# EXPLANATORY STATEMENT

*NATIONAL GREENHOUSE AND ENERGY REPORTING ACT 2007*

*NATIONAL GREENHOUSE AND ENERGY REPORTING (SAFEGUARD MECHANISM) AMENDMENT (PRESCRIBED PRODUCTION VARIABLES) RULE 2020*

(Issued by the authority of the Minister for Energy and Emissions Reduction)

## Background

The *National Greenhouse and Energy Reporting Act 2007* (the Act) establishes a single national framework for reporting and disseminating company information about greenhouse gas emissions, energy production, energy consumption and other information. The Safeguard Mechanism is part of the Act. Together with the reporting obligations under the Act, the Safeguard Mechanism provides a framework for Australia's largest emitters to measure, report and manage their emissions.

Section 22XS of the Act empowers the Minister to make legislative rules to implement the Safeguard Mechanism. The Safeguard Mechanism was established through the *National Greenhouse and Energy Reporting (Safeguard Mechanism) Rule 2015* (the Principal Rule). The Principal Rule specifies the administrative detail of how Safeguard provisions are implemented and the administrative processes for demonstrating compliance with Safeguard obligations.

Amendments were made to the Principal Rule in March 2019 to:

1. Bring baselines up-to-date by transitioning all facilities to calculated or production adjusted baselines over 2018-19 and 2019-20.
2. Simplify calculated baseline applications by giving businesses the option to use Government-determined *prescribed production variables* and *default emissions intensity* values for calculating baselines.
3. Update baselines annually for actual production where facilities use eligible production variables, so they continue to reflect facility circumstances. This requires business to report production.

The March 2019 amendments established a transition period that covers the 2018-19 and 2019-20 compliance years. All facilities can apply for a transitional calculated baseline during this period and they have the option to use either:

- **default values**: Government-determined prescribed production variables and default emissions intensity values (collectively referred to as 'default values'); or
- **estimated (site-specific) values**: which take account of individual facility circumstances, either as a site-specific production variable or a site-specific 'estimated' emissions intensity value.

At the end of the transition period, reported (historical) baselines will expire for all facilities except grid-connected electricity generators. If a facility with a reported baseline (other than a grid-connected generator) does not apply for a new baseline, it will receive a default baseline of 100,000 tonnes of $CO_2$-e from 2020-21.

It is not intended that facilities will apply for a transitional calculated baseline from 2020-21. The legislation does not prevent them for doing so, but if they do, they must use Government-determined prescribed production variables and default emissions intensity values.

In September 2019, the Principal Rule was amended to extend the application deadline for calculated-emissions baselines starting in the 2018-19 compliance year. The deadline extension is available to facilities on a multi-year monitoring period that includes the 2018-19 and 2019-20 compliance years. The September 2019 amendments also allows facilities to access the transitional calculated baseline criteria a second time from the 2019-20 year in order to adopt one or more additional prescribed production variables.

In October 2019, the *National Greenhouse and Energy Reporting Regulations 2008* (the Regulations) were amended to support the March 2019 amendments to the Principal Rule, to allow facilities whose baseline depends upon annual production levels to report the relevant production as part of their standard annual reporting. Although the requirement to report annual production for certain baselines is already a feature of the Principal Rule, this helps ensure that all information necessary for the annual calculation of a facility's baseline is included in their annual report provided to the Clean Energy Regulator.

## Purpose and operation

The *National Greenhouse and Energy Reporting (Safeguard Mechanism) Amendment (Prescribed Production Variables) Rule 2020* (the Amendment Rule) inserts Government-determined prescribed production variables and corresponding default emissions intensity values into Schedules 2 and 3 of the Principal Rule to give effect to amendments made to the Principal Rule in March 2019. The Amendment Rule also contains minor changes to provide guidance on how to prepare an estimated-emissions intensity calculation under the amendments, and amends the inherent emissions variability criteria to disregard previous calculated-emissions baseline determinations made on the basis of the transitional calculated baseline criteria.

Default emissions intensity values are representative of the average emissions intensity for that output. There is a need to balance the promotion of certainty and stability of the emissions intensity values against the need to incorporate updates to ensure baselines are set consistently with how emissions are reported. While default emissions intensity values will not be updated regularly, there may be instances where updates to the default values are warranted and appropriate. Examples of where updates could be considered include:

- material changes to the National Greenhouse and Energy Reporting Measurement Determination as a result of updating Australia's domestic reporting to remain aligned with the rules and guidance from the United Nations Framework Convention on Climate Change and/or the Intergovernmental Panel on Climate Change,

- introduction of new 'step-change' technologies across a sector or fundamental changes in market practices, and

- introduction of new mandated standards that lead to a material change in the emissions profile across an industry (but not changes in the emissions profile of an industry that occur over time as a result of incremental changes to emissions intensity).

## Consultation

The default values have been developed by the Department of Industry, Science, Energy and Resources in close consultation with industry over 2018-19. They have been developed in line with *The Framework for developing default production variables and emissions intensity values* (the Framework), which was publicly consulted on as part of the consultation for the March 2019 amendments to the Principal Rule.[1]

The following represents the consultation and development process for developing prescribed production variables and default emissions intensity values, noting that the process differed depending on the characteristics of each industry.

**Figure 1: Consultation and development process**


On 20 December 2019, the Government released the proposed amendments to the Principal Rule together with an accompanying explanatory document and detailed technical definitions document. Comments closed on 28 January 2020. 11 submissions were received from the public consultation process. Minor updates to improve workability of some definitions were made in light of consultation.

## Regulatory impact analysis

The Amendment Rule inserts technical details into the Principle Rule that are required to give effect to amendments made in March 2019. Those amendments were covered by the *Amendments to the Emissions Reduction Fund Safeguard Mechanism Final Assessment*

[1] Defaults Framework available at Appendix A of this document: https://www.environment.gov.au/system/files/consultations/56b64cc6-6455-4aa1-9b72-d00b7e09bfb3/files/safeguard-mechanism-rule-amendment-explanatory-document.pdf

*Regulation Impact Statement* (RIS), which was assessed as compliant and consistent with best practice by the Office of Best Practice Regulation (reference number 22431).

## Incorporation

The Amendment Rule refers to a document as in force at the commencement of the amendment, defined as the ***Safeguard Mechanism document***. The full name of the document is: "Safeguard Mechanism: Prescribed production variables and default emissions intensities". This document was published on the website of the Department of Industry, Science, Energy and Resources (www.industry.gov.au) and is incorporated as in force from the commencement of this Amendment Rule consistent with paragraph 14(1)(b) of the *Legislation Act 2003*. The document is also attached to this explanatory statement at Attachment C.

The Schedules also incorporate documents by reference consistent with section 14 of the *Legislation Act 2003*. The *National Greenhous and Energy Reporting (Measurement Determination) 2008*, The *National Greenhous and Energy Reporting Regulations 2008* and *Excise Act 1901* are Commonwealth legislation incorporated from time to time and available from www.legislation.gov.au. The ANZSIC industry classification and code published by the Australian and New Zealand Standard Industrial Classification (available from www.abs.gov.au) is incorporated at the commencement of the Amendment Rule. One ASTM standard is incorporated at the date of its publication and is available from www.astm.org. The Australian Taxation Office Interpretative Decision, ATO ID 2008/154, published on 18 November 2008 is incorporated at the date of its publication and is available from www.ato.gov.au.

These documents are incorporated to ensure the technical accuracy of the production variables and ensure the production variables are interpreted and used consistently with industry standards and applicable legislation.

## Safeguard Rule details

The Principal Rule and the Amendment Rule are legislative instruments within the meaning of the *Legislation Act 2003*. The Principal Rule commenced on 1 July 2016. The Amendment Rule will commence on the day after registration. The ordinary repeal arrangements for amending instruments apply. Details of the amendments are at Attachment A. The scope of each production variable in Schedules 2 and 3 are also set out in further detail in the ***Safeguard Mechanism document*** at Attachment C.

## Statement of Compatibility with Human Rights

A Statement of Compatibility with Human Rights, prepared in accordance with the *Human Rights (Parliamentary Scrutiny) Act 2011,* is at Attachment B of the Explanatory Statement.

# *Attachment A: Details of the sections in the Amendment Rule*

Section 1 – Name of Instrument

This section specifies the name of the rule is the *National Greenhouse and Energy Reporting (Safeguard Mechanism) Amendment (Prescribed Production Variables) Rule 2020* (the 'Amendment Rule').

Section 2 – Commencement

This section provides that the Amendment Rule commences the day after it is registered.

Section 3 – Authority

The Amendment Rule is made under subsection 22XS(1) of the *National Greenhouse and Energy Reporting Act 2007*. The power to make rules under this subsection includes the power to amend or revoke rules that have already been made, with any doubt about this resolved by subsection 33(3) of the *Acts Interpretation Act 1901*.

Section 4 – Schedules

This section provides for the Principal Rule to be amended or repealed as set out in the applicable items in the Schedules to this instrument. The intent of changes made through the Amendment Rule is set out below.

# *Schedule 1 – Amendments*

1. Section 4 – Definitions

This item provides for a new definition, the ***Safeguard Mechanism document***, to be added to the Principal Rule. This document is incorporated into the Amendment Rule and is available on the Department of Industry, Science, Energy and Resources' website. The ***Safeguard Mechanism document*** contains detailed definitions of the prescribed production variables, together with a list of inclusions and exclusions of emissions sources that have been included in the development of the default emissions intensity values. This detail can assist businesses to understand which emissions sources have been used in the development of the default emissions intensity values, and which emissions sources can be used in an estimated (site-specific) emissions intensity value calculation for a calculated baseline application. The document is included at Attachment C.

2. Paragraph 6(1)(a)

This item sets out that for the emissions-intensity of a production variable to meet the emissions-intensity calculation criteria, the requirements of subsections (2) to (8C) are to be met. It is consequential upon the amendments at item 4.

3. Subsections 6(3) and (4)

This item is intended to prevent the double counting of emissions in cases where a facility uses a combination of default and estimated (site-specific) values or the inappropriate allocation of

emissions to a default production variable applicable to the facility. It amends the guidance in subsections 6(3) and 6(4) on the method to calculate the emissions intensity for a production variable where this is inconsistent with the new apportionment rules in subsection (8A). For example, if the electricity prescribed production variable and a mining prescribed production variable are applicable to a facility, the facility cannot only use the electricity prescribed production variable and allocate all of its emissions to electricity production, even though this would comply with subsection 6(3). New subsection (8A) is explained further under item 4.

4. Subsection 6(8A)

This item provides for new apportionment rules so that if an application uses an estimated (site-specific) emissions intensity, emissions cannot be counted more than once in the preparation of the estimated emissions intensity and there cannot be inappropriate allocation of emissions to a prescribed production variable applicable to the facility. In particular, it is important that significant emissions that are not dependent upon the production variable are not allocated to that production variable.

Subsection 6(8A) provides that if an application uses a prescribed production variable with an estimated emissions intensity, the estimated emissions intensity must only be prepared using the same emissions types as in the default emissions intensity for that prescribed production variable (if a default emissions intensity exists), or emissions types that were considered relevant to the prescribed production variable (if a default emissions intensity does not exist), or minor emissions sources comprising less than 10 per cent of the facility's emissions, where (a) they were not included in another default emissions intensity that would apply to the facility, and (b) they were not considered relevant to any prescribed production variable that does not have an associated default emissions intensity. These rules allow minor emissions sources to be bundled with applicable production variables, but prevent the inappropriate allocation of significant emissions to production variables that were not intended to represent those emissions and may not expand or contract with changes in the production of those production variables.

Subsection 6(8B) provides that if the application uses multiple prescribed production variables and a combination of default emissions intensities and estimated emissions intensities, the estimated emissions intensities must not include the same emissions included in the default emissions intensities being used.

Subsection 6(8C) provides that the ***Safeguard Mechanism document*** should be used to determine whether an emissions type was included in either the development of a default emissions intensity, or as relevant to a production variable at the time it was included in Schedule 2 or 3.

5. At the end of subsection 25(6)

This item clarifies an eligibility requirement for the inherent emissions variability criteria. To be eligible for the inherent emissions variability criteria, a facility may have previously had a calculated-emissions baseline determination on the basis of the new facility criteria, the significant expansion criteria, the inherent emissions variability criteria or the initial calculated baseline criteria. The transitional calculated baseline criteria are not listed, so a facility may apply for calculated-emissions baseline determination using the inherent emissions variability if it has previously had a transitional calculated baseline. This reflects that facilities need to move off reported baselines earlier than previously anticipated or get a new calculated-emissions baseline determination because of defined prescribed production variables and this additional transitional baseline application was not intended to limit their existing ability to access the inherent emissions variability criteria.

6. Schedules 2 and 3

This item repeals the empty Schedules 2 and 3 and replaces them with new Schedules 2 and 3.

***Schedule 2*** sets out prescribed (annually adjusted) production variables. Section 4 of the Principal Rule defines 'prescribed (annually adjusted) production variables' as 'a metric related to the production at a facility set out in Schedule 2 that is applicable to the facility in accordance with any requirements set out in that Schedule'.

Each Part of the Schedule sets out one or more metrics which is a prescribed (annually adjusted) production variable and the associated default emissions intensity value in tonnes of carbon dioxide equivalent per unit of the production variable.

Each prescribed (annually adjusted) production variable must be applicable to a facility for it to be used under the Principal Rule. This generally involves the conduct of a particular activity, often defined generally as a transformation of inputs to outputs, to be undertaken at the facility. Further detail on what is intended by the defined production variables is set out in the ***Safeguard Mechanism document*** (at Attachment C). A number of the activity definitions used in the Schedule are the same as defined emissions-intensive trade-exposed activities in the *Renewable Energy (Electricity) Regulations 2001* and are intended to be interpreted consistently with those regulations.

The Principal Rule in paragraph 27(3)(b) and subsection 44(3A) requires that these variables must:

(a) 'be measured using the units specified in Schedule 2'; and

(b) 'meet any measurement requirements or procedures specified in Schedule 2'.

Accordingly, a Part may also include measurement requirements or procedures relevant to the application of the metrics and supporting information required in a report under the Act (as required by Division 4.4A of the *National Greenhouse and Energy Reporting Regulations 2008* for emissions reporting).

Some prescribed production variables do not currently have a default emissions intensity value as these were under development at the time of commencement. The Principal Rule will be amended to include them when they are settled. The ***Safeguard Mechanism document*** explains the emissions relevant to the development of each production variable and the calculation of its default emissions intensity value. It should be read when preparing estimated emissions intensity value. It is also attached at Attachment C.

The Schedules also incorporate documents by reference. The *National Greenhous and Energy Reporting (Measurement Determination) 2008*, *National Greenhous and Energy Reporting Regulations 2008* and *Excise Act 1901* are Commonwealth legislation incorporated from time to time and available from www.legislation.gov.au. The ANZSIC industry classification and code published by the Australian and New Zealand Standard Industrial Classification (available from www.abs.gov.au) is incorporated at the commencement of the Amendment Rule. One ASTM standard is incorporated at the date of its publication and is available from www.astm.org. The Australian Taxation Office Interpretative Decision, ATO ID 2008/154, published on 18 November 2008 is incorporated at the date of its publication and is available from www.ato.gov.au.

A summary of the prescribed production variables and default emissions intensity value is in the table below.

**Table 1: Summary of Schedule 2**

| SCHEDULE 2 | | | |
|---|---|---|---|
| **Part** | **Prescribed Production Variable** | **Default Emissions Intensity Value (tonnes carbon dioxide equivalent per unit)** | **Default Emissions Intensity Unit** |
| **MANUFACTURING** | | | |
| 2 | Bulk flat glass | 0.774 | tonnes of bulk flat glass |
| 3 | Glass containers | 0.521 | tonnes of glass containers |
| 4 | Aluminium | 1.86 | tonnes of primary aluminium |
| 5 | Alumina | 0.545 | tonnes of alumina and alumina equivalent tonnes of alumina trihydrate |
| 6 | Ammonia | 1.87 | tonnes of 100% equivalent anhydrous ammonia |
| 7 | Ammonium nitrate | 0.352 | tonnes of 100% equivalent ammonium nitrate |
| 8 | Urea | 0.566 | tonnes of 100% equivalent carbamide |
| 9 | Diammonium phosphate | 0.078 | tonnes of diammonium phosphate products |
| | Monoammonium phosphate | 0.088 | tonnes of monoammonium phosphate products |
| 10 | Sodium cyanide | | tonnes of 100% equivalent sodium cyanide |
| 11 | Synthetic rutile | 1.15 | tonnes of synthetic rutile |
| 12 | White titanium dioxide pigment | 1.68 | tonnes of white titanium dioxide pigment |
| **MINING** | | | |
| 13 | Run of mine coal | | tonnes of run-of mine coal |
| | Coal mine waste gas | | tonnes of unmitigated coal mine waste gas |
| | Fugitive emissions at a decommissioned underground coal mine | 1 | tonnes of reported fugitive emissions |

| | | | |
|---|---|---|---|
| 14 | Iron ore | | tonnes of iron ore |
| 15 | Manganese ore | | tonnes of manganese ore product |
| 16 | Bauxite | | tonnes of bauxite product |
| 17 | Heavy metal concentrate | | tonnes of heavy metal concentrate |
| 18 | Run of mine metal ore | | tonnes of run-of-mine metal ore |
| **OIL AND GAS –** Part 19 | | | |
| Div 2 | Extracted oil and gas hydrocarbon | | gigajoules of unprocessed natural gas and unstabilised crude oil and condensate |
| Div 3 | Stabilised crude oil or condensate (stabilisation only) | | gigajoules of crude oil and condensate |
| Div 4 | Stabilised crude oil and condensate (integrated extraction and stabilisation) | | gigajoules of crude oil |
| Div 5 | Processed natural gas (processing only) | | gigajoules of processed natural gas |
| Div 6 | Processed natural gas (integrated extraction and processing) | | gigajoules of processed natural gas |
| Div 7 | Liquefied natural gas (from unprocessed natural gas) | | gigajoules of liquefied natural gas |
| Div 8 | Liquefied natural gas (from processed natural gas) | | gigajoules of liquefied natural gas |
| Div 9 | Ethane | | gigajoules of ethane |
| Div 10 | Liquefied petroleum gas | | gigajoules of liquefied petroleum gas |
| Div 11 | Reservoir carbon dioxide | | tonnes of reservoir carbon dioxide |
| **STEEL MANUFACTURING –** Part 20 | | | |
| Div 2 | Coke oven coke (integrated iron and steel manufacturing) | 0.467 | tonnes of coke oven coke |
| Div 3 | Lime (integrated iron and steel manufacturing) | 0.780 | tonnes of lime |

| | | | |
|---|---|---|---|
| Div 4 | Iron ore sinter (integrated iron and steel manufacturing) | 0.233 | tonnes of iron ore sinter |
| Div 5 | Iron ore pellets (integrated iron and steel manufacturing) | 0.0586 | tonnes of iron ore pellets |
| Div 6 | Continuously cast carbon steel products and ingots of carbon steel (integrated iron and steel manufacturing) | 1.50 | tonnes of continuously cast carbon steel products and ingots of carbon steel |
| Div 7 | Hot-rolled long products (integrated iron and steel manufacturing) | 0.101 | tonnes of long products |
| Div 8 | Hot-rolled flat products (integrated iron and steel manufacturing) | 0.000358 | tonnes of flat products |
| Div 9 | Continuously cast carbon steel products and ingots of carbon steel (manufacture of carbon steel products from cold ferrous feed) | 0.0981 | tonnes of continuously cast carbon steel products and ingots of carbon steel |
| Div 10 | Hot-rolled long products (not integrated iron and steel manufacturing) | 0.0750 | tonnes of long products |
| Div 11 | Hot-rolled flat products (not integrated iron and steel manufacturing) | | tonnes of flat products |
| Div 12 | Iron ore pellets (not from integrated iron and steel manufacturing) | 0.0517 | tonnes of iron ore pellets |
| **RAIL TRANSPORT –** Part 21 | | | |
| Div 2 | Bulk freight on a dedicated line | 0.00000527 | net-tonne-kilometres of bulk freight |
| Div 3 | Bulk freight on a non-dedicated line | 0.0000163 | net-tonne-kilometres of bulk freight |
| Div 4 | Non-bulk freight | 0.0000204 | net-tonne-kilometres of freight |
| Div 5 | Rail passenger transport | 0.0000710 | passenger-kilometres |
| **AIR TRANSPORT** | | | |
| 22 | Air transport | 0.00112 | revenue-tonne-kilometres |

| | | | |
|---|---|---|---|
| **ROAD TRANSPORT** | | | |
| 23 | Passenger road transport | 0.00164 | vehicle-kilometres of passenger road transport |
| **WATER TRANSPORT** | | | |
| 24 | Mixed passenger and freight water transport | 0.000103 | operational deadweight-tonne-kilometres |
| **OTHER** | | | |
| 25 | Wastewater handling (domestic and commercial) COD removed | 0.459 | tonnes of COD removed |
| | Wastewater handling (domestic and commercial) Nitrogen removed | 5.03 | tonnes of nitrogen removed |
| 26 | Electricity generation | 0.538 | megawatt hours of electricity generated or exported |

***Schedule 3*** sets out the prescribed (fixed) production variables. It follows the same structure and content as Schedule 2. Section 4 of the Principal Rule defines 'prescribed (fixed) production variables' as 'a metric related to the production at a facility set out in Schedule 3 that is applicable to the facility in accordance with any requirements set out in that Schedule'.

The Principal Rule in paragraphs 27(3)(b) and 41(3)(c) requires that these variables must:

(a) 'be measured using the units specified in Schedule 3'; and

(b) 'meet any measurement requirements or procedures specified in Schedule 3'.

Each Part of Schedule 3 may also include measurement requirements or procedures relevant to the application of the metrics.

The ***Safeguard Mechanism document*** explains the emissions relevant to the development of each production variable and the calculation of its default emissions intensity value. It should be read when preparing estimated emissions intensity values.

A summary of the prescribed production variables and default emissions intensity values is in the table below.

**Table 2: Summary of Schedule 3**

| SCHEDULE 3 | | | |
|---|---|---|---|
| **Part** | **Prescribed Production Variable** | **Default Emissions Intensity Value (tonnes carbon dioxide equivalent per unit)** | **Default Emissions Intensity Unit** |
| | **PERTROLEUM REFINING** | | |
| 2 | Petroleum feedstock | 0.136 | kilolitres of substances mentioned |

**Worked examples**

The March 2019 amendments provide responsible emitters with a number of options when preparing a calculated baseline application using the transitional calculated baseline criteria. The following examples are included for guidance purposes, they are indicative and are not exhaustive.

***Example 1: Baseline comprising multiple prescribed production variables and default emissions intensity values***

Facility A produces three outputs: A1, A2 and A3. Each of these is a prescribed (annually adjusted) production variable listed in Schedule 2.

Facility A chooses to use the three prescribed (annually adjusted) production variables and their default emissions intensity values. This combination of electing to use only prescribed (annually adjusted) production variables and their default emissions intensity values means Facility A can move directly onto a production adjusted (annually adjusted) baseline (refer subparagraph 40(1)(ab)(iii)).

Facility A makes an application for a production adjusted (annually adjusted) baseline as follows:

$$Baseline_t = Q_{(A1,t)} \times EI_{A1} + Q_{(A2,t)} \times EI_{A2} + Q_{(A3,t)} \times EI_{A3}$$

Where:

- $Baseline_t$ is the production adjusted baseline for Facility A in any year t
- $Q_{(A1,t)}$ is the quantity of prescribed (annually adjusted) production variable A1 in year t
- $EI_{A1}$ is the default emissions intensity for A1
- $Q_{(A2,t)}$ is the quantity of prescribed (annually adjusted) production variable A2 in year t
- $EI_{A2}$ is the default emissions intensity for A2
- $Q_{(A3,t)}$ is the quantity of prescribed (annually adjusted) production variable A3 in year t
- $EI_{A3}$ is the default emissions intensity for A3

***Example 2: Baseline comprising a prescribed production variable and an estimated emissions intensity***

Facility B produces two outputs: B1 and B2. The prescribed production variables for outputs B1 and B2 are Schedule 2 annually adjusted production variables.

Facility B prepares a calculated baseline application under the transitional calculated baseline criteria. Facility B applies for the calculated emissions baseline to start on 1 July 2019, meaning they have the option under subparagraph 27(1)(d)(i)(A) of using an estimated emissions intensity.

Facility B chooses to adopt the default emissions intensity value for B1, and prepare an estimated (site specific) emissions intensity for B2.

Facility B's calculated emissions baseline would be prepared based on:

$$\text{Calculated emissions baseline} = Q_{(B1,f)} \times EI_{B1} + Q_{(B2,f)} \times EI_{(B2,f)}$$

Where:

- Calculated emissions baseline is the calculated emissions baseline for Facility B
- Q(B1,f) is a forecast of the highest production quantity of prescribed (annually adjusted) production variable B1 over the three year calculated emissions baseline period2
- EIB1 is the default emissions intensity for B1
- Q(B2,f) is a forecast of the highest production quantity of prescribed (annually adjusted) production variable B2 over the three year calculated emissions baseline period
- EIB2 is Facility B's estimated emissions intensity for B2 for the forecast year of highest production

[2] Some facilities may be eligible for a five year baseline period.

***Example 3: Baseline comprising a site specific production variable and estimated emissions intensity***

Facility C produces two outputs: C1 and C2.

A prescribed production variable has been made for C1, however there is no prescribed production variable for C2. Facility C is the only Australian producer of C2. In any one year, the production of C2 contributes between 10 to 20 per cent of Facility C's total emissions.

Facility C prepares a calculated baseline application using the transitional calculated baseline criteria. Facility C applies for the calculated emissions baseline to start on 1 July 2019, meaning they have the option under paragraph 26A(5) of using a production variable that is not a prescribed production variable.

Facility C refers to the *Safeguard Mechanism: Prescribed production variables and default emissions intensities* document to understand the emissions sources included in the default emissions intensity value for C1. Facility C apportions its total facility emissions between the production of C1 and the production of C2. Facility C takes care to ensure the only emissions attributed to the production of C2 are emissions that are relevant to the production of C2 and are not counted in the default emissions intensity value for the production of C1.

Facility C's calculated emissions baseline is prepared as follows:

$$\text{Calculated emissions baseline} = Q_{(C1,f)} \times EI_{C1} + Q_{(C2,f)} \times EI_{(C2,f)}$$

Where:

- Calculated emissions baseline is the calculated emissions baseline for Facility C
- $Q_{(C1,f)}$ is a forecast of the highest production quantity of prescribed (annually adjusted) production variable C1 over the three year calculated emissions baseline period
- $EI_{C1}$ is the default emissions intensity for C1
- $Q_{(C2,f)}$ is a forecast of the highest production quantity of the site specific production variable of C2 over the three year calculated emissions baseline period
- $EI_{C2}$ is Facility C's estimated emissions intensity for C2 for the forecast year of highest production

***Example 4: Baseline comprising Schedule 2 and 3 production variables***

Facility D manufactures D1 and also generates electricity on-site. It currently has a reported baseline, and is applying for a calculated emissions baseline for the 2019-20 compliance year using one estimated (site-specific) and one default emissions intensity value. The prescribed production variables applicable to Facility D are D1 which is a fixed (Schedule 3) production variable and electricity generation which is a annually adjusted (Schedule 2) production variable.

Facility D estimates its highest production of its primary production variable, D1, will occur in 2020-21. It estimates the production level will be 200,000 tonnes, and the estimated emissions intensity is 0.6 t $CO_2$-e/tonne of D1. It also estimates it will generate 100 MWh of electricity in 2020-21. The default emissions intensity for electricity generation is 0.538 t $CO_2$-e/MWh. The facility's calculated baseline will be 120,054 t $CO_2$-e, calculated below:

| | | | | |
|---|---|---|---|---|
| Calculated baseline | = | D1 | + | electricity generation |
| 120,054 t $CO_2$-e | = | (200,000 x 0.6) | | (100 x 0.538) |

After the three year calculated baseline period of 2019-20 to 2021-22, Facility D's actual highest production of D1 was 250,000 tonnes, with an electricity generation level of 120 megawatts.

Facility D applies for a production-adjusted baseline to start from 1 July 2022. Facility D elects to continue to use its estimated emissions intensity value for D1. Facility D's baseline will be a combination of a fixed component from D1, and an annually-adjusting component from electricity generation.

In 2022-23, Facility D generated 120 MWh of electricity. Its production-adjusted baseline was 150,065 t $CO_2$-e:

| | | | | |
|---|---|---|---|---|
| Production-adjusted baseline | = | D1 | + | electricity generation |
| 150,065 t $CO_2$-e | = | (250,000 x 0.6) | + | (120 x 0.538) |

In 2023-24, Facility D generated 105 MWh of electricity. Its production-adjusted baseline was 150,058 t $CO_2$-e:

| | | | | |
|---|---|---|---|---|
| Production-adjusted baseline | = | D1 | + | electricity generation |
| 150,056 t $CO_2$-e | = | (250,000 x 0.6) | + | (105 x 0.538) |

***Example 5: Coal Mine Waste Gas***

A facility produces 1,200,000 t $CO_2$-e unmitigated coal mine waste gas (CMWG) in a year; i.e. before any mitigation or gas transfer activities take place. The facility reports 900,000 t $CO_2$-e into NGERS for activities related to flaring, venting or other fugitive emissions.

At the basic level, the equation for determining a facility baseline (or baseline component) is:

$$Baseline = Quantity\ of\ Production\ Variable\ x\ Emissions\ Intensity$$

For CMWG the emissions intensity is:

$$EI = 1 - \frac{CMWG\ Destroyed\ \text{t}\ \text{CO}_2\text{e}}{CMWG\ Generated\ \text{t}\ \text{CO}_2\text{e}}$$

To determine the CMWG generated, the facility must either:

- Measure the CMWG generated in t $CO_2$-e; or
- Back calculate the CMWG generated from the emissions released to atmosphere.

For the facility, the CMWG destroyed will be:

$$\begin{aligned} CMWG\ Destroyed &= CMWG\ Generated - CMWG\ Emissions\ Reported\ to\ NGERS \\ &= 1{,}200{,}000 - 900{,}000 \\ &= 300{,}000\ \text{t}\ \text{CO}_2 - \text{e} \end{aligned}$$

The site specific emissions intensity of the facility is therefore:

$$\begin{aligned} EI &= 1 - \frac{300{,}000}{1{,}200{,}000} \\ &= 0.75 \end{aligned}$$

The baseline using the site specific emissions intensity is:

$$\begin{aligned} Baseline &= 1{,}200{,}000\ x\ 0.75 \\ &= 900{,}000\ \text{t}\ \text{CO}_2\text{-e} \end{aligned}$$

If the default emissions intensity for the unmitigated CMWG production variable is 0.8 (**NOT ACTUAL DEFAULT VALUE**) then the facility could opt to use the default value and receive the following baseline:

$$\begin{aligned} Baseline &= 1{,}200{,}000\ x\ 0.8 \\ &= 960{,}000\ \text{t}\ \text{CO}_2\text{e} \end{aligned}$$

***Example 6: Mass Balance Measurement***

A company operates an integrated supply chain comprising multiple safeguard facilities. The supply chain incorporates raw material extraction, downstream refining and value adding activities to produce a number of products. The raw material produced is a magnetite concentrate which is directly transported to a downstream processing facility.

