the factual emissions are below the current ERP1 target is that the model starts with lower major industrial gas use than the CCC demonstration path does over this time period.

When comparing ERP2, depending on which baseline comparison is used, the factual displays either 654 $ktCO_2e$ or 5,403 $ktCO_2e$ higher emissions in ERP2.

This modelling includes only direct gas use emissions in the energy and industrial sector. It does not include oil production emissions (which are comparatively negligible in size) or any flow on effects from gas availability or shortage into the electricity sector.

Drivers of emissions

The main drivers of emissions are industrial use, electricity generation, and residential and commercial use:

- In the factual, industrial emission projections are based on gas usage for petrochemical and process heat industrial use from 2024 to 2050. For process heat, the modelling assumed target reductions of 24% by 2035 and 70% by 2050 for high temperature heat, 13% by 2035 and 80% by 2050 for medium temperature heat, and 7% by 2035 and 90% by 2050 for low temperature heat. For the petrochemical industries, modelling assumed Waitara Valley did not reopen even with higher gas availability, but gas usage in Balance Agri Nutrients and Methanex continues until 2050.
- For the electricity sector, modelled gas use in the factual is high until 2040 largely because of the assumption that gas is needed to firm high renewables levels and for dry year support, but after 2040 gas use in this sector declines rapidly. A significant portion of the emissions comes from dry year support. While the model reduces this effect by applying a 20% weighted adjustment, if this dry year support is not called on in any year then emissions would decline accordingly. For example, the cumulative emissions to 2035 from dry year gas support are around 6,000 $ktCO_2e$.
- In the factual for the electricity sector, greater gas volumes is modelled as increased usage for peaking and firming renewable generation (wind and solar). While this does have the consequence of higher emissions from electricity generation, it will have the benefit of helping to stabilise electricity price volatility. Stable electricity prices are important for facilitating greater electrification especially in the commercial and industrial sectors.

Additional information

- In the factual, gas usage in the residential and commercial sectors has target reductions for residential space heating of 33% by 2035 and 80% by 2050, and 10% by 2035 and 40% by 2050 for water heating. Commercial reductions are similar at 23% by 2035 and 80% by 2050 for space heating and 26% for 2035 and 40% for 2050 for water heating. These target levels represent a medium level of gas usage in the model for these sectors representing electrification. Higher electrification rates would lower emissions accordingly.

Sensitivity to changes in key assumptions

A key assumption in the factual is the portion of 2C contingent reserves[4] that will be developed. The counterfactual GIC Supply Headwinds scenario assumes only 30% of 2C reserves are developed which is insufficient for New Zealand's current needs. This would lead to a gas shortage prompting a decline in industrial and energy use, which would then result in lower emissions. The most optimistic GIC scenario ('Industry focus') assumed 50% of 2C reserve development. The factual assumes 60% of 2C reserves development and that new exploration occurs. However, new exploration would take at least a decade to become productive and therefore the effect new exploration would have on emissions are unlikely to materialise until after 2035. As such, it is the level of 2C reserve development that will impact emissions during ERP2 and ERP3.

Reducing the level of 2C reserve development below 60% will reduce gas supply which will then have a flow on effect on gas use effecting emissions. The difference between the 30% 2C development in the counterfactual and 60% in the factual is 5,403 $ktCO_2e$ in ERP2. If 2C reserve production was reduced to the midpoint between these scenarios at 45% of 2C development it would not necessarily halve the emissions difference to around 2,500 $ktCO_2e$ as the relationship between gas supply and emissions outcome is not linear.

This is because an important second level of assumptions that affects emissions is where gas use is prioritised if the supply level is reduced – to the energy sector, the industrial sector, or the residential and commercial sector. Changing the assumptions on which sector gas is prioritised or directed to (whether through price or government action) will have a material effect as each sector has different emissions intensities. The quantitative effect of this sensitivity is difficult to predict without further modelling, however the general trend is clear in that reduced gas supply will lead to reduced gas usage in different sectors lowering emissions, and if the shortage is material then industrial closure is a distinct possibility leading to even higher emissions reductions.

Sensitivity to second order effects - Huntly emissions, electrification and biofuels

Huntly coal emissions from its Rankine units are not modelled in this CIPA. In 2022, electricity emissions from coal generation were 2,705 $ktCO_2e$, with an average of 3,517 $ktCO_2e$, over the previous 5 years and a peak of 6,453 $ktCO_2e$ in 2012. Given the magnitude of these emissions, assumptions around what fuel the Huntly Rankine's use, and when they may cease to operate has a significant effect on overall energy sector emissions outside of the gas sector emissions modelled in this CIPA. Increasing the gas available for the electricity sector, as the policy is intended to facilitate, could bring a number of beneficial outcomes such as allowing Huntly to run on gas rather than

[4] A 2C or contingent reserve is a gas reserve that is not currently rated as commercially viable without further investigation and development.

coal, potentially retire earlier, other gas plants such as Huntly unit 5 to run more, and enabling more gas peaking to support higher levels of wind and solar. All of these possibilities could result in materially lower energy sector emissions.

Another alternative to lowering Huntly coal emissions is to use biofuels to displace coal. This possibility is not considered in this CIPA as the policy does not have a direct influence on any future biofuels industry. Any emissions change resulting from biofuel substitution for coal is also not reflected in this CIPA.

