Regulatory Impact Statement: National direction under the RMA on industrial greenhouse gas emissions

Coversheet

Purpose of Document	
Decision sought:	*Final Cabinet decisions on a national direction instrument under the Resource Management Act 1991*
Advising agencies:	*Ministry for the Environment and Ministry of Business, Innovation and Employment*
Proposing Ministers:	*The Minister for the Environment and the Minster of Energy and Resources*
Date finalised:	*17 August 2021*

Problem Definition

There are two separate but related problems:

- To meet New Zealand's climate change target of net zero carbon emissions by 2050, industrial emissions must begin to decline. As stated in the Climate Change Commissions advice "reducing emissions from low- and medium-temperature process heat will be critical for meeting the 2050 emissions reduction target". The New Zealand Emissions Trading Scheme (NZ ETS) will continue to influence industry decisions to decarbonise industrial process heat. However, the price trajectory is uncertain and the current price is not strong enough to incentivise investment decisions to decarbonise process heat assets, which have a long life. New Zealand could also fail to develop the low-emissions fuel supply chains and technologies it will need.
- The Resource Management Amendment Act 2020 contains provisions which will allow regional councils to consider the effects of greenhouse gas (GHG) emissions on climate change. These will take effect in early 2022. Without national direction on how to interpret this, regional councils are likely to face difficulties assessing the impacts of GHG emissions from industrial process heat, creating a risk that case-by-case consenting decisions undermine the intent of the legislation, or, where regional councils develop their own approaches, inconsistent planning rules and decisions.

Executive Summary

The Government's objectives for the policy process are:

A. To achieve national consistency and certainty in the management of industrial GHG emissions under the RMA.

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B. To reduce industrial GHG emissions and support New Zealand's transition to a low-emissions economy.

2020 decision to link the Resource Management Act and the Zero Carbon Act 2019

In 2020, the Resource Management Amendment Act 2020 amended the RMA to remove the existing statutory barriers on regional councils from considering the effects of GHG emissions on climate change in planning and consenting decisions. The regulatory impact summary for that decision noted that the existing prohibition was creating a tension with the Government's climate agenda and other aspects of climate change policy. Without direction from central government, this amendment could lead to regional councils managing GHG emitting activities inconsistently across the country. The national direction will assist in achieving the purpose of the RMA by providing for the sustainable management of natural and physical resources by requiring industry to reduce their GHG emissions from process heat and accordingly reduce the associated adverse effects on the environment.

Stakeholder views

MfE and MBIE released a consultation document on the proposals. There were differing views on whether regulation is necessary, or whether the NZ ETS should remain the primary policy tool for reducing emissions.

Within those that supported regulation, there is broad support for the focus on coal over other fossil fuels. Many thought that the proposals in the consultation document were too stringent for other fossil fuels, and that this would detract from investment to switch away from coal. There is also a view that there needs to be more thought given to the availability and cost of alternative fuels, as well as the capital constraints for businesses on installing new assets.

Options to address the problem

Further change to the NZ ETS was not assessed because there are changes to the ETS underway or about to be consulted on. Therefore, the scope of the options was restricted to different options for national direction under the RMA (i.e. all were regulatory options).

13 options were identified and assessed qualitatively against five criteria.

The option that will best meet the objectives is a package of regulatory options that:

- Prohibits GHG emissions from new coal-fired industrial process heat assets, and signals the phase out in existing assets while still providing for existing asset owners to gain the useful life.
- Makes it more difficult to install new fossil fuel (other than coal) combustion assets, but recognises there is still a role for them where there are no low emissions alternatives which are both technically feasible and economically viable.
- Incentivises owners of existing fossil fuel (other than coal) combustion assets to replace them with a low-emissions alternative at the end of their natural life.

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Different options were considered for existing and new fossil fuel combustion assets because of the sunk costs, and for coal because of its emission intensity.

This package is reflected in the Cabinet paper.

Limitations and Constraints on Analysis

- The scope of the proposal was focused on industrial heat and power, and in particular giving effect to a priority in the Labour Party 2020 Election Manifesto to ban new coal boilers. National direction under the Resource Management Act 1991 (RMA) is the most appropriate mechanisms for achieving this ban, and as a result, the analysis was limited to national direction proposals.
- There are other proposals underway that could contribute to the objectives of the proposal, including amendments to the New Zealand ETS.
- While the process heat sector is a significant contributor to New Zealand's GHG emissions, it is only a subset of the GHG-emitting activities that are or could be regulated under the RMA by regional councils when amendments to the RMA come into effect.
- There is necessarily some uncertainty about how the preferred option will play out because of the possible impact of the proposal on individual emitters and the NZ ETS prices over time. This highlights the importance of monitoring the impacts of the proposal.
- The modelling required assumptions about the impact of the proposal and the behaviour of both local authorities and applicants to be made. The assumptions include:
    - the level that future carbon prices will reach
    - how the policy will influence council decisions (how many consents might be declined, when it is a discretionary decision of councils) and investment decisions by industry (where they might choose not to seek another consent for a fossil fuel asset and instead choose a low emission option that does not require a GHG consent)
    - timeframes of when existing consents expire.
- There is limited data on the distribution of resource consents for process heat in New Zealand, including on the duration and conditions of existing consents and levels of emissions and types of energy sources that are covered. The Ministry for the Environment commissioned a study to gather a sample of data from regional councils. This study and the consultation process has provided valuable data, but there is some residual uncertainty.

Responsible Manager(s) (completed by relevant manager)

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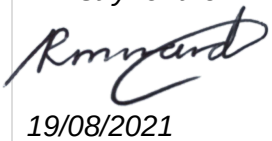

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18 / 08 / 2021

Quality Assurance (completed by QA panel)	
Reviewing Agency:	Ministry for the Environment and Ministry of Business, Innovation & Employment
Panel Assessment & Comment:	A joint Regulatory Impact Assessment Panel between the Ministry for the Environment and the Ministry for Business, Innovation and Employment has reviewed the Regulatory Impact Statement "National direction under the RMA on industrial greenhouse gas emissions". The Panel confirms that the level of information provided meets the quality assessment criteria.

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Section 1: Diagnosing the policy problem

What is the context behind the policy problem and how is the status quo expected to develop?

Background

The resource management system

The RMA is New Zealand's principal environmental legislation. The RMA provides the regulatory framework to manage the protection, use and development of natural and physical resources, including land, freshwater, the coastal marine area, and the discharge of contaminants into air, land and freshwater. The purpose of the RMA is to promote the sustainable management of natural and physical resources in a way that enables people and communities to provide for their social, economic and cultural wellbeing. The Government is planning to repeal the RMA and replace it with three pieces of legislation.

Under the RMA, local authorities (regional councils and territorial authorities) are responsible for most decisions on how natural and physical resources are managed through the development of plans and decision-making on resource consent applications.

Central government can also develop national direction on matters of national significance to direct local authority decision-making under the RMA where it is appropriate to have a nationally consistent approach for resource management issues.

Industrial greenhouse gas emissions and climate change under the RMA

Currently, regional councils are unable to manage the effects of GHG emissions on climate change under the RMA. This prohibition was made in an amendment to the RMA in 2004. The intention at that time was to ensure that the government's policy response to GHG emissions was focused on one intervention; at the time, the proposal under discussion was a carbon tax, however in 2008 the government introduced the New Zealand Emissions Trading Scheme (discussed further in the next section).

However, in June 2020 the Government passed the Resource Management Amendment Act. This repealed the prohibition (in section 70A of the RMA), and it will take effect from 31 December 2021. This means that from 2022, regional councils are able to consider the effects of a discharge of greenhouse gases on climate change when making a rule in a regional plan and in decisions on resource consent. This will apply to all activities that emit GHGs, not just industrial activities.

Interactions between air quality rules and GHG emissions

Discharges to air from industrial activities are managed by regional councils under the RMA through regional policy statements, regional plans and resource consents. Some air quality rules use the power output of a boiler or industrial heat source as a proxy e.g. boilers with a heat rating above 2 MW must obtain an air discharge consent. Air quality contaminants from

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combustion include particulates ($PM_{10, 2.5}$), nitrous dioxide, sulphur dioxide, and carbon monoxide, depending on the fuel[1].