The magnetite concentrate is transported to the downstream processing facility via a pipeline where it directly enters into processing equipment where additives are introduced to the magnetite concentrate in preparation for further processing. Rigorous measurement of the products occur prior to magnetite concentration, and after additives have been incorporated in a processing activity.

Therefore, the most rigorous measurement points do not align with the corresponding production variable of 'saleable iron ore product' (for magnetite this means the saleable product after dewatering) and does not occur at the facility boundary.

In this case, there is a rigorous measurement point which is equivalent to magnetite concentrate + additives. Where the quantity of additive is known, the corresponding volume of magnetite concentrate can be determined.

For example, if the measurement of total product (including additives) is 100t and it is known that 10t of additive X, and 5t of additive Y was added, then the amount of magnetite concentrate will be:

$$Magnetite\ concentrate = total\ product - additive\ X - additive\ Y$$
$$Magnetite\ concentrate = 100t - 10t - 5t$$
$$Magnetite\ concentrate = 85t$$

This quantity of magnetite concentrate can then be used as the production for the facility where the magnetite was extracted.

Suitable evidence of measurement could include the records from the weigh bridge after additives have been included, internal company production records of production and/or additives added, or other industry or company standard practice.

# *Attachment B: Statement of Compatibility with Human Rights*

*Prepared in accordance with Part 3 of the Human Rights (Parliamentary Scrutiny) Act 2011*

**National Greenhouse and Energy Reporting (Safeguard Mechanism) Amendment (Prescribed Production Variables) Rule 2020**

This disallowable Legislative Instrument is compatible with the human rights and freedoms recognised or declared in the international instruments listed in section 3 of the *Human Rights (Parliamentary Scrutiny) Act 2011*.

## Overview of the legislative instrument

The Safeguard Mechanism provides a framework for Australia's largest emitters to measure, report and manage their emissions. Amendments were made to the *National Greenhouse and Energy Reporting (Safeguard Mechanism) Rule 2015* (the Principal Rule) in March 2019 to:

1. Bring baselines up-to-date by transitioning all facilities to calculated or production adjusted baselines over 2018-19 and 2019-20.

2. Simplify calculated baseline applications by giving businesses the option to use Government-determined *prescribed production variables* and *default emissions intensity* values for calculating baselines.

3. Update baselines annually for actual production where facilities use eligible production variables, so they continue to reflect facility circumstances. This requires business to report production.

The *National Greenhouse and Energy Reporting (Safeguard Mechanism) Amendment (Prescribed Production Variables) Rule 2020* (the Amendment Rule) inserts the Government-determined prescribed production variables and corresponding default emissions intensity values into Schedules 2 and 3 of the Principal Rule. The Amendment Rule also contains minor changes to provide guidance on how to prepare an estimated-emissions intensity calculation under the amendments, and amend the inherent emissions variability criteria to allow up to two calculated emissions baseline determinations to have been made before the inherent emissions variability criteria is used.

## Human rights implications

This disallowable Legislative Instrument does not engage any of the applicable rights or freedoms.

The Amendment Rule inserts technical details into the Principal Rule that are required to give effect to amendments to the Principal Rule made in March 2019. Prescribed production variables and default emissions intensity values were developed using production and emissions data from facilities operating in Australia for most sectors covered under the Safeguard Mechanism. A guiding principle is protecting the confidentiality of sensitive industry data through the use of high quality and robust data. To preserve confidentiality, an average of multiple data points (over multiple facilities and multiple years) was taken rather than using a single data point. Where a sector has one facility, permission was given to publish the default emissions intensity value.

The Amendment Rule does not authorise an unlawful interference with an individual's privacy because it applies to large facilities whose responsible emitters are only likely to be very large businesses, not individuals, and the Amendment Rule adequately specifies the circumstances in which information may be collected. Information provided to the Clean Energy Regulator is protected

by strict secrecy provisions in the *Clean Energy Regulator Act 2011* as well as the *Privacy Act 1988*. The information that is published about the Safeguard Mechanism is often publicly available from other sources, not of a personal nature and relates to the integrity of the Safeguard Mechanism.

## Conclusion

This disallowable Legislative Instrument is compatible with human rights as it does not raise any human rights issues.

**Minister for Energy and Emissions Reduction**

**The Hon. Angus Taylor MP**


# *Attachment C: Safeguard Mechanism prescribed production variables and default emissions intensities*

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**Abbreviations and acronyms**

| | |
|---|---|
| $CO_2$ | Carbon dioxide |
| CCS | Carbon Capture and Storage |
| CMWG | Coal mine waste gas |
| GJ | Gigajoules |
| LNG | Liquefied Natural Gas |
| LPG | Liquefied Petroleum Gas |
| NGER | National Greenhouse and Energy Reporting |
| t | tonnes |
| t $CO_2$-e | tonnes of $CO_2$ equivalent |

# PURPOSE OF THIS DOCUMENT

The purpose of this document is to **define production variables** for use in calculated baseline applications made under the Safeguard Mechanism.

They will be used for setting baselines using the following formula:

*For all relevant production variables:*

Facility baseline = Σ (Production x Emissions Intensity)

Each production variable definition identifies the emissions sources that can contribute to the calculation of an emissions intensity value.

There are two types of emissions intensity values:

- **Default emissions intensity values**: are set by the Government and published in the Safeguard Mechanism Rule. They represent the industry average emissions intensity of production over five years.
- **Estimated (site-specific) emissions intensity values**: are set by businesses. They represent the emissions intensity of production at an individual facility.

This document can help businesses to understand which emissions sources have been used in the development of the default emissions intensity values, and which emissions sources can be used in an estimated (site-specific) emissions intensity value calculation.

## Background

### *Sources of emissions used in setting default emissions intensity values*

Production variable definitions and default emissions intensity values are published in Schedules 2 and 3 of the *National Greenhouse and Energy Reporting (Safeguard Mechanism) Rule 2015* (Safeguard Rule).

- **Schedule 2 production variables** result in baselines that can be updated each year for actual production.
- **Schedule 3 production variables** result in baselines that are fixed.

Almost all production variables are in Schedule 2. Schedule 3 is intended to allow for circumstances where an appropriate output-based production variable could not be found, so a proxy has been used that is not appropriate for annual adjustment.

All facilities can access a transitional calculated baseline in 2018-19 or 2019-20. During this transitional phase, the use of default emissions intensity values is optional.

A facility with multiple outputs could use a combination of default and estimated (site-specific) emissions intensity values. In these cases, it is important that emissions are not counted twice. That is, emissions should only be assigned to one production variable. In some cases, emissions from a particular process will need to be apportioned among two or more production variables.

This document defines the production variables and specifies the sources of emissions used by the Department to calculate default emissions intensity values. It provides guidance for businesses and auditors on the emissions sources facilities can use in site-specific emissions intensity calculations and how apportioning should be done.

### *Sources of emissions that can be used by Responsible Emitters when setting an estimated (site-specific) emissions intensity for a prescribed production variable*

The amendment to subsection 6(8B) of the Safeguard Rule establishes that where a facility uses an estimated (site-specific) emissions intensity value, the facility can only include emissions relevant to the calculation of the default emissions intensity value (or emissions relevant in defining the prescribed production variable wherever a prescribed production variable has no associated default emissions intensity). The inclusion lists, which are presented in this document, will help businesses calculate estimated (site-specific) emissions intensity values.

### *Defining prescribed production variables and default emissions intensities*

The process of defining production variables and default emissions intensity values has involved extensive stakeholder consultation and independent technical expert review. It was undertaken in accordance with the *Framework for developing default production variables and emissions-intensity value*[3] (the Framework document). The Framework document was consulted on publicly as part of the consultation for the March 2019 amendments to the Safeguard Rule.

Each production variable and default emissions intensity value was individually reviewed by an independent expert for adherence to the Framework document. In addition, all production variables and default emissions intensity values were reviewed together to check that the principles in the Framework document were applied consistently across sectors.

### *Production variable definitions and emissions source boundaries*

The following sections set out the emissions sources that were either included in or excluded from default emissions intensity calculations, and specify which emissions sources can be included in the calculation of an estimated (site-specific) emissions intensity value for a prescribed production variable. Additional information is provided for most production variables in the mining, oil and gas sectors, as there are a wide variety of facility structures, with many facilities producing multiple products.

[3] The Framework document is available here: http://www.environment.gov.au/system/files/consultations/56b64cc6-6455-4aa1-9b72-d00b7e09bfb3/files/safeguard-mechanism-rule-amendment-explanatory-document.pdf (see Appendix A).

Note: Throughout this document, the terms ‘on-site’ and ‘off-site’ refer to the site of a facility.

# SCHEDULE 2 PRODUCTION VARIABLES

## Manufacturing (other than steel)

# 1. Bulk flat glass

### 1.1. Production variable definition

1. Tonnes of bulk flat glass that:
   (a) is produced as part of carrying on the bulk flat glass activity at the facility; and
   (b) is of saleable quality.
2. The metric in subsection (1) is applicable to a facility that conducts the activity of producing bulk flat glass through the physical and chemical transformation of silica (silicon dioxide (SiO2)) and other raw and recycled materials (such as cullet) to produce bulk flat glass products, including wired glass and patterned glass, by controlled melting and forming in a contiguous process (the ***bulk flat glass activity***).
3. The default emissions intensity is 0.774 t $CO_2$-e per tonne of bulk flat glass.

### 1.2. Inclusions

For the purposes of the development of the default emissions intensity value and the preparation of an estimated (site-specific) emission intensity value for this production variable, scope 1 emissions from the following processes at the facility are included:

- melting, refining and conditioning;
- primary colouring, coating and trimming/cutting;
- secondary finishing of bulk flat glass such as secondary coating, laminating, toughening, mirroring, printing, cutting, edgeworking, insulating, glazing, encapsulating, extrusion assembling and moulding;
- complementary processes, such as packaging, head office, administrative and marketing operations where they are undertaken at the facility;
- the use of machinery, equipment and processes for the physical and/or chemical transformation described in the activity definition, including, for example:
  - machinery used to move materials within the facility, including mobile equipment;
  - control rooms, laboratories, maintenance workshops;
  - machinery used to create non-electrical energy for use in the activity;
  - the processing of by-products where they involve the recovery of materials for re-use within the facility or are necessary for the activity to proceed as described;
  - processing of by-products and waste materials from the activity;
  - furnaces, including to melt raw materials;
- cleaning of flat glass for reuse in its same physical form; and
- other incidental, ancillary or supporting processes which are not included in another default or estimated emissions intensity value.

Bulk flat glass production includes the float glass and rolled glass methods of production, as well as the sheet and plate glass methods of production.

The default emissions intensity value for the bulk flat glass activity includes all scope 1 NGER-reported emissions from the facilities relevant for setting the default intensity value, except scope 1 emissions from on-site electricity generation.

## 1.3. Exclusions

Scope 1 emissions from the following processes were not included in the default emissions intensity calculation for this production variable, and must be excluded from the calculation of an estimated (site-specific) emissions intensity value for the production variable:

- processes that do not occur within the facility:
  - off-site cutting, polishing, and washing of glass;
  - off-site processes such as: the extraction of silica; collection, sorting and transport of cullet; and secondary processing of flat glass products (such as secondary coating, laminating, toughening, mirroring, printing, cutting, polishing, washing, edge working, insulating, glazing, encapsulating, extrusion assembling and moulding); and
- on-site electricity generation.

# 2. Glass containers

## 2.1. Production variable definition

1. Tonnes of blown and pressed glass containers that:
   (a) are produced as part of carrying on the glass containers activity at the facility; and
   (b) are of saleable quality.
2. The metric in subsection (1) is applicable to a facility that conducts the activity of producing glass containers through the physical and chemical transformation of silica (silicon dioxide ($SiO_2$)) and other raw and recycled materials (such as cullet) to produce blown or pressed glass containers, by controlled melting and forming in a contiguous process (the ***glass containers activity***).
3. The default emissions intensity is 0.521 t $CO_2$-e per tonne of glass containers.

## 2.2. Inclusions

For the purposes of the development of the default emissions intensity value and the preparation of an estimated (site-specific) emission intensity value for this production variable, scope 1 emissions from the following processes at the facility are included:

- secondary finishing of glass containers such as printing / labelling, treatment for chemical resistance and coating;
- complementary processes, such as packaging, head office, administrative and marketing operations;
- the use of machinery, equipment and processes for the physical and/or chemical transformation described in the activity definition, including, for example:
  - machinery used to move materials within the facility, including mobile equipment;
  - control rooms, laboratories, maintenance workshops;
  - machinery used to create non-electrical energy for use in the activity;
  - the processing of by-products where they involve the recovery of materials for re-use within the facility or are necessary for the activity to proceed as described;
  - processing of by-products and waste materials from the activity;
  - furnaces;
- the washing and cleaning of a glass container for reuse in its same physical form; and
- other incidental, ancillary or supporting processes which are not included in another default or estimated emissions intensity value.

The production of glass containers includes the alternative processes of the production of borosilicate glass to produce borosilicate glass containers (such as pyrex) and the production of glass containers entirely from cullet.

To produce glass containers, the controlled melting and forming may use both the ‘blow and blow’ method and/or the ‘press and blow’ method.

The default emissions intensity value for the glass containers activity includes all scope 1 NGER-reported emissions from the facilities relevant for setting the default intensity value, except scope 1 emissions from on-site electricity generation.

## 2.3. Exclusions

Scope 1 emissions from the following processes were not included in the default emissions intensity calculation for this production variable, and must be excluded from the calculation of an estimated (site-specific) emissions intensity value for the production variable:

- the quarrying of silica;
- processes that do not occur within the facility:
  - the off-site sorting and processing of cullet,
  - the off-site processing of glass containers (such as labelling, treatment for chemical resistance and coating); and
- on-site electricity generation.

# 3. Aluminium

## 3.1. Production variable definition

1. Tonnes of primary aluminium (Al) that:
   (a) has a concentration of aluminium equal to or greater than 98%; and
   (b) is produced as part of carrying on the aluminium smelting activity at the facility; and
   (c) is weighed after electrolysis but before casting.
2. The metric in subsection (1) is applicable to a facility that conducts the activity of aluminium smelting through the physical and chemical transformation of alumina (aluminium oxide ($Al_2O_3$)) into saleable aluminium metal (Al) (the ***aluminium smelting activity***).
3. The default emissions intensity is 1.86 t $CO_2$-e per tonne of primary aluminium.

## 3.2. Inclusions

For the purposes of the development of the default emissions intensity value and the preparation of an estimated (site-specific) emission intensity value for this production variable, scope 1 emissions from the following processes at the facility are included:

- the use of machinery, equipment and processes for the physical and/or chemical transformation described in the activity definition, including, for example:
  - machinery used to move materials within the facility, including mobile equipment;
  - control rooms, laboratories, maintenance workshops;
  - machinery used to create non-electrical energy for use in the activity;
  - the processing of by-products where they involve the recovery of materials for re-use within the activity or are necessary for the activity to proceed as described;
  - processing of by-products and waste materials from the activity;
- electrolysis, including using a process commonly referred to as the Hall-Héroult Process;
- alloying and casting of primary aluminium into saleable aluminium metal;
- the production of anodes;
- waste heat recovery within the facility; and
- other incidental, ancillary or supporting processes which are not included in another default or estimated emissions intensity value.

The default emissions intensity value for the aluminium smelting activity includes all scope 1 NGER-reported emissions from the facilities relevant for setting the default intensity value, except scope 1 emissions from on-site electricity generation.

## 3.3. Exclusions

Scope 1 emissions from the following processes were not included in the default emissions intensity calculation for this production variable, and must be excluded from the calculation of an estimated (site-specific) emissions intensity value for the production variable:

- the production of alumina (aluminium oxide, Al203);
- the production of cathodes;
- the production of alloying materials;
- the smelting and associated casting of secondary aluminium metal (Al);
- processes that do not occur within the facility, such as downstream processing of aluminium metal (Al) beyond the facility; and
- on-site electricity generation.

# 4. Alumina

## 4.1. Production variable definition

1. Combined:
   (a) tonnes of alumina (aluminium oxide ($Al_2O_3$)) that:
      (i) has a concentration of aluminium oxide equal to or greater than 95%; and
      (ii) is produced as part of carrying on the alumina refining activity at the facility; and
      (iii) is of saleable quality; and
   (b) alumina equivalent tonnes of alumina trihydrate ($Al(OH)_3$) that:
      (i) is produced as part of carrying on the alumina refining activity at the facility; and
      (ii) is of saleable quality.
2. The metric in subsection (1) is applicable to a facility that conducts the activity of alumina refining through the physical and chemical transformation of bauxite (which is an ore containing mineralised aluminium compounds) into either or both of alumina (aluminium oxide ($Al_2O_3$)) with a concentration of aluminium oxide equal to or greater than 95% and alumina trihydrate ($Al(OH)_3$) (the ***alumina refining activity***).
3. The default emissions intensity is 0.545 t $CO_2$-e per tonne of alumina and alumina equivalent tonnes of alumina trihydrate.

## 4.2. Inclusions

Note that this production variable includes production of specialty aluminas and hydrate (alumina trihydrate, $Al(OH)_3$).

When converting alumina trihydrate (on a dry tonnes basis) to alumina equivalent tonnes, the following industry standard conversion formula should be used:

$$1 \text{ t } Al(OH)_3 = 0.6538 \text{ t } Al_2O_3 \ (102/(2 \times 78))$$

For the purposes of the development of the default emissions intensity value and the preparation of an estimated (site-specific) emission intensity value for this production variable, scope 1 emissions from the following processes at the facility are included:

- the use of machinery, equipment and processes for the physical and/or chemical transformation described in the activity definition, for example:
  - machinery used to move materials within and as part of the activity;
  - control rooms, laboratories, maintenance workshops;
  - machinery used to create non-electrical energy for use in the activity;
  - the processing of by-products where it involves the recovery of materials for re-use within the activity or is necessary for the activity to proceed as described;
  - processing of waste materials from the activity;
- wet grinding, digestion, clarification, precipitation and calcination, including using a process commonly referred to as the 'Bayer Process';

- any bauxite residue processing which involves caustic liquor recovery for reuse in the activity;
- waste heat recovery within the facility;
- production of lime (calcium oxide compounds);
- production of feedstock caustic soda (sodium hydroxide, NaOH) besides that which is generated or recovered in the activity;
- the production of steam; and
- other incidental, ancillary or supporting processes which are not included in another default or estimated emissions intensity value.

The default emissions intensity value for the alumina refining activity includes all scope 1 NGER-reported emissions from the facilities relevant for setting the default intensity value, except scope 1 emissions from on-site electricity generation.

## 4.3. Exclusions

Scope 1 emissions from the following processes were not included in the default emissions intensity calculation for this production variable, and must be excluded from the calculation of an estimated (site-specific) emissions intensity value for the production variable:

- extraction (e.g. mining) and pre-processing (e.g. crushing) of bauxite prior to wet grinding, including washing and crushing at the bauxite mine;
- processes that do not occur within the facility; and
- on-site electricity generation.

# 5. Ammonia

## 5.1. Production variable definition

1. Tonnes of 100% equivalent anhydrous ammonia ($NH_3$) contained within anhydrous ammonia that:
   (a) has a concentration of ammonia equal to or greater than 98%; and
   (b) is produced as part of carrying on the ammonia production activity at the facility; and
   (c) is of saleable quality.
2. The metric in subsection (1) is applicable to a facility that conducts the activity of producing ammonia through the chemical transformation of hydrocarbons (or other hydrogen feedstock) to hydrogen ($H_2$) that is subsequently reacted with nitrogen ($N_2$) to produce anhydrous ammonia ($NH_3$) that has a concentration of ammonia ($NH_3$) equal to or greater than 98% (the ***ammonia production activity***).
3. The default emissions intensity is 1.87 t $CO_2$-e per tonne of 100% equivalent anhydrous ammonia.

## 5.2. Inclusions

For the purposes of the development of the default emissions intensity value and the preparation of an estimated (site-specific) emission intensity value for this production variable, scope 1 emissions from the following processes at the facility are included:

- chemical transformation of a hydrocarbon feedstock (or other hydrogen feedstock) to hydrogen;
- extraction of nitrogen from air, where the nitrogen is used for the ammonia production process;
- removal of carbon dioxide gas prior to the synthesis of ammonia;
- liquefaction of ammonia product;
- transfer and refrigeration of ammonia to/from storage within the facility;
- the use of machinery, equipment and processes for the physical and/or chemical transformation described in the activity definition, including, for example:
  - machinery used to move materials within the facility, including mobile equipment;
  - control rooms, laboratories, maintenance workshops;
  - machinery used to create non-electrical energy for use in the activity;
  - the processing of by-products where they involve the recovery of materials for re-use within the activity or are necessary for the activity to proceed as described;
  - processing of by-products and waste materials from the activity; and
- other incidental, ancillary or supporting processes which are not included in another default or estimated emissions intensity value.

It is intended that all Scope 1 NGER-reported emissions from a facility can be assigned to a production variable, but where a facility produces multiple products, emissions cannot be counted more than once.

When calculating an estimated (site-specific) emissions intensity values, a facility can assign emissions which do not relate to a specific output either to one production variable only, or apportion those emissions among production variables on a justifiable basis.

## 5.3. Exclusions

Scope 1 emissions from the following processes were not included in the default emissions intensity calculation for this production variable, and must be excluded from the calculation of an estimated (site-specific) emissions intensity value for the production variable:

- upstream production of the hydrogen feedstock (such as natural gas extraction and distribution or synthesis gas production);
- downstream processing of the ammonia into ammonium nitrate, urea or any other product;
- processes which do not occur within the facility; and
- on-site electricity generation.

# 6. Ammonium nitrate

## 6.1. Production variable definition

1. Tonnes of 100% equivalent ammonium nitrate ($NH_4NO_3$) contained within ammonium nitrate solution ($NH_4NO_{3(aq)}$) that:
   (a) has a concentration of ammonium nitrate ($NH_4NO_3$) equal to or greater than 60%; and
   (b) is produced as part of carrying on the ammonium nitrate production activity at the facility; and
   (c) is of saleable quality.
2. The metric in subsection (1) is applicable to a facility that conducts the activity of producing ammonium nitrate through the chemical transformation of anhydrous ammonia ($NH_3$) to ammonium nitrate solution ($NH_4NO_{3(aq)}$) that has a concentration of ammonium nitrate ($NH_4NO_3$) equal to or greater than 60% (the ***ammonium nitrate production activity***).
3. The default emissions intensity is 0.352 t $CO_2$-e per tonne of 100% equivalent ammonium nitrate.

## 6.2. Inclusions

For the purposes of the development of the default emissions intensity value and the preparation of an estimated (site-specific) emission intensity value for this production variable, scope 1 emissions from the following processes at the facility are included:

- catalytic oxidisation of ammonia to create nitric acid;
- reaction of nitric acid and ammonia to create ammonium nitrate;
- product prilling (drying and coating or conditioning), storage and despatch;
- the use of machinery, equipment and processes for the physical and/or chemical transformation described in the activity definition, including, for example:
  - machinery used to move materials within the facility, including mobile equipment;
  - control rooms, laboratories, maintenance workshops;
  - machinery used to create non-electrical energy for use in the activity;
  - the processing of by-products where they involve the recovery of materials for re-use within the activity or are necessary for the activity to proceed as described;
  - processing of by-products and waste materials from the activity; and
- other incidental, ancillary or supporting processes which are not included in another default or estimated emissions intensity value.

It is intended that all Scope 1 NGER-reported emissions from a facility can be assigned to a production variable, but where a facility produces multiple products, emissions cannot be counted more than once.

When calculating estimated (site-specific) emissions intensity values, a facility can assign emissions which do not relate to a specific output either to one production variable only, or apportion those emissions among production variables on a justifiable basis.

## 6.3. Exclusions

Scope 1 emissions from the following processes were not included in the default emissions intensity calculation for this production variable, and must be excluded from the calculation of an estimated (site-specific) emissions intensity value for the production variable:

- upstream production of the anhydrous ammonia feedstock;
- production of ammonium nitrate using nitric acid imported from a source off-site;
- processes that do not occur within the facility; and
- on-site electricity generation.

# 7. Carbamide (urea)

## 7.1. Production variable definition

1. Tonnes of 100% equivalent carbamide (urea ($CO(NH_2)_2$)) on a dry weight basis that is:
   (a) contained within either of the following products:
      (i) carbamide solutions (urea ($CO(NH_2)_{2(aq)}$));
      (ii) saleable, granulated, prilled or other solid forms of carbamide (urea ($CO(NH_2)_{2(s)}$)); and
   (b) produced as part of carrying on the urea production activity at the facility; and
   (c) contained within products of saleable quality.
2. The metric in subsection (1) is applicable to a facility that conducts the activity of producing carbamide (urea ($CO(NH_2)_2$)) through the chemical transformation of carbon dioxide ($CO_2$) and anhydrous ammonia ($NH_3$) to produce carbamide solution (urea ($CO(NH_2)_{2(aq)}$)) that:
   (a) has a concentration of carbamide (urea ($CO(NH_2)_2$)) equal to or greater than 80%; and
   (b) is subsequently used to produce either or both of:
      (i) carbamide solutions (urea ($CO(NH_2)_{2(aq)}$)); and
      (ii) saleable granulated, prilled or other solid forms of carbamide (urea ($CO(NH_2)_{2(s)}$)).
3. The activity in subsection (2) is the ***urea production activity***.
4. The default emissions intensity is 0.566 t $CO_2$-e per tonne of 100% equivalent carbamide.

## 7.2. Inclusions

For the purposes of the development of the default emissions intensity value and the preparation of an estimated (site-specific) emission intensity value for this production variable, scope 1 emissions from the following processes at the facility are included:

- reaction of carbon dioxide with anhydrous ammonia to create a carbamide solution;
- production of finished products through prilling, granulation etc.;
- product drying / conditioning, storage and despatch;
- the use of machinery, equipment and processes for the physical and/or chemical transformation described in the activity definition, including, for example:
  - machinery used to move materials within the facility, including mobile equipment;
  - control rooms, laboratories, maintenance workshops;
  - machinery used to create non-electrical energy for use in the activity;
  - the processing of by-products where they involve the recovery of materials for re-use within the activity or are necessary for the activity to proceed as described;
  - processing of by-products and waste materials from the activity; and

- other incidental, ancillary or supporting processes which are not included in another default or estimated emissions intensity value.

It is intended that all scope 1 NGER-reported emissions from a facility can be assigned to a production variable, but where a facility produces multiple products, emissions cannot be counted more than once.

When calculating estimated (site-specific) emissions intensity values, a facility can assign emissions which do not relate to a specific output either to one production variable only, or apportion those emissions among production variables on a justifiable basis.

## 7.3. Exclusions

Scope 1 emissions from the following processes were not included in the default emissions intensity calculation for this production variable, and must be excluded from the calculation of an estimated (site-specific) emissions intensity value for the production variable:

- upstream production of the anhydrous ammonia feedstock;
- production of carbon dioxide;
- processes that do not occur within the facility;
- on-site electricity generation.

# 8. Ammonium phosphates

## 8.1. Production variable definition

1. Tonnes of diammonium phosphate ($(NH_4)_2HPO_4$) products and monoammonium phosphate ($(NH_4)H_2PO_4$) products that:
   (a) have a concentration of diammonium phosphate or monoammonium phosphate equal to or greater than 70%; and
   (b) are produced as part of carrying on the ammonium phosphate production activity at the facility; and
   (c) have a free moisture content less than 2.5%; and
   (d) are of saleable quality.
2. The metric in subsection (1) is applicable to a facility that conducts the activity of producing either or both of diammonium phosphate and monoammonium phosphate through:
   (a) the chemical transformation phosphate rock to phosphoric acid ($H_3PO_4$); and
   (b) the chemical transformation of that phosphoric acid and anhydrous ammonia ($NH_3$) to produce either or both of diammonium phosphate ($(NH_4)_2H_2PO_4$) and monoammonium phosphate ($(NH_4)H_2PO_4$).
3. The activity in subsection (2) is the ***ammonium phosphate production activity***.
4. The default emissions intensity is:
   (a) 0.078 t $CO_2$-e per tonne of diammonium phosphate products; and
   (b) 0.088 t $CO_2$-e per tonne of monoammonium phosphate products.

## 8.2. Inclusions

For the purposes of the development of the default emissions intensity value and the preparation of an estimated (site-specific) emission intensity value for this production variable, scope 1 emissions from the following processes at the facility are included:

- the mining and beneficiation of phosphate rock;
- the reaction of phosphate rock with sulphuric acid to create phosphoric acid;
- reaction of phosphoric acid and ammonia to produce ammonium phosphates;
- product drying / conditioning, storage and despatch;
- by-product (gypsum) handling and storage;
- the use of machinery, equipment and processes for the physical and/or chemical transformation described in the activity definition, including, for example:
  - machinery used to move materials within the facility, including mobile equipment;
  - control rooms, laboratories, maintenance workshops;
  - machinery used to create non-electrical energy for use in the activity;
  - the processing of by-products where they involve the recovery of materials for re-use within the activity or are necessary for the activity to proceed as described;

    - processing of by-products and waste materials from the activity; and
- other incidental, ancillary or supporting processes which are not included in another default or estimated emissions intensity value.

It is intended that all scope 1 NGER-reported emissions from a facility can be assigned to a production variable, but where a facility produces multiple products, emissions cannot be counted more than once.

When calculating estimated (site-specific) emissions intensity values, a facility can assign emissions which do not relate to a specific output either to one production variable only, or apportion those emissions among production variables on a justifiable basis.

## 8.3. Exclusions

Scope 1 emissions from the following processes were not included in the default emissions intensity calculation for this production variable, and must be excluded from the calculation of an estimated (site-specific) emissions intensity value for the production variable:

- upstream production of the anhydrous ammonia feedstock;
- production of sulphuric acid used as in an input into the conversion of phosphate rock to phosphoric acid;
- production of ammonium phosphates using phosphoric acid imported from a source off-site;
- processes that do not occur within the facility; and
- on-site electricity generation.

# 9. Sodium cyanide

## 9.1. Production variable definition

1. Tonnes of 100% equivalent sodium cyanide (NaCN) on a dry weight basis that is contained within sodium cyanide products:
   (a) produced as part of carrying on the sodium cyanide production activity at the facility; and
   (b) of saleable quality.
2. The metric in subsection (1) is applicable to a facility that conducts the activity of producing sodium cyanide through all of the following processes:
   (a) the chemical transformation methane, anhydrous ammonia ($NH_3$) and air to produce hydrogen isocyanine (HCN);
   (b) electrolysis of sodium chloride (NaCl) solution to produce caustic soda (NaOH);
   (c) the chemical transformation of hydrogen isocyanine (HCN) and caustic soda produce sodium cyanide (NaCN).
3. The activity in subsection (2) is the ***sodium cyanide production activity***.

Note: The default emissions intensity for this prescribed production variable is yet to be calculated and specified in the Schedule.

## 9.2. Inclusions

For the purposes of the development of the default emissions intensity value and the preparation of an estimated (site-specific) emission intensity value for this production variable, scope 1 emissions from the following processes at the facility are included:

- production of hydrogen isocyanine;
- production of caustic soda;
- the use of machinery, equipment and processes for the physical and/or chemical transformation described in the activity definition, including, for example:
  - machinery used to move materials within the facility, including mobile equipment;
  - control rooms, laboratories, maintenance workshops;
  - machinery used to create non-electrical energy for use in the activity;
  - the processing of by-products where they involve the recovery of materials for re-use within the activity or are necessary for the activity to proceed as described;
  - processing of by-products and waste materials from the activity; and
- other incidental, ancillary or supporting processes which are not included in another default or estimated emissions intensity value.

