Australian Government
Department of Industry, Science, Energy and Resources

Tranche 3 additions to the Safeguard Mechanism: Prescribed production variables and default emissions intensities

MAY 2021

This document forms part of the consultation package for the third tranche of prescribed production variables and default emissions intensity values to be set in the Safeguard Rule. Following this consultation process, the contents of this document will be added to the existing 'Safeguard Mechanism: Prescribed production variables and default emissions intensities' document (the Safeguard Mechanism document), available on the Department of Industry, Science, Energy and Resources' website. The purpose of the Safeguard Mechanism document is to define production variables for use in calculated and production-adjusted baseline applications made under the Safeguard Mechanism.

Tranche 3 additions to the Safeguard Mechanism: Prescribed production variables and default emissions intensities

Abbreviations and acronyms

CO_2	Carbon dioxide
GJ	Gigajoules
NGER	National Greenhouse and Energy Reporting
t	tonnes
t CO_2-e	tonnes of CO_2 equivalent

PURPOSE OF THE *SAFEGUARD MECHANISM: PRESCRIBED PRODUCTION VARIABLES AND DEFAULT EMISSIONS INTENSITIES* DOCUMENT

The purpose of the *Safeguard Mechanism: Prescribed production variables and default emissions intensities* document (the Safeguard Mechanism document) is to **define production variables** for use in calculated and production-adjusted 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.

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

Background

Sources of emissions used in setting default emissions intensity values

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

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

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

All facilities can access a transitional calculated baseline in 2018-19, 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 document defines the production variables and specifies the sources of emissions used by the Department to calculate default emissions intensity values. It provides guidance for businesses and auditors on the emissions sources facilities can use in site-specific emissions intensity calculations and how apportioning should be done.

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

The amendment to subsection 6(8B) of the Safeguard Rule establishes that where a facility uses an estimated (site-specific) emissions intensity value, the facility can only include emissions relevant to the calculation of the default emissions intensity value (or emissions relevant in defining the prescribed production variable wherever a prescribed production variable has no associated default emissions intensity). The inclusion lists, which are presented in the Safeguard Mechanism document, 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*[1] (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 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.

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

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

ADDITIONAL SCHEDULE 2 PRODUCTION VARIABLES

Pipelines

1. Gas transmission

Natural gas transmission is the activity of transporting natural gas from processing facilities to a distribution system, or to industrial customers, through high pressure pipelines with a maximum allowable operating pressure greater than 1,050 kilopascals.

The natural gas transmission production variables do not apply to facilities that process natural gas and may also compress the gas as part of, or subsequent to, the processing activity. These facilities should use the processed natural gas (processing only) or processed natural gas (production and processing) production variables. This production variable does not apply to natural gas distribution facilities which have a transmission pipeline within the facility, but do not apply work of compression to gas. These facilities should use the *kilometres of natural gas transmission pipelines* production variable.

The production variable ('work of compression') for natural gas transmission is the energy applied to the gas by compressing it, expressed in gigajoules. It is calculated using the equation for the work of compression for an adiabatic process.

1.1. Production variable definition

natural gas has the meaning given by the NGER Regulations.

natural gas transmission pipeline means a pipeline for the conveyance of natural gas reports emissions under Division 3.3.7 of the NGER (Measurement) Determination.

The activity of ***natural gas transmission*** is the transport of natural gas through natural gas transmission pipelines to customers or distribution networks**.**

Note: Customers could include large industrial facilities, liquefied natural gas stations or natural gas processing stations.

Work of compression applied to natural gas

1. Work of compression, in gigajoules, from the energy transferred to natural gas or plant concentrate by compressing it with compressors to assist its delivery to customers or distribution networks as part of carrying on the natural gas transmission activity at the facility.

   Note: Compressors used for other purposes, such as natural gas processing, are not included.

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 default emissions intensity is 0.253 t CO_2-e per gigajoule.

4. For subsections (1) and (3), the work of compression, in megawatt hours, is calculated for each compressor or compressor station (i) over each time increment (h) and summed in accordance with the following equation:

$$\sum_i \frac{Z_{av} R_u T_1}{M_W (k-1)/k} \left(\left(\frac{P_2}{P_1} \right)^{\frac{k-1}{k}} - 1 \right) \times m' \times h_i$$

where:

Z_{av} is the gas compressibility derived from gas compressibility charts or calculated by computer software, at the inlet and outlet conditions averaged over the time increment h (by dividing inlet and outlet results by 2).

