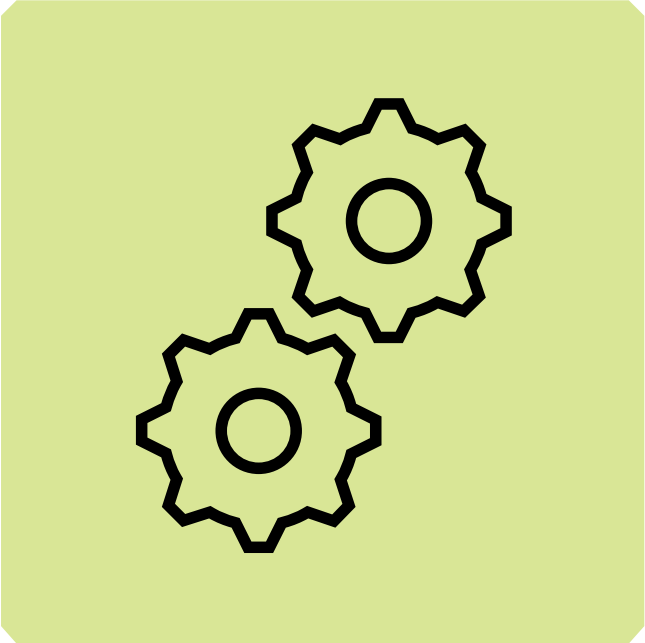
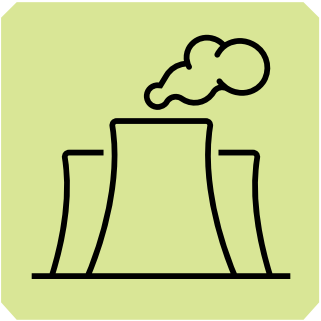
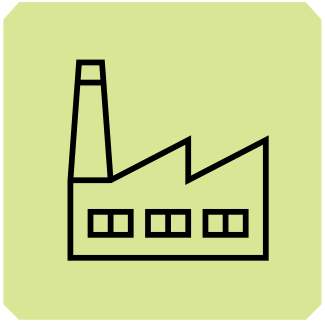
Australian Government
Clean Energy Regulator

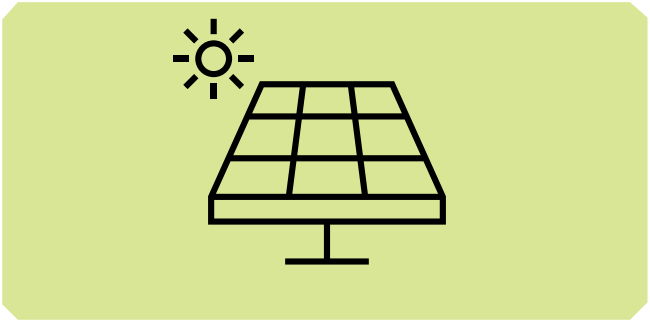


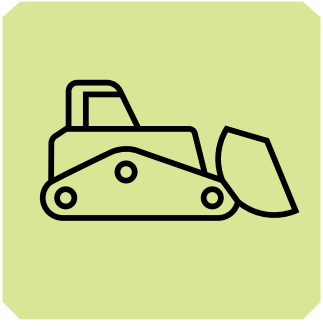
Estimating emissions and energy from fuel combustion guideline

July 2023









C E R National Greenhouse and Energy Reporting

Contents

Definitions and abbreviations

Term	Meaning
ANZSIC	Australian and New Zealand Standard Industrial Classification
BoP	Basis of preparation
CEM	Continuous emissions monitoring
CH_4	Methane
CO_2	Carbon dioxide
CO_2-e	Carbon dioxide equivalence
Department	Department of Climate Change, Energy, the Environment and Water
EO	Executive officer
GJ	Gigajoule
NA	Not available, referring to an emission calculation method
N_2O	Nitrous oxide
NGER	National Greenhouse and Energy Reporting
NGER Act	*National Greenhouse and Energy Reporting Act 2007*
NGER Legislation	The NGER Act, the NGER Regulations and the NGER Measurement Determination
NGER Measurement Determination	National Greenhouse and Energy Reporting (Measurement) Determination 2008
NGER Regulations	National Greenhouse and Energy Reporting Regulations 2008
NO	Not occurring, referring to the emission of a greenhouse gas
PEM	Periodic emissions monitoring
Safeguard Mechanism	The Australian Government's mechanism to contribute to the achievement of Australia's greenhouse gas emissions reduction targets. See the Safeguard Mechanism for more information[1].
Scope 1 emissions	Per 2.23 of the NGER Regulations, means the release of greenhouse gas into the atmosphere as a direct result of an activity or series of activities (including ancillary activities) that constitute the facility

[1] https://www.cleanenergyregulator.gov.au/NGER/The-safeguard-mechanism

SNG	Simulated natural gas means a mixture of vapourised 'liquefied petroleum gas' and compressed air. See Frequently asked questions[2] for more information.
t	Tonne

Please refer to Division 2 of the NGER Act, 1.03 of the NGER Regulations and Division 1.1.2 of the NGER Measurement Determination for defined terms in NGER Legislation.

[2] https://www.cleanenergyregulator.gov.au/OSR/EERS/Tools-to-assist-you/Frequently-asked-questions

Disclaimer

This guideline has been developed by the Clean Energy Regulator (CER) to assist entities to comply with their reporting obligations under the *National Greenhouse and Energy Reporting Act 2007*[3] (NGER Act) and associated legislation.

This guideline only applies to the 2022–23 NGER reporting year and should be read in conjunction with the NGER Act, National Greenhouse and Energy Regulations 2008[4] (NGER Regulations), and National Greenhouse and Energy Reporting (Measurement) Determination 2008[5] (NGER Measurement Determination), as in force for this reporting period. These laws and their interpretation are subject to change, which may affect the accuracy of the information contained in the guideline.

The guidance provided in this document is not exhaustive, nor does it consider all circumstances applicable to all entities. This guidance is not intended to comprehensively deal with its subject area, and it is not a substitute for independent legal advice. Although entities are not bound to follow the guidance provided in this document, they must ensure they meet their obligations under the National Greenhouse and Energy Reporting (NGER) scheme[6] at all times. CER encourages all users of this guidance to seek independent legal advice before taking any action or decision based on this guidance.

CER and the Australian Government will not be liable for any loss or damage from any cause (including negligence) whether arising directly, incidentally, or as consequential loss, out of or in connection with, any use of this guideline or reliance on it, for any purpose.

If an entity chooses to meet their obligations under the NGER scheme in a manner that is inconsistent with the guidance provided in this document, CER, or an independent auditor, may require the entity to demonstrate that they are compliant with requirements of the NGER Act, NGER Regulations, and/or the NGER Measurement Determination. Entities are responsible for determining their obligations under the law and for applying the law to their individual circumstances.