The RMA prevents regional councils from *considering* the effects of GHG emissions on climate change when making air discharge rules and considering applications for air discharge permits – however, it does not prevent rules and consents that may indirectly regulate GHG emissions as a consequence of managing the effects of a discharge on air quality.

The implication is that existing air discharge rules and permits that regulate the 'discharge of contaminants into air' also regulate (and authorise) GHG emissions as part of the overall discharge (as GHG emissions are a 'contaminant' under the RMA). This has resulted in consents being granted that authorise the discharge of GHG emissions, even though regional councils could not consider the effects of the discharge on climate change when the consent was granted.

Currently, regional plans tend to permit higher levels of some fossil fuel (e.g. natural gas) combustion than for biomass because they have worse air quality impacts. A review of regional fuel combustion rules for air quality found that permitted activity thresholds for natural gas are typically around 10 MW (range 4-50 MW) and typically around 1-2 MW for wood which is considered a carbon-neutral fuel source[2].

Emissions in and out of scope

Emissions from electricity generation (for example, coal generation at the Huntly power station, back-up diesel generators) and waste (for example, landfills), are excluded from the scope of national direction.

Despite the focus on industrial emission at this time, the reformed resource management system will have an important role across many different sectors supporting climate change outcomes for both mitigation and adaptation. Consistent with the Resource Management Review Panel's (2020) recommendations in '*New Direction for Resource Management in New Zealand'* this will be particularly important across forestry, electricity generation, waste and across urban form, as well as in industry. The intention is a more fulsome package of national direction on climate change to be developed through the new system.

Process heat

Process heat is the thermal energy used to manufacture products in industry. Process heat is generated for a number of purposes, including converting milk into powder, wood pulp into paper, metal production and chemical production (for example, methanol). Process heat

[1] https://www.legislation.govt.nz/regulation/public/2004/0309/latest/DLM287036.html?search=ta_regulation_R_rc%40rinf%40rnif_an%40bn%40rn_25_a&p=3#DLM287036

[2] 4Sight Consulting report

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currently contributes about eight per cent of New Zealand's total GHG emissions and makes up 17 per cent of emissions covered under the net zero target.

The term covers a wide range of fossil fuel combustion processes for heat and industry that is categorised into three temperature requirements – low, medium and high.

Uses of process heat

Around 67 per cent of process heat is used at low and medium temperatures, and is responsible for 60 per cent of emissions. The remainder (33 per cent of energy and 40 per cent of emissions) is used for high temperature requirements such as steel and cement manufacture. Total emissions from process heat were 8.0 $MtCO_2e$ in 2019[3].

Category	Temperature requirements	Uses	Examples
Low	Less than 100°C	Water heating Space heating	Sanitisation of equipment in the food processing sector
Medium	Between 100 and 300°C	Industrial processes	Drying wood products Drying food products, such as milk powder
High	Greater than 300°C	Industrial processes	Cement manufacture Steel manufacture Oil refining Melting metals Chemical manufacturing

Process heat is used throughout the economy, with over 84% of process heat used by the industrial sector in 2019. The commercial sector uses 9 per cent of New Zealand's process heat, and the public sector uses 4 per cent.

Technology and assets

Approximately 58 per cent of process heat is made using boiler systems (over 80 per cent of low and medium temperature process heat). Boilers typically have an economic lifespan of 25 years although they can be in use for much longer (up to 40 years). Some boilers are co-firing, which means they can operate on a mixture of two fuels e.g. coal and biomass. Some sites (notably in the dairy manufacturing and wood, pulp and paper manufacturing sectors) use heat from cogeneration or combined heat and power (CHP). This is where electricity and heat are produced simultaneously. A separate but related use of fuels is for commercial space and water heating[4]. Other industrial applications which require direct heating may use ovens, kilns or furnaces.

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[3] EECA's energy end-use database 2019

[4] The discussion document asked a question about whether this should be included in the scope of the national direction on the basis that the issues and technology options are similar.

Fuels for process heat

Around half of process heat demand is met by burning natural gas or coal. The remainder is met by electricity, bioenergy, using geothermal energy directly and liquid fossil fuels (e.g. diesel).

These are a source of GHG emissions. Industrial process heat generates around 10 per cent of New Zealand's GHG emissions and is the second largest source of energy-related emissions after transport (approx. 23 per cent of energy-related emissions). This has been relatively steady since 2000, with some annual fluctuations.

Natural gas accounted for the largest proportion of low and medium temperature process heat fuel consumption at 29 per cent, and the largest levels of GHG emissions at 44 per cent. Coal accounted for 16 per cent of process heat (for low and medium temperatures) and 39 per cent of GHG emissions (coal is more emissions-intensive per unit of industrial output than any other source).

Process heat represents about 38 per cent of New Zealand's coal use, and 40 per cent of natural gas use.

Location and availability affect choices about fuel type

For many process heat users, the location and availability of fuel types will affect their choices. Currently neither geothermal nor natural gas are available in the South Island. As a result, coal is used in the South Island for many operations of equivalent scale that are fuelled by geothermal or natural gas in the North Island.

Almost all bioenergy (wood and black liquor) is currently used in the wood, pulp and paper manufacturing sector, where residues from processing operations are used as fuel. There may be constraints on biomass supply in some regions where there is not significant forestry.

Other factors affecting the choice of energy source include:

- The temperatures required for the process – some fuels are not capable of supplying the high temperatures required by certain industrial processes.
- The compatibility of alternative fuels with existing assets. For example, biomass briquettes can be used as a direct substitute for coal in a coal boiler without upgrades, whereas other forms of biomass such as green chip/hog fuel require major refurbishment to assets and also have lower efficiency.
- The relative cost of different fuels.
- The requirement to store on-site. Wood and coal, for example, need to be stored on-site while natural gas is supplied to the site as required through a pipeline.

In some regions, electric boilers will be needed, however in some cases they will have a higher operational cost than fossil fuel boilers at current carbon and electricity prices. However, technologies such as industrial heat pumps operating at 60 – 90°C typically

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achieve a coefficient of performance (COP) of 4[5]. This means for each unit of electrical energy consumed, four units of heat energy are produced. This 'multiplier effect' significantly reduces the cost of providing heat for lower temperature applications. Electrifying process heat will also require expanding the electricity transmission and distribution grids, which will add to the total cost. High temperature heat pumps are already cost effective options for transitioning low temperature process heat and can play a role in reducing overall energy demand for transitioning medium temperature requirements.

Other alternatives include biogas (combustible gases generated from biogenic material) and synthetic gases. Currently, biogas is typically used where it is generated as a by-product of other operations e.g. landfills or wastewater treatment plants. Hydrogen is often discussed as a future alternative to fuel industrial process heat, but currently in New Zealand there are only demonstration projects. In addition, 'green' hydrogen, which is made from renewable resources, would have to be manufactured using electricity. The energy conversion rate is relatively low.

High temperature process heat requirements

A relatively small number of very large 'highly or tightly integrated' plants (e.g. production of petroleum, chemicals (largely methanol), rubber, cement, and steel) fuelled by gas and coal have high temperature requirements and make up 39 per cent of process heat.

There is less potential to decarbonise high temperature heating because of a lack of technically and economically viable alternatives. For example, steel making is a large user of high temperature process heat, and one of the main potential emissions reduction measures is substituting coal with bio-based coal/coke in the iron ore sintering process, but this has not yet been achieved commercially.

The burning of fossil fuels has other environmental impacts

There are other environmental impacts from boilers and other combustion equipment, principally air quality contaminants. For example, combustion also results in nitrous oxides (NO and NO_2) and particulate matter. These have impacts on air quality and human health and are regulated under the RMA (described in the next section). These contaminants are also generated by other combustion activities in greater or lesser amounts depending on the fuel type and combustion process.

