



Australian Government
Clean Energy Regulator

NATIONAL GREENHOUSE AND ENERGY REPORTING

Uncertainty Calculator user guide

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Disclaimer

The factors and formulas in the Uncertainty Calculator (the Calculator) are based on the [National Greenhouse and Energy Reporting \(Measurement\) Determination 2008¹](#) (the Measurement Determination) as it relates to the 2019-2020 reporting year. The Measurement Determination is updated periodically and users should note that some factors and formulas are different for earlier reporting years and may change in future years.

The Calculator is provided for information only and its use must not be construed as determinative of whether any of the thresholds for and legislative requirements under the [National Greenhouse and Energy Reporting Act 2007²](#) (the Act) and associated [National Greenhouse and Energy Regulations 2008³](#) (the NGER Regulations) have been met. The Calculator must not be used as a substitute for obtaining independent professional advice and/or undertaking independent investigations.

The Clean Energy Regulator (the agency) and the Australian Government (the custodians) will not be liable for any loss, damage, expense or cost incurred by any person or organisation arising out of the use of the Calculator, the information contained in, or derived from, the Calculator or the non-availability of the Calculator. The custodians do not warrant the accuracy, currency, reliability or completeness of the Calculator, and in no event will the custodians be liable for any direct, incidental or consequential loss or damage resulting from the use of the Calculator, or the information provided through the Calculator or the availability or non-availability of the Calculator.

¹ <https://www.legislation.gov.au/Series/F2008L02309>

² <https://www.legislation.gov.au/Series/C2007A00175>

³ <https://www.legislation.gov.au/Series/F2008L02230>

Introduction

The Calculator is a spreadsheet that:

- enables reporters to use relevant default uncertainty factors from the Measurement Determination
- aggregates emissions factor, energy content factor and activity data uncertainties, and
- aggregates uncertainties from multiple data lines to single sources and fuels as necessary.

Reporters are able to use a feature within the [Emissions and Energy Reporting System](#)⁴ (EERS) to export a table of data relevant to their uncertainty reporting. The data can be saved as a CSV file (a text file that can be opened using Microsoft Excel), and contains all activity data that is held in EERS at the time of the export.

The [Uncertainty Calculator](#)⁵ is available on our website. We recommend that you download and save it onto your computer before entering data.

Entering data into the Calculator

Data can be entered into the Calculator manually or by using the EERS uncertainty data export functionality.

Reporters are advised to finish entering and checking all activity data into EERS before starting uncertainty reporting. Any changes to activity data for fuels or sources with scope 1 emissions of 25,000 t CO₂-e or more can have an effect on uncertainty reporting.

Exporting data from EERS

To use the EERS uncertainty data export functionality:

- log into EERS
- click on 'Report Uncertainty' in the left hand navigation pane
- from the 'Facility Uncertainty' screen, click the 'Export as CSV' button
- save the file, which is an Exported_Activities.csv file
- open the Exported_Activities.csv file in Microsoft Excel, and
- select and copy the data in the CSV file, don't copy the heading row:

Figure 1: The Exported Activities file opened in Excel showing highlighted area to be copied and pasted into the Uncertainty Calculator

Unique ID	Facility name	Source	Fuel type	Method	Criteria	CO2	CH4	N2O	HFCs	SF6	PFCs	Total
Control Corp 1 F1	Facility 1	Solid waste disposal on land		Method 1	a	0	10000	0	0	0	0	10000
Control Corp 1 F1	Facility 1	Emissions released from fuel use by certain industries (including electricity generation)	Natural gas distributed in a pipeline	Method 1	a	40245	79	24	0	0	0	40348
Control Corp 1 F2	Facility 2	Stationary and Transport energy purposes (excluding electricity generation)	Natural gas distributed in a pipeline	Method 1	a	201216	393	118	0	0	0	201727
Control Corp 1 F3	Facility 2	Solid waste disposal on land		Method 1	a	0	10000	10000	0	0	0	20000

⁴ <http://www.cleanenergyregulator.gov.au/OSR/EERS/The-Emissions-and-Energy-Reporting-System>

⁵ <http://www.cleanenergyregulator.gov.au/NGER/Forms-and-resources/Calculators#Uncertainty-Calculator-and-user-guide-201819>

Importing data into the Calculator

To import the data into the Calculator:

- open the Calculator
- select the 'Source and fuel input' worksheet, and
- click to highlight the cell containing the text, 'Paste CSV data from EERS' (yellow background):

Figure 2: CSV export file data pasted into the source and fuel input tab of the Calculator

Uncertainty calculator 2015-16 04.xlsx - Microsoft Excel

FileHomeInsertPage LayoutFormulasDataReviewViewPowerPivot

Clipboard

Font

Alignment

Number

General

Conditional Formatting

Format as Table

Percent 2.7

Percent 3

Percent 4

Insert

Delete

Format

AutoSum

Fill

Clear

Sort & Filter

Find & Select

Back

View Output

Step 1

Do not leave these cells blank. If there are no emissions for each GHG type, please enter 0.

Facility unique Identifier

Facility Name

Source

Fuel Type (where applicable)

Method

Criteria

Click here and paste CSV data from EERS

CO₂

CH₄

N₂O

HFCs

SF₆

PFCs

Total

0

0

0

0

0

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- paste the data from the CSV file so that it populates the Calculator:

Figure 3: CSV export file data pasted into the source and fuel input tab of the Calculator

Uncertainty calculator 2015-16 04.xlsx - Microsoft Excel

FileHomeInsertPage LayoutFormulasDataReviewViewPowerPivot

CutCopyFormat PainterClipboard

Calibri11

If the data has been pasted correctly, the cells in the 'Result' column (viewed by scrolling to the right) will display 'OK' on a green background. If all of the cells do not display 'OK', it may mean that the data was not pasted correctly. Use Excel's undo command to reverse the pasting of the data and try again:

Figure 4: Uncertainty calculator displaying status of imported data

The screenshot shows the 'Uncertainty calculator 2015-16 04.xlsx' spreadsheet. The 'Step 2' section contains a table for 'Emissions for each gas (t CO2-e)' with columns for CO2, CH4, N2O, HFCs, SF6, and PFCs. The 'Step 3' section contains a table for 'Emission Factor Uncertainty Level (%)' with columns for CO2, CH4, N2O, HFC, SF6, and PFC. The 'Result' column shows 'Green = OK' for most entries and 'Red = Incomplete' for others. The 'Comments' column is also present.

Method	Criteria	CO2	CH4	N2O	HFCs	SF6	PFCs	Total	Energy Content Uncertainty (%)	Fuel/Activity quantity uncertainty (%)	Emission Factor Uncertainty Level (%)	Aggregated Uncertainty for the Emissions Source (%)	Result	Comments
Method 1a		0	10000	0	0	0	0	10000					OK	
Method 1a		40243	79	24	0	0	0	40346					OK	
Method 1a		201216	393	118	0	0	0	201727					OK	
Method 1		0	10000	10000	0	0	0	20000					OK	

Once data has been correctly pasted, go to the 'Output' worksheet to view the uncertainty percentages (highlighted with yellow box) that will need to be entered into EERS:

Figure 5: Uncertainty calculator displaying uncertainty percentages to be inputted into EERS

The screenshot shows the 'Output' worksheet of the 'Uncertainty calculator 2015-16 04.xlsx' spreadsheet. It displays a table with columns for Facility name, Source or fuel, Comments, Uncertainty for the source or fuel at the Facility (%), Error count, (DPH)² (Uncertainty x Emissions)², and Sum E. The 'Uncertainty for the source or fuel at the Facility (%)' column is highlighted in yellow.

Facility name	Source or fuel	Comments	Uncertainty for the source or fuel at the Facility (%)	Error count	(DPH) ² (Uncertainty x Emissions) ²	Sum E
Facility 1	Solid waste disposal on land		35.0	0	122,500,000,000	10,000
Facility 1	Natural gas if distributed in a pipeline		5.8	0	35,485,009,339	40,346
Facility 2	Natural gas if distributed in a pipeline		5.8	0	1,387,133,848,275	201,727
Facility 2	Solid waste disposal on land		35.0	0	490,000,000,000	20,000

To manually enter uncertainty data into the Calculator:

- log into EERS
- click on 'Report Uncertainty' button
- in the 'Facility Uncertainty' screen, click on the 'Modify' button and the 'Add/modify entry – Uncertainty' screen will open
- open the Calculator in Excel
- ensure the Calculator is open on the 'Source and fuel input' tab, and
- enter the facility unique identifier and facility name data into the 'Source and fuel input' tab. Enter other data from the 'Add/modify entry – Uncertainty' screen in EERS.