[3] https://www.legislation.gov.au/Series/C2007A00175
[4] https://www.legislation.gov.au/Series/F2008L0223
[5] https://www.legislation.gov.au/Series/F2008L02309
[6] http://www.cleanenergyregulator.gov.au/NGER/Pages/default.aspx

2022–23 updates

Changes in this document for the 2022–23 reporting year:

- Minor stylistic and formatting changes have been made throughout this guidance document
- Page 4 and 5: added definition for 'Safeguard Mechanism' and 'SNG' (Simulated Natural Gas)
- Page 21: added information on reporting emissions from the combustion of biomethane.

1. Purpose of this information

Corporations have reporting obligations under the NGER Legislation, comprising the NGER Act, the NGER Regulations and the NGER Measurement Determination.

It is important that data relating to greenhouse gas emissions, energy consumption and energy production of corporations, provided under the NGER scheme, is accurate and complies with the requirements of the legislation. The information is used to:

- inform Australian government policy formulation and the Australian public
- meet Australia's international reporting obligations
- assist Commonwealth, State and Territory government programs and activities
- ensure, under the Safeguard Mechanism, that net covered emissions of greenhouse gases from the operation of a designated large facility do not exceed the baseline applicable to the facility.

The following information has been compiled to provide stakeholders with an understanding of how CER will apply legislation for some fuel combustion methods through worked examples and elaborations. It is intended to assist stakeholders to comply with NGER reporting requirements.

Reporters are responsible for ensuring they meet the legislative requirements.

1.1. Focus of this guideline

The NGER Measurement Determination and the NGER Regulations contain the requirements for estimation and reporting of emissions and energy from fuel combustion.

This guideline focuses on providing guidance on the appropriate application of the methods defined in the NGER Measurement Determination, to reporting entities who report fuel combustion. See forms and resources[7] for more guidance.

[7] http://www.cleanenergyregulator.gov.au/NGER/Forms-and-resources

2. Good practice NGER reporting

Registered reporters must keep records of the group-wide facility and NGER data used for reporting in accordance with the NGER Act. Records must be kept for 5 years (subsection 22(3) of the NGER Act) and should enable CER to ascertain whether the reporting meets the requirements of the NGER legislation. This includes keeping records that are easily accessible for inspection and audit.

Records should include recording source and activity data capture, and processing data using the general estimation principles in section 1.13 of the NGER Measurement Determination, see Table 1 below.

Table 1: General estimation principles in s1.13 of the NGER Measurement Determination.

General estimation principles	Example implication for NGER reporting
Transparency Emission estimates must be documented and verifiable.	All key decisions and assumptions made to prepare NGER reporting must be documented and updated each year, in a 'Basis of preparation' document or procedure. All data and assumptions must be kept safe for 5 years.
Comparability Emission estimates using a particular method and produced by a registered corporation in an industry sector must be comparable with emission estimates produced by similar corporations in that industry sector using the same method and be consistent with the emission estimates published by the Department in the Australia's National Greenhouse Accounts[8].	Appropriately applying the rules and requirements of the NGER Measurement Determination will achieve this for most activity data and emissions estimates when reporting fuel combustion. When using industry practice approaches, for example when estimating the quantity of gaseous fuel combusted that was not acquired though commercial transaction, following industry practice is a minimum but it should also meet other requirements, such as 'Transparency' and 'Accuracy'. Using industry practice can only be accepted if it also meets the other principles and requirements set out in the NGER Measurement Determination.

[8] https://www.industry.gov.au/policies-and-initiatives/australias-climate-change-strategies/tracking-and-reporting-greenhouse-gas-emissions

General estimation principles	Example implication for NGER reporting
Accuracy Having regard to the availability of reasonable resources by a registered corporation and the requirements of the NGER Measurement Determination, uncertainties in emission estimates must be minimised and any estimates must be neither over nor under estimates of the true values at a 95% confidence level[9].	Sampling, for example for energy content or emissions factors, should be performed for a duration and frequency to enable reliable data. This is particularly relevant: Where higher order methods are used, for example Method 4 for fugitive emissions, sampling frequency should support an appropriate 95% confidence interval. Where industry practice may be used to capture data, for example if used for flaring emissions. Estimates should be neutral without bias – use of a 'conservative' estimate, for example overstating or understating emissions when compared to the likely true value is not allowed.
Completeness Subject to any applicable reporting thresholds, all emission sources identified in section 1.10 of the NGER Measurement Determination, and production and consumption of all fuels and energy commodities listed in schedule 1 of the NGER Regulations, must be accounted for.	All typical source types for fuel combustion as defined by the NGER Measurement Determination appropriately identified and reported. Identifying and documenting all instances and occurrences of relevant sources, for example if additional activity data needs to be captured, such as for fuel usage of contractors on-site or electricity generation and consumption.

An Executive Officer (EO) must approve the report's submission to CER, confirming that it has been prepared in accordance with the NGER legislation, including that the general principles have been appropriately applied. It is up to reporters to determine the appropriate processes and internal controls to ensure that a compliant report is submitted on time, supported by adequate records. This process should be formalised and repeatable.

Recommendations for compliant NGER reporting include the following:

- **Formalising NGER reporting governance** – due to the complexity for many corporations, formalising the governance arrangements may be important. This may include:

[9] Note that there is a difference in meaning between the common usage of the word 'confidence' and its statistical usage in relation to '95% confidence interval'. In natural science and technical experiments, it is often standard practice to estimate uncertainty at the 95% confidence interval. The 'confidence interval' is defined by a probability value (in this case a probability of 95%) and confidence limits on either side of the mean value. This means that the uncertainty level (the +/- percentages – otherwise known as the confidence limits) is to be calculated so that there is a 95% probability that the true value of the estimate is encompassed by the estimated uncertainty levels (the confidence limits). For example, an emission estimate of 100 kilotonne (kt) +/- 10% at the 95% confidence interval means that the true value lies between 90 kt and 110 kt with a probability of 95%.

- **Accountable (senior) manager** – accountable for executing the annual reporting process and preparing it for the EO's signature. This could include:
  - accountability for ensuring the process and documentation complies with the requirements of NGER Legislation
  - allocating sufficient resources to execute the process, including ability to instruct appropriate people to perform duties defined under the NGER reporting process – either directly, or via reference to the signing EO.
- **Responsible NGER process owner** – responsible for designing, updating and implementing the annual reporting process, with reference to the accountable (senior) manager. It includes updating the annual basis of preparation (BoP) and collaborating with data owners to define data requirements that comply with the requirements of the NGER Legislation. The responsible NGER process owner may comprise more than one individual in a small, centralised team – it may also include facility level responsible NGER process owners.
- **Responsible data owners** – responsible for measuring and documenting data in accordance with the requirements of the NGER Legislation.

- **Formalising reliance on existing data processes** – existing data processes controlled by different data owners may be suitable to rely upon for NGER reporting. In NGER facilities this may include:
  - Diesel consumption data measured based on invoices for diesel deliveries (criteria 'A' or 'AA'), with purchasing or accounts payable in control of the data records, and with accounts reconciling the amounts paid to fuel deliveries and recorded in the accounting system.
- Where the data may be the responsibility of several individuals or teams, formalising the data owners' accountability for ensuring the data used for NGER reporting are complete and accurate may be appropriate. This can include:
  - **A formal sign-off on completeness and accuracy of the annual activity data –** this way data owners formally acknowledge that the signing EO relies on the data they control.
  - **Sense checks on total amounts to be reported** – where possible, it can be useful to perform 'sense-checks' on total amounts to be reported in the NGER report to underlying systems. For example, the $-value for diesel purchases during the year as recorded in the accounting system to the NGER amount in kilolitres (kL) to be reported, and sense-checking the implied $-value paid per litre. Such analysis can form part of the data-owner sign-off process.

