EXPLANATORY STATEMENT

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

NATIONAL GREENHOUSE AND ENERGY REPORTING ACT 2007

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

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 rules to implement the Safeguard Mechanism by legislative instrument. 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.

The Safeguard Mechanism commenced on 1 July 2016. It applies to facilities with more than 100,000 tonnes of scope 1 (direct) carbon dioxide equivalent (t CO_2-e) emissions each year. These facilities must keep their emissions below a legislated baseline or purchase Australian carbon credit units to make up the difference. Baselines are intended to accommodate business growth and allow businesses to continue normal operations.

The Safeguard Mechanism was amended in March 2019 to make it fairer and simpler. Those amendments:

1. allow facilities to update baselines using more up-to-date information;
2. give businesses the option of using standardised Government-determined prescribed production variables (which define what is produced at Safeguard facilities) and associated default emissions intensity values for calculating baselines; and
3. allow baselines to adjust annually with production so they keep pace with business growth.

The March 2019 amendments established a transition period that allows baselines to be updated in 2018-19 and 2019-20. Due to the impacts of the COVID-19 pandemic, the Safeguard Mechanism was amended in May 2020 to extend the transition period by one year to include the 2020-21 compliance year. 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 (30 June 2021), reported (historical) baselines will expire for all facilities, except grid-connected electricity generators. Grid-connected electricity generators will continue to be covered by a sectoral baseline, so will not face facility-specific emissions limits. If a facility (other than a grid-connected generator) does not apply for a new baseline, or does not have another baseline in force, it will receive a default baseline of 100,000 t CO_2-e from the 2021-22 compliance year.

Although reported baselines expire on 1 July 2021, it is not intended that facilities will apply for a transitional calculated baseline from the 2021-22 year onwards. The legislation does not prevent them from doing so, but if they do, they must use Government-determined prescribed production variables and default emissions intensity values.

In March 2020, the Safeguard Rule was amended to insert the majority of Government-determined prescribed production variables and many of the corresponding default emissions intensity values into Schedules 2 and 3 to give effect to amendments made to the Safeguard Rule in March 2019.

Purpose and operation

The *National Greenhouse and Energy Reporting (Safeguard Mechanism) Amendment (Additional Prescribed Production Variables) Rule 2020* (the Amendment Rule) inserts:

- additional prescribed production variables and corresponding default emissions intensity values into Schedule 2 of the Principal Rule;
- default emissions intensity values that were not available for some prescribed production variables published in March 2020; and
- a separate set of default emissions intensity values, including for prescribed production variables published in March 2020, that account for updates to global warming potentials (GWPs).

The default values have been developed by the Department of Industry, Science, Energy and Resources in close consultation with industry. They have been developed in line with 'The Framework for developing default production variables and emissions intensity values' (the Framework), which underwent public consultation during development of the March 2019 amendments to the Safeguard Rule[1].

Default values can simplify baseline applications, reduce auditing costs, and allow baselines to adjust annually with a facility's level of production, ensuring baselines keep pace with business growth. Production variables have been prepared for the majority of Safeguard Mechanism

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

facilities. The remaining production variables will be defined over the coming months with a view to publishing them in early to mid 2021 for use in 2020-21 baseline applications, which are due before 31 October 2021 (see Table 1). Default emissions intensity values for a small number of sectors may require additional data beyond what is currently available to the Government. Default values for these sectors will be developed in consultation with industry as data becomes available, for later inclusion in the Safeguard Rule.

Authority

The Amendment Rule is made under subsection 22XS(1) of the National Greenhouse and Energy Reporting Act 2007.

Consultation

The default values have been developed in close consultation with industry. They have been assessed by independent technical experts, and reviewed by an external consultant to ensure the Framework principles have been applied consistently within and between sectors.

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 3 August 2020, 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 August 2020. Three submissions were received from the public consultation process. A minor amendment to improve workability of the coal mining production variables was made in light of feedback from businesses.

Regulatory impact analysis

The Amendment Rule inserts additional technical detail into the Principal Rule that is required to give effect to amendments made in March 2019. The March 2019 amendments were covered by the *Amendments to the Emissions Reduction Fund Safeguard Mechanism Final Assessment 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 Greenhouse and Energy Reporting (Measurement Determination) 2008* (NGER Measurement Determination) and *National Greenhouse and Energy Reporting Regulations 2008* (NGER Regulations) 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 *National Greenhouse and Energy Reporting (Safeguard Mechanism) Amendment (Prescribed Production Variables) Rule 2020* and two published Australian Standards (AS) (available from www.standards.org.au) are incorporated as in force at their date of publication (2020 for AS 4564 and 2010 for AS 3972).

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. Sections 1 to 4 and Schedule 1 of the Amendment Rule will commence on the day after registration. Schedule 2 will commence on the second day after registration. The ordinary repeal arrangements for amending instruments apply. Details of the amendments are at Attachment A. The scope of each of the production variables 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 legislative instrument is the *National Greenhouse and Energy Reporting (Safeguard Mechanism) Amendment (Additional Prescribed Production Variables) Rule 2020* (the 'Amendment Rule').

Section 2 – Commencement

This section provides that sections 1 to 4 and Schedule 1 of the instrument commences the day after it is registered. Schedule 2 of the instrument commences the second day after the instrument 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 – Additional production variables

1. Section 4 – Definition of Safeguard Mechanism document

This item replaces the existing definition of the ***Safeguard Mechanism document*** with a new definition that refers to an updated version of the document. The updated version includes the new default values that this Amendment Rule incorporates into the Principal Rule. 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 ***Safeguard Mechanism document*** is published on the website of the Department of Industry, Science, Energy and Resources (www.industry.gov.au). The ***Safeguard Mechanism document*** is also at Attachment C of this Explanatory Statement.

2. Paragraph 7(1)(d)

This item repeals the paragraph and note to remove reference to the Joint Petroleum Development Area and inserts a new paragraph. This new paragraph is a consequential change, as the reference to

the Joint Petroleum Development Area is redundant as that area has ceased to exist upon entry into force of the Timor Sea Maritime Boundaries Treaty and is replaced by the Greater Sunrise special regime area. Subsection 6A(4) of the *National Greenhouse and Energy Reporting Act 2007* already provides that the safeguard provisions do not apply to a facility in the Greater Sunrise special regime area. This paragraph complements that provision to clarify the situation if a facility is both in the Greater Sunrise special regime area and in Australia's land, exclusive economic zone or continental shelf, such that any emissions in the Greater Sunrise special regime area are not relevant to the safeguard mechanism, consistent with subsection 6A(4) of the Act.

3. At the end of subparagraph 56(1)(b)(ii)

This item inserts new wording to ensure the Regulator can update a baseline under section 56 if it used a default emissions intensity value. Section 56 allows the Regulator to update a baseline where one or more GWPs change at the start of, or during, a financial year.

4. At the end of paragraph 56(2)(c)

This item inserts new wording to ensure that a baseline emissions number determined using a default emissions intensity must be updated consistently with the changed default emissions intensity of the relevant production variable in Schedule 2 or 3. This is the same approach as is used for Schedule 1.

5. Subsection 2(2) of Schedule 2

This item fixes a typographical error.

6. Section 3 of Schedule 2

This item inserts the definition of AS or Australian Standard. Two Australian Standards are incorporated by the instrument as in force at their dates of publication in 2010 and 2020, consistent with section 14 of the *Legislation Act 2003*.

7. Heading to subsection 9(1) of Schedule 2

This item repeals a heading that is not necessary.

8. Paragraph 12(2)(a) of Schedule 2

This item fixes a typographical error.

9. Paragraph 13(2)(a) of Schedule 2

This item fixes a typographical error.

10. At the end of subsection 16(1) of Schedule 2

This item inserts additional wording at the end of section 16(1) of Schedule 2 to clarify that the coal mining activity includes post-mining activities, as well as activities that enable the extraction of coal (such as mine development, dewatering, active ventilation, maintenance of shafts and ramps and other activities that ensure the facility is maintained and fit for commencement, continuation or resumption of extraction activities, or is preparing for decommissioning). Accordingly, a mine which has gone into care and maintenance such that coal is not being produced will still be conducting the coal mining activity as defined. The production variables in sections 17 and 18 would then be applicable to the mine, even though the baseline allocation under section 17 would be zero.

11. Note after subsection 17(2) of Schedule 2

This item repeals the note and inserts the default emissions intensity for the run-of-mine coal production variable. The default emissions intensity is separated for coal from open-cut and underground mines and comprises a value for emissions associated with the physical extraction of coal, and a reference to the *NGER Measurement Determination* for the inclusion of the appropriate fugitive emissions at the facility, as they were reported for that year. If a facility includes both an underground and open cut mine, the run-of-mine coal from each mine must be multiplied by the values under paragraph (a) and (b) respectively and the total added together to calculate the baseline emissions number. There is a relevant example at the end of this attachment (see example 6).

12. Subsection 18(1) of Schedule 2

This item repeals the existing subsection 18(1) and replaces it with an updated scope of the coal mine waste gas production variable. The updated scope makes it clear that fugitive emissions from a decommissioned underground mine are not included in the production variable.

13. Note after subsection 18(2) of Schedule 2

This item repeals the note and inserts the default emissions intensity value for the coal mine waste gas production variable in Schedule 2.

14. Note after subsection 20(3) of Schedule 2

This item repeals the note and inserts the default emissions intensity value for the iron ore production variable in Schedule 2.

15. Note after subsection 22(3) of Schedule 2

This item repeals the note and inserts the default emissions intensity value for the bauxite production variable in Schedule 2.

16. Paragraph 23(2)(a) of Schedule 2

This item fixes a typographical error.

17. Note after subsection 24(3) of Schedule 2

This item repeals the note and inserts the default emissions intensity value for the run-of-mine metal ore production variable.

18. Before Division 1 of Part 23 of Schedule 2

This items inserts definitions under Part 23 of Schedule that relate to the road transport production variables. The definitions have been developed to be consistent with industry usage and reporting of the various terms for other commercial and reporting purposes.

19. After section 54 of Schedule 2

This item inserts four new production variables for the road transport sector after section 54 of Schedule 2, to ensure that all the production variables relating to road transport are grouped together. These are further explained in the ***Safeguard Mechanism document*** and the explanation of item 16 below.

20. After section 55 of Schedule 2

This item inserts the bulk freight water transport production variable after section 55 of Schedule 2, to ensure that all the production variables relating to water transport are grouped together. The

production variable is further explained in the ***Safeguard Mechanism document*** and the explanation of item 16 below.

21. Subsection 56(2) of Schedule 2

This item fixes a typographical error.

22. At the end of Schedule 2

This item inserts additional production variables into Schedule 2 of the Principal Rule. 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. 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*** (Attachment C) 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.

Schedule 2 also incorporates documents by reference. The *National Greenhouse and Energy Reporting (Measurement Determination) 2008* and *National Greenhouse and Energy Reporting Regulations 2008* 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 *National Greenhouse and Energy Reporting (Safeguard Mechanism) Amendment (Prescribed Production Variables) Rule 2020.* Two published Australian Standards (AS) (available from www.standards.org.au) are incorporated as in force at their date of publication (2020 for AS 4564 and 2010 for AS 3972).

Table 1 at the end of Attachment A summarises Schedule 2 and 3 prescribed production variables and default emissions intensity values and indicates the additions from the Amendment Rule. The Amendment Rule does not contain any additional Schedule 3 prescribed (fixed) production variables.

Schedule 2 – Update to Global Warming Potentials

1. After section 81

This item adds three new application and transitional provisions after section 81.