There is existing government regulation in place, across three systems:

- The resource management system
- The New Zealand Emissions Trading Scheme
- The Climate Change Response Act 2002

New Zealand Emissions Trading Scheme

[5] A Roadmap for Electrification – Decarbonising transport and process heat, Transpower

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New Zealand's main tool for reducing greenhouse gas (GHG) emissions is the New Zealand Emissions Trading Scheme (NZ ETS).

The NZ ETS places a price on GHG emissions. All sectors of New Zealand's economy, apart from agriculture, are included in the NZ ETS.

Businesses in the NZ ETS are required to buy units to cover their emissions, which provides an incentive for them to reduce their emissions. One unit covers one tonne of carbon dioxide equivalent emissions (tCO_2-e). A rising carbon price creates an incentive to reduce fossil fuel use through energy efficiency improvements and switching to low carbon fuels.

However, firms in trade-exposed and emission-intensive industries, such as steel and cement making industries, are allocated free emission units. In 2020, during a review of the NZ ETS, the Government agreed to phase down industrial allocations gradually from 2021. Other changes made in 2020 were:

- placing a cap on the total emissions allowed within the ETS
- introduction of a cost containment reserve and auctioning of units (the first auction took place earlier in 2021)
- an increase in the price of units under the fixed price option from $25 to $35 a unit for removals occurring in or attributed to 2020

The Government reduces the number of units supplied into the scheme over time through the NZ ETS settings ('the cap'). The cap will align with the total emissions allowed by emissions budgets.

The Climate Change Commission's advice to Government

The Climate Change Commission provided its advice to Government in May on the recommended emissions budgets and plan to meet them. The Commission's recommended action plan to decarbonise the industrial sector included:

- Stopping the installation of new coal boilers and setting a timetable to phase out fossil fuel use in existing boilers.
- Supporting innovation for decarbonising hard-to-abate industries, accounting for sector-specific circumstances and their interdependencies and the need for bespoke solutions requiring research and development.
- Acting in partnership with Iwi/Maori and in collaboration with industrial and manufacturing stakeholders.

Non-regulatory interventions: Government Investment in Decarbonising Industry fund

In 2020, the Government introduced the Government Investment in Decarbonising Industry (GIDI) fund. The Energy Efficiency and Conservation Authority (EECA) administers the $70 million GIDI fund on behalf of the Government. The fund provides co-investment for capital spending to accelerate decarbonisation projects. The projects were required to have a capital cost greater than $500,000.

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Projects considered through the scheme include: energy efficiency, technology innovation, and fuel switching where they directly reduce the use of fossil fuels. In particular, coal boilers are already being replaced with biomass or electricity.

The first round of projects from GIDI set a strong benchmark in terms of value for money, with the average emission abatement cost to the government coming in at under $25 per tonne. This fund indicates that many of the projects required through national direction will be technically and economically feasible.

Building regulation and GHG emissions

In 2020, the Government consulted on whether to introduce a mandatory Operational Emissions Cap for new residential and commercial buildings under the Building Act. This would set out the total allowable annual emissions per square meter per annum for all new buildings, including requirements for fossil fuel combustion, electricity use and water use. If this is implemented as proposed, it would regulate water and space heating for new commercial buildings.

The Operational Emissions would support decarbonising of the water and space heating element in commercial buildings, which often use gas or coal to generate the heat. s9(2)(f)(iv)

What is the policy problem or opportunity?

If there was to be no further action, there could be two distinct but related problems. These are discussed in the following sections.

1. Problem: NZ ETS price trajectories are uncertain, and carbon prices may not rise enough[6] to incentivise the uptake of commercially-available fuel switching opportunities needed to reduce GHG emissions from industry in line with the target of net-zero emissions by 2050. New Zealand could also fail to develop the low-emissions fuel supply chains and technologies it will need.

As described above, emissions pricing is a key mechanism to drive emissions reductions in energy and industry. Emissions pricing puts a financial incentive on all covered sectors of the economy and helps lower the overall economic cost of achieving emissions reductions and leads to emissions reductions across these sectors of the economy. As the carbon prices rises, there is an incentive to reduce fossil fuel use through energy efficiency improvements and fuel switching opportunities. The NZ ETS has, to date, been the key measure, but has not driven many emissions reductions in industry due to low historical prices. Recent and forthcoming policy decisions on NZ ETS price settings, including a five-year price corridor[7]

[6] For other reasons, total reliance on emissions pricing would not lead to a just transition. Implications in other sectors, such as the response of forestry and fuel costs for consumers (and potentially eventually agriculture) and distributional impacts will need to be considered.

[7] The corridor between the auction floor price and the cost containment reserve (ceiling)

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that rises over time will help to signal what the future cost will be to inform private investment decisions.

Uncertainty about future emissions prices

However, NZ ETS caps are currently only set for a few years into the future. Because emissions reductions can involve capital investment which is relatively costly and long-term, the uncertainty of the emissions price makes investing in reducing emissions riskier, so households and businesses may underinvest.

Shadow emissions pricing can play a role by anticipating future emissions prices further out in the future and complementing the current emissions pricing. It helps decision-makers account for emissions impacts and costs over the project's entire lifetime. Shadow emissions prices are especially important for government policy and investment decisions that involve a large amount of resources, or are long-lived or irreversible.

Without other interventions, the NZ ETS may also make it more difficult to develop affordable low-emissions fuel supply chains and technologies that will be needed. These are discussed in the following sections.

Lock-in of infrastructure and long-lived assets

A price on emissions, assuming rational behaviour, leads to lower-cost emissions reduction opportunities being taken up first. The lower-cost emissions reduction opportunities tend to be increasing efficiencies in existing assets (long-lived assets tend to have high capital costs). This means that the current level of emissions pricing can only play a limited role in bringing into use new technologies that will be required for the transition; it is insufficient to incentivise investment in new technology for asset replacement. Without changes being made now, investments in new emissions-intensive assets will make it increasingly difficult to achieve New Zealand's emissions reduction targets in the future.

To achieve decarbonisation of process heat in industry, New Zealand will need to secure affordable low-emissions fuel supply chains and new technologies. This includes investment in electrical grid expansion, renewable electricity generation, wood pellet manufacture, and wider biomass infrastructure and market development.

Certainty of emissions outcomes

The recent NZ ETS reforms have implemented a flexible, five-year rolling cap. An emissions price guides investment decisions but the combination of oversupply, price measures and a flexible cap in the NZ ETS mean that it will not necessarily guarantee a specific emissions outcome.

2. Problem: There will be an absence of policy for regional councils in managing the effects of GHG emissions on climate change, leading to inconsistent decisions, costly processes and increased litigation across New Zealand.

The basis for the 2020 amendments to the RMA

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The 2020 amendments to the RMA which repealed section 70A removes the prohibition on regional councils considering the effects of GHG emissions on climate change. In effect, this confers a new obligation on regional councils which they have not previously had to manage.

The regulatory impact summary for the 2020 decision to repeal section 70A noted that the existing prohibition was creating a tension with the Government's climate agenda and other aspects of climate change policy. The 2004 amendments "*reflected the climate change policy context of the time, in which the goal was for New Zealand to respond to climate change matters at the least cost to the economy, by means of a pre-eminent carbon pricing scheme. Non-price measures, including RMA regulation, were assumed to be duplicative and unnecessary unless a strong case could be made for them.*"

The impact summary noted that the Government's primary policy objective has shifted to transitioning to net zero carbon emissions by 2050, while ensuring that the economic impacts remain manageable. It noted that emissions pricing would remain as part of the wider policy package, but noted that there are also many options available which "*are not responsive to the NZ ETS price signal*".

Existing rules under the RMA

Although regional councils' existing plans regulate GHG emissions, those rules are designed to address air quality effects, not climate change effects. Because of this, regional plans generally have more lenient rules for the burning of fossil fuels for process heat compared to lower emission fuels with higher particulate matter (for example biomass, which is a low-carbon fuel).

