EXPLANATORY STATEMENT

Select Legislative Instrument 2012 No. 226

Issued by the Authority of the Minister for Climate Change and Energy Efficiency

Clean Energy Act 2011

Clean Energy Amendment Regulation 2012 (No. 6)

Section 312 of the *Clean Energy Act 2011* (the Act) provides, in part, that the Governor-General may make regulations prescribing matters required or permitted by the Act, or necessary or convenient to be prescribed for carrying out or giving effect to the Act.

The Act, together with the other Acts in the Clean Energy Legislative Package, establishes the carbon pricing mechanism as part of the Government's climate change plan.

One of the objectives of the Act is to put a price on greenhouse gas emissions in a way that supports jobs and competitiveness in the economy. Part 7 of the Act provides for the establishment of the Jobs and Competitiveness Program (the Program) to support jobs and protect the competitiveness of emissions-intensive trade-exposed (EITE) industries. EITE activities are industrial activities that produce a lot of carbon pollution but where the capacity of entities undertaking those activities to pass on carbon costs is constrained where prices are set by global markets. Section 145 of the Act provides that the Regulations may formulate the details of the Program for the annual issue of free carbon units in relation to EITE activities as defined by the Program. The Program was first established in amendments to the *Clean Energy Regulations 2011* (the Principal Regulations) on 24 February 2012.

The *Clean Energy Amendment Regulation 2012 (No. 6)* amends the Principal Regulations to:

- implement a mechanism to provide a supplementary allocation of assistance in the form of free carbon units under the Program to eligible entities that undertake the production of liquefied natural gas (LNG), which is an eligible EITE activity. The supplementary allocation adjustment ensures an effective assistance rate of no less than 50 per cent in relation to an LNG project's direct and indirect electricity emissions in the previous financial year;

- include the production of ceramic floor and wall tiles as an eligible EITE activity under the Program and outline the baselines in Part 4 for this activity for determining the amount of assistance in the form of free carbon units that each applicant would be eligible for in relation to the activity; and

- amend the basis for calculating assistance in the form of free carbon units under the Program in respect of two existing eligible EITE activities – the production of chlorine gas and sodium hydroxide (caustic soda) solution; and the production of fused zirconia – to reflect additional data that has been received by the Government in for these activities by:

    - amending the direct emissions baseline and the electricity baseline in Part 4, which are the bases for calculating free carbon units in respect of the direct

emissions from and electricity used in the two EITE activities – the production of chlorine gas and sodium hydroxide (caustic soda) solution; and the production of fused zirconia; and

- amending the category of assistance in Part 3 for the production of fused zirconia activity from moderately emissions-intensive to highly emissions-intensive. The category of assistance refers to the rate of assistance that applies for activities that are determined to be eligible under the Program as either highly emissions-intensive (with an assistance rate starting at 94.5 per cent in 2012-13) or moderately emissions-intensive (with an assistance rate starting at 66 per cent in 2012-13).

Subsection 145(5) of the Act provides that in making a recommendation to the Governor-General about regulations that amend regulations made for the purposes of subsection 145(1) of the Act, the Minister must have regard to the following matters:

- the aim and objects of this Part 7 of the Act;
- the most recent report given to the Productivity Minister by the Productivity Commission in relation to an inquiry mentioned in section 155 of the Act;
- the principle that changes that will have a negative effect on recipients of assistance under the Program should not take effect before the later of the following
  - 1 July 2017; and
  - the end of the 3-year period that begins when the reduction is announced;
- such other matters (if any) as the Minister considers relevant.

There are currently no relevant reports from the Productivity Commission.

The Minister for Climate Change and Energy Efficiency has given regard to the aim and objects of Part 7 of the Act and the principle that changes that will have a negative effect on recipients of assistance under the Program should not take effect before the later of the 1 July 2017 or the end of the 3-year period that begins when the reduction is announced.

A Human Rights Statement in respect of the Regulation is included at Attachment A.

Details of the Regulation are set out in Attachment B.

The Act does not specify conditions that need to be satisfied before the power to make the Regulation may be exercised in addition to the consideration of the matters in subsection 145(5) of the Act.

The Regulation is a legislative instrument for the purposes of the *Legislative Instruments Act 2003.*

The Regulation commences on the day after it is registered on the Federal Register of Legislative Instruments.

Consultation

The Clean Energy Legislative Package reflects the outcomes of comprehensive consultation with the public and stakeholders. Since the passage of the Clean Energy Legislative Package, the Government has consulted extensively with those covered by the mechanism and related reforms in relation to implementation and compliance issues.

In particular, the Department of Climate Change and Energy Efficiency has undertaken an extensive consultation process to establish the eligibility of EITE activities and develop Regulations to implement the Program.

The clauses concerning the supplementary allocation adjustment to be provided to applicants under the Program that undertake the production of LNG activity reflect the outcomes of comprehensive consultation with the industry body and stakeholders.

The policy framework for determining the eligibility of EITE activities for assistance under the Program was originally developed in 2009 and has also been used to establish the eligibility of activities with respect to assistance provided under the Renewable Energy Target (RET) scheme – *Renewable Energy (Electricity) Act 2000*. The process for assessing activities and defining the technical aspects of the activities, including setting assistance rates and allocative baselines, is outlined in the paper titled *Establishing the eligibility of activities under the Jobs and Competitiveness Program.*

The formal process for defining and determining the eligibility of an EITE activity involves a stakeholder workshop to formulate an appropriate activity definitions and boundary, and approval of the activity definition by the Minister for Climate Change and Energy Efficiency for the purposes of data collection. Audited data based on the approved definition is then submitted to the Government. If determined to be eligible, stakeholders in the relevant industry are consulted in regard to the drafting of the definitions to be included in the Regulations to ensure that the structure of the definitions generally reflects the conduct of the activities.

Authority: Section 312 of the
Clean Energy Act 2011

Attachment A

Statement of Compatibility with Human Rights

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

Clean Energy Amendment Regulation 2012 (No. 6)

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

Overview of the Clean Energy Amendment Regulation 2012 (No. 6)

The Regulation is designed to implement the supplementary allocation for assistance to entities undertaking the production of liquefied natural gas (LNG) to ensure an effective rate of assistance of 50 per cent in relation to the production of LNG each year.

The Regulation is also designed to include additional activities as eligible under the Jobs and Competitiveness Program (the Program) and amend the basis for calculating assistance for some existing eligible activities. The Program is a key component of the carbon pricing mechanism targeted at supporting industries that produce a lot of carbon pollution but are constrained in their capacity to pass through costs in global markets.

Human rights implications

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

Conclusion

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

Greg Combet

Minister for Climate Change and Energy Efficiency

Attachment C

Details of the *Clean Energy Amendment Regulation 2012 (No. 6)*

PART 1 - PRELIMINARY

Section 1 – Name of Regulation

Section 1 provides that the title of the Regulation is the *Clean Energy Amendment Regulation 2012 (No. 6)* (the Regulation).

Section 2 – Commencement

Section 2 provides that the Regulation commences on the day after it is registered on the Federal Register of Legislative Instruments.

Section 3 – Amendment of *Clean Energy Regulations 2011*

Section 3 provides that the Regulation amends the *Clean Energy Regulations 2011* (the Principal Regulations).

Schedule 1 - Amendments

Item [1] – Regulation 21.1, table, after item 7

This item inserts into the table of reviewable decisions a decision under clause 915 of the program to determine a final LNG emissions number for a LNG project.

Item [2] – Schedule 1, subclause 201 (1)

This item inserts the definition for category A emissions and category B emissions into subclause 201 (1).