R_u is the universal gas constant equal to 8.314 kJ/kmol·K

T_1 is the temperature of the gas, in degrees Kelvin (K), at the compressor suction flange or inlet to the compressor station (as relevant to (i)), averaged over the time increment h.

M_W is the gas molecular weight, calculated from the average gas composition over the time increment h.

k is the heat capacity ratio, derived from gas heat capacity charts or calculated by computer software, for the average gas composition over the time increment h.

P_1 is the absolute pressure at the compressor suction flange or inlet to the compressor station (as relevant to (i)), measured and averaged over the time increment h, in the same units as P_2

P_2 is the absolute pressure at the compressor discharge flange or outlet to the compressor station (as relevant to (i)), measured and averaged over the time increment h, in the same units as P_1

m' is the average gas mass flowrate, in units of mass per second, as measured for time increment h (or as converted from a volumetric flowrate measurement if required using the average gas composition over the time increment h).

h_i is the time increment for compressor or compressor station i, selected on the basis of reducing the calculation load while still having sufficient granularity to capture changes in compressor or compressor station work as operating conditions change over time.

Note: An initial time increment of one hour is suggested, to be adjusted with justification based on the variability of the pipeline operating conditions.

1.2. 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:

- compression of gas when compressors are in recycle mode;
- the use of on-site machinery, equipment and processes for the work of compression for compressors to assist the delivery of natural gas, including:
    - equipment at stations constituting part of the transmission system, such as compressor stations, metering stations and regular stations;

    - control rooms, laboratories, maintenance workshops;
    - 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;
    - maintenance and development activities including transport of staff and materials, where the transport activity wholly occurs within the facility reporting boundary; and
    - complementary activities, such as head office, administrative and marketing operations, if they are carried out at the same location as the activity.
- 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.

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:

- processing of the natural gas upstream of the activity boundary;
- transport of the natural gas by compression into the activity, if the compression occurs upstream of the activity boundary;
- natural gas distribution pipelines with a maximum allowable operating pressure of 1,050 kilopascals or less, downstream of the activity boundary;
- local distribution within the customer's premises downstream of the transmission entity's operation control, which is normally the point of sale or delivery to the customer;
- on-site electricity generation;
- processes that are included in the definition of another production variable, such as fugitive emissions in the kilometres of transmission pipeline production variable; and
- processes that do not occur within the facility.

Ethylene and polyethylene

2. Ethene (ethylene)

2.1. Production variable definition

1. Tonnes of 100% equivalent ethene (ethylene (C_2H_4)) that is contained within ethene that:
   (a) has a concentration of ethene equal to or greater than 99% by mass; and
   (b) is produced as part of carrying on the ethene 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 ethene (ethylene (C_2H_4)) through the chemical transformation of hydrocarbons to produce ethene that has a concentration of ethene equal to or greater than 99% by mass (the **ethene production activity**).
3. The default emissions intensity is 1.96 t CO_2-e per tonne of 100% equivalent ethene.

2.2. 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:

- steam cracking ethane to produce ethylene with supplemental feedstocks used at times, including naphtha, liquefied petroleum gas or its components propane and butane;
- 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
- 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.

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.

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.

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:

- upstream production of ethane, propane, butane, LPG, naphtha or other hydrocarbon feedstock;
- downstream processing of ethylene to polyethylene;
- on-site electricity production;
- importation of ethylene from a source off-site; and
- processes that do not occur within the facility.

3. Polyethylene

3.1. Production variable definition

1. Tonnes of pelletised polyethylene that:
   (a) has a standard density equal to or greater than 0.910 g/cm^3; and
   (b) is produced as part of carrying on the polyethylene 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 polyethylene through the chemical transformation ethene (ethylene (C_2H_4)) to produce polyethylene with a standard density equal to or greater than 0.910 g/cm^3 (the polyethylene production activity).
3. The default emissions intensity is 0.136 t CO_2-e per tonne of pelletised polyethylene.
4. In this section:

standard density, for polyethylene, means the density of polyethylene moulded to a thickness of 1.9 mm using Procedure C of Annex A1 to ASTM D4703-16 (2016).

Note: In 2021, the standard could be accessed from http://www.astm.org.

3.2. 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:

- polymerisation of ethene (ethylene) with additives, including comonomers, resins and other additives to produce linear low density polyethylene, low density polyethylene and high density polyethylene;
- 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
- 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.

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.

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.