Components of the Calculator

Worksheets of the Calculator

The Calculator has an 'Instructions' worksheet as well as three worksheets for data entry and calculations:

- source and fuel input
- output, and
- appendix 1 - Uncertainty of Elements.

These worksheets can be accessed through the tabs along the bottom and are briefly described below.

The 'Source and fuel input' worksheet is where source level data is entered for each facility or Network/Pipeline. Further instructions are included in row 2, at the top of the worksheet. Reporters can enter the following facility data:

- unique identifier and facility name
- source, fuel, method and measurement criteria
- scope 1 emissions for each gas, relevant quantity data (where appropriate), and
- non-default uncertainty levels (for energy content, measurement and emissions factor).

The 'Output' worksheet is where uncertainty is calculated for a source (or fuel) at a facility. In addition, reporters are able to enter details to assist record keeping.

'Appendix 1 – Uncertainty of Elements' is an optional worksheet for independently calculating uncertainty values rather than using the default values built into the Calculator. For example, it can be used to calculate the percentage uncertainty of samples collected by a corporation. Reporters are able to distinguish between sample series and the worksheet calculates other information such as standard deviations, mean, count of measurements, t-factor (to a 95 per cent confidence interval) and uncertainty (at 95 per cent confidence interval) for the sample series. This function assists reporters in calculating uncertainty in accordance with the [GHG Protocol guidance on uncertainty assessment in GHG inventories and calculating statistical parameter uncertainty](https://ghgprotocol.org/sites/default/files/ghg-uncertainty.pdf)⁶.

Source and fuel input worksheet

Step 1: complete columns A-G of the source and fuel input worksheet as described below. This step ensures the facility, source, fuel, criteria and method are correctly identified. Note, with the exception of column A, these fields do not need to be entered manually if the EERS uncertainty data export instructions are used.

- Facility unique identifier: This is a required field. The identifier is a text string that is unique to a facility (because facility names are not required to be unique). EERS automatically generates a facility unique identifier using the reporting organisation, facility name and dates of operational control.
- Facility Name: This is required field. The name of the facility to which the source is to be attributed. Facility names do not have to be unique although reporters are advised to make them unique for the

⁶ <https://ghgprotocol.org/sites/default/files/ghg-uncertainty.pdf>

corporation's group. Once a facility name has been entered it will appear in the drop-down menu and can be selected for remaining sources at the facility.

- Source: This is a required field. There is a drop-down menu that covers the source types of emissions, listed alphabetically.

Figure 6a: Fields used for data entry in Step 1, including the drop-down menus for Source of Emissions and Fuel Type

Facility unique Identifier	Facility Name	Source	Fuel Type (where applicable)	Method	Criteria
Control Corp 1 F1	Facility 1	Stationary and Transport energy purposes (excluding electricity generation)			

- Fuel Type (where applicable): Each row in this column has a drop-down menu containing a list of fuel and energy commodities. This list is context sensitive, depending on the source selected. Fuels are listed alphabetically.

Figure 6b: Fields used for data entry in Step 1, including the drop-down menus for Source of Emissions and Fuel Type

Facility unique Identifier	Facility Name	Source	Fuel Type (where applicable)	Method	Criteria
Control Corp 1 F1	Facility 1	Stationary and Transport energy purposes (excluding electricity generation)	Diesel oil - Transport		

- **Method:** This is a required field, and shows the method used to estimate the emissions from the selected source, which will also be the method used to calculate the uncertainty for that source. Where multiple methods have been used to measure a single source of emissions, a separate line should be used for each method and for emissions amounts from gases using that method.
- **Criteria:** Reporters should select the criterion for measurement (a, aa, aaa or bbb) of the amount of fuel where applicable (e.g. amount of diesel oil consumed). See the [Methods and Measurements Guideline⁷](#) for more information on measurement criteria.

Step 2: complete columns for each gas of the worksheet as described below. This step ensures the scope 1 emissions amounts and total emissions are entered. Note these fields do not need to be entered manually if the [data export instructions](#) are used.

- **Emissions for each gas (t CO₂-e):** Each column under this heading relates to one of the six greenhouse gases reported under the Act, and data must be entered. Emissions estimates, in tonnes of carbon dioxide equivalence (t CO₂-e), should be entered in the column corresponding to the specific greenhouse gas. If there are no emissions of a particular greenhouse gas then zero should be entered in the relevant cell(s).
- **Total:** The total of scope 1 emissions in t CO₂-e.