The default emissions intensity values in the Principal Rule and Schedule 1 of the Amendment Rule were developed using the global warming potentials of greenhouse gases from the Intergovernmental Panel on Climate Change's (IPCC's) Fourth Assessment Report (AR4). Schedule 1 of the Amendment Rule commences the day after the Amendment Rule is registered on the Federal Register of Legislation. New section 82 included in the Amendment Rule ensures that these Schedule 1 emissions intensity values will, in almost all circumstances, apply to baselines for the 2019-20 compliance year. This is the last compliance year in which Safeguard facilities will report their emissions under NGERs on an AR4 basis.

On 1 July 2020, the NGER Regulations and NGER Measurement Determination were amended to incorporate updated values for global warming potentials from the IPCC's Fifth Assessment Report (AR5). To support this change, Schedule 2 of the Amendment Rule would update all default emissions intensity values under the Safeguard Mechanism to use global warming potentials from the IPCC's Fifth Assessment Report (AR5). Schedule 2 of the Amendment Rule (which includes AR5 default emissions intensity values) commences two days after the Amendment Rule is registered. Subsection 83(1) included in the Amendment Rule ensures these updated values apply to baselines that relate to the 2020-21 compliance year and later years.

Subsection 83(1) applies in place of existing subsection 44(3B) for the financial year beginning on 1 July 2020. Subsection 44(3B) ensures that where a default emissions intensity or a benchmark emissions intensity changes after a production-adjusted baseline is made, the baseline for a financial year must use the (new) default emissions intensity that is in place at the start of that financial year. However, subsection 44(3B) would have the effect of applying an AR4-based default emissions intensity value to a production-adjusted baseline for the 2020-21 year. This is because AR4-based default emissions intensity values were in force on 1 July 2020 under the Safeguard Rule. The new subsection 83(1) applies in place of subsection 44(3B) for the 2020-21 year to ensure that only AR5-based default emissions intensity values are used in production-adjusted baselines in that year.

Existing section 56 of the Safeguard Rule requires the Clean Energy Regulator (the Regulator) to update certain classes of baselines to reflect any new global warming potentials that change at the start of or during that year. The Amendment Rule adds new paragraph 56(2)(d), and amends subparagraph 56(1)(b)(ii), to ensure that baselines that use default emissions intensity values will also be updated.

A facility could apply to the Regulator for a baseline that applies to the 2020-21 year and that uses AR4-based default emissions intensity values. This could occur if the baseline application is made before the Amendment Rule commences (it is only when the Amendment Rule is made and in force that the AR5 global warming potentials apply from 1 July 2020). The new subsection 83(2) included in the Amendment Rule would require the Regulator to update any calculated emissions baseline in force for the 2020-21 financial year (that has not been updated under section 56) to incorporate AR5 global warming potentials that apply from 1 July 2020.

It may be the case that Responsible Emitter has a calculated baseline that commenced on 1 July 2019 and that uses an estimated (site-specific) emissions intensity value based on AR5 global

warming potentials. This could occur where a facility applies for a calculated baseline between 1 July 2020 and 31 October 2020 and therefore uses the post-1 July 2020 NGER Regulations and NGER Measurement Determination (which adopt AR5 global warming potentials) to calculate its estimated (site-specific) emissions intensity value for its baseline. In such a case, new section 84 included in the Amendment Rule allows the Responsible Emitter to apply to the Clean Energy Regulator to adjust the facility's calculated baseline number for the 2019-20 year so that it is based on AR4 global warming potentials. The Regulator would have regard to subsection 22XQ(2) of the *National Greenhouse and Energy Reporting Act 2007* in applying the new section 84 of the Amendment Rule.

In summary, AR4-based default emissions intensity values (in Schedule 1 of the Amendment Rule and currently set out in Schedules 2 and 3 of the Safeguard Rule) are applicable, in almost all circumstances, to baselines that apply in the 2019-20 year; and AR5-based default emissions intensity values (in Schedule 2 of the Amendment Rule) are applicable to baselines that apply from the 2020-21 year.

The effect of adopting AR5 global warming potentials under the Safeguard Mechanism is that some default emissions intensity values will be higher and some will be lower than the previous AR4-based values. As a result, some baselines will be increased, and some will be decreased in the 2020-21 year relative to the 2019-20 year. However, facilities will also be reporting their emissions under NGERs using the same AR5 global warming potentials from 1 July 2020. This means that an increase or decrease in a facility's baseline as a result of the global warming potential changes can be matched by a proportionate increase or decrease in its reported emissions under NGERs. The adoption of the latest global warming potentials under the Safeguard Mechanism is intended to ensure that, going forward, baselines are set on the same basis as facilities' emissions reported under NGERs.

2. Subsection 7(3) of Schedule 2

This item omits the default emissions intensity value of 1.86 for the Aluminium production variable and replaces it with 1.85.

3. Subsection 10(3) of Schedule 2

This item omits the default emissions intensity value of 0.352 for the Ammonium nitrate production variable and replaces it with 0.315.

4. Subsection 22(4) of Schedule 2

This item omits the default emissions intensity value of 0.00402 for the Bauxite production variable and replaces it with 0.00401.

5. Subsection 49(3) of Schedule 2

This item omits the default emissions intensity value of 0.00000527 for the Net-tonne-kilometres of rail transport of bulk freight on a dedicated line production variable and replaces it with 5.29×10^{-6}.

6. Subsection 50(3) of Schedule 2

This item omits the default emissions intensity value of 0.0000163 for the Rail transport of bulk freight on a non-dedicated line production variable and replaces it with 1.63×10^{-5}.

7. Subsection 51(3) of Schedule 2

This item omits the default emissions intensity value of 0.0000204 for the Rail transport of non-bulk freight production variable and replaces it with 2.05×10^{-5}.

8. Subsection 52(3) of Schedule 2

This item omits the default emissions intensity value of 0.0000710 for the Rail passenger transport production variable and replaces it with 7.12×10^{-5}.

9. Subsection 55(3) of Schedule 2

This item omits the default emissions intensity value of 0.000103 for the Mixed passenger and freight water transport production variable and replaces it with 1.04×10^{-4}.

10. Subsection 55A(3) of Schedule 2

This item omits the default emissions intensity value of 5.4×10^{-6} for the Bulk freight water transport production variable and replaces it with 5.39×10^{-6}.

11. Paragraph 56(3)(a) of Schedule 2

This item omits the default emissions intensity value of 0.459 for the Wastewater handling COD removed production variable and replaces it with 0.513.

12. Paragraph 56(3)(b) of Schedule 2

This item omits the default emissions intensity value of 5.03 for the Wastewater handling Nitrogen removed production variable and replaces it with 4.48.

13. Subsection 57(3) of Schedule 2

This item omits the default emissions intensity value of 0.538 for the Electricity generation production variable and replaces it with 0.539.

14. Subsection 58(3) of Schedule 2

This item omits the default emissions intensity value of 0.227 for the Gas distribution production variable and replaces it with 0.254.

15. Subsection 60(3) of Schedule 2

This item omits the default emissions intensity value of 10.42 for the Kilometres of transmission pipelines production variable and replaces it with 11.62.

16. Subsection 4(6) of Schedule 3

This item omits the default emissions intensity value of 0.136 for the Petroleum Refining production variable and replaces it with 0.138.

Table 1: Summary of Schedule 2 and 3 of the Principal Rule

The green shaded boxes indicate the new prescribed production variables and default emissions intensity values. The blue shaded boxes indicate a different AR5 default emissions intensity value to the AR4 default emissions intensity value.

SCHEDULE 2				
Part	**Prescribed Production Variable**	**Default Emissions Intensity Value (AR4) (tonnes carbon dioxide equivalent per unit)**	**Default Emissions Intensity Value (AR5) (tonnes carbon dioxide equivalent per unit)**	**Default Emissions Intensity Unit**
MANUFACTURING				
2	Bulk flat glass	0.774	0.774	tonnes of bulk flat glass
3	Glass containers	0.521	0.521	tonnes of glass containers
4	Aluminium	1.86	1.85	tonnes of primary aluminium
5	Alumina	0.545	0.545	tonnes of alumina and alumina equivalent tonnes of alumina trihydrate
6	Ammonia	1.87	1.87	tonnes of 100% equivalent anhydrous ammonia
7	Ammonium nitrate	0.352	0.315	tonnes of 100% equivalent ammonium nitrate
8	Urea	0.566	0.566	tonnes of 100% equivalent carbamide
9	Diammonium phosphate	0.078	0.078	tonnes of diammonium phosphate products
	Monoammonium phosphate	0.088	0.088	tonnes of monoammonium phosphate products
10	Sodium cyanide			tonnes of 100% equivalent sodium cyanide
11	Synthetic rutile	1.15	1.15	tonnes of synthetic rutile

12	White titanium dioxide pigment	1.68	1.68	tonnes of white titanium dioxide pigment
MINING				
13	Run of mine coal[2]	0.0137	0.0137	tonnes of run-of mine coal
	Coal mine waste gas	0.564	0.564	tonnes of unmitigated coal mine waste gas
	Fugitive emissions at a decommissioned underground coal mine	1	1	tonnes of reported fugitive emissions
14	Iron ore	0.00476	0.00476	tonnes of iron ore
15	Manganese ore			tonnes of manganese ore product
16	Bauxite	0.00402	0.00401	tonnes of bauxite product
17	Heavy metal concentrate			tonnes of heavy metal concentrate
18	Run of mine metal ore	0.00859	0.00859	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			gigajoules of crude oil

[2] Plus an additional baseline allocation for fugitive emissions at an open cut mine or post mining emissions at an applicable underground mine based on the method outlined in the Safeguard Rule.

	stabilisation)			
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	0.467	tonnes of coke oven coke
Div 3	Lime (integrated iron and steel manufacturing)	0.780	0.780	tonnes of lime
Div 4	Iron ore sinter (integrated iron and steel manufacturing)	0.233	0.233	tonnes of iron ore sinter
Div 5	Iron ore pellets (integrated iron and steel manufacturing)	0.0586	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	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	0.101	tonnes of long products
Div 8	Hot-rolled flat products (integrated iron and steel manufacturing)	0.000358	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	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	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	0.0517	tonnes of iron ore pellets
RAIL TRANSPORT – Part 21				
Div 2	Bulk freight on a dedicated line	0.00000527	0.00000529	net-tonne-kilometres of bulk freight
Div 3	Bulk freight on a non-dedicated line	0.0000163	0.0000163	net-tonne-kilometres of bulk freight
Div 4	Non-bulk freight	0.0000204	0.0000205	net-tonne-kilometres of freight
Div 5	Rail passenger transport	0.0000710	0.0000712	passenger-kilometres
AIR TRANSPORT				
22	Air transport	0.00112	0.00112	revenue-tonne-kilometres
ROAD TRANSPORT – Part 23				
Div 1	Passenger road transport	0.00164	0.00164	vehicle-kilometres of passenger road transport
Div 2	Non-bulk freight road transport			cubic tonne kilometres
Div 3	Non-bulk (temperature controlled) freight road transport			cubic tonne kilometres
Div 4	Specialised and heavy haulage road transport			deadweight tonne kilometres
Div 5	Bulk freight road transport			net tonne kilometres

WATER TRANSPORT – Part 24				
Div 1	Mixed passenger and freight water transport	0.000103	0.000104	operational deadweight-tonne-kilometres
Div 2	Bulk freight water transport	0.00000540	0.00000539	net tonne kilometres
OTHER				
25	Wastewater handling (domestic and commercial) COD removed	0.459	0.513	tonnes of COD removed
	Wastewater handling (domestic and commercial) Nitrogen removed	5.03	4.48	tonnes of nitrogen removed
26	Electricity generation	0.538	0.539	megawatt hours of electricity generated or exported
NATURAL GAS DISTRIBUTION				
27	Natural gas distribution	0.227	0.254	petajoule kilometres
NATURAL GAS TRANSMISSION – Part 28				
Div 2	Kilometres of natural gas transmission pipelines	10.42	11.62	kilometres of natural gas transmission pipelines
CLINKER, LIME AND CEMENT – Part 29				
Div 2	Clinker (not used by facility to make cement)	0.841	0.841	tonne of Portland cement clinker
	Cement (produced from clinker a facility)	0.708	0.708	tonnes of cement
Div 3	Lime	1.13	1.13	tonne of lime
METAL MANUFACTURING				
30	Non-metallic mineral quarrying			tonnes of quarried rock
31	Silicon	1.92	1.92	tonnes of silicon
32	Lead bullion			tonnes of lead bullion
33	Refined lead	1.21	1.21	tonnes of refined lead

