Emissions Plan Guidance

Non-statutory

National Direction for Greenhouse Gas Emissions from Industrial Process Heat

March 2024

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Emissions Plan Guidance. Non-statutory: National Direction for Greenhouse Gas Emissions from Industrial Process Heat

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Note

This Emissions Plan Guidance is advisory only. It has been prepared to assist regional councils in implementing the national legislation for greenhouse gas emissions from industrial process heat and should be read in conjunction with other relevant official guidance documents released by Ministry for the Environment, Ministry of Business, Innovation & Employment, EECA (the Energy Efficiency and Conservation Authority) and regionally specific guidance. It should also be read in conjunction with standards, recognised industry best practice, and other relevant technical publications.

This guidance will be revised periodically, and readers should ensure they are using the latest version. The publication date of the guidance can be found on the cover page. Comments are welcome via email to technicalenquiries@eeca.govt.nz.

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Abbreviations

BAT	Best Available Techniques
BPO	Best practicable option
CAT	Cost Assessment Tool
CAPEX	Capital costs
CCRA	Climate Change Response Act 2002
CH4	Methane
CHP	Combined heat and power
CO_2	Carbon dioxide
CO_2e	Carbon dioxide equivalent
DCF	Discounted Cash Flow
EDB	Electricity Distribution Business
EDGS	Electricity Demand and Generation Scenarios
EECA	Energy Efficiency and Conservation Authority
ETS	Emissions Trading Scheme
GHG	Greenhouse gas
GJ	Gigajoule
kg	kilogram
LPG	Liquefied petroleum gas
MBIE	Ministry of Business, Innovation and Employment
MfE	Ministry for the Environment
Mt	Million tonnes
MVR	Mechanical Vapour Recompression
N_2O	Nitrous oxide
NES-AQ	Resource Management (National Environmental Standards for Air Quality) Regulations 2004

NES-GHG	Resource Management (National Environmental Standards for Greenhouse Gas Emissions from Industrial Process Heat) Regulations 2023
NPS-GHG	National Policy Statement for Greenhouse Gas Emissions from Industrial Process Heat 2023
OPEX	Operating costs
PEF	Pulsed Electric Field
$PM_{2.5}$	Particles less than 2.5 micrometres in diameter
PM_{10}	Particles less than 10 micrometres in diameter
RMA	Resource Management Act 1991
SF_6	Sulphur hexafluoride
SQP	Suitably Qualified Person
tCO_2e	Tonnes of carbon dioxide equivalent
TVR	Thermal Vapour Recompression
UV	Ultraviolet

Explanatory note

Legislative instruments have various components and conventions apply when referring to them. In this guidance document:

- 'sections' of the Resource Management Act (and other Acts) are referred to as s. 1, s. 2 and so on. Reference to sub-parts of the relevant section will usually be referred to specifically
- 'regulations' that make up the NES-GHG are referred to as r. 1, r. 2 and so on. Reference to sub-parts of the relevant regulation will also usually be referred to specifically
- schedules within the NES-GHG have 'clauses' that are referred to as cl. 1, cl. 2 and so on
- 'clauses' of the NPS-GHG are referred to as cl. 1.1, 1.2 and so on with specific references as needed
- sections of this guidance document will usually be referred to as 'section 1 [2, 3, 4 etc.] of this document' to avoid confusion with sections of Acts.

1 Introduction

1.1 Purpose of this guidance

The Resource Management (National Environmental Standards for Greenhouse Gas Emissions from Industrial Process Heat) Regulations 2023 (the 'NES-GHG') and National Policy Statement for Greenhouse Gas Emissions from Industrial Process Heat 2023 (the 'NPS-GHG') were published on 29 June 2023. Both policy instruments came into force on 27 July 2023.

The purpose of this guidance document is to assist regional councils and unitary authorities (hereafter collectively referred to as 'regional councils') in implementing the NES-GHG and NPS-GHG. The new national direction will require many industrial greenhouse gas (GHG) emitters using fossil fuels for industrial process heat to obtain resource consent for GHG discharges and prepare and implement emissions plans. This document provides guidance on these matters.

This guidance is aimed at regional council staff, decision makers and specialists who are:

- considering whether a resource consent is needed to commence, continue, or phase out a GHG discharge from industrial process heat devices
- assessing resource consent applications for GHG emissions from industrial process heat devices
- deciding whether to seek external technical reviews and advice on consent applications.

This guidance document will also be useful for consent applicants and the planners and technical experts who are preparing resource consent applications for GHG discharges from industrial process heat devices and the associated emissions plans.

This guidance document is non-statutory. While this guidance explains legal process steps in the development, auditing and decision making for resource consent applications and components of emissions plans, the guidance is not legal advice and should not be construed as such.

The guidance was prepared by experts in environmental planning, the Resource Management Act 1991 (RMA) and industrial process heat. This guidance and the interpretations given have been developed from within those areas of expertise and experience.[1]

1.2 National legislation on greenhouse gases

The Climate Change Response Act 2002 (CCRA) sets a statutory target for New Zealand to achieve net zero GHG emissions by 2050.[2] The RMA was amended in 2020 to help achieve this target.[3] Through the amendments, regional councils must now consider the effects of GHG emissions on climate change in RMA decision-making, including when deciding whether to grant or decline a resource consent application.

[1] Interpretations are made using principles of statutory interpretation (as per s.10 of the Legislation Act 2019).

[2] The Climate Change Response Act 2002 (CCRA), which was amended by the Climate Change Response (Zero Carbon) Amendment Act 2019, includes a 'net zero' target of national emissions by 2050.

[3] Resource Management Amendment Act 2020.

In June 2023, a new RMA policy framework to support regional councils when assessing GHG emissions came into force, with a focus on reducing GHG emissions from industrial process heat that uses fossil fuels. The policy framework includes the NES-GHG and NPS-GHG.

- The NES-GHG regulates GHG emissions from industrial process heat using fossil fuels.
- The NPS-GHG provides a policy framework for assessing resource consent applications for GHG emissions from industrial process heat using fossil fuels.

Together, the NES-GHG and NPS-GHG provide an integrated set of regulations, objectives and policies aimed at reducing GHGs emitted from industrial process heat where it is provided by fossil fuels.

1.3 What is industrial process heat?

Under the NES-GHG, industrial process heat is defined as the thermal energy used in industrial processes, including manufacturing and processing of raw materials, or to grow plants (or other photosynthesising organisms) indoors.[4] However, industrial process heat does not include thermal energy used for space heating of buildings for people's comfort (for example, heating of commercial offices).

1.4 Why industrial process heat?

Process heat currently generates around 8% of New Zealand's total GHG emissions, and 17% of GHG emissions captured by the Government's net zero target. Modelling suggests that the NPS-GHG and NES-GHG could reduce emissions by a range of 9.1 to 38.2 Mt CO_2e cumulatively to 2050.[5] Decarbonising industrial process heat therefore presents a significant opportunity to reduce New Zealand's overall GHG emissions by managing, reducing and where possible phasing out emissions.

1.5 Policy framework: NES-GHG and NPS-GHG

The NES-GHG sets out the regulations for GHG emitting activities from industrial process heat. The NES-GHG prohibits the discharge of GHGs from:

- all new heat devices that burn coal to deliver low-to-medium temperature process heat (below 300°C), and
- existing heat devices that burn coal to deliver low-to-medium temperature process heat after 1 January 2037 (unless operating under an existing consent).

The NES-GHG also requires operators to obtain resource consent for the discharge of GHGs for other (new and existing) fossil fuel-fired process heat devices if they emit 500 tCO_2e or more per site per year.[6]

The NES-GHG differentiates process heat and the requirements for a resource consent based on:

- the amount of CO_2e emissions per year
- the type of fossil fuel used to power the device (coal or other fossil fuels)
- the temperature of process heat (above or below 300°C)
- whether the device is new or existing
- the time of application (pre or post 1 January 2037).[7]

[4] NES-GHG, r. 3

[5] Ministry for the Environment. 2023. National Direction for Greenhouse Gas Emissions from Industrial Process Heat Evaluation report under section 32 of the Resource Management Act.

[6] Further discussion on what constitutes a "site" is provided in Section 2.5 of this guidance document.

[7] For existing coal burning devices delivering process heat at or below 300°C.

The NES-GHG lists the information requirements for resource consent applications, including:

- an emissions plan, setting out actions and methods to reduce GHG emissions from the heat device(s) that burns fossil fuels (as prescribed in Regulation 15 of the NES-GHG), which in some circumstances must be reviewed by a suitably qualified person (SQP) approved by the regional council
- an assessment of the best practicable option (BPO) to prevent or minimise any actual or likely adverse climate change effect of the activity and other discharges from GHGs from all heat devices at the same site (excluding back-up devices)
- for new devices, an assessment of any technically feasible and financially viable lower-emissions alternatives to the device.

The NPS-GHG provides policy guidance for implementing the NES-GHG. The NPS-GHG sets out one objective and three policies for managing emissions of GHGs from industrial process heat using fossil fuels. The NPS-GHG also sets out how regional councils are to implement the objective and policies.

The objective of the NPS-GHG is to:

> *reduce emissions of greenhouse gases by managing the discharges to air of greenhouse gases from the production of industrial process heat, in order to mitigate climate change and its current and future adverse effects on the environment and the wellbeing of people and communities.*

The NPS-GHG policies are:

Policy 1: Discharges to air of greenhouse gases from heat devices are reduced or eliminated by:

a. *avoiding discharges from new heat devices that burn coal and deliver heat at or above 300°C, unless there is no technically feasible and financially viable lower emissions alternative;*
b. *avoiding discharges from new heat devices that burn coal and deliver heat below 300 °C; restricting discharges from existing heat devices that burn coal and deliver heat at or above 300°C;*
c. *restricting and phasing out discharges from existing heat devices that burn coal and deliver heat below 300°C;*
d. *avoiding discharges from new heat devices that burn any fossil fuel other than coal, unless there is no technically feasible and financially viable lower emissions alternative;*
e. *restricting discharges from existing heat devices that burn any fossil fuel other than coal.*

Policy 2: Regional councils consider the cumulative effects of discharges of greenhouse gases when considering resource consent applications for discharges from heat devices.

Policy 3: Holders of resource consents for discharges to air of greenhouse gases from heat devices update relevant emissions plans to reflect technological developments and best practice.

2 Key elements of the NES-GHG and NPS-GHG

2.1 Greenhouse gases have persistent and pervasive environmental effects

Greenhouse gases (GHGs), unlike many other contaminants, persist and accumulate in the atmosphere, causing concentrations to increase over time. For example, carbon dioxide (CO_2) persists in the atmosphere once emitted, unless otherwise absorbed. More than 60% of anthropogenic (human generated) CO_2 is likely to remain in the atmosphere 1,000 years from now and more than 15% is likely to remain in 10,000 years.[8]

Furthermore, the climate change effects of GHG emissions are not always experienced locally but contribute towards a global problem. The effects of GHG emissions from one specific source are therefore hard to quantify as they occur independently of the location of the discharge. This differs to many other air discharge contaminants, where the effects are spatially limited to a specific area and will often diminish with distance from the point of discharge.

As a result, the approach to reducing GHG emissions through the NES-GHG and NPS-GHG is to focus on the source of the GHG emission, being the industrial process heat device, as opposed to the effect of the discharge.

