Government leadership

Cost assessment tool user guide

National Direction for Greenhouse Gas Emissions from Industrial Process Heat

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EECA
TE TARI TIAKI PŪNGAO
ENERGY EFFICIENCY & CONSERVATION AUTHORITY

Acknowledgments

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Note

This Cost Assessment Tool User Guidance is advisory only. It has been prepared to provide instructions on how to use the Cost Assessment Tool, and to assist regionals council in interpreting Cost Assessment Tools populated by applicants seeking air discharge consents.

This guidance 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 & Conservation Authority) and regionally specific guidance. It should also be read in conjunction with standards, recognised industry best practice, and other 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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Contents

1. Purpose

1.1 Purpose of this document

The Cost Assessment Tool User Guide is an accompanying document to the Cost Assessment Tool[1] ("the tool") and is intended to:

- provide instructions for resource consent applicants ("applicants") who are applying for an air discharge consent under the National Direction for Greenhouse Gas Emissions from Industrial Process Heat;
- assist the consenting authority, generally a regional council ("council"), in assessing the air discharge consent application by providing guidance on interpreting the information provided by the applicant in the tool, the results, what to check for, and raising any flags identified by the tool; and
- assist Suitably Qualified Persons (SQPs) with the best practicable option (BPO) assessment and assessment of financial viability of lower-emission heating devices.

1.2 Purpose of the tool

The tool calculates the lifecycle cost of **two heat device options** that could be used to provide industrial process heat for an applicant's facility.

For new heat devices, emissions plans must include an assessment of the technical feasibility and financial viability of lower-emission heating devices. The applicant may use the tool for the assessment of financially viability of lower-emissions heating devices. The tool is also helpful for the BPO assessment for new and existing devices. This means that no other option would present a better balance between costs and greenhouse gas (GHG) emissions for New Zealand.

The consenting authority ("the council") assessing the application can use the tool to check the appropriateness of an applicant's inputs, assess their relevance, and confirm the applicant's assessment that their preferred option is the BPO. The council may use this information when making a decision on the application.

The purpose of the tool is to:

- provide a standardised assessment of the lifecycle cost of potential heat device options.
- provide standard economic inputs for New Zealand-wide inputs such as discount rate, shadow carbon cost and energy prices.
- allow for detailed input of project specific costs by the applicant.
- allow for comparison of the lifecycle cost of different heat device options.
- check that costs for each option are in line with identified market benchmarks.
- check that the different options being assessed provide the same service for the applicant.

1 The Cost Assessment Tool (CAT) calculates the lifecycle cost of two heat plant options that could be used to provide heat for an applicant's facility by assessing the financial viability of lower emissions alternatives to a proposed heat device.

The tool has been pre-populated with some example plant options, to assist users in understanding the type and magnitude of input required. These examples and the screenshots included in this guide, are intended to be indicative only, and do not represent a recommended approach.

The tool enables comparisons between options as entered by the users. It does not apply checks against the regulations, for example the maximum length of consents, or whether heat device options are captured by specific aspects of the regulations.

Assessors should note that the tool is not ‘locked down’. If they have concerns about the results presented, it is recommended that data be entered into a freshly downloaded copy of the tool to check for any discrepancies in calculations or assumptions.

2. Cost Assessment Tool overview

2.1 The Cost Assessment Tool structure

The tabs used in the tool are colour coded for ease of navigation (Table 1).

Table 1: Tool tab colour-coding

	Information purposes only.
	User inputs required.
	Conducts general checks to ensure the tool is operating as expected or contain standardised inputs which should not generally be changed.
	Contains calculations, do not change.
	Output and analysis worksheets.

2.2 Input and output tabs

2.2.1 Input tabs

Input tabs are colour-coded yellow and labelled 'Option X Inputs', where 'X' is a heat option number (Figure 1).

Figure 1: Option inputs tabs and colour

Each heat option has its own input tab (Figure 2), and inputs need to be entered into these tabs.

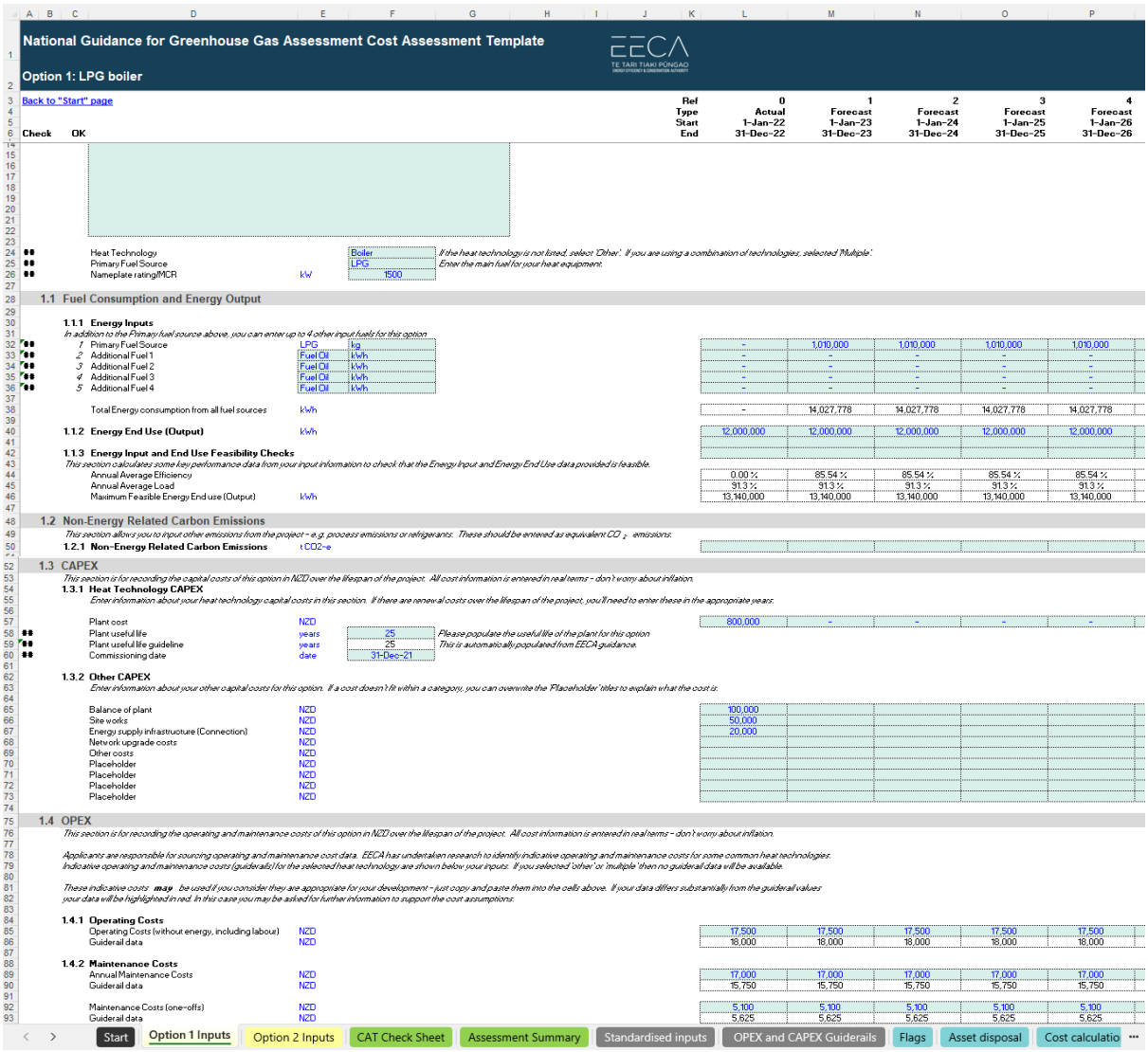


Figure 2: Layout of the user input tabs

The sections or headings within the 'Option X Inputs' tabs, for two options are categorised as:

1. Heat Device Description

1.1 Fuel/Energy consumption and output

1.2 Non-Energy Related Carbon Emissions

1.3 CAPEX

1.4 OPEX

2.2.2 Output tab / Assessment Summary tab

The output tab or 'Assessment Summary' tab is coloured coded green (Figure 3).

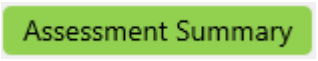


Figure 3: Assessment summary tab and colour code

A dashboard, displaying the CAT outputs, has graphs to visualise the costs and emissions over time (Figure 4). The lower part of Figure 4 shows a projects emissions lifecycle profile of the two heat device options (here the example shows a coal boiler vs a heat pump). The option with the lowest cost, emissions, and lowest levelised cost of energy ("LCOE" meaning the average cost of energy produced by the plant over its lifetime) is clearly displayed (see tabs highlighted green).