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:

- upstream production of ethylene;
- upstream production of ethane, propane, butane, LPG, naphtha or other hydrocarbon feedstock;
- on-site electricity production;
- importation of polyethylene from a source off-site; and
- processes that do not occur within the facility.

Steel manufacturing

4. Treated steel flat products

4.1. Production variable definition

1. Tonnes of treated steel flat products that:
   (a) are produced as part of carrying on the treated steel flat products activity at the facility; and
   (b) are flat in profile, such as plate and coil; and
   (c) have not previously been included as a tonne of treated steel flat products under this section; and
   (a) have been treated with one or a combination of the following processes:
      a. annealing;
      b. metal coating;
      c. painting.
   (d) are of saleable quality.
2. The metric in subsection (1) is applicable to a facility that conducts the activity of transforming hot-rolled steel coil, using a combination of physical or chemical processes, into treated steel flat products that:
   (b) are flat in profile, such as plate and coil; and
   (c) have involved the pickling and cold-rolling of hot-rolled steel coil; and
   (d) have been treated with one or a combination of the following processes:
      d. annealing;
      e. metal coating;
      f. painting.
3. The activity in subsection (2) is the ***treated steel flat products activity***.
4. The default emissions intensity is 0.144 t CO_2-e per tonne of treated steel flat products.

4.2. Inclusions

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

- the use of machinery, equipment and processes for the physical and/or chemical transformation described in the activity definition, including, for example:
  - the pickling, cold reduction, annealing, metal coating and painting processes;
  - 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;
    - the on-site recovery and processing of steel scrap; and
    - on-site 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;
- on-site transportation of steel products;
- 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.

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.

4.3. 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 upstream processes, including, but not limited to the production of hot-rolled steel coil;
- processes which do not occur within the facility; and
- on-site electricity generation.

Food manufacturing

5. Wheat Protein Products (Dried Gluten)

5.1. Production variable definition

1. Tonnes of the following products produced as part of carrying on the wheat protein products production activity at the facility that meet the requirements of subsection (2):
   (a) vital wheat gluten;
   (b) devitalised wheat gluten;
   (c) solubilised wheat proteins.
2. The requirements for products to be included in subsection (1) are that the products:
   (a) do not have a moisture content that exceeds 10% (as a gravimetric water content); and
   (b) for vital and devitalised wheat gluten, have at least 80% crude protein (on a dry solids basis, where nitrogen content is multiplied by 6.25); and
   (c) for solubilised wheat proteins, have at least 60% crude protein (on a dry solids basis, where nitrogen content is multiplied by 6.25); and
   (d) exclude added vitamins, minerals, amino acids, and optional ingredients on a dry weight basis; and
   (e) are of saleable quality.
3. The metric in subsection (1) is applicable to a facility that conducts the activity of producing wheat protein products by the physical and chemical transformation of wheat into one or more of the products listed in subsection (1) that meet the requirements in subsection (2).
4. The activity in subsection (3) is the ***wheat protein products production activity***.

5.2. Inclusions

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

- The production of steam in boilers for use in the activity.
- The production of heat energy for drying.
- The use of on-site machinery, equipment, and processes for the physical and/or chemical transformation described in the activity definition above, including, for example:
  - machinery used to move materials within and as part of the activity;
  - control rooms, laboratories, maintenance workshops;
  - machinery used to create other 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;

- waste heat recovery within the facility;
- the onsite processing of waste materials; 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.

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.

5.3. Exclusions

Covered emissions from the following processes are 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:

- flour milling done either on-site or elsewhere in the process;
- upstream wheat production, gathering, and transfer that occurs off-site;
- on-site wastewater treatment of sludge from the production process, unless reported as covered emissions under NGER;
- processes that are included in the definition of another production variable, e.g. dried wheat starch, wheat based glucose, wheat based dried distillers grain, fuel ethanol, or beverage grade ethanol;
- processes which do not occur within the facility; and
- on-site electricity generation.