  In larger corporate groups with a significant number of facilities, some of the data processes may be centralised, e.g. centralised purchasing and recording of diesel fuel data. Working through what the appropriate data process should be, and who should ultimately be accountable for the required NGER data, can be useful.

  Where existing facility processes are insufficient at delivering suitable NGER data, additional data processes should be formalised.

- **Creating a BoP document** – CER encourages reporters to create a BoP to support reporters in meeting NGER record-keeping requirements. Though not mandatory, a BoP illustrates the methodology by which a NGER report has been prepared, including details such as facility layout, data sources and calculation methods. Much of what is referenced earlier in this compilation can be recorded in a BoP.

  CER also encourages reporters to consider submitting their BoP (or a summary thereof) with each year's NGER report to clarify key assumptions and decisions applied.

2.1. Contact CER if method temporarily not available

Reporters should observe the requirements in section 1.19 of the NGER Measurement Determination for down time of equipment used to monitor emissions:

- If the down time in a year is 6 weeks (42 days) or less, each day of the down time can be estimated consistently with the principles of section 1.13 of the NGER Measurement Determination.

  Note: for continuous emissions monitoring (CEM) to be applicable, the down time cannot exceed 10% of the year (36.5 or 36.6 days) – i.e. maximum 5 weeks and one day (excluding down time for calibration), as per subsection 1.26(4).

- If the down time exceeds 6 weeks in a year, and within 6 weeks after the day when down time exceeds 6 weeks, the registered controlling corporation or responsible emitter must inform CER in writing of the following:
  - the reason why down time is more than 6 weeks
  - how the reporter plans to minimise down time
  - how emissions have been estimated during the down time.

Whilst this 'down time' requirement in practice may be of most relevance for CEM using Method 4, it is a global requirement for all emissions sources. Periodic Emissions Monitoring (PEM) using Method 4 can also be affected, noting that if monthly emissions monitoring is applied, only one measurement period can be missed. It also applies to all other emissions sources, e.g. failure of a meter to measure flow of gas to a combustion source, even when using Method 1, 2 or 3.

Where there has been more than 6 weeks down time in a year, and Method 2, 3 or 4 has been used to estimate emissions for a separate occurrence of a source, CER may require a reporter to use Method 1 to estimate emissions.

3. Fuel combustion emissions

The principal greenhouse gas generated by the combustion of fossil fuels for energy is carbon dioxide. The quantity of gas produced depends on the carbon content of the fuel and the degree to which the fuel is fully combusted. Small quantities of methane and nitrous oxide are also produced, depending on the actual combustion conditions. Methane may be generated when fuel is heated, but only partially burnt, and depends on combustion temperatures and the level of oxygen present. Nitrous oxide results from the reaction between nitrogen and oxygen in the combustion air.

The principal purpose of the combustion of fossil fuels in the Australian economy is for the consumption or use of energy. This guideline addresses the general case of the estimation of emissions from the combustion of fossil fuels for that purpose.

This guideline provides for the following matters:

- estimation of emissions released from the following sources:
  - the combustion of solid fuels
  - the combustion of gaseous fuels
  - the combustion of liquid fuels
  - fuel use by certain industries.
- the estimation of energy for certain purposes.

3.1. Reporting context

Under regulation 4.22 of the NGER Regulations, reporters should submit data for each individual energy type including fuel, consumed for:

- electricity generation
- transport (excluding international bunker fuels)
- production of a chemical or metal production, including as carbon reductants or feedstocks
- any other purpose, including any other stationary energy purposes
- fuels consumed without combustion.

For each energy type (e.g. each fuel) the reporter should also report:

- the amount and energy content of each energy type consumed for each purpose (a) to (e)
- the emissions of each greenhouse gas from the consumption of the energy for each purpose (a) to (d)
- the methods in the NGER Measurement Determination used to estimate the emissions from the consumption of the energy for each purpose (a) to (d)
- the criteria in the NGER Measurement Determination used to estimate the amount and energy content of fuel consumed for each purpose (a) to (e).

3.2. Estimating emissions released from the combustion of solid fuels

Part 2.2 of the NGER Measurement Determination applies to emissions released from the combustion of solid fuel in relation to a separate instance of a source if the amount of solid fuel combusted in relation to the separate instance of the source is more than 1 tonne (t). The measurement and reporting of emissions and energy associated with the combustion of a solid fuel is optional if the quantity of solid fuel combusted

in a separate instance of a source is 1 t or less. Separate instance of a source is defined in section 1.9A of the NGER Measurement Determination. Amounts below the reporting threshold may still be reported if doing so is more efficient for the reporter.

The methods available for reporting the combustion of solid fuels under part 2.2 of the NGER Measurement Determination by gas are summarised in table 2.

Table 2: Summary of available methods, for estimating emissions from the combustion of solid fuels, by emissions of gas type (j).

Method	CO_2	CH_4	N_2O
Method 1	Section 2.4	Section 2.4	Section 2.4
Method 2	Section 2.5 (using an oxidation factor) or section 2.6 (using an estimated oxidation factor	NA	NA
Method 3	Section 2.12 (using an oxidation factor or an estimated oxidation factor)	NA	NA
Method 4	**Part 1.3**	**NA**	**NA**

Note: NA = Not available.

3.2.1. Method 1—emissions of carbon dioxide, methane and nitrous oxide from solid fuels

Method 1 for solid fuels is derived from the methodology in Australia's National Greenhouse Accounts as published in the National Inventory Reports [10]. Estimates of emissions from the combustion of individual solid fuel types are made by multiplying a (physical) quantity of fuel combusted by a fuel-specific energy content factor and a fuel-specific emission factor for each relevant greenhouse gas (in this case, carbon dioxide, methane and nitrous oxide).

The list of solid fuels for which emissions must be calculated appears in Schedule 1 of the NGER Regulations. The energy content and emissions factors are given in schedule 1 of the NGER Measurement Determination.

Energy content and emission factors required for the estimation of emissions from the combustion of solid fuels using this approach are given in Part 1 of Schedule 1 to the NGER Measurement Determination. These factors are intended to be default factors – to be used in the absence of better information about the qualities of the fuels combusted at a particular facility (if better information on fuel qualities for emissions of carbon dioxide is available, the reporter may utilise Method 2, 3 or 4, for estimation of emissions of carbon dioxide only).

[10] https://www.dcceew.gov.au/climate-change/publications/national-inventory-reports

Once selected, the energy content factor (EC_i) for a particular fuel must be applied to all calculations of energy emissions from that fuel for a facility in the reporting year (subsection 6.5(3) of the NGER Measurement Determination).