2.2 The objective of the NPS-GHG is to reduce greenhouse gas emissions

In resource management, 'objectives' are a statement of what is to be achieved in relation to any resource management issue. As provided in Section 1.5 of this guidance document, the objective of the NPS-GHG is to reduce emissions of GHGs by managing the discharges to air of GHGs from the production of industrial process heat.

GHGs is an umbrella term used to include carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), any hydrofluorocarbon, any perfluorocarbon and sulphur hexafluoride (SF_6).[9] The scope of GHGs within the NPS-GHG and NES-GHG is limited to those GHGs emitted from burning fossil fuels in industrial process heat devices.

In practice, to establish whether the objective of the NPS-GHG is achieved, any reduction in GHGs will need to be quantifiable. Therefore, resource consent applications and emissions plans will need to consider:

- the baseline GHG emissions (that is, under the current process/activity)[10]
- the anticipated GHG emissions due to the proposed activity (new or existing)
- how the difference will be measured, quantified and verified through the resource consent and emissions plan.

[8] Archer, D (2005) Fate of fossil fuel CO_2 in geologic time. *Journal of Geophysical Research* Vol. 10. C09S05. doi:10.1029/2004JC002625

[9] As defined in s. 4(1) of the CCRA.

[10] Baseline emissions should be 12-months before the application date (or as close as practicable to the application date) unless the applicant has provided justification for using a different emissions baseline.

2.3 The NES-GHG and NPS-GHG apply to discharges from industrial process heat only

The NES-GHG and NPS-GHG specifically apply to the emission of GHGs from industrial fossil fuel-fired heating devices. The NES-GHG defines a 'heat device' as a device that produces industrial process heat, for example, a boiler, furnace, engine, or other combustion device, but excludes devices used for the primary purpose of generating and transmitting electricity. 'Industrial process heat' is defined as thermal energy used in industrial processes and to grow plants indoors but excludes space-heating devices used for people's comfort.[11]

The NES-GHG does not apply to new and existing heat devices used for back-up purposes (such as during maintenance and unexpected events) or devices on low-emissions sites.[12] A low-emissions site is defined as a site that emits less than 500 tCO_2e/year from heat devices that burn any fossil fuel and are not back-up devices.[13] Prohibited activities are the exception to this rule. The NES-GHG applies to all new coal-fired heat devices that deliver low-to-medium temperature heat (below 300°C) and all existing coal-fired heat devices that deliver low-to-medium heat from 1 January 2037 (including back-up devices and devices on low emissions sites).[14]

Regional councils, and industrial processors, will therefore need to consider several matters in determining whether an activity is within scope of the NES-GHG and NPS-GHG. In most instances, this exercise will be straightforward. However, sometimes regional councils will need to establish whether an activity involves a 'heat device' and 'industrial process heat' and a further assessment of the applicant's operations may be required.

Where a discharge does not require consent under the NES-GHG, regional councils will continue to apply the objective, policy and rule framework in their own regional plans for managing air discharges under s. 15 of the Resource Management Act 1991 (RMA). GHG emissions from non-industrial process heat devices and other sources are outside the scope of the NES-GHG and NPS-GHG. The effects of these emissions are to be considered more broadly under s. 32 and 104 of the RMA.

2.4 Coal is being phased-out for low-to-medium temperature applications

From 27 July 2023 onwards, it is prohibited to discharge GHGs from burning coal in new heat devices for low-to-medium temperature applications (less than 300°C).[15] For existing heat devices that burn coal for low-to-medium temperature applications, any resource consents granted to authorise the discharge of GHGs will have a maximum possible duration of 10 years under the NES-GHG, and cannot have expiry dates that go beyond 31 December 2036. Also, after 1 January 2037, no further consents can be granted for coal devices used to deliver low-to-medium temperature heat.[16]

All discharges of GHGs from burning coal for low-to-medium temperature applications will be prohibited from 1 January 2037.[17] Current users of coal for low-to-medium temperature applications will need to prepare for alternative technologies, fuels and processes before their existing consents expire and the NES-GHG prohibition becomes applicable.

[11] NES-GHG, r. 3.

[12] A 'Back-up' device is defined in the NES-GHG as a heat device that produces industrial process heat –
(a) For 400 hours or less each year; and
(b) Only when the heat is required but cannot be produced by another heat device at the site because its operation –
(i) is prevented by maintenance or an unexpected event; or
(ii) is not enough to meet a temporary, additional demand for the heat.

[13] NES-GHG, r. 3.

[14] NES-GHG, r. 7 and r. 9.

[15] NES-GHG, r. 7.

[16] NES-GHG, r. 18(3)(b).

[17] NES-GHG, r. 9.

2.5 Regional council to decide whether to take a site-wide approach to emissions

Where resource consent applications involve two or more heat devices, whether new or existing, the NES-GHG requires the relevant regional council to decide whether to take a site-wide approach to their assessment and determination of an application.[18] Under a site-wide approach, the regional council will consider the total climate change effect from all relevant heat devices[19] and impose a single set of conditions, including an emissions plan, that covers all relevant heat devices.[20]

The site-wide approach only applies to those heat devices on site that require resource consent under the NES-GHG at the time of the application and does not extend to already consented devices (unless these consents are due to expire). As such, only those devices for which the applicant requires resource consent under the NES-GHG can be managed through the site-wide approach.

The NES-GHG defines 'site' to mean, one or more parcels of land (whether or not they are contiguous - as in, share a common border) that are managed as a single operation. As such, the site-wide approach will only apply to devices within the same operation on a site and would not extend to other operators who are operating from the same site (for example, leaseholders).

2.6 When resource consents and emissions plans are needed

All activities within the scope of the NES-GHG are either prohibited or require resource consent for a restricted discretionary activity if they are discharging 500 tCO_2e or more per site, per year. Resource consent for a restricted discretionary activity is required for:

- new and existing coal-burning devices that deliver heat at or above 300°C
- existing coal-burning devices that deliver heat below 300°C (before 1 January 2037)
- new and existing devices that burn fossil fuel other than coal.

All resource consent applications must include a proposed emissions plan.[21] The purpose of the emissions plan is:[22]

> *to set out actions and methods to reduce the carbon dioxide equivalent of greenhouse gases discharged from the activity (the emissions), including by meeting any emissions reduction targets, in order to encourage, over time, -*
>
> *a. best practices in energy efficiency; and*
>
> *b. the transition from heat devices that burn fossil fuels to those that reduce the adverse climate change effects by—*
>
> *i. using different fuel sources or no fuel; and*
>
> *ii. emitting lower, or zero, emissions.*

[18] NES-GHG, r. 12.

[19] NES-GHG, r. 12(3)(a).

[20] NES-GHG, r. 12(3)(b).

[21] NES-GHG, r. 13.

[22] NES-GHG, r. 15(2).

The NES-GHG specifies exactly what needs to be in an emissions plan, including:

- **for new heat devices, an assessment of any technically feasible and financially viable lower-emissions alternatives to the heat device**
- **for any new and existing heat device:**
  - **an assessment of the best practicable option (BPO) to prevent or minimise any actual or likely adverse climate change effects of the activity and other greenhouse gas discharges from all heat devices on the site**
  - **an assessment of energy efficiency improvements available for the activity and whether the improvements will be made**
  - **a transition pathway for preventing and minimising emissions and the adverse climate change effects of the activity, and appropriate emissions reductions targets.**

Resource consent applicants requiring consent under the NES-GHG will more than likely need to engage those with specialist knowledge in areas such as:

- process heat thermal energy auditing
- industrial process engineering
- engineering economics / financial analysis.

2.7 Suitably qualified person must review emissions plan for high-emissions sites

Consent applications relating to high-emissions sites must include an emissions plan that has been reviewed by a suitably qualified person (SQP) who has been approved by the regional council.[23] High emissions sites are defined as a site that emits more than 2,000 tCO_2e/year from heat devices burning fossil fuels (excluding back-up devices).[24]

The SQP does not need to draft the emissions plan, however, the applicant must ensure that the SQP:

- reviews the proposed emissions plan, including the assessment of the BPO
- gives recommendations about whether the proposed emissions plan meets the purpose and content required under the NES-GHG
- confirms that the assessment of the BPO is correct
- gives reasons for the recommendation.[25]

[23] NES-GHG, r. 14.

[24] NES-GHG, r. 3.

[25] NES-GHG, r. 14(3)

The SQP is an independent person appointed by the applicant based on set criteria and approved by the regional council. In the NES-GHG, a SQP is defined as a practitioner or other person who the relevant regional council determines:

- has expertise in the technology and practices of industrial process heat and reduction of GHG emissions
- is suitably qualified to provide an independent review and recommendations relating to the discharge of any GHGs from a heat device.[26]

Further information about what constitutes a 'suitably qualified person' is in Section 3.7 of this guidance document.

Provided an emissions plan is reviewed and approved by an independent SQP, who has been approved by the regional council, the regional council should not need to commission further technical review under s. 92(2) of the RMA.

[26] NES-GHG, r. 14(5).

3 Resource consent applications

3.1 Decision-making framework under the NES-GHG/NPS-GHG

When determining whether the NES-GHG applies, and assessing consents under the NES-GHG and NPS-GHG framework, regional councils will need to consider the following.

- Is the activity within scope of the NES-GHG?
- What is the activity status under the NES-GHG?
- Should the regional council take a site-wide approach?
- What are the matters of restricted discretion?
- Does the emissions plan meet the requirements of the NES-GHG?
- For high-emission sites, has the emissions plan been reviewed by an approved suitably qualified person (SQP)?
- Have the effects been appropriately assessed?

The following sections guide the user through each of these steps.

3.2 Is the activity within scope of the NES-GHG?

To determine whether the activity is within scope of the NES-GHG, the regional council will need to have a detailed understanding of the industrial activities being undertaken (or proposed to be undertaken) on site. The following provides a suggested pathway for determining whether the activity is within scope of the NES-GHG. It is important to remember that any activity not within scope of the NES-GHG may still require a resource consent under the regional council's own regional plan rules as regulated by s. 15 of the Resource Management Act 1991 (RMA).

1. Does the activity relate to a 'heat device' as defined in the NES-GHG?

The NES-GHG only manages greenhouse gas (GHG) emissions from certain heat devices. The NES-GHG defines a 'heat device' as:

> *(a) a device that produces industrial process heat (for example, a boiler, furnace, engine, or other combustion device); but*
>
> *(b) does not include a device used for the primary purpose of—*
>
> *(i) generating electricity, including a generator used for back-up electricity or for maintaining the electricity network; or*
>
> *(ii) transmitting electricity, including in mobile and fixed substations.*

Two components therefore need to be established to determine if the activity relates to a 'heat device' under the NES-GHG:

- Whether the device provides industrial process heat.
- Whether the device's primary purpose is to generate or transmit electricity.

In establishing whether the device is used to produce industrial process heat, the definition of 'industrial process heat' in the NES-GHG is:

(a) thermal energy that is used—

(i) in industrial processes, including in manufacturing and in the processing of raw materials; or

(ii) to grow plants or other photosynthesising organisms indoors; but

(iii) does not include thermal energy used in the warming of spaces for people's comfort (for example, heating of commercial offices).