6. Dried Wheat Starch

6.1. Production variable definition

1. Tonnes of the following products produced as part of carrying on the dried wheat starch production activity at the facility that meet the requirements of subsection (2):
   (a) dried wheat starch;
   (b) modified and resistant starches.
2. The requirements for products to be included in subsection (1) are that the products:
   (a) have a moisture content of no more than 13% (as a gravimetric water content); and
   (b) have a protein content of no more than 0.35% (on a dry solids basis, where nitrogen content is multiplied by 5.7); and
   (c) for unmodified dried wheat starch covered by paragraph (1)(a), have a Brabender peak viscosity of no less than 500 Brabender Units at 8% solids (on a dry solids basis) when measured in accordance with standard industry practices; and
   (d) are of saleable quality.
3. The metric in subsection (1) is applicable to a facility that conducts the activity of producing dried wheat starch through the removal of non-starch fractions of the wheat flour by physical and chemical transformation of wheat into one of the products listed in subsection (1) that meet the requirements in subsection (2).
4. The activity in subsection (3) is the ***dried wheat starch production activity***.

6.2. Inclusions

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

- the production of steam in boilers for use in the activity;
- the production of heat energy for drying;
- the use of on-site machinery, equipment, and processes for the physical and/or chemical transformation described in the activity definition above, including, for example:
  - machinery used to move materials within and as part of the activity;
  - control rooms, laboratories, maintenance workshops;
  - machinery used to create other 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;
  - waste heat recovery within the facility;
  - the onsite processing of waste materials; 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.

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.

6.3. Exclusions

Covered emissions from the following processes are 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:

- flour milling done either on-site or elsewhere in the process;
- upstream wheat production, gathering, and transfer;
- processes that are included in the definition of another production variable, e.g. wheat protein products, wheat based glucose, wheat based dried distillers grain, fuel ethanol, or beverage grade ethanol;
- processes which do not occur within the facility; and
- on-site electricity generation.

7. Wheat Based Glucose

7.1. Production variable definition

1. Tonnes of the following products produced as part of carrying on the wheat based glucose production activity at the facility that meet the requirements of subsection (2):
   (a) wheat based glucose syrup;
   (b) maltodextrin.
2. The requirements for products to be included in subsection (1) are that the products:
   (a) for wheat based glucose syrup, is produced from wheat to a total solids percentage of between 67% to 84%; and
   (b) for wheat based glucose syrup has a dextrose equivalent content of not less than 20% (expressed as D-glucose on a dry weight basis); and
   (c) for maltodextrin:
      a. may be dried to a moisture content that does not exceed 10% (as a gravimetric water content); and
      b. has a dextrose equivalent content of between 10% and 20% (expressed as D-glucose on a dry weight basis); and
   (d) are of saleable quality.
3. The metric in subsection (1) is applicable to a facility that conducts the activity of producing wheat based glucose through the physical and chemical transformation of wheat starch into one of the products listed in subsection (1) that meet the requirements in subsection (2).
4. The activity in subsection (2) is the ***wheat based glucose production activity***.

7.2. Inclusions

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

- The production of steam in boilers for use in the activity
- The production of heat energy for drying
- The use of on-site machinery, equipment, and processes for the physical and/or chemical transformation described in the activity definition above, including, for example:
  - machinery used to move materials within and as part of the activity;
  - control rooms, laboratories, maintenance workshops;
  - machinery used to create other 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;
  - waste heat recovery within the facility;
  - the onsite processing of waste materials; 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.

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.

7.3. Exclusions

Covered emissions from the following processes are 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:

- flour milling done either on-site or elsewhere in the process;
- upstream wheat production, gathering, and transfer;
- on-site wastewater treatment of sludge from production process, unless reported as covered emissions under NGER;
- processes that are included in the definition of another production variable, e.g. wheat protein products, dried wheat starch, wheat based dried distillers grain, fuel ethanol, or beverage grade ethanol;
- processes which do not occur within the facility; and
- on-site electricity generation.

8. Wheat Based Dried Distillers Grain (DDG)

8.1. Production variable definition

1. Tonnes of wheat based dried distillers grain that are produced as part of carrying on the wheat based dried distillers grain production activity at the facility to meet the following requirements:
   (a) are a minimum of 88% dry matter on a dry solids basis; and
   (b) are a minimum of 20% crude protein (on a dry solids basis, where nitrogen is multiplied by 6.25); and
   (c) are of saleable quality.
2. The metric in subsection (1) is applicable to a facility that conducts the activity of producing wheat based dried distillers grain through the physical and chemical transformation of the non-fermentable residues of wheat starch products from the production of ethanol, where the residues are dried under heat, into wheat based dried distillers grain.
3. The activity in subsection (2) is the ***wheat based dried distillers grain production activity.***

8.2. Inclusions

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

- The production of steam in boilers for use in the activity
- The production of heat energy for drying
- The production of Condensed Distillers Solubles (CDS), which is “the liquid fraction and residues left from the production of ethanol using wheat starch by-products”
- The pelletising process and processing of additional ingredients for that process
- The use of on-site machinery, equipment, and processes for the physical and/or chemical transformation described in the activity definition above, including, for example:
  - machinery used to move materials within and as part of the activity;
  - control rooms, laboratories, maintenance workshops;
  - machinery used to create other 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;
  - waste heat recovery within the facility;
  - the onsite processing of waste materials; 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.