34	Zinc in fume	3.34	3.34	tonnes of zinc in fume
35	Caustic calcined magnesia	1.51	1.51	tonnes of caustic calcined magnesia
36	Copper anode	0.677	0.677	tonnes of copper anode
37	Manganese sinter	0.242	0.242	tonnes of manganese sinter
38	Ferromanganese alloy	1.30	1.30	tonnes of ferromanganese alloy
39	Silicomanganese alloy	1.70	1.70	tonnes of silicomanganese alloy
NICKEL MANUFACTURING – Part 40				
Div 2	Primary nickel products (from nickel bearing inputs)	8.78	8.78	tonnes of 100% equivalent nickel
	Primary nickel products (from imported intermediate nickel products)	2.52	2.52	tonnes of 100% equivalent nickel
	Intermediate nickel products (from nickel bearing inputs)	1.76	1.76	tonnes of 100% equivalent nickel
PULP AND PAPER – Part 41				
Div 2	Tissue paper			tonnes of rolls of uncoated tissue paper
Div 3	Packaging and industrial paper			tonnes of rolls of packaging and industrial paper
Div 4	Printing and writing paper			tonnes of rolls of uncoated printing and writing paper
Div 5	Newsprint			tonnes of rolls of uncoated newsprint
Div 6	Pulp			tonnes of wet or dry pulp

SCHEDULE 3			
Prescribed Production Variable	Default Emissions Intensity Value AR4 (tonnes carbon dioxide equivalent per unit)	Default Emissions Intensity Value AR5 (tonnes carbon dioxide equivalent per unit)	Default Emissions Intensity Unit
PETROLEUM REFINING			
Petroleum feedstock	0.136	0.138	kilolitres of substances mentioned

Worked examples

The following examples are included for guidance purposes, they are indicative only and are not exhaustive.

Example 1: Baseline comprising an estimated (site-specific) emissions intensity value and a default emissions intensity value

Facility A produces two outputs: A1 and A2. The prescribed production variables for outputs A1 and A2 are Schedule 2 prescribed (annually adjusted) production variables.

Facility A prepares a calculated baseline application under the transitional calculated baseline criteria. Facility A applies for the calculated baseline to start on 1 July 2020, meaning they have the option under sub-subparagraph 27(1)(d)(i)(A) of using an estimated (site-specific) emissions intensity.

Facility A chooses to adopt the default emissions intensity value for A1, and prepare an estimated (site-specific) emissions intensity for A2.

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

$$\text{Calculated emissions baseline} = Q_{(A1,f)} \times EI_{A1} + Q_{(A2,f)} \times EI_{(A2,f)}$$

Where:

- Calculated emissions baseline is the calculated emissions baseline for Facility A
- $Q_{(A1,f)}$ is a forecast of the highest annual production quantity of prescribed (annually adjusted) production variable A1—which is the facility's primary production variable—over the three year calculated emissions baseline period.
- EI_{A1} is the default emissions intensity for A1
- $Q_{(A2,f)}$ is a forecast of the production quantity of prescribed (annually adjusted) production variable B2 in the year used to set the production quantity for $Q_{(A1,f)}$
- $EI_{(A2,f)}$ is Facility A's estimated (site-specific) emissions intensity value for A2 for the forecast year used to set the production quantity for $Q_{(A1,f)}$.

Example 2: New baseline to apply from 1 July 2020 – operation of subsection 83(1)

Facility B applies for a calculated baseline to commence on 1 July 2020. It chooses to use an estimated (site-specific) emissions intensity value for production variable B1, and a default emissions intensity value for production variable B2.

In line with subsection 83(1) of the Amendment Rule, the relevant AR5-based default emissions intensity value from Schedule 2 of the Safeguard Rule is used in the baseline application for production variable B1.

To set the estimated emissions intensity value for B2, the facility develops a forecast of its emissions intensity using the current version of the NGER Measurement Determination, which uses AR5-based emissions factors. In this way, both Facility B's baseline and its NGER-reported emissions will be set on an AR5 basis.

Example 3: Reported baseline updated for the latest global warming potentials – operation of section 56 and subsection 83(1)

Facility C is on a reported baseline of 150,000 t CO_2-e. In line with section 56 of the Safeguard Rule, the Regulator updates the reported baseline to an AR5 basis for the 2020-21 year. Should Facility C apply for a new baseline (i.e., a calculated baseline or a production adjusted baseline) that uses a default emissions intensity and that commences in the 2020-21 year, the new baseline would replace the reported baseline for that year. The new baseline would be set using AR5 global warming potentials in line with subsection 83(1).

Example 4: Global warming potentials – operation of section 84

Facility D produces D1 and D2, which are prescribed (annually adjusted) production variables listed in Schedule 2. Facility D is on a reported baseline and lodges an application in October 2020 for a calculated baseline to commence in the 2019-20 year using estimated (site-specific) emissions intensity values for D1 and D2.

Facility D estimates its highest production of its primary production variable, D1, will occur in 2021-22, at 200,000 tonnes. It uses emissions factors from NGERs that are based on AR5 global warming potentials in the calculation of its estimated emissions intensities. The D1 estimated emissions intensity is 0.7 t CO_2-e/tonne of D1. It also estimates it will produce 5,000 tonnes of D2 in 2021-22, with an estimated emissions intensity of 0.4 t CO_2-e/tonne of D2. The Clean Energy Regulator determines that the facility's calculated baseline will be 142,000 t CO_2-e, calculated below:

Calculated baseline = D1 + D2
142,000 t CO_2-e = (200,000 x 0.7) + (5,000 X 0.4)

Facility D applies to the Clean Energy Regulator, under section 84, to have its 2019-20 baseline adjusted using AR4 global warming potentials. The estimated emissions intensity for D1 remains the same, but the new estimated emissions intensity value for D2 is 0.6. After considering the application, the Clean Energy Regulator adjusts the facility's calculated baseline for the 2019-20 year to 143,000 t CO_2-e, calculated below:

Calculated baseline = D1 + D2
143,000 t CO_2-e = (200,000 x 0.70) + (5,000 X 0.6)

This calculated baseline number is in force for the 2019-20 year, and reverts back to 142,000 t CO_2-e for the 2020-21 year, unless the calculated baseline is replaced by a different baseline on application by Facility D.

Example 5: Updated global warming potentials – operation of subsection 83(1), and sections 82 and 84

Facility E produces E1 and E2, which are prescribed (annually adjusted) production variables listed in Schedule 2 of the Safeguard Rule. Facility E is on a reported baseline and makes an application for a calculated baseline to commence in the 2019-20 year using an estimated (site-specific) emissions intensity value for E1 and the default emissions intensity value for E2. Facility E lodges its baseline application with the Regulator in October 2020.

Facility E estimates its highest production of its primary production variable, E1, will occur in 2021-22. It estimates the production level will be 200,000 tonnes, and the estimated emissions intensity will be 0.62 t CO_2-e/tonne of E1. The facility estimates this emissions intensity for the 2020-21 year using the current version of the NGER Measurement Determination, which is based on AR5 global warming potentials.

It also estimates it will produce 1,000 tonnes of E2 in 2020-21. The default emissions intensity in force from 1 July 2019 for E2 is based on the AR4 global warming potentials, as per section 82 included in the Amendment Rule, and is equal to 0.55 t CO_2-e/tonne of E2. The facility's calculated baseline will be 124,500 t CO_2-e, calculated below:

Calculated baseline	=	E1	+	E2
124,500 t CO_2-e	=	(200,000 x 0.62)	+	(1,000 X 0.55)

Should the facility choose to, it can apply to the Regulator under new section 84 to have its baseline adjusted for the 2019-20 year so that the emissions intensity for E1 is based on the AR4 global warming potentials. Say Facility E chooses to apply to have its baseline amended for the 2019-20 year. The amended estimated emissions intensity for E1 is 0.63 based on the AR4 global warming potentials. The facility's calculated baseline for the 2019-20 year would be amended to be 126,500 t CO_2-e, calculated below:

Calculated baseline	=	E1	+	E2
126,500 t CO_2-e	=	(200,000 x 0.63)	+	(1,000 X 0.55)

This baseline would be in force for the 2019-20 year only. For the 2020-21 year, the estimated emissions intensity value for E1 would revert back to using the AR5 global warming potential. This is because new section 84 included in the Amendment Rule only adjusts, on application, the estimated emissions intensity for the 2019-20 year, and not later years. Similarly, the default emissions intensity for E2 would be adjusted by the Clean Energy Regulator to incorporate AR5 global warming potentials in accordance with subsection 83(1).

Example 6: An underground coal mine in care and maintenance

An underground coal mine is currently in care and maintenance, and has not produced any run-of-mine coal during the financial year. Active ventilation, dewatering and maintenance of shafts and ramps has continued to ensure the facility can resume extraction activities in the future.

During the financial year, the facility produced 180,000 t CO_2-e of unmitigated coal mine waste gas.

The facility uses the default values to determine its baseline for the financial year. The baseline calculation for the financial year is as follows.

Calculated baseline $= (\text{ROM Coal}_{\text{Prod}} \times \text{ROM Coal}_{\text{EI}}) + (\text{CMWG}_{\text{Prod}} + \text{CMWG}_{\text{EI}})$

$= (0 \times \text{ROM Coal}_{\text{EI}}) + (180{,}000 \times 0.564)$

$= 101{,}520$ t CO_2-e

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 (Additional Prescribed Production Variables) Rule 2020

This Rule 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.

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 (Additional Prescribed Production Variables) Rule 2020* (the Amendment Rule) inserts additional Government-determined prescribed production variables and corresponding default emissions intensity values into Schedule 2 of the Principal Rule. The Amendment Rule follows an amendment to the Principal Rule in March 2020, which set the majority of prescribed production variables and default emissions intensity values in Schedules 2 and 3. The Amendment Rule also contains an additional set of default emissions intensity values which account for updates to global warming potentials, which apply from the 2020-21 compliance year.

Human rights implications

This Rule does not engage any of the applicable rights or freedoms.

The Amendment Rule inserts additional technical detail into the Principal Rule that is 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 data from a single facility. 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 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 helps to promote 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.

The Hon. Angus Taylor MP

Minister for Energy and Emissions Reduction

Attachment C: Safeguard Mechanism: Prescribed production variables and default emissions intensities

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.

This document, known as the ***Safeguard Mechanism document***, is referred to in section 6 of the *National Greenhouse and Energy Reporting (Safeguard Mechanism) Rule 2015* (Safeguard Rule). It is available on the Department of Industry, Science, Energy and Resources website[3].

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 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.

[3] Here: https://www.industry.gov.au/data-and-publications/safeguard-mechanism-prescribed-production-variables-and-default-emissions-intensity-values

All facilities can access a transitional calculated baseline in 2018-19, 2019-20 or 2020-21. 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.

The *Safeguard Mechanism: Prescribed production variables and default emissions intensities* 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

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 will help businesses calculate estimated (site-specific) emissions intensity values.

Defining prescribed production variables and default emissions intensities

The process of defining the 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*[4] (the Framework document). The Framework document was consulted on publicly as part of the consultation for the March 2019 amendments to the Safeguard Rule.