To determine whether thermal energy is used for an industrial process, decision-makers could consider matters such as:

- the type of activity (for example, whether it involves manufacturing and processing raw materials)
- the zoning of the site under the relevant district plan
- the description of the anticipated industrial activities within the industrial zone section of the district plan
- whether the activity has any relevant land use consents from the district council (for example, for industrial activities).

The NES-GHG does not apply to devices that are used for the primary purpose of generating or transmitting electricity, as opposed to producing industrial process heat as defined under the NES-GHG. Typically, this exception will only apply to electricity generation companies, as most industrial sites' fossil fuel generators used for back-up electricity will be considered back-up devices and are already exempt under the NES-GHG.

If the primary purpose of the heat device is to generate electricity to contribute to the national grid rather than to produce products (aligned with the definition of industrial process heat) then it will not be within scope of the NES-GHG and NPS-GHG.

Co-generation or CHP (combined heat and power), which can be common in industrial processes, is the production of two forms of energy from one fuel source. For example, a generator could produce electrical power as the primary energy source and heat as the secondary energy source. If the primary purpose of the device is to generate electricity, but the heat is used in an industrial process elsewhere, the NES-GHG does not apply. If the heat is primarily for an industrial process with electricity production the secondary process, then the activity is captured by the NES-GHG.

2. Is the device a coal-fired device?

The NES-GHG applies to coal-fired heat devices, however, the devices managed by the NES-GHG depends on:

- the amount of CO_2e discharged per year
- whether the device is new or existing
- the temperature the heat is delivered at (above or below 300°C)
- whether the device is a back-up device or on a low emissions site, and
- the time of the application (pre or post 2037).

The following coal-fired devices are within the scope of the NES-GHG.[27]

- Devices that deliver heat at or above 300°C, excluding back-up devices and devices on low emissions sites.[28]
- Devices that deliver heat below 300°C:
  - all new devices,[29] including back-up devices and devices on low emissions sites
  - before 2037, existing devices, excluding back-up devices and devices on low emissions sites[30]
  - from 2037, all existing devices,[31] including back-up devices and devices on low emissions sites (unless operating under an existing consent granted prior to the commencement date of the NPS and NES with an expiry date later than 1 January 2037).[32]

3. Is the device on a low-emissions site?

Except for certain coal-fired devices,[33] the NES-GHG does not apply to devices on a low-emissions site. A 'low-emissions site' is defined as a site that emits less than 500 tCO_2e/year of GHGs from heat devices that burn any fossil fuel and are not back-up devices. To make this determination, a regional council should confirm with the applicant the total annual GHG emissions from the site. Any devices on low emissions sites, except for certain coal-fired devices (as highlighted above), can be excluded from further assessment under the NES-GHG.

Table 1 provides the approximate annual fuel consumption values that results in 500 tCO_2e/year for various fossil fuels.

Table 1 – Approximate annual fuel consumption of various fossil fuels for GHG emissions of 500 tCO_2e/year

Fuel type	Emissions factor applied (kg CO_2e/unit)[34]	Annual fuel consumption (approximate)	Units
Natural gas	53.7	9,311	GJ
LPG	2.97	168,350	kg
Waste oil	3.00	166,667	litre
Diesel	2.68	186,567	litre
Coal (sub-bituminous)	2.00	250,000	kg
Coal (bituminous)	2.66	187,970	kg
Coal (lignite)	1.43	349,650	kg

[27] This list requires an understanding of what constitutes a 'low-emissions site' and a 'back-up device'. See the following sections for these definitions.

[28] NES-GHG, r. 6.

[29] NES-GHG, r. 7.

[30] NES-GHG, r. 8.

[31] NES-GHG, r. 9.

[32] Schedule 1(2) of the NES-GHG and s. 43B(6)-(9) of the RMA.

[33] All new devices, and all existing devices from 2037, that deliver heat below 300°C.

[34] (Ministry for the Environment, 2023) *Measuring emissions: A guide for organisations*

4. Is the device a back-up device?

Except for certain coal-fired devices,[35] the NES-GHG does not apply to back-up devices. A 'back-up device' is defined as:

> *a heat device that produces industrial process heat:*
>
> *(a) for 400 hours or less each year; and*
>
> *(b) only when the heat is required but cannot be produced by another heat device at the site because its operation—*
>
> *(i) is prevented by maintenance or an unexpected event; or*
>
> *(ii) is not enough to meet a temporary, additional demand for the heat*

5. Does the NES-GHG currently apply to the activity?

Whether the NES-GHG currently applies to an activity is a matter of timing. Any given site may have several heat devices, some of which will be captured by the NES-GHG and others that won't yet be captured. Accordingly, the NES-GHG:

- applies immediately to all new devices[36]
- will apply to existing devices that are operating under permitted activity rules in regional plans from 26 January 2025 (or until the permitted activity rule ends, if that happens sooner)[37]
- will apply to existing devices that are already consented once the existing consent expires.[38]

3.3 What is the activity status under the NES-GHG?

Once an activity is confirmed within scope of the NES-GHG, the regional council will determine whether resource consent is required for a restricted discretionary activity or if the activity is prohibited under the NES-GHG. Section 87A(6) of the RMA provides that, if an activity is described as 'prohibited', including in an NES, then no resource consent application can be made or granted for the activity. Resource consents can therefore only be applied for, and obtained, if they are for a restricted discretionary activity under the NES-GHG.

The following diagram outlines the activity status for each device under the NES-GHG.

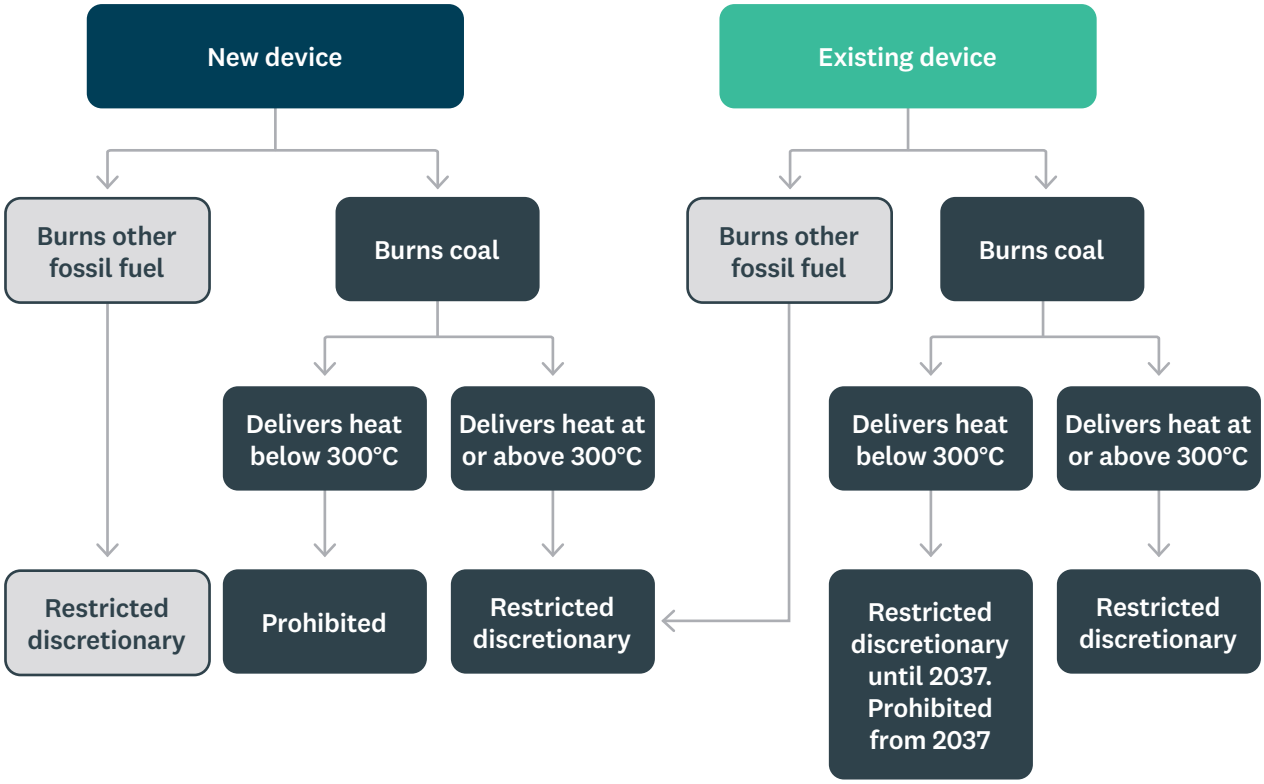
[35] All new devices, and all existing devices from 2037, that deliver heat below 300°C.

[36] NES-GHG, r. 6, 7 & 10.

[37] Schedule 1(1)

[38] Schedule 1(2) of the NES-GHG and s. 43B(6)-(9) of the RMA.

Figure 1: NES-GHG consent pathway (source: MfE Guidance, 2023)



It is important to note that applicants may require resource consent under the NES-GHG and the relevant regional plan for air discharges. In this situation, regional councils may choose to assess the consent application on a bundled basis, which could result in a more restrictive activity status for the proposal if the discharge to air is a discretionary or non-complying activity. Whether to assess the application on a bundled basis will be case-specific and regional councils should consider taking legal advice on the appropriateness of bundling a restricted discretionary activity.

3.4 Should the regional council take a site-wide approach?

The regional council must decide whether to take a site-wide approach where sites have two or more heat devices that require consent under the NES-GHG. A site-wide approach can apply to heat devices on sites across multiple parcels of land (whether or not they are contiguous – as in, share a common border) provided they form part of a single operation. A site-wide approach can only apply to those heat devices that require resource consent under the NES-GHG. It cannot extend to devices that are not within scope of the NES-GHG or are already subject to an existing resource consent.

While the regional council has discretion on whether to apply a site-wide approach, in general, a site-wide approach should be taken unless there are exceptional circumstances that would warrant relevant heat devices being managed separately. The regional council should discuss the site-wide approach with the applicant as part of pre-application meetings. Ideally, the decision on whether to take a site-wide approach should be made prior to the applicant preparing resource consent application documents and emissions plan.

A site-wide approach means that the regional council will assess the effects of GHG emissions from all relevant devices and impose one set of conditions on devices. All discharges will be managed under a combined emissions plan. The regional council can consider the GHGs discharged from already consented devices when assessing an appropriate amount to discharge from the heat devices eligible for consent (through the emissions plan). The regional council can also consider the cumulative effects of all GHG emissions from the site as part of the s. 104 assessment of the resource consent application under the RMA (as per clause 3.2 of the NPS-GHG). However, the reductions and consent conditions can only apply to the heat devices that require consent under the NES-GHG and cannot extend to heat devices that are already consented or outside the scope of the NES-GHG.

If there are several devices on the same site (or within a single operation), a site-wide approach will simplify the assessment and compliance monitoring for the consent. The resource consent application should include a combined assessment of environmental effects, emissions plan and best practicable option (BPO) assessment, and the activity will be authorised through a combined resource consent.