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.

8.3. Exclusions

Covered emissions from the following processes are 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:

- flour milling done either on-site or elsewhere in the process;
- upstream wheat production, gathering, and transfer;
- on-site wastewater treatment of sludge from production process, unless reported as covered emissions under NGER;
- processes that are included in the definition of another production variable, e.g. wheat protein products, dried wheat starch, wheat based glucose, fuel ethanol, or beverage grade ethanol;
- processes which do not occur within the facility; and
- on-site electricity generation.

9. Ethanol—95

9.1. Production variable definition

1. Kilolitres of ethanol produced as part of carrying on the ethanol—95 production activity at the facility that meet the requirements of subsection (2).

2. The requirements for ethanol to be included in subsection (1) are the ethanol:

   (a) is produced with a minimum 95% ethanol content by volume; and

   (b) is not further processed into ethanol—absolute or beverage grade ethanol covered by sections 93 and 94 or otherwise included in those production variables; and

   (c) is of saleable quality.

3. The metric in subsection (1) is applicable to a facility that conducts the activity of producing ethanol through the physical and chemical transformation of feedstocks into ethanol that meet the requirements in subsection (2).

4. The activity in subsection (3) is the ***ethanol–95 production activity***.

9.2. Inclusions

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

- the production of steam in boilers for use in the activity;
- the production of heat energy for processes such as drying and concentrating;
- the use of on-site machinery, equipment, and processes for the physical and/or chemical transformation described in the activity definition above, including, for example:
  - machinery used to move materials within and as part of the activity;
  - control rooms, laboratories, maintenance workshops;
  - machinery used to create other 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 by-products and waste materials from the activity;
  - waste heat recovery within the facility;
- 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.

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

Covered emissions from the following processes are 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:

- feedstock preparation included in another production variable, or occurs off-site;
- upstream feedstock production, gathering, and transfer;
- processes that are included in the definition of another production variable, e.g. Wheat Protein Products, Dried Wheat Starch, Beverage Grade Ethanol or Ethanol – Absolute;
- processes which do not occur within the facility; and
- on-site electricity generation.

10. Ethanol—Absolute

10.1. Production variable definition

1. Kilolitres of ethanol produced as part of carrying on the ethanol—absolute production activity at the facility that meet the requirements of subsection (2).

2. The requirements for ethanol to be included in subsection (1) are that the ethanol:

   (a) is produced with a minimum 99% ethanol content by volume; and

   (b) is not further processed into beverage grade ethanol covered by section 94 or otherwise included in the ethanol production variables under sections 92 or 94; and

   (c) is of saleable quality.

3. The metric in subsection (1) is applicable to a facility that conducts the activity of producing ethanol through the physical and chemical transformation of feedstocks into ethanol that meet the requirements in subsection (2).

4. The activity in subsection (3) is the ***ethanol—absolute production activity***.

10.2. Inclusions

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

- The production of steam in boilers for use in the activity.
- The production of heat energy for processes such as drying and concentrating.
- The use of on-site machinery, equipment, and processes for the physical and/or chemical transformation described in the activity definition above, including, for example:
  - machinery used to move materials within and as part of the activity;
  - control rooms, laboratories, maintenance workshops;
  - machinery used to create other 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 by-products and waste materials from the activity;
  - waste heat recovery within the facility;
- 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.

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.

10.3. Exclusions

Covered emissions from the following processes are 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:

- feedstock preparation included in another production variable, or occurs off-site;
- upstream feedstock production, gathering, and transfer;
- processes that are included in the definition of another production variable, e.g. Wheat Protein Products, Dried Wheat Starch, Beverage Grade Ethanol or Fuel Grade Ethanol;
- processes which do not occur within the facility; and
- on-site electricity generation.

11. Beverage Grade Ethanol

11.1. Production variable definition

1. Kilolitres of ethanol produced as part of carrying on the beverage grade ethanol production activity at the facility that meet the requirements of subsection (2).

