



Section 4: Phasing out fossil fuels in process heat

This section explains the issues around long-lived process heat investments and emissions lock-in, and seeks your views on options to:

- Deter the development of any new coal-fired process heat, through a ban on new coal-fired process heat equipment for low and medium temperature requirements, and
- Require existing coal-fired process heat equipment supplying end-use temperature requirements below 100°C to be phased out by 2030.

What's the problem?

This section responds to the following ICCC recommendations from the *Accelerated Electrification* report:

- 3a. Deterring the development of any new fossil fuel process heat.
- 3b. Setting a clearly defined timetable to phase out fossil fuels in existing process heat, with the phase out of coal as a priority.

As highlighted in the ICCC's *Accelerated Electrification* report, if new fossil fuel plant is not deterred, efficiency gains and emission reductions made in existing plants have the potential to be outweighed by the building of new fossil fuel heat plant. There is also a risk that if the carbon price rises faster than a business's expectations, that emissions-intensive assets will become stranded before the end of their economic life.

Industrial energy investment decisions are long-term, involve high capital costs, and are highly dependent on the relative capital and fuel costs of different energy sources. At present, coal is the cheapest form of energy used to supply process heat. It is also the most emissions-intensive. Coal boilers have an economic lifespan of about 25 years, and are often repaired and maintained to be used for much longer periods (some coal boilers have been used for over 40 years). Extending the economic life of a boiler requires less upfront capital than replacing it.

Uncertainty about future carbon prices and policy has contributed to maintaining fossil fuel technologies' on-going attractiveness for investment, and carbon price expectations are often not factored into decision-making because of this uncertainty.

While it is important to maintain policy efforts on ensuring an effective NZ-ETS and carbon price signal, it is possible, for the reasons above, that the price signal alone will not be sufficient to deliver a timely transition that prevents the lock-in of high-emission and long life assets that run the risk of becoming stranded over time.

What are the options?

We seek your feedback on the following options to deter investment in new fossil fuel plants:

- Deter the development of any new coal-fired process heat, through a ban on new coal-fired process heat equipment for low and medium temperature requirements, and/or
- Require existing coal-fired process heat equipment for temperature requirements below 100°C to be phased out by 2030

It is expected that the Corporate Energy Transition Plans option outlined in section 1 would also address, at least in part, the issues outlined in this section. However the following options could be implemented on a faster timeline and would have an immediate impact, lowering the risk of locking in new coal assets. These options also provide more certainty on new coal investment decisions.

Deterring the development of any new fossil fuel process heat

Option 4.1 Introduce a ban on new coal-fired boilers for low and medium temperature requirements

Description

This option would introduce a ban on new coal-fired boilers for low and medium temperature requirements.

The nature of different manufacturing processes defines how the heat can be supplied and used. Temperature requirements can be classified as low, medium or high, as set out below:

- Low: less than 100°C, used for water and space heating
- Medium: between 100 and 300°C, for example drying wood products or milk powder, and
- High: Greater than 300°C, for example making steel.

Analysis

This option would ensure New Zealand avoids building new and additional long-lived and emissions-intensive assets (coal boilers). Preventing investment in new coal plant is considered a priority due to its emissions intensity. A ban is simple to administer, incurs minimal cost on the Government, and could be introduced quickly.

This option has the potential to substitute for a carbon price, and this could suppress the price elsewhere, likely reducing abatement in other areas. Some coal to biomass opportunities exist at current carbon prices, however carbon prices in excess of \$60/t CO₂-e, are required to make widespread coal-to-biomass and some coal-to-electricity projects economic.

It is difficult to assess the impact of a ban as new investments in coal-fired boilers are private industry decisions. Dairy processors Synlait and Fonterra, as well as meat processor, Alliance, have announced their commitments to build no additional coal-fired boilers. As these three companies make up a large portion of the market for low and medium temperature heat, a ban may have a small impact on future emissions abatement, and therefore impose relatively low costs on industry. For low-temperature requirements, cost effective new capacity or capacity expansion can be met through good process design and electrification.

For medium-temperature requirements however, banning the use of coal for capacity expansion has the potential to impose significant costs on industry. This will depend whether or not industry is looking to expand its production capacity in the short term, and whether production of lower emissions goods is a viable option (e.g. a factory making cheese rather than milk powder).

New medium temperature coal capacity is most likely be South Island milk powder drying facilities, where coal boilers are typically installed. Dairy production growth is slowing, as productivity improvements are offset by declining herd numbers and changing land use.³⁵ However, there may still be dairy processing investments that compete for the existing milk pool, either by new entrants or from the expansion of existing companies.

³⁵ MPI (2019). *Situation and outlook for primary industries (SOPI)*, <https://www.mpi.govt.nz/news-and-resources/economic-intelligence-unit/situation-and-outlook-for-primary-industries/>

If industry is looking to expand its production capacity in the short term, this option may have wider economic impacts. For example, it could deter additional investment in milk drying facilities, especially in the South Island. This is because current drying technologies require steam and there may be insufficient biomass available in some locations to provide this. Supplying steam using direct electricity is relatively expensive.³⁶ However, this is not likely to impact less emissions-intensive and potentially higher value forms of dairy processing, such as cheese manufacturing.

Other options considered, but not favoured are:

- Allowing exemptions in any ban. Exemptions have the potential to create an “uneven–playing field” and depending on application can be seen as unequitable. Those with greater resource are those likely to be best equipped and successful in being granted an exemption.
- Inclusion of natural gas (and other fossil fuels) in the ban has not been considered because carbon prices in excess of \$120/t CO₂-e are required to make many gas-to-electricity projects economic. Such a broad ban would be a blunt instrument and entail very high cost on industry. It could force higher cost abatement in the sector (and the wider economy) compared to more cost-effective options available today. However, to achieve our net zero carbon 2050 target, it is possible that the phase down of gas in industry will also be required in the future.