3.5 What are the matters of restricted discretion?

The matters of restricted discretion differ depending on whether the device is new or existing. Any resource consent application for a new or existing device will need to address the matters of restricted discretion in Regulation 17 of the NES-GHG. These matters are largely addressed through:

- the assessment of the BPO
- the preparation of an emissions plan[39]
- the consent conditions[40]
- the consent term.[41]

Any application for a new device will also need to address a further matter of restricted discretion in Regulation 16 of the NES-GHG, being an assessment of any technically feasible and financially viable lower-emission alternatives to the heat device. This is essentially a 'gateway test' whereby applicants must demonstrate that there are no technically feasible and financially viable lower-emission alternatives to the proposed heat device. If there is a technically feasible and financially viable lower-emission alternative to the proposed heat device, the applicant should be implementing this alternative. Regional councils have discretion under Regulation 16 of the NES to decline a resource consent application to discharge GHGs from a new heat device where a technically feasible and financially viable lower emissions alternative exists.

These matters are addressed further in the Sections 4 and 5 of this guidance document.

[39] NES-GHG, r. 15.

[40] NES-GHG, r. 19.

[41] NES-GHG, r. 18.

3.6 Does the emissions plan meet the requirements of the NES-GHG?

All resource consent applications prepared under the NES-GHG must include a proposed emissions plan.[42] Regulation 15 of the NES-GHG sets out the purpose and content of an emissions plan. The purpose of the emissions plan is:

> *to set out actions and methods to reduce the carbon dioxide equivalent of greenhouse gases discharged from the activity (the emissions), including by meeting any emissions reduction targets, in order to encourage, over time,—*
>
> *(a) best practices in energy efficiency; and*
>
> *(b) the transition from heat devices that burn fossil fuels to those that reduce the adverse climate change effects by—*
>
> *(i) using different fuel sources or no fuel; and*
>
> *(ii) emitting lower, or zero, emissions.*[43]

This purpose aligns with the objective of the NPS-GHG, being an overall reduction in GHG emissions from industrial process heat.

The emissions plan must include:[44]

- the purpose of the activity to which the heat device(s) relate
- the number of heat devices (excluding back-up devices), their age and fuel source (if any)
- the thermal energy that is (or will be) produced, and the thermal energy that can be produced, by each device (broken down by fuel source where there is more than one device)
- for new devices, an assessment of any technically feasible and financially viable lower-emissions alternatives
- an assessment of the BPO to prevent or minimise any actual or likely adverse climate change effect of the activity and all other non-backup devices on, or proposed, for the site
- an assessment of any energy efficiency improvements that are available for the activity
- whether, and how, any of those improvements will be made
- a transition pathway that sets out actions to prevent or minimise greenhouse gas emissions from the activity and their climate change effects
- appropriate emissions reductions targets for the scale, type, and site-specific circumstances of the activity (unless the BPO provides no reasonable prospect of reducing the emissions during the term of the resource consent).

Section 4 of this guidance document provides details about preparing and assessing emissions plans. Appendix B provides a checklist for all the information required in Regulation 15(3) of the NES-GHG. The checklist is a useful starting point for regional councils when they assess resource consent applications under s. 88 of the RMA for completeness and for applicants who are preparing emissions plans.

[42] NES-GHG, r. 13.

[43] NES-GHG, r. 15(2).

[44] NES-GHG, r. 15(3).

3.7 Has the emissions plan been reviewed by a suitably qualified person?

The NES-GHG requires all emissions plans for high emissions sites to be reviewed by an approved SQP. The applicant should have the emissions plan reviewed by an SQP prior to submitting the resource consent application, and a SQP will make a recommendation to the regional council on the emissions plan.

When determining whether a site is a 'high emissions site', regional councils need to apply the definition of 'site' in the NES-GHG. Therefore, a 'high emissions site':

- is a site that emits more than 2,000 tCO_2e/year of GHGs from heat devices that burn any fossil fuel and are not back-up devices[45]
- includes heat devices on one or more land parcels (whether or not they are contiguous – as in, share a common border) that form part of the same operation.[46]

The regional council can reject a resource consent application under s. 88 of the RMA if it does not include an emissions plan that meets the requirements of Regulation 15 of the NES-GHG, or if the emissions plan for a 'high emissions site' has not been reviewed by an SQP (see the checklist in Appendix B). If information has been provided, however, it lacks detail required to make a decision on the application, a further information request under s. 92(1) of the RMA may be more appropriate.

It is important to note that the emissions plan does not necessarily need to be prepared by an SQP. However, an SQP who is independent to the organisation, and approved by the regional council, must review the emissions plan.

The Ministry for the Environment (MfE) has published guidance on the attributes of a SQP under the NES-GHG.

Learn more - https://environment.govt.nz/publications/national-direction-for-greenhouse-gas-emissions-from-industrial-process-heat-attributes-of-a-suitably-qualified-person/

Carbon and Energy Professionals (CEP) are creating qualifications and certifications for SQPs so a list of certified SQPs will be on the CEP website and available for regional councils to use.

Learn more - https://cep.org.nz/

[45] Definition of 'high emissions site' under NES-GHG, r. 3.

[46] Definition of 'site' under NES-GHG, r. 3.

3.8 Have the effects been appropriately assessed?

The assessment of effects will largely pertain to the content of the emissions plan, including the BPO assessment and proposed transition pathway and emissions reduction targets. For 'high emissions sites', regional councils will be able to rely on advice from the SQP as to the adequacy of the BPO assessment and appropriateness of the proposed transition pathway. For all other sites, regional councils may have inhouse expertise to assess the adequacy of the emissions plan (using this guidance document) or wish to commission a technical review of the emissions plan through s.92(2) of the RMA.

The assessment of effects will also need to include an assessment of cumulative effects as per Policy 2 of the NPS-GHG. Clause 3.2 of the NPS-GHG provides further direction on the cumulative effects assessment. The cumulative effects assessment must assess the effects of all discharges from heat devices on the site and recognise that all discharges from process heat contribute to climate change and any reduction contributes to climate change mitigation. Regional councils are required to include words to this effect within their regional plans.[47]

[47] Section 3.2 of the NPS-GHG.

4 Emissions Plans

4.1 Overview

This section sets out guidance for preparing and assessing emissions plans. This section is supported by the checklist in Appendix B, which provides high level details on what must be included in an emissions plan. The information requirements for emissions plans are extensive. This guidance provides an overview of the type of information that should be provided within the emissions plan. However, the level of detail and investigations required is scalable to the type, complexity, and size of the activity. For high emissions sites, regional councils will be provided with advice from suitably qualified person(s) (SQPs) regarding the adequacy of information.

All resource consent applications prepared under the NES-GHG must be submitted with a proposed emissions plan. The emissions plan will need to be prepared with input from people who are competent and knowledgeable in process heat thermal energy auditing, industrial process engineering, and engineering economics/financial analysis.

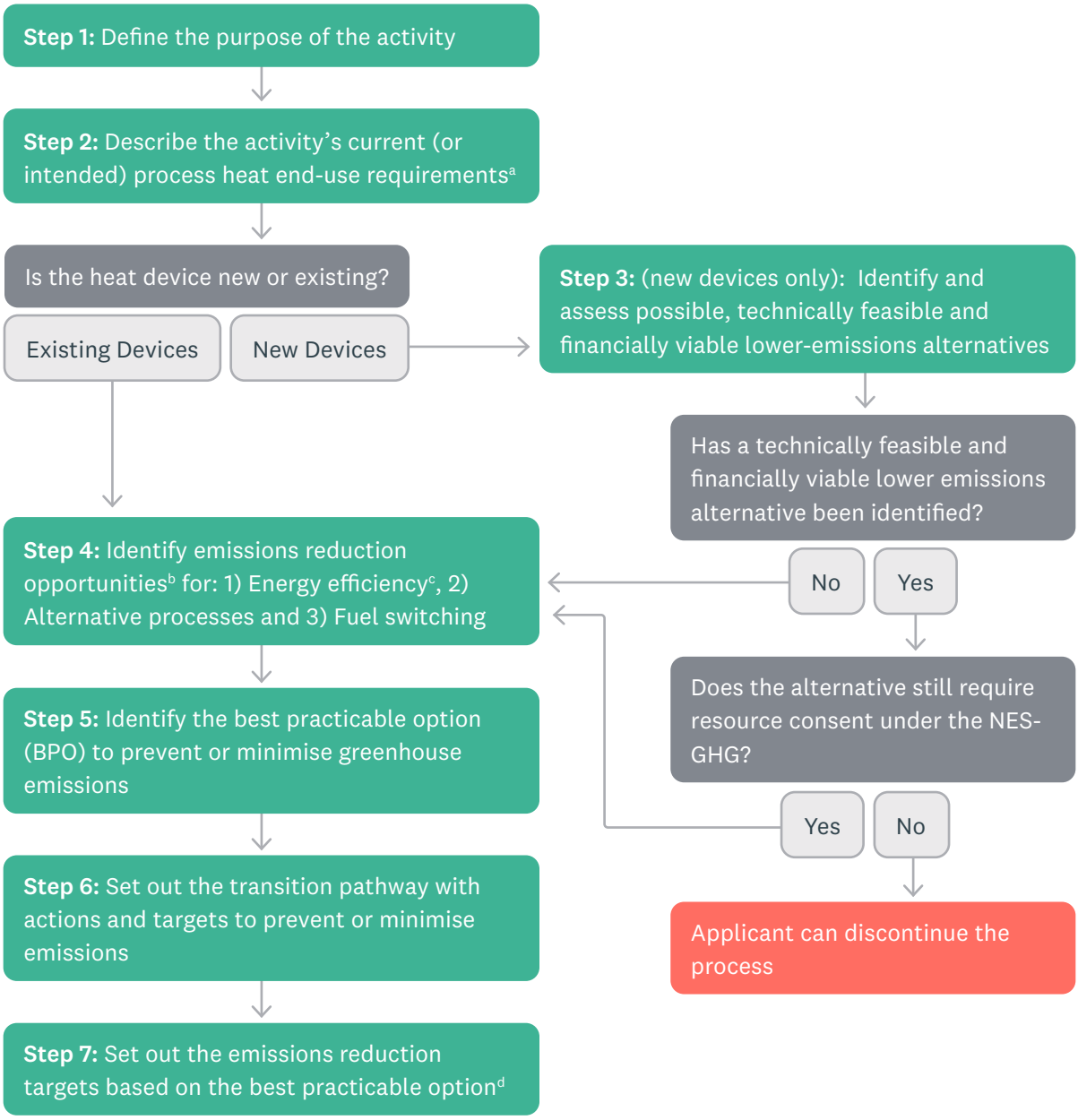
Regulation 15 of the NES-GHG sets out the purpose and content of an emissions plan. The regional council can reject a resource consent application under s.88 of the Resource Management Act 1991 (RMA) if it does not include an emissions plan that meets the requirements of Regulation 15 of the NES-GHG. This section guides the user through the following steps for assessing/preparing an emissions plan:

- **Step 1: Define the purpose of the activity**
- **Step 2: Describe the activity's current (or intended) process heat end-use requirements**
- **Step 3 (new devices only): Identify and assess possible, technically feasible and financially viable options to reduce or avoid emissions**
- **Step 4: Identify emissions reduction opportunities for energy efficiency, alternative processes, and fuel switching**
- **Step 5: Identify the best practicable option to prevent or minimise greenhouse gas emissions**
- **Step 6: Set out the transition pathway with actions and targets to prevent or minimise emissions**
- **Step 7: Set out emissions reduction targets based on the best practicable option.**

Figure 2 below provides an example approach to developing an emissions plan.