Item [3] – Schedule 1, subclause 201 (1)

This item inserts the definition for eligible LNG emissions into subclause 201(1).

Item [4] – Schedule 1, subclause 201 (1)

This item inserts the definition for the final LNG emissions number into subclause 201(1). The term ‘final LNG emissions number’ is used to refer to the LNG emissions number calculated by the Regulator which is worked out as the sum of category A emissions and category B emissions for the relevant financial year, attributable to LNG production and apportioned to LNG production where emissions are attributable to both LNG and saleable by-products.

Item [5] – Schedule 1, subclause 201 (1)

This item inserts definitions for LNG facility, LNG project, LNG supplementary allocation adjustment and LNG supplementary allocation rules into subclause 201(1).

The term ‘LNG facility’ is used to refer to a facility, other than an upstream LNG facility, that carries out the activity of producing liquefied natural gas either wholly or partly.

The term ‘LNG project’ is used to refer to all of the following:

- one or more LNG facilities where the LNG activity is carried out; and
- one or more upstream LNG facilities, where some or all the gas mixture containing natural gas extracted, transported and/or handled at these facilities is ultimately transformed to liquefied natural gas at the LNG facility or facilities, whether or not the facilities are co-located.

Item [6] – Schedule 1, subclause 201 (1)

This item inserts the definition for network or pipeline facility into subclause 201(1).

Item [7] – Schedule 1, subclause 201 (1)

This item inserts the definition for the provisional LNG emissions number into subclause 201(1). The term ‘provisional LNG emissions number’ is used to refer to the LNG emissions number calculated by the applicant and included in an application for assistance, which is worked out as the sum of category A emissions and category B emissions for the relevant financial year, attributable to LNG production. The method for calculating this number is prescribed in clause 915.

Item [8] – Schedule 1, subclause 201 (1)

This item inserts the definition for upstream LNG facility into subclause 201(1). The term ‘upstream LNG facility’ is used to refer to a facility which extracts a gas mixture containing natural gas or a pipeline that supplies the gas mixture containing natural gas as part of an LNG project. To be part of an LNG project, some or all natural gas handled or transported by an upstream LNG facility must be liquefied at an LNG facility that on 30 June of the previous financial year had a maximum productive capacity of at least 500,000 tonnes of LNG. These definitions are intended to extend the boundary of eligible emissions beyond the facilities that would only conduct the ordinary LNG activity to include facilities that are part of an LNG project.

For an LNG project with an LNG facility with a productive capacity of less than 500,000 tonnes of LNG on 30 June of the previous financial year, an upstream LNG facility is any facility that is supplied natural gas from a network or pipeline facility (mentioned in the *National Greenhouse and Energy Reporting Regulations 2008* (NGER Regulations) sub-regulation 2.20(2)) that handles natural gas before it is transferred to a place where some or all the natural gas is to be liquefied at the LNG facility. An upstream LNG facility is not any facility that extracts a gas mixture containing natural gas from an upstream geological formation.

Item [9] – Schedule 1, subclause 343 (3)

This item amends subclause 343 to provide that the production of fused zirconia is a highly emissions-intensive activity, which changes the assistance rate for which this activity is eligible. This amendment reflects further analysis of the activity based on additional data

received by the Government from entities in the industry that undertook this activity during the base period.

This amendment to the assistance category takes effect for applications under the Program in relation to the 2012-13 application year and subsequent years.

In relation to the change to the assistance rate for the production of fused zirconia activity, the Minister has had regard to the principle that changes that will have a negative effect on recipients of assistance under the Program should not take effect before the later of 1 July 2017 or three years from when the change is announced. The effect of the amendment results in an increase in the allocation of free carbon units per tonne of relevant product that is described for the activity.

Item [10] – Schedule 1, after clause 346

Division 47 Production of ceramic floor and wall tiles

Clause 347 – Production of ceramic floor and wall tiles

This item prescribes an additional activity as an eligible EITE activity for free carbon units under the Program.

Clause 347 provides that the production of ceramic floor and wall tiles is the physical and chemical transformation of raw clay and other raw materials, such as feldspar and quartz, into saleable ceramic floor and wall tiles. The tiles that are produced by undertaking the activity conform to the international standard of ISO 13006:2012 (issued by the International Organisation of Standardization) as in force at the time the tiles are produced, including updates to this standard, or an equivalent standard.

The production of ceramic floor and wall tiles is an EITE activity eligible for assistance at the moderately emissions-intensive rate.

The activity as conducted during the period used to assess the eligibility of the activity involved the onsite grinding and milling of clay and raw materials to produce tile composite; tile rolling, pressing and cutting; preparation and application of glaze and other tile decorating; and operation of kilns and spray dryers to produce ceramic floor and wall tiles.

The inputs of the activity have been defined to include clay and other raw materials. The output of this activity is saleable ceramic floor and wall tiles that conform to ISO 13006:2012 as in force at the time the tiles are produced, or an equivalent standard.

The activity does not include the upstream mining and extraction of input materials such as clay, feldspar and quartz. The activity also does not include the production of glaze.

Subclause 347(4) outlines that the basis of issue is per tonne of ceramic floor and wall tiles that conform to ISO 13006:2012 or an equivalent standard. The measurement of the relevant ceramic floor and wall tiles should be measured according to the accepted industry practice for ceramic floor and wall tile production.

To be eligible for assistance, the ceramic floor and wall tiles must have been produced by carrying on the activity (as defined by clause 347) to be eligible as a relevant product. For example, if imported ceramic floor and wall tiles are included with the product produced

from the activity, only the domestically produced ceramic floor and wall tiles would be included in the tonnes of the relevant product.

The ceramic floor and wall tiles must be of saleable quality (as defined by regulation 202). In particular, the tonnes of ceramic floor and wall tiles which are scrapped, lost or discarded are not to be included in the tonnes of relevant product.

Item [11] – Schedule 1, subclause 401 (1), table, item 1.31

This item amends the basis for the issue of free carbon units in respect of the production of chlorine gas and sodium hydroxide (caustic soda) activity (outlined in Schedule 1, Part 3, Division 42) by changing the allocative baselines for direct emissions and electricity used in the activity. This amendment reflects additional data received by the Government from entities in the industry that undertook this activity during the base period. The amendment to the allocative baselines takes effect for applications for assistance under the Program for the 2012-13 year and subsequent years.

In relation to the change to the baselines for the production of chlorine gas and sodium hydroxide activity, the Minister has had regard to the principle that changes that will have a negative effect on recipients of assistance under the Program should not take effect before the later of 1 July 2017 or three years from when the change is announced. The effect of the amendments to the baselines results in an overall increase in the allocation of free carbon units per tonne of relevant product that is described for the activity.

Item [12] – Schedule 1, subclause 401 (1), table, after item 1.32

This item amends the basis for the issue of free carbon units in respect of the production of fused zirconia activity (outlined in Schedule 1, Part 3, Division 43) by changing the allocative baselines for direct emissions and electricity used in the activity. This amendment reflects further analysis of the activity based on additional data received by the Government from entities in the industry that undertook this activity during the base period. The amendment also addresses a drafting error in respect of the direct emissions baseline for this activity. The amended allocative baselines take effect for applications for assistance under the Program for the 2012-13 year and subsequent years.

In relation to the change to the baselines for the production of fused zirconia, the Minister has had regard to the principle that changes that will have a negative effect on recipients of assistance under the Program should not take effect before the later of 1 July 2017 or three years from when the change is announced. The amendment to the baselines results in an increase in the allocation of free carbon units per tonne of relevant product that is described for the activity.