Production variables and default emissions intensity values have been reviewed by an independent expert for adherence to the Framework document, including to check that the principles in the Framework document have been 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

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[4] 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).

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.

Emissions-intensity values

Table 1 (below) sets out the emissions-intensity values for each production variable. AR4 values apply to baselines that relate to 2019-20. AR5 values apply to baselines that relate to 2020-21 and later years.

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

EMISSIONS INTENSITY VALUES

Table 1: Emissions-intensity values

SCHEDULE 2				
Safeguard Rule reference (part)	Prescribed Production Variable	Default Emissions Intensity Value AR4 (tonnes carbon dioxide equivalent per unit)	Default Emissions Intensity Value AR5 (tonnes carbon dioxide equivalent per unit)	Default Emissions Intensity Unit
MANUFACTURING				
2	Bulk flat glass	0.774	0.774	tonnes of bulk flat glass
3	Glass containers	0.521	0.521	tonnes of glass containers
4	Aluminium	1.86	1.85	tonnes of primary aluminium
5	Alumina	0.545	0.545	tonnes of alumina and alumina equivalent tonnes of alumina trihydrate
6	Ammonia	1.87	1.87	tonnes of 100% equivalent anhydrous ammonia
7	Ammonium nitrate	0.352	0.315	tonnes of 100% equivalent ammonium nitrate
8	Urea	0.566	0.566	tonnes of 100% equivalent carbamide
9	Diammonium phosphate	0.078	0.078	tonnes of diammonium phosphate products
	Monoammonium phosphate	0.088	0.088	tonnes of monoammonium phosphate products
10	Sodium cyanide			tonnes of 100% equivalent sodium cyanide
11	Synthetic rutile	1.15	1.15	tonnes of synthetic rutile

12	White titanium dioxide pigment	1.68	1.68	tonnes of white titanium dioxide pigment
MINING				
13	Run of mine coal[5]	0.0137	0.0137	tonnes of run-of mine coal
	Coal mine waste gas	0.564	0.564	tonnes of unmitigated coal mine waste gas
	Fugitive emissions at a decommissioned underground coal mine	1	1	tonnes of reported fugitive emissions
14	Iron ore	0.00476	0.00476	tonnes of iron ore
15	Manganese ore			tonnes of manganese ore product
16	Bauxite	0.00402	0.00401	tonnes of bauxite product
17	Heavy metal concentrate			tonnes of heavy metal concentrate
18	Run of mine metal ore	0.00859	0.00859	tonnes of run-of-mine metal ore
30	Non-metallic mineral quarrying			tonnes of quarried rock
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

[5] Plus an additional baseline allocation for fugitive emissions at an open cut mine or post mining emissions at an applicable underground mine based on the method outlined below.

Div 5	Processed natural gas (processing only)			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	0.467	tonnes of coke oven coke
Div 3	Lime (integrated iron and steel manufacturing)	0.780	0.780	tonnes of lime
Div 4	Iron ore sinter (integrated iron and steel manufacturing)	0.233	0.233	tonnes of iron ore sinter
Div 5	Iron ore pellets (integrated iron and steel manufacturing)	0.0586	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	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	0.101	tonnes of long products
Div 8	Hot-rolled flat products (integrated iron and steel manufacturing)	0.000358	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	0.0981	tonnes of continuously cast carbon steel products and ingots of carbon steel
Div 10	Hot-rolled long products	0.0750	0.0750	tonnes of long products

	(not integrated iron and steel manufacturing)			
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	0.0517	tonnes of iron ore pellets
RAIL TRANSPORT – Part 21				
Div 2	Bulk freight on a dedicated line	0.00000527	0.00000529	net-tonne-kilometres of bulk freight
Div 3	Bulk freight on a non-dedicated line	0.0000163	0.0000163	net-tonne-kilometres of bulk freight
Div 4	Non-bulk freight	0.0000204	0.0000205	net-tonne-kilometres of freight
Div 5	Rail passenger transport	0.0000710	0.0000712	passenger-kilometres
AIR TRANSPORT				
22	Air transport	0.00112	0.00112	revenue-tonne-kilometres
ROAD TRANSPORT – Part 23				
Div 1	Passenger road transport	0.00164	0.00164	vehicle-kilometres of passenger road transport
Div 2	Non-bulk freight road transport			cubic tonne kilometres
Div 3	Non-bulk (temperature controlled) freight road transport			cubic tonne kilometres
Div 4	Specialised and heavy haulage road transport			deadweight tonne kilometres
Div 5	Bulk freight			net tonne kilometres
WATER TRANSPORT – Part 24				
Div 1	Mixed passenger and freight water transport	0.000103	0.000104	operational deadweight-tonne-kilometres
Div 2	Bulk freight water transport	0.00000540	0.00000539	net tonne kilometres

WASTEWATER				
25	Wastewater handling (domestic and commercial) COD removed	0.459	0.513	tonnes of COD removed
	Wastewater handling (domestic and commercial) Nitrogen removed	5.03	4.48	tonnes of nitrogen removed
ON-SITE ELECTRICITY GENERATION				
26	Electricity generation	0.538	0.539	megawatt hours of electricity generated or exported
NATURAL GAS DISTRIBUTION				
27	Natural gas distribution	0.227	0.254	petajoule kilometres
NATURAL GAS TRANSMISSION – Part 28				
Div 2	Kilometres of natural gas transmission pipelines	10.42	11.62	kilometres of natural gas transmission pipelines
CLINKER, LIME AND CEMENT – Part 29				
Div 2	Clinker (not used by facility to make cement)	0.841	0.841	tonne of Portland cement clinker
	Cement (produced from clinker a facility)	0.708	0.708	tonnes of cement
Div 3	Lime	1.13	1.13	tonne of lime
METAL MANUFACTURING				
31	Silicon	1.92	1.92	tonnes of silicon
32	Lead bullion			tonnes of lead bullion
33	Refined lead	1.21	1.21	tonnes of refined lead
34	Zinc in fume	3.34	3.34	tonnes of zinc in fume
35	Caustic calcined magnesia	1.51	1.51	tonnes of caustic calcined magnesia
36	Copper anode	0.677	0.677	tonnes of copper anode
37	Manganese sinter	0.242	0.242	tonnes of manganese sinter
38	Ferromanganese alloy	1.30	1.30	tonnes of

				ferromanganese alloy
39	Silicomanganese alloy	1.70	1.70	tonnes of silicomanganese alloy
NICKEL MANUFACTURING – Part 40				
Div 2	Primary nickel products (from nickel bearing inputs)	8.78	8.78	tonnes of 100% equivalent nickel
	Primary nickel products (from imported intermediate nickel products)	2.52	2.52	tonnes of 100% equivalent nickel
	Intermediate nickel products (from nickel bearing inputs)	1.76	1.76	tonnes of 100% equivalent nickel
PULP AND PAPER – Part 41				
Div 2	Tissue paper			tonnes of rolls of uncoated tissue paper
Div 3	Packaging and industrial paper			tonnes of rolls of packaging and industrial paper
Div 4	Printing and writing paper			tonnes of rolls of uncoated printing and writing paper
Div 5	Newsprint			tonnes of rolls of uncoated newsprint
Div 6	Pulp			tonnes of wet or dry pulp

SCHEDULE 3

Prescribed Production Variable	Default Emissions Intensity Value AR4 (tonnes carbon dioxide equivalent per unit)	Default Emissions Intensity Value AR5 (tonnes carbon dioxide equivalent per unit)	Default Emissions Intensity Unit
PETROLEUM REFINING			
Petroleum feedstock	0.136	0.138	kilolitres of substances mentioned

SCHEDULE 2 PRODUCTION VARIABLES

Manufacturing (other)

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***).

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***).

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***).

3.2 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***).

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***).

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***).

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***.

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 of 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***.

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 of 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***.

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***.

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***.

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.

3. The default emissions intensity is:

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

   (i) the default run-of-mine coal emissions intensity value; and

   (ii) if section 3.4(6) of the NGER Measurement Determination applies to the coal mine—the factor EF_j given by subsection 3.17(2) of the NGER Measurement Determination for the coal mine;

   per tonne of run-of-mine coal.

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

   (i) the default run-of-mine coal emissions intensity value; and

   (ii) the emissions, in t CO_2-e, calculated under section 3.20, 3.21 or 3.26 of the NGER Measurement Determination for the coal mine in the relevant report under the Act for the financial year divided by the tonnes of run-of-mine coal for the same year;

   per tonne of run-of-mine coal.

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 and includes activities to enable the extraction of coal and post-mining activities.

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-of-mine coal.

Fugitive emissions at an underground coal mine for post-mining fugitive emissions are allocated using the factor EF_j given by subsection 3.17(2) of the NGER Measurement Determination where this applies to the coal mine; per tonne of run-of-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;
- fugitive emissions from post-mining storage of coal from an underground mine where the average annual percentage of methane in VAM exceeds 0.1%;
- 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:
   (a) generated at the facility as part of carrying on the coal mining activity at the facility; and
   (b) not from a decommissioned underground mine.
   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.
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

o 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;

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:

- Emissions which result from CMWG sources 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;
- Post-mining fugitives from the storage of coal from an underground mine where the average annual percentage of methane in VAM exceeds 0.1%; 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***.

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***.

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 activity;
- 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***.

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 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***.

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***.

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.

20. Non-metallic mineral quarrying

20.1 Production variable definition

1. Tonnes of quarried rock that:
   (a) contains 1 or more minerals that are not metals; and
   (b) is produced as part of carrying on the non-metallic mineral quarrying activity at the facility; and
   (c) is either:
      a. of saleable quality at the mine; or
      b. suitable as a feed source of 1 or more non-metallic minerals for production of other processed products; and
   (d) has not been counted for another production variable at the facility; and
   (e) is not eligible to be a prescribed production variable for the metal ore or coal mining sectors.
2. The metric in subsection (1) is applicable to a facility that conducts the activity of quarrying non-metallic minerals through:
   (a) the physical extraction of rock containing 1 or more minerals that are not metals; and
   (b) the processing of the extracted rock to produce a non-metallic mineral product or feedstock material, such as aggregates for the construction industry.
3. The activity in subsection (2) is the ***non-metallic mineral quarrying activity***.

20.2 Scope of the activity

The activity includes the processes required to extract the non-metallic rock, as well as basic on-site processing of the extracted material to make it suitable as a feedstock or final product. Typical quarried products are aggregates for the construction industry as well as stones such as limestone, sandstone, marble and granite.

Quarrying involves the removal and storage of overburden material to allow access to the minerals. The overburden and rock are quarried 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 and stationary diesel engines for electricity generation.

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

Movement of waste material associated with the quarry is covered by the production variable, as is the development processes required to allow extraction of the quarried material, including land clearing and removal and storage of topsoil for later use.

Crushing and screening of the rock to remove waste material may be needed to ensure the product is suitable as a feedstock at the same facility or for off-site transport. These processes are generally electrically driven.

20.3 Inclusions

For the purposes of the development of the default emissions intensity value and the preparation of an estimated (site-specific) emissions 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 rock described in the activity definition, including, for example:
    - machinery used to prepare and remove topsoil and overburden to allow quarrying;
    - 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;
- waste heat recovery within the activity;
- the supply of utilities such as, but not limited to, natural gas used in heating baths, compressed air, nitrogen, steam and water where these are used in support of the activity and within the activity boundary
- drilling and blasting using explosives and other equipment;
- 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.

Oil and gas

21. Extracted oil and gas

21.1 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***.

21.2 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.

21.3 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.

21.4 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.

21.5 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.

22. Stabilised crude oil or condensate (stabilisation only)

22.1 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***.

22.2 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.

22.3 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 22.5;
- 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.

22.4 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:

- 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.

22.5 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.

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.

23. Stabilised crude oil (integrated extraction and stabilisation)

23.1 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).

23.2 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.

23.3 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.