Step 3: for calculating your uncertainty requires correct completion of the remaining columns to give an aggregated uncertainty for the emissions source. If method 1 is used, default values will be used.

- **Energy Content Uncertainty (%):** reporters should leave these cells blank if they intend to use default values under Method 1. If energy content percentage uncertainty is calculated independently, enter the value as a whole number (e.g. 3.3 per cent uncertainty is entered as '3').
- **Fuel/Activity Quantity Uncertainty (%):** reporters should leave these cells blank if they intend to use default values under Method 1. If fuel or activity quantity uncertainty is calculated independently, enter the value as a whole number (e.g. 2.9 per cent uncertainty is entered as '3').
- **Emission Factor Uncertainty Level (%):** there are six columns for the reportable greenhouse gases under this heading. Reporters should leave these cells blank if they intend to use default values or if the source does not have emissions for a particular gas. Enter the percentage value as a whole number.
- **Aggregated Uncertainty for the Emissions Source (%):** some sources and methods 2, 3 and 4 allow for the direct entry of aggregated uncertainty for a source. If a value is entered here, the columns for the three headings directly above will be blacked out. This is shown in Figure 3.
- If aggregated uncertainty for a source is entered, then the only other field that needs to be filled out for that source is emissions for each gas in t CO₂-e. Note: If aggregated uncertainty is used, all workings for calculating the aggregated uncertainty for the emission source must be well documented and made readily available if an audit is undertaken or requested by the agency.
- Reporters may wish to include comments in these cells.

⁷ <http://www.cleanenergyregulator.gov.au/NGER/Forms-and-resources/Guides-and-factsheets>

Figure 7: Fields used for data entry in Step 3

Uncertainty calculator 2015-16 d4.xlsx - Microsoft Excel

File

Home

Insert

Page Layout

Formulas

Data

Review

View

PowerPivot

Cut

Copy

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Calibri

11

A

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A

Font

Wrap Text

Merge & Center

Number

General

Conditional Formatting

as Table

Percent 2 7

Percent 3

Percent 4

Normal

Bad

Good

Styles

Insert

Delete

Format

Cells

AutoSum

Fill

Clear

Sort & Filter

Find & Select

Editing

A11

Control Corp 1 F1

Do not leave these cells blank. If there are no emissions for each GHG type, please enter 0.																		
		Step 2							Step 3							(Optional)	Result	
Method	Criteria	Emissions for each gas (t CO2-e)						Energy Content Uncertainty (%)	Fuel/Activity quantity uncertainty (%)	Emission Factor Uncertainty Level (%)						Aggregated Uncertainty for the Emissions Source (%)	Green = OK Red = Incomplete	Comments
		CO ₂	CH ₄	N ₂ O	HFCs	SF ₆	PFCs			Total	CO ₂	CH ₄	N ₂ O	HFC	SF ₆			
Method 1a		0	10000	0	0	0	0	10000									OK	
Method 1a		40243	79	24	0	0	0	40346									OK	
Method 1a		201216	393	118	0	0	0	201727									OK	
Method 1		0	10000	10000	0	0	0	20000									OK	
		0	0	0	0	0	0	0										
		0	0	0	0	0	0	0										

Output worksheet

The Output worksheet shows the aggregated uncertainty for each source and fuel type for each facility.

Once a facility's unique identifier has been entered in the 'Source and fuel input' worksheet, the facility name will be shown in the 'Facility Name' column as shown in Figure 8 (see below):

Figure 8: Output worksheet example after data has been entered

	Facility name	Source or fuel	Comments	Uncertainty for the source or fuel at the Facility (%) (Enter into EERS)	Error count	(DPE) ² ((Uncertainty x Emissions) ²)	Sum E
15	1 Facility 1	Solid waste disposal on land		35.0	0	122,500,000,000	10,000
16	2 Facility 1	Natural gas if distributed in a pipeline		5.8	0	55,485,009,339	40,346
17	3 Facility 2	Natural gas if distributed in a pipeline		5.8	0	1,387,133,849,275	201,727
18	4 Facility 2	Solid waste disposal on land		35.0	0	490,000,000,000	20,000
19	5						
20	6						
21	7						

Adding your data to EERS

Once the uncertainty for a source or fuel type (at a facility) has been calculated these numbers can be entered into the uncertainty add/modify entry screen in EERS.