It is intended that all Scope 1 NGER-reported emissions from a facility can be assigned to a production variable, but where a facility produces multiple products, emissions cannot be counted more than once.

When calculating estimated (site-specific) emissions intensity values, a facility can assign emissions which do not relate to a specific output either to one production variable only, or apportion those emissions among production variables on a justifiable basis.

## 9.3. Exclusions

Scope 1 emissions from the following processes were not included in the default emissions intensity calculation for this production variable, and must be excluded from the calculation of an estimated (site-specific) emissions intensity value for the production variable:

- upstream production of the anhydrous ammonia feedstock;
- upstream production of the hydrogen feedstock (such as natural gas extraction and distribution or synthesis gas production);
- processes that do not occur within the facility; and
- on-site electricity generation.

# 10. Synthetic rutile

## 10.1. Production variable definition

1. Tonnes of synthetic rutile that:
   (a) has a titanium dioxide ($TiO_2$) concentration equal to or greater than 88% and less than 95.5%; and
   (b) has an iron (Fe) concentration greater than 0.5%; and
   (c) are produced as part of carrying on the synthetic rutile production activity at the facility; and
   (d) are of saleable quality.
2. The metric in subsection (1) is applicable to a facility that conducts the activity of producing synthetic rutile through the chemical transformation of ilmenite ore (ore containing $FeTiO_3$) through the reduction of iron oxides in order to increase the titanium dioxide ($TiO_2$) concentration to produce synthetic rutile that:
   (a) has a titanium dioxide ($TiO_2$) concentration equal to or greater than 88% and less than 95.5%; and
   (b) has an iron (Fe) concentration greater than 0.5%.

   *Note: The transformation described in subsection (2) is known as the Becher process.*
3. The activity in subsection (2) is the ***synthetic rutile production activity***.
4. The default emissions intensity is 1.15 t $CO_2$-e per tonne of synthetic rutile.

## 10.2. Inclusions

For the purposes of the development of the default emissions intensity value and the preparation of an estimated (site-specific) emission intensity value for this production variable, scope 1 emissions from the following processes at the facility are included:

- oxidation process that involves heating the ilmenite in a rotary kiln with air to convert the iron in the ilmenite grains to iron(III) oxide;
- reduction process that involves further heating the oxidated ilmenite, with coal being used as reductant, in a rotary kiln to reduce the iron oxide in the mineral grains to metallic iron;
- aeration process that involves the removal of the metallic iron by rusting it out, commonly achieved in a continuously agitated tank that contain mile ammonium chloride solution with air being pumped through the tank;
- acid leaching process that involves removal of the remainder of iron oxide using mild sulfuric acid;
- mechanical handling and processing materials for the purpose undertaking the above processes;
- mineral separation process;
- the use of machinery, equipment and processes for the physical and/or chemical transformation described in the activity definition, including, for example:

- machinery used to move materials within the facility, including mobile equipment;
- control rooms, laboratories, maintenance workshops;
- machinery used to create non-electrical energy for use in the activity;
- the processing of by-products where they involve the recovery of materials for re-use within the facility or are necessary for the activity to proceed as described;
- processing of by-products and waste materials from the activity;
- furnaces;
- flaring; and

- other incidental, ancillary or supporting processes which are not included in another default or estimated emissions intensity value.

The default emissions intensity value for the synthetic rutile production activity includes all scope 1 NGER-reported emissions from the facilities relevant for setting the default intensity value, except scope 1 emissions from on-site electricity generation.

## 10.3. Exclusions

Scope 1 emissions from the following processes were not included in the default emissions intensity calculation for this production variable, and must be excluded from the calculation of an estimated (site-specific) emissions intensity value for the production variable:

- upstream production of the ilmenite feedstock, such as mining;
- upstream production materials that are used in the oxidation, reduction, aeration and acid leaching processes, such as mining of coal, production of ammonium chloride or sulfuric acid;
- downstream processing of the synthetic rutile into products, such as titanium dioxide pigment, with a purity of titanium dioxide that is higher than 99.5%;
- processes that do not occur within the facility; and
- on-site electricity generation.

# 11. White titanium dioxide pigment

## 11.1. Production variable definition

1. Tonnes of white titanium dioxide ($TiO_2$) pigment that:
   (a) conform with ASTM classification D476-00 (2011); and
   (b) have an iron (Fe) concentration greater than 0.5%; and
   (c) are produced as part of carrying on the white titanium dioxide pigment production activity at the facility; and
   (d) are of saleable quality.

   Note: In 2020, the standard could be accessed from http://www.astm.org.

2. The metric in subsection (1) is applicable to a facility that conducts the activity of producing white titanium dioxide ($TiO_2$) pigment through the chemical transformation of 1 or more of the following:
   (a) rutile ($TiO_2$);
   (b) synthetic rutile ($TiO_2$);
   (c) ilmenite ($FeTiO_3$);
   (d) leucoxene;
   (e) titanium slag that has an iron (Fe) concentration of greater than or equal to 7%;

   to produce white titanium dioxide ($TiO_2$) pigment.

3. The white titanium dioxide (TiO2) pigment produced under subsection (2) must:
   (a) conform with ASTM classification D476-00 (2011); and
   (b) have an iron (Fe) concentration of less than or equal to 0.5%.

   Note: In 2020, the standard could be accessed from http://www.astm.org.

4. The activity in subsection (2) is the ***white titanium dioxide pigment production activity***.

5. The default emissions intensity is 1.68 t $CO_2$-e per tonne of white titanium dioxide pigment.

## 11.2. Inclusions

For the purposes of the development of the default emissions intensity value and the preparation of an estimated (site-specific) emission intensity value for this production variable, scope 1 emissions from the following processes at the facility are included:

- the reduction of inputs with carbon and oxidisation with chlorine to produce titanium tetrachloride;
- the distillation of titanium tetrachloride and re-oxidisation to produce white titanium dioxide pigment while re-generating chlorine for re-use;
- the use of machinery, equipment and processes for the chemical transformation described in the activity, including for example:
  - machinery used to move materials within and as part of the activity;

    - control rooms, laboratories maintenance workshops;
    - machinery used to create non-electrical energy for use in the activity;
    - on-site processing of by-products and waste materials required to comply with Commonwealth, State or Territory obligations.
- waste heat recovery;
- production of nitrogen and oxygen consumed within the activity; and
- other incidental, ancillary or supporting processes which are not included in another default or estimated emissions intensity value.

The default emissions intensity value for the white titanium dioxide pigment activity includes all scope 1 NGER-reported emissions from the facilities relevant for setting the default intensity value, except scope 1 emissions from on-site electricity generation.

## 11.3. Exclusions

Scope 1 emissions from the following processes were not included in the default emissions intensity calculation for this production variable, and must be excluded from the calculation of an estimated (site-specific) emissions intensity value for the production variable:

- upstream production of rutile, synthetic rutile, ilmenite, titanium slag or leucoxene;
- production of hydrated titanium dioxide pigment (raw pigment) that is not further processed into saleable white titanium dioxide pigment;
- production of white titanium dioxide pigment that is produced from hydrated titanium dioxide pigment (raw pigment) that is not produced on site;
- processes that do not occur within the facility; and
- on-site electricity generation.

# Coal mining

## 12. Run of mine coal

### 12.1. Production variable definition

1. Tonnes of run-of-mine coal that is produced as part of carrying on the coal mining activity at the facility.

   Note: The coal may be sold with or without beneficiation.

2. The metric in subsection (1) is applicable to a facility that:

   (a) conducts the ***coal mining activity***; and

   (b) if it includes an underground coal mine—uses the coal mine waste gas production variable.

Note: The default emissions intensity for this prescribed production variable is yet to be calculated and specified in the Schedule. When published, it will have the following structure:

The default emissions intensity is:

(a) for a tonne of run-of-mine coal from an underground coal mine—XX t $CO_2$-e per tonne of run-of-mine coal; and

(b) for a tonne of run-of-mine coal from an open cut coal mine—the sum of:

(i) XX t CO2-e; and

(ii) the factor EFj given by section 3.20 of the NGER Measurement Determination for the coal mine;

per tonne of run-of-mine coal.

Where 'XX' is the same number in part (a) and part (b).

*Definition of coal mining activity*

Where the activity of ***coal mining*** is the physical extraction of coal in an open-cut or underground coal mine.

### 12.2. Scope of the activity

Saleable coal is the primary output from a coal mine. In some cases, the run-of-mine (ROM) coal is the saleable product, while in other circumstances the ROM coal requires beneficiation. Therefore, ROM coal can be an output or intermediate product depending on the facility circumstances.

The production variable is for the production of coal from underground and open-cut mining processes. The scope of the production variable includes the processes required to extract the coal and to prepare for and undertake beneficiation.

Beneficiation can include:

- crushing so that the product coal is of relatively uniform size;
- washing and flotation to remove partings and lower ash content; and
- disposal of waste.

The production variable includes all development processes required to allow extraction of the coal, including development of new mining areas through the life of the facility. This includes land clearing, removal and storage of topsoil for later use, and rehabilitation of mined areas that occurs during the continued operation of the mine.

Coal is mined from both open-cut and underground mines, based on the physical characteristics of the mine geology and the most economically efficient mining method. Both open-cut and underground mining may be used for any particular coal seam, and separate seams mined at a single facility. Both mining methods are covered by this production variable.

### *Fugitive coal mine waste gas*

Emissions from coal mine waste gas at an underground mine are excluded from the production variable. A coal mine waste gas production variable is available to provide a baseline component for fugitive emissions at underground coal mines.

Fugitive emissions at open-cut coal mines are included in this production variable using the factor $EF_j$ given by section 3.20 of the NGER Measurement Determination for the coal mine; per tonne of run-or-mine coal.

### *Open-cut mining of coal*

Open-cut mining includes all forms of extraction that are not conducted underground. Open-cut mining involves the removal and storage of overburden and interburden material to allow access to the production coal seams. The overburden, interburden and coal are mined using drill and blasting techniques to break up the materials to allow extraction. Mining equipment includes draglines, hydraulic shovels, excavators, haul trucks, earth moving equipment and conveyor systems.

The primary source of scope 1 emissions is the combustion of liquid fuel – usually diesel – used in hydraulic shovels, excavators, bulldozers, haul trucks, drilling rigs and stationary diesel engines used for water management, electricity generation, and sometimes in-pit or primary ROM crushing. Major equipment items such as draglines commonly use electric power.

Emissions from blasting include the oxidation of hydrocarbons (diesel) mixed with other materials, usually ammonium nitrate, to generate the explosive reaction.

During the life of the mine, waste material will require multiple movements as the mine plan evolves. All movement of waste material within the facility is covered by the production variable.

The movement of coal within the mine may involve temporary storage intended to provide buffering for the crushing and beneficiation process and short-term storage of saleable coal (either ROM or washed coal) prior to shipment. Washery tailings are usually stored in a tailings pond.

As mining is completed in different parts of the facility the mined area is rehabilitated by profiling the surface to a finished level, replacing topsoil, and revegetation. The emissions from rehabilitation are included in the production variable.

### *Underground mining of coal*

Underground mining, like open-cut mining, requires significant activity to prepare for the extraction of coal. Shallow underground mines may include the development of an access ramp allowing vehicles to access the underground mining areas for haulage of coal and waste

material (during development) to the surface. Deeper mines would generally be developed with one or more vertical shafts to lift coal and possibly waste material (during development) to the surface. Underground mines also include vertical shafts for ventilation including powerful ventilation fans, and sometimes cooling water supply and other services such as electricity and communications.

Different mining techniques can be employed underground depending on the characteristics of the mine geology. The most common techniques are long-wall mining and continuous mining. In each case the primary mining equipment is electrically operated. There is minimal waste material during normal mining operations. Waste material is, when possible, left underground as backfill of previous voids. Coal, and waste when required, is brought to the surface for treatment (coal) or storage (coal and waste).

The primary source of scope 1 emissions from underground mining is from the combustion of liquid fuel – usually diesel – used in underground vehicles, haul trucks, and drilling rigs when access ramps are available, stationary engines used for water management, electricity generation and sometimes underground primary ROM crushing. Emissions from blasting will occur.

*Beneficiation of ROM coal*

A coal preparation plant (CPP; also known as a coal handling and preparation plant (CHPP), coal handling plant, prep plant, tipple or wash plant) is a facility that washes coal of soil and rock, crushes it into graded sized chunks (sorting), stockpiles grades preparing it for sale.

*Measurement of ROM coal*

The output of the activity is defined as tonnes of ROM coal, that is coal that is produced in the mining operations before screening, crushing or preparation of the coal has occurred. The measurement of this output is expected to be based on company records of the quantity of ROM coal mined and received for beneficiation or sale. The measurement of the output for the issue of a baseline is by tonne of ROM coal that is suitable to be: further processed on-site (or transferred to another facility) to produce a saleable product; or sold directly from the facility, where the coal was mined.

*Mine rehabilitation*

Rehabilitation for an individual mine or part of a mine may occur at a facility while other parts of the mine continue in operation, or at the end of life of the facility. The rehabilitation that occurs during the continued operation of the mine are included in the production variable. End of mine life rehabilitation is not included in the production variable.

## 12.3. Inclusions

For the purposes of the development of the default emissions intensity value and the preparation of an estimated (site-specific) emission intensity value for this production variable, scope 1 emissions from the following processes at the facility are included:

- the use of on-site machinery, equipment and processes for the extraction and treatment of the ore described in the activity definition, including, for example:
    - machinery used to:
        - prepare and remove topsoil and overburden to allow mining of ore;

        - develop underground access roadways;
        - install equipment required to move materials;
        - allow drainage of coal mine waste gas;
    - machinery used to move materials within the facility, including mobile equipment;
    - control rooms, laboratories, maintenance workshops;
    - machinery used to create non-electrical energy for use in the activity;
    - the processing of by-products where they involve the recovery of materials for re-use within the activity or are necessary for the activity to proceed as described;
    - on-site processing of waste materials from the activity;
- beneficiation of coal including:
    - crushing to size the coal;
    - washing to remove waste material;
    - sorting by coal quality;
- the supply of utilities such as, but not limited to, compressed air, cooling and water where these are used in support of the activity and within the facility;
- the regeneration of any solvents used within the activity;
- the storage and loading of the saleable coal into a medium of transportation such as trucks or rail trains;
- transportation of inputs used in the activity to storage at the facility, where the transport activity wholly occurs within the facility;
- transportation of the output of the activity from storage at the facility, where the transport activity wholly occurs within the facility;
- complementary processes, such as packaging, head office, administrative and marketing operations, which occur within the boundary of the facility that is undertaking the activity;
- other incidental, ancillary or supporting processes which are not included in another default or estimated emissions intensity value; and
- where the facility is (or includes) an open-cut coal mine, the fugitives emissions associated with the open-cut coal mine are included.

It is intended that all scope 1 NGER-reported emissions from a facility can be assigned to a production variable. Where a facility produces multiple products, emissions must be apportioned in a justifiable manner, making sure no emissions are counted more than once and the total emissions counted cannot be more than the total emissions from the facility.

## 12.4. Exclusions

Scope 1 emissions from the following processes were not included in the default emissions intensity calculation for this production variable, and must be excluded from the calculation of an estimated (site-specific) emissions intensity value for the production variable:

- on-site electricity generation;

- processes that are included in the definition of another production variable, such as fugitive emissions from coal mine waste gas (CMWG) at an underground coal mine; and
- processes that do not occur within the facility.

# 13. Coal mine waste gas

## 13.1. Production variable definition

1. Tonnes of $CO_2$-e of unmitigated coal mine waste gas generated at the facility as part of carrying on the coal mining activity at the facility.

   Note: This includes pre-mine drainage, mining phase activities and post mining activities creating coal mine waste gas in the relevant reporting period.

2. The metric in subsection (1) is applicable to a facility that:

   (a) conducts the ***coal mining activity*** at an underground coal mine; and

   (b) uses the run-of-mine coal production variable.

Note: The default emissions intensity for this prescribed production variable is yet to be calculated and specified in the Schedule.

3. The t of $CO_2$-e of unmitigated coal mine waste gas generated must be measured consistently with the NGER (Measurement) Determination.

*Definition of coal mine waste gas*

Where ***coal mine waste gas*** means a substance that:

- consists of:
  - naturally occurring hydrocarbons; or
  - a naturally occurring mixture of hydrocarbons and non-hydrocarbons; and
- is:
  - drained from:
    - an underground coal mine that is covered by a lease (however described) that authorises coal mining; or
    - a closed underground coal mine that is, or was, covered by a lease (however described) that authorises, or authorised, coal mining; or
  - conveyed in a ventilation air shaft or duct to the surface of a mine mentioned in subparagraph (i).

*Emissions-intensity calculation method*

The method to allocate a baseline for fugitive emissions from an operating underground mine is to multiply the amount of fugitive emissions generated by a factor that represents a proportion to be captured and destroyed. Under this approach, fugitive emissions can be considered the 'production variable' and the factor representing the amount to capture and destroy the 'emissions intensity'. This is an alternate approach to an output-based production variable because fugitive emissions are a waste stream (although some fugitive emissions captured can be sold as natural gas of saleable quality), not a final output or intermediate product, so the conventional meaning of emissions intensity cannot apply.

This alternative approach achieves a similar outcome to the standard method of allocating baselines: [amount of coal mine waste gas generated: "production"] x [factor representing amount to capture and destroy: "emissions intensity"]

The default emissions intensity is worked out as 1 – default capture rate, where this rate is calculated as the ratio of the amount of methane in CMWG destroyed to the amount generated.

## 13.2. Scope of the activity

The variable that is equivalent to the production variable is coal mine waste gas generated in the relevant reporting period as part of the extraction of coal from underground mining processes. The scope of the variable includes all sources of fugitive emissions:

- surface in-seam pre-mining drainage;
- underground in-seam pre-mining drainage;
- drainage of waste coal mine gas from the goaf (the mined area of an underground mine);
- waste coal mine gas entrained in ventilation air (VAM), excluding naturally occurring $CO_2$ and emissions from fuels combusted underground;
- fugitive emissions from post-mining storage of coal from an underground mine where the average annual percentage of methane in VAM exceeds 0.1%; and

The default CMWG capture rate takes into account all methods used for the destruction (beneficial or otherwise) of waste coal mine gas including but not limited to:

- combustion in a flare;
- combustion in a generator to produce electricity;
- combustion in a boiler;
- catalytic combustion (or similar) of VAM; and
- sale of waste coal mine gas that is of saleable quality.

CMWG generated and CMWG captured are measured in accordance with the methods described in the NGER (Measurement) Determination authorised for use in each reporting period.

*Measurement of CMWG*

The output metric of the activity is defined as tonnes of coal mine waste gas generated from mining processes at the facility during the reporting period expressed in t $CO_2$-e before any emission abatement or transfer processes. The amount of CMWG is estimated in accordance with the methods described in the NGER (Measurement) Determination authorised for use in each reporting period. Measurement and records of CMWG generated is as required by the methods described in the NGER (Measurement) Determination authorised for use in the reporting period.

## 13.3. Inclusions

For the purposes of the development of the default emissions intensity value and the preparation of an estimated (site-specific) emission intensity value for this production variable, scope 1 emissions from the following processes at the facility are included:

- CMWG emissions at an underground mine.

## 13.4. Exclusions

Scope 1 emissions from the following processes were not included in the default emissions intensity calculation for this production variable, and must be excluded from the calculation of an estimated (site-specific) emissions intensity value for the production variable:

- processes that are included in the definition of another production variable, including the ROM coal production variable;
- processes that do not occur within the facility;
- on-site electricity generation;
- fugitive emissions from an open-cut mine; and
- CMWG from a decommissioned underground mine.

# 14. Fugitive emissions at a decommissioned underground coal mine

## 14.1. Production variable definition

1. Tonnes of $CO_2$-e emissions reported under Division 3.2.4 of the NGER (Measurement) Determination for the facility.
2. The metric in subsection (1) is applicable to a facility that is a decommissioned underground mine.
3. The default emissions intensity is 1 t $CO_2$-e per t $CO_2$-e of reported emissions.
4. The t of $CO_2$-e of emissions must be measured consistently with the NGER (Measurement) Determination.

*Definition of decommissioned underground mine*

Where ***decommissioned underground mine*** means an underground coal mine where the following activities have ceased to occur and are not expected to occur in the future:

- coal production;
- active mine ventilation, including the operation of ventilation fans at the mine.

*Emissions-intensity calculation method*

The method to allocate a baseline for fugitive emissions at a decommissioned coal mine is for the baseline to equal the amount of fugitive emissions reported by the facility. This is achieved by multiplying the amount of fugitive emissions generated at the decommissioned mine by 1. Under this approach, fugitive emissions can be considered the 'production variable' and the factor of 1 the 'emissions intensity'. This is an alternative approach to using an output-based production variable because fugitive emissions are a waste stream, not a final output or intermediate product, so the correct interpretation of emissions intensity does not apply. This approach also recognises that the fugitive emissions at a decommissioned coal mine cannot be mitigated by a facility in a reporting sense, as they are reported on the basis of a decay curve based on the emissions in the final year of operation.

This alternative approach achieves a similar outcome to the standard method of allocating baselines: [amount of CMWG generated at the decommissioned mine: "production"] x [1: "emissions intensity"].

The metric for fugitive emissions at a decommissioned coal mine is applicable to a facility that is (or includes) a decommissioned underground coal mine on-site. The default 'emissions intensity' is 1.0 t $CO_2$-e per tonne of fugitive emissions for the decommissioned underground coal mine.

## 14.2. Scope of the activity

This production variable is intended to provide a baseline equal to the reported fugitive emissions from a decommissioned coal mine.

The NGER (Measurement) Determination provides methods to report coal mine waste gas (CMWG) emissions for decommissioned underground coal mines that are dependent on the level of fugitive emissions prior to decommissioning, and decrease over time. The appropriate method should be used.

*Measurement of fugitive emissions from decommissioned mines*

The output of the activity is defined as tonnes of fugitive coal mine waste gas estimated in accordance with the methods described in the NGER (Measurement) Determination authorised for use in each reporting period.

## 14.3. Inclusions

For the purposes of the development of the default emissions intensity value and the preparation of an estimated (site-specific) emission intensity value for this production variable, scope 1 emissions from the following processes at the facility are included:

- the fugitive emissions as estimated by the applicable NGER method for decommissioned underground coal mines.

## 14.4. Exclusions

Scope 1 emissions excluded from the prescribed production variable for fugitive emissions from decommissioned mines are those not reported as fugitive emissions from a decommissioned underground coal mine.

# Iron ore mining

## 15. Iron ore

### 15.1. Production variable definition

1. Tonnes of iron ore, on a wet basis, that:
   (a) is produced as part of carrying on the iron ore mining activity at the facility; and
   (b) is of saleable quality.
2. The metric in subsection (1) is applicable to a facility that conducts the activity of mining iron ore through:
   (a) the physical extraction of mineral ores that contain iron ore metal; and
   (b) the processing of the extracted ores to produce an iron ore product of saleable quality.

   Note: The processes may include crushing, screening, grinding, separation, concentrating, filtration and waste to tailings.
3. The activity in subsection (2) is the ***iron ore mining activity***.

Note: The default emissions intensity for this prescribed production variable is yet to be calculated and specified in the Schedule.

### 15.2. Scope of the activity

Hematite ore is the most common oxide mineral form requiring limited processing including crushing and screening. Magnetite ore requires additional processing to remove impurities. Magnetite ore processing leads to a concentrate.

The production variable includes all development processes required to allow extraction of the iron ore, including development of new mining areas through the life of the facility. This includes land clearing and removal and storage of topsoil for later use.

Iron ores are presently mined from open-cut mines in Australia. This production variable would apply to underground mines should they be developed.

*Open-cut mining of iron ore*

Open-cut mining involves the removal and storage of overburden material that allows access to the iron ore. The overburden and ore are mined using drill and blasting techniques to break up the materials to allow extraction, usually via excavator loading into trucks.

*Dewatering is a significant activity at mines that are below the natural water table.*

The primary source of scope 1 emissions is the combustion of liquid fuel – usually diesel – used in excavators, bulldozers, haul trucks, drilling rigs and stationary diesel engines used for water management, electricity generation, and sometimes in-pit or primary ROM crushing.

Emissions from blasting include the oxidation of hydrocarbons mixed with other materials, usually ammonium nitrate, to generate the explosive reaction.

During the life of the mine, material may require multiple movements as the mine plan evolves. All movement of waste material within the facility is covered by the production variable.

The hauling of ore for treatment may involve temporary storage intended to provide buffering for the milling process, or for longer-term storage of lower grade ores for later blending or treatment, often at the end of the mine life.

### *Underground mining of iron ore*

Underground mining, like open-cut mining, requires significant activity to prepare for the extraction of ore for treatment. Shallow underground mines may include the development of an access ramp allowing vehicles to access the underground mining areas for haulage of ore and possibly waste to the surface. Deeper mines would generally be developed with one or more vertical shafts to lift ore and possibly waste material to the surface. Underground mines would also include vertical shafts for ventilation, and sometimes cooling water supply and other services such as electricity and communications.

Different mining techniques can be employed underground depending on the characteristics of the ore body. All involve drilling, blasting and movement of any waste required to access the ore. Waste material is, when possible, left underground as backfill of previous voids. Ore, and waste when required, is brought to the surface for treatment (ore) or storage (ore and waste).

The primary source of scope 1 emissions from underground mining is from the combustion of liquid fuel – usually diesel – used in underground vehicles, haul trucks, and drilling rigs when access ramps are available, stationary engines used for water management, electricity generation and sometimes underground primary ROM crushing. Emissions from blasting will occur.

### *Processing of iron ore*

Some iron ore mines require limited or no additional processing. Crushing, screening to separate waste material and ore into fines and lumps for sale and washing. Large material may undergo further crushing and return to the separation process.

Other iron ore mines may require more significant processing which could include crushing, grinding, separation and filtration to produce a concentrate for sale with waste going to a tailings facility.

The processing of iron ore is primarily electrically driven machinery. Scope 1 emissions are primarily related to ore and material handling processes.

### *Measurement of saleable iron ore*

The output of the activity is defined as tonnes of saleable iron ore. The measurement of this output is expected to be based on records of the quantity of saleable iron ore produced, measured on a wet basis (for magnetite concentrate measurement would occur after dewatering) using calibrated instruments or other industry standards as applicable. Evidence of the measurement may include third party transport bill of lading records or internal company production records. The measurement of the production variable is by tonne of saleable iron ore that is produced at the facility where the iron ore was mined.

*Mine rehabilitation*

Rehabilitation for individual mines may occur at a facility while other mines are operated, or at the end of life of the facility. The rehabilitation which occurs during the continued operation of the mine are included in the production variable. End of mine life rehabilitation is not included in the production variable.

## 15.3. Inclusions

For the purposes of the development of the default emissions intensity value and the preparation of an estimated (site-specific) emission intensity value for this production variable, scope 1 emissions from the following processes at the facility are included:

- the use of on-site machinery, equipment and processes for the extraction and treatment of the ore to produce the iron ore product at the facility described in the activity definition, including, for example:
    - machinery used to:
        - prepare and remove topsoil and overburden to allow mining of ore;
        - develop underground access pathways;
        - dewater mine areas;
        - install equipment required to move materials;
    - machinery used to move materials within the facility, including mobile equipment;
    - control rooms, laboratories, maintenance workshops;
    - machinery used to create non-electrical energy for use in the activity;
    - the processing of by-products where they involve the recovery of materials for re-use within the activity or are necessary for the activity to proceed as described;
    - on-site processing of waste materials;
- the treatment of mined iron ore to size and separate iron ore from waste materials, including:
    - crushing, grinding, screening and filtration to separate waste material and appropriately size material for sale or further processing;
    - washing of ore;
    - mineral recovery processes intended to return iron ore to the crushing and screening process;
- the supply of utilities such as, but not limited to, compressed air, cooling and water where these are used in support of the activity and within the facility;
- drilling and blasting using explosives and other equipment;
- the storage and loading of the iron ore product into a medium of transportation such as trucks or rail trains;
- transportation of inputs used in the activity to storage at the facility, where the transport activity wholly occurs within the facility;
- transportation of the output of the activity from storage at the facility, where the transport activity wholly occurs within the facility;

- complementary processes, such as packaging, head office, administrative and marketing operations, which occur within the boundary of the facility which is undertaking the activity; and
- other incidental, ancillary or supporting processes which are not included in another default or estimated emissions intensity value.

It is intended that all scope 1 NGER-reported emissions from a facility can be assigned to a production variable. Where a facility produces multiple products, emissions must be apportioned in a justifiable manner, making sure no emissions are counted more than once and the total emissions counted cannot be more than the total emissions from the facility.

## 15.4. Exclusions

Scope 1 emissions from the following processes were not included in the calculation of the default emissions intensity for the iron ore prescribed production variable:

- on-site electricity generation; and
- processes that do not occur within the facility.

# Other mining

## 16. Manganese ore

### 16.1. Production variable definition

1. Tonnes of manganese ore product, on a wet basis, that:
   (a) is produced as part of carrying on the manganese ore mining activity at the facility; and
   (b) is of saleable quality.
2. The metric in subsection (1) is applicable to a facility that conducts the activity of mining manganese ore through:
   (a) the physical extraction of mineral ores that contain manganese metal; and
   (b) the processing of the extracted ores by crushing and separation into a manganese ore product.
3. The activity in subsection (2) is the ***manganese ore mining activity***.

Note: The default emissions intensity for this prescribed production variable is yet to be calculated and specified in the Schedule.

### 16.2. Scope of the activity

Manganese ore is mined in open-cut mines and undergoes crushing, screening and washing.

The production variable includes all development processes required to allow extraction of the manganese ore, including development of new mining areas through the life of the facility. This includes land clearing and removal and storage of topsoil for later use.

*Open-cut mining of manganese ore*

Open-cut mining involves the removal and storage of overburden material that allows access to the iron ore. The overburden and ore are mined using drill and blasting techniques to break up the materials to allow extraction, usually via excavator loading into trucks.

The primary source of scope 1 emissions is liquid fuel – usually diesel – used in excavators, bulldozers, haul trucks and stationary engines used for drilling, water management, and sometimes in-pit crushing.

Emissions from blasting include the oxidation of hydrocarbons mixed with other materials, usually ammonium nitrate, to generate the explosive reaction.

During the life of the mine, movement of waste material may require multiple movements as the mine plan evolves. All movement of waste material within the facility is covered by the production variable.

The hauling of ore for treatment may involve temporary storage intended to provide buffering for the milling process, or longer-term storage of lower grade ores for later blending or treatment, often at the end of the mine life.

*Processing of manganese ore*

Manganese ore mines require limited processing with some ore exported directly without processing. Crushing and the separation via screening of ore by fines and lump ore and removal of waste clay material by washing and gravity and cyclonic separation techniques.

The processing of manganese ore is primarily electrically driven machinery. Scope 1 emissions are limited to ore handling processes.

*Measurement of saleable manganese*

The output of the activity is defined as tonnes of saleable manganese. The measurement of this output is expected to be based on records of the quantity of saleable manganese measured on a wet basis using calibrated instruments or other industry standards as applicable. Evidence of the measurement may include third party transport bill of lading records or internal company production records. The measurement of the output for the issue of a baseline is by tonne of saleable manganese that is produced: at the facility; or transported away from the facility, where the manganese ore was mined.