23.4 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 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.

23.5 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.

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.

24. Processed natural gas (processing only)

24.1 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)***.

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.

24.2 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.

24.3 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 24.5 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.

24.4 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 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.

24.5 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.

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.

25. Processed natural gas (integrated extraction and processing)

25.1 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).

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.

25.2 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.

25.3 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.

25.4 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 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.

25.5 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.

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).

26. Liquefied natural gas (from unprocessed natural gas)

26.1 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***.
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.

26.2 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.

26.3 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 26.5 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.

26.4 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 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.

26.5 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.

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.

27. Liquefied natural gas (from processed natural gas)

27.1 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***.
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.

27.2 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.

27.3 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.

27.4 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 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.

27.5 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.

28. Ethane

28.1 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***.

28.2 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 28.4.

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.

28.3 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 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 28.5;
    - 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.

28.4 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 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.

28.5 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.

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.

29. Liquefied petroleum gas

29.1 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.

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.

29.2 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 29.5.

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.

29.3 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 29.5;

- 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.

29.4 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 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.

29.5 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.

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.

30. Reservoir carbon dioxide

30.1 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.

30.2 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.

30.3 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.

30.4 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.

30.5 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.

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[6]; 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:

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

- 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.

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.

31. Coke oven coke (integrated iron and steel manufacturing)

31.1 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***.

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 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.

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
- coal mining.

32. Lime (integrated iron and steel manufacturing)

32.1 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***.

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 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.

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
- the extraction of raw materials.

33. Iron ore sinter (integrated iron and steel manufacturing)

33.1 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***.

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 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.

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. Iron ore pellets (integrated iron and steel manufacturing)

34.1 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***.

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 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.

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;
- on-site electricity generation; and
- iron ore mining.

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

35.1 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***.

35.2 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.

35.3 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.

36. Hot-rolled long products

36.1 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***.

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 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.

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

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. Hot-rolled flat products

37.1 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***.

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 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[7]; 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.

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

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:

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

38.1 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***.

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 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.

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 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.

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

39.1 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. 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.

39.2 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.

39.3 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.

40. Net-tonne-kilometres of bulk freight on a 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:

(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 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 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.

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 bulk freight on a non-dedicated line

41.1 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 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.

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.

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. Net-tonne-kilometres of non-bulk freight

42.1 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 net-tonne 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.

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.

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.

43. Passenger-kilometres of rail passenger transport

43.1 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 passenger-kilometres must be measured consistently with relevant industry practice.

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-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.

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 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

44. Revenue-tonne-kilometres of air transport

44.1 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.

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.

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 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.

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

Road transport - freight

General definitions

bulk freight is the transport of goods that:

(a) consist of one or more of:

(i) large quantities of a homogenous product; and

(ii) product in shipping containers; and

(iii) uniform types of packaged goods such as bags, pallets and drums; and

(b) are conveyed in road tankers (including ISO tankers), side tipping vehicles, skeletal and flat top trailers, and other road registered vehicles used for carrying bulk materials; and

(c) are generally charged on a weight basis.

cubic tonne is the volume of the freight item (generally height × width × depth) multiplied by a cubic conversion factor (for nominal or actual density) to derive an equivalent net weight.

cubic-tonne-kilometre means the unit of measure representing the movement over a distance of one kilometre of one cubic tonne of freight.

deadweight tonne is a tonne of the carrying capacity of the vehicle including fuel, driver and passengers, provisions and freight, but not including the weight of the prime mover and trailer.

deadweight-tonne-kilometre means the unit of measure representing the movement of a deadweight tonne over a distance of one kilometre.

freight includes a saleable good or transported service (such as crane hire) transported in a road-registered vehicle.

net-tonne-kilometre means the unit of measure representing the movement over a distance of one kilometre of one net tonne of freight.

net tonne, of freight, is the mass of the freighted goods, excluding the mass of the prime mover, trailer, fuel, driver, passengers and provisions.

non-bulk freight is the transport of packaged and pallet loads of freight, that is not bulk freight or specialised and heavy haulage, in vehicles with carrying capacity greater than 4.5 tonnes.

non-bulk (temperature-controlled) freight is the transport of non-bulk freight in temperature controlled conditions, such as by refrigeration, in vehicles with carrying capacity greater than 4.5 tonnes where the power for the temperature control equipment is derived from the drive train.

specialised and heavy haulage is the transportation of either or both of specialised equipment and loads in excess of 200 tonnes on road-registered vehicles that is not bulk freight.

specialised equipment includes:

(a) platform low loaders and trailing equipment capable of carrying loads in excess of 200 tonnes; and

(b) crane and rigging services and lift and shift operations; and

(c) custom engineered trailers for off the road tyre transport; and

(d) equipment for port discharge; and

(e) machines for sleeper transport and positioning; and

(f) equipment and machinery used for transferring freight between the road transport vehicle and another form of transport (such as rail or shipping); and

(g) other similar equipment.

45. Non-bulk freight road transport

45.1 Production variable definition

1. Cubic-tonne-kilometres of non-bulk freight that:
   (a) result from carrying out the non-bulk freight road transport activity at the facility; and
   (b) are not counted for another road transport production variable.
2. The metric in subsection (1) is applicable to a facility that:
   (a) transports non-bulk freight by road in registered vehicles that do not control the temperature of the freight (the ***non-bulk freight road transport activity***)
   (b) is in the road freight transport ANZSIC industry classification and code 461.
3. The cubic-tonne kilometres must be measured consistently with relevant industry practice.

45.2 Inclusions

For the purposes of the development of the default emissions intensity value and the preparation of an estimated (site-specific) emissions 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 non-bulk freight;
- combustion of fuels on the road registered vehicle for generating electricity to drive the propulsion system for the purpose of transferring non-bulk freight;
- complementary activities, such as head office, administrative and marketing operations, transport for maintenance and inspection, if they are carried out at the same location as 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.

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 road registered vehicle not sent to the propulsion system of the road registered vehicle; and
- processes that do not occur within the facility.

46. Non-bulk freight (temperature-controlled) road transport

46.1 Production variable definition

1. Cubic-tonne-kilometres of non-bulk (temperature controlled) freight that:
   (a) result from carrying out the non-bulk (temperature controlled) freight road transport activity at the facility; and
   (b) are not counted for another road transport production variable.
2. The metric in subsection (1) is applicable to a facility that:
   (a) transports non-bulk (temperature controlled) freight by road in registered vehicles that control the temperature of the freight (the ***non-bulk (temperature controlled) freight road transport activity***)
   (b) is in the road freight transport ANZSIC industry classification and code 461.
3. The cubic-tonne kilometres must be measured consistently with relevant industry practice.

46.2 Inclusions

For the purposes of the development of the default emissions intensity value and the preparation of an estimated (site-specific) emissions 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 transporting non-bulk (temperature-controlled) freight;
- combustion of fuels on the road registered vehicle for generating electricity to drive the propulsion system for the purpose of transporting non-bulk (temperature-controlled) freight;
- complementary activities, such as head office, administrative and marketing operations, transport for maintenance and inspection, if they are carried out at the same location as 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.

46.3 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; and
- processes that do not occur within the facility.

47. Bulk freight road transport

47.1 Production variable definition

1. Net-tonne-kilometres of bulk freight that:
   (a) result from carrying out the bulk road freight transport activity at the facility; and
   (b) are not counted for another road transport production variable.
2. The metric in subsection (1) is applicable to a facility that:
   (a) transports bulk freight by road in registered vehicles (the ***bulk freight road transport activity***); and
   (b) is in the road freight transport ANZSIC industry classification and code 461.
3. The net-tonne kilometres must be measured consistently with relevant industry practice.

47.2 Inclusions

For the purposes of the development of the default emissions intensity value and the preparation of an estimated (site-specific) emissions 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 transporting bulk freight;
- combustion of fuels on the road registered vehicle for generating electricity to drive the propulsion system for the purpose of transporting bulk freight;
- direct emissions from vehicles, machinery and equipment used for supporting bulk freight transport;
- complementary activities, such as head office, administrative and marketing operations, transport for maintenance and inspection, if they are carried out at the same location as 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.

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 the road registered vehicle not sent to the propulsion system of the road registered vehicle; and
- processes that do not occur within the facility.

48. Specialised and heavy haulage road transport

48.1 Production variable definition

1. Deadweight-tonne-kilometres of specialised and heavy haulage freight that:
   (a) result from carrying out the specialised and heavy haulage road transport activity at the facility; and
   (b) are not counted for another road transport production variable.
2. The metric in subsection (1) is applicable to a facility that:
   (a) transports specialised and heavy haulage freight by road in registered vehicles (the ***specialised and heavy haulage road transport activity***); and
   (b) is in the road freight transport ANZSIC industry classification and code 461.
3. The deadweight-tonne kilometres must be measured consistently with relevant industry practice.

48.2 Inclusions

For the purposes of the development of the default emissions intensity value and the preparation of an estimated (site-specific) emissions 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 specialised and heavy haulage;
- combustion of fuels on the road register vehicle to generate electricity to drive the propulsion system for the purpose of specialised and heavy haulage;

- direct emissions from vehicles, machinery and equipment used for supporting specialised and heavy haulage;
- electricity generated by the propulsion system of the road registered vehicle that is consumed within the road registered vehicle;
- complementary activities, such as head office, administrative and marketing operations, transport for maintenance and inspection, if they are carried out at the same location as 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.

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:

- electricity generated on the road registered vehicle not sent to the propulsion system of the road registered vehicle; and
- processes that do not occur within the facility.

Road transport - passenger

49. Vehicle-kilometres of passenger road transport

49.1 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.

In this section:

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

49.2 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.

49.3 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.

Water transport

50. Bulk freight water transport

50.1 Production variable definition

1. Net tonne-kilometres of bulk freight water transport that:
   (a) result from carrying on the bulk freight water transport activity at the facility; and
   (b) relate to the covered emissions of the facility; and
   (c) are not counted in the mixed passenger and freight water transport production variable in section 55 of Schedule 2.
2. The metric in subsection (1) is applicable to a facility that:
   (a) transports bulk freight by water (the bulk freight water transport activity); and
   (b) is in the water freight transport ANZSIC industry classification and code 481.
3. 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:

net tonne-kilometres, of bulk freight water transport, are the tonnes of the bulk freight carried on board a ship for a voyage multiplied by the kilometres of the laden voyage.

50.2 Inclusions

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

- direct emissions from transport of bulk freight, including dry and liquid products, by water (laden voyage);
- combustion of fuels and electricity generated on the ship to drive the propulsion system for the purpose of bulk freight water transport;
- electricity generated by the propulsion system of the ship that is consumed on the ship;
- direct emissions from vehicles, machinery and equipment used for supporting bulk freight water transport;
- complementary activities, such as head office, administrative and marketing operations, transport for maintenance and inspection, 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, such as ballast distance.

50.3 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 generation on the ship that is not sent to the propulsion system of the ship and not consumed on the ship;
- manufacturing process emissions; and
- processes that do not occur within the facility.

51. Deadweight-tonne-kilometres of mixed passenger and freight water transport

51.1 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 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.

51.2 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.

51.3 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

52. Wastewater handling (domestic and commercial)

52.1 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 handling of either or both of domestic or commercial wastewater and reports emissions under Division 5.3 of the NGER (Measurement) Determination.

3. 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 $_{measured\ entering}$ is the COD entering the site measured consistently with the requirements in Division 5.3 of the NGER (Measurement) Determination.

COD $_{in\ effluent\ leaving\ site}$ is the COD leaving the site measured consistently with the requirements in Division 5.3 of the NGER (Measurement) Determination.

COD $_{in\ sludge\ leaving\ site}$ is COD in sludge leaving the site measured consistently with the requirements in Division 5.3 of the NGER (Measurement) Determination.