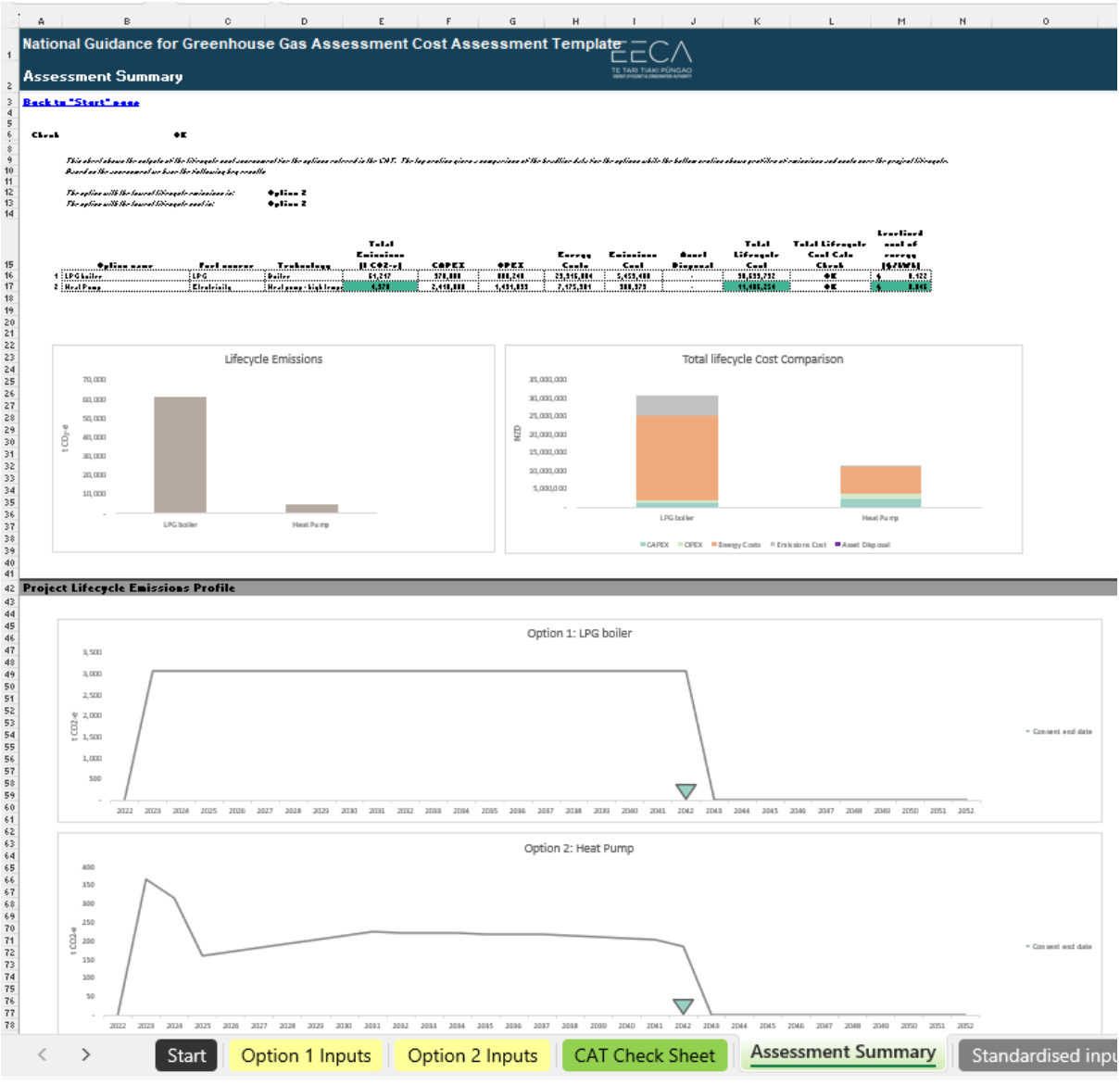


Figure 4: Layout of assessment summary containing outputs

2.2.3 CAT Check Sheet tab

The 'CAT Check Sheet' (green tab in Figure 4) allows for checks of the data in the tool.

Columns C to H will display an 'OK' value if there are no outstanding alerts indicated within the input tabs. If the value is not 'OK' then the user should investigate the source of the error flag and make appropriate adjustments, or provide an explanation of the discrepancy. For example, the tool is not able to handle all possible plant configurations, or the applicant may have a quoted value for a given cost that overrides the default values included.

The tool is not able to accurately assess the capex for existing plant, so there will likely be errors/ flags raised for the capex value of existing plant, whether entered as an 'existing plant' type or a new plant type.

The inputs that trigger the **energy end use alert, efficiencies/co-efficient of performance (COP) alert** and **consistency of energy end use demand alert**, can all be found within the option inputs tabs. Where column A of an inputs tab shows "Err", the alert has been raised in this row.

2.3 Cell formatting

Table 2 shows how the cells are formatted, including the relevant functions in the tool and how applicants should interact with them.

Table 2: Cell formatting

100	Manual inputs to be entered by the applicant. Some cells may contain defaults which should only be overwritten if the applicant has better information.
100	Parameters to control fixed tool elements (e.g. timeline).Caution: this should not be adjusted by the applicant.
100	Cells containing formulas that 'call-up' data from other parts of the tool. No other operations are performed on this data.
	Cells surrounded by formula or inputs that have been deliberately left blank and where no assumptions should be added.

Applicants should **only enter values into green cells or choose options from the drop-down lists.** Some green cells have been pre-populated with recommended values. Applicants should only override these values if they are confident they have more accurate estimates.

3. Step-by-step guide for applicants

Applicants can follow the steps below to populate the tool using the Inputs tabs.

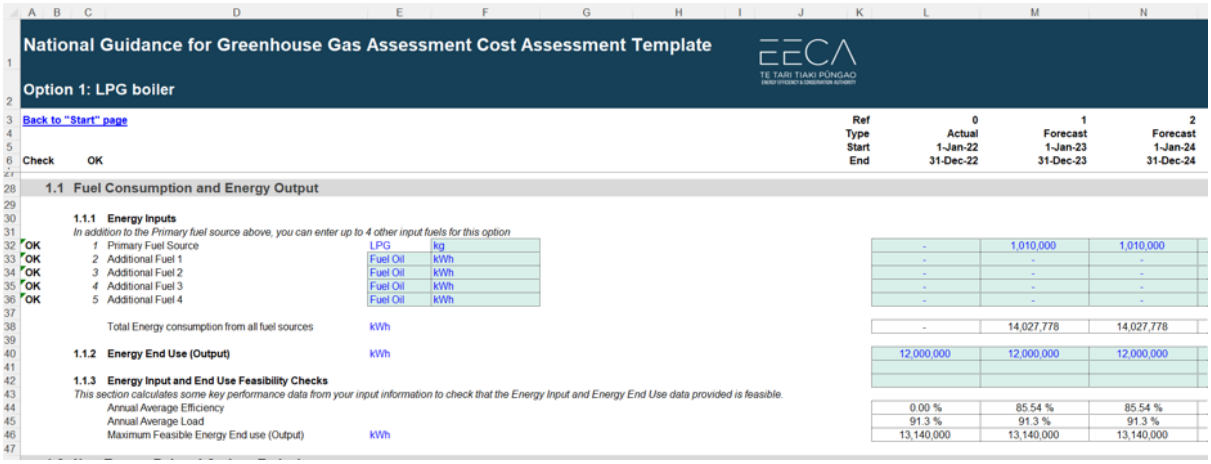
3.1 Heat device description

a) Select ‘Fuel source’, and ‘Heat technology’ from the drop-down menus provided in cells F24 and F25.

b) Enter the ‘Nameplate rating or maximum continuous rating (MCR)’ of the heat option in cell F26. The MCR is specified in kilowatt (kW) units and can usually be found in the manufacturer’s specifications.

3.2 Fuel Consumption and Energy Output

Section 1.1. of the options input sheets asks applicants to show fuel consumption and energy output (Figure 5).



National Guidance for Greenhouse Gas Assessment Cost Assessment Template

Option 1: LPG boiler

Back to "Start" page

				Ref	0	1	2
				Type	Actual	Forecast	Forecast
				Start	1-Jan-22	1-Jan-23	1-Jan-24
Check	OK			End	31-Dec-22	31-Dec-23	31-Dec-24
1.1 Fuel Consumption and Energy Output							
1.1.1 Energy Inputs							
In addition to the Primary fuel source above, you can enter up to 4 other input fuels for this option							
OK	1	Primary Fuel Source	LPG	kg	-	1,010,000	1,010,000
OK	2	Additional Fuel 1	Fuel Oil	kWh	-	-	-
OK	3	Additional Fuel 2	Fuel Oil	kWh	-	-	-
OK	4	Additional Fuel 3	Fuel Oil	kWh	-	-	-
OK	5	Additional Fuel 4	Fuel Oil	kWh	-	-	-
		Total Energy consumption from all fuel sources		kWh	-	14,027,778	14,027,778
1.1.2 Energy End Use (Output)				kWh	12,000,000	12,000,000	12,000,000
1.1.3 Energy Input and End Use Feasibility Checks							
This section calculates some key performance data from your input information to check that the Energy Input and Energy End Use data provided is feasible.							
		Annual Average Efficiency			0.00 %	85.54 %	85.54 %
		Annual Average Load			91.3 %	91.3 %	91.3 %
		Maximum Feasible Energy End use (Output)		kWh	13,140,000	13,140,000	13,140,000

Figure 5: Fuel Consumption and Energy Output

a) The selected fuel source (cell F25) will represent the primary fuel source for the heat option. Up to five fuel sources can be included per heat option. If there are additional fuel sources for the same heat option, select the additional fuel sources from the drop-down menus in cells E33-E36.

b) Enter the ‘Fuel consumption’ or ‘Energy consumption’ into the input cells in columns L to AP in rows 32 to 36. For the energy consumption units, select e.g., ‘kWh’, ‘litre’ or ‘kg’ from the drop-down menus in Column F.

c) Enter the ‘Energy end use (Output)’ in row 40.

d) The ‘Energy Input and End Use Feasibility Checks’ calculate three different metrics to help assess the validity of the input data.

e) Discrepancies will be shown on the ‘CAT check sheet’ tab.