Appendix 1 – Uncertainty of Elements worksheet

This is an optional worksheet for independently calculating uncertainty values rather than using default values built into the Calculator (see below). This worksheet helps reporters calculate the uncertainty for a set of measurements or other data. The worksheet has been developed in accordance with the Uncertainty Protocol and uses the t-factor method with a 95 per cent confidence interval in accordance with part 8.2 of the Measurement Determination.

Figure 9: Example of the Appendix 1 - Uncertainty of Elements worksheet

CALCULATING THE UNCERTAINTY OF VARIOUS ELEMENTS USED IN NGER REPORTING

[Hover over here for instructions](#)

Registered Corporation Name								
-----------------------------	--	--	--	--	--	--	--	--

Reference Number	Example	1	2	3	4	5	6	7
Description	Fuel Factor	Facility 1 anthracite energy content	Transport LPG energy content	Transport CO ₂ emissions factor	Transport N ₂ O emissions factor	Transport CH ₄ emissions factor		
Standard Deviation	0.079	0.929	1.727	4.124	0.025	0.028		
Mean	0.650	28.525	24.367	58.083	0.105	0.191		
Count of measurements	5	8	12	12	12	12		
t-factor (95% CI)	2.780	2.360	2.200	2.200	2.200	2.200		
Uncertainty @ 95% CI	0.098	0.775	1.097	2.619	0.016	0.018		
% Uncertainty	15	3	5	5	15	9		
Measurement unit	kg/GJ	GJ/t	GJ/t	kg Co2-e/GL	kg Co2-e/GL	kg Co2-e/GL		
Measurement								
1	0.700	27	25.2	64.2	0.1	0.2		
2	0.650	28.2	24.8	64.5	0.05	0.15		
3	0.600	29.3	24.6	64.2	0.06	0.16		
4	0.750	28.5	23.2	59.8	0.12	0.19		
5	0.550	30	23.5	58.5	0.13	0.22		
6		27.9	23.9	56.3	0.11	0.15		
7		28.2	24.9	56.5	0.12	0.17		
8		29.1	25.2	54.5	0.13	0.19		
9			23.4	55.3	0.11	0.19		
10			23.8	55.2	0.1	0.22		
11			28.6	54.1	0.11	0.23		
12			21.3	53.9	0.12	0.22		
13								

Available inputs

- Description: Cells in this row can be used to describe the samples which have been taken which will assist clear identification and record keeping (e.g. Facility 1 brown coal energy content).
- Standard deviation
- Mean
- Count of measurements
- t-factor (95% confidence interval)
- uncertainty at a 95% confidence interval
- % uncertainty
- Measurement Unit: The unit in which the samples are measured (e.g. GJ/t).
- Measurement: For a set of samples, each of the individual samples need to be entered (see next section). Standard deviation, Mean, Count of measurements, t-factor and the % uncertainty will automatically be calculated each time a new measurement sample is entered:
 - » The percentage uncertainty can then be manually entered into the 'Source and fuel input' worksheet as part of Step 3 above. The other variables are provided for the reporter's information.

How to calculate percentage uncertainty of samples

Entering sample data to obtain a percentage uncertainty for the sample set can be done by following the procedures below. An example has been provided (see Figure 9).

- Under reference number 1, enter the description of the fuel source (e.g. Facility 1 anthracite energy content).
- In the same column, enter the measurement unit used (e.g. GJ/t).
- In the same column, enter measurement results with one value per cell, starting at measurement 1 and progressing downwards (e.g. '27.0, 28.2, 29.3, etc). Enter numerical data only. Do not enter the measurement unit in these cells.
- Repeat these steps for all remaining sample sets of data.

Uncertainty reporting process

Reporting uncertainty in EERS

A corporation will report uncertainty at the source or fuel type level in EERS as part of its section 19, 22G and 22X (as applicable) emissions and energy reports.

To report uncertainty, reporters must:

- ensure all relevant activity data has been entered into EERS, and
- click on the 'Data Entry' tab and then on the entity at the highest level of the corporate structure (see below). The 'Report Uncertainty' button is located on the lower left of the screen.