Example 1

A facility consumes 20,000 t of washed bituminous coal for a purpose other than for the production of electricity or coke. The reporter elects to use Method 1 (Division 2.2.2) for each of the 3 greenhouse emission gases (j) (carbon dioxide, methane and nitrous oxide), for the fuel type bituminous coal. Emissions are estimated as follows:

$$\mathbf{E_{ij}} = \frac{\mathbf{Q_i} \times \mathbf{EC_i} \times \mathbf{EF_{ijoxec}}}{\mathbf{1,000}}$$

where:

E_{ij} is the emissions of gas type (j) released from the combustion of fuel type (i) from the operation of the facility during the year measured in tonnes of carbon dioxide equivalence (t CO_2-e).

Q_i is the quantity of fuel type (i) estimated under Division 2.2.5 measured in t. In this case it is 20,000 t of bituminous coal.

EC_i is the energy content factor of fuel type (i) estimated under section 6.5. In this case it is assumed to be 27 GJs per tonne (GJ/t) of bituminous coal.

EF_{ijoxec} is the emission factor for each gas type (j) (which includes the effect of an oxidation factor) released from the combustion of fuel type (i) measured in kilograms of CO_2-e per GJ (kg CO_2-e/GJ) according to source as mentioned in Schedule 1. In this case, for CO_2, it is 90.0 kg CO_2-e/GJ for bituminous coal. For methane, the emission factor is 0.04 kg per GJ (kg/GJ) and for nitrous oxide, 0.2 kg/GJ.

Emissions of greenhouse gases (carbon dioxide, methane and nitrous oxide) in t CO_2-e are estimated as follows:

Emissions of carbon dioxide from combustion of bituminous coal:

= (20,000 x 27.0 x 90.0)/1,000 = 48,600 t CO_2-e

Emissions of methane from combustion of bituminous coal:

= (20,000 x 27.0 x 0.04)/1,000 = 22 t CO_2-e

Emissions of nitrous oxide from combustion of bituminous coal:

= (20,000 x 27.0 x 0.2)/1,000 = 108 t CO_2-e

3.2.2.1. Method 2—estimating emissions of carbon dioxide using default oxidation factor

Method 2 (set out in Division 2.2.3) does not apply default emission factors to the estimation of emissions. Method 2 instead produces more accurate estimates for each facility by calculating facility-specific emissions factors – effectively averaging out variations in emissions factors for the fuels that are applicable to a facility. These emissions factors are expected to be neither over nor under-estimates and should comply with the general principles (including accuracy) in section 1.13 of the NGER Measurement Determination. Calculation inputs for Method 2 are obtained by sampling and analysing the fuels that are combusted at the facility to quantify the intrinsic qualities of the fuels themselves that affect actual emission levels. These qualities include the carbon, ash and moisture content of a fuel and may vary significantly from source to source, particularly for coals.

Method 2 is derived from the methodologies published in the Technical Guidelines for the Generator Efficiency Standards program, released in December 2006 by the former Australian Greenhouse Office and is designed to enable more accurate estimates of emissions for a particular facility.

Under Method 2, representative and unbiased samples of fuels consumed must be sampled and analysed in accordance with subdivision 2.2.3.3 of the NGER Measurement Determination. Analysis of the fuels for carbon, energy, ash or moisture content must be done in accordance with the prescribed Australian or international standards or equivalent.

In order to deduct carbon dioxide captured for permanent storage, reporters are required to use Method 2 or higher. These higher order methods provide a more accurate estimate of the carbon dioxide emissions than under Method 1, the default method. As the carbon dioxide captured is deducted from the emissions estimate, it is necessary to have a greater level of accuracy in the emissions estimate than is achieved using Method 1.

Division 2.2.3 of the NGER Measurement Determination provides 2 options for Method 2, using either an assumed oxidation factor (subdivision 2.2.3.1), or an estimated oxidation factor determined by reference to additional information about the fuels combusted by the facility (subdivision 2.2.3.2).

For sub-division 2.2.3.1, oxidation factors are drawn from default factors utilised in Australia's National Greenhouse Accounts.

Once the sampling and analysis of the fuel for carbon, ash and moisture has been completed in accordance with subdivision 2.2.3.3, emissions may then be estimated in accordance with the equations specified in section 2.5 (1) or 2.6 (1) of the NGER Measurement Determination.

Example 2

A facility consumes 100,000 t of bituminous coal with a carbon content of 75% and an energy content of 28.5 GJs per tonne (GJ/t) for purposes other than coke or electricity production. The reporter elects to use Method 2 (using default oxidation factor) (section 2.5 of the NGER Measurement Determination) for the estimation of emissions of carbon dioxide and Method 1 (division 2.2.2) for the estimation of emissions from methane and nitrous oxide.

Carbon dioxide emissions are estimated according to Method 2 (using default oxidation factor) as follows:

1. Estimate the carbon dioxide emission factor ($EF_{ico2ox,kg}$) for fuel type (i) as follows:

$$\mathbf{EF_{ico_2ox,kg}} = \frac{\mathbf{C_{ar}}}{\mathbf{100}} \times \mathbf{OF_s} \times \mathbf{3.664}$$

where:

$EF_{ico2ox,kg}$ the carbon dioxide emission factor for fuel type (i) in kg of CO_2-e per kg of fuel;

C_{ar} is the percentage of carbon in fuel type (i) as received for the facility. In this case the percentage of carbon in bituminous coal is estimated to be 75.

OF_s or oxidation factor, is 1.0

= 75/100 x 1.0 x 3.664 = 2.75 kg CO_2-e per kg of fuel

2. Estimate the carbon dioxide emission factor for fuel type (i) measured in kg CO_2-e per GJ (kg CO_2-e/GJ) as follows:

$$\mathbf{EF_{ico_2oxec}} = \frac{\mathbf{EF_{ico_2ox,kg}}}{\mathbf{EC_i}} \times \mathbf{1,000}$$

where:

$EF_{ico2ox,kg}$ is the carbon dioxide emission factor for fuel type (i) measured in kg CO_2-e per kg of fuel.

EC_i is the energy content factor of fuel type (i) estimated under section 6.5 of the NGER Measurement Determination. In this case the energy content factor of bituminous coal is estimated to be 28.5 GJ/t.

= 2.75/28.5 x 1,000 = 96.4 kg CO_2-e/GJ

3. **Estimate emissions as follows:**

$$\mathbf{E_{ico_2}} = \frac{\mathbf{Q_i \times EC_i \times EF_{ico_2 oxec}}}{\mathbf{1,000}} - \mathbf{\gamma RCCS_{CO_2}}$$

where:

E_{ico2} means the emissions of carbon dioxide released from the combustion of a fuel type (i) from the operation of the facility during the year measured in t CO_2-e.

Q_i is the quantity of fuel type (i) measured in tonnes estimated under Division 2.2.5.

EC_i is the energy content factor of fuel type (i) estimated under section 6.5.

γ is the factor 1.861×10^{-3} for converting a quantity of carbon dioxide from cubic metres (m^3) at standard conditions of pressure and temperature to t CO_2-e.

$RCCS_{CO2}$ is carbon dioxide captured for permanent storage measured in m^3 in accordance with Division 1.2.3.

$EF_{ico2oxec}$ is the carbon dioxide emission factor for fuel type (i) measured in kg CO_2-e/GJ.