*Mine rehabilitation*

Rehabilitation for individual mines may occur at a facility while other mines are operated, or at the end of life of the facility. The rehabilitation which occurs during the continued operation of the mine are included in the production variable. End of mine life rehabilitation is not included in the production variable.

## 16.3. Inclusions

For the purposes of the development of the default emissions intensity value and the preparation of an estimated (site-specific) emission intensity value for this production variable, scope 1 emissions from the following processes at the facility are included:

- the use of on-site machinery, equipment and processes for the extraction and treatment of the ore described in the activity definition, including, for example:
    - machinery used to:
        - prepare and remove topsoil and overburden to allow mining of ore;
        - dewatering of mine areas;
        - install equipment required to move materials;
    - machinery used to move materials within the facility, including mobile equipment;
    - control rooms, laboratories, maintenance workshops;
    - machinery used to create non-electrical energy for use in the activity;
    - on-site processing of waste materials from the;
- the treatment of mined manganese ore to size and separate manganese ore from waste materials, including:
    - crushing to produced fines and lumps of required size;
    - washing process and separation processes for removal of waste material.
- the supply of utilities such as, but not limited to, compressed air, cooling and water where these are used in support of the activity and within the facility;

- drilling and blasting using explosives and other equipment;
- the storage and loading of the iron ore product into a medium of transportation such as trucks or rail trains;
- transportation of inputs used in the activity to storage at the facility, where the transport activity wholly occurs within the facility;
- transportation of the output of the activity from storage at the facility, where the transport activity wholly occurs within the facility;
- complementary processes, such as packaging, head office, administrative and marketing operations, which occur within the boundary of the facility that is undertaking the activity; and
- other incidental, ancillary or supporting processes which are not included in another default or estimated emissions intensity value.

It is intended that all scope 1 NGER-reported emissions from a facility can be assigned to a production variable. Where a facility produces multiple products, emissions must be apportioned in a justifiable manner, making sure no emissions are counted more than once and the total emissions counted cannot be more than the total emissions from the facility.

## 16.4. Exclusions

Scope 1 emissions from the following processes were not included in the default emissions intensity calculation for this production variable, and must be excluded from the calculation of an estimated (site-specific) emissions intensity value for the production variable:

- on-site electricity generation; and
- processes that do not occur within the facility.

# 17. Bauxite

## 17.1. Production variable definition

1. Tonnes of bauxite product that:
   (a) is produced as part of carrying on the bauxite mining activity at the facility; and
   (b) is of saleable quality.
2. The metric in subsection (1) is applicable to a facility that conducts the activity of mining bauxite through:
   (a) the physical extraction of aluminium ores such as gibbsite ($Al(OH)_3$), boehmite (γ-Aloo(OH)) and diaspore (α-AlO(OH)); and
   (b) the processing of the extracted ores into a bauxite product.
3. The activity in subsection (2) is the ***bauxite mining activity***.

Note: The default emissions intensity for this prescribed production variable is yet to be calculated and specified in the Schedule.

## 17.2. Scope of the activity

The production variable includes all development processes required to allow extraction of the bauxite, including development of new mining areas through the life of the facility. This includes land clearing and removal and storage of topsoil for later use.

Bauxites are presently mined by open-cut strip mining of shallow deposits.

*Open-cut mining of bauxite*

Open-cut mining involves the removal and storage of overburden material that allows access to the bauxite. The overburden is removed using truck and shovel techniques, with drill and blast only required when a substantial caprock layer is present. The bauxite is then extracted via excavator loading into trucks.

The primary source of scope 1 emissions is the combustion of liquid fuel – usually diesel – used in excavators, bulldozers, haul trucks, drilling rigs and stationary diesel engines used for water management, electricity generation, and sometimes in-pit or primary ROM crushing.

Emissions from blasting include the oxidation of hydrocarbons mixed with other materials, usually ammonium nitrate, to generate the explosive reaction.

During the life of the mine, material may require multiple movements as the mine plan evolves. All movement of waste material within the facility is covered by the production variable.

The hauling of ore for treatment may involve temporary storage intended to provide buffering for the separation process, or for longer-term storage of lower grade ores for later blending or treatment.

*Processing of bauxite*

Some bauxite mines require limited or no additional processing. Crushing, washing and screening to separate waste material and bauxite for sale

The processing of bauxite is primarily electrically driven machinery. Scope 1 emissions are limited to ore handling processes.

*Measurement of saleable bauxite*

The output of the activity is defined as tonnes of saleable bauxite suitable as a feedstock for processing into alumina. The measurement of this output is expected to be based on records of the quantity of saleable bauxite produced, measured using calibrated instruments or other industry standards as applicable. Evidence of the measurement may include third party transport bill of lading records or internal company production records. The measurement of the output for the issue of a baseline is by tonne of saleable bauxite suitable as a feedstock for processing into alumina: at the facility; or transported away from the facility, where the bauxite was mined.

*Mine rehabilitation*

Rehabilitation for individual mines may occur at a facility while other mines are operated, or at the end of life of the facility. The rehabilitation that occurs during the continued operation of the mine are included in the production variable. End of mine life rehabilitation is not included in the production variable.

## 17.3. Inclusions

For the purposes of the development of the default emissions intensity value and the preparation of an estimated (site-specific) emission intensity value for this production variable, scope 1 emissions from the following processes at the facility are included:

- the use of on-site machinery, equipment and processes for the extraction and treatment of the ore described in the activity definition, including, for example:
    - machinery used to:
        - prepare and remove topsoil and overburden to allow mining of ore;
        - install equipment required to move materials;
    - machinery used to move materials within the facility, including mobile equipment;
    - control rooms, laboratories, maintenance workshops;
    - machinery used to create non-electrical energy for use in the activity;
    - on-site processing of waste materials from the activity;
- the treatment of mined bauxite to size and separate bauxite from waste materials, including:
    - crushing;
    - washing and screening to separate waste material;
    - mineral recovery processes intended to return bauxite to the crushing and screening process;
- the supply of utilities such as, but not limited to, compressed air, cooling and water where these are used in support of the activity and within the facility;
- the storage and loading of the bauxite product into a medium of transportation such as trucks or rail trains;

- transportation of inputs used in the activity to storage at the facility, where the transport activity wholly occurs within the facility;
- transportation of the output of the activity from storage at the facility, where the transport activity wholly occurs within the facility;
- complementary processes, such as packaging, head office, administrative and marketing operations, which occur within the boundary of the facility that is undertaking the activity; and
- other incidental, ancillary or supporting processes which are not included in another default or estimated emissions intensity value.

It is intended that all scope 1 NGER-reported emissions from a facility can be assigned to a production variable. Where a facility produces multiple products, emissions must be apportioned in a justifiable manner, making sure no emissions are counted more than once and the total emissions counted cannot be more than the total emissions from the facility.

## 17.4. Exclusions

Scope 1 emissions from the following processes were not included in the default emissions intensity calculation for this production variable, and must be excluded from the calculation of an estimated (site-specific) emissions intensity value for the production variable:

- on-site electricity generation; and
- processes that do not occur within the facility.

# 18. Heavy metal concentrate (mineral sands)

## 18.1. Production variable definition

1. Tonnes of heavy metal concentrate, on a wet basis, that:
   (a) is suitable as a feedstock for a mineral separation process; and
   (b) is produced as part of carrying on the mineral sands mining activity at the facility; and
   (c) is of saleable quality.
2. The metric in subsection (1) is applicable to a facility that conducts the activity of mining mineral sands through:
   (a) the physical extraction of mineral sands such as such as such as ilmenite, zircon, rutile, leucoxene and monazite; and
   (b) the processing of the extracted mineral sands by crushing and separation into a heavy metal concentrate.
3. The activity in subsection (2) is the ***mineral sands mining activity***.

Note: The default emissions intensity for this prescribed production variable is yet to be calculated and specified in the Schedule.

## 18.2. Scope of the activity

The term 'mineral sands' refers to ores containing heavy minerals including ilmenite, rutile, leucoxene, and zircon. Ilmenite, leucoxene, and rutile are titanium bearing minerals used mainly as feedstock for the production of titanium dioxide pigments. Zircon is a zirconium bearing mineral used for the manufacture of ceramics and refractories and in a range of industrial and chemical applications. Monazite is a rare earth bearing mineral found within heavy mineral sand deposits in Australia. Monazite is rich in thorium and is not widely exploited in Australia due mainly to the very limited market for monazite.

Mining of mineral sands ores is carried out either by dry mining methods or wet dredging techniques. Dry mining methods utilise heavy machinery such as scrapers to collect and transport ore located above the water table into a hopper for subsequent processing. Dry mining methods generate significant scope 1 emissions from fuel use.

Dredge mining, or wet mining, is best suited to ore reserves below the water table. Dredging involves cutting the ore under the surface of a pond and using a bucket well and suction to pump the ore in slurry form to a concentrator for separation and processing. Wet mining is primarily electricity based.

The ore is then transported (in slurry form) to a concentrator plant for separation and processing.

The production variable includes all development processes required to allow extraction of the mineral sands, including development of new mining areas through the life of the facility. This includes land clearing and removal and storage of topsoil for later use.

*Mining of mineral sands*

The primary source of scope 1 emissions is the combustion of liquid fuel – usually diesel – used in excavators, bulldozers, haul trucks, drilling rigs and stationary diesel engines used for dredging and water management, electricity generation, and sometimes in-pit or primary ROM crushing.

During the life of the mine, material may require multiple movements as the mine plan evolves. All movement of waste material within the facility is covered by the production variable.

The hauling of mineral sands for treatment may involve temporary storage intended to provide buffering for the concentrating process.

*Processing of mineral sands*

Water is added to the mineral sands to wash the slurry through a series of spiral separators that use gravity to separate the heavy mineral sands from lighter quartz sand, rock and clay. The slurry is primary separation process step is the production of a heavy mineral concentrate (HMC) using a wet gravity separation technique. The ore is washed through a series of spiral separators that utilise sizing and gravity differentiation to separate the heavy minerals from the accompanying clay, quartz sand and rock. The concentrate obtained from this process contains a mix of valuable heavy minerals as well as other non-valuable heavy mineral components and waste. The separation process produces mineral concentrate.

The heavy metal concentrate undergoes secondary processing to separate the individual minerals. Secondary processing to separate minerals is primarily an electrically driven process. This secondary processing is not included within this production variable.

*Measurement of saleable heavy metal concentrate*

The output of the activity is defined as tonnes of saleable heavy metal concentrate product suitable as a feedstock for mineral separation processes measured on a wet basis. The measurement of this output is expected to be based on records of the quantity of saleable heavy metal concentrate measured on a wet basis using calibrated instruments or other industry standards as applicable. Evidence of the measurement may include third party transport bill of lading records or internal company production records. The measurement of the production variable is by tonne of saleable heavy metal concentrate suitable as a feedstock for mineral separation processes: at the facility; or transported away from the facility.

*Mine rehabilitation*

Rehabilitation for individual mines may occur at a facility while other mines are operated, or at the end of life of the facility. The rehabilitation that occurs during the continued operation of the mine are included in the production variable. End of mine life rehabilitation is not included in the production variable.

## 18.3. Inclusions

For the purposes of the development of the default emissions intensity value and the preparation of an estimated (site-specific) emission intensity value for this production variable, scope 1 emissions from the following processes at the facility are included:

- the use of on-site machinery, equipment and processes for the extraction by dry mining methods and treatment of the mineral sands described in the activity definition, including, for example:
    - machinery used to:
        - prepare and remove topsoil and overburden to allow mining of mineral sands;
        - install equipment required to move materials;
    - machinery used to move materials within the facility, including mobile equipment;
    - control rooms, laboratories, maintenance workshops;
    - machinery used to create non-electrical energy for use in the activity;
    - on-site processing of waste materials from the activity;
- the treatment of mined mineral sands to separate mineral sands from waste materials to form a heavy metal concentrate, including:
    - washing and screening to separate waste material;
    - mineral recovery processes intended to return mineral sands to the separation process;
- the supply of utilities such as, but not limited to, compressed air, cooling and water where these are used in support of the activity and within the facility;
- the storage and loading of the heavy metal concentrate product into a medium of transportation such as trucks or rail trains;
- transportation of inputs used in the activity to storage at the facility, where the transport activity wholly occurs within the facility;
- transportation of the output of the activity from storage at the facility, where the transport activity wholly occurs within the facility;
- complementary processes, such as packaging, head office, administrative and marketing operations, which occur within the boundary of the facility that is undertaking the activity; and
- other incidental, ancillary or supporting processes which are not included in another default or estimated emissions intensity value.

It is intended that all scope 1 NGER-reported emissions from a facility can be assigned to a production variable. Where a facility produces multiple products, emissions must be apportioned in a justifiable manner, making sure no emissions are counted more than once and the total emissions counted cannot be more than the total emissions from the facility.

## 18.4. Exclusions

Scope 1 emissions from the following processes were not included in the default emissions intensity calculation for this production variable, and must be excluded from the calculation of an estimated (site-specific) emissions intensity value for the production variable:

- on-site electricity generation;
- secondary processing of heavy metal concentrate to separate the individual minerals; and
- processes that do not occur within the facility.

# 19. Run of mine metal ore

## 19.1. Production variable definition

1. Tonnes of run-of-mine metal ore that:
   (a) contains 1 or more metals; and
   (b) is produced as part of carrying on the metal ore mining and processing activity at the facility; and
   (c) is of saleable quality; and
   (d) has not been counted, in whole or part, for another production variable at the facility; and
   (e) is not eligible to be the bauxite, manganese ore or iron ore prescribed production variable.
2. The metric in subsection (1) is applicable to a facility that conducts the activity of mining and processing metal ore through:
   (a) the physical extraction of mineral ores containing metals; and
   (b) the processing of the extracted ores to produce a metal product or feedstock material.
3. The activity in subsection (2) is the ***metal ore mining and processing activity***.

Note: The default emissions intensity for this prescribed production variable is yet to be calculated and specified in the Schedule.

## 19.2. Scope of the activity

The production variable is run-of-mine metal ore, however the activity includes not just the processes required to extract the ore, but also those for on-site processing of the ore, such as into metal concentrates and bars. Processing can include:

- metal ores produced via a pyrometallurgical process from sulphate ores. Metal concentrate is produced at most metal sulphate mines and subsequently used as a feedstock for smelters to produce metals (smelting is excluded from the activity);
- alternative processing techniques, such as heap leaching and solvent extraction or electrowinning can be used for low grade metal ores, resulting in direct metal production.

If the processed outputs meet the definitions of other production variables, then the ROM metal ore production variable is not applicable, such as iron ore or bauxite.

The production variable includes all development processes required to allow extraction of the metal bearing ore, including development of new mining areas through the life of the facility. This includes land clearing and removal and storage of topsoil for later use.

Metal ores are mined from both open-cut and underground mines, based on the physical characteristics of the mine and the most economically efficient mining method. Both open-cut and underground mining may be used for any particular ore body, and separate ore bodies mined at a single facility. Both mining methods are covered by this production variable.

*Open-cut mining of metal ore*

Open-cut mining involves the removal and storage of overburden material to allow access to the metal bearing ore. The overburden and ore are mined using drill and blasting techniques to break up the materials to allow extraction, usually via excavator loading into trucks.

The primary source of scope 1 emissions is the combustion of liquid fuel – usually diesel – used in excavators, bulldozers, haul trucks, drilling rigs and stationary diesel engines used for water management, electricity generation, and sometimes in-pit or primary ROM crushing.

Emissions from blasting include the oxidation of hydrocarbons mixed with other materials, usually ammonium nitrate, to generate the explosive reaction.

During the life of the mine, waste material may require multiple movements as the mine plan evolves. All movement of waste material within the facility is covered by the production variable.

The hauling of ore for treatment may involve temporary storage intended to provide buffering for the milling process, or for longer-term storage of lower grade ores for later blending or treatment, often at the end of the mine life.

*Underground mining of metal ore*

Underground mining, like open-cut mining, requires significant activity to prepare for the extraction of ore for treatment. Shallow underground mines may include the development of an access ramp allowing vehicles to access the underground mining areas for haulage of ore and possibly waste to the surface. Deeper mines would generally be developed with one or more vertical shafts to lift ore and possibly waste material to the surface. Underground mines would also include vertical shafts for ventilation, and sometimes cooling water supply and other services such as electricity and communications.

Different mining techniques can be employed underground depending on the characteristics of the ore body. All involve drilling, blasting and movement of any waste required to access the ore. Waste material is, when possible, left underground as backfill of previous voids. Ore, and waste when required, is brought to the surface for treatment (ore) or storage (ore and waste).

The primary source of scope 1 emissions from underground mining is from the combustion of liquid fuel – usually diesel – used in underground vehicles, haul trucks, and drilling rigs when access ramps are available, stationary engines used for water management, electricity generation and sometimes underground primary ROM crushing. Emissions from blasting will occur.

*Processing of metal ore via grinding, separation and flotation*

Grinding of hard rock ore may require multiple stages to reduce the particle size of mineral ore to a required size to allow formation of metal grains in a slurry prior to beneficiation by flotation. Grinding is generally electrically driven.

The flotation process involves the addition of chemical flocculant such as xanthates to increase the hydrophobic properties of the metallic mineral grains to separate the metal from the water slurry. Compressed air injection or other mixing processes are used to form air bubbles that capture the hydrophobic mineral grains and rise to the surface, forming a froth. The froth is mechanically removed, producing a concentrate of the metal mineral. The waste materials

are sent to a tailings dam for storage. The flotation and separation process are generally electrically driven.

The collected metal mineral slurry from the flotation process are sent to a hydrocyclone to thicken the slurry by reducing the water content. Hydraulic presses may then be used to further dry the metal concentrate.

*Processing of metal ore via leaching*

Various leaching options are available for metal extraction including chemical and biological leaching. The majority of emissions expected to be covered by this production variable will result from the mining rather than processing processes.

*Measurement of ROM metal ore*

The output of the activity is defined as tonnes of ROM metal ore, that is, ROM metal ore produced by mining operations that is suitable for (or has been through) primary crushing. The measurement of this output is expected to be based on company records of the quantity of ROM ore mined or other industry measurement standards as applicable. The measurement of the output for the issue of a baseline is by tonne of ROM that is produced, which is suitable for: processing into concentrate, metal bar or other feedstock at the facility; or transportation away from the facility.

*Mine rehabilitation*

Rehabilitation for an individual mine or part of a mine may occur at a facility while other parts of the mine continue in operation, or at the end of life of the facility. The rehabilitation that occurs during the continued operation of the mine are included in the production variable. End of mine life rehabilitation is not included in the production variable.

## 19.3. Inclusions

For the purposes of the development of the default emissions intensity value and the preparation of an estimated (site-specific) emission intensity value for this production variable, scope 1 emissions from the following processes at the facility are included:

- the use of on-site machinery, equipment and processes for the extraction and treatment of the ore described in the activity definition, including, for example:
    - machinery used to:
        - prepare and remove topsoil and overburden to allow mining of ore;
        - develop underground access roadways;
        - dewatering mine areas;
        - install equipment required to move materials.
    - machinery used to move materials within the facility, including mobile equipment;
    - control rooms, laboratories, maintenance workshops;
    - machinery used to create non-electrical energy for use in the activity;
    - machinery used to generate electricity that is not reported as electricity production in an NGER report;
    - the processing of by-products where they involve the recovery of materials for re-use within the activity or are necessary for the activity to proceed as described;

- on-site processing of waste materials from the activity;

- the treatment of mined ore to separate metal bearing ore from waste materials and concentrating one or more metals that are subsequently contained in a solution form predominantly containing metal, including:
  - crushing and grinding to produce a fine mineral slurry;
  - flotation, leaching and adsorption process that separates the metal bearing ore from the waste material;
  - thickening of metal containing slurry to reduce water content;
  - electrochemical processes to separate metal species from a flocculant used in an adsorption process;
  - drying and preparation for transport of metal concentrate;
  - drying of pregnant eluate and preparation for a furnace;
  - smelting the metals and setting in metal bars;
  - mineral recovery processes intended to return metal ore to the flotation circuit.
- Alternative treatment processes that produce metal in a solution including:
  - heap leaching & insitu leaching involving chemical or acid reagents;
  - pressurised vessel leaching involving chemical or acid reagents;
  - bio-leaching using microbes to extract the metal from the ore;
- waste heat recovery within the activity;
- drilling and blasting using explosives and other equipment;
- the supply of utilities such as, but not limited to, compressed air, cooling and water where these are used in support of the activity and within the facility;
- the regeneration of any solvents used within the activity;
- the storage and loading of the metal concentrate into a medium of transportation such as trucks or rail trains;
- transportation of inputs used in the activity to storage at the facility, where the transport activity wholly occurs within the facility;
- transportation of the output of the activity from storage at the facility, where the transport activity wholly occurs within the facility;
- complementary processes, such as packaging, head office, administrative and marketing operations, which occur within the boundary of the facility that is undertaking the activity; and
- other incidental, ancillary or supporting processes which are not included in another default or estimated emissions intensity value.

It is intended that all scope 1 NGER-reported emissions from a facility can be assigned to a production variable. Where a facility produces multiple products, emissions must be apportioned in a justifiable manner, making sure no emissions are counted more than once and the total emissions counted cannot be more than the total emissions from the facility.

## 19.4. Exclusions

Scope 1 emissions from the following processes were not included in the default emissions intensity calculation for this production variable, and must be excluded from the calculation of an estimated (site-specific) emissions intensity value for the production variable:

- on-site electricity generation; and
- processes that do not occur within the facility.

# Oil and gas

## 20. Extracted oil and gas

### 3.1. Production variable definition

1. Total gigajoules of the following products that meet the requirements of subsection (2):
   (a) unprocessed natural gas;
   (b) unstabilised crude oil and condensate.
2. The requirements for products to be included in subsection (1) are that the products:
   (a) consist of
      (i) naturally occurring hydrocarbons; or
      (ii) a naturally occurring mixture of hydrocarbons and non-hydrocarbons; and
   (b) are extracted from a naturally occurring petroleum reservoir as part of carrying on the oil and gas extraction activity at the facility; and
   (c) at the time of measurement for the production variable, have undergone minimal or partial processing that is either:
      (i) sufficient only to allow efficient transportation of the product to processing facilities; or
      (ii) less than required to be considered processed natural gas or saleable crude oil or condensate; and
   (d) are not consumed in carrying on the oil and gas extraction activity.
3. The metric in subsection (1) is applicable to a facility that conducts the activity of oil and gas extraction through the production of a hydrocarbon stream from a naturally occurring petroleum reservoir and either:
   (a) transports the produced stream of products covered by subsection (1) to the upstream boundary of a separate facility that conducts one or more of the following activities:
      (i) natural gas processing;
      (ii) processed or unprocessed natural gas liquefaction;
      (iii) crude oil or condensate stabilisation; or
   (b) transfers the products covered by subsection (1) to downstream processes within the same facility to produce multiple products.
4. The activity in subsection (3) is the ***oil and gas extraction activity***.

Note: The default emissions intensity for this prescribed production variable is yet to be calculated and specified in the Schedule.

### 3.2. Scope of the activity

The extraction of unprocessed natural gas and unstabilised crude oil and/or condensate is the production of a fluid stream from a naturally occurring petroleum reservoir (which could include an unconventional source, such as coal seam gas or shale oil), that may contain gas,

crude oil, condensate, natural gas liquids and non-hydrocarbon components, in a gaseous, liquid and/or mixed liquid and gaseous state, and may include transportation of the fluid stream to a facility or facilities for processing.

The produced stream may undergo a treatment stage where crude oil, condensate, natural gas liquids and/or water are separated from the gas stream and the gas stream may be compressed to allow transportation for processing. Before compression, minimal processing of the gas stream may occur to allow efficient transportation of the gas. Partial processing of the gas, such as partial acid gas removal or separation of natural gas liquids, may also occur. The unprocessed natural gas is transported by pipeline to a separate downstream facility for processing, or may be transferred for processing within the same facility which produces multiple outputs.

The liquid components may undergo a treatment stage where bulk gases and water are removed. Following such processing, the liquids are transported either with the gas or separately to the same or a different facility for processing. Partial processing of the crude oil/condensate, such as some additional gas removal, may occur. However, the crude oil/condensate produced as an output from this partial processing does not meet the standard defined in the crude oil and condensate production variable (for example, it is not stabilised and is not of a saleable quality), and hence remains unprocessed crude oil/condensate.

The activity may include the re-injection of produced fluids (liquid hydrocarbon or water and gas), where the re-injection is undertaken for the purpose of either safely disposing of by-product or for the purposes of secondary or tertiary hydrocarbon recovery. This activity does not include gas re-injection into a natural or constructed reservoir and subsequent gas withdrawal as a storage facility operated to meet variations in gas supply and demand.

The activity does not apply to production from facilities that only extract and process crude oil into stabilised crude oil, as this is intended to be covered by the ***stabilised crude oil (extraction and stabilisation)*** production variable.

The outputs of the activity are GJ of unprocessed natural gas and unstabilised crude oil/condensate. The measurement of this output is expected to be conducted so that it does not include any GJ of unprocessed natural gas or unstabilised crude oil/condensate that are consumed within the activity. The measurement of the production variable is as GJ of unprocessed natural gas and unstabilised crude oil/condensate that are transported, as a gas and/or liquid, away from the activity.

The activity does not include the downstream processing of the natural gas or the crude oil/condensate and other associated liquids.

## 3.3. Inclusions

For the purposes of calculating the default emissions intensity value and the estimated (site-specific) emission intensity value for this production variable, scope 1 emissions from the following processes at the facility should be included:

- The use of machinery, equipment and processes for the activity as described in the activity definition, including, for example:
    - machinery used to move materials within and as part of the activity, including machinery required to lift the crude oil from the petroleum reservoir if required;
    - control rooms, laboratories, and maintenance workshops;

- machinery used to create non-electrical energy for use in the activity;
- the processing of by-products where they involve the recovery of materials for re-use within the activity or are necessary for the activity to proceed as described;
- on-site processing and/or disposal of waste materials, such as wastewater, from the activity;
- machinery used for secondary or tertiary enhanced oil recovery, such as chemical or water injection, gas injection, carbon dioxide enhanced oil recovery;

- partial treatment of the produced hydrocarbon stream that can be subsequently transported to a downstream facility for processing, using processes including, for example:
  - bulk water removal (such as emissions associated with the separation of water from the extracted natural gas or crude oil and flaring of entrained hydrocarbons in this water);
  - separation of gas from liquids;
  - injection of additives such as corrosion inhibitor to allow efficient transportation of the gas or liquid;
  - removal of sulphur compounds;
  - removal of reservoir $CO_2$ (the separated reservoir $CO_2$ is not included and must be reported separately, but the emissions associated with the process of separating the reservoir $CO_2$ are included);
- any flaring, leaks or venting of greenhouse gases associated with the activity, except reservoir $CO_2$;
- the short-term buffer storage of hydrocarbon liquids produced in the extraction activity, where the volume of that buffer storage is designed specifically to allow efficient loading into transportation systems, such as tankers or pipelines, at a frequency and rate determined by the facility's off-take requirements;
- field compression of the unprocessed natural gas and/or pumping of unstabilised crude oil and condensate associated with the gathering of the fluids upstream of any treatment carried out as part of the activity;
- compression of the unprocessed natural gas and/or pumping of unstabilised crude oil and condensate to transfer the fluids to the downstream activity boundary;
- the supply of utilities such as, but not limited to, compressed air, nitrogen, steam and water where these are used in support of the activity and within the activity boundaries;
- the regeneration of any catalysts or solvents, if the regeneration is undertaken within the activity;
- recovery/capture and use of waste heat/energy within the activity; and
- other incidental, ancillary or supporting processes which are not included in another default or estimated emissions intensity value.

## 3.4. Exclusions

For the purposes of calculating the default emissions intensity value and the estimated (site-specific) emission intensity value for this production variable, scope 1 emissions from the following processes at the facility should be excluded:

- reservoir $CO_2$ that is separated from the hydrocarbon stream as part of the extraction activity, as reservoir $CO_2$ is reported under its own production variable;
- processes which do not occur within the facility; and
- on-site electricity generation.

## 3.5. Multiple production variables from the same facility

It is intended that all scope 1 NGER-reported emissions from a facility can be assigned to a production variable. Where a facility produces multiple products, emissions must be apportioned in a justifiable manner, making sure no emissions are counted more than once and the total emissions counted cannot be more than the total emissions from the facility.

# 21. Stabilised crude oil or condensate (stabilisation only)

## 3.6. Production variable definition

1. Total gigajoules of the crude oil and condensate that:
   (a) are a mixture of hydrocarbons that are liquid at atmospheric pressure (101.325 kilopascals) and ambient temperature; and
   (b) can be safely stored and transported at atmospheric pressure and ambient temperature; and
   (c) are produced as part of carrying on the crude oil or condensate stabilisation activity at the facility; and
   (d) are not consumed in carrying on the crude oil or condensate stabilisation activity; and
   (e) are of saleable quality.
2. The metric in subsection (1) is applicable to a facility that conducts the activity of crude oil or condensate stabilisation through the physical transformation of either or both of unstabilised crude oil and condensate, which may be a mixture of liquids and gases, into stabilised crude oil and condensate that:
   (a) is in a liquid state; and
   (b) has a vapour pressure of less than 101.325 kilopascals; and
   (c) is safe to store and transport at atmospheric pressure and ambient temperature.
3. The activity in subsection (2) is the ***crude oil or condensate stabilisation activity***.

Note: The default emissions intensity for this prescribed production variable is yet to be calculated and specified in the Schedule.

## 3.7. Scope of the activity

This production variable applies to facilities that produce stabilised crude oil or condensate, typically as one of multiple hydrocarbon products. It does not apply to facilities that extract the well fluid and subsequently produce stabilised crude oil or condensate as the only saleable hydrocarbon product. These facilities should use the ***stabilised crude oil (extraction and stabilisation)*** production variable.

The production of stabilised crude oil or condensate is the separation of crude oil or condensate from a mixture that may contain crude oil, condensate, natural gas and non-hydrocarbon components, in a liquid and/or mixed liquid and gaseous state on entering the activity, into crude oil or condensate that is stable in a liquid state at atmospheric pressure and ambient temperature, and that is in a liquid state on leaving the activity.

The activity involves the stabilisation of unstabilised crude oil and/or condensate, which is taken from a crude oil or natural gas extraction activity or from an alternative source such as an unstabilised crude oil or condensate pipeline. It may include a feed treatment stage where bulk water is removed. Following such processing, the predominantly liquid mixture is stabilised by removing some of the dissolved light hydrocarbon and non-hydrocarbon

components to reduce the vapour pressure, for example by passing it through several stages of separation at increasingly lower pressures, or via a stabilisation (distillation) column.

Hydrocarbons contained in the unstabilised crude oil and/or condensate stream may be processed into other products, such as processed natural gas, ethane and LPG. However, the processing steps unique to these other products are not part of the activity.

It is intended that alternative forms of production that do not require the feed treatment stage would be considered to fit within the activity definition, so long as at least stabilisation of crude oil and/or condensate takes place at the facility.

The outputs of the activity are GJ of crude oil or condensate. The measurement of this output is to be conducted so that it does not include any GJ of crude oil or condensate that are consumed during the activity. The measurement of the production variable is as GJ of crude oil or condensate of saleable quality that are transported, as a liquid, away from the facility where the crude oil or condensate was stabilised.