There is also an absence of objectives and policies in RMA policy statements and plans to support decision-making on GHG emissions or on climate change mitigation more generally. The consequence is that, for RMA planning and consenting, it will be very difficult for decision-makers to assess and scrutinise the effects of GHG emissions on climate change. This also has the potential to result in complex case-by-case assessments whereby applicants can argue the effects of their individual GHG emissions on the 'environment' and climate change are negligible.

Also, regional councils may choose to fill the 'regulatory gap' by developing their own objectives, policies and rules in plans. This could result in different rules and mitigation approaches that vary from region to region. This would lead to inconsistency, uncertainty and other outcomes that are contrary to the purpose of the RMA and New Zealand's wider climate change goals.

Emissions from electricity generation (for example, coal generation at the Huntly power station, back-up diesel generators) and waste (for example, landfills), are excluded from the scope of national direction. It is proposed that these will be addressed through non-statutory guidance. The reformed resource management system will have an important role across many different sectors supporting climate change outcomes for both mitigation and adaptation. The intention is a more fulsome package of national direction on climate change to be developed through the new system.

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Stakeholder views on the problem

A consultation document containing the proposals was released for consultation on 8 April to 20 May. The Ministry for the Environment received 91 submissions on the consultation document. Five stakeholder workshops were held on the proposal with industry, local government and interested groups, and two one-on-one discussions with iwi who expressed an interest in the proposal.

The principal stakeholder groups include: industry, local government, the oil and gas sector and resource extraction sectors, environmental groups and iwi/Māori. 47 of the 91 submissions were from industry and local government. Seven of the fourteen regional councils who will be responsible for regulating the impacts of GHG emissions on climate change made submissions.

Industry stakeholders would generally be the regulated parties. We received submissions from most sectors who would be affected by the proposal: food processing, pulp and paper, horticulture, dairy, meat processing, manufacturing, electricity, metal smelting and chemicals manufacture. There was limited engagement from the commercial sector on the discussion document.

The responses to the consultation document, as well as the views expressed in stakeholder meetings, have informed the definition of the problem and the analysis in this document.

Agreement that there needs to be a transition to a net-zero emissions future

Nearly all stakeholders who made a submission on the proposal recognised the need to reduce GHG emissions across the board, including from process heat. They were supportive of aligning with New Zealand's wider climate change targets (domestic and international climate targets).

There was very strong support for New Zealand to reduce its GHG emissions to meet its obligations under the Paris Agreement and the 2050 net-zero target in the Climate Change Response Act. Nearly all submitters acknowledged that industrial and process heat would need to move to renewable fuels over time and away from fossil fuels, although there was a wide range of views about the preferred timeframe and nature of that transition, including whether certain fuels (natural gas) could or should play a role as a transitional fuel (these are described further in the options analysis).

Interaction with the New Zealand Emissions Trading Scheme - the case for complementary measures

There were differing views on whether complementary measures to the NZ ETS - i.e. regulation - was necessary or desirable.

Some submitters - principally from industry - thought that the ETS is adequately place and should remain the primary tool to achieve emissions reductions. They believed that the ETS, and the recent changes to its settings, should be left to 'bed down' to see what impact they will have, while others thought it should be further strengthened through increasing the carbon price and / or phasing out free allocation credits to industrial emitters more rapidly. A corollary of this view was that regulatory intervention will lead to:

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- higher costs, as it will distort investment incentives (e.g. inhibiting investment in green gas technology)
- unintended consequences, such as disincentivising shifts from coal to natural gas (which would have an emission reduction)
- unnecessary complexities.

Some submitters also thought that policies which focus on a specific industry (in this case, industrial process heat) would distort the incentives created by the ETS and meant that, in future, there would be a need for further industry-specific incentives to achieve the desired objective of emissions reduction – and that this would unnecessarily increase the complexity of the system.

This would simply lead to a 'waterbed' effect, where emissions are not reduced but simply shifted out of one sector to another.

On the other hand, some submitters, including industry, local government and individuals, thought that regulatory change was needed to achieve reductions in GHG emissions at the speed required to meet New Zealand's climate obligations.

The risk of 'emissions leakage' was also raised. This is where firms cease operation in one country because of the high costs or regulatory barriers to emissions, and instead shift production overseas where emissions experience less or no price or regulation, where there is no benefit to global GHG reductions.

Support for the focus on coal

There was overall support that it was reasonable to target interventions towards coal-fired assets because coal is the cheapest and most emissions-intensive fuel. A few submitters opposed a targeted focus on regulating specific fuel and technology types because it would not reduce emissions overall (these submitters also tended not to support a regulatory approach). Submissions also recognised that the focus on coal had already been signalled well by Government.

Cost of investment and capital constraints

The cost and capital constraints of transitioning away from fossil fuels was raised by several industry submitters. Many saw the expected capital cost of conversion or new assets as a barrier and thought that more and continued government funding was needed. In particular, small-medium enterprises – who are not likely to be eligible for the GIDI fund – commented that they need financial support to transition away from coal. For example, a small horticultural company outlined the challenges they have faced switching away from coal, after investigating alternatives for several years.

Some submitters, primarily from local government also noted the costs involved in compliance and monitoring. Regional councils would have to undertake the reviews with an understanding and familiarisation of the new rules under the national direction and to be able to understand the technicalities of the consent application from industry and raised the need for additional support.

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Availability and cost of alternative fuels

There was feedback from industry and industry bodies that the poor economics (and availability) of lower-emission alternatives prevented many from switching. Several industry submitters stated that electricity is not feasible (particularly in light of the current price of electricity), and biomass was not a practicable or economic alternative because it is not readily available locally. Many stakeholders thought that encouraging electrification, for example by lowering the cost of electricity, would be lower risk than banning or regulating certain fuels. Other submitters noted that that there was no reason that coal could not be substituted in all low and medium temperature applications with price competitive, readily available alternatives such as biomass. Some of these submitters noted that process heat users should take active steps to secure their own supply of bioenergy resources for future use.

The importance of emissions across New Zealand

There was some feedback from companies which operate industrial sites and use process heat in more than one region, who thought that it was important to focus on reductions at a national level, rather than regionally. In their view, it is difficult to see how the proposal can operate with sufficient national coordination for a widely distributed business, and there needed to be flexibility to manage assets as a national portfolio to achieve the largest reduction of greenhouse gas emissions, for example switching one large boiler from coal to biomass could result in more emissions reductions than two small boilers. They raised the issue of emissions boundaries and the risk of having sites under jurisdiction of different regional councils, as councils have limited mandate or visibility of actions occurring in other regions.

What objectives are sought in relation to the policy problem?

There are two objectives the Government is seeking in relation to the problem:

A. To achieve national consistency and certainty in the management of industrial emissions under the RMA.
B. To reduce industrial emissions and support New Zealand's transition to a low-emissions economy.

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Section 2: Deciding upon an option to address the policy problem

What criteria will be used to compare options to the status quo?

The following criteria have been used to assess the likely impacts of the options under consideration:

1. The emissions reduction that the option will achieve.
2. Consistency in resource management regulation: the need to manage GHG emissions in a nationally consistent way.
3. Compliance burden for industry and other emitters, including consenting costs, and the capital and operating costs of complying with the option.
4. Costs and complexity of implementation (local government): the cost for local government to implement the option, including plan changes and monitoring activities.
5. System risks, including wider unanticipated options, and distributional impacts.
6. System benefits, including environmental co-benefits and development of low-emissions energy, infrastructure and markets.

There are likely to be some trade-offs between these criteria. Achieving emissions reductions may come about at the expense of costs to industry and to local government to implement.

What scope will options be considered within?

The scope of feasible options to address the problem was constrained to RMA national direction options. This is partly because the options are a response to the amendments to the RMA which will allow regional councils to consider the effects of GHG emissions on climate change.

Some submitters provided feedback that options other than national direction would better achieve the second objective of reducing emissions from industry and process heat. Suggested options included:

1. Increasing capital funding for switching to low-emissions alternatives (through an increase of the GIDI fund or broader eligibility e.g. lower the minimum project cost limit for small-scale operations).