= 100,000 x 28.5 x 96.4/1,000

= 274,800 t CO_2-e

Methane and nitrous oxide emissions are estimated according to Method 1 as follows:

$$\mathbf{E_{ij}} = \frac{\mathbf{Q_i \times EC_i \times EF_{ijoxec}}}{\mathbf{1,000}}$$

where:

E_{ij} is the emissions of gas type (j) released from the combustion of fuel type (i) from the operation of the facility during the year measured in t CO_2-e.

Q_i is the quantity of fuel type (i) estimated under Division 2.2.5 measured in t.

EC_i is the energy content factor of fuel type (i) estimated under section 6.5.

EF_{ijoxec} is the emission factor for each gas (which includes the effect of a default oxidation factor) released from the combustion of fuel type (i) measured in kg CO_2-e/GJ according to source, as listed in Schedule 1 of the NGER Measurement Determination.

Emissions of methane from combustion of bituminous coal:

= (100,000 x 28.5 x 0.04)/1,000 = 114 t CO_2-e

Emissions of nitrous oxide from combustion of bituminous coal:

= (100,000 x 28.5 x 0.2)/1,000 = 570 t CO_2-e

3.2.2.2. Method 2—estimating carbon dioxide using an estimated oxidation factor

- Sub-division 2.2.3.2 of the NGER Measurement Determination sets out the second option for the estimation of emissions from solid fuel combustion using an estimated oxidation level by reference to additional information about the fuels combusted by the facility. An alternative approach, using an assumed oxidation factor, is set out in sub-division 2.2.3.1.

3.2.2.3. Sampling and analysis for Method 2

- Under Method 2, representative and unbiased samples of fuels consumed must be sampled and analysed in accordance with Subdivision 2.2.3.3 of the NGER Measurement Determination.
- As coal is a heterogeneous material, for the sample to be truly representative it must contain the correct proportions of each particle size present, as well as the correct proportions of particles of varying impurity content. Therefore, in the process of collecting a representative sample, each particle in the lot must have an equal probability of being sampled ('equal selection probability'); the representativeness of the sample being a function of the mass of the sample, or more correctly, the number of particles in the sample.
- A mechanical sampling system designed and operated in accordance with Australian Standard AS 4264.4 – 1996 Coal and coke – Sampling – Determination of precision and bias[11] should be used to sample the coal or solid fuel. Ideally, this type of sampling system would be set up to obtain coal as it is either being loaded at the coal source or unloaded at the facility. One lot of coal will normally represent one day or one trainload of coal. If necessary, manual sampling of the coal may be used provided that the sampling equipment and procedure used is in accordance with AS 4264.4.
- Sample preparation, as required, for providing a laboratory sample for analysis is normally carried out in 2 steps:
    1. initial crushing and subdivision of the samples, as part of an operation that is integrated with the coal sampling
    2. final crushing and subdivision at the laboratory to provide the analysis sample.
- Precision is defined as a measure of the extent to which the observations within a set agree with each other; usually expressed as twice the standard deviation (95% confidence level). Precision checks should be carried out on the sampling process to confirm that the sampling rate is acceptable. The procedure for determining the precision of coal sampling and sample preparation is prescribed in AS 4264.4. It is

[11] https://store.standards.org.au/product/as-4264-4-1996

recommended that precision tests be undertaken on a yearly basis and whenever there is a change in the fuel source or a significant change in the qualitative characteristics of a particular fuel.

- If several sources of fuels are being sampled through a given plant, sampling conditions and sample precision checks should be carried out on the source that exhibits the highest degree of heterogeneity.
- Bias can be defined as the tendency to obtain a value that is either consistently higher or consistently lower than the reference value; in practice this is the difference between the reference value and the average result obtained from many determinations. The recommended procedure for the estimation of bias in a coal sampling system is given in AS 4264.4. In the case of bias testing of mechanical samplers, the reference samples are usually stopped belt samples off a conveyor belt. For the purposes of verification of a coal sampling system, the coal samples taken for bias testing (pairs consisting of a reference sample and a sample taken by the coal sampler) should be analysed for total moisture and ash.
- Bias testing should always be carried out on a new sampling system. For an existing system, the following verification procedure may be followed if there is some doubt about the conformance of the sampling system:
    1. conduct a detailed technical audit of the sampling system
    2. correct any non-conformances that have been observed
    3. conduct a limited bias test on the system, usually with the coal that exhibits the widest stochastic variability in total moisture or ash, to provide a more quantitative verification that the sampling system is performing correctly.
- Analysis of the fuels for carbon, energy, ash or moisture content must be done in accordance with section 2.8 of the NGER Measurement Determination, in accordance with the listed Australian or international documentary standards and by a laboratory that meets the requirements equivalent to those in AS ISO/IEC 17025:2005. Alternatively, the analysis may be undertaken by an online analyser in accordance with section 2.8 (3) of the NGER Measurement Determination. The listing of applicable standards for the analysis of solid fuels is in Schedule 2 of the NGER Measurement Determination.
- For higher ranked coal (bituminous coal, sub-bituminous coal, anthracite, coking coal and coal coke), the standard of analysis defines that an ultimate analysis must be used to determine carbon, moisture and ash content of the fuel which can then be used to determine the emission factor of that solid fuel – the standards for each fuel type are listed in Schedule 2 of the NGER Measurement Determination. Equivalent standards to those listed in Schedule 2 may also be used. Examples of equivalent standards include those produced by AS, New Zealand (NZ), American Society for Testing Materials (ASTM), International Organization for Standardization (ISO) and European Committee for Standardization (CEN) standards organisations. The standards must be in force on the date stated in subsection 1.9(4). An accredited laboratory (as defined in section 1.8 of the NGER Measurement Determination) or similar laboratory complying with the requirements of AS ISO/IEC 17025:2005 must be used to conduct the analysis.

3.2.2.4. Requirements for analysis of furnace ash and fly ash

- Sampling of furnace and fly ash is needed if Method 2 in sub-division 2.2.3.2 of the NGER Measurement Determination is used (using an estimated oxidation factor) rather than Method 2 in sub-division 2.2.3.1 (using oxidation factor).
- It is recognised that the configuration of plant varies and sampling of carbon in ash must be based on representative operating conditions for the plant.
- Furnace ash includes ash collected at the bottom of the furnace hopper of the coal unit and ash collected within the economiser hopper at the rear pass of the coal fired power plant. There is no

standard procedure to collecting furnace ash or economiser hopper ash; however, in a wet extraction system, reasonable samples may be obtained by using sampling ladles to collect material from sluiceways. In a dry extraction system, good representative samples can be obtained directly from the conveyor. Care should be taken in attempting to obtain samples of furnace ash because of the inherent dangers associated with such operations. The NGER Measurement Determination allows for alternative collection methods to be used to obtain samples where it is not feasible due to safety and operational considerations, if it provides representative ash sampling.