4. 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 $_{measured\ entering}$ is the nitrogen entering the site measured consistently with the requirements in Division 5.3 of the NGER (Measurement) Determination.

N $_{in\ effluent\ leaving\ site}$ is the nitrogen leaving the site measured consistently with the requirements in Division 5.3 of the NGER (Measurement) Determination.

N $_{in\ sludge\ leaving\ site}$ 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.

52.2 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.

52.3 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.

52.4 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.

52.5 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

53. Electricity generation

53.1 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 applies:
   (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.

53.2 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.

53.3 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.

Pipelines

54. Natural gas distribution

Natural gas distribution is the activity of delivering natural gas to customers through low pressure pipelines with a maximum allowable operating pressure of 1,050 kilopascals or less. The activity does not involve natural gas processing or work of compression applied to natural gas. These facilities should use the *processed natural gas* or *work of compression applied to natural gas or plant condensate* production variables.

Natural gas distribution facilities can include high pressure pipelines (over 1,050 kilopascals) within the boundary of a gas distribution facility. These are technically reported as 'transmission' under NGER, with associated transmission fugitive emissions reported. It is intended that the *kilometres of natural gas transmission pipelines* production variable is applicable to a natural gas distribution facility that has high pressure pipelines which are considered transmission pipelines and reports emissions under Division 3.3.7 of the NGER (Measurement) Determination. This accounts for the fugitive emissions associated with the natural gas transmission pipeline.

54.1 Production variable definition

1. Petajoule-kilometres of natural gas:
   (a) delivered to customers as part of carrying on the natural gas distribution activity at the facility; and
   (b) that is not lost or consumed as part of carrying on the natural gas distribution activity; and
   (c) that is only counted once.

2. The metric in subsection (1) is applicable to a facility that conducts the activity of transporting natural gas through natural gas distribution pipelines to customers (the ***natural gas distribution activity***) and reports emissions under Division 3.3.8 of the NGER (Measurement) Determination.

3. The energy content of natural gas:
   (a) must be measured as the higher heating value energy content; and
   (b) may include the energy content of hydrogen included in the natural gas so long as the natural gas mixture meets applicable standards for gas within the network (such as Australian Standard 4564).

In this section:

natural gas has the meaning given by the NGER Regulations.

natural gas distribution pipelines mean pipelines for the conveyance of natural gas that report emissions under Division 3.3.8 of the NGER (Measurement) Determination.

petajoule-kilometre means the multiplication of:
(a) the total energy content, in petajoules, of natural gas delivered to customers by means of a natural gas distribution pipelines which are part of the facility; and

(b) the total length, in kilometres, of the natural gas distribution pipelines used to deliver natural gas to customers as part of the facility as at the end of the relevant financial year.

Note: Natural gas distribution pipelines not used in the delivery of natural gas to customers are not included in these kilometres.

54.2 Inclusions

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

- machinery, equipment and processes which are integral to, and essential for, the natural gas distribution activity, including:
  - distribution piping, including gas mains and service lengths (from the gas main to the customer's meter);
  - equipment at stations constituting part of the distribution system, such as city gate stations, gate stations, regular stations and metering stations;
  - control rooms, gas sampling stations, laboratories, maintenance workshops;
- any flaring, leaks or venting of greenhouse gases associated with the activity, including any reservoir carbon dioxide present in the natural gas;
- the supply of utilities such as, but not limited to, natural gas used in heating baths, compressed air, nitrogen, steam and water where these are used in support of the activity and within the activity boundary;
- complementary activities, such as head office, administrative and marketing operations, transport for maintenance and inspection, if they are carried out at the same location as 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.

54.3 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:

- natural gas transmission in pipelines at a pressure greater than 1,050 kilopascals, upstream of the facility;
- local distribution within the customer's premises downstream of the distribution facility's operational control, which is normally the point of sale to the customer;

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

55. Fugitive emissions from transmission pipelines

This production variable accounts for the fugitive emissions associated with a natural gas transmission pipeline. Natural gas distribution facilities can also include high pressure pipelines (over 1,050 kilopascals) within the boundary of a gas distribution facility. These are technically reported as 'transmission' under NGER, with associated transmission fugitive emissions reported. It is intended that the *kilometres of natural gas transmission pipelines* production variable is applicable to a natural gas distribution facility that has high pressure pipelines which are considered transmission pipelines and reports emissions under Division 3.3.7 of the NGER (Measurement) Determination.

The default emissions intensity value is comprised of the emissions factors in the NGER (Measurement) Determination for:

- tonnes of CO_2-e per kilometre of gas transmission piping associated with carbon dioxide; and
- tonnes of CO_2-e per kilometre of gas transmission piping associated with methane.

55.1 Production variable definition

1. Kilometres of natural gas transmission pipelines used to deliver natural gas or plant condensate to customers or distribution networks as part of carrying on the natural gas transmission activity at the facility.
2. The metric in subsection (1) is applicable to a facility that conducts the natural gas transmission activity and reports emissions under Division 3.3.7 of the NGER (Measurement) Determination.
3. The kilometres of the natural gas transmissions pipelines must not be greater than the kilometres of pipelines reported under section 3.76 of the NGER (Measurement) Determination for the same financial year.

55.2 Inclusions

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

- Natural gas transmission pipelines at a pressure greater than 1,050 kilopascals, including looping and laterals, upstream of or within a natural gas distribution facility.

55.3 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:

- machinery, equipment and processes which are integral to, and essential for, the activity described in the natural gas distribution activity definition, including, for example:
    - distribution piping, including gas mains and service lengths (from the gas main to the customer's meter)
    - equipment at stations constituting part of the distribution system, such as city gate stations, gate stations, regulator stations and metering stations
    - control rooms, gas sampling stations, laboratories, maintenance workshops;
- processes which do not occur within the facility; and
- on-site electricity generation.

Clinker and cement

There are two prescribed production variables for clinker and cement manufacturing. One is for the production of ***clinker*** that is not used by the facility to make cement. The other is for the production of ***cement*** made from clinker produced at a facility.

Definitions

(1) In this Part:

cement means any hydraulic cement, including general purpose and blended cements, meeting the minimum requirements for such cements set out in AS 3972—2010 or any other specific contract and export specifications.

Note: In 2020, AS 3972—2010 was available from http://www.standards.org.au.

Portland cement clinker means the Portland cement clinker resulting from clinker production which:

(a) has a concentration of calcium silicates equal to or greater than 60% by mass; and

(b) has a concentration of magnesium oxide (MgO) equal to or less than 4.5% by mass; and

(c) is useable in the making of Portland cement.

(2) In this Part the activity of ***clinker production*** is the physical and chemical transformation of:

(a) either or both of calcium carbonate compounds (limestone ($CaCO_3$)) and other calcium carbonate ($CaCO_3$) feedstocks; and

(b) any of the following:

(i) clay;

(ii) clay mixed with 1 or more feedstocks that contain 1 or more of the following:

(A) silicon dioxide (SiO_2);

(B) iron (Fe);

(C) aluminium oxide (alumina (Al_2O_3));

(iii) 1 or more feedstocks that, when combined, contain all of the following:

(A) silicon dioxide (SiO_2); and

(B) iron (Fe); and

(C) aluminium oxide (alumina (Al_2O_3));

that are fused together at a temperature above 1000 °C into Portland cement clinker.

56. Clinker

56.1 Production variable definition

1. Tonnes of Portland cement clinker on a dry weight basis that:

(a) is produced as part of carrying on the clinker production activity at the facility; and

(b) is exported from the facility or allocated for export from the facility (whether the export will occur within or after the reporting year); and

(c) is not used to make cement at the facility; and

(c) is of saleable quality.

2. The metric in subsection (1) is applicable to a facility that:
   (a) conducts the clinker production activity at the facility; and
   (b) if the metric in section 64 of this Schedule (the cement production variable) is applicable to the facility—also uses that prescribed production variable.

56.2 Inclusions

For the purposes of the development of the default emissions intensity value and the preparation of an estimated (site-specific) emissions 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 which are integral to, and essential 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 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;
- waste heat recovery within the 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;
- crushing, pre-homogenisation and grinding of raw materials that is contiguous with the clinker production process associated with clinker dispatched;
- kiln dust production and reprocessing;
- reject production where this is not recycled in the process; and
- other incidental, ancillary or supporting processes which are not included in the definition of another production variable.

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.

56.3 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 of raw materials;
- crushing of raw materials that is not contiguous with the clinker production process;

- production of clinker that is used, or intended to be used, for making cement on-site;
- processes which do not occur within the facility; and
- on-site electricity generation.

57. Cement

57.1 Production variable definition

1. Tonnes of cement on a dry weight basis that:
   (a) is produced as part of carrying out the cement production activity at the facility; and
   (b) is attributable to Portland cement clinker produced as part of carrying on the clinker production activity at the facility in accordance with subsection (4); and
   (c) is of saleable quality.

2. The metric in subsection (1) is applicable to a facility that:
   (a) conducts the clinker production activity at the facility; and
   (b) conducts the activity of producing cement through the physical transformation of Portland cement clinker into cement through a process of comminution with gypsum or other additives (the ***cement production activity***); and
   (b) if the metric in section 63 (the clinker production variable) is applicable to the facility—also uses that prescribed production variable.

3. For subsection (1) cement is attributable to Portland cement clinker produced as part of carrying on the clinker production activity at the facility in accordance with the following equation:

$$\mathrm{Ce_a} = \mathrm{Ce_f} \times \frac{\mathrm{Cl_f}}{\mathrm{Cl_f} + \mathrm{Cl_i}}$$

   where:

   Ce_a is the cement attributable to Portland cement clinker produced as part of carrying on the clinker production activity at the facility, in tonnes.

   Ce_f is the total amount of cement produced at the facility (f) in the reporting year, in tonnes, that is of saleable quality.

   Cl_f is the amount of Portland cement clinker, in tonnes, produced as part of carrying on the clinker production activity at the facility (f) in the reporting year and used, or intended to be used, to produce cement at the facility, not including any tonnes of Portland cement clinker counted for the clinker production variable.

   Cl_i is the amount of Portland cement clinker, in tonnes, not covered by ***Cl_f*** and imported in the reporting year to produce cement at the facility (whether or not the Portland cement clinker was produced in or outside of Australia).

4. For paragraphs 4.23C(2)(b) and 4.23D(3)(b) of the NGER Regulations, the following information must be included in a report under the Act in calculating the amount of the prescribed (annually adjusted) production variable for a reporting year:

(a) the total amount of Portland cement clinker produced at a facility in the reporting year (whether or not it is used, exported from the facility or stockpiled); and

(b) the value of each variable in the equation in subsection (4).

57.2 Inclusions

For the purposes of the development of the default emissions intensity value and the preparation of an estimated (site-specific) emissions 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 which are integral to, and essential 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 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;
- waste heat recovery within the 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;
- crushing, pre-homogenisation and grinding of raw materials that is contiguous with the clinker production process associated with clinker used for making cement on-site;
- transforming of clinker, both produced on-site and imported, into cement through milling, including the process of comminution with gypsum and other additives;
- kiln dust production and reprocessing;
- reject production where this is not recycled in the process; and
- other incidental, ancillary or supporting processes which are not included in the definition of another production variable.

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.

57.3 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 of raw materials;

- crushing of raw materials that is not contiguous with the clinker production process; and
- production of clinker that is not used, or not intended to be used, for making cement on-site;
- processes which do not occur within the facility; and
- on-site electricity generation.