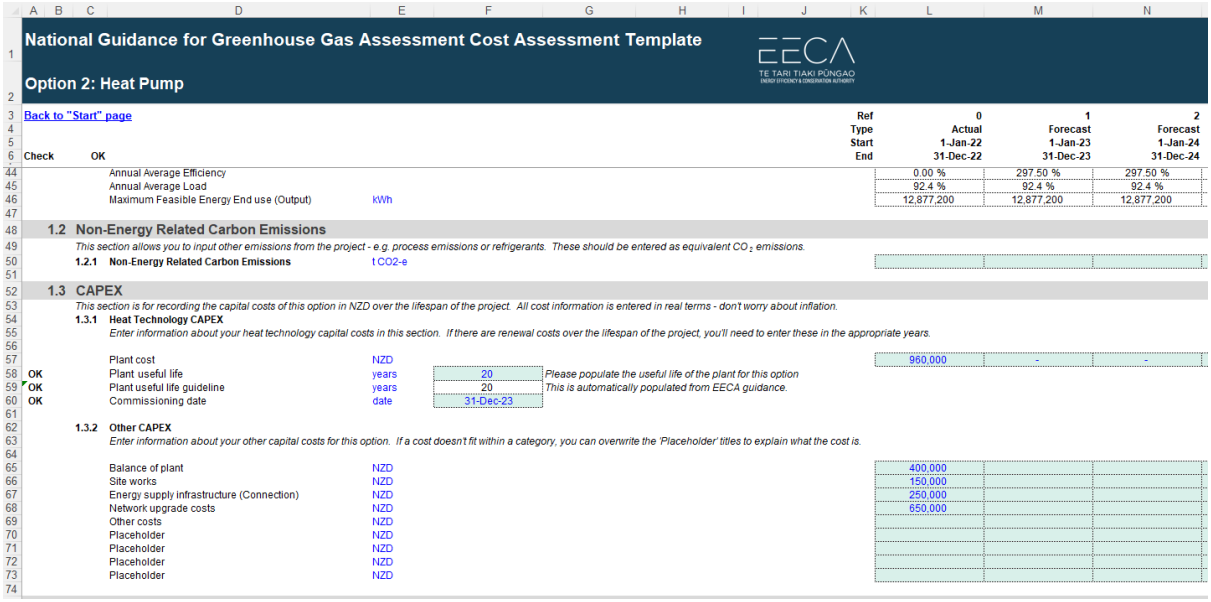
3.3 Non-Energy related carbon emissions

Section 1.2 of the options input sheets allows applicants to enter non-energy emissions values. Adding this information is optional, noting that if this information is added, the additional emissions will be included in the 'total lifecycle emissions' of this option in the Assessment Summary tab. Reviewers and approvers should be aware that these emissions are outside the scope of the National Environmental Standards for Greenhouse Gas Emissions from Industrial Process Heat.

Non-energy related carbon emissions could include embedded or embodied emissions related to the purchase, construction, transport etc. of new equipment, or allowances for emissions that might not be captured in the fuel emissions factors, e.g., refrigerant leakage. Applicants should be prepared to explain and provide evidence for any significant values entered in this section.

3.4 CAPEX (Capital Expenditure)

Section 1.3 of the options input sheets displays the CAPEX inputs (Figure 6).



	National Guidance for Greenhouse Gas Assessment Cost Assessment Template							
	Option 2: Heat Pump							
	Back to "Start" page			Ref	0	1	2	
				Type	Actual	Forecast	Forecast	
				Start	1-Jan-22	1-Jan-23	1-Jan-24	
Check	OK			End	31-Dec-22	31-Dec-23	31-Dec-24	
	Annual Average Efficiency				0.00 %	297.50 %	297.50 %	
	Annual Average Load				92.4 %	92.4 %	92.4 %	
	Maximum Feasible Energy End use (Output)	kWh			12,877,200	12,877,200	12,877,200	
1.2	Non-Energy Related Carbon Emissions							
	This section allows you to input other emissions from the project - e.g. process emissions or refrigerants. These should be entered as equivalent CO_2 emissions.							
1.2.1	Non-Energy Related Carbon Emissions	t CO2-e						
1.3	CAPEX							
	This section is for recording the capital costs of this option in NZD over the lifespan of the project. All cost information is entered in real terms - don't worry about inflation.							
1.3.1	Heat Technology CAPEX							
	Enter information about your heat technology capital costs in this section. If there are renewal costs over the lifespan of the project, you'll need to enter these in the appropriate years.							
	Plant cost	NZD			960,000	-	-	
OK	Plant useful life	years	20	*Please populate the useful life of the plant for this option*				
OK	Plant useful life guideline	years	20	*This is automatically populated from EECA guidance.*				
OK	Commissioning date	date	31-Dec-23					
1.3.2	Other CAPEX							
	Enter information about your other capital costs for this option. If a cost doesn't fit within a category, you can overwrite the 'Placeholder' titles to explain what the cost is.							
	Balance of plant	NZD			400,000			
	Site works	NZD			150,000			
	Energy supply infrastructure (Connection)	NZD			250,000			
	Network upgrade costs	NZD			650,000			
	Other costs	NZD						
	Placeholder	NZD						
	Placeholder	NZD						
	Placeholder	NZD						
	Placeholder	NZD						

Figure 6: CAPEX inputs

a) Enter the 'Heat technology CAPEX' and 'Other CAPEX' into the input cells in columns L to AP in rows 57 and 65 to 73.

b) Select the 'Plant commissioning date' of the plant from the drop-down menu in cell F60.

c) If there are CAPEX categories that have not been covered in the tool, create your own category by replacing 'Placeholder' with appropriate names in cells D70 to D73, and adding the corresponding values in columns L to AP.

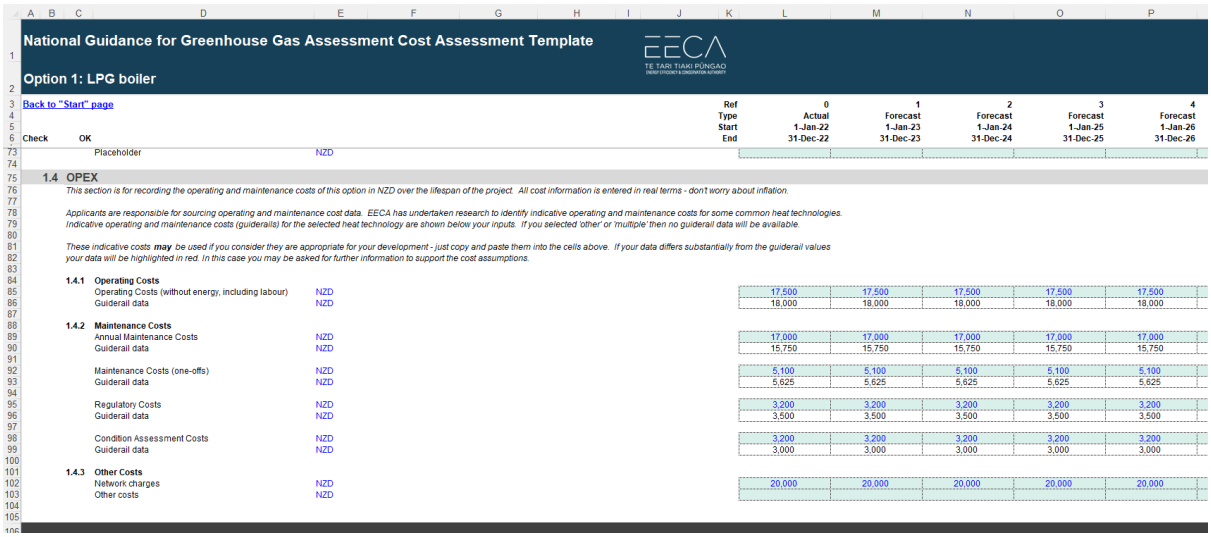
d) The 'Guiderail alert' in the 'CAT Check Sheet' will turn red if the 'Plant cost' inputs in row 57 are outside the allowable deviation range. The allowable deviation range is calculated based on industry norm estimates for the plant in question. If the alert is red, the applicant may want to adjust their inputs or provide evidence to the council that the costs entered are reasonable.

e) Note that the tool is designed to assess options for new plants. Input data involving an existing plant will likely flag CAPEX discrepancies.

f) This includes sale of decommissioned existing plant which should be entered as negative CAPEX in the option that enables it to be sold. We recommend entering any sale values in a different year to main plant capex to help preserve transparency.