Item [13] – Schedule 1, subclause 401 (1), table, item 2.11

This item inserts into the table in Part 4 of Schedule 1 allocative baselines for assistance that relate to the production of ceramic floor and wall tiles as prescribed by item 10, which is categorised as a moderately emissions-intensive activity.

The baselines are for the direct emissions and electricity use for the activity in clause 347. The baselines have been established as the weighted industry average of the emissions and electricity intensity of the activities, based on historical data submitted by the entities

undertaking the activity during the base period, consistent with the principles of the JCP outlined in *Establishing the eligibility of activities under the Jobs and Competitiveness Program*.

The formula for calculating the number of free permits in Part 9 of Schedule 1 to the Regulations applies the baselines as outlined in the table.

Item [14] – Schedule 1, subparagraph 604 (7) (c) (ii)

This item amends subparagraph 604 (7) (c) (ii) in order to insert a new paragraph described in item 15.

Item [15] – Schedule 1, after paragraph 604 (7) (c)

Paragraph 604 (7) (d)

This item inserts a new subparagraph (d) (i) into regulation 604 (7) which requires that the auditor set out in its report, a reasonable assurance opinion as to whether the provisional LNG emissions Number is presented fairly, in all material aspects, in accordance with the LNG supplementary allocation rules (Part 9, Division 10) and measurement policies adopted and disclosed by the applicant.

Subparagraph (ii) requires that the auditor set out in its report, a reasonable assurance opinion as to whether the process flow diagrams used to attribute emissions to LNG production as described in paragraph 916 (2) (e) presents the flows of inputs and outputs of LNG and saleable by-products through LNG project fairly. This is intended to interact with paragraph 916 (2) (e) which requires that the process flow diagram be based on fair and reasonable assumptions. The intention is that the auditor would need to check that the assumptions used in the process flow diagram would fairly represent the actual flow of inputs and outputs of LNG and saleable by-products.

Subparagraph (iii) applies if an applicant is a small-scale facility that is required to report average GJ per tonne of LNG produced in the previous financial year under paragraph 710 (2) (e). The auditor is required to set out in its report, a reasonable assurance opinion as to whether this number is presented fairly in all material respects in accordance with the definition of the LNG activity in clause 336.

Item [16] – Schedule 1, Part 7, after Division 7

This item inserts a new division after Division 7 of the Regulations.

Division 8 Special arrangements for LNG supplementary allocations

Clause 710

Clause 710 outlines the requirements of the applicant to provide a report to the Regulator, in a manner and form approved by the Regulator, detailing a number of items relevant to determining the LNG supplementary allocation adjustment number including:

a) a calculation of the provisional LNG emissions number;

b) the amount of category A emissions, and the material bases on which the amount of category A emissions were worked out including the principles, methods and policies used; and

c) the amount of category B emissions, and the material bases on which the amount of category B emissions were worked out including the principles, methods and polices used.

The Regulator may approve one or more forms that applicants who seek LNG supplementary allocation must use to meet the reporting requirement under this regulation.

Item [17] – Schedule 1, after subparagraph 902 (2) (a) (i) (E)

This item inserts a new subparagraph under subregulation 902 (2).

Subparagraph 902 (2) (a) (i) (F) requires the Regulator to provide all of the applicant's allocation of free carbon units in respect to the LNG Supplementary Allocation as soon as practicable after an application has been approved. This allocation is provided with respect to emissions in the previous financial year.

Item [18] – Paragraph 902 (3) (e)

This item amends paragraph 902 (3) (e) in order to insert a new paragraph described in item 19.

Item [19] – Paragraph 902 (3) (e)

This item inserts a new subparagraph under paragraph 902 (3) (e).

Paragraph 902 (3) (f) requires the Regulator to provide all of the applicant's allocation of free carbon units in respect to the LNG Supplementary Allocation as soon as practicable after an application has been approved. This allocation is provided with respect to emissions in the previous financial year.

Item [20] – Schedule 1, after clause 913

This item inserts two new divisions after clause 913 of the Regulations.

Division 9 Calculation of supplementary allocation of units for LNG production activity

Clause 914

Clause 914 sets out the circumstances under which a supplementary allocation of units is made and how the amount of units allocated (the supplementary allocation adjustment) is calculated.

To receive a supplementary allocation:

- an application for free carbon units in relation to carrying on the LNG production activity must be made;

- in the previous financial year, an application for free carbon units in relation to carrying on the LNG production activity must have been either:
  - approved; or
  - rejected on the basis of a negative allocation number being calculated triggering a relinquishment requirement under Division 3 of Part 13; and
- in the previous financial year, at least one tonne of LNG must have been produced from the LNG Project that meets the criteria of the LNG production activity described in Division 36 of Part 3.

Clause 914 establishes the formula for working out the LNG supplementary allocation adjustment. To calculate the LNG supplementary allocation adjustment, first multiply the final LNG emissions number (worked out under Division 10 of part 9) by 50 per cent. Then subtract from this number the allocations that would have been made, with respect to the LNG activity, in the previous financial year using actual production data for that year (the starting formula). If the number worked out is negative, then the LNG supplementary allocation adjustment is equal to zero.

Division 10 LNG supplementary allocation rules

Clause 915

Clause 915 establishes the methodology by which the Regulator is required to calculate the final LNG emissions number. The final LNG emissions number is worked out by adding together the emissions attributable to LNG production from category A and category B for the relevant previous financial year. Clauses 916 and 917 detail how emissions from an LNG project may be attributed to production of LNG or saleable by-products.

Subclause 915 (2) defines eligible category A and category B emissions. Principally, category A emissions constitute direct emissions, including any direct emissions used to generate steam, that are not used to generate electricity. Whereas category B emissions constitute direct and indirect emissions used to generate electricity, including direct and indirect emissions used to generate steam that is used for the purpose of generating electricity. This categorisation of emissions is intended to enable the use of different methodologies to apportion emissions to LNG production under subclause 917.

Category A emissions include:

a) eligible covered emissions that amount to a provisional emissions number from the LNG project that are not related to electricity generation;

- note that direct emissions associated with steam generated onsite that is not used to generate electricity would be counted under this grouping of category A emissions;
- where relevant, provisional emissions numbers need to be adjusted by the prescribed percentage in accordance with section 26 to 28 of the Act. That is, where the prescribed percentage applies to reduce the liability of a tonne of emissions arising from operations in the Joint Petroleum Development Area and/or

the Greater Sunrise unit area then that same percentage needs to be applied to emissions counted within the supplementary allocation calculation;

b) eligible emissions that are attributable to the combustion of fuels that are mentioned in subsection 30 (2) of the *Clean Energy Act 2011* that are not related to electricity generation*;*

c) eligible emissions from combustion of the opt-in amount of taxable fuel specified in the Opt-in Scheme that are not related to electricity generation; and

d) eligible emissions from the generation of steam imported to the LNG project that are not related to electricity generation.

Category B emissions include:

a) eligible emissions from the LNG project that are related to electricity generation (generated within the LNG facility or upstream LNG facilities of the LNG project);

b) emissions from imported grid electricity, which is derived by multiplying the eligible imported megawatt-hours by the electricity allocation factor (EAF), where the EAF is equal to 1.0 t CO_2-e per megawatt-hour; and

c) emissions from imported electricity from another facility that is directly connected to the LNG facility by a dedicated line, which is derived by multiplying the eligible imported megawatt-hours by the emissions intensity of the imported electricity.