Figure 10: Report Uncertainty button on the lower left

The screenshot displays the EERS Client Portal interface. At the top, there are navigation tabs: 'EERS Home', 'Data Entry', 'Reports', and 'Entity access'. The 'Data Entry' tab is selected. On the right side of the header, it shows 'Signed in as John Smith-SprintTwoUAT-IBGMON' and a 'Logout' button. The main content area is titled 'Reporting Entity Information' and includes a 'View' dropdown and a help icon. Below this, there's a section for 'Identifying Details' with fields for 'Name' (filled with 'SprintTwoUAT-IBGMON'), 'Australian Business Number (ABN)', 'Australian Company Number (ACN)', 'Australian Registered Body Number (ARBN)', and 'Trading Name'. Below that is the 'Street Address' section with fields for 'Address Line 1' (filled with '123 SprintTwoUAT-IBGMON street'), 'Address Line 2', and 'Address Line 3'. On the left sidebar, under 'Client Portal Home', there's a section for 'Emissions and Energy Reporting System' and 'Corporate Structure'. The 'Corporate Structure' section shows a list of entities with 'SprintTwoUAT-IBGMON' selected. Below this is a 'Favourites' section. At the bottom of the sidebar, there are several buttons: 'Add Entity', 'Embodied Emissions', 'Small Facilities Percentages', 'Report Uncertainty' (highlighted), and 'Enable Client Support Access'.

- The 'Facility Uncertainty' reporting screen (see below) shows all sources and fuels relevant to reporting uncertainty for the organisation.

Figure 11: Uncertainty screen

Facility Uncertainty

Emissions from the following fuel types and sources exceed the 25 kilotonne scope 1 threshold (see Regulations 4.08 and 4.17A) and require uncertainty to be reported. Click on the Help icon for more information on using the 'Auto-calculate' and 'Export as CSV' functions.

Fuel	Method(s) used	Emission (tCO ₂ -e)	Uncertainty %	Auto-calculate	User input
Facility 1					
Natural gas distributed in a pipeline	Method 1 and 2	107,093	1.0 %	☐	
Facility 2					
Brown coal	Method 1 and 2	2,624,122	1.7 %	☐	
Facility 3					
Natural gas distributed in a pipeline	Method 1 and 2	386,001	1.4 %	☐	
Facility 4					
Coal seam methane that is captured for combustion	Method 1 and 2	715,000	0.7 %	☐	

- To go back to the 'Reporting Entity Information' screen, click the blue hyperlinks at the top or bottom of the table.
- To modify or remove a reported uncertainty amount click the pen icon to the right of the auto-calculate entry which will display the 'Add/modify entry – Uncertainty' screen:

Figure 11: Add/modify – Uncertainty screen

Add / modify entry – Uncertainty

Facility:
 Source: Fuel combustion
 Fuel Type: Natural gas distributed in a pipeline

Activity Description	Source	Method	Criterion	CO ₂	N ₂ O	CH ₄	HFCs	SF ₆	PFCs	Total	
Natural gas for electricity	Emissions released from fuel use by certain industries (including electricity generation)	Method 2	A	106,821	0	0	0	0	0	106,821	
Natural gas for electricity	Emissions released from fuel use by certain industries (including electricity generation)	Method 1	A	0	63	209	0	0	0	272	
										Total	107,093

Uncertainty Percentage: %

CER Hotline: 1300 553 542 (within Australia)
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- On this screen, reporters should enter the uncertainty related to the activity data for all the fuels and/or sources on this screen in the 'Uncertainty Percentage' field. To calculate and report this uncertainty in accordance with the Measurement Determination, reporters may choose to use the Calculator.
- After reporting uncertainty, reporters should continue generating and submitting their reports. If any of the activities relevant to uncertainty reporting are adjusted, reporters should reassess their uncertainty reporting.

Special cases: Emissions from entities that are not common 'facilities'

Facility Aggregates

Uncertainty reporting will only apply to a facility where scope 1 emissions from combustion of a fuel type or from a source at the facility are 25,000 t CO₂-e or more (NGER Regulations 4.08 and 4.17A). Facilities cannot be reported within a facility aggregate if scope 1 emissions from the facility are 25,000 t CO₂-e or more (NGER Regulation 4.25). Therefore emissions from facility aggregates will not appear in the uncertainty dashboard.

Incidental and percentage reporting

Data reported as a percentage or and incidental is not subject to uncertainty reporting requirements (under NGER Regulation 4.26 and 4.27 respectively).