3.5 OPEX (Operating Expenditure)

Section 1.4 of the options input sheets displays the OPEX inputs (Figure 7).



National Guidance for Greenhouse Gas Assessment Cost Assessment Template

Option 1: LPG boiler

Back to "Start" page

			Ref	0	1	2	3	4
			Type	Actual	Forecast	Forecast	Forecast	Forecast
			Start	1-Jan-22	1-Jan-23	1-Jan-24	1-Jan-25	1-Jan-26
Check	OK		End	31-Dec-22	31-Dec-23	31-Dec-24	31-Dec-25	31-Dec-26
	Placeholder	NZD						
1.4	OPEX							
	This section is for recording the operating and maintenance costs of this option in NZD over the lifespan of the project. All cost information is entered in real terms - don't worry about inflation.							
	Applicants are responsible for sourcing operating and maintenance cost data. EECA has undertaken research to identify indicative operating and maintenance costs for some common heat technologies. Indicative operating and maintenance costs (guiderails) for the selected heat technology are shown below your inputs. If you selected 'other' or 'multiple' then no guiderail data will be available.							
	*These indicative costs **may** be used if you consider they are appropriate for your development - just copy and paste them into the cells above. If your data differs substantially from the guiderail values your data will be highlighted in red. In this case you may be asked for further information to support the cost assumptions.*							
1.4.1	**Operating Costs**							
	Operating Costs (without energy, including labour)	NZD		17,500	17,500	17,500	17,500	17,500
	Guiderail data	NZD		18,000	18,000	18,000	18,000	18,000
1.4.2	**Maintenance Costs**							
	Annual Maintenance Costs	NZD		17,000	17,000	17,000	17,000	17,000
	Guiderail data	NZD		15,750	15,750	15,750	15,750	15,750
	Maintenance Costs (one-offs)	NZD		5,100	5,100	5,100	5,100	5,100
	Guiderail data	NZD		5,625	5,625	5,625	5,625	5,625
	Regulatory Costs	NZD		3,200	3,200	3,200	3,200	3,200
	Guiderail data	NZD		3,500	3,500	3,500	3,500	3,500
	Condition Assessment Costs	NZD		3,200	3,200	3,200	3,200	3,200
	Guiderail data	NZD		3,000	3,000	3,000	3,000	3,000
1.4.3	**Other Costs**							
	Network charges	NZD		20,000	20,000	20,000	20,000	20,000
	Other costs	NZD						

Figure 7: OPEX inputs

a) This technology and nameplate selection serves as the basis for the industry OPEX norm estimates that will be compared against the applicant's inputs.

b) Enter the 'Operations expenditure', 'Maintenance expenditure' and 'Other expenses' into the input cells in columns L to AP and in rows 85 to 103.

c) If the 'Other costs' expenditure category is large, you should provide a breakdown of these costs. Inclusion of non-cash costs such as depreciation and tax effects are not recommended. Care should be taken if including administrative and potentially complex or opaque costs such as finance interest.

d) The cost data entries will turn red to indicate where inputs are outside the allowable deviation range. The allowable deviation range is calculated based on industry norm estimates. If the alert is red, values may be adjusted, or applicants should provide additional evidence that their inputs are reasonable.

4. Guidance for Councils

When reviewing an application (including the completed tool populated by the applicant) councils should pay attention to:

- analysing the assessment summary.
- checks within the tool.
- the standardised inputs.
- OPEX guiderails.
- CAPEX and efficiency guiderails.

These are discussed in more detail below.

4.1 Analysing the Assessment Summary

The applicant should be using the tool as evidence that their preferred fossil fuel source is the BPO, and that a lower emission option is not financially viable.

a) The option with the lowest 'Total lifecycle cost' will be highlighted in green. This is also visually shown in the graph with a breakdown of costs (Figure 8).

b) A review of the "CAT check sheet' will highlight any potential data input discrepancies that may warrant further questions or explanation. The council can make a judgement on whether the evidence is sufficient.

c) Observe if there are any unusual or unexpected data within the graphs for the emissions profiles (Figure 9) of each heat option over its lifetime to observe. Investigate the source of any unusual or unexpected data.

d) Observe if there are any unusual or unexpected data within the graphs for the CAPEX and OPEX profiles of each heat option, see 'CAPEX vs OPEX' (Figure 10). Investigate the source of any unusual or unexpected data.