- With respect to all eligible emissions from electricity that is not sourced from the grid, it is intended that the actual emissions resulting from that electricity supply should be counted for the LNG supplementary allocation. The EAF of 1.0 is to be used only for electricity bought from the grid to account for the potential pass-through of carbon costs per MWh of electricity used;

- For each source of electricity generated onsite at the LNG project, the emissions intensity is worked out as the direct emissions associated with the generation of electricity that is consumed by the LNG project, measured in the same manner as reported under the NGER Act 2007, divided by the MWh of electricity consumed by the LNG project.

  Example

  Sadie Grace operates a LNG facility that uses high pressure steam to drive steam turbine generators and steam turbine compressors. All steam is generated onsite through the combustion of fuel gas. Sadie has determined through project monitoring and measurement that 70 per cent of the steam is used to drive the generators, while 30 per cent is used to drive the compressors. Sadie needs to determine whether the emissions associated with steam is eligible as category A or as category B emissions.

  The steam consumed in the steam turbine generators is used to generate electricity for use at the facility which extracts the raw gas. Emissions associated with the 70 per cent of steam used for this equipment will be eligible as category B emissions.

The steam turbine compressors are used throughout the production process, however no electricity is generated. The direct emissions associated with the generation of the remaining 30 per cent of steam will be counted as direct emissions, eligible under category A.

Subclauses 915 (4) and (5) list those sources of emissions that are specifically included as eligible LNG project emissions.

Emissions reported from facilities within the LNG project must satisfy the condition of being an emission reported for the purposes of parts 3 to 3F of the NGER Act, which can be measured using a method determined under section 10 of the NGER Act. LNG project emissions may include those emissions that arise from the following machinery, equipment and processes used in the LNG project:

a) the extraction of a gas mixture containing natural gas for liquefaction from an upstream geological formation;

b) the transportation and/or handling of an upstream gas mixture containing natural gas to a location where it is liquefied;

c) the liquefaction of natural gas;

d) the use of machinery, equipment or processes that are integral to, and essential for:

   i. the physical or chemical transformation described in the LNG production activity in part 3; or

   ii. the extraction, transportation or handling of the a gas mixture containing natural gas that is to be liquefied or consumed within the LNG project;

   For example:

   - Machinery used to move liquefied natural gas within the LNG project;

   - Machinery, equipment or processes used to conduct operations in control rooms, laboratories, maintenance workshops; and

   - Machinery used to create non-electrical energy for use in the LNG project.

e) the processing of by-products that involve the recovery of materials for re-use in the LNG project;

f) the processing within the LNG project of waste materials created at the LNG project to comply with Commonwealth, State or Territory obligations;

g) the use of gas that is not directly derived from the upstream geological formation that forms part of the LNG project for commissioning purposes;

h) the recovery of waste heat within a LNG project;

i) the consumption of steam within a LNG project;

j) the treatment of a gas mixture containing natural gas that is subsequently transformed into liquefied natural gas, including the following treatments:

   i. bulk water removal (such as the separation of water from a gas mixture containing natural gas and flaring of entrained hydrocarbons in this water);

   ii. removal of acid gases (such as carbon dioxide and hydrogen sulphide);

   iii. dehydration and mercury removal;

   iv. flaring or venting of greenhouse gases and any fugitive emissions related to that treatment or the liquefaction process (such as flaring or venting compressor seals and valves);

k) the supply of utilities (such as compressed air, nitrogen and water) used in support of the LNG project;

l) the regeneration of any catalysts or solvents used within a LNG project;

m) drilling activities where a gas mixture containing natural gas is extracted and transformed into liquefied natural gas within the LNG project;

n) the short-term buffer storage of liquefied natural gas where the volume of that buffer storage is designed specifically for enabling efficient loading of liquefied natural gas into a transportation system for transportation, as a gas or a liquid, away from the facility;

o) the loading of the liquefied natural gas on transportation (such as ocean going tankers and other waterborne vessels or facilities, pipeline systems, and road transport) other than gasification for the resupply of natural gas in gaseous form.

All of these emissions are also subject to the requirements in clause 916 which establishes how an emission should be attributed and whether it should be apportioned according to the rules at clause 917.

Subclause 915 (6) lists those sources of emissions that are specifically excluded from an LNG project. LNG Project emissions do not include emissions associated with the following machinery, equipment or processes:

a) the transportation of equipment used in the extraction, handling or liquefaction processes to storage at the LNG project;

b) the transportation of saleable by-products produced within the LNG project away from the LNG project;

c) the transportation of saleable by-products produced within the LNG project within or between LNG facilities forming part of the LNG project, if these by-products do not contain the natural gas that is to be liquefied within the LNG project;

d) processing solely for the production of saleable by-products for transportation away from the LNG project, if these by-products are not to be liquefied into liquefied natural gas by the LNG project;

For example:

- Condensate stripping operations;
- LPG fractionation; and
- Acid gas removal of a solely domestic gas stream.

e) the carrying out of complementary activities (such as packaging, operating a head office, administrative and marketing operations) whether or not these activities are carried out at the same location as the LNG project;

f) the transportation of people or supplies to and from the LNG project or the operation of accommodation buildings.

Subclause 915 (7) establishes that any emissions from the consumption of steam or electricity within an LNG project that are not reported under NGERS are not eligible LNG emissions.

Subclause 915 (8) establishes that any emissions that have not been reported from any facilities within a LNG project are not eligible emissions. This subclause is intended to allow applicants to submit their application for free allocations without needing to include emissions from facilities where the necessary data cannot be accessed.

By excluding emissions under this subclause from the final LNG emissions number, the Regulator will exclude them from the supplementary allocation adjustment provided to the applicants.

Subclause 915 (9) clarifies that any emission that cannot be measured using a method determined under section 10 of the NGER Act is not an eligible LNG emission.

Subclause 915 (10) allows the Regulator to reduce the Final LNG Emissions Number to 0 if the information in the application is insufficient, and the applicant has not provided further information at the request of the Regulator to facilitate the determination of the Final LNG Emissions number under subregulation 801 (1). This is intended to allow the Regulator to approve ordinary allocations for an application where the Final LNG Emissions Number cannot be determined, and to encourage applicants to include relevant information as required to support the calculation.

Circumstances which lead the Regulator to a conclusion that the final LNG emissions number cannot be determined include when the auditor is unable to provide an opinion under paragraph 604(7)(c) that the provisional LNG emissions number is presented fairly in all material aspects, in accordance with the LNG supplementary allocation rules, or where the application does not contain sufficient reporting required under regulation 710 to support the calculation of the provisional LNG emissions number.

Clause 916

Clause 916 establishes the rules that apply to the attribution of emissions from a particular source within an LNG project to the production of LNG. An LNG project may produce saleable by-products in addition to LNG. The LNG supplementary allocation only applies to those emissions which arise from the production of LNG. Emissions arising from the production of saleable by-products must be excluded from the amount of eligible LNG

emissions either through the attribution rules (clause 916) or through the apportionment rules (clause 917 following the application of 916).

Subclause 916 (2) defines saleable by-products as hydrocarbon products of a saleable quality, such as LPG and Domgas, which are to be measured as transported away from the LNG project.

Subparagraph 916 (2) (b) establishes the criteria that must be applied to attribute emissions to the production of LNG or saleable by-products, or to determine that emissions must be apportioned under clause 917. The criteria require that:

- if the machinery, equipment or process is demonstrated to have been used solely for the production of saleable by-products, then the emissions must not be attributed as eligible LNG emissions;

- if the machinery, equipment or process is demonstrated to have been used solely for the production of liquefied natural gas, then the emissions must be attributed as eligible LNG emissions; or

- if the machinery, equipment or process cannot be demonstrated to have been used solely for the production of saleable by-products or the production of liquefied natural gas, then the emissions must be apportioned in accordance with clause 917.