Figure 2 - Example approach to developing an emissions plan

Example approach to developing an emissions plan



[a] Defining energy end-use requirements includes identifying all of the process heat end users and the associated process heat demand requirements. For example, determining the process heat end users' temperature requirements, and assessing the demand variation, i.e. the base load, and peaking requirements for the heat device(s). It also includes identifying any future process heat energy end-use considerations.

[b] To identify opportunities, applicants should refer to the Best Available Techniques (BAT) reference documents, EECA's sector decarbonisation programme, and EECA's international technology scan.

[c] Energy efficiency options can also be identified through a process heat thermal energy audit. Waste heat opportunities as well as heat pumps as a process heat energy source should be considered for low temperature process heat below 100°C.

[d] Unless the best practicable option (BPO) provides no reasonable prospect of reducing the emissions during the term of the resource consent.

4.2 Assessing/preparing an emissions plan

Step 1: Define the purpose of the activity

The proposed emissions plan should clearly describe the objective(s) and key requirements of the activity that fossil-fuelled heat use is being applied for. The description should be detailed enough to allow the assessor to verify that the process selection and heat supply selection are justifiable.

The purpose should provide an overall description of:

- the industrial process(es) for which process heat is sought
- the process heat requirements for the operation
- the site's process heat energy uses and associated greenhouse gas (GHG) emissions:
    - by energy source over a typical year
    - energy use profile over the relevant period (year, month, week, day), including the annual hours a year of operation and scheduled down-time for maintenance.[48]

If industrial process heat is supplied across a site boundary (for example, a business purchases process heat from a nearby business as 'heat-as-a-service'), consenting the device(s) is the responsibility of the operator of the fossil fuel heat device. However, regional councils should consider process heat requirements of both the industrial process heat producer and consumer(s) sites when reviewing an emissions plan.

Step 2: Describe the activity's current (or intended) process heat end-uses

Defining energy end-use requirements includes identifying all the process heat end users and the associated process heat demand requirements. This includes, for example, determining the process heat end user's temperature requirements and assessment demand variation (such as the base load and peaking requirements for the heat device(s)). It also includes identifying any future process heat energy end-use considerations for which resource consent is being sought.

For each relevant heat device, a description of the asset and its purpose should be provided to include the following elements:[49]

- type of thermal energy required (for example, steam versus hot water requirements)
- name plate information (if any)
- nominal, minimum, and maximum rated capacity
- rated design pressure and normal operating pressure
- energy source over the relevant period (including breakdown of blended or mixed-fuel sources)
- energy use profile over the relevant period (year, month, week, day), including the annual hours a year of operation and scheduled down-time for maintenance

[48] This information can be found in energy bills and will also be part of any process heat thermal energy audit (see Step 4). MfE's emissions factors will also be relevant - https://environment.govt.nz/publications/measuring-emissions-a-guide-for-organisations-2023-emission-factors-summary/

[49] The description of the purpose of each heat asset may be different to the overall description of the purpose of using process heat. This is because a process step in manufacturing can be achieved by several assets, and conversely some assets can achieve several process steps.

- associated carbon emissions (emissions quantity and emissions intensity per tonne of product) and emissions factor(s) used[50]
- outlet temperature from the heat device (outlet delivery temperature of the utility)
- process/product temperatures required at end use (the temperature required to be delivered for each of the process heat user(s))
- the date the asset started its operating life (noting that an asset starts its operating life when it has been commissioned for the first time, and that using a second-hand asset doesn't change the operating life starting date)
- significant planned maintenance
- the engineering design life. If there is a significant difference between the fossil fuel option and the lower emissions option, this should be justified by the applicant and reviewed by an SQP for high emissions sites.

Ideally the description of the heat device(s) and end use will include a process flow diagram of the industrial process heat application showing each process step, how they relate to each other, the main mass and energy flows, and temperatures.

The emissions plan should identify planned continuance or changes to wider site operations, including scheduling of any relevant works. For example:

- an existing boiler reaches the end of its economic life in 6 years or requires a major refurbishment/ maintenance. This could change the financial viability of a lower emissions option as investment would need to be made for either significant maintenance or a new boiler regardless.
- the existing refrigeration system needs to be replaced within 2 years. This may allow a heat pump to be integrated into the site (using waste heat from the new refrigeration system), reducing overall costs.
- there is a project to expand or reduce the plant capacity. This could be an opportunity to downsize or upgrade the heat device.
- a new product will be manufactured on site. This could change the process heat requirements and potentially remove the requirement for steam, making a heat pump a viable option.

Step 3 (new devices only): Identify and assess possible, technically feasible and financially viable lower-emissions alternatives

Step 3 is required for all new devices. Step 3 is essentially a 'gateway test' where applicants must be able to demonstrate that there are no technically feasible and financially viable alternatives to the proposed heat device. If such an alternative exists, regional councils have the discretion to decline the application under Regulation 16 of the NES-GHG. Undertaking this process early in the development of an emissions plan is crucial because the operator may establish that there is a technically feasible and financially viable alternative that does not require resource consent under the NES-GHG. For example, an operator may determine that they can install a heat pump instead of a fossil fuel fired boiler and no longer require consent under the NES-GHG. In this situation, the operator would not need to apply for resource consent under the NES-GHG or prepare an emissions plan.

[50] Evidence of how emissions were calculated, including the emissions factors used, should be included in the emissions plan. Evidence of additionality should be provided if a renewable energy certificate is used to claim lower emissions. A renewable energy purchase is additional if the associated renewable energy generation capacity would not have been added without that purchase.

The NES-GHG defines a 'technically feasible and financially viable lower-emissions alternative' as a heat device that:[51]

> *(a) provides an equivalent service while discharging a lower, or zero, carbon dioxide equivalent of greenhouse gases; and*
>
> *(b) is technically feasible for the applicant to use to provide the service, having regard to the current state of technical knowledge and the likelihood that the alternative can be successfully applied; and*
>
> *(c) is financially viable, taking into account the following expected costs and benefits during a 20-year period starting on the date of the application:*
>
> *(i) all capital costs:*
>
> *(ii) all operating costs:*
>
> *(iii) any financial benefits.*

To meet the definition, the alternative would need to satisfy all three of these requirements through a three-part process as outlined below.

1. Are there possible alternatives to provide an equivalent service while discharging a lower, or zero, carbon dioxide equivalent of GHGs?

The applicant should first develop a list of possible alternatives to provide an equivalent service while discharging lower, or zero, GHG emissions. The list should include process alternatives and supply alternatives.

- A process alternative is an alternative manufacturing process which means process heat may not be needed any more.
- A supply alternative is the same manufacturing process where process heat will still be needed, but an alternative heat supply avoids or reduces GHG emissions, i.e. fossil fuel is replaced with a renewable energy source.

Examples of possible process alternatives to provide an equivalent service while discharging lower, or zero, GHG emissions are:

- An evaporator with mechanical vapour recompression (MVR) uses electricity, which is less emission intensive than a similar evaporator with a thermal vapour recompression (TVR) using steam produced by a fossil fuel boiler.
- An industrial heat pump used to produce hot water, which is less emissions intensive than producing hot water from a fossil fuel boiler. Heat pumps are high-efficiency process heat sources that upgrade ambient or waste heat to useful temperatures by using relatively small amounts of electricity. Industrial heat pumps should be investigated for process heat temperature requirements below 100°C.[52]

[51] NES-GHG, r. 16.

[52] Currently, heat pumps are generally limited to temperatures below 100°C, which makes them suitable for producing hot water. Although not widely available (including in New Zealand), output temperatures of up to 150°C can be achieved if waste heat of about 100 °C is available as input. There are steam heat pumps expected in the near future. Learn more about industrial heat pumps for process heat - https://www.eeca.govt.nz/insights/eeca-insights/industrial-heat-pumps-for-process-heat/

Assessments of alternative production processes, and their flow-on effects for reductions in GHG emissions, are particularly important for complex and integrated processes.

EECA publishes international technology scans that can be used to quickly identify some potential alternative technologies.

Learn more – International Technology Scan - Alternative Technologies for Process Heat | EECA

EECA is developing decarbonisation pathways by sector.

Learn more – Support to decarbonise business sectors | EECA

Best Available Techniques (BAT) reference documents provide a basis for assessing how the current process compares with international practices in the same sector.

Learn more – Emissions Plan Guidance | EECA

2. Are any of the alternatives technically feasible for the applicant to use to provide the service?

The common meaning of technically feasible is applied in the NES-GHG. An option could be determined as 'technically feasible' if it has been demonstrated in practice and is available and applicable to meet the requirements of the process the resource consent is being sought for and is compatible with the site's operational requirements. In this sense:

- a technology is 'demonstrated' if it is being used for the same type of process, such as a similar plant producing the same product and the solution is commercially available demonstrating a technology readiness level of 9 and above (level 9 meaning the technology is commercially available)[53]
- a technology is 'available' if it can be obtained through commercial channels or is otherwise available within the common meaning of the term
- an available technology is 'applicable' if it can reasonably be installed and operated to deliver the activity's objectives
- an available technology is 'compatible' if it meets the sites operational, functional and performance requirements.

An option cannot be considered technically feasible if it faces insurmountable barriers. Insurmountable barriers will typically fall under one or more of the following categories:

(a) Insufficient electric network capacity.

(b) Low emission fuel (lack of) availability.

(c) Inability to source lower emission technology within reasonable conditions.

(d) Physical limitations.

(e) Contradictions with other regulatory constraints.

(f) Other reasons.

[53] https://www.iea.org/data-and-statistics/data-tools/etp-clean-energy-technology-guide

The following section provides a discussion on these insurmountable barriers.

(a) Insufficient electric network capacity

A network upgrade might be required to implement the alternative option. However, a technical upgrade may not be possible before a certain time (for example, it would take five years to get the transmission extension), or not at all, depending on Transpower or the local electricity distribution business (EDB).

To confirm insufficient electric network capacity as a technical barrier, applicants should provide a letter from Transpower or the local EDB informing of the delay constraints, with a copy of the applicant's request.

Insufficient electric network capacity could also be a financial barrier. However, the upgrade costs should be addressed through the financially viable assessment in the next part (part 3).

(b) Low-emission fuel (lack of) availability

Regional availability of sustainably sourced biofuel (for example, woody biomass) in the required type, timing (of supply), or cost considerations can prevent using a possible alternative lower-emissions option. However, the applicant is expected to have genuinely tried to source the biofuel required and provide evidence of these investigations.

For biogas, the biofuel source is organic waste. If there is a large amount of usable organic waste available on site, for example, dairy processing sites, meat processing sites, food manufacturing sites and paper mills, then the operator should investigate biogas options further. For biomass that will be sourced externally from the site, the applicant will need to secure suppliers and a lack of biomass fuel availability could be an insurmountable barrier.

To confirm fuel supply as a barrier, applicants should supply onsite biofuel information (for biogas) or letters from potential biomass suppliers in the area, with a copy of the applicant's request.

A list of biomass suppliers can be found on the Bioenergy New Zealand website.

Learn more – https://www.bioenergy.org.nz/find-accredited-suppliers

EECA's Regional Energy Transition Accelerator Programme provides further information on regional availability and price of biomass and electricity.