- Section 2.11 of the NGER Measurement Determination sets out the procedures and minimum frequencies for sampling for carbon in fly ash. It is acknowledged that some facilities sample on a more regular basis and these more frequent measurements should be incorporated into a facility's estimates.
- Additional sampling should be undertaken for furnace and fly ash after a significant change in operating conditions as the amount and type of ash produced can vary significantly as a result of the change. Sampling after significant changes in operating changes is required under section 2.11 of the NGER Measurement Determination.
- For facilities where load profiles vary significantly throughout the operation of the facility, it is recommended that ash is sampled as a function of load.
- For furnace ash and fly ash, analysis of the carbon content must be undertaken in accordance with AS 3583.2 – 1991 Determination of moisture content[12] and AS 3583.3 – 1991 Determination of loss on ignition[13] or a standard that is equivalent to those standards.

3.2.3. Method 3—Solid fuels

- Method 3 is a variation on Method 2. Method 3 is the same as Method 2 (including whether using the oxidation factor under section 2.5 or an estimated oxidation factor under section 2.6), except that sampling of fuels must be conducted in accordance with the Australian or international standards listed in section 2.12 of the NGER Measurement Determination or by an equivalent standard.
- Once sampling of the fuel has been conducted in accordance with the standard, the analysis of the fuel for carbon, ash and moisture should be conducted as for Method 2. Emissions may then be estimated in accordance with the same equations as set out in sections 2.5 (1) or 2.6 (1) (depending on whether an oxidation factor under section 2.5 or an estimated oxidation factor under section 2.6 is used) of the NGER Measurement Determination.

3.3. Emissions released from the combustion of gaseous fuels

- Part 2.3 of the NGER Measurement Determination applies to emissions released from the combustion of gaseous fuels in relation to a separate instance of a source if the amount of gaseous fuel combusted in relation to the separate instance of the source is more than 1,000 m^3.
- Reporting of emissions and energy associated with the combustion of a gaseous fuel is optional if the quantity of gaseous fuel combusted in a separate instance of a source is 1,000 m^3 or less.
- Separate instance of a source is defined in section 1.9A of the NGER Measurement Determination. Amounts below the reporting threshold may still be reported if doing so is more efficient for the reporter.

[12] https://store.standards.org.au/product/as-3583-2-1991
[13] https://store.standards.org.au/product/as-3583-3-1991

The list of gaseous fuels for which emissions must be calculated is given in Schedule 1 of the NGER Regulations. Please note that biomethane is reportable as a fuel under NGER for the first time in NGER reporting year 2022-23. See Reporting blended fuels, other fuel mixes, bitumen and explosives guideline[14] for more information on how to report emissions from the combustion of biomethane.

The methods available for reporting the combustion of gaseous fuels under part 2.3 of the NGER Measurement Determination by gas are summarised in table 3.

Table 3: Summary of available methods, for estimating emissions from the combustion of gaseous fuel, by emissions of gas type (j).

Method	CO_2	CH_4	N_2O
Method 1	Section 2.20	Section 2.20	Section 2.20
Method 2	Section 2.21	Section 2.27	NA
Method 3	Section 2.26	NA	NA
Method 4	**Part 1.3**	**NA**	**NA**

Note: NA = Not available.

3.3.1. Method 1—emissions of carbon dioxide, methane and nitrous oxide

Method 1 for gaseous fuels is derived from the methodology in Australia's National Greenhouse Accounts as published in the National Inventory Report. Emissions for each gas type (carbon dioxide, methane or nitrous oxide) are estimated for individual fuel types by multiplying a (physical) quantity of fuel combusted by a fuel-specific energy content factor and a fuel-specific emission factor for each relevant greenhouse gas.

Energy content and emission factors required for the estimation of emissions using this approach are set out in Part 2 of Schedule 1 of the NGER Measurement Determination. These factors are intended as default factors that can be used in the absence of better information.

Once selected, the energy content factor (ECi) for a particular fuel must be applied to all calculations of energy emissions from that fuel for a facility in the reporting year. The emission factors listed have been estimated using the Australian Greenhouse Emissions Information System (AGEIS) operated by the Department. Consequently, they are determined simultaneously with the production of Australia's National Greenhouse Accounts ensuring that reporter inventories are consistent with those national accounts.

3.3.2. Method 2—emissions of carbon dioxide from the combustion of gaseous fuels

Method 2 is designed to enable more accurate estimates of emissions at a particular facility. At a facility level, more accurate estimates of emissions are obtained by sampling and analysing fuels for qualities that affect emission levels when the fuel is combusted. These qualities include the composition of the constituent gases of the fuel combusted – for example, the share of methane in the combusted gas.

3.3.2.1. Sampling and analysis

Under Method 2, representative and unbiased samples of fuels consumed must be obtained for analysis. Analysis of the fuels for composition of constituent gases must be done in accordance with listed Australian

[14] https://www.cleanenergyregulator.gov.au/DocumentAssets/Pages/Reporting-blended-fuels-other-fuel-mixes-and-bitumen-guidelin.aspx

or international standards. A listing of applicable standards is given in section 2.24 of the NGER Measurement Determination. Equivalent standards may also be used. Examples of equivalent standards include those produced by AS, NZ, ASTM, ISO and CEN standards organisations. The standards must be on the date stated in subsection 1.9(4) of the NGER Measurement Determination in force for the reporting period.

An accredited laboratory (as defined in section 1.8 of the NGER Measurement Determination) or a laboratory complying with the requirements in AS ISO/IEC 17025:2005 (or equivalent requirements) must be used to conduct the analysis. An online analyser may be used if calibrated in accordance with an appropriate standard, and if the online analysis is undertaken in accordance with section 2.24 of the NGER Measurement Determination.

The minimum frequencies of analysis of the gaseous fuels are set out in section 2.25 of the NGER Measurement Determination.

Emissions may then be estimated in accordance with Subdivision 2.3.3.1 of the NGER Measurement Determination.

3.3.3. Method 3—emissions of carbon dioxide released from the combustion of gaseous fuels

As for solid fuels, Method 3 is a variation on Method 2. Method 3 is the same as Method 2 except that sampling of fuels should be conducted in accordance with the standards prescribed in section 2.26 of the NGER Measurement Determination or an equivalent standard.

Once sampling of the fuel has been conducted in accordance with the relevant standard, the analysis of the fuel should be conducted as for Method 2. Emissions may then be estimated in accordance with the equations specified in section 2.21 (1) in Method 2 of the NGER Measurement Determination.

3.3.4. Method 2—emissions of methane from the combustion of gaseous fuels

Section 2.27 of the NGER Measurement Determination sets out Method 2 for estimating methane emissions from the combustion of gaseous fuels. The quantity of methane emissions from the combustion of fuels depends on the equipment used. In the case of gaseous fuels, small variations in emissions are possible.

Method 2 for estimating emissions of methane is the same as Method 1 under section 2.20 of the NGER Measurement Determination, save that the factor EF_{ijoxec} (being the emission factor for methane released during the year measured in kg CO_2-e/GJ of fuel type (*i*)) is instead obtained using the equipment type emission factors listed in Volume 2, section 2.3.2.3 of the 2006 IPCC Guidelines, corrected to gross calorific values.