As this CIPA only analyses gas supply and demand emissions it does not consider flow on effects into other energy related sectors such as electrification in transport and the relationship between electricity price and EV uptake. The model therefore does not directly capture any increase in EV uptake (and therefore reduced petrol emissions) as a result of more stable electricity prices (due to more gas in the system reducing electricity price volatility). These effects are however indirectly captured because declining gas use in the electricity sector reflects higher renewable generation in that sector.

Oil emissions

The assessed emissions are calculated from gas development and use within New Zealand and do not include emissions from oil extraction and processing. Emissions from oil extraction and processing were 12.18 $ktCO_2e$ in 2021 (0.04% of energy emissions) which was a significant increase on previous years which averaged around 0.6 $ktC0_2e$ from 2015 to 2020. Any new oil that might be discovered as a result of this proposal is not expected to materially change or increase oil extraction and processing emissions and is not included in the CIPA analysis. As this oil is usually exported, its use does not contribute to local emissions outcomes.

Carbon leakage

Any new exploration and development of gas fields is assumed to be used within New Zealand. Any new oil that is developed is assumed to be exported as it has been in the past. Some of the major gas users provide products vital to the New Zealand economy such as fertilizers. If these companies cannot provide these products utilising New Zealand gas, a reverse carbon leakage is possible arising from increased emissions from the transport of substitute products into New Zealand. However, it is also plausible that a more efficient overseas plant could make the product with fewer emissions negating any additional transport emissions to New Zealand. This issue has not been modelled in this CIPA.

Summary and illustration of modelled emissions

Overall the policy to encourage gas development will not reverse the trend of declining gas use during the transition which is part of a global shift towards new renewable technology and investment. Rather its effect will be to slow the decline in emissions in order to ensure there is sufficient gas, particularly for key industries and for electricity sector usage, to maintain security of supply during the transition.

Section 4: Quality assurance

Quality assurance

Estimated emissions impact of the proposals is 14.2 million tonnes to 2035

The proposal to remove the current ban on new petroleum exploration alongside measures to improve investor confidence is expected to lead to a substantial increase in emissions. This increase, projected to be approximately 14.2 Mt CO2e cumulative to 2035, stems largely from prolonged gas usage in the electricity, commercial and industrial sectors. This is as compared with a counterfactual "supply headwinds" scenario where current gas supply is challenged, and future supply is limited. In that world, industrial production and economic activity reduce due to lack of supply of gas.

When compared the Climate Change Commission's (CCC) demonstration path, the proposals are expected to result in an increase in emissions of approximately 3Mt CO2e cumulative to 2035. This equates to a decrease in emissions of 1Mt CO2e within the first emissions budget period (2022-2025), and an increase in emissions of 650Kt CO2e within the second emissions budget period (2026-2030), and 3Mt CO2e within the third emissions budget period (2030-2035).

While also a modelled pathway based on assumptions, given the sector sub-targets in ERP1 were based on the CCC's demonstration pathway, this comparison can give a sense of the potential impact of the proposals as compared to how we had planned to be tracking.

Officials believe comparing emissions against the "supply headwinds" counterfactual, rather than the CCC demonstration path, more accurately reflects the realistic constraints of the current gas supply.

It should be noted that these proposals address the other two parts of the energy trilemma – security of supply and affordability. We are now in a situation where our annual natural gas production is expected to peak this year and undergo a sustained decline, creating a pressing security of supply issue. This could affect schools, hospitals, businesses, and jobs.

The 14.2 million tonnes is the estimate for direct gas impacts. It does not model the potential emissions impact for displaced coal-fired electricity generation as a result of gas availability. These emissions savings could be significant. In 2022, electricity emissions from coal generation were 2.7 $MtCO_2e$, with an average of 3.5 $MtCO_2e$, over the previous 5 years and a peak of 6.4 $MtCO_2e$ in 2012.

Neither does the CIPA factor in the full range of potential emissions reductions that may result from increased renewable energy generation, stabilised by a secure supply of gas, and increased electrification (for example, process heat electrification, EV uptake).

ERP2 (due at the end of 2024) provides an opportunity to develop a system-wide package of options that collectively contribute to the Government's long-term objectives for the energy transition and for meeting our climate change targets.

Officials consider this counterfactual, which has a steeper decline in gas supply, to be realistic

Quality assurance

The counterfactual has a steeper decline in gas supply as compared with the Climate Change Commission's demonstration pathway. There has been some public commentary that the that the Climate Change Commission's modelling underlying its current consultation processes may not realistically reflect the gas security situation. The Climate Change Commission is currently preparing advice on settings for the fourth emissions budget.

The chosen counterfactual is realistic and reflects the seriousness of the gas security situation. Gas production has fallen by 51 petajoules between the years 2018 and 2023, and some large gas consumers are expressing concern about their ability to secure gas contracts.

The counterfactual also has a steeper decline in gas supply to the modelling being used for the ERP2 interim projections. The ERP2 modelling makes assumptions based on our understanding of expected gas supply at 1 January 2023 and does not currently reflect recent developments. For example, it does not take in to account the most recent reserves estimates, which are expected to be lower than previously estimated. In comparison, gas supply is constrained in the counterfactual by assuming that only 30% of reserves are developed and then increases this level to 60% in the factual.

Due to the timing of this Cabinet paper relative to the work being undertaken to support development and socialisation of the interim projections, it was not possible to align this work in time for the Cabinet paper. Officials are continuing to engage on how to incorporate this updated understanding of gas supply into the ENZ model and future projections of how we are tracking using that model.

Quality statement from MfE CIPA team

The CIPA team has reviewed the estimates at a high level and considers the modelling for this proposal to follow good practice and use reasonable assumptions.