Learn more – https://www.eeca.govt.nz/co-funding-and-support/products/about-reta/

(c) Inability to source a lower-emission technology within reasonable conditions

Some lower-emissions assets will be subject to long lead times. Note that an inability to source differs from 'delays' or 'long lead time'. Long lead times are not a barrier if the project is planned well in advance (which is one of the objectives of having a long-term transition plan). In some instances, however, a very long lead time might be a technical barrier. For example, the activity might not be able to operate for a long period.

What constitutes a 'long period' will need to be determined by the regional council through weighing the economic effects of a long lead-in time, versus the long-term benefits of implementing a lower emitting option. However, a lead-time of two or more years is likely to constitute a technical barrier. Applicants should provide evidence to verify the accuracy of the lead-time and justify why the timing to source a lower-emissions technology is a barrier for them implementing the technology.

Some suppliers might decide to apply commercial practices that do not allow an applicant to procure the lower-emissions alternative. For example:

- heat pump suppliers decide to focus on another market and decline making a proposal
- suppliers do not want to provide commercial conditions up to New Zealand standards (such as no performance guarantees).

In both situations, applicants should provide letters or email exchanges with suppliers as evidence of the barrier and demonstrate that every reasonable effort has been made to overcome it, including reaching out to enough potential suppliers, especially local ones (in New Zealand or Australia for example).

(d) Physical limitations

Physical limitations refers to where an option is not feasible for reasons such as:

- insufficient space to install a lower-emission option, and
- insufficient access to the site to supply the fuel to a lower-emission option (for example, delivery truck access for woody biomass fuel supply).

Evidence expected to demonstrate the physical limitation will mostly be visual supports such as maps, plans, drawings, and pictures.

(e) Contradictions with other regulatory constraints

Some feasible options might be in contradiction with other regulations or local rules such as:

- noise or traffic restrictions that limit fuel delivery
- air discharge rules and standards, which in some areas for biomass may require additional capital cost for particulate control technology,[54] and
- air discharge restrictions under the Resource Management (National Environmental Standards for Air Quality) Regulations 2004 (NES-AQ), which constrains new consents for PM_{10} discharges in polluted airsheds.

The applicant could demonstrate this barrier by providing a rule assessment by an environmental planner and/or evidence of a pre-application meeting with the relevant territorial authority and/or regional council confirming that the activity will face significant barriers to consenting. The applicant may have even sought and been declined resource consent for the activity.

[54] Particulate control technology for biomass heat devices includes technologies such as cyclone separators, bag filters, electrostatic precipitators, or scrubbers.

(f) Other reasons

Other technical barriers could be production constraints. The emissions plan should distinguish between what is an insurmountable barrier and what could be managed through the right timing. People preparing and assessing emissions plans should refer to supporting documents (Best Available Techniques (BAT) reference documents, EECA's Sector Decarbonisation Programme resources or EECA's international technology scan) to help to define if the alternative lower emissions technology is used by other sites for similar purposes in New Zealand and other countries. Industry associations can also provide evidence for product quality requirements if these are a barrier. Note that technologies used in other countries may not be available or applicable in New Zealand for various reasons, the applicant should identify in the alternatives assessment.

3. Are any of the technically feasible alternatives financially viable?

The next step is to assess the financial viability of the technically feasible alternatives. Financial viability considers capital and operating costs, and financial benefits. A cost assessment will help determine which options are financially viable.

EECA has co-developed a spreadsheet Cost Assessment Tool (CAT) with a leading accounting consultancy, which is available on the EECA website

Learn more – Emissions Plan Guidance | EECA

A user guidance for the CAT is also provided on EECA's website. Summary guidance is provided in Appendix C of this guidance document.

Learn more – https://www.eeca.govt.nz/regulations/emissions-plan-guidance/

The tool is designed to provide a common set of assumptions and calculation methods for regional councils and applicants to understand both the financial and emissions impacts of process heat technology choices and consenting decisions.

The tool is a discounted cashflow analysis template that can compare the costs and emissions of process heat supply options.

The tool is structured to identify all the common costs associated with different types of technology and will flag significant discrepancies between entered data and baseline assumptions. Regional councils may wish to request applicants to explain any discrepancies to check that their assumptions are reasonable.

The tool is designed to be able to be used with a minimum amount of additional input data. For example, while applicants should have obtained cost estimates for alternative process heat options, if these estimates are incomplete, the CAT contains guidance values to help fill in any gaps.

The tool includes an 'Assessment summary' sheet that provides the key outputs, which are 'total lifecycle cost' and 'total emissions'. An alternative process, fuel or energy source is likely to be financially viable if it has a similar or lower total lifecycle cost compared to the fossil fuel process heat option. Further, if a device has a marginally higher lifecycle cost, but a significantly lower total emissions, this could indicate that the

preferred option is a marginal choice and could be subject to stricter conditions, for example a shorter consenting period.

To establish that an alternative option in not financially viable, an applicant may need to submit additional or supporting material. For example, a letter from their lending provider indicating that the required finance would not be available for the amount required to purchase alternative technologies.

4. What technically feasible and financially viable lower-emissions alternatives to the activity exist?

Finally, once the applicant has gone through the three parts above, they will be able to identify whether there are any technically feasible and financially viable lower-emissions alternatives to the heat device. If a technically feasible and financially viable lower-emission alternative to the proposed heat device exists, regional councils have the discretion to decline the resource consent application under Regulation 16 of the NES-GHG. If several alternatives exist, the emissions plan should have a best practicable option (BPO) assessment of all alternatives, prepared through Step 5. In some cases, applicants may identify a technically feasible and financially viable lower-emissions alternative that does not need resource consent under the NES-GHG and decide to pursue this option. The applicant would therefore not need to proceed further with the resource consent application or emissions plan.

Step 4: Identify emissions reduction opportunities for energy efficiency, alternative processes, and fuel switching

Step 4 is used to identify emission reduction opportunities and alternative options for the BPO. For new devices, Steps 3 and 4 will have some degree of overlap. Step 4 involves identifying emission reduction opportunities under the following three categories:

- energy efficiency/process heat optimisation options
- alternative process options
- fuel switching options.

Regulation 15(3) of the NES-GHG requires emissions plans to assess any energy efficiency improvement available and define whether, and how, improvements will be made. The identification of alternative process and fuel switching options are then considered a necessary step for the BPO assessment in Step 5.

When exploring these opportunities, applicants should refer to the Best Available Techniques (BAT) reference documents, EECA's sector decarbonisation programme, and EECA's international technology scan. The BAT reference documents provide information on international practices in the same sector for lower-emissions alternatives, but the BAT does not necessarily constitute the BPO. The BPO for any activity will be site, and activity, specific and is identified through the BPO assessment in Step 5.

- **Access the BAT reference documents – Emissions Plan Guidance | EECA.**
- **Access the Sector Decarbonisation Programme – Sector Decarbonisation Programme | EECA.**
- **Access the International Technology Scan – International Technology Scan – Alternative Technologies for Process Heat | EECA**

1. What are the opportunities for energy efficiency improvements?

The NES-GHG requires emissions plans to include an assessment of any energy efficiency improvements (including process change improvements) that are available for the activity.[55] Improving energy efficiency can help process heat users significantly reduce process heat demand and associated energy costs.

Additionally, improving energy efficiency helps make fuel switching projects more financially attractive by reducing the rated capacity required of the lower emissions alternative and therefore capital cost requirements.

Applicants should first review thermal energy consumption (commonly known as a mass and energy balance) across the operation to identify opportunities for improvement. Applicants should undertake a Type 3 process heat thermal energy audit (or equivalent), as per the Australia/New Zealand Standard for energy audits (including a pinch analysis if applicable or appropriate).[56] The process heat thermal energy audit should have been performed within four years of the consent application.

An emissions plan should then include:

- a copy of the process heat thermal energy audit report with the findings of the audit
- a timeline and list of projects/activities chosen for implementation from the audit report noting that the consent applicant will be responsible for implementing these projects/activities
- justifications for:
    - the energy efficiency projects selected for implementation
    - their selected implementation date(s), and
    - justification for not implementing any recommendations from the audit.

2. What are the lower-emissions process alternatives?

Once energy efficiency improvements are identified, applicants should identify lower-emission process alternatives that could reduce or avoid process heat demand. This involves identifying any alternative ways to produce the product with less, or no, process heat or alternative products that meet the same requirement. For example:

- pulsed electric field (PEF) technology in the food sector uses electric pulses rather than traditional heating or blanching methods which use steam from a fossil fuel boiler
- using an ultraviolet (UV) system to sterilise knives in the meat industry rather than hot water coming from a fossil fuel boiler.

3. What are the fuel switching opportunities?

After the applicant has considered options to minimise or avoid process heat through energy efficiency and process alternatives, they should investigate options to supply lower-emission process heat to the site. Reducing the site's process heat demand through energy efficiency and process alternatives can help to make fuel switching projects more financially attractive, so this assessment should be completed after energy efficiency and process alternatives have been identified.

[55] NES-GHG, r. 15 (3)(e)(ii)

[56] AS/NZS 3598.2:2014. *Energy audits - Part 2: Industrial and related activities.* https://www.standards.govt.nz/shop/asnzs-3598-22014/

Fuel switching alternatives might involve fuel switching from fossil fuels to one or more of the following:

- solid biomass fuel source
- biogas fuel source
- electric fuel source (heat pump or electric/electrode heat device)
- geothermal fuel source.

Sometimes, a single technology option won't be the most optimal, depending on the site's heat demand profile, and a mix of technology could be more cost effective while still reducing GHG emissions. Mixed technology solutions are often chosen by operators to improve operational flexibility and/or reduce fuel supply risks. It is important to note that fuel switching may result in alternate consenting requirements under the relevant regional plan (for example, replacing natural gas with biomass might result in $PM_{2.5}$ and PM_{10} emissions not previously considered as important).

Step 5: Identify the best practicable option to prevent or minimise greenhouse gas emissions from the consented heat device

The emissions plan must include an assessment of the BPO to prevent or minimise any actual or likely adverse climate change effect of the activity for which consent is required and other GHGs from heat devices on, or proposed for, the same site.[57] If the consent is granted, the NES-GHG requires the regional council to impose a consent condition requiring the consent holder to adopt the BPO, as assessed by the regional council.[58]

The NES-GHG adopts the RMA definition of BPO. The RMA defines the BPO, in relation to a discharge of a contaminant, as:[59]

> *…the best method for preventing or minimising the adverse effects on the environment having regard, among other things, to—*
>
> *(a) the nature of the discharge or emission and the sensitivity of the receiving environment to adverse effects; and*
>
> *(b) the financial implications, and the effects on the environment, of that option when compared with other options; and*
>
> *(c) the current state of technical knowledge and the likelihood that the option can be successfully applied.*

The BPO assessment is therefore an exercise of weighting undertaken by the applicant which compares a range of options for preventing or minimising adverse climate change effects of the GHG discharge from the fossil fuel-fired heat device, taking into account the environmental effects, financial implications and technical knowledge.

[57] NES-GHG, r. 15(3)(e).

[58] NES-GHG, r. 19(2).

[59] RMA, s.2(1).

To confirm the BPO, applicants should first use the assessments in Steps 3 and 4 to identify alternative options to compare against the heat device for which consent is being sought. Each option to be assessed should consist of:

- the amount of tCO_2e/year to be discharged from the fossil fuelled heat device that needs resource consent under the NES-GHG,
- the actions that would be applied to the fossil fuelled heat device that will reduce GHG emissions over the duration of the consent, including energy efficiency, process alternatives, and fuel switching, and
- if relevant, any transition away from the fossil-fuelled heat device during the consent term (for example, if the applicant is moving towards an alternative process or lower emissions heat device, for existing devices).