Subparagraph 916 (2) (c) establishes that applicants can demonstrate the origin of emissions by either (i) examining the molar percentage of saleable products that flow through, or are immediately upstream of, the piece of machinery, equipment of process; or (ii) by process flow diagrams that have are based on reasonable assumptions.

Subparagraph 916 (2) (c) (i) establishes that applicants can demonstrate the origin of emissions by examining the molar percentage of saleable products that flow through, or are immediately upstream of, the piece of machinery, equipment of process.

- The intention of this paragraph is to allow applicants to demonstrate the origin of emissions for a piece of machinery, equipment or process based on the closest point where a flow of hydrocarbons can be measured, so long as it is not downstream of that piece of machinery, equipment or process.

Subparagraph 916 (2) (c) (ii) establishes that applicants can demonstrate the origin of emissions by process flow diagrams that have been confirmed as a fair representation through assurance procedures.

- It is envisaged that demonstrating origin by aid of a process flow diagram will reduce compliance burden so that emissions that need to be attributed to either solely LNG or solely saleable by-products do not have to be subject to the mathematical requirement of subparagraph 916 (d) (i) (i.e. a molar percentage estimate).

- If the process flow diagram can demonstrate that only LNG flows beyond a certain point in the production process, then all emissions downstream of this point could be attributed to LNG by evidence of this process flow diagram.

- The process flow diagram needs to be based on fair and reasonable assumptions in order to be relied on for attributing emissions to the production of LNG and saleable by-products. This requirement is intended to interact with the requirement for the auditor to provide a reasonable assurance opinion that any process flow diagram used presents the flow of inputs and outputs of LNG and saleable by-products fairly (subparagraph 604(7)(d)(ii)). The intention is that the auditor would need to check that the assumptions used in the process flow diagram fairly represent the actual flow of inputs and outputs of LNG and saleable by-products.

Subparagraph 916 (2) (d) allows applicants to use subparagraphs 916 (2) (b) (i) and (ii) to attribute emissions from electricity, when using method 2 in subclause 917 (3) and electricity consumption of a particular piece of machinery, equipment, or process has not been monitored.

Example

Continuing the earlier example from the description of Regulation 915, Sadie needs to determine whether the steam emissions she previously classified into Category A and B can be entirely attributed to the production of LNG or saleable by-products. Even though all steam was generated at one source through the combustion of fuel gas, these emission can be attributable to various pieces equipment or processes throughout the production process.

Referring to Diagram 1 below, Sadie's facility has:

- *Point 1.1:* one steam turbine generator used to generate electricity in the extraction of the raw gas mixture LNG and saleable by-products;
- *Point 1.2:* one depletion compressor used in the separation process to extract condensate from the raw gas mixture;
- *Point 1.3:* one refrigerant compressor used in the liquefaction process to extract LPG and produce LNG;
- *Point 1.4:* one boil off gas compressor used in the LNG storage tank.

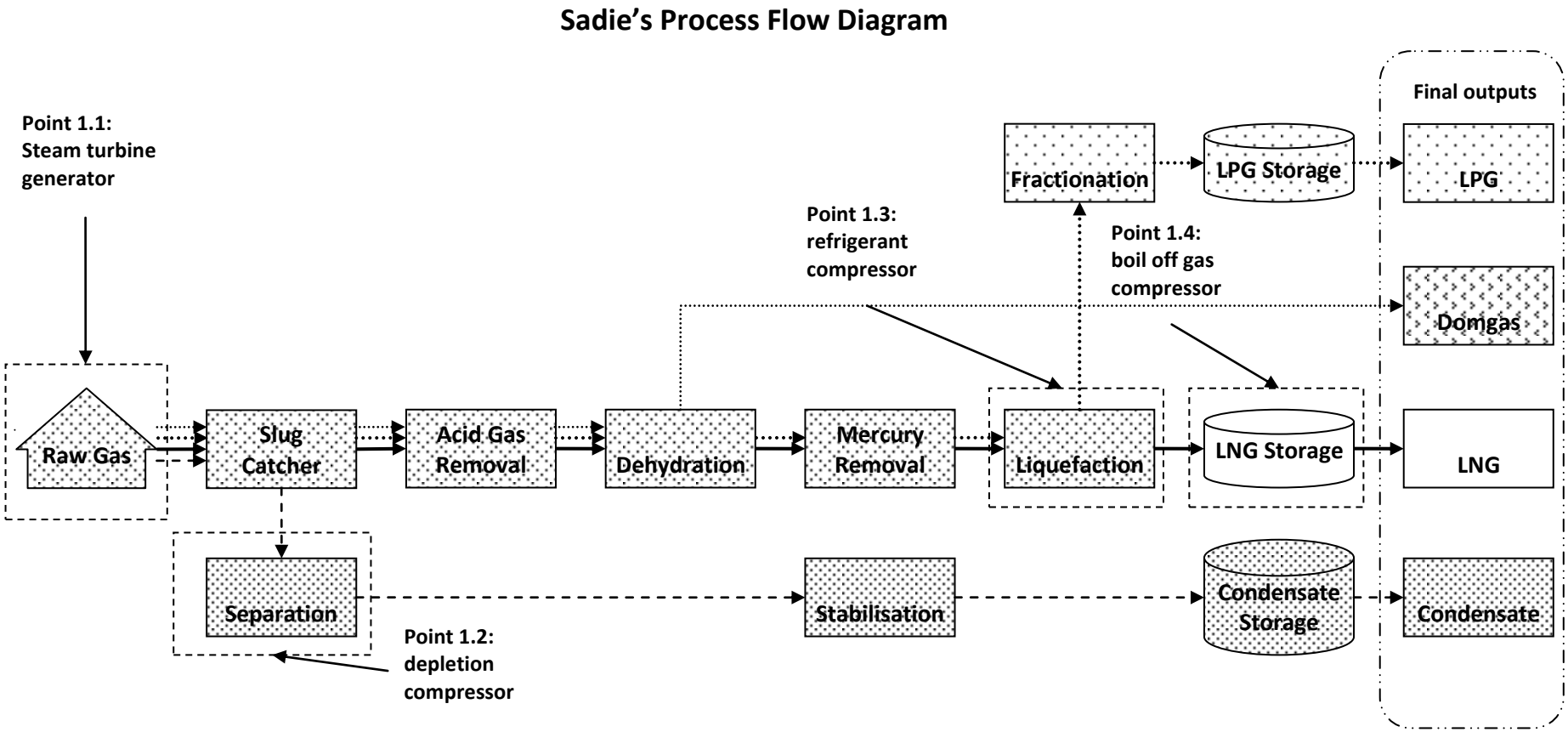
The category B emissions associated with the generation of steam used in the steam turbine generator at Point 1.1 are attributable to production of LNG and all saleable by-products. These emissions should be apportioned according to paragraph 917.

Category A emissions associated with the generation of steam used in the depletion compressor at Point 1.2 are entirely attributable to condensate production. These emissions are excluded from eligible LNG emissions.

Category A emissions associated with generation of steam used in the refrigerant compressor at Point 1.3 are attributable to both LNG and LPG production. These emissions should be apportioned according to paragraph 917.

Category A emissions associated with the generation of steam used in the boil off compressor at Point 1.4 are entirely attributable to the production of LNG. These emissions should be included as eligible LNG emissions without any apportioning.