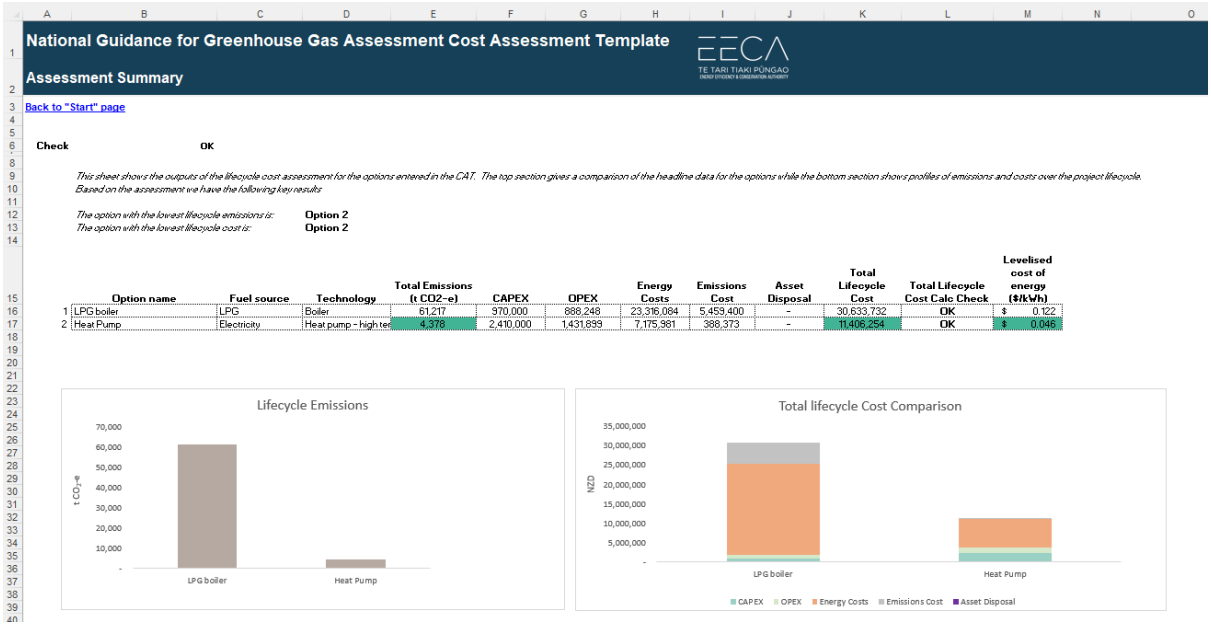


Figure 8: Option comparison section

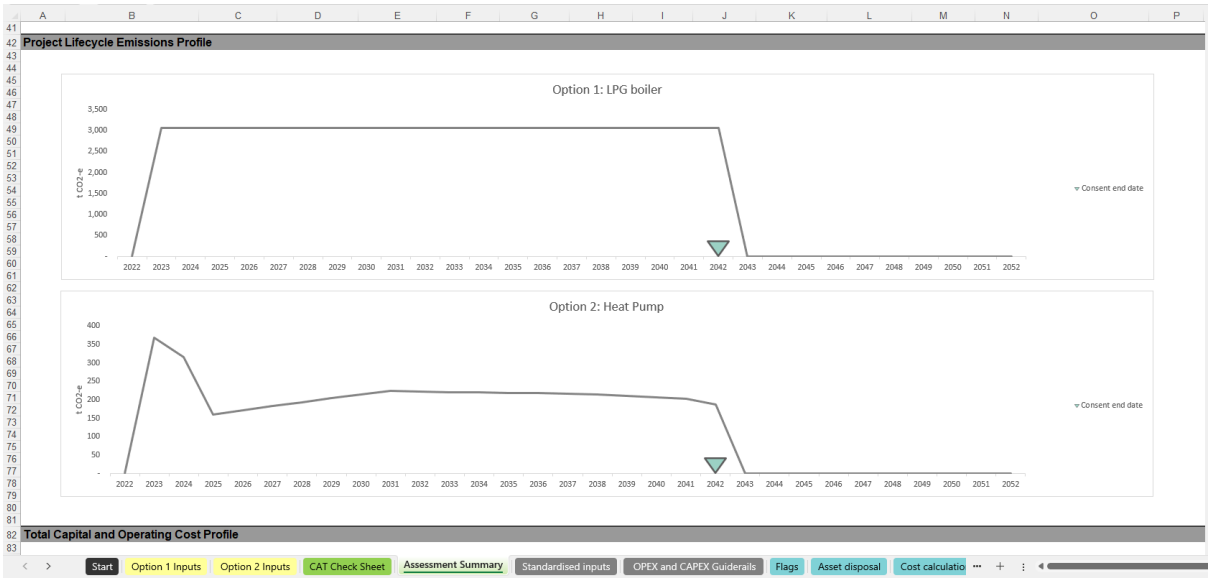


Figure 9: Energy and non-energy related emissions during project lifespan

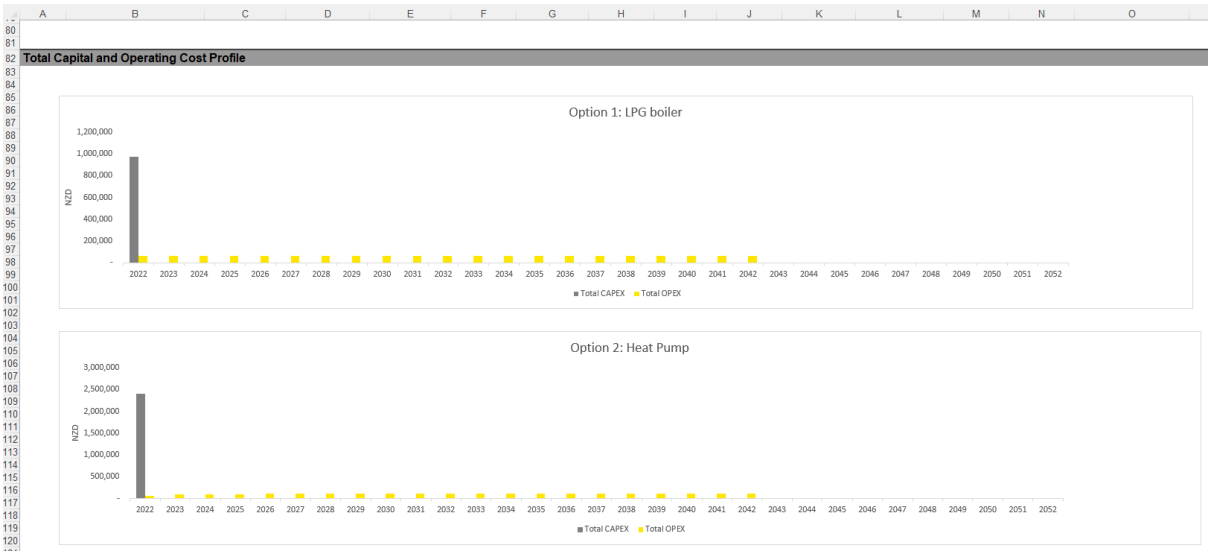


Figure 10: CAPEX and OPEX costs over lifespan

4.2 Checks within the tools

a) There are checks within the tool to identify errors in the input data, but not all errors will be captured by these checks.

b) In most tabs, cell C6 states whether errors have been detected in that tab (Figure 11).

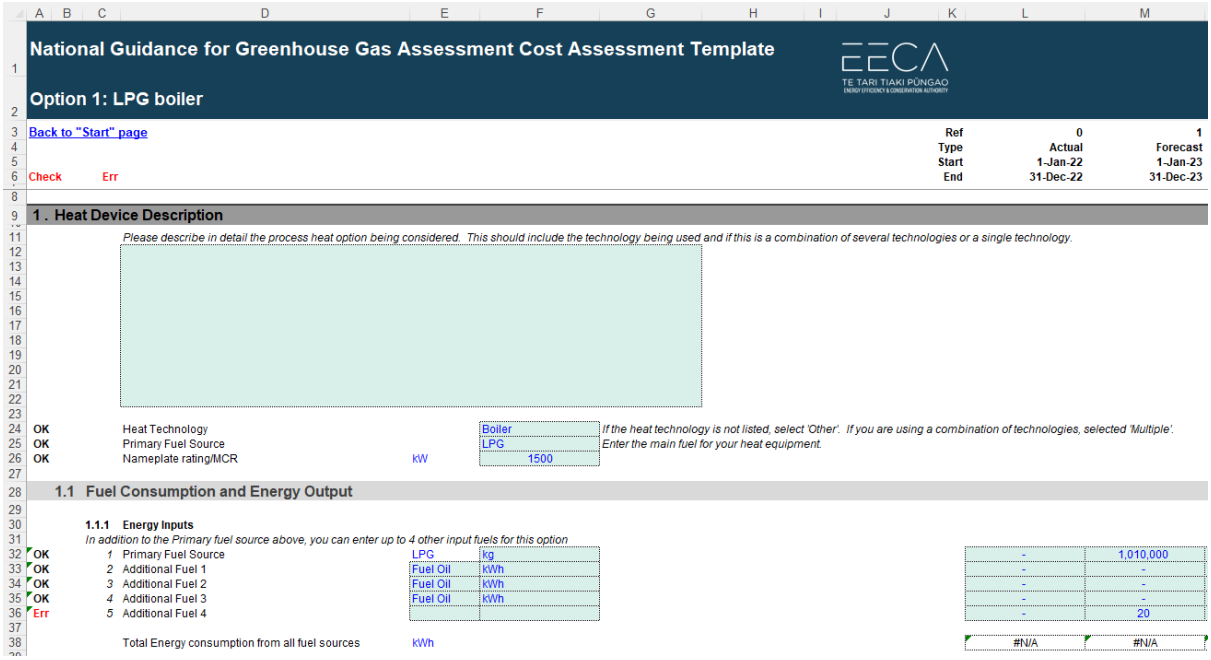


Figure 11: Error notifications

4.3 Standardised inputs

The 'Standardised inputs' tab contains the controls for different aspects of the tool and has the following sections:

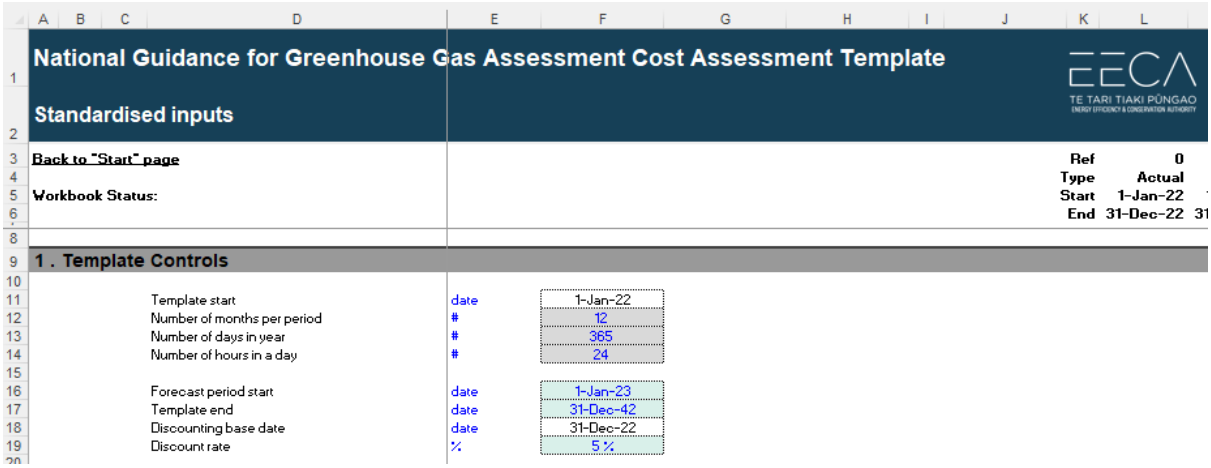
- Template controls for general information e.g., forecast period, discount rates (Figure 12)
- Emissions factors (per kWh generated by each fuel type ($kgCO_2e/kWh$))
- Energy conversion factors (of fuel to kWh)
- Energy unit prices
- List of technologies
- Shadow carbon prices
- Units/labels
- Other conversion factors
- Variance thresholds
- Tolerance levels

4.3.1 Standardised inputs - Template controls

a) Start and finish dates can be changed in column F, rows 16 and 17. Any changes to these cells affect the whole tool.

b) Within the 'Cash flows' tab, the discount rate is used to calculate the lifecycle cost of each heat option. The discount rate can be changed in cell F19 of the 'Standardised inputs' tab. EECA recommends a 5% discount rate as per Treasury guidelines[2]. Higher discount rates e.g. based on the actual borrowing cost faced by applicants, may be acceptable to councils, however councils should be aware that higher discount rates generally favour short-term outcomes which may be inconsistent with the intent of the regulations.