Several methodologies for the BPO are available to the applicant, including multi-criteria analysis, and the chosen methodology will be specific to the proposal. The emissions plan needs to clearly describe the BPO assessment methodology and assessment criteria. The BPO assessment must be replicable. Once the BPO has been determined, the transition plan, emission reduction targets and consent conditions will be tied to the BPO.

The Best Available Technique (BAT) reference documents found on EECA's website provides a basis for assessing how the current process compares with international practices in the same sector.

Learn more – Emissions Plan Guidance | EECA

EECA's Sector Decarbonisation Programme collaborates with sector associations and technical experts to connect New Zealand businesses with world-class innovation and best practice guidance to decarbonise at a sector level. The programme also provides new businesses with best practice knowledge when they enter the sector.

Learn more – Access the Sector Decarbonisation Programme | EECA

Step 6: Set out the transition pathway with actions and targets to prevent or minimise emissions

A transition pathway is intended to provide a decarbonisation roadmap for the site's industrial process heat. The pathway sets out the identified BPO actions to reduce emissions during the timeframe of the consent. The transition pathway defines the GHG emissions reduction targets for the consent period based on what can be achieved as identified under the BPO assessment and is required to be implemented as a condition of the resource consent.

Figure 3 is an example of a transition pathway for implementing actions overtime to reduce emissions.[60]

[60] Figure 3 is for illustrative purposes only. The number of decarbonisation projects for an industrial site will be dependent on many different factors including the complexity of the site and where the site is on their decarbonisation journey.

Figure 3 - Example Transition Pathway

Actions		Consent Year	Remaining Emissions
Baseline emissions		N/A	100%
Process change	New process technology	Year 1	15% / 85%
Energy Demand reduction	Dryer heat recovery	Year 3	10% / 75%
	Steam network heat recovery (flash steam, blowdown…)	Year 3	5% / 70%
Process change	Material substitution	Year 6	10% / 60%
Fuel Switching	**Option A:** Boiler conversion to biomass	Year 9	50% * 5%
	Option B: Switch to biogas + (biogas/biomass/electricity)	Year 9	25% * 5%
	Option C: Electrification	Year 9	40% * 12%

*Around 50% of reduction in electricity emissions is expected from the evolution of the grid-sourced electricity carbon intensity.

Biomass Biogas Electricity

The pathway sets out the planned implementation date of each project, which is defined depending on considerations such as:

- technical feasibility – when is it practically feasible to have the project commissioned?
- asset management plan – when is an existing asset reaching the end of its life and requires replacement?
- co-dependencies – does this project require another action/project to be implemented first?
- timing – could any of the items be implemented earlier?
- other considerations – is there a compelling reason not to, such as lower emissions fuel supply considerations?[61]

A transition pathway will cover, at a minimum, the duration of the consent period. Some existing heat devices may not reach the end of life during the consent period. In this situation, it could be cost prohibitive for the applicant to replace the heat device with a lower-emissions alternative during the consent term. The transition pathway should therefore set out the timeframe for when this heat device will be replaced and include alternative options for reducing GHG emissions during the consent term, such as energy efficiency, fuel switching and/or process alternatives, consistent with the BPO. Doing so will ensure that the applicant can still show a reduction in GHG emissions during the consent term, consistent with the requirements of the NES-GHG and NPS-GHG. It will also avoid applicants applying for short-term consent durations (for example, 2-5 years) with the objective of avoiding long-term planning and locking in the status quo. The goal of the transition pathway is to avoid the need for a future resource consent under the NES-GHG.

[61] For information regarding biomass and electricity supply, please see Regional Energy Transition Accelerator reports here https://www.eeca.govt.nz/co-funding-and-support/products/about-reta/.

In some instances, especially for large projects, high technical complexity and capital cost (CAPEX) outlay may result in significant uncertainties on the decarbonisation decision. In this situation, it may be reasonable to have several options for a replacement lower-emissions process heat device in a transition pathway. For example, for a fuel switching project requiring medium-to-high temperature process heat,[62] there may be three options in the decarbonisation pathway:

- Option 1 – a biomass boiler
- Option 2 - an electric boiler
- Option 3 – a combination of the two.

Co-dependent decarbonisation actions (for example, the project requires another action/project to be implemented first) can sometimes result in several pathways. Usually, the most practical way to address this co-dependency is to confirm the BPO and transition pathway in the resource consent application and emissions plan, but plan for a review of the pathway at a point in time where uncertainties are lower, and a feasibility study can be performed to reassess the BPO for decarbonisation. Resource consent conditions should provide some flexibility in this situation.

Step 7: Set out the emissions reduction targets

The emissions reduction targets are an outcome of the transition pathway. The emissions reduction targets will be based on the level of GHG emission reduction that is estimated to be achieved through implementing the proposed transition pathway and the BPO. The emissions reduction targets will also be site-specific and depend on what is appropriate for the operator, site and activity.

Consent conditions should incorporate the tCO_2e/year and be specified annually according to the transition pathway. The tCO_2e/year baseline should be for the 12-months before the application date (or as close as practicable) unless the applicant has provided justification for a different emissions baseline.

Table 2 provides an example of emissions reduction targets for a site initially emitting 1,000 tCO_2e/year. The reduction targets are based on the year that identified actions are planned for, the estimated emission reduction, and the corresponding annual emissions that are authorised by the consent, reducing over time. The emissions reduction targets will form part of the emissions plan, required as a condition of consent. Regional councils will need to determine how consent conditions are to be drafted, and whether an emissions reduction target is binding or can be amended throughout the consent term (for example, where a significant degree of uncertainty exists).[63] In this example, the fossil fuelled heat device will be replaced by a heat pump in year 9. As such, the consent term would only need to be for 9-years and the applicant would no longer need resource consent under the NES-GHG.

[62] Currently, heat pumps are generally limited to temperatures below 100°C, which makes them suitable for producing hot water. Although not widely available (including in New Zealand), output temperatures of up to 150°C

[63] Section 5 of this document provides further guidance on consent conditions.

Table 2 – Example emissions reduction target for a site initially emitting 1,000 tCO_2e/year

Consent year	Identified best practicable options (BPO)	Reduction in consented fossil fuel emissions (tCO_2e/year)	Annual consented fossil fuel emissions quantity (tCO_2e/year)
1	Implement energy efficiency best practices in the first year of consent. Expected emissions reduction of 100 tCO_2-e/year.	-100	1,000
2	Installation of screens and fans in second year of consent. Expected emissions reduction of 200 tCO_2e/year.	-200	900
3	No identified actions in transition pathway.	0	700
4	Investment in dehumidification, heat pumps, and greenhouse improvements in third year of consent. Expected emissions reduction of 200 tCO_2e/year.	-200	700
5-8	No identified actions in transition pathway.	0	500
9	Investment in a heat pump when the gas boiler reaches the end of its life. Expected emissions reduction of 500 tCO_2e/year.	-500	500
10			0 (note - consent no longer required)
Total cumulative emissions			**5,800**

For ‘high emissions sites’, regional councils will be able to rely on the technical expertise of SQP when assessing the appropriateness of the BPO assessment, transition pathway and emissions reduction targets. The SQP’s emissions plan review will assess the extent to which the relevant BPO has been determined and applied and the effectiveness and achievability of actions set out in the plan to reduce emissions.

For ‘low emissions sites’, regional councils will need to consider whether the BPO, transition pathway and emissions targets are appropriate. Considerations could include:

- the emissions reductions already achieved at the site (with evidence of past emissions reductions and emissions intensity improvements)
- the potential for further energy efficiency, process alternatives, and fuel switching
- the scale of the activity, and
- any site-specific circumstances.

All emissions plans will need to show a reduction in GHG emissions over the consent term. The exception to this requirement is where the BPO provides no reasonable prospect of reducing emissions during the consent term.[64] Regional councils should seek further justification from the applicant if the BPO actions, transition pathway and emissions reduction targets appear insufficient or unreasonable compared to sector peers or sector benchmarks.

[64] NES-GHG, r. 15(3)(iv)(b)

5 Resource consent condition and compliance

5.1 Resource consent term

The NES-GHG specifies the following resource consent terms:[65]

- For new devices, 20 years or less.
- For existing devices, 10 years or less.
- For coal burning devices that deliver heat at or below 300° C, the consent term must end before 1 January 2037.

5.2 Conditions

The regional council is required to impose the following conditions on any resource consent granted under the NES-GHG:[66]

- The consent holder must adopt the best practicable option (BPO) described in their consent application, as advised by the suitably qualified person (SQP) and/or assessed by the regional council.
- The consent holder must comply with an emissions plan for the activity that the regional council has determined satisfies the requirements of Regulation 15 of the NES-GHG (purpose and content of an emissions plan).
- The consent holder must monitor their compliance with the emissions plan, including any emissions reduction targets, and to report to the regional council on their monitoring.

The regional council can also impose any other conditions in accordance with s. 104C (3) of the RMA.

Additionally, Policy 3 of the NPS-GHG seeks to ensure that resource consent holders update their emissions plans to reflect technological developments and best practice. Clause 3 of the NPS-GHG sets out what regional councils must do to implement or give effect to the NPS-GHG. Every regional council is required to include the following policy (or words to the same effect) in its regional plan:

> *When considering an emissions plan as part of an application for a resource consent for a restricted discretionary activity relating to discharges to air of greenhouse gases from heat devices, the consent authority must consider:*
>
> *(a) the timing and content of updates of the emissions plan to be made by the holder of the consent; and*
>
> *(b) how those updates will reflect changes in technology and best practices.*

Once a consent is granted, the emissions plan will form part of the consent and will therefore be binding. Regional councils will need to determine the circumstances where emissions plans can be reviewed and amended during the consent term. Regulation 17 (1)(g) and clause 3 of the NPS-GHG provide a basis for emissions plans and targets to be reviewed and updated to reflect changes in technology and best practices.

[65] NES-GHG, r. 18.

[66] NES-GHG, r. 19.

Regional councils should also consider whether to include conditions that require the consent holder to review and update their emissions plans. The purpose of this review would be to address any uncertainties in the BPO assessment and enable some flexibility in implementing the BPO, while keeping within the emissions reduction targets. Appropriate timeframes for any reviews will need to be determined and any changes to the BPO assessment, transition pathway or emissions reduction targets could require a change to the consent conditions under s.127 of the Resource Management Act 1991 (RMA) or trigger the need for a new resource consent. Any review condition would be separate to the generic s. 128 RMA review by regional councils, as the requirement would be for the consent holder to undertake the review.

6 Additional support for the national direction

EECA offers co-funding and support opportunities to assist with eligible decarbonisation projects, and energy audits for some sites.

Learn more – Co-funding and support for businesses | EECA

Ministry for the Environment, Ministry of Business, Innovation and Employment, and EECA are here to support you with implementing the National Direction for Greenhouse Gas Emissions from Industrial Process Heat. Please reach out with any questions via the following channels:

Ongoing policy support via mitigation@mfe.govt.nz

Technical enquiries and emissions plan support via technicalenquiries@eeca.govt.nz

Appendix A: Glossary

Note: (*) means the definition as per the NES-GHG.