The activity does not include the upstream extraction or production of unstabilised crude oil and condensate to feed the activity. Further, the activity does not include the downstream processing of the stabilised crude oil including refining into petroleum products such as petrol, jet fuel, diesel, lubrication oil, bitumen or other refinery products. The activity also does not include transportation of the stabilised crude oil to downstream users or processors.

## 3.8. Inclusions

For the purposes of developing the default emissions intensity value and the estimated (site-specific) emission intensity value for this production variable, scope 1 emissions from the following processes at the facility are included:

- the use of machinery, equipment and processes for the physical transformation described in the activity definition, including, for example:
    - machinery used to move materials within and as part of the activity;
    - control rooms, laboratories, and maintenance workshops;
    - machinery used to create non-electrical energy for use in the activity;
    - the processing of by-products where they involve the recovery of materials for re-use within the activity or are necessary for the activity to proceed as described; unless the by-product is being reported as a separate production variable, in which case, refer to section 3.10;
    - on-site processing and/or disposal of waste materials, such as wastewater, from the activity;
- recovery/capture and use of waste heat/energy within the activity;
- the treatment of the feed stream that is subsequently transformed into stabilised crude oil or condensate, using processes including, for example:
    - bulk water removal (such as emissions associated with the separation of water from the natural gas and flaring of entrained hydrocarbons in this water);
    - stabilisation, being the process of removing some of the dissolved light hydrocarbon and non-hydrocarbon components from crude oil and/or condensate to reduce its vapour pressure, for example by passing it through several stages of separators at increasingly lower pressures; or via a stabilisation (distillation) column;

- dehydration;
- desalting;
- removal of sulphur compounds;

- any flaring, leaks or venting of greenhouse gases associated with the activity, except reservoir $CO_2$;
- the short-term buffer storage of stabilised crude oil or condensate where the volume of that buffer storage is designed specifically to allow efficient loading into transportation systems, such as tankers, at a frequency and rate determined by the facility's off-take requirements;
- the supply of utilities such as, but not limited to, compressed air, nitrogen, steam and water where these are used in support of the activity and within the activity boundaries;
- the regeneration of any catalysts or solvents, if the regeneration is undertaken within the activity;
- the loading of the stabilised crude oil or condensate (by pumping) into a medium of transportation such as tankers, pipelines or to a piece of equipment which will consume the stabilised crude oil or condensate, if the pumps are included within the facility for the purpose of NGER; and
- other incidental, ancillary or supporting processes which are not included in another default or estimated emissions intensity value.

## 3.9. Exclusions

For the purposes of calculating the default emissions intensity value and the estimated (site-specific) emission intensity value for this production variable, scope 1 emissions from the following processes at the facility should be excluded:

- the processing or transfer of other products such as processed natural gas, ethane or LPG;
- processes which do not occur within the facility; and
- on-site electricity generation.

## 3.10. Multiple production variables from the same facility

It is intended that all scope 1 NGER-reported emissions from a facility can be assigned to a production variable. Where a facility produces multiple products, emissions must be apportioned in a justifiable manner, making sure no emissions are counted more than once and the total emissions counted cannot be more than the total emissions from the facility.

The method for determining the amount of emissions to be apportioned to each reported production variable may be one of the following options:

1. Apportion emissions from the activity to each production variable using a whole-of-activity mass balance method that assigns emissions at each step to the associated material stream, tracked through the activity to its transportation out of the activity location. For example, for a crude oil and condensate (processing) activity that also produces processed natural gas:
    - apportion emissions from the processing steps between the two production variables, using a mass balance method;

- apportion the emissions from facility activities such as generation of utilities, venting and flaring, treatment of waste streams, between the two production variables, using a mass balance method;
- apportion the emissions from remaining, general facility activities such as the control rooms, laboratories, and maintenance workshops between the two production variables, in the ratio of the amount of that production variable produced, for example on an energy basis, unless there is another justifiable basis.

2. Apportion all emissions unique to the crude oil and condensate processing activity to the crude oil and condensate (processing) production variable. Similarly, apportion all emissions unique to other production variables produced at the same facility to the relevant production variable. Apportion all emissions involved in processing steps prior to the separation of crude oil and condensate amongst the various production variables on an energy basis, unless there is another justifiable basis. That is:
   - apportion all emissions from the pre-processing, such as bulk water and gas separation, amongst the various production variables in the ratio of the amount of each production variable produced, for example on an energy basis, unless there is another justifiable basis;
   - apportion all emissions from the crude oil and/or condensate stabilisation unit operation, such as the series of separators or stabilisation column, to the crude oil and condensate (processing) production variable;
   - apportion all emissions from the further processing of the crude oil and condensate, such as desalting (if that process is carried out) and pumping to storage, to the crude oil and condensate (processing) production variable;
   - apportion all emissions from activities such as generation of utilities, venting and flaring, treatment of waste streams, associated with the crude oil and condensate stabilisation process and the further processing of the crude oil and condensate to the crude oil and condensate (processing) production variable;
   - apportion all emissions from the processing of each of the other production variables, (for example dehydration, dew point control and compression if another production variable was processed natural gas), to the relevant production variable;
   - apportion all emissions from activities such as generation of utilities, venting and flaring, treatment of waste streams, associated with each of the other production variables, to the relevant production variable;
   - apportion the emissions from remaining, general facility activities such as general utilities, the control rooms, laboratories, and maintenance amongst the various production variables in the ratio of the amount of each production variable produced, for example on an energy basis, unless there is another justifiable basis.

# 22. Stabilised crude oil (integrated extraction and stabilisation)

## 3.11. Definition

1. Total gigajoules of the crude oil that:
   (a) are a mixture of hydrocarbons that are liquid at atmospheric pressure (101.325 kilopascals) and ambient temperature; and
   (b) can be safely stored and transported at atmospheric pressure and ambient temperature; and
   (c) are produced as part of carrying on the integrated crude oil extraction and stabilisation activity at the facility; and
   (d) are not consumed in carrying on the integrated crude oil extraction and stabilisation activity; and
   (e) are of saleable quality.
2. The metric in subsection (1) is applicable to a facility that:
   (a) conducts both of the following activities:
      (i) the extraction of a hydrocarbon stream from a naturally occurring petroleum reservoir;
      (ii) the crude oil or condensate stabilisation activity; and
   (b) has stabilised crude oil as its only saleable hydrocarbon product.
3. The activity in subsection (2) is the ***integrated crude oil extraction and stabilisation activity***.
4. However, the metric in subsection (1) is not applicable to a facility using another oil and gas production variable in Schedule 2 (other than the reservoir $CO_2$ production variable).

Note: The default emissions intensity for this prescribed production variable is yet to be calculated and specified in the Schedule.

## 3.12. Scope of the activity

This production variable applies to facilities that both extract the well fluid and subsequently produce stabilised crude oil as the only saleable hydrocarbon product.

The extraction of crude oil is the production of a fluid stream that is predominantly liquid from a naturally occurring petroleum reservoir, which may also contain water and/or non-hydrocarbon components, and transportation of the fluid stream to the processing facility (which is part of the same facility) for processing.

The processing of the fluid stream into stabilised crude oil is the separation of crude oil from the fluid stream, which was a mixture that may contain crude oil, natural gas and non-hydrocarbon components, in a liquid and/or mixed liquid and gaseous state on entering the process, into crude oil that is stable in a liquid state at atmospheric pressure and ambient temperature, and that is in a liquid state on leaving the activity.

The activity involves the extraction of crude oil from a naturally occurring petroleum reservoir, which could include an unconventional source, such as a shale oil deposit. The produced fluid may also include natural gas, water, $CO_2$ and other non-hydrocarbon gases.

The activity may include a feed treatment stage where bulk gases and water are removed from the well stream. Following such processing, the predominantly liquid mixture is stabilised by removing some of the dissolved light hydrocarbon and non-hydrocarbon components to reduce the vapour pressure, for example by passing it through several stages of separation at increasingly lower pressures, or via a stabilisation (distillation) column.

Gases contained in the unstabilised crude oil stream are disposed of, for example by use as fuel, flaring, or compression for injection into a petroleum reservoir, and hence have not been reported as a separate production variable. The water contained in the unstabilised crude oil stream is treated as required, for example by desalination; and disposed of, for example by discharge to the environment, reinjection or evaporation.

It is intended that alternative forms of extraction and stabilisation that do not require the removal of water would be considered to fit within the activity definition, so long as at least stabilisation of crude oil takes place at the facility.

This activity does not include crude oil refining. The activity is also not satisfied where the crude oil being produced by the facility has a vapour pressure higher than atmospheric pressure at ambient temperature. The activity is also not satisfied by a facility that does stabilisation but not extraction, as the output from such a facility is *stabilised crude oil and condensate (stabilisation only)*.

The outputs of the activity are GJ of crude oil. The measurement of this output is to be conducted so that it does not include any GJ of crude oil that are consumed within the facility. The measurement of the production variable is as GJ of crude oil that are transported, as a liquid, away from the facility where the crude oil was stabilised.

The activity does not include the downstream processing of the stabilised crude oil including refining into petroleum products such as petrol, jet fuel, diesel, lubrication oil, bitumen or other refinery products. The activity also does not include transportation of the stabilised crude oil to downstream users or processors, after the point of transfer into the crude oil tanker or pipeline.

## 3.13. Inclusions

For the purposes of developing the default emissions intensity value and the estimated (site-specific) emission intensity value for this production variable, scope 1 emissions from the following processes at the facility are included:

- the use of machinery, equipment and processes for the extraction and physical transformation described in the activity definition, including, for example:
    - machinery used to move materials within and as part of the activity, including machinery required to lift the crude oil from the petroleum reservoir if required;
    - control rooms, laboratories, and maintenance workshops;
    - machinery used to create non-electrical energy for use in the activity;

- the processing of by-products where they involve the recovery of materials for re-use within the activity, such as compression of gas to be reinjected into the reservoir, or are necessary for the activity to proceed as described;
- on-site processing and/or disposal of waste materials, such as gases and wastewater;
- the injection of fluids (liquid hydrocarbon or water and gas) for the purposes of secondary or tertiary hydrocarbon recovery;

- recovery/capture and use of waste heat/energy within the activity;
- field pumping of the well fluid associated with the gathering of the fluid upstream of processing;
- the treatment of the well fluid that is subsequently transformed into stabilised crude oil, using processes including, for example:
  - bulk gas and water removal (such as emissions associated with the separation of water from the crude oil and flaring of entrained hydrocarbons in this water);
  - stabilisation, being the process of removing some of the dissolved light hydrocarbon and non-hydrocarbon components from crude oil to reduce its vapour pressure, for example by passing it through several stages of separators at increasingly lower pressures; or via a stabilisation (distillation) column;
  - dehydration;
  - desalting;
  - removal of sulphur compounds;
  - removal of reservoir $CO_2$ (the separated reservoir $CO_2$ is not included and must be reported separately, but the emissions associated with the process of separating the reservoir $CO_2$ are included);
- any flaring, leaks or venting of greenhouse gases associated with the activity, except reservoir $CO_2$;
- the short-term buffer storage of stabilised crude oil where the volume of that buffer storage is designed specifically to allow efficient loading into transportation systems, such as tankers, at a frequency and rate determined by the facility's off-take requirements;
- the supply of utilities such as, but not limited to, compressed air, nitrogen, steam and water where these are used in support of the activity and within the activity boundaries;
- the regeneration of any catalysts or solvents, if the regeneration is undertaken within the activity;
- the loading of the stabilised crude oil (eg by pumping) into a medium of transportation such as tankers or pipeline, or to a piece of equipment which will consume the stabilised crude oil, if such loading equipment is included within the facility for the purpose of NGER; and
- other incidental, ancillary or supporting processes which are not included in another default or estimated emissions intensity value.

## 3.14. Exclusions

For the purposes of calculating the default emissions intensity value and the estimated (site-specific) emission intensity value for this production variable, scope 1 emissions from the following processes at the facility should be excluded:

- reservoir $CO_2$ that is separated from the crude oil mixture as part of the extraction and processing activity, as reservoir $CO_2$ is reported under its own production variable;
- processes which do not occur within the facility; and
- on-site electricity generation.

## 3.15. Multiple production variables from the same facility

It is intended that all scope 1 NGER-reported emissions from a facility can be assigned to a production variable.

The ***stabilised crude oil (extraction and stabilisation)*** production variable does not allow for the use of other production variables, except for reservoir $CO_2$ and electricity. If other hydrocarbon products identified as production variables are produced by the activity, the separate production variables of ***stabilised crude oil and condensate (stabilisation only)***, along with the other applicable production variables, such as *unprocessed* or *processed natural gas*, must be used.

# 23. Processed natural gas (processing only)

## 3.16. Production variable definition

1. Gigajoules of processed natural gas that:
   (a) are produced as part of carrying on the natural gas processing activity at the facility; and
   (b) are not consumed in carrying on the natural gas processing activity; and
   (c) are of saleable quality.
2. The metric in subsection (1) is applicable to a facility that conducts the activity of processing natural gas through the physical transformation of unprocessed natural gas, which may be a mixture of gases and liquids, into processed natural gas (the ***natural gas processing activity)***.

Note: The default emissions intensity for this prescribed production variable is yet to be calculated and specified in the Schedule.

*Definition of processed natural gas*

Where 'processed natural gas' means a substance that:

- is in a gaseous state at standard temperature and pressure; and
- consists of:
  (a) naturally occurring hydrocarbons; or
  (b) a naturally occurring mixture of hydrocarbons and non-hydrocarbons; and
- is mainly methane; and
- has been:
  (a) injected into a natural gas transmission pipeline; or
  (b) supplied to a third party for injection into a natural gas transmission pipeline; or
  (c) supplied to a downstream user after processing the substance to an agreed specification, such that the gas has at least the following qualities:
    (i) water content of 150 mg/$Sm^3$ or less;
    (ii) inert gases (including carbon dioxide) of 12 molar per cent or less;
    (iii) hydrocarbon cricondentherm of 10 °C or lower;
    (iv) sulphur content (including any sulphur from odourant) of 60 mg/$Sm^3$ or less.

## 3.17. Scope of the activity

This production variable applies to facilities that produce processed natural gas, typically as one of multiple hydrocarbon products. It does not apply to facilities that extract the unprocessed natural gas and subsequently produce processed natural gas as the only saleable hydrocarbon product. These facilities should use the ***processed natural gas (production and processing)*** production variable.

The processing of natural gas is the treatment of an unprocessed natural gas stream, which may contain some hydrocarbon and/or non-hydrocarbon liquids, to produce a gaseous stream

for injection into a natural gas transmission pipeline, or for supply to another downstream user with a specification meeting the requirements of the processed natural gas definition.

The activity involves the receipt of unprocessed natural gas from a facility (which may be the same facility) conducting the activity of natural gas extraction, and processing it to a quality suitable for injection into a natural gas transmission pipeline or for supply to a downstream user with a specification meeting the requirements of the processed natural gas definition. The processing may involve separation from hydrocarbon and/or non-hydrocarbon liquids, dehydration, acid gas removal, mercury removal, and any other processes required to bring the gas to pipeline quality or the user specification meeting the requirements of the processed natural gas definition. Compression of the gas to allow injection into the pipeline is also included in the activity, if the equipment used for compression is included within the facility for the purpose of reporting under the NGER scheme.

The inputs of the activity are a stream of unprocessed natural gas that may contain gas, crude oil, condensate, natural gas liquids and non-hydrocarbon components, in a gaseous, liquid and/or mixed liquid and gaseous state.

The outputs of the activity are GJ of processed natural gas injected into the natural gas transmission pipeline or supplied to a downstream user with a specification meeting the requirements of the processed natural gas definition. The measurement of this output is expected to be conducted so that it does not include any GJ of processed natural gas that are consumed within the activity.

The activity does not include the upstream extraction or production of unprocessed natural gas to feed the activity. Further, the activity also does not include transportation of the processed natural gas, from the point where it is injected into a natural gas transmission pipeline, to downstream users or processors.

## 3.18. Inclusions

For the purposes of developing the default emissions intensity value and the estimated (site-specific) emission intensity value for this production variable, scope 1 emissions from the following processes at the facility are included:

- the use of machinery, equipment and processes for the physical transformation described in the activity definition, including, for example:
    - machinery used to move materials within and as part of the activity;
    - control rooms, laboratories, and maintenance workshops;
    - machinery used to create non-electrical energy for use in the activity;
    - the processing of by-products where they involve the recovery of materials for re-use within the activity or are necessary for the activity to proceed as described; unless the by-product is being reported as a separate production variable, in which case, refer to section 3.20 below;
    - on-site processing and/or disposal of waste materials, such as wastewater, from the activity;
- recovery/capture and use of waste heat/energy within the activity;
- treatment of the unprocessed natural gas stream that is subsequently transformed into processed natural gas, using processes including, for example:
    - bulk water removal (such as emissions associated with the separation of water from the natural gas and flaring of entrained hydrocarbons in this water);

- separation of gas from liquids;
- removal of sulphur compounds;
- removal of reservoir $CO_2$ (the separated reservoir $CO_2$ is not included and must be reported separately, but the emissions associated with the process of separating the reservoir $CO_2$ are included);
- mercury removal;
- dehydration, for example by glycol absorption and/or molecular sieves;
- removal of ethane and heavier hydrocarbons;
- odourisation of the processed natural gas;

- any flaring, leaks or venting of greenhouse gases associated with the activity, except reservoir $CO_2$;
- the supply of utilities such as, but not limited to, compressed air, nitrogen, steam and water where these are used in support of the activity and within the activity boundaries;
- the regeneration of any catalysts or solvents, if the regeneration is undertaken within the activity;
- compression of the gas process stream (as part of or subsequent to the processing activity), including where the processed gas is then injected into a gas transmission pipeline and the compression contributes to the gas reaching the required pressure for transmission, if such equipment is included within the facility for the purpose of NGER; and
- other incidental, ancillary or supporting processes which are not included in another default or estimated emissions intensity value.

## 3.19. Exclusions

For the purposes of calculating the default emissions intensity value and the estimated (site-specific) emission intensity value for this production variable, scope 1 emissions from the following processes at the facility should be excluded:

- reservoir $CO_2$ that is separated from the natural gas mixture as part of the processing activity, as reservoir $CO_2$ is reported under its own production variable;
- the processing or transfer of other production variables such as ethane and/or LPG, or crude oil and condensate (processed) (if hydrocarbon liquids separated from the natural gas stream are incorporated into a crude oil or condensate stream);
- processes which do not occur within the facility; and
- on-site electricity generation.

## 3.20. Multiple production variables from the same facility

It is intended that all scope 1 NGER-reported emissions from a facility can be assigned to a production variable. Where a facility produces multiple products, emissions must be apportioned in a justifiable manner, making sure no emissions are counted more than once and the total emissions counted cannot be more than the total emissions from the facility.

The method for determining the amount of emissions to be apportioned to each reported production variable may be one of the following options:

1. Apportion emissions from the activity to each production variable using a whole-of-activity mass balance method that assigns emissions at each step to the associated material stream, tracked through the activity to its transportation out of the activity location. For example, for a processed natural gas activity that also produces ethane:
    - apportion emissions from the processing steps between the two production variables, using a mass balance method
    - apportion the emissions from facility activities such as generation of utilities, venting and flaring, treatment of waste streams, between the two production variables, using a mass balance method
    - apportion the emissions from remaining, general facility activities such as the control rooms, laboratories, and maintenance workshops between the two production variables, in the ratio of the amount of that production variable produced, for example on an energy basis, unless there is another justifiable basis.
2. Apportion all emissions unique to the processed natural gas activity to the processed natural gas production variable. Similarly, apportion all emissions unique to other production variables produced at the same facility to the relevant production variable. Apportion all emissions involved in processing steps prior to the separation of natural gas amongst the various production variables on an energy basis, unless there is another justifiable basis. For example, for a processed natural gas activity that also produces ethane and/or liquefied petroleum gas:
    - apportion all emissions from the pre-processing, such as bulk water separation, amongst the various production variables in the ratio of the amount of each production variable produced, for example on an energy basis, unless there is another justifiable basis
    - apportion all emissions from processed natural gas production and further gas processing unit operations to the processed natural gas production variable
    - apportion all emissions from activities such as generation of utilities, venting and flaring, treatment of waste streams, associated with the production of processed natural gas to the processed natural gas production variable
    - apportion all emissions from the ethane production unit operations, such as the fractionation step that produced the ethane and/or liquefied petroleum gas, to the ethane/liquefied petroleum gas production variable
    - apportion all emissions from the further processing of the ethane/liquefied petroleum gas, such as further $CO_2$ removal and compression to storage or the facility discharge pipeline, to the ethane/liquefied petroleum gas production variable
    - apportion all emissions from activities such as generation of utilities, venting and flaring, treatment of waste streams, associated with each of the other production variables, to the relevant production variable
    - apportion the emissions from remaining, general facility activities such as general utilities, the control rooms, laboratories, and maintenance amongst the various production variables in the ratio of the amount of each production variable produced, for example on an energy basis, unless there is another justifiable basis.

# 24. Processed natural gas (integrated extraction and processing)

## 3.21. Production variable definition

1. Gigajoules of processed natural gas that:
   (a) are produced as part of carrying on the integrated natural gas extraction and processing activity at the facility; and
   (b) are not consumed in carrying on the integrated natural gas extraction and processing activity; and
   (c) are of saleable quality.
2. The metric in subsection (1) is applicable to a facility that:
   (a) conducts both of the following activities:
      (i) the extraction of a hydrocarbon stream that is predominantly gas from a naturally occurring petroleum reservoir;
      (ii) the natural gas processing activity; and
   (b) has processed natural gas as its only saleable hydrocarbon product.
3. The activity in subsection (2) is the ***integrated natural gas extraction and processing activity***.
4. However, the metric in subsection (1) is not applicable to a facility using another oil and gas production variable in Schedule 2 (other than the reservoir $CO_2$ production variable).

Note: The default emissions intensity for this prescribed production variable is yet to be calculated and specified in the Schedule.

*Definition of processed natural gas*

Where 'processed natural gas' means a substance that:

- is in a gaseous state at standard temperature and pressure; and
- consists of:
  (a) naturally occurring hydrocarbons; or
  (b) a naturally occurring mixture of hydrocarbons and non-hydrocarbons; and
- is mainly methane; and
- has been:
  (a) injected into a natural gas transmission pipeline; or
  (b) supplied to a third party for injection into a natural gas transmission pipeline; or
  (c) supplied to a downstream user after processing the substance to an agreed specification, such that the gas has at least the following qualities:
    (i) water content of 150 mg/$Sm^3$ or less;
    (ii) inert gases (including carbon dioxide) of 12 molar per cent or less;
    (iii) hydrocarbon cricondentherm of 10 °C or lower;

(iv) sulphur content (including any sulphur from odourant) of 60 mg/$Sm^3$ or less.

## 3.22. Scope of the activity

This production variable applies to facilities that both extract unprocessed natural gas and subsequently produce processed natural gas as the only saleable hydrocarbon product.

The extraction of natural gas is the production of a fluid stream that is predominantly gaseous from a naturally occurring petroleum reservoir, which may also contain water and/or non-hydrocarbon components, in a gaseous and/or mixed liquid and gaseous state, and transportation of the fluid stream for processing within the same integrated facility.

The processing of natural gas is the treatment of the extracted natural gas stream to produce a gaseous stream for injection into a natural gas transmission pipeline or for supply to another downstream user with a specification meeting the requirements of the processed natural gas definition.

The activity involves the extraction of natural gas from a naturally occurring petroleum reservoir. The produced fluid may also include water, $CO_2$ and other non-hydrocarbon gases. The produced stream may undergo a treatment stage where water is separated from the gas stream. The gas stream may then be compressed to allow transportation to a downstream location for processing, which is part of the same integrated facility.

The processing involves transforming the natural gas into a quality suitable for injection into a natural gas transmission pipeline, or for supply to another downstream user with a specification meeting the requirements of the processed natural gas definition. The processing may involve separation from water, dehydration, and any other processes required to bring the gas to pipeline quality or the user specification meeting the requirements of the processed natural gas definition. Compression of the gas to allow injection into the pipeline is included in the activity, if the equipment used for compression was included within the facility for the purpose of National Greenhouse and Energy Reporting (NGER).

The outputs of the activity are GJ of processed natural gas injected into a natural gas transmission pipeline or supplied to another downstream user with a specification meeting the requirements of the processed natural gas definition. The measurement of this output is expected to be conducted so that it does not include any GJ of processed natural gas that are consumed within the facility. The measurement of the production variable is as GJ of processed natural gas that are transported, as a gas, away from the facility where the natural gas was processed.

The activity does not include transportation of the processed natural gas, from the point where it is injected into a natural gas supply pipeline, to downstream users or processors.

## 3.23. Inclusions

For the purposes of developing the default emissions intensity value and the estimated (site-specific) emission intensity value for this production variable, scope 1 emissions from the following processes at the facility are included:

- the use of machinery, equipment and processes for the extraction and physical transformation described in the activity definition, including, for example:
    - machinery used to move materials within and as part of the activity;
    - control rooms, laboratories, and maintenance workshops;

- machinery used to create non-electrical energy for use in the activity;
- the processing of by-products where they involve the recovery of materials for re-use within the activity or are necessary for the activity to proceed as described;
- on-site processing and/or disposal of waste materials, such as wastewater, from the activity;

- field compression of the unprocessed natural gas associated with the gathering of the gas upstream of processing;
- compression of the gas process stream (as part of or subsequent to the processing activity), including where the processed gas is then injected into a gas transmission pipeline and the compression contributes to the gas reaching the required pressure for transmission, if such equipment is included within the facility for the purpose of NGER;
- recovery/capture and use of waste heat/energy within the activity;
- treatment of the unprocessed natural gas stream that is subsequently transformed into processed natural gas, using processes including, for example:
  - bulk water removal (such as emissions associated with the separation of water from the natural gas and flaring of entrained hydrocarbons in this water);
  - removal of sulphur compounds;
  - removal of reservoir $CO_2$ (the separated reservoir $CO_2$ is not included and must be reported separately, but the emissions associated with the process of separating the reservoir $CO_2$ are included);
  - dehydration, for example by glycol absorption and/or molecular sieves;
  - mercury removal;
  - odourisation of the processed natural gas;
- any flaring, leaks or venting of greenhouse gases associated with the activity, except reservoir $CO_2$;
- the regeneration of any catalysts or solvents, if the regeneration is undertaken within the activity;
- the supply of utilities such as, but not limited to, compressed air, nitrogen, steam and water where these are used in support of the activity and within the activity boundaries; and
- other incidental, ancillary or supporting processes which are not included in another default or estimated emissions intensity value.

## 3.24. Exclusions

For the purposes of calculating the default emissions intensity value and the estimated (site-specific) emission intensity value for this production variable, scope 1 emissions from the following processes at the facility should be excluded:

- reservoir $CO_2$ that is separated from the natural gas mixture as part of the extraction and/or processing activities, as reservoir $CO_2$ is reported under its own production variable;
- processes which do not occur within the facility; and
- on-site electricity generation.

## 3.25. Multiple production variables from the same facility

It is intended that all scope 1 NGER-reported emissions from a facility can be assigned to a production variable.

The ***processed natural gas (extraction and processing***) production variable does not allow for the use of multiple production variables from the same activity, except for reservoir $CO_2$ and electricity. If other hydrocarbon products identified as production variables are produced in the activity, the separate production variables of unprocessed natural gas and processed natural gas must be used, along with the other production variable(s).

# 25. Liquefied natural gas (from unprocessed natural gas)

## 3.26. Production variable definition

1. Gigajoules of liquefied natural gas that:
   (a) have a methane ($CH_4$) content by mass of 70% or more; and
   (b) are produced as part of carrying on the unprocessed natural gas liquefaction activity at the facility; and
   (c) are in a liquid state; and
   (d) have been loaded onto a transport vessel, tanker or other transportation system; and
   (e) are of saleable quality; and
   (f) have not been counted as part of the liquefied natural gas production variable in section 32 of Schedule 2 (liquefied natural gas from processed natural gas).
2. The metric in subsection (1) is applicable to a facility that conducts the activity of liquefying unprocessed natural gas through the physical transformation of unprocessed natural gas into liquefied natural gas that:
   (a) has a methane content by mass of 70% or more; and
   (b) is in a liquid state on leaving the facility.
3. The activity in subsection (2) is the ***unprocessed natural gas liquefaction activity***.

Note: The default emissions intensity for this prescribed production variable is yet to be calculated and specified in the Schedule.

4. The quantity of the metric in subsection (1) may be evidenced by a bill of lading relating to the transport of liquefied natural gas from the facility.

## 25.1. Scope of the activity

The production of LNG from unprocessed natural gas is the physical transformation of unprocessed natural gas, which is in a gaseous state on entering the activity, to LNG which has a methane content by mass of 70 per cent or more and that is in a liquid state on leaving the activity.

The activity involves the processing and subsequent liquefaction of unprocessed natural gas that was taken from, or is a part of, a facility that undertakes the oil and gas extraction activity. The activity may include the removal of $CO_2$, hydrogen sulphide, water, other contaminants, LPGs, ethane and heavier hydrocarbons, and the liquefaction (through compression and temperature reduction) of the resulting methane rich gas stream to liquefied natural gas at a temperature of approximately -162$^{o}$C. The facility processing unprocessed natural gas to liquefied natural gas may also undertake activities such as producing stabilised condensate, processed natural gas and LPG. The production of these other aforementioned production variables are not part of the activity.

This activity does not include the undertaking of natural gas extraction, or through LNG regasification. The activity is also not satisfied where the product is in a gaseous state on

leaving the facility or has a concentration of methane ($CH_4$) that is less than 70 per cent with respect to mass.

The inputs of the activity include unprocessed natural gas in a gaseous state, which is predominantly methane, from a facility (which could be the same facility) conducting the activity of natural gas extraction. The stream may contain hydrocarbon and/or non-hydrocarbon liquids as well as the naturally occurring gaseous phase.

The outputs of the activity are GJ of LNG where the concentration of methane is equal to or greater than 70 per cent with respect to mass. The measurement of this output is expected to be conducted so that it does not include any GJ of LNG that boil off in conveying the LNG to a transportation vessel or storage facility.

The activity does not include the upstream extraction of the natural gas or transportation of the unprocessed natural gas to the boundary of the facility conducting the activity of LNG production from unprocessed natural gas. Further, the activity does not include the downstream processing of the LNG including transportation, distribution or regasification, or the processing of any by-products from the production of LNG including condensate, processed natural gas and LPG.