A timetable to phase out fossil fuels

Option 4.2 Require existing coal-fired process heat equipment supplying end-use temperature requirements below 100°C to be phased out by 2030.

Description

This option would require process heat users to phase out existing coal assets that are being used to supply end-use requirements below 100°C by 2030.³⁷ We propose that a government-mandated timetable apply only to coal consumption for temperatures below 100°C due to the higher cost of transitioning existing higher temperature applications and switching away from natural gas.

Analysis

This option would ensure that low cost emission reductions in process heat occur and is intended to overcome potential perverse incentives associated with option 4.1 – whereby existing coal boilers are refurbished and maintained for decades to avoid triggering the definition of “new coal investment”.

The compliance costs of this proposal would be different across low-temperature process heat users. These would vary according to:

- The emissions price: fuel switching off coal to supply low temperature heat will be the low hanging fruit for emissions reductions as the emissions price rises. However, it is uncertain whether coal will be phased out by 2030 in response to the emission price. If the phase out of coal for low temperature heat was to occur before 2030 in response to a rising emission price, then compliance costs are minimal. However, if the emissions price does not rise enough, then compliance costs will be higher.
- The age of equipment: having to retire equipment early creates stranded assets. However, we note that many boilers run long past retirement age.

³⁶ Using electricity directly for steam generation (e.g. in the form of an electric boiler) is still very expensive, needing carbon prices in excess of \$150/t CO₂-e to become cost effective. Using electricity via heat pumps, MVR or heat recovery is much more cost effective compared to making steam directly, achieving 14 times greater emissions reduction per unit of electricity used.

³⁷ The option for Corporate Energy Transition Plans outlined in Section 1 also addresses the ICC’s recommendation 3 and covers higher temperature applications and other fossil fuels.

- Sector-specific circumstances, such as production process, energy cost as a proportion of revenue, access to capital and profitability, and
- Location and access to alternative fuels including transmission and distribution capacity.

In addition, there is a risk that this option encourages switching from coal to gas when there are viable lower emission alternatives, such as biomass or electricity available. This risk would be mitigated if Corporate Energy Transition Plans for large users are also in place.

As with option 4.1, we also considered, but do not favour, inclusion of other fossil fuels, allowing exemptions, or including higher temperature requirements at this stage.

We have also identified options that could be pursued under the Resource Management Act (RMA), including:

- Exploring options as part of the comprehensive review of the resource management system beginning in 2020, which will consider the role of regulation in supporting climate change mitigation, and ensure alignment with the Climate Change Response (Zero Carbon) Amendment Act. To support the Expert Advisory Group (who will carry out the review), MBIE officials are working with MfE and other agencies to outline key issues and scope options to avoid industrial activities “locking in” high emissions methods for activities that may be consented prior to an effective price signal under the NZ-ETS and to encourage Best Available Techniques (BAT).³⁸
- Developing a National Environmental Standard or National Planning Standard for cleaner industrial production requiring councils to take into account New Zealand-specific BAT and/or specifying numerical emissions limits for industrial activities. Any National Environmental Standard would need to be developed in accordance with the process outlined in the RMA.

Questions

Q4.1	Do you agree with the proposal to ban new coal-fired boilers for low and medium temperature requirements?
Q4.2	Do you agree with the proposal to require existing coal-fired process heat equipment for end-use temperature requirements below 100 degrees Celsius to be phased out by 2030? Is this ambitious or is it not doing enough?
Q4.3	For manufacturers: referring to each specific proposal, what would be the likely impacts or compliance costs on your business?
Q4.4	Could the Corporate Energy Transition Plans (Option 1.1) help to design a more informed phase out of fossil fuels in process heat? Would a timetabled phase out of fossil fuels in process heat be necessary alongside the Corporate Energy Transition Plans?
Q4.5	In your view, could national direction under the RMA be an effective tool to support clean and low GHG-emitting methods of industrial production? If so, how?

³⁸ BATs or best practicable options refer to the most effective techniques for preventing or reducing emissions or environmental effects that are technically feasible and economically viable within a sector. BAT does not necessarily prescribe that fossil fuels can or cannot be used for a particular activity. Rather, BAT represents the latest stage of development (state of the art) of processes, of facilities or of methods of operation specific to a business sector that are in operation today, which indicate the practical suitability of a particular measure for limiting discharges, emissions and waste.

Q4.6

In your view, could adoption of best available technologies be introduced via a mechanism other than the RMA?

Summary assessment of options against criteria

	Ban on new coal (low-med temp)	Ban on new coal (low-high temp)	Ban on all new fossil fuels (all temp)	Coal phase-out by 2030 (<100°C)	FF phase-out by 2030 (<100°C)	FF phase-out by 2030 (all temp)
To what extent is the barrier addressed?	✓	✓✓	✓✓✓	✓	✓✓	✓✓✓
Primary benefits – emissions reductions	✓	✓✓	✓✓✓	✓	✓✓	✓✓✓
Primary benefits – EE & RE	✓	✓✓	✓✓	✓	✓✓	✓✓
Wider economic effects	-	X	XX	-	X	XXX
Compliance costs	X	XX	XXX	XX	XXX	XXX
Administration costs	X	X	X	X	X	X

Key: Option under active consideration Option not preferred