   . All the $70 million GIDI funding is likely to be allocated by the end of 2021. It has brought forward some industry projects, including switching from coal to biomass or electricity. However, the total investment required to replace all fossil fuel process heat assets with low-emissions alternatives is significant. The Energy Efficiency and Conservation Authority (EECA) estimates it to be in the order of $3 billion excluding space and water heating, and $4.5 billion if including space and water heating. There are also many smaller entities that may face capital constraints or are unable to absorb the costs of transition.

2. Strengthening the NZ ETS, whether through changes to the price floor and ceiling in the cost containment reserve or phasing out industrial allocation more quickly.

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While strengthening the NZ ETS would provide a stronger incentive to reduce emissions, on its own it would not lead to the necessary developments in low-emissions fuel supply chains and technology discussed in the problem definition. However, there are also some changes to the ETS underway or about to be consulted on, including changes to the industrial allocation regime and price settings and the number of units available.

3. Options for reducing the costs of and barriers to lower emissions fuels e.g. the cost of electricity and electricity grid infrastructure. Stakeholder feedback on this was useful and will be considered for further development once the first Emission Reduction Plan is in place.
4. Some submitters suggested repealing the RMA Amendment as the policy was too rushed or not durable, and instead defer consideration climate change mitigation to RM system reform.

What options are being considered?

The regulatory options for addressing industrial emissions from coal have been split out from other fossil fuels because of the higher emissions from coal (on a unit energy basis). All of the options are variations of different policy and rule frameworks under the national direction provisions of the RMA. Therefore, all of them operate within the framework of the RMA, which is based on avoiding, remedying or mitigating the effects of activities.

We also looked at different options for existing and new assets, in recognition of the fact that there will be sunk costs for existing asset owners that will not be the case for someone looking to install a new asset.

Option 1 – the counterfactual

Under the counterfactual, regional councils would still be able to consider the impact of GHG emissions on climate change because of the changes to the RMA that will come into effect on 1 January 2022. There would be no national policy or rule framework for fossil fuel combustion equipment. There is some inherent uncertainty about the impacts of the counterfactual because it will depend on the actions of regional councils. They may choose to develop regional objectives, policies and rules to include in regional plans, however this would take time, involve considerable cost to industry, local government and ratepayers funding the process, and decisions would likely be appealed to the Environment Court.

We have not assumed additional reduction in emissions from council decisions in the short term under the counterfactual (before plan changes could be made) as it is too uncertain; regional councils could either impose very stringent or very lenient approaches. Also, it could take councils a long time to develop rules and make plan changes and any reductions would likely be realised in the second emissions budget.

Emission reductions under the counterfactual

In the absence of national direction under the RMA, existing interventions to achieve reductions in GHG emissions from industrial process heat would continue, principally the NZ ETS and agreed GIDI projects.

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Although the emissions reductions will vary over time depending on the price of New Zealand units, for the purpose of this analysis we have assumed the emissions reductions of the counterfactual to be zero, at an ETS price of $35 (the midpoint of the price floor of $20 and price ceiling of $50)[8].

However the Government is also considering, concurrently to the development of this policy, changes to the NZ ETS price corridor. If that were to be progressed, there would be some interactions with the national direction. The potential impacts of this are set out in the section on marginal costs and benefits.

Options for existing fossil fuel combustion equipment at low and medium temperatures (other than coal)

Option	Description
Option 2 Adoption of BPO (restricted discretionary activity status)	Regional councils could either grant or decline the consent, but the issues they can consider in making that decision are 'restricted' to what the NES specifies. In this case, the restricted matters would be: • Preparing a GHG emissions plan • The extent and achievability of the emission reduction targets set in the GHG emissions plan • The extent to which the applicant has adopted the best practicable option to reduce emissions, including consideration of financial implications and technical feasibility • Monitoring, reporting and review requirements.
Option 3 GHG emissions must be avoided unless there are no feasible alternatives (restricted discretionary activity status)	This option is the same as option 2, with the exception that regional councils could only grant a consent if they were satisfied that: • There are no low-emissions technically and economically viable alternative options • The GHG emission plan would deliver emission reductions. The assessment of technically viable and economically feasible would be based on an analysis of alternative low emission options, taking into account an agreed shadow carbon price relevant to the lifetime of the asset to factor in future emissions costs.
Option 4 Signalling a future phase out date for	This option would include a phase-out date in the national direction to signal that, after a specific date, no resource consent would be granted for low and medium temperature fossil fuel combustion equipment.

[8] The price of New Zealand units at the time of preparing this analysis is approximately $47. Although the current ETS price is higher than the assumed ETS price for the analysis, it is not clear how the price will change over time so we have assumed the midpoint price.

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existing fossil fuel combustion (other than coal)	

Options for existing coal combustion equipment at low and medium temperatures

Option 5 Avoid GHG emissions unless there are no feasible alternatives (restricted discretionary activity status)	This is the same as option 3 but applied to coal combustion equipment.
Option 6 Maximum consent duration.	Regional councils would be able to grant a consent with a maximum consent duration of ten years. This option is additive to option 5.
Option 7 Signalling a future phase out date for existing coal-fired assets	Under this option, no resource consent would be granted for low and medium temperature coal-fired combustion equipment after 2037. Any consents granted once the national direction came into effect could not allow them to operate beyond 2037. 2037 was chosen on the basis of the Climate Change Commission's initial demonstration path.

Options for new fossil fuel combustion equipment at low and medium temperatures

Option 8 Adoption of BPO (restricted discretionary activity status)	This is the same as option 2, applied to new fossil fuel combustion equipment. Regional councils could either grant or decline the consent, but the issues they can consider in making that decision are 'restricted' to what the NES specifies. In this case, the restricted matters would be: • Preparing a GHG emissions plan • The extent and achievability of the emission reduction targets set in the GHG emissions plan • The extent to which the applicant has adopted the best practicable option to reduce emissions, including consideration of financial implications and technical feasibility Monitoring, reporting and review requirements.
Option 9 Avoid GHG emissions unless there are no feasible alternatives	This is the same as options 3 and 5 applied to new fossil fuel combustion equipment. All of the criteria of option 8 would apply. On top of those, regional councils could only grant a consent if they were satisfied that:

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(restricted discretionary activity status)	• There are no low-emissions technically and economically viable alternative options • The GHG emission plan would deliver emission reductions.
Option 10 GHG emissions are prohibited with specified exemptions (prohibited activity status)	No consents for new GHG activities would be granted, except where there are specified exemptions set out by the Minister or Government, based on specific criteria. The exemptions would be limited to critical industries and applications (for example, emergency response activities) to help avoid the potential for unintended negative consequences of prohibiting new fossil fuel assets in all circumstances. The exemptions could also be applied to some areas of the country to recognise the limited alternative fuel options in some locations. For example, in some regions where there is limited access to biomass, stringent controls on particulate matter discharge in some polluted air sheds, and no access to natural gas.
Option 11 GHG emissions are prohibited above a specified emission volume threshold	This would require suitable thresholds of emission volume to be developed which would then determine the emissions limits in the discharge permit. This would require suitable thresholds of emission volume to be developed which would then determine the emissions limits in the discharge permit.

Options for new coal fired combustion equipment at low and medium temperatures

Option 12 Prohibit GHG emissions (prohibited activity status)	No consents for new low and medium temperature coal-fired combustion would be granted at the date the national direction took effect.

Options relating to scope of the national direction

Option 13 Include commercial space and water heating in the scope of the national direction	In this option, the national direction would apply to commercial space and water heating. This would be on top of the proposed operational efficiency cap under the Building Act which would impose total allowable annual emissions per square meter per annum for all new buildings.

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How do the options compare to the counterfactual?