58. Lime

58.1 Production variable definition

1. Tonnes of lime on a dry weight basis that:
   (a) is produced as part of carrying on the lime production activity at the facility; and
   (b) has a concentration of either or both of calcium oxide (CaO) and magnesium oxide (MgO) equal to or greater than 60% by mass; and
   (c) is not counted for another production variable in this Schedule; and
   (d) is of saleable quality.
2. The metric in subsection (1) is applicable to a facility that conducts the activity of producing lime through the physical and chemical transformation, through the calcining process, of calcium and magnesium sources (such as calcium carbonate ($CaCO_3$) and magnesium carbonate ($MgCO_3$)) into lime that has a concentration of either or both of calcium oxide (CaO) and magnesium oxide (MgO) equal to or greater than 60% by mass (***the lime production activity***).

58.2 Inclusions

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

- the direct emissions from machinery, equipment and processes which are integral to, and essential 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 is necessary for the activity to proceed as described; and
  - processing of by-products and waste materials from the activity;
- waste heat recovery within the 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;
- kiln dust production: crushing, grinding and preparation of raw materials contiguous with the equipment required to conduct the transformation as described;

- reject production where this is not recycled in the process; and
- other incidental, ancillary or supporting processes which are not included in the definition of another production variable.

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.

58.3 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 of raw materials;
- crushing, grinding and preparation of raw materials not contiguous with the equipment required to conduct the transformation as described;
- processes which do not occur within the facility; and
- on-site electricity generation.

The lime must not be produced as part of an integrated iron and steel manufacturing activity.

The lime must be produced at the facility and be of saleable quality. The tonnes of lime, which are scrapped, lost or discarded are not to be included in the tonnes of reported relevant product.

Additionally, if inputs are transformed into saleable lime which is then recycled prior to being sold, this tonnage should be counted only once for the definition of a relevant product.

Metal manufacturing

59. Silicon

59.1 Production variable definition

1. Tonnes of silicon (Si) that:
   (a) has a concentration of silicon equal to or greater than 98% by mass; and
   (b) is produced as part of carrying on the silicon 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 silicon through the chemical transformation of silica (silicon dioxide (SiO_2)) to produce silicon with a concentration of silicon equal to or greater than 98% by mass, conducted in accordance with the overall chemical equation:

   $SiO_2(s)+2C(s) \rightarrow Si(s) +2CO(g)$

   (the ***silicon production activity***).

59.2 Inclusions

For the purposes of the development of the default emissions intensity value and the preparation of an estimated (site-specific) emissions 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 the facility and as part of the activity, 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 waste materials from the activity;
- the production of secondary feed-stock products which support the silicon production process (such as charcoal production), where these processes occur within the facility boundary;
- waste heat recovery within the facility;
- the supply of utilities such as, but not limited to, natural gas used in heating baths, compressed air, nitrogen, steam and water where these are used in support of the activity and within the activity boundary;
- preparation of silicon in order to produce a saleable silicon product; 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.

59.3 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:

- mining, crushing, grinding and milling of silica (silicon dioxide, SiO_2) prior to the smelting process;
- processes that do not occur within the facility boundary; and
- on-site electricity generation.

60. Lead bullion

60.1 Production variable definition

1. Tonnes of lead bullion that:
   (a) has a concentration of lead (Pb) equal to or more than 99% by mass; and
   (b) is produced as part of carrying on the lead bullion 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 lead bullion through the chemical transformation of concentrated mineralised lead compounds with or without additional lead bearing secondary materials (the ***lead bullion production activity***).

60.2 Inclusions

For the purposes of the development of the default emissions intensity value and the preparation of an estimated (site-specific) emissions 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 and as part of the activity, 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;

- waste heat recovery within the facility;
- the supply of utilities such as, but not limited to, natural gas used in heating baths, compressed air, nitrogen, steam and water where these are used in support of the activity and within the activity boundary; 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.

60.3 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 which do not occur within the facility; and
- on-site electricity generation.

61. Refined lead

61.1 Production variable definition

1. Tonnes of refined lead that:
   (a) has a concentration of lead (Pb) equal to or more than 99.97% by mass; and
   (b) is produced as part of carrying on the refined lead 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 refined lead through the chemical transformation of concentrated mineralised lead compounds with or without additional lead bearing secondary materials, into refined lead (the ***refined lead production activity***).

Note: The blasting and sintering processes used in the activity may also treat concentrated mineralised zinc compounds and/or zinc bearing secondary materials.

61.2 Inclusions

For the purposes of the development of the default emissions intensity value and the preparation of an estimated (site-specific) emissions 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 and as part of the activity, 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;
- waste heat recovery within the facility;
- the supply of utilities such as, but not limited to, natural gas used in heating baths, compressed air, nitrogen, steam and water where these are used in support of the activity and within the activity boundary; 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.

61.3 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 which do not occur within the facility; and
- on-site electricity generation.

62. Zinc in fume

62.1 Production variable definition

1. Tonnes of zinc in fume that:
    (a) has a concentration of zinc (Zn) equal to or more than 60% by mass; and
    (b) is produced as part of carrying on the zinc in fume 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 zinc in fume through the chemical transformation in a slag fumer of zinc

containing residues and wastes to produce zinc in fume (the ***zinc in fume production activity***).

62.2 Inclusions

For the purposes of the development of the default emissions intensity value and the preparation of an estimated (site-specific) emissions 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 and as part of the activity, 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;
- waste heat recovery within the facility;
- the supply of utilities such as, but not limited to, natural gas used in heating baths, compressed air, nitrogen, steam and water where these are used in support of the activity and within the activity boundary; 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.

62.3 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 which do not occur within the facility; and
- on-site electricity generation.

63. Caustic calcined magnesia

63.1 Production variable definition

1. Tonnes of caustic calcined magnesia that:
    (a) has a minimum magnesium oxide (MgO) content of 75% by mass; and

(b) is burned between 650°C and 1200°C; and

(c) is produced as part of carrying on the magnesia production activity at the facility; and

(d) is of saleable quality.

Note: Due to the definition of saleable quality, inputs that are transformed into saleable magnesia which is then re-calcined are only counted once.

2. The metric in subsection (1) is applicable to a facility that conducts the activity of producing caustic calcined magnesia through the physical and chemical transformation of magnesite (magnesium carbonate ($MgCO_3$)) in a furnace into caustic calcined magnesia (the ***magnesia production activity***).

Note: Caustic calcined magnesia may also be transformed into deadburned magnesia and electrofused magnesia at the facility, which involves burning or fusing at higher temperatures than in paragraph (1)(b).

63.2 Inclusions

For the purposes of the development of the default emissions intensity value and the preparation of an estimated (site-specific) emissions 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 and as part of the activity, 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;
- waste heat recovery within the facility;
- the supply of utilities such as, but not limited to, natural gas used in heating baths, compressed air, nitrogen, steam and water where these are used in support of the activity and within the activity boundary; 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.

63.3 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 which do not occur within the facility; and
- on-site electricity generation.

64. Copper anode

64.1 Production variable definition

1. Tonnes of copper anode that:
   (a) has a copper concentration between 99 and 99.9% by mass; and
   (b) is produced as part of carrying on the copper anode 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 copper anode through the physical and chemical transformation of copper sulphide concentrates in a smelter to produce copper anodes (the ***copper anode production activity***).

Note: Copper anode is often an input into the production of copper cathode at the same facility.

64.2 Inclusions

For the purposes of the development of the default emissions intensity value and the preparation of an estimated (site-specific) emissions 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 and as part of the activity, 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;
  - production of sulphuric acid;
- waste heat recovery within the facility;
- the supply of utilities such as, but not limited to, natural gas used in heating baths, compressed air, nitrogen, steam and water where these are used in support of the activity and within the activity boundary; 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.

64.3 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 which do not occur within the facility; and
- on-site electricity generation.

65. Manganese sinter

65.1 Production variable definition

1. Tonnes of manganese sinter that:
   (a) has a minimum concentration of manganese (Mn) of 40% by mass; and
   (b) is produced as part of carrying on the manganese sinter 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 manganese sinter through the physical and chemical transformation of small particles of manganese ore by sintering into manganese sinter (the ***manganese sinter production activity***).

Note: Manganese sinter is often an input into an electric arc furnace.

65.2 Inclusions

For the purposes of the development of the default emissions intensity value and the preparation of an estimated (site-specific) emissions 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 and as part of the activity, 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;

- waste heat recovery within the facility;
- the supply of utilities such as, but not limited to, natural gas used in heating baths, compressed air, nitrogen, steam and water where these are used in support of the activity and within the activity boundary; 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.

65.3 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 which do not occur within the facility; and
- on-site electricity generation.

66. Ferromanganese alloy

66.1 Production variable definition

1. Tonnes of ferromanganese alloy that:
   (a) has a minimum concentration of manganese (Mn) of 67% by mass; and
   (b) is produced as part of carrying on the ferromanganese 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 ferromanganese alloy through the physical and chemical transformation of manganese ore or sinter into ferromanganese alloy (the ***ferromanganese production activity***).

66.2 Inclusions

For the purposes of the development of the default emissions intensity value and the preparation of an estimated (site-specific) emissions 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 and as part of the activity, 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;
- waste heat recovery within the facility;
- the supply of utilities such as, but not limited to, natural gas used in heating baths, compressed air, nitrogen, steam and water where these are used in support of the activity and within the activity boundary; 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.

66.3 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 which do not occur within the facility; and
- on-site electricity generation.

67. Silicomanganese alloy

67.1 Production variable definition

1. Tonnes of silicomanganese alloy that:
    (a) has a minimum concentration of manganese (Mn) of 60% by mass; and
    (b) has a minimum concentration of silicon (Si) of 12% by mass; and
    (c) is produced as part of carrying on the silicomanganese production activity at the facility; and
    (d) is of saleable quality.
2. The metric in subsection (1) is applicable to a facility that conducts the activity of producing silicomanganese through the physical and chemical transformation of one or

more of manganese ore, manganese sinter or ferromanganese slag produced at the facility into silicomanganese alloy (the ***silicomanganese production activity***).

67.2 Inclusions

For the purposes of the development of the default emissions intensity value and the preparation of an estimated (site-specific) emissions 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 and as part of the activity, 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;
- waste heat recovery within the facility;
- the supply of utilities such as, but not limited to, natural gas used in heating baths, compressed air, nitrogen, steam and water where these are used in support of the activity and within the activity boundary; 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.

67.3 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 which do not occur within the facility; and
- on-site electricity generation.

Nickel manufacturing

There are three prescribed production variables for nickel manufacturing. One is for the production of ***intermediate nickel products*** that do not undergo further processing at the facility. The other two production variables are both for the production of ***primary nickel products***, but distinguished on the inputs to the manufacturing process, which are either ***intermediate nickel products*** or ***nickel bearing inputs***.

The production of intermediate and primary nickel products through the chemical and physical transformation of nickel bearing inputs and intermediate nickel products is grouped together in the ***nickel manufacturing activity***. This avoids duplication of processes in the inclusions and exclusions list.

General definitions

intermediate nickel products mean:

(a) nickel matte;

(b) mixed nickel-cobalt hydroxide precipitate where the concentration of nickel is between 35 and 47% (inclusive) by mass;

(c) mixed nickel-cobalt sulphide precipitate where the concentration of nickel is between 43 and 57% (inclusive) by mass;

(d) basic nickel carbonate where the concentration of nickel is between 40 and 45% (inclusive) by mass;

(e) crude nickel sulphate where the concentration of nickel is equal to or greater than 21% (inclusive) by mass.

imported intermediate nickel products, *for a facility, means an intermediate nickel product not produced at the facility.*

nickel bearing inputs mean:

(a) mineralised nickel ores (including laterite or sulphide ores);

(b) nickel sulphide concentrates;

(c) other nickel containing concentrates that have not undergone secondary processing;

(d) low grade nickel waste products that require equivalent processing to mineralised nickel ores.

primary nickel products mean:

(a) basic nickel carbonate where the concentration of nickel is equal to or greater than 50% nickel by mass;

(b) nickel oxide where the concentration of nickel is equal to or greater than 78% nickel by mass;

(c) nickel sulphate hexahydrate ($NiSO_4.6H_20$) where the concentration of nickel is equal to or greater than 22% nickel by mass;

(d) other nickel products that have a concentration of nickel equal to or greater than 98% nickel by mass.