Calculating uncertainty: Industrial process sources using method 1

The table below specifies industrial process sources that do not have default uncertainty values in the Measurement Determination. If emissions from these sources involve the combustion of a fuel, then default fuel combustion uncertainty factors may be used for emissions attributable to each fuel. Otherwise, the uncertainty must be calculated in accordance with the Uncertainty Protocol.

Source
Sodium cyanide production
Soda ash production
Ammonia production
Carbide production
Chemical or mineral production (other than carbide production) using a carbon reductant or carbon anode
Iron, steel or other metal production using an integrated metalworks
Ferroalloys production
Aluminium production (where activity relates to emissions from the production of baked carbon anodes)

Other metals production

Using default combustion uncertainty factors for industrial process sources

In the following screenshot, the source iron, steel or other metal production using an integrated metalworks involves the combustion of three fuels. The three example fuels are anthracite coal, blast furnace gas, and charcoal. It is necessary to understand the amount of emissions from each of these fuels. These three fuels and the amount of scope 1 emissions have been entered into the Calculator as shown below:

Figure 13: Fuel combustion for particular industrial processes



The screenshot shows the 'Clean Energy Regulator' logo and a 'View Output' button. Below is a table titled 'Step 1' with columns for Facility unique Identifier, Facility Name, Source, Fuel Type (where applicable), Method, Criteria, and Emissions (CO₂ and CH₄). The table contains data for three facilities: ACT1, VIC1, and WA1, each with a source of 'Emissions released from fuel use by certain industries (including electricity generation)' and a fuel type of 'Liquefied natural gas'. The emissions for ACT1 are 0, for VIC1 are 14006, and for WA1 are 9000. The table also includes a 'Do not leave these cells' warning.

Step 1							Do not leave these cells	
Facility unique Identifier	Facility Name	Source	Fuel Type (where applicable)	Method	Criteria		CO ₂	CH ₄
CC1-ACT1	ACT1	Emissions released from fuel use by certain industries (including electricity generation)	Liquefied natural gas	Method 1	a		0	
CC1-VIC1	VIC1	Emissions released from fuel use by certain industries (including electricity generation)	Liquefied natural gas	Method 3	a		14006	
CC1-WA1	WA1	Iron steel or other metal production using an integrated metalworks	Anthracite	Method 1	a		9000	
CC1-WA1	WA1	Iron steel or other metal production using an integrated metalworks	Blast furnace gas	Method 1	a		9000	
CC1-WA1	WA1	Iron steel or other metal production using an integrated metalworks	Charcoal	Method 1	a		9000	
							0	
							0	
							0	
							0	

Calculating uncertainty for carbon mass balance equations using method 1

The Measurement Determination provides methods based on a carbon mass balance approach for estimating scope 1 emissions from sources:

- which have multiple carbon inputs and outputs, and
- where the integrated nature of a facility means that the emissions estimate for the process as a whole is more accurate than estimates of emissions from different aspects of the process.

A carbon mass balance approach is provided for estimating emission from some activities under the following industrial process sources:

- Division 4.2.3 – Use of carbonates for production of a product other than cement clinker, lime or soda ash (limited use)
- Division 4.2.4 - Soda ash use and production
- Division 4.3.5 – Chemical or mineral production, other than carbide production, using a carbon reductant or carbon anode
- Division 4.4.1 – Iron, steel or other metal production using an integrated metalworks
- Division 4.4.2 – Ferroalloys production, and
- Division 4.4.5 – Other metals production.

The rules in the Measurement Determination for assessing the uncertainty of emissions estimates using method 1, 2 or 3 are part of the uncertainty associated with estimating based on a number of parameters, including the energy content factor, emissions factor and/or activity data.

Part 8.3 of the Measurement Determination does not set out default values for assessing the uncertainty of emissions estimates using a method based on a carbon mass balance approach, which is a function of uncertainty associated with carbon content factors and activity data.

Given this, it is reasonable for reporters to assess uncertainty of emissions estimates using a carbon mass balance approach in accordance with the uncertainty protocol.