2 Discount Rates | The Treasury New Zealand



National Guidance for Greenhouse Gas Assessment Cost Assessment Template

Standardised inputs

Back to "Start" page

Workbook Status:

Ref	0
Type	Actual
Start	1-Jan-22
End	31-Dec-22

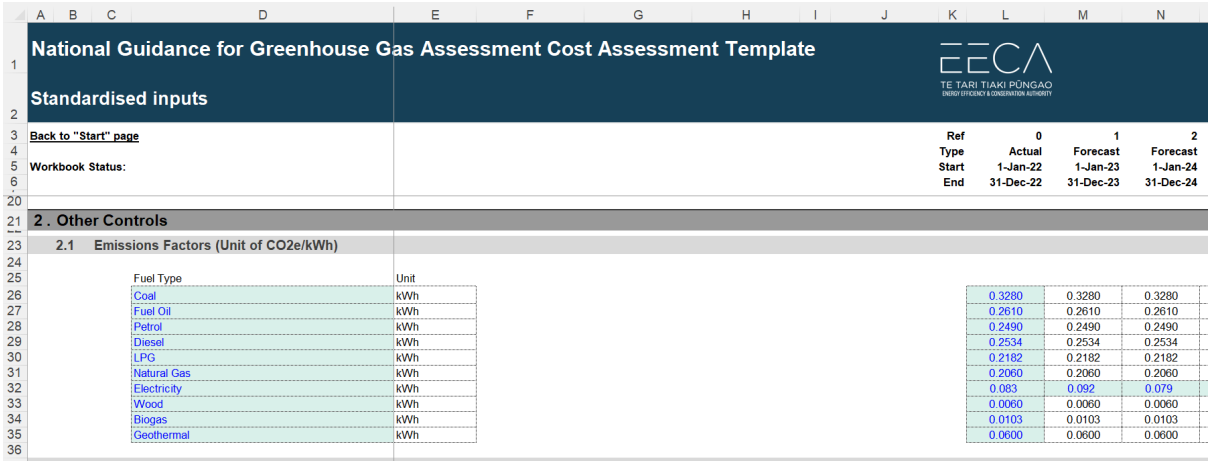
1 . Template Controls

Template start	date	1-Jan-22
Number of months per period	#	12
Number of days in year	#	365
Number of hours in a day	#	24
Forecast period start	date	1-Jan-23
Template end	date	31-Dec-42
Discounting base date	date	31-Dec-22
Discount rate	%	5 %

Figure 12: Template controls

4.3.2 Standardised inputs – Emissions Factors

a) Section 2.1 is the 'Emissions Factors' table containing scientific constants used throughout the tool to convert the volume of each fuel type used (in kWh) into kilograms of CO_2 emitted.



National Guidance for Greenhouse Gas Assessment Cost Assessment Template

Standardised inputs

Back to "Start" page

Workbook Status:

Ref	0	1	2
Type	Actual	Forecast	Forecast
Start	1-Jan-22	1-Jan-23	1-Jan-24
End	31-Dec-22	31-Dec-23	31-Dec-24

2 . Other Controls

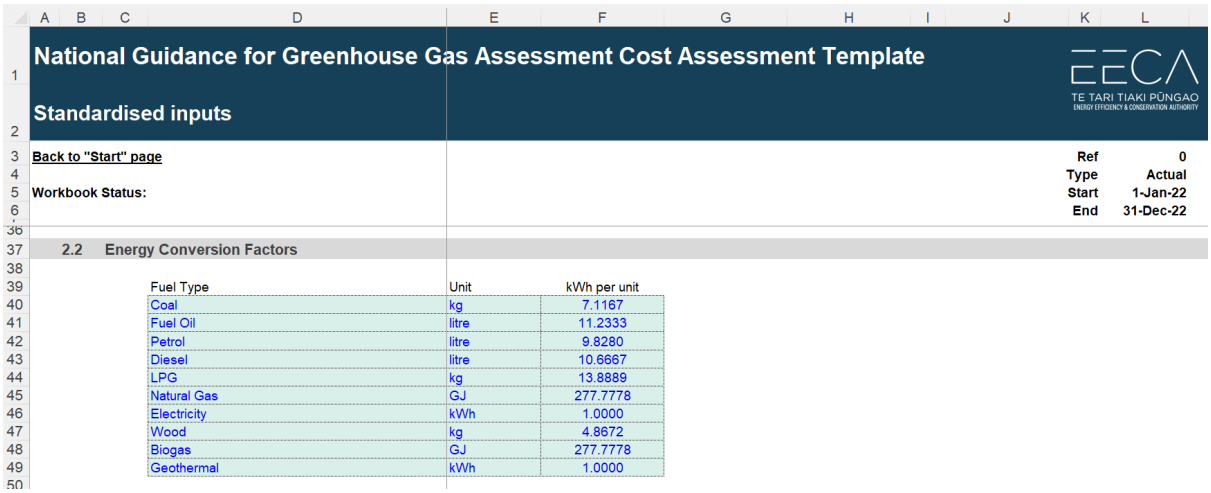
2.1 Emissions Factors (Unit of CO2e/kWh)

Fuel Type	Unit			
Coal	kWh	0.3280	0.3280	0.3280
Fuel Oil	kWh	0.2610	0.2610	0.2610
Petrol	kWh	0.2490	0.2490	0.2490
Diesel	kWh	0.2534	0.2534	0.2534
LPG	kWh	0.2182	0.2182	0.2182
Natural Gas	kWh	0.2060	0.2060	0.2060
Electricity	kWh	0.083	0.092	0.079
Wood	kWh	0.0060	0.0060	0.0060
Biogas	kWh	0.0103	0.0103	0.0103
Geothermal	kWh	0.0600	0.0600	0.0600

Figure 13: Emissions factors

4.3.3 Standardised inputs – Energy Conversion Factors

a) Section 2.2 is the 'Energy Conversion Factors' table with values converting fuel to kWh (Figure 14). These are standard engineering conversions and should not be changed, any changes made will need an explanation to satisfy the council that they are valid.



National Guidance for Greenhouse Gas Assessment Cost Assessment Template

Standardised inputs

Back to "Start" page

Workbook Status:

Ref	0
Type	Actual
Start	1-Jan-22
End	31-Dec-22

2.2 Energy Conversion Factors

Fuel Type	Unit	kWh per unit
Coal	kg	7.1167
Fuel Oil	litre	11.2333
Petrol	litre	9.8280
Diesel	litre	10.6667
LPG	kg	13.8889
Natural Gas	GJ	277.7778
Electricity	kWh	1.0000
Wood	kg	4.8672
Biogas	GJ	277.7778
Geothermal	kWh	1.0000

Figure 14: Conversion factors of fuel to energy

4.3.4 Standardised inputs – Energy Unit Prices

a) Section 2.3 is the 'Energy Unit Prices' table showing prices used to calculate the cost of fuel each year (Figure 15). These values are net of ETS costs and are a best estimate at the time of publishing the tool. Councils may request different prices (and the underlying calculations) if applicants are using their own prices.

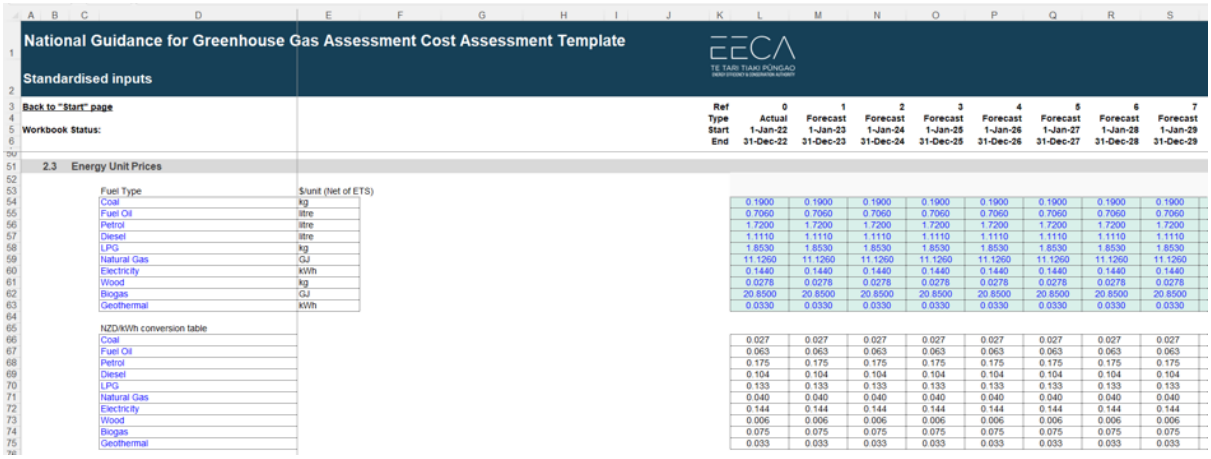


Figure 15 : Energy unit prices

4.3.5 Standardised inputs – List of technologies

a) Section 2.4 has the list of technologies. This list of technologies is used as a drop-down list on Option Input tabs and throughout the tool. This technologies list is maintained by EECA and should not be changed.