3.4. Emissions released from the combustion of liquid fuels

Part 2.4 of the NGER Measurement Determination applies to emissions released from the combustion of liquid in relation to a separate instance of a source if the amount of liquid fuel combusted in relation to the separate instance of the source is:

- the combustion of petroleum-based oil (other than petroleum-based oil used as fuel) or petroleum-based grease, in relation to a separate instance of a source, if the total amount of oil and grease combusted in relation to the separate instance of the source is more than 5 kL.
- for a liquid fuel not of the kind mentioned in paragraph (a)—the combustion of liquid fuel in relation to a separate instance of a source, if the total amount of liquid fuel combusted in relation to the separate instance of the source is more than 1 kL.

Reporting of emissions and energy associated with the combustion of a liquid fuels is optional if the quantity of liquid fuel combusted in a separate instance of a source is less than the amounts described in (a) and (b) above. 'Separate instance of a source' is defined in section 1.9A of the NGER Measurement Determination. Amounts below the reporting threshold may still be reported if doing so is more efficient for the reporter.

The methods available for reporting the combustion of gaseous fuels under part 2.4 of the NGER Measurement Determination by gas are summarised in table 4.

Table 4: Summary of available methods, for estimating emissions from the combustion of liquid fuels, by emissions of gas type (j).

Method	CO_2	CH_4	N_2O
Method 1	Section 2.41	Section 2.41	Section 2.41
Method 2	Section 2.42	Section 2.48	Section 2.48
Method 3	Section 2.47	NA	NA
Method 4	**Part 1.3**	**NA**	**NA**

Note: NA = Not available.

3.4.1. Method 1—emissions of carbon dioxide, methane and nitrous oxide from liquid fuels other than petroleum-based oils or greases

As for solid and gaseous fuels, Method 1 is derived from the National Greenhouse Accounts national methodology as published in the National Inventory Report. Emissions are estimated for individual fuel types by multiplying a (physical) quantity of fuel combusted by a fuel-specific energy content factor and a fuel-specific emission factor for each relevant greenhouse gas (in this case, carbon dioxide, methane and nitrous oxide).

The list of liquid fuels for which emissions must be calculated is given Schedule 1 to the NGER Regulations.

Energy content factors for each fuel type are required to be estimated under section 6.5 of the NGER Measurement Determination. Once selected, the energy content factor (EC_i) for a particular fuel must be applied to all calculations of energy emissions from that fuel for a facility in the reporting year.

The emission factors required for the estimation of emissions using Method 1 are given in Part 3 of Schedule 1 of the NGER Measurement Determination (for stationary energy purposes – for Method 1, this means purposes that do not involve transport energy purposes) and in Division 4.1 of Schedule 1 for transport energy purposes (for Method 1, these purposes are either transport by vehicles registered for road use, rail transport, marine navigation or air transport).

Equipment specific factors for methane and nitrous oxide are provided for transport fleets. It is intended that the methane and nitrous oxide factors applicable to particular transport fleet should be utilised in the estimation of emissions for the fuel combusted for those fleets. No transport factors are provided for vehicles not registered for road use. Stationary energy factors for individual fuel types should be used in these cases.

The emission factors listed have been estimated using the AGEIS[15]. Consequently, they are determined simultaneously with the production of Australia's National Greenhouse Accounts ensuring that reporter inventories are consistent with those national accounts.

3.4.2. Method 2—emissions of carbon dioxide from liquid fuels other than petroleum-based oils or greases

Method 2 is designed to enable more accurate estimates of emissions at a particular facility. At a facility level more accurate estimates of emissions are obtained by sampling and analysing fuels for qualities that affect emission levels when the fuel is combusted. These qualities include the fuel's carbon content which may vary from fuel to fuel, albeit marginally for standard commercial fuels.

3.4.2.1. Sampling and analysis

If using Method 2, representative and unbiased samples of fuels consumed must be obtained and analysed. The general requirements for sampling are set out in section 2.44 of the NGER Measurement Determination.

Analysis of the fuels for carbon, energy content and density must be done in accordance with the Australian or international standards listed in section 2.45, or an equivalent standard. Examples of equivalent standards include those produced by AS, NZ, ASTM, ISO and CEN standards organisations. The standards must be in force on the date stated in subsection 1.9(4) of the NGER Measurement Determination in force for the reporting period.

Unlike solid and gaseous fuels, standards for analysis have not been listed for a number of fuel types, reflecting the apparent absence of such standards particularly for volatile fuels. It is considered that for many liquid fuels that the use of Method 2 facility-specific emission factors would be likely to bring only marginal benefits in any case.

An accredited laboratory as defined in section 1.8 of the NGER Measurement Determination, or similar laboratory that meets the requirements of ASO ISO/IEC 17025:2005 must be used to conduct the analysis.

Analysis must be performed at least as frequently as provided for in section 2.46 of the NGER Measurement Determination (currently, quarterly, or by delivery of the fuel).

3.4.3. Method 3—emissions of carbon dioxide from liquid fuels other than petroleum-based oils or greases

Method 3 is similar to Method 2. The main difference is that, in Method 3, the sampling of fuels should be conducted in accordance with the standard prescribed in section 2.47 of the Determination or its equivalent. Once the sampling is completed, the analysis processes of Method 2 should be employed, including the estimate of emissions specified in section 2.42 of the Determination.

3.4.4. Method 2—emissions of methane and nitrous oxide from liquid fuels other than petroleum-based oils or greases

Method 2 for the estimation of methane and nitrous oxide emissions from the combustion of liquid fuels is the same as Method 1 under section 2.41, save that the reporter uses the equipment-specific emission factors set out in schedule 1 of the NGER Measurement Determination. This approach is only available for vehicles manufactured post-2004 (see paragraph 2.48(2)(a) of the NGER Measurement Determination) and

[15] https://ageis.climatechange.gov.au

certain trucks that meet specified design standards (see paragraph 2.48(2)(b) of the NGER Measurement Determination.

No sampling and analysis of fuels are required for this Method 2 for non-carbon dioxide emissions. This is because the emissions of methane and nitrous oxide depend, in general, on combustion conditions and the equipment used to combust the fuel. In contrast, the carbon dioxide emissions depend on the chemical qualities of the fuels themselves which can only be ascertained by analysis.

Example 3

A company consumes 35,000 kL (kilolitres) of diesel oil: 25,000 kL for transport purposes (with a post-2004 vehicle fleet) and 10,000 kL for stationary energy purposes. The reporter elects to use Method 1 (Division 2.4.2 of the NGER Measurement Determination) for each of the 3 greenhouse emission gases (j) (carbon dioxide, methane and nitrous oxide) for the diesel consumed for stationary energy purposes and Method 2 (Division 2.4.5 of the NGER Measurement Determination) for methane and nitrous oxide emissions from diesel consumed for transport by post 2004 vehicles.

Emissions for the diesel consumed for stationary energy purposes are estimated as follows:

$$\mathbf{E_{ij}} = \frac{\mathbf{Q_i} \times \mathbf{EC_i} \times \mathbf{EF_{ijoxec}}}{\mathbf{1,000}}$$

where:

E_{ij} is emissions of gas type (j) released from the combustion of fuel type (i) from the operation of the facility during the year measured in t CO_2-e.

