29 October 2024

Example Organisation

Emissions Plan.

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Notes on how to use this document and industrial emissions consents

This document is intended to be used in conjunction with the user guide and the excel **Calculations Spreadsheet.** This document is the final step to assembling a plan, so if you have not already, start with the how-to guide for background information and a detailed walkthrough.

All text added to this document should be done inside the boxes provided:

Example box: type here

If you are using this document specifically for a resource consent, all of the text and information generally applies, but information specific to industrial emissions consents are highlighted grey (like this sentence).

Emissions Plan Summary

Write the summary details of your emissions reduction plan in the box below.

- What projects that you have considered do you intend to complete and when?
- What impact will that have on your overall emissions and what is the required investment?
- Briefly discuss why this approach was chosen (or otherwise summarise section 4).
- If applying for a resource consent, why were these projects selected as the best practicable option?
    - Note: the purpose of an emissions plan for a resource consent is to reduce greenhouse gas emissions from devices used to generate process heat. The best practicable option is the project or group of projects, including energy efficiency, fuel switching, and process change, that are technically and financially viable and result in emissions reductions.

Our emissions plan is to implement wastewater heat recovery to preheat water, install VSDs, insulate exposed sections of steam piping, and reduce the steam temperature used for preheating water. Once these projects have been implemented a biomass boiler will be installed to replace the existing natural gas fired boiler.

These projects combined will reduce our total site-level emissions by 93% for an investment of $1,280,000.

It was decided this was the best approach for our site due to the projects having either a short payback (<10 years) or providing the highest possible emissions savings (biomass boiler).

Paste the Projects Table from the “Projects Table” tab of the **Calculations Spreadsheet** in the box below (replace the example graphic in the box):

For resource consents, the projects displayed in this table should make up your best practicable option.

Project description	Annual emissions savings (tCO2-e/year)	Annual emissions (tCO2-e/year)	Year
Baseline		**592**	
Wastewater heat recovery	48		2026
Install VSDs	4	**539**	**2026**
Insulate pipe sections	6		2027
Reduce process temperature	15	**518**	**2027**
Biomass boiler	478	**40**	**2029**

Paste Emissions Roadmap from the “Emissions Roadmap” tab of the **Calculations Spreadsheet** in the box below (replace the example table in the box):

Project Type	Project Description	Year	Annual Savings ($t\ CO_2$-e)	(%)	Annual Emissions ($t\ CO_2$-e)	(%)	Remaining emissions	Capex ($k)	Opex savings ($k/yr)	NPV ($k)
Baseline emissions					592					
Demand reduction	Wastewater heat recovery	2026	48	8%		92%		$ 170,000	$ 20,000	$ 144,653
Energy efficiency	Install VSDs	2026	4	1%		91%		$ 80,000	$ 11,000	$ 88,816
Energy efficiency	Insulate pipe sections	2027	6	1%		90%		$ 10,000	$ 1,566	$ 13,597
Process change	Reduce process temperature	2027	15	3%		88%		$ 20,000	$ 3,863	$ 36,739
Fuel Switching	Biomass boiler	2029	478	81%		7%		$ 1,000,000	-$ 80,000	-$ 1,730,612
Total			**552**	**93%**	**40**	**7%**		**$ 1,280,000**	**-$ 44,000**	**-$ 1,447,000**

1. Organisation, site, and process overview

Describe your organisation, your site, and what you do or make and how. Provide enough detail that a reader could understand your site without having to visit it in-person.

Example Organisation is a commercial laundry in Auckland using natural gas to generate steam at 8-bar via a natural gas fired boiler. The steam is used directly in the washer units (direct injection for sanitation and cleaning) and indirectly to heat ambient water to 60 °C for the washers. There is also a direct fired natural gas dryer. A burner heats air which is passed through the dryer's drum and is vented to atmosphere at a temperature of 200 °C. Example Organisation provides laundry services for hotels in the Auckland region and processes linen (bedding) daily.