2. The requirements for ethanol to be included in subsection (1) are that the ethanol:

   (a) would otherwise be eligible as ethanol—95 or ethanol—absolute, but is not included in the tonnes of those products under section 92 or 93; and

   (b) has been processed to a higher degree of purity than ordinarily required for ethanol—95 or ethanol—absolute, to a standard for use in beverages and other forms of human consumption; and

   (c) is of saleable quality.

3. The metric in subsection (1) is applicable to a facility that produces beverage grade ethanol through the physical and chemical transformation of feedstocks into ethanol that meets the requirements in subsection (2).

4. The activity in subsection (3) is the ***beverage grade ethanol production activity***.

11.2. Inclusions

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

- The production of steam in boilers for use in the activity.
- The production of heat energy for drying.
- The use of on-site machinery, equipment, and processes for the physical and/or chemical transformation described in the activity definition above, including, for example:
  - machinery used to move materials within and as part of the activity;
  - control rooms, laboratories, maintenance workshops;
  - machinery used to create other 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 by-products and waste materials from the activity;
  - waste heat recovery within the facility;
- 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.

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.

11.3. Exclusions

Covered emissions from the following processes are 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:

- feedstock preparation included in another production variable, or occurs off-site;
- upstream feedstock production, gathering, and transfer;
- processes that are included in the definition of another production variable, e.g. Wheat Protein Products, Dried Wheat Starch, Ethanol - 95 or Ethanol – Absolute;
- processes which do not occur within the facility; and
- on-site electricity generation.

12. Raw Sugar

12.1. Production variable definition

1. Tonnes of raw sugar that:
   (a) is produced as part of carrying on the raw sugar manufacturing activity at the facility; and
   (b) is generally useable in sugar refining activities; and
   (c) is of saleable quality.
2. The metric in subsection (1) is applicable to a facility that conducts the activity of manufacturing raw sugar through the physical or chemical transformation of sugar cane or other plant matter into raw sugar that:
   (a) is generally useable in sugar refining activities; and
   (b) is of saleable quality.
3. The activity in subsection (2) is the ***raw sugar manufacturing activity.***
4. The default emissions intensity is 0.0311 t CO_2-e per tonne of raw sugar.

12.2. Inclusions

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

- handling and storing of plant matter undertaken within the facility boundary;
- the raw sugar manufacturing process from receipt of plant matter, including any crushing, washing, shredding, rolling, concentrating, crystallizing, clarifying, evaporating, centrifuging and drying processes, and up to and including the finishing, packaging and on-site storing of the raw sugar and associated by-products, such as bagasse or molasses;
- the processing of by-products where they involve the recovery of materials for re-use within the activity, resale or are necessary for the activity to proceed as described;
- complementary processes, such as packaging, head office, administrative and marketing operations where they are undertaken at the site of 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;
  - 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 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; 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.

12.3. 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;
- the manufacture of steam for export;
- processes that do not occur within the facility; and
- processes that are included in the definition of another production variable.

13. Exported steam related to the raw sugar manufacturing activity

13.1. Production variable definition

1. Gigajoules of steam that:
    (a) is generated at a sugar mill by heating water; and
    (b) is transferred or exported to another facility for use at that facility.
2. The metric in subsection (1) is applicable to a facility that:
    (a) conducts the raw sugar manufacturing activity; and
    (b) is structured such that energy (including steam and with or without the export of electricity) is intended to be the only output from the facility for a portion of the year under ordinary operating conditions, such as a facility with a seasonal output which exports energy year-round.
3. The gigajoules of steam exported must be:
    (a) measured consistently with the NGER (Measurement) Determination, including the principles in section 1.13 and reporting requirements under the NGER Regulations; and
    (b) calculated as total steam exported for a reporting period; and
    (c) unless in conflict with paragraph (a), measured consistently at the facility over time.
4. The default emissions intensity is 0.0490 t CO_2-e per gigajoule of steam.

13.2. 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 steam generation process for steam that is exported outside the facility, with the amount of steam exported being consistent with what is reported under NGERs.

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.

Measurement of Steam Exported

The output metric of the activity is defined as gigajoules of steam generated at the facility during the reporting period and transferred outside the NGER facility boundary. The amount of steam exported is estimated in accordance with the methods described in the NGER (Measurement) Determination each reporting period.

13.3. 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:

- any steam generated and used on-site, for example for electricity generation or another process at the facility;
- processes that are included in the definition of another production variable, e.g. manufacture of raw sugar;
- on-site electricity generation; and
- processes that do not occur within the facility.