## 3.27. Inclusions

For the purposes of developing the default emissions intensity value and the estimated (site-specific) emission intensity value for this production variable, scope 1 emissions from the following processes at the facility are included:

- the use of machinery, equipment and processes for the physical and/or chemical transformation described in the activity definition, including, for example:
    - machinery used to move materials within and as part of the activity;
    - control rooms, laboratories, maintenance workshops;
    - machinery used to create non-electrical energy for use in the activity;
    - the processing of by-products where they involve the recovery of materials for re-use within the activity or are necessary for the activity to proceed as described; unless the by-product is being reported as a separate production variable, in which case, refer to section 3.29 below;
    - on-site processing and/or disposal of waste materials from the activity;
- recovery/capture and use of waste heat/energy within the activity;
- the treatment of the unprocessed natural gas feed, including:
    - bulk water removal (such as emissions associated with the separation of water from the natural gas and flaring of entrained hydrocarbons in this water);
    - separation of gas from liquid;
    - removal of sulphur compounds;
    - removal of reservoir $CO_2$ (the separated reservoir $CO_2$ is not included and must be reported separately, but the emissions associated with the process of separating the reservoir $CO_2$ are included);
    - removal of mercury and any other impurities;
    - dehydration, for example by glycol absorption and/or molecular sieves;

- removal of ethane and heavier hydrocarbons;
- liquefaction of the natural gas to produce LNG;

- any flaring, leaks or venting of greenhouse gases associated with the activity, except reservoir $CO_2$;
- the short-term buffer storage of LNG where the volume of that buffer storage is designed specifically to allow efficient loading into the transportation system, such as ocean going tankers, at a frequency and rate determined by the facility's off-take requirements;
- the supply of utilities such as, but not limited to, compressed air, nitrogen, steam and water where these are used in support of the activity and within the activity boundaries;
- the regeneration of any catalysts or solvents, if the regeneration is undertaken within the activity;
- the loading of the LNG into a medium of transportation such as ocean going tankers or a pipeline (by pumping), if the pumps are included within the facility for the purpose of NGER; and
- other incidental, ancillary or supporting processes which are not included in another default or estimated emissions intensity value.

## 3.28. Exclusions

For the purposes of calculating the default emissions intensity value and the estimated (site-specific) emission intensity value for this production variable, scope 1 emissions from the following processes at the facility should be excluded:

- reservoir $CO_2$ that is separated from the feed stream as part of the processing activity, as reservoir $CO_2$ is reported under its own production variable;
- the processing or transfer of other production variables such as processed natural gas, ethane and/or LPG, or crude oil/condensate (processing) (if hydrocarbon liquids separated from the natural gas stream are incorporated into a crude oil or condensate stream);
- processes which do not occur within the facility; and
- on-site electricity generation.

## 3.29. Multiple production variables from the same facility

It is intended that all scope 1 NGER-reported emissions from a facility can be assigned to a production variable. Where a facility produces multiple products, emissions must be apportioned in a justifiable manner, making sure no emissions are counted more than once and the total emissions counted cannot be more than the total emissions from the facility.

The method for determining the amount of emissions to be apportioned to each reported production variable may be one of the following options:

1. Apportion emissions from the activity to each production variable using a whole-of-activity mass balance method that assigns emissions at each step to the associated material stream, tracked through the activity to its transportation out of the activity location. For example, for an LNG production activity that also produces processed natural gas:

- apportion emissions from the processing steps between the two production variables, using a mass balance method
- apportion the emissions from facility activities such as generation of utilities, venting and flaring, treatment of waste streams, between the two production variables, using a mass balance method
- apportion the emissions from remaining, general facility activities such as the control rooms, laboratories, and maintenance workshops between the two production variables, in the ratio of the amount of that production variable produced, for example on an energy basis, unless there is another justifiable basis.

2. Apportion all emissions unique to the LNG production activity to the LNG from unprocessed natural gas production variable. Similarly, apportion all emissions unique to other production variables produced at the same facility to the relevant production variable. Apportion all emissions involved in processing steps prior to the separation of the LNG stream from the natural gas stream amongst the various production variables on an energy basis, unless there is another justifiable basis. For example, for an LNG production facility that also produces processed natural gas:
   - apportion all emissions from the pre-processing, such as bulk water separation, amongst the various production variables in the ratio of the amount of each production variable produced, for example on an energy basis, unless there is another justifiable basis
   - apportion all emissions from the natural gas processing to the quality required for liquefaction to the LNG production variable
   - apportion all emissions from the LNG liquefaction unit operation to the LNG production variable
   - apportion all emissions from activities such as generation of utilities, venting and flaring, treatment of waste streams, associated with the production of LNG to the LNG production variable
   - apportion all emissions from the further processing of the natural gas to a standard that meets the definition of the processed natural gas production variable, such as odourisation and compression, to the processed natural gas production variable
   - apportion all emissions from activities such as generation of utilities, venting and flaring, treatment of waste streams, associated with the production of processed natural gas to the processed natural gas production variable
   - apportion the emissions from remaining, general facility activities such as general utilities, the control rooms, laboratories, and maintenance amongst the various production variables in the ratio of the amount of each production variable produced, for example on an energy basis, unless there is another justifiable basis.

# 26. Liquefied natural gas (from processed natural gas)

## 3.30. Production variable definition

1. Gigajoules of liquefied natural gas that:
   (a) have a methane content by mass of 70% or more; and
   (b) are produced as part of carrying on the processed natural gas liquefaction activity at the facility; and
   (c) are in a liquid state; and
   (d) have been loaded onto a transport vessel, tanker or other transportation system; and
   (e) are of saleable quality; and
   (f) have not been counted as part of the liquefied natural gas production variable in section 31 of Schedule 2 (liquefied natural gas from unprocessed natural gas).
2. The metric in subsection (1) is applicable to a facility that conducts the activity of liquefying processed natural gas through the physical transformation of processed natural gas into liquefied natural gas that:
   (a) has a methane content by mass of 70% or more; and
   (b) is in a liquid state on leaving the facility.
3. The activity in subsection (2) is the ***processed natural gas liquefaction activity***.

Note: The default emissions intensity for this prescribed production variable is yet to be calculated and specified in the Schedule.

4. The quantity of the metric in subsection (1) may be evidenced by a bill of lading relating to the transport of liquefied natural gas from the facility.

## 3.31. Scope of the activity

The production of LNG from processed natural gas is the physical transformation of processed natural gas, which is in a gaseous state on entering the activity, to LNG that has a methane content by mass of 70 per cent or more and that is in a liquid state on leaving the activity.

The activity involves the processing and subsequent liquefaction of processed natural gas that is taken from a natural gas pipeline. The activity may include the removal of $CO_2$, hydrogen sulphide, water, other contaminants, LPGs, ethane and heavier hydrocarbons, and liquefaction (through compression and temperature reduction) of the resulting methane rich gas stream to liquefied natural gas at a temperature of approximately -162$^{o}$C.

This activity does not include the undertaking of natural gas extraction and processing, or through LNG regasification. The activity is also not satisfied where the natural gas being processed is in a gaseous state on leaving the activity or has a concentration of methane ($CH_4$) that is less than 70 per cent with respect to mass.

The outputs of the activity are GJ of LNG where the concentration of methane is equal to or greater than 70 per cent with respect to mass. The measurement of this output is expected to

be conducted so that it does not include any GJ of LNG that boil off in conveying the LNG to a transportation vessel or storage facility.

The activity does not include the upstream extraction or processing of the natural gas for injection into the natural gas pipeline that feeds the LNG production activity. Further, the activity does not include the downstream processing of the LNG including transportation, distribution or regasification.

## 3.32. Inclusions

For the purposes of developing the default emissions intensity value and the estimated (site-specific) emission intensity value for this production variable, scope 1 emissions from the following processes at the facility are included:

- the use of machinery, equipment and processes for the physical and/or chemical transformation described in the activity definition, including, for example:
  - machinery used to move materials within and as part of the activity;
  - control rooms, laboratories, maintenance workshops;
  - machinery used to create non-electrical energy for use in the activity;
  - the processing of by-products where they involve the recovery of materials for re-use within the activity or are necessary for the activity to proceed as described;
  - on-site processing and/or disposal of waste materials from the activity;
- recovery/capture and use of waste heat/energy within the activity;
- the treatment of the processed natural gas feed, if any, including:
  - removal of sulphur compounds;
  - removal of reservoir $CO_2$ (the separated reservoir $CO_2$ is not included and must be reported separately, but the emissions associated with the process of separating the reservoir $CO_2$ are included);
  - further dehydration, for example by molecular sieves;
  - removal of mercury and any other impurities;
  - removal of ethane and heavier hydrocarbons;
  - liquefaction of the natural gas to produce LNG;
- any flaring, leaks or venting of greenhouse gases associated with the activity, except for reservoir $CO_2$;
- the short-term buffer storage of LNG where the volume of that buffer storage is designed specifically to allow efficient loading into the transportation system, such as ocean going tankers, at a frequency and rate determined by the facility's off-take requirements;
- the supply of utilities such as, but not limited to, compressed air, nitrogen, steam and water where these are used in support of the activity and within the activity boundaries;
- the regeneration of any catalysts or solvents, if the regeneration is undertaken within the activity;

- the loading of the LNG into a medium of transportation such as ocean going tankers or a pipeline (by pumping), if the pumps are included within the facility for the purpose of NGER; and
- other incidental, ancillary or supporting processes which are not included in another default or estimated emissions intensity value.

## 3.33. Exclusions

For the purposes of calculating the default emissions intensity value and the estimated (site-specific) emission intensity value for this production variable, scope 1 emissions from the following processes at the facility should be excluded:

- reservoir $CO_2$ that is separated from the feed stream as part of the processing activity, as reservoir $CO_2$ is reported under its own production variable;
- processes which do not occur within the facility; and
- on-site electricity generation.

## 3.34. Multiple production variables from the same facility

It is intended that all scope 1 NGER-reported emissions from a facility can be assigned to a production variable. Where a facility produces multiple products, emissions must be apportioned in a justifiable manner, making sure no emissions are counted more than once and the total emissions counted cannot be more than the total emissions from the facility.

# 27. Ethane

## 3.35. Production variable definition

1. Gigajoules of the ethane that:
   (a) has an ethane content by mass of 95% or more; and
   (b) is in a gaseous state; and
   (c) is produced as part of carrying on the ethane production activity at the facility; and
   (d) is not consumed in carrying on the ethane production activity; and
   (e) is of saleable quality.
2. The metric in subsection (1) is applicable to a facility that conducts the activity of ethane production through the separation of ethane from a mixture of hydrocarbons to produce ethane that:
   (a) has an ethane content by mass of 95% or more; and
   (b) is in a gaseous state.
3. The activity in subsection (2) is the ***ethane production activity***.

Note: The default emissions intensity for this prescribed production variable is yet to be calculated and specified in the Schedule.

## 3.36. Scope of the activity

The production of ethane gas is the separation and purification of ethane from a stream containing a mixture of hydrocarbons and non-hydrocarbons, into an ethane product that is gaseous on leaving the activity.

The activity involves the production of ethane from a processing plant. Examples of these types of facilities include natural gas processing facilities or natural gas liquids recovery facilities.

Ethane is produced in an activity that also produces processed natural gas and/or LPG. The activity may also produce other products, so emissions must be apportioned in a justifiable manner amongst the relevant production variables, as per the guidelines in section 3.38.

The process involves the pre-treatment of the mixed hydrocarbon stream, for example by dehydration (water removal) and removal of bulk $CO_2$ and other impurities; partial liquefaction of the mixed hydrocarbon inlet stream by cooling it to cryogenic temperatures; then fractionation (distillation) to separate the gaseous methane from ethane and heavier hydrocarbons; then further fractionation to remove ethane from the propane and heavier hydrocarbons.

Following separation of the ethane from the mixed hydrocarbon stream, the ethane may be purified, for example by further removal of $CO_2$. The ethane is then compressed for transfer into storage or a pipeline.

As described above, hydrocarbons contained in the hydrocarbon inlet stream may also be processed into other products, such as processed natural gas and LPG. The processing steps unique to these other products are not part of the activity.

It is intended that alternative forms of production that do not require the feed treatment stage would be considered to fit within the activity definition, so long as at least the separation from other hydrocarbons and non-hydrocarbons, purification if required, and transfer of ethane takes place at the facility.

This activity does not include the undertaking of natural gas processing, LPG production or crude oil refining. The activity is also not satisfied through the undertaking of ethane production that does not produce ethane that is equal to or greater than 95 percent with respect to mass, and is transported away from the facility. The further refining of ethane into other chemicals is not considered part of this activity.

The inputs of the activity include a hydrocarbon stream that may also contain some non-hydrocarbons. This stream may be processed or unprocessed natural gas, coal seam gas, or other mixtures of hydrocarbons and non-hydrocarbons, sourced from activities such as natural gas processing and LNG production facilities or from an alternative source such as crude oil stabilisation.

The outputs of the activity are GJ of ethane in a gaseous state. The measurement of this output is to be conducted so that it does not include any GJ of ethane that are consumed within the facility. The measurement of the production variable is as GJ of ethane that are transported, in a gaseous state, away from the facility where the ethane was produced.

The activity does not include the upstream extraction or production of the mixed hydrocarbon stream that feeds the activity. Further, the activity does not include transportation of the gaseous ethane to downstream users or processors.

## 3.37. Inclusions

The ethane production activity is carried out at processing plants that undertake a range of activities and report a range of production variables. Emissions from machinery or activities that are not solely related to the ethane production activity must be apportioned amongst the relevant production variables from the facility, as per the guidelines in section 3.39. Where inclusions are listed below, they are emissions that could be included, provided the rules of apportionment are followed.

For the purposes of developing the default emissions intensity value and the estimated (site-specific) emission intensity value for this production variable, scope 1 emissions from the following processes at the facility are included:

- the use of machinery, equipment and processes for the physical transformation described in the activity definition, including, for example:
    - machinery used to move materials within and as part of the activity;
    - machinery used to create non-electrical energy for use in the activity;
    - the processing of by-products where they involve the recovery of materials for re-use within the activity or are necessary for the activity to proceed as described; unless the by-product is being reported as a separate production variable, in which case, refer to section 3.39;
    - on-site processing and/or disposal of waste materials from the activity;
- recovery/capture and use of waste heat/energy within the activity;

- the regeneration of any catalysts or solvents used, if the regeneration is undertaken within the activity;
- the treatment of the hydrocarbon stream to produce ethane, using processes including, for example:
    - pretreatment of the mixed hydrocarbon stream by removing impurities such as water, sulphur compounds and mercury (if required);
    - removal of reservoir $CO_2$ (the separated reservoir $CO_2$ is not included and must be reported separately, but the emissions associated with the process of separating the reservoir $CO_2$ are included);
    - cooling of the mixed hydrocarbon stream to cryogenic temperature so it is partially liquefied, for example using refrigeration and/or turbo-expansion;
    - separation of the gaseous methane from the feed stream using fractionation (distillation);
    - heating the remaining mixed hydrocarbon stream, then removing the ethane by fractionation;
    - removal of any impurities from the ethane stream;
- any flaring, leaks or venting of greenhouse gases associated with the activity, except reservoir $CO_2$;
- the short-term buffer storage of ethane where the volume of that buffer storage is designed specifically to allow efficient loading into transportation systems, at a frequency and rate determined by the facility's off-take requirements;
- the supply of utilities such as, but not limited to, refrigeration, compressed air, nitrogen, steam and water where these are used in support of the activity and within the activity boundaries;
- the transfer of the ethane (by compression) into a medium of transportation such as a pipeline or to a piece of equipment outside the facility which will consume the ethane, if such transfer equipment is included within the facility for the purpose of NGER; and
- other incidental, ancillary or supporting processes which are not included in another default or estimated emissions intensity value.

## 3.38. Exclusions

For the purposes of calculating the default emissions intensity value and the estimated (site-specific) emission intensity value for this production variable, scope 1 emissions from the following processes at the facility should be excluded:

- reservoir $CO_2$ that is separated as part of the processing activity, as reservoir $CO_2$ is reported under its own production variable;
- the processing or transfer of other production variables such as processed natural gas, and/or LPG, as the emissions from other production variables from the activity must be apportioned as per the guidance provided below;
- processes which do not occur within the facility; and
- on-site electricity generation.

## 3.39. Multiple production variables from the same facility

It is intended that all scope 1 NGER-reported emissions from a facility can be assigned to a production variable. Where a facility produces multiple products, emissions must be apportioned in a justifiable manner, making sure no emissions are counted more than once and the total emissions counted cannot be more than the total emissions from the facility.

The method for determining the amount of emissions to be apportioned to each production variable may be one of the following options:

1. Apportion emissions from the activity to each production variable using a whole-of-activity mass balance method that assigns emissions at each step to the associated material stream, tracked through the activity to its transportation out of the activity location. For example, for a natural gas processing plant that produces ethane as one of two or more production variables:
    - apportion emissions from the processing steps amongst all the production variables, using a mass balance method;
    - apportion the emissions from facility activities such as generation of utilities, venting and flaring, treatment of waste streams, amongst all the production variables, using a mass balance method;
    - apportion the emissions from remaining, general facility activities such as the control rooms, laboratories, and maintenance workshops amongst all the production variables, in the ratio of the amount of that production variable produced, for example on an energy basis, unless there is another justifiable basis.
2. Apportion all emissions unique to the production of ethane to the ethane production variable. Similarly, apportion all emissions unique to other production variables produced at the same facility to the relevant production variable. Apportion all emissions involved in processing steps prior to the separation of ethane amongst the various production variables on an energy basis, unless there is another justifiable basis. For example, for a natural gas processing plant that produces ethane as one of two or more production variables:
    - apportion all emissions from the pre-processing, such as bulk water separation and bulk $CO_2$ removal, amongst the various production variables in the ratio of the amount of each production variable produced, for example on an energy basis, unless there is another justifiable basis;
    - apportion all emissions from processed natural gas production and further processed natural gas processing unit operations to the processed natural gas production variable;
    - apportion all emissions from activities such as generation of utilities, venting, flaring, and treatment of waste streams, associated with the production of processed natural gas to the processed natural gas production variable;
    - apportion all emissions from the ethane production unit operations, such as the fractionation step that produced the ethane, to the ethane production variable;
    - apportion all emissions from the further processing of the ethane, such as further $CO_2$ removal and compression to storage or the facility discharge pipeline, to the ethane production variable;

- apportion all emissions from activities such as generation of utilities, venting and flaring, treatment of waste streams, associated with the production of ethane, to the ethane production variable;
- apportion all the emissions from the production and further processing of other production variables, such as LPG, to the respective production variable, being LPG for this example;
- apportion all emissions from activities such as generation of utilities, venting and flaring, treatment of waste streams, associated with each of the other production variables, to the relevant production variable;
- apportion the emissions from remaining, general facility activities such as general utilities, the control rooms, laboratories, and maintenance amongst the various production variables in the ratio of the amount of each production variable produced, for example on an energy basis, unless there is another justifiable basis.

# 28. Liquefied petroleum gas

## 3.40. Production variable definition

1. Gigajoules of the liquefied petroleum gas that:
   (a) is in a liquid state;
   (b) is produced as part of carrying on the liquefied petroleum gas production activity at the facility; and
   (c) is not consumed in carrying on the liquefied petroleum gas production activity; and
   (d) is of saleable quality.
2. The metric in subsection (1) is applicable to a facility that:
   (a) conducts the activity of liquefied petroleum gas production through the separation of propane and butane fractions from a mixture of hydrocarbons to produce liquefied petroleum gas that is in a liquid state (the ***liquefied petroleum gas production activity***); and
   (b) includes another activity covered by this Part.

Note: The default emissions intensity for this prescribed production variable is yet to be calculated and specified in the Schedule.

*Definition of liquefied petroleum gas*

'Liquefied petroleum gas' means a substance that is:

- liquid propane; or
- liquid butane; or
- a liquid mixture of propane and butane; or
- a liquid mixture of propane and other hydrocarbons that consists mainly of propane; or
- a liquid mixture of butane and other hydrocarbons that consists mainly of butane; or
- a liquid mixture of propane, butane and other hydrocarbons that consists mainly of propane and butane.

## 3.41. Scope of the activity

The production of liquid LPG is the separation and purification of propane and butane fractions from a stream containing a mixture of hydrocarbons, and that may also contain non-hydrocarbons, into an LPG product that is in a liquid state on leaving the activity.

The activity involves the production of LPG from a facility that produced a number of products. Examples of these types of facilities include natural gas processing facilities, natural gas liquefaction facilities or natural gas liquids recovery facilities.

LPG is produced in an activity that may also produce processed natural gas, liquefied natural gas (LNG), ethane and condensate. Emissions from this activity must be apportioned in a justifiable manner amongst the relevant production variables, as per the guidelines in section 3.44.

The process involves the pre-treatment of the mixed hydrocarbon stream, for example by dehydration (water removal) and removal of bulk $CO_2$ and other impurities; partial liquefaction of the mixed hydrocarbon inlet stream by cooling it to cryogenic temperatures; a series of fractionation (distillation) steps to separate first the gaseous methane from ethane and heavier hydrocarbons; then the ethane from the propane and heavier hydrocarbons; then the propane from the butane and heavier hydrocarbons, and lastly the butane from the pentane and heavier hydrocarbons. The propane and butane fractions may be removed in the same fractionation (distillation) column.

Following separation of the propane and butane fractions from the mixed hydrocarbon stream, the resulting LPG streams may be kept separated or recombined. The propane and butane fractions are then compressed until liquefaction occurs, and the resulting LPG stream(s) is transferred to storage or a pipeline.

As described above, hydrocarbons contained in the hydrocarbon inlet stream may also be processed into other products such as processed natural gas, ethane or crude oil/ condensate. The processing steps unique to these other products are not part of the activity.

It is intended that alternative forms of production that do not require the feed treatment stage would be considered to fit within the activity definition, so long as at least the separation from other hydrocarbons and non-hydrocarbons, purification if required, and liquefaction of the propane and butane fractions takes place at the facility.

This activity does not include the undertaking of natural gas processing, ethane production, crude oil/condensate stabilisation or crude oil refining. The activity is also not satisfied through the undertaking of LPG production that does not produce LPG that is of saleable quality and is transported away from the facility. The further refining of pure propane, butane or LPG into other chemicals is not considered part of this activity.

The inputs of the activity include a hydrocarbon stream that may also contain some non-hydrocarbons. This stream may be processed or unprocessed natural gas, or other mixtures of hydrocarbons and non-hydrocarbons, sourced from activities such as natural gas processing, natural gas liquids removal and LNG production facilities or from an alternative source such as crude oil/condensate stabilisation.

The outputs of the activity are GJ of LPG in a liquid state. The measurement of this output is to be conducted so that it does not include any GJ of LPG consumed within the activity.

The activity does not include the upstream extraction or production of the mixed hydrocarbon stream that feeds the activity. Further, the activity does not include transportation of the LPG to downstream users or processors.

## 3.42. Inclusions

The LPG production activity is carried out at processing plants that undertake a range of activities and report a number of production variables. Emissions from machinery or activities that are not solely related to the LPG production activity must be apportioned amongst the relevant production variables from the facility, as per the guidelines in section 28.5. Where inclusions are listed below, they are emissions that could be included, provided the rules of apportionment are followed.

For the purposes of developing the default emissions intensity value and the estimated (site-specific) emission intensity value for this production variable, scope 1 emissions from the following processes at the facility are included:

- the use of machinery, equipment and processes for the physical transformation described in the activity definition, including, for example:
    - machinery used to move materials within and as part of the activity;
    - machinery used to create non-electrical energy for use in the activity;
    - the processing of by-products where they involve the recovery of materials for re-use within the activity or are necessary for the activity to proceed as described; unless the by-product is being reported as a separate production variable, in which case, refer to section 3.44;
    - onsite processing and/or disposal of waste materials from the activity;
- recovery/capture and use of waste heat/energy within the activity;
- the treatment of the hydrocarbon stream to produce LPG using processes including, for example:
    - pretreatment of the mixed hydrocarbon stream by removing impurities such as water, sulphur compounds and mercury (if required);
    - cooling of the mixed hydrocarbon stream to cryogenic temperature so it is partially liquefied, for example using refrigeration and/or turbo-expansion;
    - separation of the gaseous methane from the feed stream using fractionation (distillation);
    - heating the remaining mixed hydrocarbon stream, then removing the ethane by fractionation (distillation) if required;
    - heating the mixed hydrocarbon stream remaining after the removal of methane and ethane, then removing the propane fraction by fractionation (distillation);
    - heating the remaining mixed hydrocarbon stream, then removing the butane fraction by fractionation (distillation), noting that the propane and butane fractions may be removed via the same fractionation column if separate propane and butane fractions are not required;
    - removal of impurities from the LPG stream(s);
    - the liquefaction of the propane and butane fractions, or the combined LPG stream by cooling;
    - odourisation of the LPG product(s);
- any flaring, leaks or venting of greenhouse gases associated with the activity, except for reservoir $CO_2$;
- the short-term buffer storage of LPG where the volume of that buffer storage is designed specifically to allow efficient loading into transportation systems, at a frequency and rate determined by the facility's off-take requirements;
- the supply of utilities such as, but not limited to, refrigeration, compressed air, nitrogen, steam and water where these are used in support of the activity and within the activity boundaries;

- the regeneration of any catalysts or solvents, if the regeneration is undertaken within the activity;
- the transfer of the LPG (by pumping) into a medium of transportation such as a pipeline or road tankers, or to a piece of equipment outside the facility that will consume the LPG, if the pumps are included within the facility for the purpose of NGER; and
- other incidental, ancillary or supporting processes which are not included in another default or estimated emissions intensity value.

## 3.43. Exclusions

For the purposes of calculating the default emissions intensity value and the estimated (site-specific) emission intensity value for this production variable, scope 1 emissions from the following processes at the facility should be excluded:

- reservoir $CO_2$ that is separated from the fluid as part of the processing activity, as reservoir $CO_2$ is reported under its own production variable;
- the processing or transfer of other production variables such as processed natural gas, ethane or crude oil/condensate, as the emissions from other production variables from the activity must be apportioned as per the guidance provided below;
- processes which do not occur within the facility; and
- on-site electricity generation.

## 3.44. Multiple production variables from the same facility

It is intended that all scope 1 NGER-reported emissions from a facility can be assigned to a production variable. Where a facility produces multiple products, emissions must be apportioned in a justifiable manner, making sure no emissions are counted more than once and the total emissions counted cannot be more than the total emissions from the facility.

The method for determining the amount of emissions to be apportioned to each reported production variable may be one of the following options:

1. Apportion emissions from the activity to each production variable using a whole-of-activity mass balance method that assigns emissions at each step to the associated material stream, tracked through the activity to its transportation out of the activity location. For example, for a processed natural gas activity that produces LPG as one of two or more production variables:
    - apportion emissions from the processing steps amongst all the production variables, using a mass balance method;
    - apportion the emissions from facility activities such as generation of utilities, venting and flaring, treatment of waste streams, amongst all the production variables, using a mass balance method;
    - apportion the emissions from remaining, general facility activities such as the control rooms, laboratories, and maintenance workshops amongst all the production variables, in the ratio of the amount of that production variable produced, for example on an energy basis, unless there is another justifiable basis.
2. Apportion all emissions unique to the production of LPG to the LPG production variable. Similarly, apportion all emissions unique to other production variables produced at the same facility to the relevant production variable. Apportion all emissions involved in processing steps prior to the separation of LPG amongst the various production variables

on an energy basis, unless there is another justifiable basis. For example, for a natural gas processing plant that produces LPG as one of two or more production variables:

- apportion all emissions from the pre-processing, such as bulk water separation and bulk $CO_2$ removal, amongst the various production variables in the ratio of the amount of each production variable produced, for example on an energy basis, unless there is another justifiable basis;
- apportion all emissions from processed natural gas production and further processed natural gas processing unit operations to the processed natural gas production variable;
- apportion all emissions from activities such as generation of utilities, venting, flaring, and treatment of waste streams, associated with the production of processed natural gas to the processed natural gas production variable;
- apportion all emissions from the LPG production unit operations, such as the fractionation steps that produced the propane and butane, to the LPG production variable;
- apportion all emissions from the further processing of the LPG, such as pumping to storage or the facility discharge pipeline, to the LPG production variable;
- apportion all emissions from activities such as generation of utilities, venting and flaring, treatment of waste streams, associated with the production of LPG, to the LPG production variable;
- apportion the emissions from remaining, general facility activities such as general utilities, the control rooms, laboratories, and maintenance amongst the various production variables in the ratio of the amount of each production variable produced, for example on an energy basis, unless there is another justifiable basis.

# 29. Reservoir carbon dioxide

## 3.45. Production variable definition

1. Tonnes of reservoir carbon dioxide that:
   (a) were separated in an acid gas removal unit (from natural gas, crude oil mixtures or products produced from extracted hydrocarbons) as part of one of the following activities:
      (i) the oil and gas extraction activity;
      (ii) the integrated crude oil extraction and stabilisation activity;
      (iii) the natural gas processing activity;
      (iv) the integrated natural gas extraction and processing activity;
      (v) the processed natural gas liquefaction activity;
      (vi) the unprocessed natural gas liquefaction activity; and
   (b) when separated, consist of a mixture that is overwhelmingly carbon dioxide ($CO_2$) and may contain incidental associated substances derived from the source material and capture and separation processes; and
   (c) have not previously been included as a tonne of reservoir carbon dioxide under this section; and
   (d) were not imported as a carbon dioxide stream from another facility.
2. The metric in subsection (1) is applicable to a facility that separates reservoir carbon dioxide from natural gas, crude oil mixtures or products produced from extracted hydrocarbons as part of one of the following activities:
   (a) the oil and gas extraction activity;
   (b) the integrated crude oil extraction and stabilisation activity;
   (c) the natural gas processing activity;
   (d) the integrated natural gas extraction and processing activity;
   (e) the processed natural gas liquefaction activity;
   (f) the unprocessed natural gas liquefaction activity.
3. The default emissions intensity is given by the following equation:

$$EI_{,reservoir\ carbon\ dioxide} = 1 - storage\ rate$$

where:

***EI, reservoir carbon dioxide*** is the default emissions intensity, in t $CO_2$-e per tonne of reservoir carbon dioxide.

***storage rate*** is the ***fraction*** of the separated reservoir carbon dioxide that is injected into geological storage using a carbon capture and storage, enhanced oil recovery or other petroleum reservoir management purpose, as determined by the Regulator for the facility and included in the baseline determination applicable to the facility.

## 3.46. Scope of the activity

The production of reservoir $CO_2$ as a by-product of oil and gas extraction and production activities is the process of separating naturally occurring reservoir $CO_2$ present in a natural gas and/or crude oil mixture, or their products, from the mixture or product stream.

The activity may occur as part of any oil and gas extraction and production activity that resulted in the production of one or more hydrocarbon production variables.

For the removal of reservoir $CO_2$ from natural gas, the processing may involve chemical absorption, a membrane process or any other process that created a $CO_2$ rich stream from the natural gas. The composition of this stream is overwhelmingly carbon dioxide, but may contain incidental associated substances derived from the natural gas and the process used to separate the carbon dioxide from the natural gas.

The output of the activity is tonnes of naturally occurring reservoir $CO_2$ separated from the product stream. The production variable therefore is reservoir $CO_2$ that is released to atmosphere, is stored using a carbon capture and storage (CCS) mechanism or is stored by being utilised in an enhanced oil recovery or other petroleum reservoir management process. Reservoir $CO_2$ can only be counted once, so reservoir $CO_2$ that has previously been separated and reinjected (for example, for enhanced oil recovery) and has resurfaced is not included in the production variable.

The default emissions intensity for reservoir $CO_2$ is (1 – "storage rate") tonnes $CO_2$-e per tonne of carbon dioxide separated. The "storage rate" is the fraction of separated $CO_2$ that is injected into geological storage using a carbon capture and storage (CCS) process or enhanced oil recovery or other petroleum reservoir management purposes, rather than being released to atmosphere.

## 3.47. Inclusions

Emissions that are included in the reservoir $CO_2$ production variable calculation include:

- tonnes of naturally occurring reservoir $CO_2$ separated in an acid gas removal unit, including incidental associated substances derived from the natural gas and the process used to separate the carbon dioxide from the natural gas.

Emissions that are included in the 'storage rate' calculation include:

- the fraction of the separated $CO_2$ that is injected into geological storage using a carbon capture and storage (CCS) process or enhanced oil recovery or other petroleum reservoir management purposes, rather than being released to atmosphere.