Part 7 of the Uncertainty Protocol recommends four ways to quantify uncertainty ranges for indirectly measured emissions:

- run statistical tests on one or several sets of sample data (e.g. by the method explained in section 6.2 of the GHG Protocol)
- determine the instrument precision of any measurement equipment used, especially for activity data
- consult experts within the company to give an estimation of the uncertainty range of the data used as explained in Section 6.1 of the Uncertainty Protocol, and
- use third-hand uncertainty ranges (e.g. the Intergovernmental Panel on Climate Change (IPCC) data provided in the second worksheet of the uncertainty tool)

The Uncertainty Protocol recommends item 4 is only used where it is not possible to collect facility specific data for use in items 1 to 3. Section 8.15(2) of the Measurement Determination prevents the use of Item 4 when emissions are estimated using method 2, 3, or 4.

When using method 1, if it is not feasible to use items 1 to 3 of the uncertainty protocol to assess the uncertainty of estimates of emissions. A reporter may use item 4 and the IPCC overall source uncertainty figure of 10 per cent for carbon dioxide from industrial processes sources provided in the 'Calculations' worksheet of the GHG Protocol [Uncertainty Calculation Tool](#)⁸, if the reporter is confident it is a reasonable assessment of the uncertainty.

Calculating uncertainty from methods 2, 3 and 1 (non-default factors) emissions

Uncertainty for emissions estimates calculated under methods 2 and 3 must be calculated in accordance with the Uncertainty Protocol (Part 8.4 of the Measurement Determination). Under certain circumstances, outlined in part 8.3 of the Measurement Determination uncertainty for emissions estimated under method 1 can also be calculated in this manner.

The procedure for applying these methods to the Calculator is outlined as follows:

- enter a description for the source (e.g. natural gas (pipeline) - petroleum refining)
- type in the facility name under the 'Facility Name' column or, alternatively select the facility name from the drop down menu
- choose a Source (e.g. fuel combustion)
- select the method used to measure the emissions of the source, and
- choose criterion for estimation (if applicable).

Note: The criterion for estimation will be blacked out, where this is not a required variable for uncertainty calculations.

⁸ [https://ghgprotocol.org/sites/default/files/standards_supporting/Uncertainty Calculation Tool.xlsx](https://ghgprotocol.org/sites/default/files/standards_supporting/Uncertainty%20Calculation%20Tool.xlsx)

- For method 2 and 3 calculations, a reporter must calculate the uncertainty according to the principles in the Uncertainty Protocol. Data may be entered into the Calculator in either of two ways:
 - » Enter: estimated scope 1 emissions (from the EERS-generated section 19 NGER report), calculated energy content uncertainty, Fuel/Activity quantity uncertainty, and emission factor uncertainty (for each of the gases). The energy content, activity/fuel quantity and emissions factor uncertainties must have been calculated in accordance with Part 8.4 of the Measurement Determination.

OR

- » Enter the emissions data and aggregated uncertainty for the emissions source. Certain cells of the worksheet become blacked out to indicate fields where data is not required.
- Reporters may use the 'Appendix 1 – Uncertainty of Elements' worksheet (discussed previously) to calculate uncertainties based on the principles outlined in the Uncertainty Protocol.
- For method 1 (using non-default values), where uncertainty values are calculated in accordance with the Measurement Determination and the Uncertainty Protocol, these can be entered into the relevant cells. If no value is entered, default values will be applied.
- If multiple sources are attributed to a single facility, the calculator will aggregate the uncertainty for each source. The aggregated uncertainty for each facility as well as the corporation's total percentage uncertainty will be shown on the 'Output' worksheet (Figure 6).

Calculating uncertainty from method 4 emissions estimates

Assessments of uncertainty for emissions estimated under method 4 must conform to principles outlined in the Uncertainty Protocol. When using method 4 to calculate emissions estimates, only estimated emissions and aggregated uncertainty can be entered into the Calculator for each emissions source. All other cells for entering uncertainty factors will be blacked out by the Calculator when this is done.

Emissions data for each gas must also be entered in order to calculate the percentage uncertainty for the particular source.

Note: Data and methodologies associated with the calculation of the aggregated uncertainty under method 4 should be documented and retained.

Where a corporation exceeds the limits of the Calculator

The Calculator has been designed to meet the needs of the majority of reporting corporations, but is limited to 50 facilities and fuel combinations.

Where a corporation exceeds either of these limits, data should be split between several copies of the Calculator. In doing so, reporters should ensure that all data for a single facility is located in the same copy of the Calculator to avoid errors.

More information

If you require more information on the Calculator, please email us via reporting@cleanenergyregulator.gov.au or call on 1300 553 542.