Options for existing fossil fuel combustion equipment at low and medium temperatures (other than coal)

	Option 1 Counterfactual (i.e. the RMA Amendment coming into force without national direction)	**Option 2** Adoption of BPO	**Option 3** Avoid GHG emissions unless no feasible alternatives	**Option 4** Signalling a future phase out date for fossil fuel combustion equipment
Emissions reduction	0 Emissions reduction assumed	+ Limited reduction in emissions (due to energy efficiency improvements)	++ Significant reduction in emissions where low emissions alternatives are available	+ Impetus for switching to low-emissions alternatives as assets come to end of life
Consistency in resource management regulation	0 Likely to be significant variation in how regional councils treat industrial GHG emissions	+ One consistent policy and rule framework, with some variation in how regional councils apply national direction	+ Provides some consistency, but possible variation in how regional councils apply rules	++ Provides a clear and consistent rule at the phase out date
Compliance burden for industry	0 Costs of applying for consent, and level of regulatory risk created by uncertain and inconsistent decision-making	- Costs of applying for consent and preparing GHG Plan, as well as some costs of adopting energy efficiency and demand reduction projects to obtain and comply with consent	- - Greater cost to demonstrate no feasible options, as well as costs of upgrading or retrofitting assets to obtain consent for existing assets where there may be economic life remaining	- Little compliance burden in the short term, but costs will increase as the phase out date nears
Costs for local government	0 Significant costs for each council to develop planning and rule frameworks for GHG emissions, as well as costs of evaluating consent applications	- Some costs to evaluate consent applications	- - Costs to evaluate consent applications and feasible options and ensure consenting authority is satisfied there are no viable low emission options	0 No significant costs in the short term

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System risks, including unanticipated impacts, and distributional impacts	0 Risk of overly stringent consenting could reduce industry competitiveness or lead to closure Risk of overly lenient consenting could lead to budgets and targets not being achieved	0 No significant impacts identified	- - Stakeholder feedback that this would divert capital away from decarbonising coal fired assets which have a greater emissions intensity and create debate and confrontation between applicants and consent authorities	- - Risk of unanticipated impacts on the natural gas supply in particular if suppliers interpret this as a signal that there will be no demand for natural gas and leave the market. That would impact on energy affordability and electricity security, and could foreclose on the potential to repurpose existing infrastructure for renewable gases
System benefits, including environmental co-benefits and development of low-emissions energy, infrastructure and markets	0 No significant impacts identified	+ Grows and supports development of energy efficiency services, and unlocks environmental co-benefits and business energy productivity improvements	++ Provides a strong signal to support development of low emissions fuels and infrastructure	++ Provides a signal to support development of low emissions fuels and infrastructure
Overall assessment	0	+	-	++

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Key for qualitative judgements:

++	much better than doing nothing/counterfactual
+	better than doing nothing/counterfactual
0	about the same as doing nothing/counterfactual
-	worse than doing nothing/counterfactual
- -	much worse than doing nothing/counterfactual

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Options for existing coal combustion equipment at low and medium temperatures

	Option 1 Counterfactual	**Option 5** Avoid GHG emissions unless there are no feasible alternatives	**Option 6** Maximum consent duration	**Option 7** Signalling a future phase out date for coal-fired combustion
Emissions reduction	0 Some emissions reduction possible, although highly variable and unpredictable	++ Significant reduction in emissions where low emissions alternatives are available	+ Some reduction in emissions from maximum consent duration of 10 years	+ Impetus for switching to low-emissions alternatives as assets come to end of life
Consistency in resource management regulation	0 Likely to be significant variation in how regional councils treat industrial GHG emissions	+ Provides some consistency, but possible variation in how regional councils apply rules	+ Increases consistency (although on only one aspect of consenting)	++ Provides a clear and consistent rule at the phase out date
Compliance burden for industry	0 Costs of applying for consent, and level of regulatory risk created by uncertain and inconsistent decision-making	- - Significant costs of demonstrating no feasible options, as well as costs of upgrading or retrofitting infrastructure to obtain consent Impact on ability to use existing assets	- - Impact on ability to use existing assets	- Little compliance burden in the short term, but costs will increase as the phase out date nears
Costs for local government	0 Significant costs for each council to develop planning and rule frameworks for GHG emissions, as well as costs of evaluating consent applications	- - Costs to evaluate consent applications and feasible options	0 No significant impacts identified	0 No significant costs in the short term
System risks, including unanticipated impacts, and	0 Risk of overly stringent consenting could reduce industry competitiveness or lead to closure	0 No significant impacts identified	0 No significant impacts identified	0 No significant impacts identified. 2037 seen to be a sufficient lead in time to allow for

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distributional impacts	Risk of overly lenient consenting could lead to budgets and targets not being achieved			coal users to secure low emission fuel sources
System benefits, including environmental co-benefits and development of low-emissions energy, infrastructure and markets	0 No significant impacts identified	++ Provides a strong signal to support development of low emissions fuels and infrastructure	+ Signals fuel switching opportunity at the end of the consent period	+ Provides a signal to support development of low emissions fuels and infrastructure
Overall assessment	0	+	+	+++

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Options for new fossil fuel combustion equipment at low and medium temperatures (other than coal)

	Option 1 Counterfactual	**Option 8** Adoption of BPO	**Option 9** Avoid GHG emissions unless there are no feasible alternatives	**Option 10** GHG emissions are prohibited with specified exemptions	**Option 11** GHG emissions are prohibited above a specified emission volume threshold
Emissions reduction	0 Some avoided emissions possible, although highly variable and unpredictable	+ Some avoided emissions where plant design and layout can ensure overall energy demand is minimised	++ Significant avoided emissions where low emissions alternatives are available	++ Significant avoided emissions	++ Significant avoided emissions (depending on the specified volume threshold)
Consistency in resource management regulation	0 Likely to be significant variation in how regional councils treat industrial GHG emissions	+ One consistent policy and rule framework, with some variation in how regional councils apply rules	+ Provides some consistency, but possible variation in how regional councils apply rules	++ One consistent policy and rule framework	++ One consistent policy and rule framework
Compliance burden for industry	0 Costs of applying for consent, and level of regulatory risk created by uncertain and inconsistent decision-making	- Costs of applying for consent and preparing GHG Plan, as well as costs of new assets	- - Significant costs of demonstrating no feasible options, as well as costs of new assets if consent is declined (or applicants choose not to apply)	- - - Depending on the specified exemptions, it will prohibit some assets creating significant costs for emitters (or risks of emissions leakage)	- - - Costs of applying for consent; depending on the specified volume threshold, it could render some assets unable to gain consent (and therefore not able to be used), creating significant costs for emitters (or risks of emissions leakage)

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Costs for local government	0 Significant costs for each council to develop planning and rule frameworks for GHG emissions, as well as costs of evaluating consent applications	- Some costs to evaluate consent applications	- - Costs to evaluate consent applications and feasible options	0 No significant impacts identified	- - Difficult for local government to integrate with existing rules
System risks, including unanticipated impacts, and distributional impacts	0 Risk of overly stringent consenting could reduce industry competitiveness or lead to closure Risk of overly lenient consenting could lead to budgets and targets not being achieved	0 No significant impacts identified	0 No significant impacts identified	- - - Risk of unanticipated impacts on the natural gas supply in particular if suppliers interpret this as a signal that there will be no demand for natural gas and leave the market. That would impact on energy affordability and security, and could foreclose on the potential to repurpose existing infrastructure for renewable gases.	- - Risk of creating perverse incentive to structure assets to fall just under the threshold
System benefits, including environmental co-benefits and development of low-emissions energy, infrastructure and markets	0 No significant impacts identified	+ Grows and supports development of energy efficiency services, and unlocks environmental co-benefits and business energy productivity improvements	++ Provides a strong signal to support development of low emissions fuels and infrastructure	++ Provides a strong signal to support development of low emissions fuels and infrastructure	++ Provides a strong signal to support development of low emissions fuels and infrastructure

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Overall assessment	0	+	+	-- -	- -

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Options for new coal combustion equipment at low and medium temperatures