The following inclusions and exclusions list applies to the ***nickel manufacturing*** activity:

Inclusions

For the purposes of the development of the default emissions intensity value and the preparation of an estimated (site-specific) emissions intensity value for the production variables in the nickel manufacturing activity, 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 and as part of the activity, 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,
- waste heat recovery within the facility;
- the supply of utilities such as, but not limited to, natural gas used in heating baths, compressed air, nitrogen, steam and water where these are used in support of the activity and within the activity boundary; 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.

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

68. Primary nickel product (produced from nickel bearing inputs)

68.1 Production variable definition

1. Tonnes of 100% equivalent nickel that:

(a) is contained within primary nickel products that:

a. are produced from nickel bearing inputs as part of carrying on the nickel manufacturing activity at the facility; and

b. are of saleable quality; and

(b) has not been counted in relation to the intermediate nickel product production variable at the facility.

2. The metric in subsection (1) is applicable to a facility that conducts the ***nickel manufacturing*** activity.

69. Primary nickel product (produced from imported intermediate nickel products)

69.1 Production variable definition

1. Tonnes of 100% equivalent nickel contained within primary nickel products that:

(a) are produced from imported intermediate nickel products as part of carrying on the nickel 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 ***nickel manufacturing*** activity.

70. Intermediate nickel product (produced from nickel bearing inputs)

70.1 Production variable definition

1. Tonnes of 100% equivalent nickel contained within intermediate nickel products that:

(a) are produced from nickel bearing inputs as part of carrying on the nickel manufacturing activity at the facility; and

(b) are not, and are not intended to be, transformed into primary nickel products at the facility; and

(c) are of saleable quality.

2. The metric in subsection (1) is applicable to a facility that conducts the nickel manufacturing activity.

Pulp and paper manufacturing

71. Tissue paper manufacturing

71.1 Production variable definition

1. Tonnes of rolls of uncoated tissue paper that:
   (a) has a grammage range of 13 g/m^2 to 75 g/m^2; and
   (b) has a moisture content in the range of 4% to 11% by mass; and
   (c) is generally useable in sanitary products such as facial tissue, paper towel, bathroom tissue and napkins; and
   (d) has not been counted for another production variable at the facility; and
   (e) is produced as part of carrying on the tissue paper manufacturing activity at the facility; and
   (f) is of saleable quality.
2. The metric in subsection (1) is applicable to a facility that conducts the activity of producing rolls of uncoated tissue paper through the physical or chemical transformation of any or all of wood chips, sawdust, wood pulp and recovered paper into rolls of uncoated tissue paper that:
   (a) has a grammage range of 13 g/m^2 to 75 g/m^2; and
   (b) has a moisture content in the range of 4% to 11% by mass; and
   (c) is generally useable in sanitary products such as facial tissue, paper towel, bathroom tissue and napkins; and
   (d) is of saleable quality.
3. The activity in subsection (2) is the ***tissue paper manufacturing*** activity.

71.2 Inclusions

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

- handling, storing and treating purchased pulp;
- the paper making process from receipt of pulp and up to and including the finishing, packaging andstoring the final paper products (including products that have been further refined from the production variable definition of rolls of paper product);
- the treatment of wastewater generated from the paper-making operations;
- on-site transport of paper products;
- 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;

- 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;
- complementary processes, such as packaging, head office, administrative and marketing operations where they are undertaken at the site of the facility;
- other incidental, ancillary or supporting processes which are not included in the definition of another production variable.

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.

71.3 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:

- on-site electricity generation
- processes that do not occur within the facility;
- processes that are included in the definition of another production variable, e.g. pulp manufacture.

72. Packaging and industrial paper manufacturing

72.1 Production variable definition

1. Tonnes of rolls of packaging and industrial paper that:
   (a) is produced from wholly or partially unbleached input fibre; and
   (b) has a grammage range of 30 g/m^2 to 500 g/m^2; and
   (c) has a moisture content in the range of 4% to 11% by mass; and
   (d) is uncoated; and
   (e) is generally useable as a packaging or industrial paper, including products such as kraft liner, recycled or multiply liner, medium, sack and bag paper, wrapping paper, plasterboard liner, horticultural paper and building paper; and
   (f) has not been counted for another production variable at the facility; and
   (g) is produced as part of carrying on the packaging and industrial paper manufacturing activity at the facility; and
   (h) is of saleable quality.
2. The metric in subsection (1) is applicable to a facility that conducts the activity of producing rolls of packaging and industrial paper through physical or chemical

transformation of any or all of wood chips, sawdust, wood pulp and recovered paper into packaging and industrial paper that:

(a) is produced from wholly or partially unbleached input fibre; and

(b) has a grammage range of 30 g/m^2 to 500 g/m^2; and

(c) has a moisture content in the range of 4% to 11% by mass; and

(d) is uncoated; and

(e) is generally useable as a packaging or industrial paper, including products such as kraft liner, recycled or multiply liner, medium, sack and bag paper, wrapping paper, plasterboard liner, horticultural paper and building paper; and

(f) is of saleable quality.

3. The activity in subsection (2) is the ***packaging and industrial paper manufacturing activity***.

72.2 Inclusions

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

- handling, storing and treating purchased pulp;
- the paper making process from receipt of pulp and up to and including the finishing, packaging and storing the final paper products (including products that have been further refined from the production variable definition of rolls of paper product);
- the treatment of wastewater generated from the paper-making operations;
- on-site transport of paper products;
- 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;
- 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;
- complementary processes, such as packaging, head office, administrative and marketing operations where they are undertaken at the site of the facility;
- other incidental, ancillary or supporting processes which are not included in the definition of another production variable.

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.

72.3 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:

- on-site electricity generation
- processes that do not occur within the facility
- processes that are included in the definition of another production variable, e.g. pulp manufacture

73. Printing and writing paper manufacturing

73.1 Production variable definition

1. Tonnes of rolls of coated or uncoated printing and writing paper that:
   (a) is produced from 100% bleached or brightened input fibre; and
   (b) has a grammage range of 42 g/m^2 to 350 g/m^2; and
   (c) has a moisture content in the range of 4% to 11% by mass; and
   (d) is generally useable as a printing and writing paper product, including products such as offset paper, copy paper, laser printing paper, magazine paper, filing card paper, manilla, book printing paper, envelope paper, forms paper, scholastic paper, cheque paper and security paper; and
   (e) has not been counted for another production variable at the facility; and
   (f) is produced as part of carrying on the printing and writing paper manufacturing activity at the facility; and
   (g) is of saleable quality.
2. The metric in subsection (1) is applicable to a facility that conducts the activity of producing rolls of coated or uncoated printing and writing paper through physical or chemical transformation of any or all of wood chips, sawdust, wood pulp and recovered paper into rolls of coated or uncoated printing and writing paper that:
   (a) is produced from 100% bleached or brightened input fibre; and
   (b) has a grammage range of 42 g/m^2 to 350 g/m^2; and
   (c) has a moisture content in the range of 4% to 11% by mass; and
   (d) is generally useable as a printing and writing paper product, including products such as offset paper, copy paper, laser printing paper, magazine paper, filing card paper, manilla, book printing paper, envelope paper, forms paper, scholastic paper, cheque paper and security paper; and
   (e) is of saleable quality.
3. The activity in subsection (2) is the ***printing and writing paper manufacturing activity***.

73.2 Inclusions

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

- handling, storing and treating purchased pulp;
- the paper making process from receipt of pulp and up to and including the finishing, packaging and storing the final paper products (including products that have been further refined from the production variable definition of rolls of paper product);
- the treatment of wastewater generated from the paper-making operations;
- on-site transport of paper products;
- 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;
- 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;
- complementary processes, such as packaging, head office, administrative and marketing operations where they are undertaken at the site of the facility;
- other incidental, ancillary or supporting processes which are not included in the definition of another production variable.

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.

73.3 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:

- on-site electricity generation
- processes that do not occur within the facility
- processes that are included in the definition of another production variable, e.g. pulp manufacture

74. Newsprint manufacturing

74.1 Production variable definition

1. Tonnes of rolls of uncoated newsprint that:
   (a) has a grammage range of 30 g/m^2 to 80 g/m^2; and
   (b) has a moisture content range of 4% to 11% by mass; and

(c) is generally usable for newspaper or publication products; and

(d) has not been counted for another production variable at the facility; and

(e) is produced as part of carrying on the newsprint manufacturing activity at the facility.

2. The metric in subsection (1) is applicable to a facility that conducts the activity of producing rolls of uncoated newsprint through the chemical and physical transformation, using an integrated process, of any or all of woodchips, sawdust, wood pulp and recovered paper into rolls of uncoated newsprint that:

   (a) has a grammage range of 30 g/m^2 to 80 g/m^2; and

   (b) has a moisture content range of 4% to 11% by mass; and

   (c) is generally usable for newspaper or publication products

3. The activity in subsection (2) is the ***newsprint manufacturing activity***.

74.2 Inclusions

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

- handling, storing and treating purchased pulp;
- the paper making process from receipt of pulp and up to and including the finishing, packaging and storing the final paper products (including products that have been further refined from the production variable definition of rolls of paper product);
- the treatment of wastewater generated from the paper-making operations;
- on-site transport of paper products;
- 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;
- 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;
- complementary processes, such as packaging, head office, administrative and marketing operations where they are undertaken at the site of the facility;
- other incidental, ancillary or supporting processes which are not included in the definition of another production variable.

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.

74.3 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:

- on-site electricity generation
- processes that do not occur within the facility
- processes that are included in the definition of another production variable, e.g. pulp manufacture.

75. Pulp manufacturing

75.1 Production variable definition

1. Tonnes of wet or dry pulp that:
   (a) is generally useable in one or more of:
      i) paper manufacturing;
      ii) packaging and cardboard manufacturing;
      iii) newsprint manufacturing;
      iv) tissue paper manufacturing; and
      v) the production of sanitary products (such as a fluff pulp layer in sanitary products); and
   (b) is measured according to ordinary measurement rules applicable in the industry; and
   (c) if wet pulp—is converted to an air dried basis; and
   (d) is produced as part of carrying on the pulp production activity at the facility.

Note: The quantity of pulp is generally converted to an air dried basis by adjusting the relevant tonnes to their mass with a moisture content of 10% (without drying the relevant wet pulp product).

2. The metric in subsection (1) is applicable to a facility that conducts the activity of producing pulp through the physical or chemical transformation of any or all of wood chips, sawdust, wood pulp and recovered paper into wet or dry pulp that is generally usable in one or more of the following:
   (a) paper manufacturing;
   (b) packaging and cardboard manufacturing;
   (c) newsprint manufacturing;
   (d) tissue paper manufacturing; and
   (e) the production of sanitary products (such as a fluff pulp layer in sanitary products).

3. The activity in subsection (2) is the ***pulp production activity***.

75.2 Inclusions

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

- handling, storing and treating of pulp feedstock;
- the pulp making process from receipt of materials and up to and including the drying, packaging and storing the final pulp products (if being sold);
- the treatment of wastewater generated from the paper-making operations;
- on-site transport of pulp products;
- 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;
- 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;
- complementary processes, such as packaging, head office, administrative and marketing operations where they are undertaken at the site of the facility;
- other incidental, ancillary or supporting processes which are not included in the definition of another production variable.

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.

75.3 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:

- on-site electricity generation
- processes that do not occur within the facility
- processes that are included in the definition of another production variable, e.g. paper manufacture.

SCHEDULE 3 PRODUCTION VARIABLES

76. Petroleum refining

76.1 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***.

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.

76.2 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.

76.3 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.