Back-up device*	A heat device that produces industrial process heat: a) for 400 hours or less each year; and b) only when the heat is required but cannot be produced by another heat device at the site because its operation: i. is prevented by maintenance or an unexpected event; or ii. is not enough to meet a temporary, additional demand for the heat
Capital Cost Accuracy	The capital cost accuracy for the heat device the applicant is applying for a consent should be an estimate Class 3 (+/- 30%).
Climate change effects*	for a discharge, means the effects of the discharge on climate change (which are effects on the environment).
Delivers heat at [°C]	The highest end use process temperature (not the utility temperature). This is the temperature needed for the process heat end use rather than the heat generated by the heat device. Consider the instance where certain boilers produce steam above 300°C to meet process heat end user demands of only 220°C. In such cases, the relevant temperature for policy considerations would be 220°C (or slightly higher ~3°C to 10°C to account for process heat exchange efficiency).
Emissions Plan*	an emissions plan that satisfies regulation 15 of NES-GHG.
Existing*	for a heat device: a) means a device that, before 27 July 2023, is installed and operational, or able to be operated, at a site; and b) includes a device described in paragraph (a) after it is upgraded or improved; but c) does not include a device that, on or after 27 July 2023, is installed in replacement of a device described in paragraph (a).
Fossil Fuel*	a) Means any carbon-based fuel sourced from fossil hydrocarbon deposits; and b) Includes: i coal, coke, diesel, liquid petroleum gas, natural gas, oil, peat, plastics, and used oil; and ii any fuel wholly or partly derived from a fuel described in paragraph (a), including tyres used as fuel; but (c) does not include biomass or biogas.

Heat device*	a) Means a device that produces industrial process heat (for example, a boiler, furnace, engine, or other combustion device); but b) does not include a device used for the primary purpose of: i generating electricity, including a generator used for back-up electricity or for maintaining the electricity network; or ii transmitting electricity, including in mobile and fixed substations.
High-emissions site*	Means a site that, each year, emits more than 2,000 tCO_2e of greenhouse gases from heat devices that: a) burn any fossil fuel; and b) are not back-up devices.
Industrial process heat*	a) Means thermal energy that is used: i in industrial processes, including in manufacturing and in the processing of raw materials; or ii to grow plants or other photosynthesising organisms indoors; but; b) does not include thermal energy used in the warming of spaces for people's comfort (for example, heating of commercial offices).
Low-emissions site*	Means a site that, each year, emits less than 500 tCO_2e of greenhouse gases from heat devices that: a) burn any fossil fuel; and b) are not back-up devices.
New*	For a heat device, means not existing.
Regional councils	Includes regional councils and unitary authorities as defined under s. 5 of the Local Government Act 2002.
Service*	Means an end-use for which industrial process heat is produced.
Site*	One or more parcels of land (whether or not they are contiguous) that are managed as a single operation.
Technically feasible and financially viable lower-emissions alternative*	An alternative to the proposed heat device that: a) provides an equivalent service while discharging a lower, or zero, carbon dioxide equivalent of greenhouse gases; and b) is technically feasible for the applicant to use to provide the service, having regard to the current state of technical knowledge and the likelihood that the alternative can be successfully applied; and c) is financially viable, taking into account the following expected costs and benefits during a 20-year period starting on the date of the application: i all capital costs ii all operating costs iii any financial benefits.

Appendix B: Checklist for Emissions Plans

Part A: Information requirements	
Applicant has applied for relevant resource consents under the NES-GHG for industrial process heat device(s).	☐
Resource consent application includes an emissions plan that provides information required by Regulation 15(3) of the NES-GHG (assess against Part B).	☐
For high emissions sites, emissions plan has been reviewed by a suitably qualified person (SQP) approved by the regional council.	☐
Assessment of environmental effects includes a cumulative effects assessment as per clause 3.2 of the NPS-GHG.	☐
Part B: Contents of emissions plan (indicative only)	
Step 1: Define the purpose of the activity.	☐
Describe the following aspects of proposal: • industrial process • process heat requirements for the operation • process heat uses and associated GHG emissions.	☐
Step 2: Describe the activity's current (or intended) process heat end uses.	☐
a) List each relevant heat device requiring consent, including its purpose and all key information.	☐
b) Describe future plans for the site, including planned continuance or changes to the wider operation over the consent term.	☐
Step 3 (new devices only): Identify and assess possible, technically feasible and financially viable lower emissions alternatives.	☐
a) Provide a description of all possible alternatives identified.	☐
b) Provide evidence of any unsurmountable technical barriers for implementing potential alternatives.	☐
c) Provide a cost assessment for all possible, technically feasible alternatives.	☐
d) Demonstrate that there are no technically feasible, financially viable alternatives to the proposed heat device.	☐

Step 4: Identify emissions reduction opportunities for energy efficiency, alternative processes, and fuel switching.	
a) Identify and describe energy efficiency options over the consent term, including the results of a recent process heat thermal energy audit (Type 3 or equivalent).	
b) Identify and describe any potential lower emissions process alternatives.	
c) Identify and describe any fuel switching opportunities.	
Step 5: Identify the best practicable option (BPO) to prevent or minimise greenhouse gas emissions.	
a) Describe several alternative options to prevent or minimise GHG emissions, as identified through Steps 3 and 4.	
b) Assess each option against defined criteria using a suitable BPO methodology.	
c) Confirm the proposal as the BPO.	
Step 6: Set out the transition pathway to decarbonise.	
a) Propose a transition pathway to reduce GHG emissions over the consent term.	
b) Transition pathway must show a reduction in GHG acceptable to the regional council (and SQP for high emission sites).	
Step 7: Set out proposed emissions reduction targets.	
a) Set annual targets to reduce GHG emissions over the consent term, linked to the transition pathway in Step 6. Specify the consent year, identified actions, reduction in consented fossil fuel emissions (tCO_2e/year) and annual consented fossil fuel emissions or target.	

Appendix C: Guidance for Cost Assessment Tool for new devices

When cost assessment is required

The Cost Assessment Tool (CAT) can be used for new devices when applicants are assessing the financial viability of lower emission alternatives to a proposed heat device under Regulation 16 of the NES-GHG. The CAT will also be helpful for applicants preparing a best practicable option (BPO) assessment for their emissions plans.[67]

How the Cost Assessment Tool works

The CAT relies on the following aspects:

- A **discounted cash flow (DCF)** analysis used over a sufficient time frame to fully reflect all net benefits and costs arising from the investment(s). The timeframe will be based on a 20-year period as required under NES-GHG Regulation 16(2)(c).
- Two options:
    - A base case- the GHG emitting option for which the applicant is seeking a consent
    - The 'next–best' technically feasible lower-emission option

  The applicant needs to enter expected or estimated costs for both options. The tool enables a **'by default' approach** that uses pre-populated values suggested by EECA, but which allows alternative values and assumptions to be used if deemed better suited to a specific case. The applicant would have to demonstrate to the regional council the justification for using different values.
- The **lowest total lifecycle cost** is used as the key indicator to compare options. The total emissions impact is also presented as part of the results to help councils assess materiality if the total lifecycle cost differences are marginal between the two options.

Process for using the Cost Assessment Tool

The process for using the CAT is as follows:

1. Once the technically feasible options have been identified, the applicant will gather the inputs (energy needs, CAPEX and OPEX, GHG emissions) and complete one DCF for each feasible option, including the one the applicant is applying for a consent to discharge from.
2. The purpose of the CAT is to demonstrate that the option for which the applicant wants a consent is either:
    a. the least emitting option or
    b. the option with the lowest total lifecycle cost.
3. If the test **does not** demonstrate (a) or (b) for the applicant's preferred option, then a technically feasible and financially viable lower-emissions alternative exists, and in this case, the regional council has discretion to decline the resource consent application.

[67] NES-GHG, r. 18.

4. If the test **does** demonstrate (a) for the applicant's preferred option, then the regional council can be assured that the proposal is the BPO, and no other technically feasible and financially viable lower-emissions alternatives exist.
5. If the test **does** demonstrate (b) for the applicant's preferred option, then the regional council will need to consider the relative emissions impact alongside the extra financial cost incurred to implement the lower emissions option.

Running a cost assessment test

This section provides guidance on how to run a cost assessment test using the CAT.

(a) Capital costs (CAPEX)

Discounting rate:

Treasury's long-term default discounting rate is recommended to be used in all applications to allow fair and consistent comparison.

Learn more – https://www.treasury.govt.nz/information-and-services/state-sector-leadership/guidance/reporting-financial/discount-rates

A sensitivity discount rate of 10%, for example (based on typical weighted average cost of capital of companies listed on the NZX[68]), can be used for comparison with Treasury's long-term default rate.

Note that while all costs, including emissions costs are discounted in the tool, the "total emissions" figure is not discounted, and represent the total emissions reduced. As such, care must be taken in inferring a 'marginal cost of abatement' or other levelised measures from the summary figures.

External capital costs (for example, grid upgrades):

If external capital costs are required to make the project happen (such as investments for a grid upgrade), they can be added to the overall capital costs.

Accuracy:

Capital cost accuracy is the level of confidence around the cost estimate and reflects the stage of design.

The capital cost accuracy for the heat device the applicant is applying for a consent should be an estimate Class 3 (+/- 30%).

Maintaining existing assets should be included in the under relevant CAPEX or OPEX input.

(b) Operational costs (OPEX)

Future energy prices:

Using by default a pre-defined pathway for prices ($/GJ) for each form of energy.

There are several options for this (keeping in mind that this is an economic test, and economic prices are not commercial prices). Referring to one (or several) external reference point(s) (for example, Long-Run Marginal Costs from MBIE's Electricity Demand and Generation Scenarios (EDGS), MBIE's specifically defined pathways, Climate Change Commission assumptions).

[68] PwC New Zealand Cost of Capital Report 2022 https://www.pwc.co.nz/pdfs/2022/cost-of-capital-report-2022.pdf

The assumption made for simplicity is that prices for various energy will remain stable in average over the long period considered in the business plan.

Non-fuel operating costs:

EECA suggests default non-fuel operating costs, including maintenance costs, as a percentage of initial capital to spend in average every year for the main asset types (for example, boilers).

EECA has guidance around non-fuel operating costs for various process heat devices which can be found on the EECA website,

Learn more – https://www.eeca.govt.nz/regulations/emissions-plan-guidance/

Applicant can choose to use different assumptions if they have more detailed evidence on non-fuel operating costs.

Emissions Trading Scheme costs:

The Emissions Trading Scheme (ETS) component of energy costs will not be included in the fuel prices used in the analysis as a shadow price will already be applied on emissions. If applicants are entering their own fuel prices into the Cost Assessment Tool, the ETS component will need to be removed from the fuel price.

Interpretation of the test:

Comparing options:

The comparison of the available options should demonstrate that the proposed option presents the lowest total lifecycle cost.

Materiality:

If an option with lower emissions than the proposed option presents an immaterial difference in total lifecycle cost, it could be considered well within the range of uncertainties and sensitivity effects. Therefore, the public interest and principal of precaution over the risks toward the environment should take precedence and the option presenting the lowest emissions should be favoured.

Other economic or financial impacts:

Regional councils may factor other economic or financial impacts (for example, impacts on the local economy).

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