## 3.48. Exclusions

Emissions that are not included in the production variable and associated 'storage rate' calculation include:

- machinery, equipment and processes involved in the separation of $CO_2$ from the feed stream or product—these are to be assigned to the facility's oil and gas production variables;
- further treatment, if any, of the separated $CO_2$ stream—these are to be assigned to the facility's oil and gas production variables;

- machinery, equipment and processes involved in the storage of $CO_2$ using a CCS mechanism, or utilisation of the $CO_2$ in enhanced oil recovery or other petroleum reservoir management processes—these are to be assigned to the facility's oil and gas production variables;
- the regeneration of any catalysts or solvents used to separate the $CO_2$, even if the regeneration is undertaken within the activity, as these are to be assigned to the relevant oil and gas production variables;
- other incidental, ancillary or supporting processes;
- processes which do not occur within the facility; and
- on-site electricity generation.

## 3.49. Multiple production variables from the same facility

It is intended that all scope 1 NGER-reported emissions from a facility can be assigned to a production variable.

The ***reservoir carbon dioxide*** production variable may be used in conjunction with any other oil and gas production variable, where the activity has included the separation of reservoir $CO_2$ from the feed stream or product, to provide an allowance for the emission of reservoir $CO_2$. The apportionment of emissions between the $CO_2$ production variable and the hydrocarbon production variable(s) is to be as described in the inclusions and exclusions above.

# Steel manufacturing

There are nine prescribed production variables for primary steel manufacturing. Five production variables for integrated iron and steel manufacturing—from the preparation of raw materials to casting of carbon steel—are being grouped together in the activity of ***integrated iron and steel manufacturing***. This grouping is made in recognition of the integrated nature of the processes, which will avoid duplication of processes in the inclusions and exclusions list. The remaining four production variables are being defined as four activities that each represent the relevant production variable.

## General definitions

***integrated iron and steel manufacturing*** is the chemical and physical transformation of iron ore into crude carbon steel products and hot-rolled carbon steel products involving all of the following processes:

(a) the carbonisation of coal (principally coking coal) into coke oven coke;

(b) the chemical and physical transformation of either or both of limestone or dolomite, into lime (including burnt lime and burnt dolomite);

(c) the chemical and physical transformation of iron ore into iron ore sinter or iron ore pellets;

(d) the chemical and physical transformation of iron ore feed, including iron ore sinter and iron ore pellets, into molten iron that includes the reduction of oxides of iron using carbon as the predominant reducing agent;

(e) the chemical and physical transformation of molten iron and cold ferrous feed, such as pig iron, flat iron and ferrous scrap, into 1 or more of the following:

(i) continuously cast carbon steel products;

(ii) ingots of carbon steel;

(iii) hot-rolled carbon steel products, which commenced hot-rolling at a temperature above 800 °C.

***manufacture of carbon steel from cold ferrous feed*** is the physical and chemical transformation of cold ferrous feed (such as ferrous scrap, pig iron and flat iron) by heating and melting into liquid steel and the subsequent casting of the liquid steel to produce 1 or more of the following:

(a) continuously cast carbon steel products;

(b) ingots of carbon steel.

(c) hot-rolled carbon steel products, which commenced hot-rolling at a temperature above 800 °C.

***hot-rolled long products*** is the hot-rolling of continuously cast carbon steel products (originally produced from an integrated iron and steel manufacturing activity or manufacture of carbon steel from cold ferrous feed activity) into carbon steel long products that*:*

(a) are in coils or straight lengths; and

(b) are generally produced in rod, bar and structural (section) mills; and

(c) generally have a cross sectional shape such as I, T, Y, U, V, H, C, L, square, rectangular, round, flat, hexagonal, angle, channel, structural beam profile or rail profile.

***hot-rolled flat products*** is the hot-rolling of continuously cast carbon steel products (originally produced from an integrated iron and steel manufacturing activity or manufacture of carbon steel from cold ferrous feed activity) into carbon steel flat products that*:*

(a) are flat in profile, such as plate and hot rolled coil; and

(b) are generally produced in hot strip mills and plate mills; and

(c) are generally greater than 600 mm in width; and

(d) are generally less than 150 mm in thickness.

***carbon steel*** means material that*:*

(a) contains by mass more iron (Fe) than any other single element; and

(b) has a carbon (C) concentration less than 2%.

***coke oven coke*** means the solid product obtained from the carbonisation of coal (principally coking coal) at a high temperature and includes coke breeze and foundry coke.

The following inclusions and exclusions list *applies* to the ***integrated iron and steel manufacturing*** activity, specifically:

- coke oven coke (integrated iron and steel manufacturing)
- lime (integrated iron and steel manufacturing)
- iron ore sinter (integrated iron and steel manufacturing)
- iron ore pellets (integrated iron and steel manufacturing)
- continuously cast carbon steel products and ingots of carbon steel (integrated iron and steel manufacturing).

## Inclusions for integrated iron and steel manufacturing

For the purposes of the development of the default emissions intensity values relevant to this activity and the preparation of estimated (site-specific) emission intensity values for production variables relevant to this activity, scope 1 emissions from the following processes at the facility are included:

- the use of machinery, equipment and processes used for the physical and/or chemical transformation described in the activity definition, including, for example:
    - machinery used to move materials within the facility, including mobile equipment;
    - control rooms, laboratories, maintenance workshops;
    - machinery used to create non-electrical energy for use in the activity;

- the processing of by-products where it involves the recovery of materials for re-use within the activity or is necessary for the activity to proceed as described[4]; and
- onsite processing of waste materials and by-products from the activity;

- waste heat recovery within the facility;
- steam produced on-site that is not used to produce electricity;
- the production of cryogenic gases e.g. oxygen, nitrogen and argon that are consumed in the activity;
- the conduct of secondary metallurgical treatment;
- the production of intermediate products manufactured for export from the facility;
- casting via the continuous casting process or ingot casting process into intermediate steel products;
- the processing of cold ferrous feed where that process is conducted on site;
- the treatment or combustion of indigenous waste gases, e.g. coke oven gas, blast furnace gas and basic oxygen steelmaking off-gas;
- steel scrap receival (including quality checks and storage);
- warehousing or storage of activity outputs, raw materials and consumables used by the activity where this is at the same location as the activity;
- water and waste treatment (including gases) necessary for the activity to be conducted;
- transportation of inputs (including intermediate products) used in the activity to storage at the facility, where the transport activity wholly occurs within the facility;
- transportation of the outputs (including intermediate products) from the activity from storage at the facility, where the transport activity wholly occurs within the facility;
- complementary activities, such as raw material preparation (including blending, sizing), straightening and cold-forming, facility managed port operations, packaging, head office, administrative and marketing operations where they are undertaken at the site of the facility; and
- other incidental, ancillary or supporting processes which are not included in another default or estimated emissions intensity value.

It is intended that all scope 1 NGER-reported emissions from a facility can be assigned to a production variable, but where a facility produces multiple products, emissions cannot be counted more than once.

When calculating estimated (site-specific) emissions intensity values, a facility can assign emissions which do not relate to a specific output either to one production variable only, or apportion those emissions among production variables in accordance with:

- the methods used to calculate the emissions of continuously cast carbon steel in accordance with the requirements in the *National Greenhouse and Energy Reporting (Measurement) Determination 2008*; and

[4] Examples include BTX, blast furnace slag, gypsum and ammonium sulphate.

- the apportioning method used by the responsible emitter in their data submission to the Department for the purposes of calculating the default emissions intensity in 2019.

## Exclusions for integrated iron and steel manufacturing

For the purposes of the development of the default emissions intensity values relevant to this activity and the preparation of estimated (site-specific) emission intensity values for production variables relevant to this activity, scope 1 emissions from the following processes are not taken to relate to the activity and must be excluded from the calculation of an estimated emissions intensity value relevant to this activity:

- the primary extraction and concentration of raw materials prior to the conduct of the activity;
- any stand-alone finishing processes, including, but not limited to, cold-rolling, annealing, pickling or coating of steel products;
- processes which do not occur within the facility;
- on-site electricity generation.

# 30. Coke oven coke (integrated iron and steel manufacturing)

## 30.1. Production variable definition

1. Tonnes of coke oven coke on a dry weight basis that:
   (a) are produced as part of carrying on the integrated iron and steel manufacturing activity at the facility; and
   (b) meet the necessary requirements for use in the integrated iron and steel manufacturing activity.
2. The metric in subsection (1) is applicable to a facility that conducts the activity of ***integrated iron and steel manufacturing***.
3. The default emissions intensity is 0.467 t $CO_2$-e per tonne of coke oven coke.

## 30.2. Inclusions

For the purposes of the development of the default emissions intensity value and the preparation of an estimated (site-specific) emission intensity value for this production variable, scope 1 emissions from the following processes are included within the production variable:

- the component of emissions from the activity of integrated iron and steel manufacturing that is attributable to the production of coke oven coke by:
  - the methods used to calculate the emissions of coke oven coke in accordance with the requirements in the *National Greenhouse and Energy Reporting (Measurement) Determination 2008*; and
  - the apportioning method used by the responsible emitter in their data submission to the Department for the purposes of calculating the default emissions intensity in 2019; and
- other incidental, ancillary or supporting processes which are not included in another default or estimated emissions intensity value.

## 30.3. Exclusions

For the purposes of the development of the default emissions intensity value and the preparation of an estimated (site-specific) emission intensity value for this production variable, scope 1 emissions from the following processes are not taken to relate to the production variable and must be excluded from the calculation of an estimated (site-specific) emissions intensity value for the production variable:

- processes excluded from the activity of integrated iron and steel manufacturing;
- processes which do not occur within the facility;
- on-site electricity generation; and
- coal mining.

# 31. Lime (integrated iron and steel manufacturing)

## 31.1. Production variable definition

1. Tonnes of lime on a dry weight basis that:
   (a) are produced as part of carrying on the integrated iron and steel manufacturing activity at the facility; and
   (b) meet the necessary requirements for use in the integrated iron and steel manufacturing activity.
2. The metric in subsection (1) is applicable to a facility that conducts the activity of ***integrated iron and steel manufacturing***.
3. The default emissions intensity is 0.780 t $CO_2$-e per tonne of lime.

## 31.2. Inclusions

For the purposes of the development of the default emissions intensity value and the preparation of an estimated (site-specific) emission intensity value for this production variable, scope 1 emissions from the following processes are included within the production variable:

- the component of emissions from the activity of ***integrated iron and steel manufacturing*** that is attributable to the production of lime (including burnt lime and burnt dolomite) by:
  - the methods used to calculate the emissions of lime in accordance with the requirements in the *National Greenhouse and Energy Reporting (Measurement) Determination 2008*; and
  - the apportioning method used by the responsible emitter in their data submission to the Department for the purposes of calculating the default emissions intensity in 2019; and
- other incidental, ancillary or supporting processes which are not included in another default or estimated emissions intensity value.

## 31.3. Exclusions

For the purposes of the development of the default emissions intensity value and the preparation of an estimated (site-specific) emission intensity value for this production variable, scope 1 emissions from the following processes are not taken to relate to the production variable and must be excluded from the calculation of an estimated (site-specific) emissions intensity value for the production variable:

- processes excluded from the activity of integrated iron and steel manufacturing;
- processes which do not occur within the facility;
- on-site electricity generation; and
- the extraction of raw materials.

# 32. Iron ore sinter (integrated iron and steel manufacturing)

## 32.1. Production variable definition

1. Tonnes of iron ore sinter on a dry weight basis that:
   (a) are produced as part of carrying on the integrated iron and steel manufacturing activity at the facility; and
   (b) meet the necessary requirements for use in the integrated iron and steel manufacturing activity.
2. The metric in subsection (1) is applicable to a facility that conducts the activity of ***integrated iron and steel manufacturing***.
3. The default emissions intensity is 0.233 t $CO_2$-e per tonne of iron ore sinter.

## 32.2. Inclusions

For the purposes of the development of the default emissions intensity value and the preparation of an estimated (site-specific) emission intensity value for this production variable, scope 1 emissions from the following processes are included within the production variable:

- the component of emissions from the activity of integrated iron and steel manufacturing that is attributable to the production of iron ore sinter by:
  - the methods used to calculate the emissions of iron ore sinter in accordance with the requirements in the *National Greenhouse and Energy Reporting (Measurement) Determination 2008*; and
  - the apportioning method used by the responsible emitter in their data submission to the Department for the purposes of calculating the default emissions intensity in 2019; and
- other incidental, ancillary or supporting processes which are not included in another default or estimated emissions intensity value.

## 32.3. Exclusions

For the purposes of the development of the default emissions intensity value and the preparation of an estimated (site-specific) emission intensity value for this production variable, scope 1 emissions from the following processes are not taken to relate to the production variable and must be excluded from the calculation of an estimated (site-specific) emissions intensity value for the production variable:

- processes excluded from the activity of integrated iron and steel manufacturing***;***
- processes which do not occur within the facility;
- on-site electricity generation; and
- iron ore mining.

# 33. Iron ore pellets (integrated iron and steel manufacturing)

## 33.1. Production variable definition

1. Tonnes of iron ore pellets on a dry weight basis that:
   (a) are produced as part of carrying on the integrated iron and steel manufacturing activity at the facility; and
   (b) meet the necessary requirements for use in the integrated iron and steel manufacturing activity.
2. The metric in subsection (1) is applicable to a facility that conducts the activity of ***integrated iron and steel manufacturing***.
3. The default emissions intensity is 0.0586 t $CO_2$-e per tonne of iron ore pellets.

## 33.2. Inclusions

For the purposes of the development of the default emissions intensity value and the preparation of an estimated (site-specific) emission intensity value for this production variable, scope 1 emissions from the following processes are included within the production variable:

- the component of emissions from the activity of integrated iron and steel manufacturing that is attributable to the production of iron ore pellets by:
  - the methods used to calculate the emissions of iron ore pellets in accordance with the requirements in the *National Greenhouse and Energy Reporting (Measurement) Determination 2008*; and
  - the apportioning method used by the responsible emitter in their data submission to the Department for the purposes of calculating the default emissions intensity in 2019; and
- other incidental, ancillary or supporting processes which are not included in another default or estimated emissions intensity value.

## 33.3. Exclusions

For the purposes of the development of the default emissions intensity value and the preparation of an estimated (site-specific) emission intensity value for this production variable, scope 1 emissions from the following processes are not taken to relate to the production variable and must be excluded from the calculation of an estimated (site-specific) emissions intensity value for the production variable:

- processes excluded from the activity of integrated iron and steel manufacturing;
- processes which do not occur within the facility;
- on-site electricity generation; and
- iron ore mining.

# 34. Continuously cast carbon steel products and ingots of carbon steel (integrated iron and steel manufacturing)

## 34.1. Production variable definition

1. Tonnes of continuously cast carbon steel products and ingots of carbon steel that:
   (a) are produced as part of carrying on the integrated iron and steel manufacturing activity at the facility; and
   (b) are of saleable quality.
2. The metric in subsection (1) is applicable to a facility that conducts the activity of ***integrated iron and steel manufacturing***.
3. The default emissions intensity is 1.50 t $CO_2$-e per tonne of continuously cast carbon steel products and ingots of carbon steel.

## 34.2. Inclusions

For the purposes of the development of the default emissions intensity value and the preparation of an estimated (site-specific) emission intensity value for this production variable, scope 1 emissions from the following processes are included within the production variable:

- the component of emissions from the activity of integrated iron and steel manufacturing that is attributable to the production of continuously cast carbon steel products by:
  - the methods used to calculate the emissions of continuously cast carbon steel in accordance with the requirements in the *National Greenhouse and Energy Reporting (Measurement) Determination 2008*; and
  - the apportioning method used by the responsible emitter in their data submission to the Department for the purposes of calculating the default emissions intensity in 2019.
- other incidental, ancillary or supporting processes which are not included in another default or estimated emissions intensity value.

## 34.3. Exclusions

For the purposes of the development of the default emissions intensity value and the preparation of an estimated (site-specific) emission intensity value for this production variable, scope 1 emissions from the following processes are not taken to relate to the production variable and must be excluded from the calculation of an estimated (site-specific) emissions intensity value for the production variable:

- processes excluded from the activity of integrated iron and steel manufacturing;
- processes which do not occur within the facility; and
- on-site electricity generation.

# 35. Hot-rolled long products

## 35.1. Production variable definition

1. Tonnes of hot-rolled carbon steel long products that:
   (a) are produced as part of carrying on the hot-rolled carbon steel long products activity at the facility; and
   (b) are in coils or straight lengths; and
   (c) are generally produced in rod, bar and structural (section) mills; and
   (d) generally have a cross sectional shape such as I, T, Y, U, V, H, C, L, square, rectangular, round, flat, hexagonal, angle, channel, structural beam profile or rail profile; and
   (e) are of saleable quality.
2. The metric in subsection (1) is applicable to a facility that conducts the activity of the hot-rolling continuously cast carbon steel products (originally produced from an integrated iron and steel manufacturing activity or manufacture of carbon steel from cold ferrous feed activity) into carbon steel long products that:
   (a) are in coils or straight lengths; and
   (b) are generally produced in rod, bar and structural (section) mills; and
   (c) generally have a cross sectional shape such as I, T, Y, U, V, H, C, L, square, rectangular, round, flat, hexagonal, angle, channel, structural beam profile or rail profile.
3. The activity in subsection (2) is the ***hot-rolled carbon steel long products activity***.
4. For hot-rolled long products produced at integrated iron and steel manufacturing facilities, the default emissions intensity is 0.101 t $CO_2$-e per tonne of long products.
5. For hot-rolled long products not produced at integrated iron and steel manufacturing facilities, the default emissions intensity is 0.0750 t $CO_2$-e per tonne of long products.

## 35.2. Inclusions

For the purposes of the development of the default emissions intensity values relevant to this activity and the preparation of estimated (site-specific) emission intensity values for production variables relevant to this activity, scope 1 emissions from the following processes are included within the activity boundary:

- the direct emissions from machinery, equipment and processes used for the physical and/or chemical transformation described in the activity definition, including, for example:
  - machinery used to move materials within the facility, including mobile equipment;
  - control rooms, laboratories, maintenance workshops;
  - machinery used to create non-electrical energy for use in the activity;
  - the on-site recovery and processing of steel scrap from rolling operations back into facility operations;

    - onsite processing of waste materials and by-products from the activity;
- waste heat recovery within the facility;
- steam produced on-site that is not used to produce electricity;
- warehousing or storage of activity outputs, raw materials and consumables used by the activity where this is at the same location as the activity;
- water and waste treatment (including gases) necessary for the activity to be conducted;
- transportation of inputs used in the activity to storage at the facility, where the transport activity wholly occurs within the facility;
- transportation of the output of the activity from storage at the facility, where the transport activity wholly occurs within the facility;
- complementary processes, such as packaging, head office, administrative and marketing operations where they are undertaken at the site of the facility; and
- other incidental, ancillary or supporting processes which are not included in another default or estimated emissions intensity value.

It is intended that all scope 1 NGER-reported emissions from a facility can be assigned to a production variable, but where a facility produces multiple products, emissions cannot be counted more than once.

Where emissions need to be apportioned among the activity of integrated iron and steel manufacturing and the activity of hot-rolled long products, the responsible emitter should use:

- the methods used to calculate the emissions of continuously cast carbon steel in accordance with the requirements in the *National Greenhouse and Energy Reporting (Measurement) Determination 2008*; and
- the apportioning method used by the responsible emitter in their data submission to the Department for the purposes of calculating the default emissions intensity in 2019.

A facility can assign emissions from ancillary services or processes (which do not relate to a specific output) to one production variable only, or apportion those emissions among production variables as described above.

## 35.3. Exclusions

For the purposes of the development of the default emissions intensity values relevant to this activity and the preparation of estimated (site-specific) emission intensity values for production variables relevant to this activity, scope 1 emissions from the following processes are not taken to relate to the activity and must be excluded from the calculation of an estimated (site-specific) emissions intensity value from the activity:

- any stand-alone finishing processes, including, but not limited to, cold-rolling, annealing, pickling or coating of steel products;
- processes which do not occur within the facility; and
- on-site electricity generation.

# 36. Hot-rolled flat products

## 36.1. Production variable definition

1. Tonnes of hot-rolled carbon steel flat products that:
   (a) are produced as part of carrying on the hot-rolled carbon steel flat products activity at the facility; and
   (b) are flat in profile, such as plate and hot rolled coil; and
   (c) are generally produced in hot strip mills and plate mills; and
   (d) are generally greater than 600 mm in width; and
   (e) are generally less than 150 mm in thickness; and
   (f) are of saleable quality.

2. The metric in subsection (1) is applicable to a facility that conducts the activity of the hot-rolling continuously cast carbon steel products (originally produced from an integrated iron and steel manufacturing activity or manufacture of carbon steel from cold ferrous feed activity) into carbon steel flat products that:
   (a) are flat in profile, such as plate and hot rolled coil; and
   (b) are generally produced in hot strip mills and plate mills; and
   (c) are generally greater than 600 mm in width; and
   (d) are generally less than 150 mm in thickness.

3. The activity in subsection (2) is the ***hot-rolled carbon steel flat products activity***.

4. For hot-rolled flat products produced at integrated iron and steel manufacturing facilities, the default emissions intensity is 0.000358 t $CO_2$-e per tonne of flat products.

Note: The default emissions intensity for the hot-rolled flat products not produced at integrated iron and steel manufacturing facilities prescribed production variable is yet to be calculated and specified in the Schedule.

## 36.2. Inclusions

For the purposes of the development of the default emissions intensity values relevant to this activity and the preparation of estimated (site-specific) emission intensity values for production variables relevant to this activity, scope 1 emissions from the following processes are included within the activity boundary:

- the use of machinery, equipment and processes for the physical and/or chemical transformation described in the activity definition, including, for example:
  - machinery used to move materials within the facility, including mobile equipment;
  - control rooms, laboratories, maintenance workshops;
  - machinery used to create non-electrical energy for use in the activity;

- the processing of by-products where it involves the recovery of materials for re-use within the activity or is necessary for the activity to proceed as described[5]; and
- the on-site recovery and processing of steel scrap from rolling operations back into facility operations; and
- onsite processing of waste materials and by-products from the activity;

- waste heat recovery within the facility;
- steam produced on-site that is not used to produce electricity;
- casting via the continuous casting process or ingot casting process into intermediate steel products;
- warehousing or storage of activity outputs, raw materials and consumables used by the activity where this is at the same location as the activity;
- water and waste treatment (including gases) necessary for the activity to be conducted;
- transportation of inputs used in the activity to storage at the facility, where the transport activity wholly occurs within the facility;
- transportation of the output of the activity from storage at the facility, where the transport activity wholly occurs within the facility;
- complementary processes, such as packaging, head office, administrative and marketing operations, where they are undertaken at the site of the facility; and
- other incidental, ancillary or supporting processes which are not included in another default or estimated emissions intensity value.

It is intended that all scope 1 NGER-reported emissions from a facility can be assigned to a production variable, but where a facility produces multiple products, emissions cannot be counted more than once.

Where emissions need to be apportioned among the activity of integrated iron and steel manufacturing and the activity of hot-rolled flat products, the responsible emitter should use:

- the methods used to calculate the emissions of continuously cast carbon steel in accordance with the requirements in the *National Greenhouse and Energy Reporting (Measurement) Determination 2008*; and
- the apportioning method used by the responsible emitter in their data submission to the Department for the purposes of calculating the default emissions intensity in 2019.

A facility can assign emissions from ancillary services or processes (which do not relate to a specific output) to one production variable only, or apportion those emissions among production variables as described above.

## 36.3. Exclusions

For the purposes of the development of the default emissions intensity values relevant to this activity and the preparation of estimated (site-specific) emission intensity values for production variables relevant to this activity, scope 1 emissions from the following processes

[5] Examples include BTX, blast furnace slag, gypsum and ammonium sulphate.

are not taken to relate to the activity and must be excluded from the calculation of an estimated (site-specific) emissions intensity value from the activity:

- any stand-alone finishing processes, including, but not limited to, cold-rolling, annealing, pickling or coating of steel products;
- processes which do not occur within the facility; and
- on-site electricity generation.

# 37. Continuously cast carbon steel products and ingots of carbon steel (manufacture of carbon steel products from cold ferrous feed)

## 37.1. Production variable definition

1. Tonnes of continuously cast carbon steel products and ingots of carbon steel that:
   (a) are produced as part of carrying on the manufacture of carbon steel products from cold ferrous feed activity at the facility; and
   (b) are not produced as part of carrying on the integrated iron and steel manufacturing activity at the facility; and
   (c) are of saleable quality.
2. The metric in subsection (1) is applicable to a facility that conducts the activity of the ***manufacture of carbon steel products from cold ferrous feed***.
3. The default emissions intensity is 0.0981 t $CO_2$-e per tonne of continuously cast carbon steel products and ingots of carbon steel.

## 37.2. Inclusions

For the purposes of the development of the default emissions intensity values relevant to this activity and the preparation of estimated (site-specific) emission intensity values for production variables relevant to this activity, scope 1 emissions from the following processes are included within the activity boundary:

- the use of machinery, equipment and processes used for the physical and/or chemical transformation described in the activity definition, including, for example:
  - machinery used to move materials within the facility, including mobile equipment;;
  - control rooms, laboratories, maintenance workshops;
  - machinery used to create non-electrical energy for use in the activity;
  - the processing of by-products where it involves the recovery of materials for re-use within the activity or is necessary for the activity to proceed as described; and
  - onsite processing of waste materials or by-products from the activity;
- waste heat recovery within the facility;
- steam produced on-site that is not used to produce electricity;
- warehousing or storage of activity outputs, raw materials and consumables used by the activity where this is at the same location as the activity;
- the preparation of cold ferrous feed prior to any heating and melting into liquid steel;
- the conduct of secondary metallurgical treatment;
- the production of cryogenic gases, e.g. oxygen, nitrogen and argon that are consumed in the activity;
- casting via processes such as continuous casting or ingot casting into intermediate steel products;

- water and waste treatment (including gases etc.) necessary for the activity to be conducted;
- transportation of inputs used in the activity to storage at the facility, where the transport activity wholly occurs within the facility as the activity;
- transportation of the outputs from the activity from storage at the facility, where the transport activity wholly occurs within the facility;
- complementary processes, such as raw material preparation (including blending, sizing), facility managed port operations, straightening and cold-forming, packaging, head office, administrative and marketing operations where they are undertaken at the site of the facility; and
- other incidental, ancillary or supporting processes which are not included in another default or estimated emissions intensity value.

It is intended that all scope 1 NGER-reported emissions from a facility can be assigned to a production variable, but where a facility produces multiple products, emissions cannot be counted more than once.

When calculating estimated (site-specific) emissions intensity values, a facility can assign emissions from ancillary services or processes (which do not relate to a specific output) to one production variable only, or apportion those emissions among production variables on a justifiable basis.

## 37.3. Exclusions

For the purposes of the development of the default emissions intensity values relevant to this activity and the preparation of estimated (site-specific) emission intensity values for production variables relevant to this activity, scope 1 emissions from the following processes are not taken to relate to the activity and must be excluded from the calculation of an estimated (site-specific) emissions intensity value from the activity:

- the primary extraction and concentration of raw materials prior to the conduct of the activity;
- any stand-alone finishing processes, including, but not limited to, cold-rolling, annealing, pickling or coating of steel products;
- processes which do not occur within the facility; and
- on-site electricity generation.

# 38. Iron ore pellets (not from integrated iron and steel manufacturing)

## 38.1. Production variable definition

1. Tonnes of iron ore pellets on a dry weight basis that:
   (a) are produced as part of carrying on the iron ore pellet production activity at the facility; and
   (b) have a concentration of iron (Fe) equal to or greater than 63%; and
   (c) have a concentration of alumina (aluminium oxide ($Al_2O_3$)) equal to or less than 2%; and
   (d) have a concentration of silicon dioxide (silica ($SiO_2$)) equal to or less than 7%; and
   (e) have an average diameter of between 9 and 16 millimetres; and
   (f) are of saleable quality.
2. The metric in subsection (1) is applicable to a facility that conducts the activity of producing iron ore pellets through the physical and chemical transformation of iron ore into saleable iron ore pellets that are for the production of steel and that have:
   (a) a concentration of iron (Fe) equal to or greater than 63%; and
   (b) a concentration of alumina (aluminium oxide ($Al_2O_3$)) equal to or less than 2%; and
   (c) a concentration of silicon dioxide (silica ($SiO_2$)) equal to or less than 7%; and
   (d) an average diameter of between 9 and 16 millimetres.
3. However, the metric in subsection (1) is not applicable to a facility that includes the integrated iron and steel manufacturing activity.
4. The activity in subsection (2) is the ***iron ore pellets production activity***.
5. The default emissions intensity is 0.0517 t $CO_2$-e per tonne of iron ore pellets.
6. In this section:

   ***iron ore*** means any form of iron ore product that has not been semi-processed into iron ore balls or exposed to a hardening process by the application of heat or pressure and includes:
   (a) magnetite ore that has been concentrated; and
   (b) hematite ore that has been crushed to varying extents.

## 38.2. Inclusions

For the purposes of the development of the default emissions intensity values relevant to this activity and the preparation of estimated (site-specific) emission intensity values for production variables relevant to this activity, scope 1 emissions from the following processes within the facility are included:

- the direct emissions from machinery, equipment, facilities and processes used for the physical and/or chemical transformation described in the activity definition, including, for example:

    - machinery used to move materials within the facility, including mobile equipment;
    - control rooms, laboratories, maintenance workshops;
    - machinery used to create non-electrical energy for use in the activity;
    - the processing of by-products where they involve the recovery of materials for re-use within the activity or are necessary for the activity to proceed as described; and
    - onsite processing of by-products and waste materials from the activity;
- emissions associated with the production of hot air for use in furnace operations;
- waste heat recovery within the facility;
- steam produced on-site that is not used to produce electricity;
- transportation of inputs used in the activity to storage at the facility, where the transport activity wholly occurs within the facility;
- transportation of the output of the activity from storage at the facility, where the transport activity wholly occurs within the facility;
- complementary processes, such as packaging, head office, administrative and marketing operations where they are undertaken at the site of the facility; and
- other incidental, ancillary or supporting processes which are not included in another default or estimated emissions intensity value.

The default emissions intensity value for the iron ore pellets production activity includes all scope 1 NGER-reported emissions from the facilities relevant for setting the default intensity value, except scope 1 emissions from on-site electricity generation.

## 38.3. Exclusions

For the purposes of the development of the default emissions intensity values relevant to this activity and the preparation of estimated (site-specific) emission intensity values for production variables relevant to this activity, scope 1 emissions from the following processes are not taken to relate to the activity and must be excluded from the calculation of an estimated (site-specific) emissions intensity value from the activity:

- the production of iron ore concentrate;
- processes which do not occur within the facility; and
- on-site electricity generation.

# Rail transport

***Rail transport*** is the use of rolling stock that combusts fuels on-board for propulsion and transports passengers or freight on a rail system.

Note: Fuel may be combusted by a drive train or used to generate electricity that runs the drive train.

There are four prescribed production variables for rail transport. All fall under the *activity* of *rail transport*.

## General definitions

***ANZSIC industry classification and code*** means an industry classification and code for that classification published in the Australian and New Zealand Standard Industrial Classification (ANZSIC), 2006.

***bulk freight*** includes goods that consist of large quantities of homogenous product that is generally non-containerised and conveyed in wagons, such as iron ore, coal and grain.