2. Equipment and operations

Describe all equipment at your site that has related or associated emissions. The example information in the box below is tailored to process heat consents but could be adapted for any plan. The goal is for the reader to understand your equipment, operations, and what you are trying to achieve that presently relies on fossil-fuels.

For resource consents, describe all equipment at your site that uses fossil fuels for process heat and describe the processes that require the heat. Be specific about the type of equipment, size(s) of equipment, temperatures, pressures, typical operating hours, etc. The more information the better here as there are many different types of processes and equipment. Note: if you have included a process flow diagram or other schematics in Appendix C, you can reference those here if they depict the information.

Note: copy/paste more equipment sections as needed or delete any extra sections- include all equipment and operations with associated emissions.

Equipment #1 name: Steam boiler
Equipment type: Boiler
Equipment fuel type: Natural gas
Equipment age: 25 years
Equipment rating: 1.5 MW output
Equipment operating temperature, pressure, etc.: 175°C, 8 bar
Equipment typical operating hours: Monday – Friday, 6 am – 4 pm
Equipment typical load: 100% fire for early morning warm-up, 80% during operating hours
Describe the end use(s) of this equipment: Direct steam injection (washers), heating hot water (washers)
End use temperature requirement: 175 °C, 8 bar (direct steam injection), 150 °C, 4 bar (heating hot water)

Equipment #2 name: Main dryer
Equipment type: Dryer
Equipment fuel type: Natural gas
Equipment age: 25 years
Equipment rating: 750 kW output
Equipment operating temperature, pressure, etc.: 200°C (Flue temperature)
Equipment typical operating hours: Monday – Friday, 6 am – 4 pm
Equipment typical load: 80% duty during operating hours
Describe the end use(s) of this equipment: Drying linen
End use temperature requirement: 200°C to achieve required drying time

3. Energy usage and associated greenhouse gas emissions

This section summarises the energy usage and greenhouse gas emissions of the site.

3.1 Energy consumption, costs & associated emissions

Paste the annual fuel usage and associated greenhouse gas emissions table from the **Calculations Spreadsheet** below (replace the example table in the box). The intent here is to list the total annual fuel consumption and associated emissions from all sources for the most recent year of available data.

Note: for resource consents, electricity should not be included in emissions totals.

Energy Type	Energy Consumption			GHG Emissions
	kWh		$	tCO2-e/year
Electricity	400,000	$	80,000	31
NaturalGas	2,777,800	$	145,000	560
Total	3,177,800	$	225,000	592

Other information (as relevant)

Add any other relevant information regarding fuel usage or emissions here. For example, if your usage has gone up in recent years or is expected to significantly decrease for some reason, describe that. If you expect your usage to increase in the coming years explain why. If the **Calculations Spreadsheet** was not able to accurately capture your emissions for some reason, explain why and what they should be here.

4. Greenhouse gas reduction opportunities explored

Note: for resource consents, a technically feasible option is one that provides an equivalent level of service.
Note: for resource consents, a financially viable option considers capital costs and any operational savings over a 20-year period.

4.1 Process change opportunities

For many sites, it will not be practical or possible to change parts or entire processes to decarbonise, however, for some specific industries this will be a key step. For example, a steel mill could replace a coal-fired furnace with an electrically powered arc furnace, or a process could be adjusted to send a hot finished product for further processing rather than letting it cool down first and heating it back up later.

If you have no process change opportunities, state that in the box below.

The process change options that were considered were:
1: Reducing process temperature (water heating)
2:
3:

Briefly describe why each option was selected or not to be included in your emissions plan.

For resource consents, if an option was not selected, be specific about why not. You need to prove that is not technically feasible or financially viable with a detailed explanation, calculations, quotes, etc.