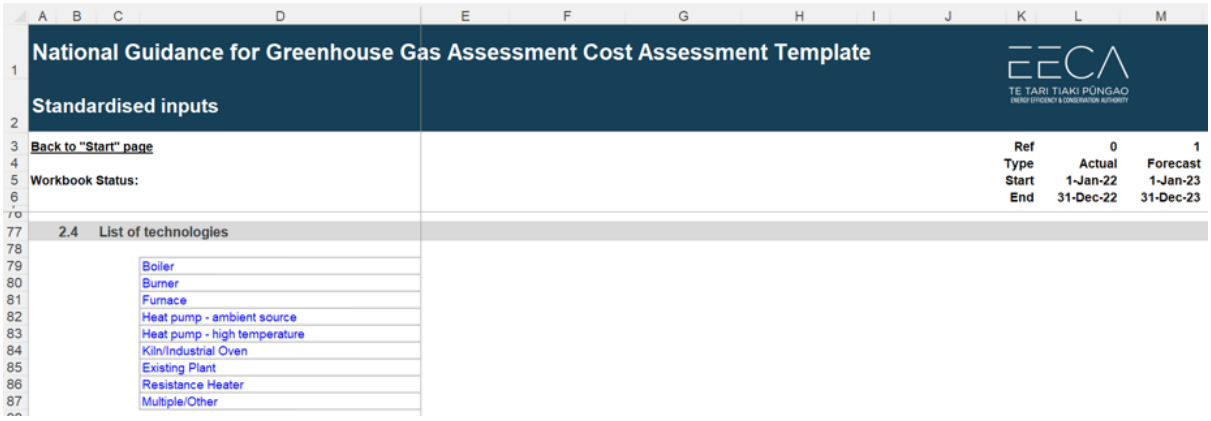


Figure 16: List of technologies

4.3.6 Standardised inputs – Shadow Carbon Price

a) Section 2.5 lists the shadow carbon price used to calculate the cost of carbon emissions for each year going forward (Figure 17). These values are maintained by EECA, sourced from Treasury guidance, and should not be changed.

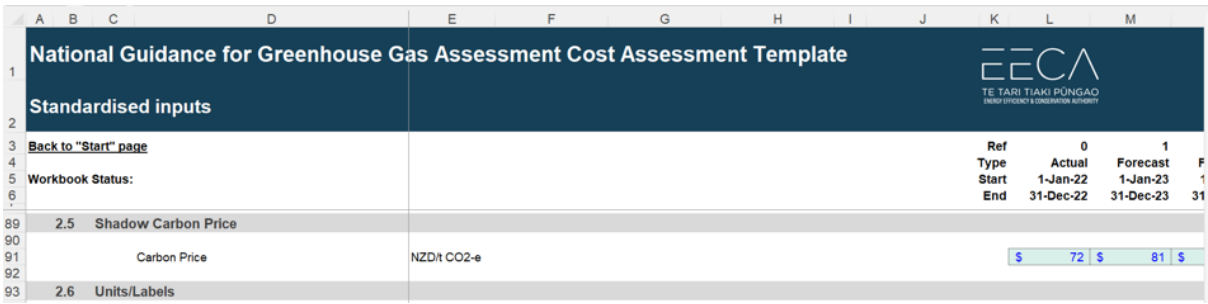


Figure 17: Shadow carbon price

4.3.7 Standardised inputs – Units/Labels

a) Section 2.6 The 'Units or labels' shown in Figure 18 are used throughout the tool. These values are maintained by EECA and should not be changed.

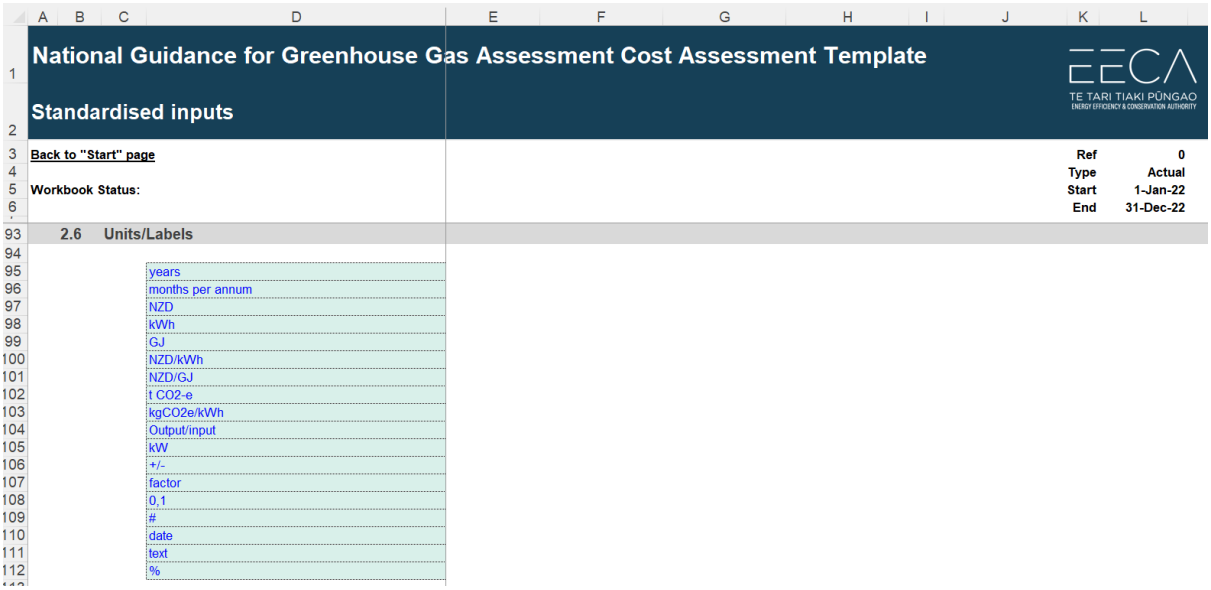


Figure 18: Units and labels

4.3.8 Standardised inputs – Variance Threshold

a) Section 2.8 Variance Threshold (Figure 19) is used to determine the allowable deviation for every guiderail figure in the tool before an error flag is raised. The variance threshold can be changed in cell E122. Note that any changes made will need an explanation to satisfy the council that they are valid.

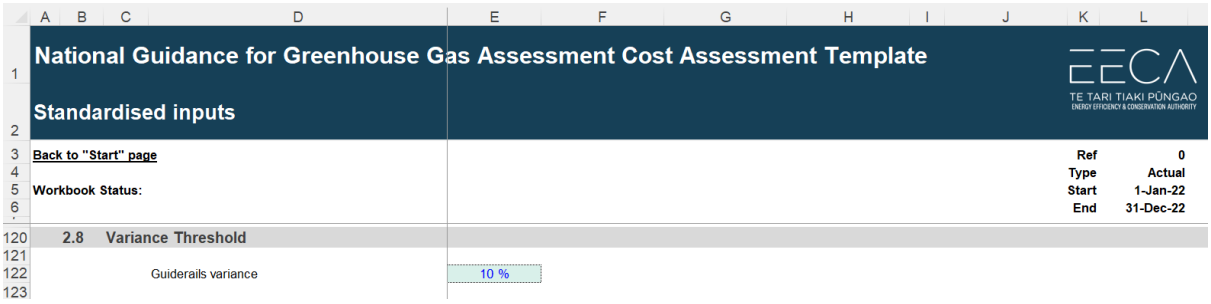


Figure 19: Variance threshold

4.4 OPEX Guiderails

a) The OPEX guiderail values (Figure 20) are maintained by EECA and should not be changed. These inputs represent expert estimates of various operations and maintenance expenses for a given type of asset. They are used to check and alert if any of the applicant's manual inputs are materially different from observed industry estimates.