Diagram 1: Attributing Category A and Category B emissions associated with steam generation



Clause 917

Clause 917 establishes the methodology for apportioning category A and category B emissions which cannot be wholly attributed to the production of LNG or saleable by-products.

The methodologies in clause 917 set out how electricity and non-electricity emissions attributable to a piece of equipment or process can be apportioned to production of LNG based on the molar percentage of the LNG, relative to the total moles of LNG and all other saleable by-products.

Two types of molar percentage are defined, depending on where measurement of the LNG and saleable by-products occurs and is elected to be used:

- The 'final molar percentage' is measured from final outputs transported away from the LNG project and is equal to the total number of moles of LNG that meets the criteria of the LNG activity definition divided by the total number of moles of LNG and all other saleable by-products.

- The 'process molar percentage' is a measure of the proportion of the number of moles of LNG that meet the criteria of the LNG activity definition compared to the total moles of LNG and all other saleable by-products which have flowed through a piece of equipment or process. The process molar percentage for a particular piece of equipment or process may be determined by direct measurement, or through back-calculation using the process flow diagram mentioned in 916 (2) (d) (ii) to determine which saleable by-products measured in the final molar percentage have flowed through at that point in the production process.

Subclauses 917 (2) and 917 (3) set out separate apportioning methodologies for category A emissions and category B recognising that additional steps may need to be taken in order to identify electricity emissions from machinery, equipment or a process. It is intended that any given emission can only be counted once across the various apportioning methodologies.

Similar to the methods for measurement in the NGER Act, progressively accurate emissions apportionment methodologies have been developed. Entities are encouraged to use higher order apportionment methodologies where they are more cost effective.

Subclause 917 (2) proposes methodologies for apportioning eligible category A emissions to LNG production. These emissions include eligible emissions that face a direct or indirect carbon price, that arise from the LNG facility or upstream LNG facility of an LNG project or imported steam from another facility, excluding any emissions associated with electricity generation.

Category A emissions may be apportioned using either the final molar percentage (method 1) or process molar percentage (method 2).

Method 1 is summarised as follows:

Eligible LNG emissions apportioned = $residual\ category\ A\ emissions\ \times\ FMP$

Where:

- residual category A emissions are the category A emissions that have not been apportioned using another method (residual after method 2).
- FMP is the final molar percentage as described above.

Method 2 is summarised as follows:

Eligible LNG emissions apportioned
= $Category\ A\ emissions\ from\ a\ piece\ of\ equipment\ or\ single\ process \times PMP$

Where:

- PMP is the process molar percentage as described above.

The applicant has a choice of using method 1 or 2, or a combination of both. For example, if an applicant can isolate a certain proportion of emissions arising from a piece of equipment or single process, method 2 may be applied for those emissions and method 1 may be applied for all remaining category A emissions.

Example

Continuing the earlier example from the description of Regulation 916, Sadie needs to apportion the following Category A emissions:

- *Point 1.3 in Diagram 1:* Emissions from steam used in the refrigerant compressor which are attributable to both LNG and LPG production;
- *Point 2.1 in Diagram 2:* Fugitive emissions from the facility where the raw gas is extracted, which are attributable to the production of LNG and all saleable by-products;
- *Point 2.2 in Diagram 2:* Emissions from CO_2 venting from the acid gas removal unit, which are attributable to the production of LNG, LPG and domestic gas.
- *Point 2.3 in Diagram 2:* Emissions from gas flare, which sits outside of the direct production process. However the gas is sourced from points after the dehydration process. These emissions are therefore attributable to LNG and LPG production.
- *Point 2.4 in Diagram 2:* Emissions that occur from use of transport fuel used within the LNG project but cannot be attributed to a particular process.

Sadie can apportion emissions using Method 1, or a combination of Method 1 and Method 2 (in this example, emissions associated with Point 4 cannot be attributed to a single process, therefore a process molar percentage cannot be determined to apply Method 2).

Method 1

If Sadie chooses Method 1 only, all emissions will be apportioned based on the final molar percentage (FMP).

Eligible LNG emissions apportioned using Method 1 =

[Total emission from Point 3, Diagram 1 and Points 1 to 4 in Diagram 2]
× [LNG/ (LNG+ LPG+ Domgas +Condensate)]

Method 1 and 2

If Sadie chooses to use Method 2 where possible, the following emissions will be apportioned based on the process molar percentage (PMP) applicable to each point in the diagram:

Eligible LNG emissions apportioned using Method 2 =

Fugitive emissions (Point 1, Diagram 2) × [LNG/ (LNG+ LPG+ Domgas + condensate)]

+ acid gas removal emissions (Point 2, Diagram 2) × [LNG/ (LNG+ LPG+ Domgas)]

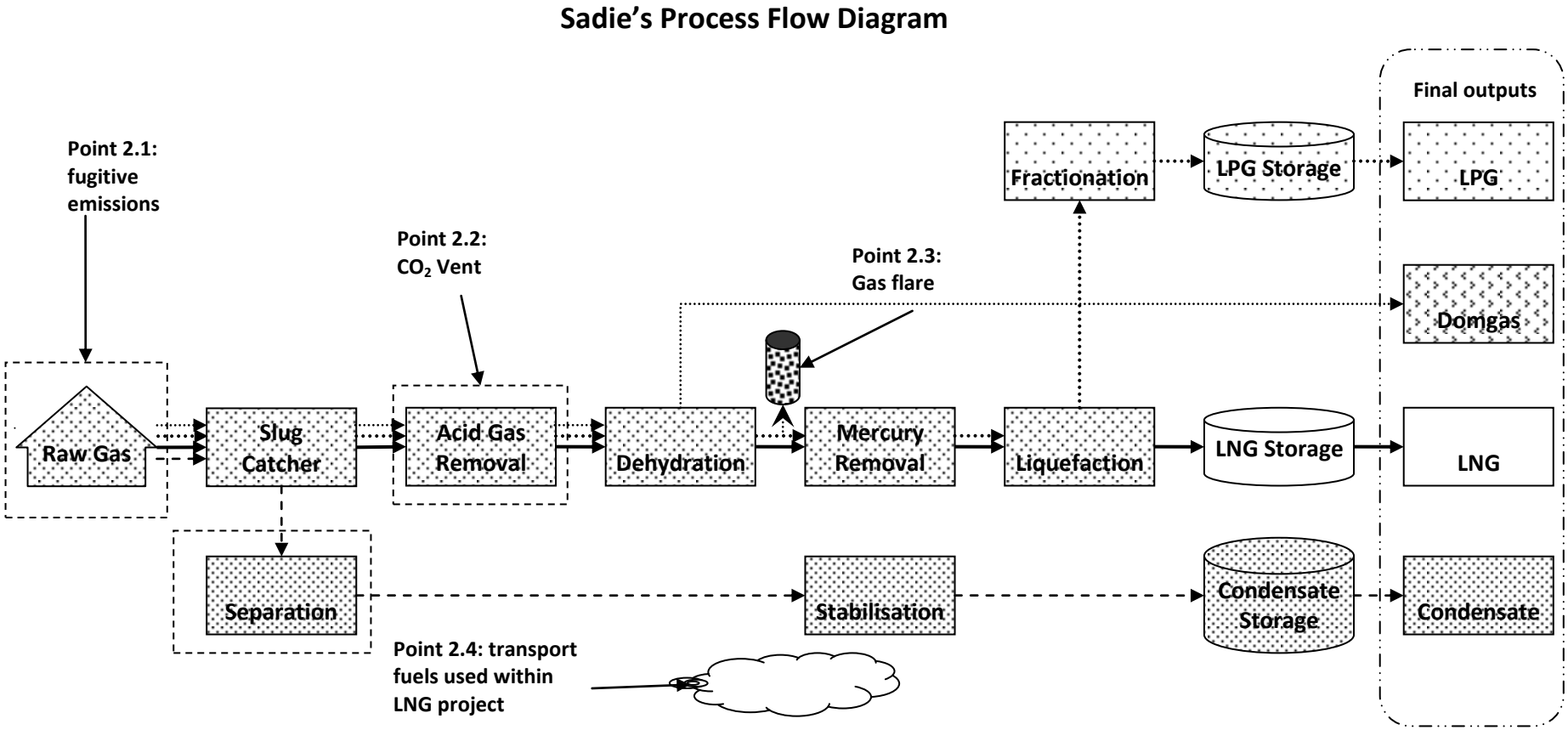
+ gas flare emissions (Point 3, Diagram 2) × [LNG/ (LNG+ LPG)]