- 1: This option was chosen due to good energy savings and a <10-year payback
- 2:
- 3:

4.2 Energy efficiency opportunities

Energy efficiency opportunities are the first step to providing immediate and financially attractive emissions and opex reductions. Implementation of these opportunities can lead to reduced fuel switching project costs by reducing process heat demands.

For resource consents, the EECA Emission Plan Guidance is for a process heat thermal energy audit performed within the last four years. This will ensure the NES requirement of assessing the best practices in energy efficiency over time is met.

The energy efficiency opportunities that were considered include:
- 1: Install VSDs
- 2: Insulate pipe sections
- 3:

Briefly describe why each option was selected or not to be included in your emissions reduction plan.

For resource consents, if an option was not selected, be specific about why not. You need to prove that is not technically feasible or financially viable with a detailed explanation, calculations, quotes, etc.

- 1: This option was chosen due to good energy savings and a <10-year payback
- 2: This option was chosen due to the low capital cost and a <10-year payback
- 3:

4.3 Demand Reduction opportunities

Demand reduction opportunities are the first step to providing immediate and financially attractive emissions and opex reductions. Implementation of these opportunities can lead to reduced fuel switching project costs by reducing process heat demands.

The demand reduction opportunities we considered include:

- 1: Wastewater heat recovery
- 2: Preheating boiler combustion air
- 3: Dryer flue heat recovery

Briefly describe why each option was selected or not to be included in your emissions reduction plan.

For resource consents, if an option was not selected, be specific about why not. You need to prove that is not technically feasible or financially viable with a detailed explanation, calculations, quotes, etc.

- 1: This option was chosen due to good energy savings and a <10-year payback
- 2: This option was not chosen due to a long payback period > 20-year payback
- 3: This option was not chosen due to practical implications (heavy heat exchanger fouling due to lint, particulate etc.)

4.4 Fuel switching opportunities

Fuel switching opportunities to lower greenhouse gas options include things like electrification via heat pump or electric resistance heaters, biomass (including equipment conversions or replacements), biogas, etc. Paste the fuel switching options table from the “Fuel Switching Project Tables” tab of the **Calculations Spreadsheet** in the box below (and replace the example table in the box):

		Chosen Option		Option 2
Technology		Biomass boiler		Electric boiler
Existing energy type		NaturalGas		NaturalGas
Existing energy consumption (kWh/year)		2,433,778		2,433,778
Replacement energy type		Biomass		Electricity
Replacement energy consumption (kWh/year)		2,333,000		1,880,000
Annual operating cost savings ($/year)	-$	80,000	-$	200,000
Emissions savings (tCO2-e/year)		478		344
Capital cost	$	1,000,000	$	1,200,000
Implementation Year		2029		2029
NPV		-$1,730,612		-$3,435,102

Briefly describe why each option was selected or not to be included in your emissions plan.

For resource consents, if an option was not selected, be specific about why not. You need to prove that is not technically feasible or financially viable with a detailed explanation, calculations, quotes, etc.

- 1: A biomass boiler was chosen due to it having the highest emissions savings, and lowest operating costs.
- 2: An electric boiler was not chosen due to electrical constraints and higher operating costs.
- 3:

5. Projects tab

Paste the Projects Table from the "Projects Table" tab of the **Calculations Spreadsheet** in the box below (replace the example graphic in the box):

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Insulate pipe sections	6		2027
Reduce process temperature	15	**518**	**2027**
Biomass boiler	478	**40**	**2029**

6. Emissions roadmap

Paste Emissions Roadmap from the “Emissions Roadmap” tab of the **Calculations Spreadsheet** in the box below (replace the example table in the box):

For resource consents, the projects displayed in this roadmap should make up your best practicable option and should form the basis of any emissions targets set.

Project Type	Project Description	Year	Annual Savings ($t\ CO_2$-e)	(%)	Annual Emissions ($t\ CO_2$-e)	(%)	Remaining emissions	Capex ($k)	Opex savings ($k/yr)	NPV ($k)
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