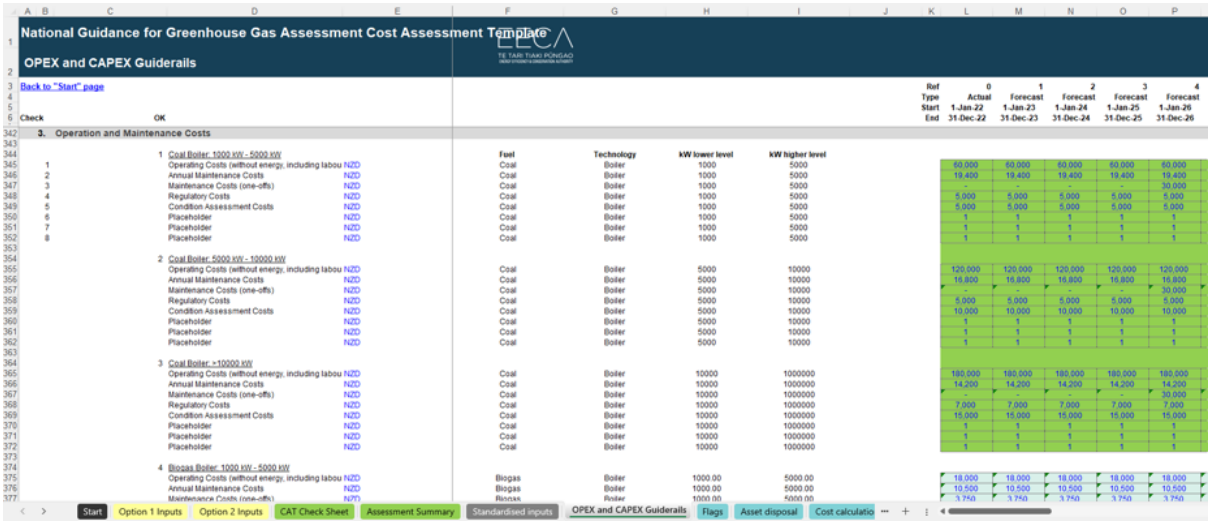
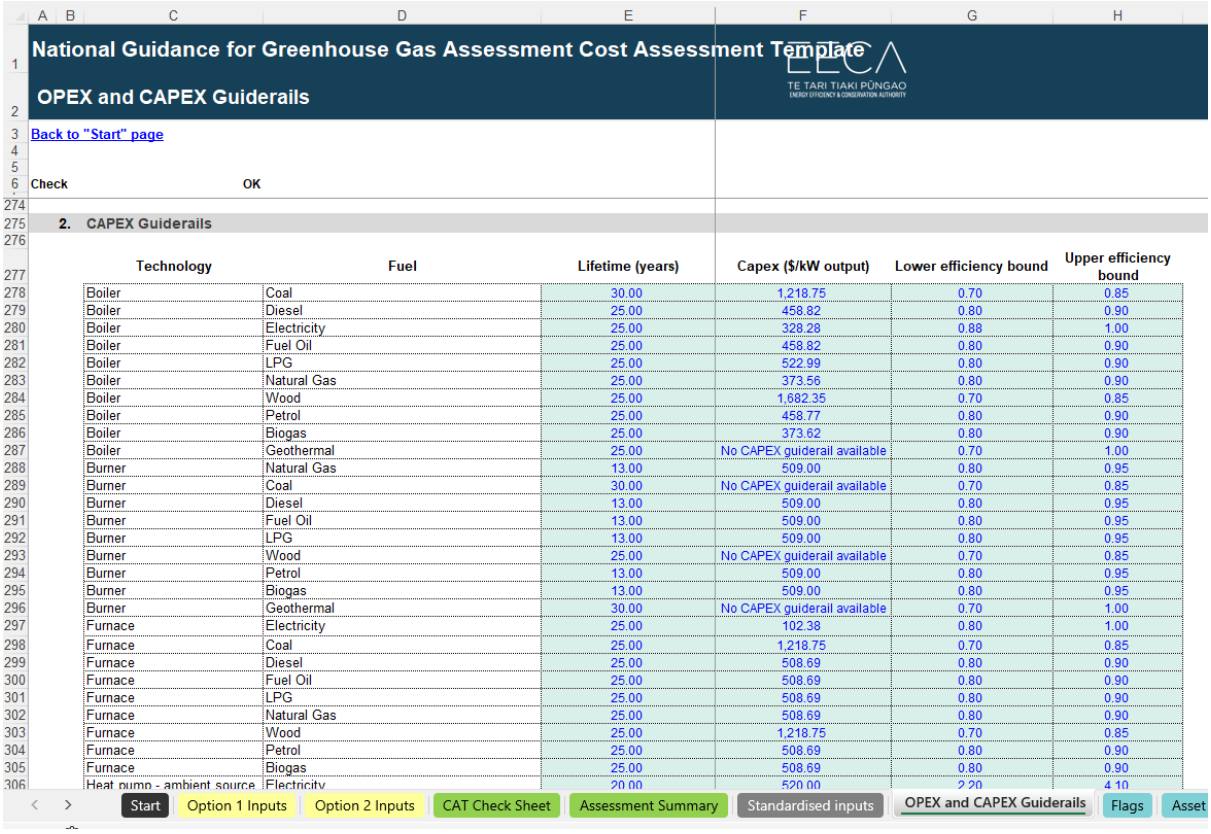


Figure 20: OPEX guiderails

4.5 CAPEX and efficiency guiderails

a) The 'CAPEX and efficiency guiderails' (Figure 21) are industry norm estimates of CAPEX ($/kW output), efficiency (output/input) and asset lifecycle (years). These can be used by the council to check if any of the applicant's manual inputs differ materially from observed industry values. These values are maintained by EECA and should not be changed.



Technology	Fuel	Lifetime (years)	Capex ($/kW output)	Lower efficiency bound	Upper efficiency bound
Boiler	Coal	30.00	1,218.75	0.70	0.85
Boiler	Diesel	25.00	458.82	0.80	0.90
Boiler	Electricity	25.00	328.28	0.88	1.00
Boiler	Fuel Oil	25.00	458.82	0.80	0.90
Boiler	LPG	25.00	522.99	0.80	0.90
Boiler	Natural Gas	25.00	373.56	0.80	0.90
Boiler	Wood	25.00	1,682.35	0.70	0.85
Boiler	Petrol	25.00	458.77	0.80	0.90
Boiler	Biogas	25.00	373.62	0.80	0.90
Boiler	Geothermal	25.00	No CAPEX guiderail available	0.70	1.00
Burner	Natural Gas	13.00	509.00	0.80	0.95
Burner	Coal	30.00	No CAPEX guiderail available	0.70	0.85
Burner	Diesel	13.00	509.00	0.80	0.95
Burner	Fuel Oil	13.00	509.00	0.80	0.95
Burner	LPG	13.00	509.00	0.80	0.95
Burner	Wood	25.00	No CAPEX guiderail available	0.70	0.85
Burner	Petrol	13.00	509.00	0.80	0.95
Burner	Biogas	13.00	509.00	0.80	0.95
Burner	Geothermal	30.00	No CAPEX guiderail available	0.70	1.00
Furnace	Electricity	25.00	102.38	0.80	1.00
Furnace	Coal	25.00	1,218.75	0.70	0.85
Furnace	Diesel	25.00	508.69	0.80	0.90
Furnace	Fuel Oil	25.00	508.69	0.80	0.90
Furnace	LPG	25.00	508.69	0.80	0.90
Furnace	Natural Gas	25.00	508.69	0.80	0.90
Furnace	Wood	25.00	1,218.75	0.70	0.85
Furnace	Petrol	25.00	508.69	0.80	0.90
Furnace	Biogas	25.00	508.69	0.80	0.90
Heat pump - ambient source	Electricity	20.00	520.00	2.20	4.10

Figure 21: CAPEX and efficiency guiderail

4.6 Other considerations

To allow flexibility in the tool, the cells have been kept unlocked. If councils are uncertain about the accuracy of the results, councils could copy the applicant's information onto a clean sheet from EECA's website as a comparison

Glossary

Applicant	The person or company that is applying for a resource consent.
Best Practicable Option (BPO)	The best method or option for preventing or minimising the adverse effects on the environment
CAPEX	Means 'capital expenditure', which are funds used by a company to acquire and upgrade physical assets such as property, plants, buildings, technology, or equipment.
Condition assessment cost	The cost associated with condition assessment inspections, which help plan preventative maintenance or remedial work to preserve an object's value and extend its useful life
Consent Authority	The council considering applications for Air Discharge Permits under section 87 of the Resource Management Act 1991 (RMA).
Coefficient of Performance (COP)	A ratio of useful heating or cooling energy provided (energy output) relative to energy input.
End-use energy demand	The output energy required for the end use process.
Energy supply infrastructure (Connection)	Dedicated connection equipment from the heat plant to the fuel source.
Energy input	The amount of energy consumed by the heat technology.
Fuel source	A substance that is used by the heat plant to provide heat (e.g. coal, gas, electricity)
Heat Device Type	Type of equipment designed, used, and intended to be used to supply heat for a structure.
LCOE	Means 'Levelised cost of energy' meaning the average cost of energy produced by the plant over its lifetime.
Lifecycle cost	Economic cost to New Zealand for an option over the lifespan of the consent.
Maximum Continuous Rating (MCR)	The maximum output (MW) that a heat technology can produce continuously under normal conditions. Under ideal conditions, the actual output could be higher than the MCR.
Nameplate rating	The manufacturer's output rating of the heat technology. See MCR.
Network upgrade costs	A modification or addition to transmission-related facilities that are integrated with and support the transmission system for general benefit of all applicants.
Network charges	The network tariff is what networks charge for you to use their infrastructure (e.g. pipelines, poles, and wires) to get you the energy your heat plant consumes.
Non-energy related carbon emissions	Carbon emissions from processes (e.g. chemical processes in manufacturing) that are not from energy use.
OPEX	Means 'operational expenditure', which are funds spent for ongoing costs of running a business including maintenance expenses e.g., rent, marketing, payroll, insurance.
Regulatory compliance costs	The costs incurred by business to meet regulatory obligations.
Seasonal adjustment factors	A factor to account for the change in energy usage due to seasonal changes. i.e. more energy would be required to produce heat in winter than in summer months.
Site works	The process in which the construction site is prepared for the construction job.
tool	The Cost Assessment tool that calculates present cost values and highlights the option with least present cost.