+ emissions associated with steam used in the refrigerant compressor (Point 3, Diagram 1) × [LNG/ (LNG+ LPG)]

And, eligible LNG emissions apportioned using Method 1 =

+ transport fuel emissions (Point 4) × [LNG/ (LNG+ LPG+ Domgas + condensate)]

Diagram 2: Apportioning Category A emissions



Subclause 917 (3) proposes methodologies for apportioning eligible category B emissions to LNG production. Category B emissions may be apportioned by using the final molar percentage as set out in method 1, or process molar percentage as set out in methods 2 and 3.

The distinction of categorising emissions associated with electricity separate to category A emissions solely relates to the different emissions estimation methods that are necessary to determine a valid estimation of electricity and non-electricity emissions.

It is recognised that emissions from electricity can either be determined using direct measurement (i.e. monitoring using electricity metering) or estimated from a proxy based on 'energy equipment demand' multiplied by a 'run-time factor' for situations where electricity consumption is not directly monitored. For a particular piece of equipment or process, method 2 sets out how such emissions may be estimated and method 3 sets out how emissions may be directly measured in order to apportion using a process molar percentage.

Method 1 is summarised as follows:

Eligible LNG emissions apportioned = $residual\ electricity\ emissions \times FMP$

Where:

- residual electricity emissions are the electricity emissions that have not been apportioned using another method (residual after method 2 and 3).

With respect to any electricity consumed within the LNG project that is to be apportioned to LNG, and where method 1 is not chosen, and where electrical sub-metering is not available at an individual process or equipment level, applicants may elect to use an apportionment method which estimates the annual electrical use of that process or piece of equipment (method 2).

Method 2 is summarised as follows:

Eligible LNG emissions apportioned = $residual\ electricty\ emissions \times PDP \times PMP$

Where:

- residual electricity emissions are the electricity emissions that have not been apportioned using another method (residual after method 3).
- PMP is the process molar percentage as described above.
- PDP is the pre-determined percentage equal to EED_a / TED

- EED_a is the 'equipment energy demand' of a particular piece of equipment or process. EED_a is the maximum demand (measured in MW) of a piece of equipment, as set out in its technical specifications, multiplied by the 'run-time load factor' for that equipment;

  Where, the 'run-time load factor' (RLF), is the ratio of the hours that piece of equipment operated in the previous financial year to the total hours in that year (for example 8,760 hours in a non-leap year).

  $EED_a = MW_a \times RLF_a$

- TED is the 'total electricity demand', which is the sum of all equipment energy demand figures for each piece of equipment consuming the electricity from a particular source to be apportioned using method 2 (measured in MW).

  $TED = \sum_{i=1}^{n} \mathbf{EED_i}$

  n is the total number of pieces of equipment consuming the electricity from a particular source to be apportioned using method 2.

Where historical hours of operation for a particular piece of equipment are not available for a particular year, the applicant may use either:

- An estimate of operating hours demonstrated by an explanation of the engineering design of the equipment or process; or

- The operating hours used in the previous financial year's application.

Where method 1 is not chosen, and where electricity consumption of equipment or the process was being monitored in the previous financial year, applicants use apportionment method 3, which measures the annual electrical use of that process or piece of equipment from meter readings multiplied by the emissions intensity of the generation source. The estimation must be calculated as follows.

Method 3 is summarised as follows:

Eligible LNG emissions apportioned = electricity emissions $\times$ PMP

It is intended that an applicant could choose to use method 1, 2 or 3 or a combination of all three to apportion category B emissions, provided that method 2 is not used where monitoring was in place that enabled the use of method 3 for particular equipment. For example, if an applicant had electricity consumption monitoring of some equipment, method 3 can be used for that equipment, while method 2 can be used for some other pieces of equipment and method 1 could be used to estimate the residual electricity consumption.

Subclause 917 (4) establishes the requirement that where electricity consumption data for a piece of equipment or process has been monitored method 2 cannot be used.

Subclause 917 (5) establishes the methodology for estimating the run-time factor for method 2 if the hours of operation for the equipment or process are not monitored. A reasonable estimate may be based on either, or both, an explanation of the engineering design of the equipment or process, and the hours of operation for the equipment and process as reported in the previous year's application, adjusted for any operational changes.

Example

Continuing the earlier example from the description of Regulation 917, Sadie purchases some electricity from the grid which is used by equipment and processes at the LNG project. Sadie also uses steam to generate electricity onsite. These are classed as category B emissions.

Referring to Diagrams 1 and 3, Sadie needs to apportion the following Category B emissions:

- *Point 1.1 in Diagram 1:* Emissions from steam used to generate electricity at the steam turbine generator in the extraction of the raw gas mixture;

- *Point 3.1 in Diagram 3:* Emissions from electricity consumed by the acid gas removal unit, mercury removal unit, and the fractionation unit. Electricity consumed by this equipment, together with the electricity consumed by the liquefaction process is monitored by one overall electricity meter; and

- *Point 3.2 in Diagram 3:* Emissions from electricity use by the liquefaction process, which is sub metered. This electricity is ultimately sourced from the grid and consumption is also included in the overall electricity meter.

Method 1

If Sadie chooses Method 1 only, all emissions will be apportioned based on the final molar percentage (FMP).

Eligible LNG emissions apportioned using Method 1 =

Steam generated electricity consumed at Point 1, Diagram 1 × emissions intensity of steam generated
× [LNG/ (LNG+ LPG+ Domgas +Condensate)]

+ grid sourced electricity at Points 1 to 2 in Diagram 3 × emissions intensity of electricity bought from the grid
× [LNG/ (LNG+ LPG+ Domgas +Condensate)]

Note: The deemed emissions intensity of electricity bought from the grid is 1tCO_2-e/MWh.

Method 1, 2, and 3

Sadie may seek to use method 2 where possible. However, she cannot use method 2 where electricity consumption is being directly monitored (at the sub-metered liquefaction plant at point 2 in diagram 3). Because all emissions from steam used to generate electricity are attributable to all products, using a higher order method would not yield any additional accuracy. As a result, Sadie elects to use method 1 to apportion emissions from steam used to generate electricity.

As the liquefaction process electricity consumption is sub metered (Point 3), Sadie must use method 3 to apportion eligible emissions. Electricity emissions from this process are attributable to both LNG and LPG, therefore eligible LNG emissions will be calculated as:

Eligible LNG emissions apportioned using method 3 =

= sub-metered electricity consumption × emissions intensity of electricity bought from the grid × [LNG/ (LNG+ LPG)]

To apply method 2, Sadie must work out the emissions that have not been apportioned already using another method (the residual electricity).