***dedicated line*** includes:

(a) a line that only services the rail transport needs of a single business enterprise or corporate group; and

(b) a vertically integrated rail system:

(i) where the rail infrastructure manager and the user of the rail system is under common control or part of a common corporate group; and

(ii) that wholly or predominantly serves the rail transport needs of a single business enterprise or corporate group.

***freight*** includes a saleable good.

***net-tonne-kilometre*** means the unit of measure representing the movement over a distance of one kilometre of one tonne of freight. The weight of the rolling stock (such as tractive vehicle and rail car) is excluded.

***passenger-kilometre*** means the unit of measure representing the movement over a distance of one kilometre of one passenger.

Note: facilities that are not in the rail freight transport or rail passenger transport sectors are excluded from the use of rail transport production variables.

# 39. Net-tonne-kilometres of bulk freight on a dedicated line

## 39.1. Production variable definition

1. Net-tonne-kilometres of bulk freight that:
   (a) result from carrying on the rail transport activity at the facility; and
   (b) is transported by rail:
      (i) only using a dedicated line; or
      (ii) using a dedicated line for over 70% of the journey.
2. The metric in subsection (1) is applicable to a facility that:
   (a) conducts the activity of ***rail transport***; and
   (b) transports bulk freight by rail wholly or partly on one or more dedicated lines; and
   (c) is in the rail freight transport ANZSIC industry classification and code 471.
3. The default emissions intensity is 0.00000527 t $CO_2$-e per net-tonne-kilometre of bulk freight.
4. The net-tonne kilometres must be measured consistently with relevant industry practice.

## 39.2. Inclusions

For the purposes of the development of the default emissions intensity value and the preparation of an estimated (site-specific) emission intensity value for this production variable, scope 1 emissions from the following processes at the facility are included:

- combustion of fuels on-board a rolling stock to drive the propulsion system for the purpose of transferring passengers and freight on a rail system;
- combustion of fuels on-board the rolling stock for the generation of electricity to drive the propulsion system for the purpose of transferring passengers and goods on a rail system. For example, a diesel engine connected to an electrical generator, creating electricity that powers electric traction motors;
- electricity generated by the propulsion system of a rolling stock that is consumed within the rolling stock;
- direct emissions from, and electricity use of, machinery and equipment used for supporting rail freight or passenger transport. For example, vehicles and equipment used in rail system maintenance activities;
- water and waste treatment (including fugitive emissions) necessary to support rail system maintenance activities. For example, water and waste treatment for maintenance camps along the rail system;
- complementary activities, such as packaging, head office, administrative and marketing operations, which occur within the boundary of the facility that is undertaking the activity; and
- other incidental, ancillary or supporting processes which are not included in another default or estimated emissions intensity value.

The default emissions intensity value for the net-tonne-kilometres of bulk freight on a dedicated line activity includes all scope 1 NGER-reported emissions from the facilities relevant for setting the default intensity value, except scope 1 emissions from on-site electricity generation.

## 39.3. Exclusions

Scope 1 emissions from the following processes were not included in the default emissions intensity calculation for this production variable, and must be excluded from the calculation of an estimated (site-specific) emissions intensity value for the production variable:

- electricity generated on the rolling stock not sent to the propulsion system or traction motors of the rolling stock;
- manufacturing process emissions; and
- processes which do not occur within the facility.

# 40. Net-tonne-kilometres of bulk freight on a non-dedicated line

## 40.1. Production variable definition

1. Net-tonne-kilometres of bulk freight that:
   (a) result from carrying on the rail transport activity at the facility; and
   (b) is transported by rail; and
   (c) either:
      (i) does not use a dedicated line; or
      (ii) uses a dedicated line for 70% or less of the journey.
2. The metric in subsection (1) is applicable to a facility that:
   (a) conducts the activity of ***rail transport***; and
   (b) transports bulk freight by rail wholly or partly on one or more non-dedicated lines; and
   (c) is in the rail freight transport ANZSIC industry classification and code 471.
3. The default emissions intensity is 0.0000163 t $CO_2$-e per net-tonne-kilometre of bulk freight.
4. The net-tonne kilometres must be measured consistently with relevant industry practice.

## 40.2. Inclusions

For the purposes of the development of the default emissions intensity value and the preparation of an estimated (site-specific) emission intensity value for this production variable, scope 1 emissions from the following processes at the facility are included:

- combustion of fuels on-board a rolling stock to drive the propulsion system for the purpose of transferring passengers and goods on a rail system;
- combustion of fuels on-board the rolling stock for the generation of electricity to drive the propulsion system for the purpose of transferring passengers and goods on a rail system. For example, a diesel engine connected to an electrical generator, creating electricity that powers electric traction motors;
- electricity generated by the propulsion system of a rolling stock that is consumed within the rolling stock;
- direct emissions from, and electricity use of, machinery and equipment used for supporting rail freight or passenger transport. For example, vehicles and equipment used in rail system maintenance activities;
- water and waste treatment (including fugitive emissions) necessary to support rail system maintenance activities. For example, water and waste treatment for maintenance camps along the rail system;
- complementary activities, such as packaging, head office, administrative and marketing operations, which occur within the boundary of the facility that is undertaking the activity; and

- other incidental, ancillary or supporting processes which are not included in another default or estimated emissions intensity value.

It is intended that all scope 1 NGER-reported emissions from a facility can be assigned to a production variable, but where a facility produces multiple products, emissions cannot be counted more than once.

When calculating estimated (site-specific) emissions intensity values, a facility can assign emissions which do not relate to a specific output either to one production variable only, or apportion those emissions among production variables on a justifiable basis.

## 40.3. Exclusions

Scope 1 emissions from the following processes were not included in the default emissions intensity calculation for this production variable, and must be excluded from the calculation of an estimated (site-specific) emissions intensity value for the production variable:

- electricity generated on the rolling stock not sent to the propulsion system or traction motors of the rolling stock;
- manufacturing process emissions; and
- processes which do not occur within the facility.

# 41. Net-tonne-kilometres of non-bulk freight

## 41.1. Production variable definition

1. Net-tonne-kilometres of freight that:
   (a) result from carrying on the rail transport activity at the facility; and
   (b) is transported by rail; and
   (c) is not bulk freight.
2. The metric in subsection (1) is applicable to a facility that:
   (a) conducts the activity of ***rail transport***; and
   (b) transports freight that is not bulk freight; and
   (c) is in the rail freight transport ANZSIC industry classification and code 471.
3. The default emissions intensity is 0.0000204 t $CO_2$-e per net-tonne-kilometre of freight.
4. The net-tonne kilometres must be measured consistently with relevant industry practice.

## 41.2. Inclusions

For the purposes of the development of the default emissions intensity value and the preparation of an estimated (site-specific) emission intensity value for this production variable, scope 1 emissions from the following processes at the facility are included:

- combustion of fuels on-board a rolling stock to drive the propulsion system for the purpose of transferring passengers and goods on a rail system;
- combustion of fuels on-board the rolling stock for the generation of electricity to drive the propulsion system for the purpose of transferring passengers and goods on a rail system. For example, a diesel engine connected to an electrical generator, creating electricity that powers electric traction motors;
- electricity generated by the propulsion system of a rolling stock that is consumed within the rolling stock;
- direct emissions from, and electricity use of, machinery and equipment used for supporting rail freight or passenger transport. For example, vehicles and equipment used in rail system maintenance activities;
- water and waste treatment (including fugitive emissions) necessary to support rail system maintenance activities. For example, water and waste treatment for maintenance camps along the rail system;
- complementary activities, such as packaging, head office, administrative and marketing operations, which occur within the boundary of the facility that is undertaking the activity; and
- other incidental, ancillary or supporting processes which are not included in another default or estimated emissions intensity value.

Where a facility produces multiple products, emissions cannot be counted more than once.

When calculating estimated (site-specific) emissions intensity values, a facility can assign emissions which do not relate to a specific output either to one production variable only, or apportion those emissions among production variables on a justifiable basis.

## 41.3. Exclusions

Scope 1 emissions from the following processes were not included in the default emissions intensity calculation for this production variable, and must be excluded from the calculation of an estimated (site-specific) emissions intensity value for the production variable:

- electricity generated on the rolling stock not sent to the propulsion system or traction motors of the rolling stock;
- manufacturing process emissions; and
- processes which do not occur within the facility.

# 42. Passenger-kilometres of rail passenger transport

## 42.1. Production variable definition

1. Passenger-kilometres that result from carrying on the rail transport activity at the facility.
2. The metric in subsection (1) is applicable to a facility that:
   (a) conducts the activity of ***rail transport***; and
   (b) transports passengers; and
   (c) is in the rail passenger transport ANZSIC industry classification and code 472.
3. The default emissions intensity is 0.0000710 t $CO_2$-e per passenger-kilometre.
4. The passenger-kilometres must be measured consistently with relevant industry practice.

## 42.2. Inclusions

For the purposes of the development of the default emissions intensity value and the preparation of an estimated (site-specific) emission intensity value for this production variable, scope 1 emissions from the following processes at the facility are included:

- combustion of fuels on-board a rolling stock to drive the propulsion system for the purpose of transferring passengers and goods on a rail system;
- combustion of fuels on-board the rolling stock for the generation of electricity to drive the propulsion system for the purpose of transferring passengers and goods on a rail system. For example, a diesel engine connected to an electrical generator, creating electricity that powers electric traction motors;
- electricity generated by the propulsion system of a rolling stock that is consumed within the rolling stock;
- direct emissions from, and electricity use of, machinery and equipment used for supporting rail freight or passenger transport. For example, vehicles and equipment used in rail system maintenance activities;
- water and waste treatment (including fugitive emissions) necessary to support rail system maintenance activities. For example, water and waste treatment for maintenance camps along the rail system;
- complementary activities, such as packaging, head office, administrative and marketing operations, which occur within the boundary of the facility that is undertaking the activity; and
- other incidental, ancillary or supporting processes which are not included in another default or estimated emissions intensity value.

The default emissions intensity value for the passenger-kilometres of rail passenger transport activity includes all scope 1 NGER-reported emissions from the facilities relevant for setting the default intensity value, except scope 1 emissions from on-site electricity generation.

## 42.3. Exclusions

Scope 1 emissions from the following processes were not included in the default emissions intensity calculation for this production variable, and must be excluded from the calculation of an estimated (site-specific) emissions intensity value for the production variable:

- electricity generated on the rolling stock not sent to the propulsion system or traction motors of the rolling stock;
- manufacturing process emissions; and
- processes which do not occur within the facility.

# Air transport

## 43. Revenue-tonne-kilometres of air transport

### 43.1. Production variable definition

1. Revenue-tonne-kilometres of air transport that:
   (a) result from carrying on the air transport activity at the facility; and
   (b) relate to the covered emissions of the facility.
2. The metric in subsection (1) is applicable to a facility that:
   (a) transports passengers and freight by air (the ***air transport activity***); and
   (b) is in the air and space transport ANZSIC industry classification and code 490.
3. The default emissions intensity is 0.00112 t $CO_2$-e per revenue-tonne-kilometre.

In this section:

***freight-tonne-kilometre*** means the unit of measure representing the movement of a tonne of freight over the distance of one kilometre calculated by multiplying the total tonnes of freight on a flight by the distance flown.

***passenger-tonne-kilometre*** means the unit of measure representing the movement of a revenue-generating passenger over the distance of one kilometre calculated by assuming each passenger and baggage on a flight total 90 kilograms and multiplying by the distance flown.

***revenue-tonne-kilometre*** means the sum of passenger-tonne-kilometres and freight-tonne-kilometres.

### 43.2. Inclusions

For the purposes of the development of the default emissions intensity value and the preparation of an estimated (site-specific) emission intensity value for this production variable, scope 1 emissions from the following processes at the facility are included:

- combustion of fuels on the aircraft to drive the propulsion system for the purpose of transferring passengers and freight;
- combustion of fuels on the aircraft for the generation of electricity to drive the propulsion system for the purpose of transferring passengers and freight;
- electricity generated by the propulsion system of the aircraft that is consumed on the aircraft;
- direct emissions from, and electricity use of, vehicles, machinery and equipment used for supporting air transport. For example, ground vehicles used in transporting passengers on the air or land side of an airport;
- fugitive emissions from air conditioning and refrigeration;
- complementary activities, such as packaging, head office, administrative and marketing operations, which occur at the facility that is undertaking the activity; and

- other incidental, ancillary or supporting processes which are not included in another default or estimated emissions intensity value.

The default emissions intensity value for the air transport activity includes all scope 1 NGER-reported emissions from the facilities relevant for setting the default intensity value, except scope 1 emissions from on-site electricity generation.

## 43.3. Exclusions

Scope 1 emissions from the following processes were not included in the default emissions intensity calculation for this production variable, and must be excluded from the calculation of an estimated (site-specific) emissions intensity value for the production variable:

- electricity generated on the aircraft not sent to the propulsion system of the aircraft;
- manufacturing process emissions; and
- processes which do not occur within the facility.

# Passenger road transport

## 44. Vehicle-kilometres of passenger road transport

### 44.1. Production variable definition

1. Vehicle-kilometres of passenger road transport that result from carrying on the road passenger transport activity at the facility.

2. The metric in subsection (1) is applicable to a facility that:

   (a) transports passengers by road in registered vehicles (the ***road passenger transport activity***); and

   (b) is in the passenger road transport ANZSIC industry classification and code 462.

3. The default emissions intensity is 0.00164 t $CO_2$-e per vehicle-kilometre.

In this section:

> ***vehicle-kilometre*** means the unit of measure representing the movement of a vehicle over the distance of one kilometre.

### 44.2. Inclusions

For the purposes of the development of the default emissions intensity value and the preparation of an estimated (site-specific) emission intensity value for this production variable, scope 1 emissions from the following processes at the facility are included:

- combustion of fuels on the road registered vehicle to drive the propulsion system for the purpose of transferring passengers;
- combustion of fuels on the road registered vehicle for the generation of electricity to drive the propulsion system for the purpose of transferring passengers;
- electricity generated by the propulsion system of the road registered vehicle that is consumed within the road registered vehicle;
- direct emissions from, and electricity use of, vehicles, machinery and equipment used for supporting the road passenger transport activity;
- complementary activities, such as packaging, head office, administrative and marketing operations, which occur within the facility that is undertaking the activity; and
- other incidental, ancillary or supporting processes which are not included in another default or estimated emissions intensity value.

The default emissions intensity value for the vehicle-kilometres of passenger road transport activity includes all scope 1 NGER-reported emissions from the facilities relevant for setting the default intensity value, except scope 1 emissions from on-site electricity generation.

## 44.3. Exclusions

Scope 1 emissions from the following processes were not included in the default emissions intensity calculation for this production variable, and must be excluded from the calculation of an estimated (site-specific) emissions intensity value for the production variable:

- electricity generated on the road registered vehicle not sent to the propulsion system of the road registered vehicle;
- manufacturing process emissions; and
- processes which do not occur within the facility.

# Mixed passenger and freight water transport

## 45. Deadweight-tonne-kilometres of mixed passenger and freight water transport

### 45.1. Production variable definition

1. Deadweight-tonne-kilometres of water transport that:
   (a) result from carrying on the mixed passenger and freight water transport activity at the facility; and
   (b) relate to the covered emissions of the facility.
2. The metric in subsection (1) is applicable to a facility that:
   (a) transports passengers and freight by water (the ***mixed passenger and freight water transport activity***); and
   (b) is in the water freight transport or water passenger transport ANZSIC industry classification and codes 481 or 482.
3. The default emissions intensity is 0.000103 t $CO_2$-e per operational deadweight-tonne-kilometre.
4. The relevant kilometres must be measured:
   (a) using the actual distance travelled and recorded on a ship for a voyage; or
   (b) by using an internationally accepted standard distance between the two ports on a voyage.

In this section:

***operational deadweight tonne*** is a tonne of the cargo, passengers, fuel, dry provisions, supplies and other things carried on board a ship for a voyage, but not including the ship itself.

***deadweight-tonne-kilometre*** means the unit of measure representing the movement of an operational deadweight tonne over the distance of one kilometre.

### 45.2. Inclusions

For the purposes of the development of the default emissions intensity value and the preparation of an estimated (site-specific) emission intensity value for this production variable, scope 1 emissions from the following processes at the facility are included:

- combustion of fuels on the ship to drive the propulsion system for the purpose of transferring passengers and freight;
- combustion of fuels on the ship for the generation of electricity to drive the propulsion system for the purpose of transferring passengers and freight;
- electricity generated by the propulsion system of the ship that is consumed on the ship;
- direct emissions from, and electricity use of, vehicles, machinery and equipment used for supporting water passenger and freight transport;

- fugitive emissions from air conditioning and refrigeration;
- complementary activities, such as packaging, head office, administrative and marketing operations, which occur within the facility that is undertaking the activity; and
- other incidental, ancillary or supporting processes which are not included in another default or estimated emissions intensity value.

The default emissions intensity value for the operational deadweight-tonne-kilometres of mixed passenger and freight water transport activity includes all scope 1 NGER-reported emissions from the facilities relevant for setting the default intensity value, except scope 1 emissions from on-site electricity generation.

## 45.3. Exclusions

Scope 1 emissions from the following processes were not included in the default emissions intensity calculation for this production variable, and must be excluded from the calculation of an estimated (site-specific) emissions intensity value for the production variable:

- electricity generated on the ship not sent to the propulsion system of the ship;
- manufacturing process emissions; and
- processes which do not occur within the facility.

# Wastewater

## 46. Wastewater handling (domestic and commercial)

### 46.1. Production variable definitions

1. Tonnes of the following:
   (a) COD removed, calculated in accordance with subsection (4); and
   (b) nitrogen removed, calculated in accordance with subsection (5).
2. The metric in subsection (1) is applicable to a facility whose primary activity is the handing of either or both of domestic or commercial wastewater and reports emissions under Division 5.3 of the NGER (Measurement) Determination.
3. The default emissions intensity is:
   (a) 0.459 t $CO_2$-e per tonne of COD removed; and
   (b) 5.03 t $CO_2$-e per tonne of Nitrogen removed.
4. For paragraph (1)(a), COD removed is given by the following equation:

$$\text{COD removed} = \text{COD}_{\text{measured entering}} - (\text{COD}_{\text{in effluent leaving site}} + \text{COD}_{\text{in sludge leaving site}})$$

where:

***COD***$_{\textit{measured entering}}$ is the COD entering the site measured consistently with the requirements in Division 5.3 of the NGER (Measurement) Determination.

***COD***$_{\textit{in effluent leaving site}}$ is the COD leaving the site measured consistently with the requirements in Division 5.3 of the NGER (Measurement) Determination.

***COD***$_{\textit{in sludge leaving site}}$ is COD in sludge leaving the site measured consistently with the requirements in Division 5.3 of the NGER (Measurement) Determination.

5. For paragraph (1)(b), nitrogen removed is given by the following equation:

$$\text{nitrogen removed} = \text{N}_{\text{measured entering}} - (\text{N}_{\text{in effluent leaving site}} + \text{N}_{\text{in sludge leaving site}})$$

where:

***N***$_{\textit{measured entering}}$ is the nitrogen entering the site measured consistently with the requirements in Division 5.3 of the NGER (Measurement) Determination.

***N***$_{\textit{in effluent leaving site}}$ is the nitrogen leaving the site measured consistently with the requirements in Division 5.3 of the NGER (Measurement) Determination.

***N***$_{\textit{in sludge leaving site}}$ is the nitrogen in sludge leaving the site measured consistently with the requirements in Division 5.3 of the NGER (Measurement) Determination.

In this section:

***COD*** or ***chemical oxygen demand*** means the total material available for chemical oxidation (both biodegradable and non-biodegradable) measured in tonnes.

## 46.2. COD Removed Inclusions

For the purposes of the development of the default emissions intensity value and the preparation of an estimated (site-specific) emission intensity value for this production variable, scope 1 emissions of all gases, other than nitrous oxide, from the following processes at the facility are included:

- the treatment of wastewater received by the facility as well as from other associated on-site processes, including:
  - flaring;
  - stationary equipment such as diesel back-up or natural gas boilers not used to generate electricity;
  - sulphur hexafluoride gases used in equipment at the facility;
- the use of machinery, equipment and processes for the physical and/or chemical transformation described in the activity definition, including, for example:
  - machinery used to move materials within the facility, including mobile equipment;
  - control rooms, laboratories, maintenance workshops;
  - machinery used to create non-electrical energy for use in the activity;
  - the processing of by-products where they involve the recovery of materials for re-use within the facility or are necessary for the activity to proceed as described;
  - processing of waste materials from the activity;
  - furnaces; and
- other incidental, ancillary or supporting processes which are not included in another default or estimated emissions intensity value.

The default emissions intensity value for the COD removed activity includes all scope 1 NGER-reported emissions, other than emissions of nitrous oxide and scope 1 emissions from on-site electricity generation, from the facilities relevant for setting the default intensity value.

## 46.3. COD Removed Exclusions

Scope 1 emissions from the following processes were not included in the default emissions intensity calculation for this production variable, and must be excluded from the calculation of an estimated (site-specific) emissions intensity value for the production variable:

- further treatment of the outflow by receiving entities;
- pre-treatment of industrial and commercial wastewater that occurs off-site;
- processes that do not occur within the facility, such as the distribution and transportation of treated wastewater, sludge biosolids, and other outputs from the facility to receiving destinations;
- on-site electricity generation; and
- processes that are included in the definition of another production variable.

## 46.4. Nitrogen Removed Inclusions

For the purposes of the development of the default emissions intensity value and the preparation of an estimated (site-specific) emission intensity value for this production variable, scope 1 emissions of nitrous oxide from the following processes at the facility are included:

- the treatment of wastewater received by the facility as well as from other associated on-site processes;
- the use of machinery, equipment and processes for the physical and/or chemical transformation described in the activity definition, including, for example:
    - machinery used to move materials within the facility, including mobile equipment;
    - control rooms, laboratories, maintenance workshops;
    - machinery used to create non-electrical energy for use in the activity;
    - the processing of by-products where they involve the recovery of materials for re-use within the facility or are necessary for the activity to proceed as described;
    - processing of by-products and waste materials from the activity;
    - furnaces;
    - flaring; and
- other incidental, ancillary or supporting processes which are not included in another default or estimated emissions intensity value.

The default emissions intensity value for the nitrogen removed activity includes all scope 1 NGER-reported emissions of nitrous oxide from the facilities relevant for setting the default intensity value, except scope 1 emissions from on-site electricity generation.

## 46.5. Nitrogen Removed Exclusions

Scope 1 emissions from the following processes were not included in the default emissions intensity calculation for this production variable, and must be excluded from the calculation of an estimated (site-specific) emissions intensity value for the production variable:

- further treatment of the outflow by receiving entities;
- pre-treatment of industrial and commercial wastewater that occurs off-site;
- processes that do not occur within the facility, such as the distribution and transportation of treated wastewater, sludge biosolids, and other outputs from the facility to receiving destinations; and
- on-site electricity generation.

# Electricity

## 47. Electricity generation

### 47.1. Production variable definition

1. Megawatt hours of electricity that:
   (a) are produced as part of carrying on the electricity generation activity at the facility; and
   (b) if electricity generation is the only production variable applicable to the facility—are exported from the facility; and
   (c) if the electricity generation occurs on a vehicle:
      (i) are not used by the vehicle's propulsion system; or
      (ii) are not both generated by a vehicle's propulsion system and used by or on the vehicle for purposes unrelated to propulsion.
2. The metric in subsection (1) is applicable to a facility that conducts the activity of electricity generation (the ***electricity generation activity***).
3. The default emissions intensity is 0.538 t $CO_2$-e:
   (a) if paragraph (1)(b) does not apply—per megawatt hour of electricity generated; and
   (b) if paragraph (1)(b) applies—per megawatt hour of electricity exported from the facility.
4. The megawatt hours of electricity under subsections (1) and (3) must:
   (a) if a meter is available to measure the electricity—be metered; and
   (b) if a meter is not available to measure the electricity—be calculated in a verifiable way in accordance with industry practice; and
   (c) if some or all of the electricity is exported to a designated electricity network—be measured consistently with the requirements applicable to the designated electricity network; and
   (d) if paragraph (b) applies and the electricity is exported to a designated electricity network—be measured in accordance with the requirements for the export of electricity into the designated electricity network.

### 47.2. Inclusions

For the purposes of the development of the default emissions intensity value and the preparation of an estimated (site-specific) emission intensity value for this production variable, scope 1 emissions from the following processes at the facility are included:

- electricity produced on-site and sent to a designated electricity network (as defined in section 4 of the Safeguard Rule); and
- electricity produced on-site that is used on-site or sent to another location that is not a designated electricity network (as defined in section 4 of the Safeguard Rule);

- note: this includes electricity generated on a vehicle, but not by its propulsion system (e.g. by a generator on a ship), that is either used on-site or sent to another location.

To avoid confusion: emissions from (a) electricity generation that is not used in a vehicle's drive train or propulsion system, and (b) electricity generated by a vehicle's drive train or propulsion system that is then exported from the vehicle, have been included in the calculation of the emissions intensity value for the prescribed electricity generation production variable. Facilities are therefore able to receive baseline allocation for such generation through the use of the prescribed electricity generation production variable.

## 47.3. Exclusions

Scope 1 emissions from the following processes were not included in the default emissions intensity calculation for this production variable, and must be excluded from the calculation of an estimated (site-specific) emissions intensity value for the production variable:

- electricity generated on a vehicle that is used by the vehicle's (including ship's) propulsion system;
- electricity generated by a vehicle's (including ship's) propulsion system that is used by the vehicle for non-propulsion purposes (such as lighting, navigation, refrigeration);
  - note that emissions from electricity generated by a vehicle's (including ship's) propulsion system that is exported outside the facility was included in the calculation of the default emissions intensity value for the electricity generation production variable, which means that generation of that type (such a regenerative breaking from trains) is eligible to use the electricity generation production variable in a baseline application;
- steam produced on-site that is not used to produce electricity;
- processes that do not occur within the facility.

# SCHEDULE 3 PRODUCTION VARIABLES

## 48. Petroleum refining

### 48.1. Production variable definition

1. Kilolitres of the following substances that are used in carrying on the activity of petroleum refining at the facility in accordance with subsection (2):

   (a) stabilised crude petroleum oil at 15 °C and 1 atmosphere; and

   (b) condensate at 15 °C and 1 atmosphere; and

   (c) tallow at 15 °C and 1 atmosphere; and

   (d) vegetable oil at 15 °C and 1 atmosphere; and

   (e) eligible petroleum feedstocks at 15 °C and 1 atmosphere.

2. A substance mentioned in paragraphs (1)(a) to (e) is used in carrying on the activity of petroleum refining if the substance is, or is to be, refined:

   (a) by 1 or both of the processes mentioned in paragraphs (3)(a) and (b); and

   (b) into either of the following:

      (i) 1 or more petroleum products mentioned in paragraphs (3)(c) and (d);

      (ii) other by products which result from carrying on the petroleum refining activity.

3. The metric in subsection (1) is applicable to a facility that conducts the activity of petroleum refining through the chemical and physical transformation of stabilised crude petroleum oil, which may be supplemented with 1 or more of condensate, tallow, vegetable oil, eligible petroleum feedstocks or other petroleum feedstocks, to produce a range of refined petroleum products through the following processes:

   (a) the distillation of stabilised crude petroleum oil, condensate, tallow, vegetable oil and other petroleum feedstocks;

   (b) the adjustment of the molecular weight and structure of hydrocarbons (such as that which occurs through catalytic or hydro cracking, steam or catalytic reforming, polymerisation, isomerisation or alkylation);

   (c) the blending of products from distillation and adjustment of molecular weight and structure to produce Australian and international standard diesel, jet fuel and unleaded petrol;

   (d) the production of 2 or more of the following refinery products saleable in Australian or international markets:

      (i) hydrogen;
      (ii) ethane;
      (iii) propane;
      (iv) refinery grade propylene;
      (v) polymer grade propylene;
      (vi) liquefied petroleum gas;
      (vii) butane;
      (viii) naphtha;

(ix) aviation gasoline;
(x) before oxygenate blend;
(xi) kerosene;
(xii) heating oil;
(xiii) solvents;
(xiv) lubricant base stocks;
(xv) leaded petrol;
(xvi) waxes;
(xvii) bitumen.

4. However, the metric in subsection (1) is not applicable to a facility unless:
   (a) each of the processes mentioned in paragraphs (1)(a) to (d) are conducted within the year at the facility; and
   (b) the combined volume of diesel, jet fuel, unleaded petrol, lubricant base stocks and bitumen at 15°C and 1 atmosphere produced from stabilised crude petroleum oil, condensate, tallow, vegetable oil and eligible petroleum feedstocks is equal to or greater than 75% of the total kilolitres of stabilised crude petroleum oil, condensate, tallow, vegetable oil and eligible petroleum feedstocks used in the year at the facility.
5. The activity in subsection (3) is the ***petroleum refining activity***.
6. The default emissions intensity is 0.136 t $CO_2$-e per kilolitre of the substances mentioned in paragraphs (1)(a) to (e).

In this section:

***condensate*** has the same meaning as in the *Excise Act 1901*.

***eligible petroleum feedstocks*** means any 1 or more of the following that were not produced through the conduct of the petroleum refining activity carried on at another facility in Australia:

(a) catalytic cracker feedstocks that are processed in the catalytic cracker in carrying on the petroleum refining activity and have a density of 0.84 to 0.98 kg/L at 15°C and 1 atmosphere;

(b) hydro cracker unit feedstocks that are processed in the hydro cracking unit in carrying on the petroleum refining activity and have a density of 0.84 to 0.98 kg/L at 15 °C and 1 atmosphere;

(c) reformer unit feedstocks that are used to produce reformate in carrying on the petroleum refining activity and have a density of 0.6 to 0.80 kg/L at 15 °C and 1 atmosphere;

(d) alkylation unit feedstocks that are used to produce alkylate in carrying on the petroleum refining activity and have a density of 0.55 to 0.62 kg/L at 15 °C and 1 atmosphere;

(e) bitumen feedstocks that are used to produce bitumen in carrying on the petroleum refining activity and have a density greater than or equal to 0.95 kg/L at 15 °C and 1 atmosphere;

(f) lubricant base stock feedstocks that are used to produce lubricant base stocks in carrying on the petroleum refining activity and have a density of 0.84 to 0.98 kg/L at 15 °C and 1 atmosphere.

***stabilised crude petroleum oil*** has the meaning given in the Australian Taxation Office Interpretative Decision, ATO ID 2008/154, published on 18 November 2008.

***unleaded petrol*** means all grades of unleaded petrol meeting Australian or international standards, including standard unleaded petrol, premium unleaded petrol and other proprietary forms of unleaded petrol.

## 48.2. Inclusions

For the purposes of the development of the default emissions intensity value and the preparation of an estimated (site-specific) emission intensity value for this production variable, scope 1 emissions from the following processes at the facility are included:

- the activity of petroleum refining as defined in Schedule 3 of the Safeguard Rule; and
- all scope 1 NGER-reported emissions from the facilities relevant for setting the default intensity value, except scope 1 emissions from on-site electricity generation.

## 48.3. Exclusions

Scope 1 emissions from the following processes were not included in the default emissions intensity calculation for this production variable, and must be excluded from the calculation of an estimated (site-specific) emissions intensity value for the production variable:

- upstream stabilisation of crude petroleum oil;
- processes which do not occur within the facility;
- on-site electricity generation.