Q_i is the quantity of the fuel type (i) combusted from the operation of the facility during the year measured in tonnes and estimated under Division 2.4.6. In this case 25,000 kL of diesel is used for transport purposes and 10,000 kL of diesel is for stationary energy purposes.

EC_i is the energy content factor of fuel type (i) estimated under section 6.5

(a) for stationary energy purposes — column 3 of the table 2.4.2A (part 3 of schedule 1 of the NGER Measurement Determination). In this case being 38.6 gigajoules per kilolitre (GJ/kL).

(b) for post 2004 vehicles — column 3 of table 2.4.5A (Division 4.2 of part 4 of schedule 1 of the NGER Measurement Determination). In this case being 38.6 GJ/kL.

EF_{ijoxec} is the emission factor for each gas type (j) released from the operation of the facility during the year (which includes the effect of a default oxidation factor) measured in kg CO_2-e/GJ of the fuel type (i) according to source as mentioned in:

(a) for stationary energy purposes — columns 4-6 of the table 2.4.2A (part 3 of schedule 1 of the NGER Measurement Determination); and

(b) for post 2004 vehicles — column 4-6 of table 2.4.5A (Division 4.2 of part 4 of schedule 1 of the NGER Measurement Determination).

Therefore, emissions of greenhouse gases (carbon dioxide, methane and nitrous oxide) in t CO_2-e are estimated as follows:

Combustion of diesel oil for stationary energy purposes (Method 1):

Emissions of carbon dioxide = (10,000 x 38.6 x 69.9)/1,000 = 26,981 t CO_2-e

Emissions of methane = (10,000 x 38.6 x 0.1)/1,000 = 39 t CO_2-e

Emissions of nitrous oxide = (10,000 x 38.6 x 0.2)/1,000 = 77 t CO_2-e

Combustion of diesel oil for transport purposes for post-2004 vehicles:

Emissions of carbon dioxide = (25,000 x 38.6 x 69.9)/1,000 = 67,454 t CO_2-e

Emissions of methane (Method 2) = (25,000 x 38.6 x 0.01)/1,000 = 10 t CO_2-e

Emissions of nitrous oxide (Method 2) = (25,000 x 38.6 x 0.5)/1,000 = 483 t CO_2-e

3.4.5. Methods for estimating emissions of carbon dioxide from petroleum-based oils or greases

This method applies to the consumption of petroleum-based oils or greases (PBOGs) as lubricants or greases. PBOGs that are consumed without combustion should be reported under section 2.68 of the NGER Measurement Determination. Some scenarios to which section 2.68 of the NGER Measurement Determination would apply include:

- coating of metal products with petroleum-based oils for corrosion protection
- use of petroleum-based oils as hydraulic fluids (including brake fluids)
- greases used in electric motor applications
- oils used in gearboxes
- use of petroleum-based oils as components of products such as oil-extended polymers or elastomers, paints, solvents or sprays
- use of oils in electrical equipment (e.g. transformer oil)
- use of oils as heat transfer fluids or working fluids in industrial applications.

Depending on the operating conditions of the facility and the number and complexity of consumption points, reporters may wish to use the flash point of the fuel to identify whether or not the PBOG could be combusted. The flash point is the lowest temperature at which a product can form a vapour/air mixture capable of combustion. It is a measurable and testable physical property of all petroleum-based products and is stated on the Material Safety Data Sheet of every PBOG product sold.

By comparing the maximum operating temperature that each PBOG is likely to be exposed, it is possible to show that a given PBOG is appropriately reported as consumed without combustion.

If the PBOG is determined to be consumed with combustion, the available Methods (1, 2, and 3) can be found in subdivision 2.4.1.2 of the NGER Measurement Determination.

3.5. Amount of energy consumed in a cogeneration process

Cogeneration processes are situations where electricity and another product are produced from the consumption of a single quantity of fuel. For the reporting requirements of a co-generation process please

see the Estimating emissions and energy in the electricity generation, transmission, and distribution sectors guideline[16] for more information.

3.6. Apportionment of energy consumed for electricity, transport and for stationary energy

Apportionment of fuels consumed between various purposes is considered less critical than the overall estimate of fuel consumed for a facility. Consequently, allocations of fuels consumed between purposes may be determined by facility records based on facility measurement techniques.

For the purpose of determining fuels consumed in transport, the term 'road transport' means fuel consumed by a vehicle registered for road use and the term 'marine navigation' means fuel consumed to propel a vessel/boat/submarine through water.

Subject to section 2.70 of the NGER Measurement Determination, the amount of fuel type (***i***) consumed by a reporting corporation or liable entity that is apportioned between electricity generation, transport (excluding international bunker fuels) and other stationary energy purposes may be determined using the records of the corporation or liable entity if the records are based on the measurement equipment used by the corporation or the liable entity to measure consumption of the fuel types (see section 2.71 of the NGER Measurement Determination).

4. Uncertainty

Uncertainty must be reported for a facility if the direct (Scope 1) emissions from the combustion of an energy type or for a source are 25,000 t CO_2-e or more in a reporting year.

Uncertainty is reported per above-threshold source and is not required to be summed and reported at the facility, corporation, or group levels.

Part 8.3 of the NGER Measurement Determination sets out how to assess uncertainty where Method 1 is used to estimate Scope 1 emissions. Part 8.4 of the NGER Measurement Determination sets out the requirements for assessing uncertainty where Method 2, 3 or 4 is used to estimate Scope 1 emissions. See the Reporting uncertainty guideline[17] for more information.

[16] http://www.cleanenergyregulator.gov.au/DocumentAssets/Pages/estimating-emissions-and-energy-in-the-electricity-sectors.aspx
[17] http://www.cleanenergyregulator.gov.au/DocumentAssets/Pages/Reporting-uncertainty-guideline.aspx

5. More information and references

This information has been provided by CER for use by entities to assist in the consistent accounting and reporting of greenhouse gas emissions, energy consumption and energy production using the NGER Legislation.

More information

For more information, please contact CER.

Email: reporting@cleanenergyregulator.gov.au

Phone: 1300 553 542 within Australia

Website: www.cleanenergyregulator.gov.au

References

National Greenhouse and Energy Reporting Act 2007 (NGER Act)

National Greenhouse and Energy Reporting Regulations 2008 (NGER Regulations)

National Greenhouse and Energy Reporting (Measurement) Determination 2008 (NGER Measurement Determination)

- See Guidelines[18] for additional guidance on:
  - methods and measurement criteria
  - reporting energy production and consumption
  - reporting hydrofluorocarbons and sulphur hexafluoride gases
  - blended fuels, other fuel mixes, bitumen and explosives
  - petroleum-based oils and greases measuring and reporting consumption
  - reporting uncertainty.
- See training videos[19] for additional guidance on:
  - emissions and energy sources and activities
  - emissions and energy reporting thresholds
  - emissions estimation methods and fuel measurement criteria
  - reporting uncertainty
  - reporting contractors
  - reporting gaseous fuel combustion
  - reporting liquid fuel combustion.

[18] https://www.cleanenergyregulator.gov.au/NGER/Forms-and-resources/Guidelines
[19] http://www.cleanenergyregulator.gov.au/OSR/EERS/Tools-to-assist-you/Training-videos