	Option 1 Counterfactual	Option 12 Prohibit GHG emissions
Emissions reduction	0 Some avoided emissions possible, although highly variable and unpredictable	++ Significant avoided emissions.
Consistency in resource management regulation	0 Likely to be significant variation in how regional councils treat industrial GHG emissions	++ One policy and rule framework with no room for variation.
Compliance burden for industry	0 Costs of applying for consent, and level of regulatory risk created by uncertain and inconsistent decision-making	- - No consent required for a prohibited activity. Cost of alternative options as can no longer install new coal assets.
Costs for local government	0 Significant costs for each council to develop planning and rule frameworks for GHG emissions, as well as costs of evaluating consent applications	0 No significant costs identified.
System risks, including unanticipated impacts, and distributional impacts	0 Risk of overly lenient consenting could lead to budgets and targets not being achieved	0 No significant impacts identified.
System benefits, including environmental co-benefits and development of low-emissions energy, infrastructure and markets	0 No significant impacts identified	0 No significant impacts identified
Overall assessment	0	++

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Options for scope of national direction

	Counterfactual: commercial water and space heating not included	**Option 13** Include commercial water and space heating in the national direction
Emissions reduction	0	+ Greater emissions reduction – over the first three budget periods (to 2035), there is approximately a ten percent additional emission reduction if commercial heating is included
Consistency in resource management regulation	0	+ Greater scope of activities subject to national regulation and therefore likely to be managed consistently
Compliance burden for industry	0	- - There is a risk that there could be double regulation of GHG emissions from commercial space and water heating (in the national direction and under the Building Act, if those proposals are implemented).
Costs for local government	0	- Greater costs for local government if it is included within scope
System risks, including unanticipated impacts, and distributional impacts	0	- Creates a disparity between space heater users and users of other coal-fired combustion equipment i.e. where one type of process heat is regulated but another is not.
System benefits	0	+ Provides a strong signal about decarbonising process heat, and increases the likelihood that emissions will be reduced.
Overall assessment	0	0

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What option is likely to best address the problem, meet the policy objectives, and deliver the highest net benefits?

The option that is most likely to best address the problem is a national direction instrument that provides a policy and rule framework which gives effect to the following policy approach.

- Existing fossil fuel assets (other than coal): the preferred option (option 2) incentivises asset owners to replace them with a low-emissions alternative at the end of their natural life. If asset owners apply for a new consent, regional councils could either grant or decline the consent, but the issues they can consider in making that decision are limited.
- Existing coal combustion assets: the preferred options (options 5, 6 and 7) signals that these assets must be phased out by 2037, as well as a maximum duration of ten years for a new consent between now and 2022 and 2037. If asset owners apply for a new consent, regional councils can grant it where there are no other technically feasible and economically viable options, but they will need to transition to alternative fuels by 2037.
- New fossil fuel assets (other than coal): the preferred option (option 9) makes it more difficult to install new fossil fuel assets, but recognises there is still a role for them. If asset owners apply for a consent, regional councils can grant it where there are no low emissions alternatives which are both technically feasible and economically viable.
- New coal combustion assets: the preferred option (option 12) prohibits GHG emissions from new coal-fired process heat assets.

There was very little feedback during the consultation process on whether commercial space and water heating should be included. Therefore, there is currently no clear preferred option. To address this, MfE and MBIE will carry out further engagement with stakeholders through the draft Emissions Reduction Plan and the exposure draft of the national direction instruments before deciding on a preferred option and providing further advice to Ministers.

Summary

The package of preferred options will meet both of the policy objectives, and, based on a qualitative assessment set out in the tables above, delivers the highest net benefits of the options assessed. It is important to note that there would be significant compliance costs for industry in making the capital investment in energy efficiency and fuel switching technology, and there may also be increased operational costs depending on the fuel and technology application. In the analysis, the capital and operational costs are the only costs that have been monetised, while the only benefits that have been monetised are the emission reductions across a range of shadow prices.

The costs and benefits that have not been monetised, such as energy productivity improvements (from the adoption of the best practicable option) and environmental co-benefits (mainly air quality improvements) will be significant.

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What are the marginal costs and benefits of the option?

The marginal costs and benefits of the option are set out in Table 1. In general, the costs of the policy (which mainly involve switching to low carbon fuel alternatives or changes to yield greater energy efficiency, as well as consenting costs) will fall on emitters, while the benefits (reduced emissions) accrue to New Zealand.

The monetised costs and benefits have been obtained from modelling carried out to support the analysis. A description of the modelling methodology and assumptions is set out in the next section.

Table 1: marginal costs and benefits of the preferred option

Affected groups	Comment	Impact	Evidence Certainty
Additional costs of the preferred option compared to taking no action			
Regulated groups	One-off costs of capital upgrades and ongoing costs of alternative fuel, if higher cost than fossil fuel	The costs to emitters from 2022-2050 are estimated to be $749 million and $1,455 million. This represents an average 14 – 20 percent increase in the cost of process heat (compared to fossil fuel) over 2022-2050.	Low
	One-off costs of consent processing and preparing GHG plans	Low	Low
Regulators (local government)	Ongoing cost of consent processing (although the majority of this can be charged back to the applicant)	Low	Medium
Total monetised costs		**$749 - $1,455 million**	**Low**
Non-monetised costs		**Low**	**Medium**
Additional benefits of the preferred option compared to taking no action			
Regulated groups	Reduction in emissions will mean avoided exposure to cost of emissions under the NZ ETS	Low	Low

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	Energy efficiency improvements identified through preparation of Greenhouse Gas Emissions Plan (not necessarily associated with fuel switching). These could result in operational cost savings and have other productivity benefits (e.g. reduced maintenance costs) [9]	Medium - the Climate Change Commission's demonstration path has assessed the energy efficiency improvement to be in the order of 1.1 per cent per year in the food processing sectors.	Low
Regulators (local government)	Avoided costs of developing own rules to manage industrial GHG emissions, and reduced risk of litigation	Low	Medium
New Zealand (socialised benefit)	Benefits of GHG emissions reductions (based on Treasury shadow emission values used in its Cost Benefit Analysis guidance[10])	The benefits from 2022-2050 are estimated to be between $483 million and $1,618 million. The estimated reduction in emissions of the preferred option is between 16 and 26 Mt CO_2.e from 2022 – 2050.	Low
	Reduction in air quality contaminants (switching from coal to electricity or modern clean-burning biomass boilers) and toxic coal ash waste (ash from biomass boilers is non-toxic and can be used as fertiliser)	Medium, depending on location (in the South Island, where coal is more prevalent, the benefits will be higher)	Low

[9] Case studies available on EECA's website Case studies | EECA https://www.eeca.govt.nz/insights/case-studies/

[10] New Zealand Treasury, Guide for departments and agencies using Treasury's CBAx tool for cost benefit analysis, December 2020

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New Zealand	Development of energy efficiency services and supply chains for alternative fuels, which could create new economic and employment opportunities in regions	Medium	Low
New Zealand	Greater recovery of forestry residues could reduce downstream impacts (debris) in erosion-prone areas	Low	Low
Total monetised benefits		**$483 - $1,618 million**	**Low**
Non-monetised benefits		**Medium**	**Low**

However, changes to the ETS price settings would influence the estimated impacts of this policy

The price of NZ units strongly influences the potential impacts of the national direction proposals estimated by the modelling. The modelling results above use a base ETS price of $35 in real terms. However, as mentioned in the description of options, the Government is considering changes to the ETS price settings as the government responds to the Climate Change Commission's report. Any changes could affect the impact of this new national direction, most likely by blunting the impacts (both costs and benefits) it is likely to have.

For example, at higher ETS prices there is a smaller volume of emissions of the preferred option is presented in the table belowthat the proposed national direction could impact (as the higher ETS price is assumed to drive a larger reduction, leaving less 'work' for the national direction to do). Therefore, the impacts of the national direction (both costs and benefits) would likely be lower. The modelling shows that the estimated costs of capital upgrades and ongoing costs of fuel would be between $444 million and $951 million, and the estimated benefits of emissions reductions would be between $205 million and $794 million.

However, if the ETS price were higher, the abatement cost of reducing the 'remaining' emissions (i.e. those not affected by the higher ETS price) are likely to be substantially higher because they represent the operations which are the most expensive to decarbonise.

It is important to note that these estimates are based on a model that assumes emission costs are optimised and firms respond perfectly to the market NZ ETS price. In reality, emitters may not always optimise costs or may face other barriers in decarbonising their operations. The consent process and other factors influencing switching process heat assets may trigger firms to bring forward or delay low emissions investments to align with the timing of consent expiry.

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Marginal abatement costs

The estimated emissions reductions distributed across a range of marginal abatement costs bands for this policy are set out in Table 2. This shows that abatement opportunities in process heat are generally evenly dispersed across abatement cost bands, except that the $25-$75 cost band has the lowest abatement potential. Most of the coal reduction opportunities are economic under $125 per tonne; whereas the largest proportion of emission reductions for natural gas assets are for an abatement cost over $125 per tonne.

Table 2: Potential 2021 annual abatement by marginal abatement costs by fuel (Mt CO_2-e)

	Less than $25	$25-75	$75-125	$125-175	Over $175
Coal	0.43	0.09	1.26	0.13	0.07
Liquid	0.30	0.01	0.00	0.00	0.00
Gas	0.41	0.27	0.01	1.62	1.21
LPG	0.06	0.00	0.00	0.00	0.00
Total	1.20	0.38	1.27	1.74	1.28

How the costs and benefit have been modelled

The monetised costs and benefits of the preferred policy option have been modelled using a model developed specifically for that purpose. The results are dependent on multiple factors including the ETS price faced by emitters and the shadow price applied to derive emissions benefits.

In simple terms, the model estimates the cost of meeting the heating requirements for the sector, end-use and boiler size chosen for the different fossil and non-fossil (electricity and biomass) options.

The estimate is based on:

- the cost of the delivered fuel, which in turn is built up from estimates of the wholesale cost of the fuel, plus transport and retail costs
- the non-fuel boiler costs – both capex and opex
- the efficiency of the boiler or combustion asset

This cost distinguishes between new-build situations and for situations where an existing fossil plant could switch to a non-fossil option.

These cost values are used to determine a marginal abatement cost (MAC) for choosing the cheapest non-fossil option rather than the fossil option.

The benefits are calculated by multiplying the number of tonnes of emissions reduction by an estimated value of the social cost of carbon. The analysis presented in the tables assumes a

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shadow price at the mid-point of the range outlined in the Treasury's guidance on cost benefit analysis. When the shadow price is low, emissions reductions are valued less and vice versa.

Assumptions

- An ETS price of $35 has been assumed because this is the midpoint of the current price corridor (the price floor of $20 and the price ceiling of $50 in (in real terms). This is consistent with emissions modelling by Government agencies and the Commission has assumed an ETS price of $35 based on the mid-point of the ETS settings range.[11] This is not a forecast of where the price will go as we are unable to model the future price increases or decreases.
    - In the analysis above, due to the number of different shadow prices, we have presented the results as a range based on the range of shadow prices published by the Treasury in its Cost Benefit Analysis guidance[12].
    - The cost benefit analysis attributes abatement actions that are economic to undertake under the scenario's assumed emissions price to the ETS, rather than the national direction policy.
    - Estimates of the efficacy of the preferred option resulting in a switch to a low-emissions alternative were made based on experience with similar regulations.

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[11] The current ETS price has risen strongly in recent months and is approaching the cost containment reserve price of $50, but this has not been applied in the modelling. The key reason for this is to maintain consistency with the Commissions and Government baseline projections. The Commission and Government baseline projection have assumed an ETS price of $35 now and into the future in line with current ETS settings.

[12] New Zealand Treasury, Guide for departments and agencies using Treasury's CBAx tool for cost benefit analysis, December 2020

Section 3: Delivering an option

How will the new arrangements be implemented?

The preferred option will be given effect to through a targeted national policy statement (NPS) and national environmental standard (NES) An exposure draft of the NPS and NPS will be shared with targeted stakeholders to test that the instruments can be implemented effectively. The NPS and NES will take effect 28 days after they are notified in the New Zealand Gazette. s9(2)(f)(iv)

Regional Councils will be able to give effect to the NPS and NES provisions without making changes to regional plans. The NPS will include objectives and policies to provide the policy direction for making decisions on resource consent applications. The NES will provide the rule framework for prohibited activities, and activities that require resource consents. The milestones and timeframes for implementing the NES provisions are set out in the table below.

NES Milestone	Timeframe
Prohibited activity for no use of coal in new assets	Immediate effect
Resource consents for discharges currently permitted under regional plans	18 month period to apply for resource consents
Consent renewals for coal use in existing assets up to 2037, GHG Plan requirement	Immediate effect on expiry of existing resource consents for discharge to air
Consents for use of other fossil fuels in new and existing assets, and GHG Plan requirement	Immediate effect for all new consents, and effect on expiry of existing consents

Councils will need to prepare for an increase in the number of resource consents, particularly in regions where coal use for industrial processes is permitted below a particular threshold. Additional technical guidance and expertise may also be needed to help assess applications and GHG Plans that are required for resource consent applications. Resource consent applicants will also require guidance on the content of GHG Plans, and best practicable option for different scales of activity.

An Implementation Plan will be developed to support councils implement the NPS and NES. Implementation will involve three workstreams:

1. Written guidance to support regional councils and resource consent applicants implement the NPS and NES. The guidance will consist of a user guide and guidance sheets that summarise the requirements. EECA and MBIE will also prepare guidance for regional councils on:

    - what constitutes the best practicable option with regard to reducing GHG emissions from process heat.

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- how to assess economic feasibility. The assessment will employ the levelised cost of energy (LCOE)[13] s9(2)(f)(iv) .

2. Partnership working with regional councils and industry through existing forums including the National Air Quality Working Group, the Policy Special Interest Group, a Technical Advisory Group established to provide input to the development of the national direction, and iwi. This workstream will build on existing partnerships with industry and regional councils, as primary implementers of the national direction. It will involve formally establishing a working in partnership approach to:
   - Share best practice and information
   - Help develop and review written guidance
   - Identify implementation issues
   - Raise issues requiring technical clarification and guidance
   - Identify future amendments needed.

3. Specialist technical information commissioned to support implementation of the NPS and NES.

Greenhouse Gas Emissions Plans (to accompany resource consent applications) are also required to be independently reviewed by a suitably qualified practitioner for discharges emitting above 2000 tonnes of CO2 per year. s9(2)(f)(iv)

Implementation risks

There is a risk that regional councils will not have the technical capability to assess technical and economic feasibility, particularly soon after national direction first comes into effect. This can be mitigated by providing adequate guidance at the time the NPS and NES take effect.

s9(2)(f)(iv) .

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[13] LCOE is a measure of the average net present cost of energy generation for a generating plant over its lifetime. It is used for investment planning and to compare different methods of generation on a consistent basis.

s9(2)(f)(iv)

How will the new arrangements be monitored, evaluated, and reviewed?

MfE and MBIE will review the NPS and NES in 2026, five years after the instruments take effect.

In order to determine the effectiveness of the NPS and NES, a monitoring programme will be developed that includes appropriate indicators, data collection and analysis, and evaluation. The data required to inform a review will include the number of resource consents for different fuel type, an assessment of resource consent conditions and consent duration, review of GHG Plans for small and large scale assets and how the best practicable option has been required, and an assessment of emission reduction targets that have been applied.

The review will also include:

- Engagement with the industry sector to determine implementation and compliance costs, the feasibility of alternative fuels and technology and whether the NPS and NES has influenced investment decisions.
- Engagement with local government on technical capacity to assess and process resource consents, and consistency in application of the NPS and NES will also be required. Building partnerships as part of the Implementation Plan will help prepare for the 2026 review by identifying implementation issues early and setting up processes to share information.

A report will be prepared for Ministers outlining an assessment of implementation, and recommended amendments if required.

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