Residual electricity = total electricity from the grid – sub-metered electricity

Residual electricity must be apportioned using the PDP for each piece of equipment.

Acid gas removal unit

$PDP_{\text{acid gas removal unit}} = EED_{\text{acid gas removal unit}} / TED$

Where $EED_{\text{acid gas removal unit}} =$

$[MW_{\text{acid gas removal unit}} \times \text{hours of operation}_{\text{acid gas removal unit}} / \text{total hours in the year}]$

And $TED = [EED_{\text{acid gas removal unit}} + EED_{\text{mercury removal unit}} + EED_{\text{fractionation unit}}]$

Mercury removal unit

$PDP_{\text{mercury removal unit}} = EED_{\text{mercury removal unit}} / TED$

Where $EED_{\text{mercury removal unit}} =$

$[MW_{\text{mercury removal unit}} \times \text{hours of operation}_{\text{mercury removal unit}} / \text{total hours in the year}]$

Fractionation unit

$PDP_{\text{fractionation unit}} = EED_{\text{fractionation unit}} / TED$

Where $EED_{\text{fractionation unit}} =$

$[MW_{\text{fractionation unit}} \times \text{hours of operation}_{\text{fractionation unit}} / \text{total hours in the year}]$

Therefore, emissions would be apportioned for each piece of equipment as follows:

Eligible LNG emissions using Method 2 =

Residual electricity × emissions intensity of electricity bought from the grid × $PDP_{\text{acid gas removal unit}}$ × [LNG/ (LNG+ LPG+ Domgas)]

+ Residual electricity × emissions intensity of electricity bought from the grid × $PDP_{\text{mercury removal unit}}$ × [LNG/ (LNG+ LPG)]

+ Residual electricity × emissions intensity of electricity bought from the grid × $PDP_{\text{fractionation unit}}$ × 0

Note: While the frationation unit did not require apportioning itself (as a result of being entirely attributable to LPG production), it consumed a share of the overall electricity consumption from the grid. As a result, it needed to be included in the PDP calculation.

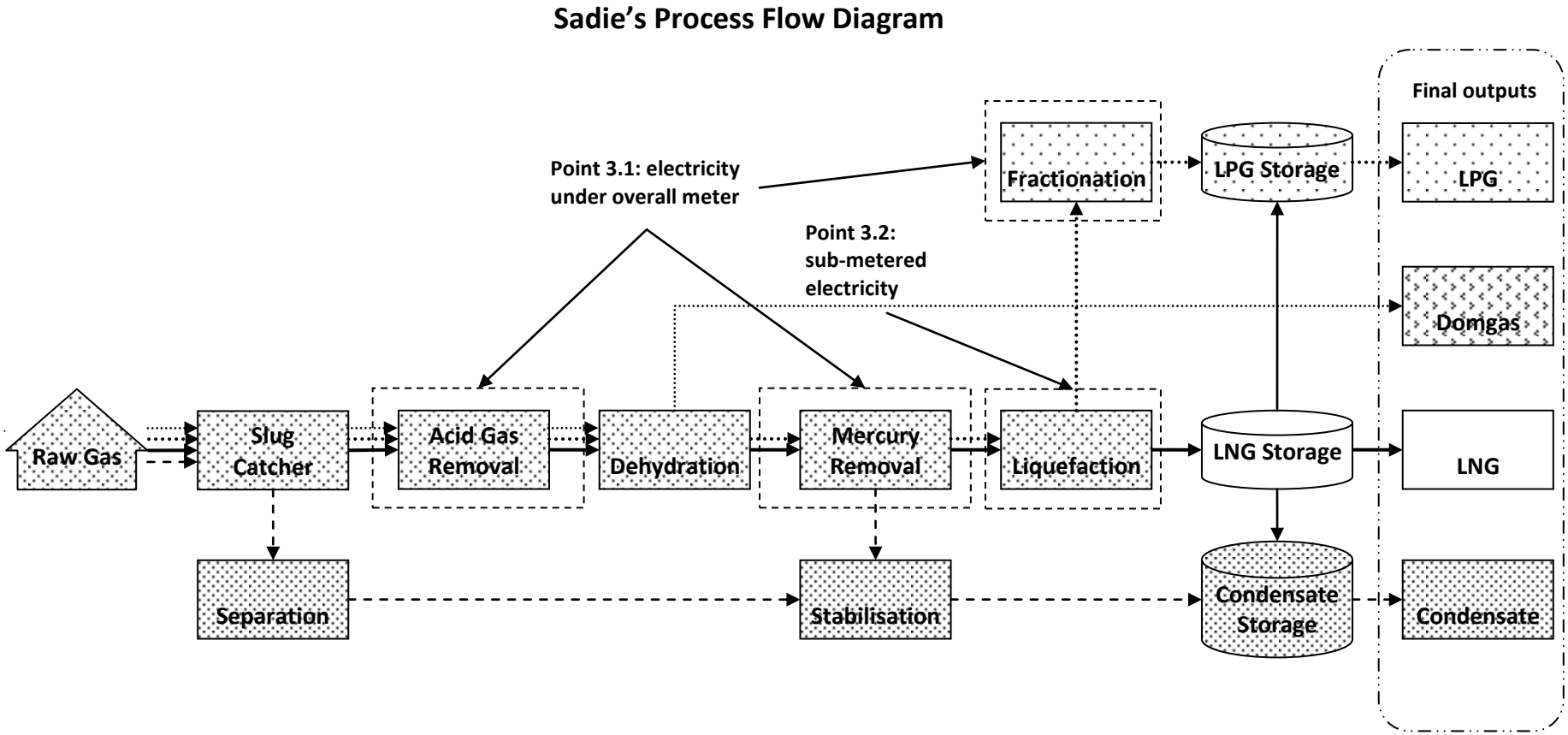
All emissions from steam used to generate electricity are attributable to production of LNG and all saleable by-products. This means regardless of the way total emissions are split up (for example by using method 2 to split up emissions from various sub-processes), the emissions attributable to LNG are the same. Therefore Sadie elects to use method 1 due as it requires less information and calculations.

Eligible LNG emissions using method 1=

= steam emissions × [LNG/ (LNG+ LPG+ Domgas +Condensate)]

Therefore total eligible LNG emissions equal those apportioned according method 1 + method 2 + method 3.

Diagram 3: Apportioning Category B emissions



Clause 918

Clause 918 establishes the mechanism for eligible LNG emissions that are upstream of a small-scale LNG facility to be estimated. Upstream emissions for small-scale facilities will be calculated through the use of a proxy factor rather than specific project emissions estimates based on the rules contained in regulations 915 to 917.

The small-scale upstream LNG facility emissions factor ($SSLF_t$) is intended to be a mechanical calculation, where no judgement is used by the Regulator outside of calculation steps described in clause 918. It is to be calculated as factor per tonne of output produced in the previous financial year that meets the criteria of the LNG activity definition in regulation 336.

The $SSLF_t$ will be worked out by the Regulator as total direct emissions from all facilities which extract or transport natural gas within a metropolitan or non-metropolitan area of a State or Territory divided by the total natural gas consumed within a metropolitan or non-metropolitan area of a State or Territory.

The total direct emissions (to be measured in CO_2-e) are sourced from NGER reporting for the year ending 30 June 2009 from:

- all facilities that extract a gas mixture containing natural gas which is consumed within a metropolitan or non-metropolitan area of a State or Territory; and

- all network or pipeline facilities that transport and/or handle natural gas which is consumed within a metropolitan or non-metropolitan area of a State or Territory.

The total amount of natural gas (measured in GJ) consumed in a metropolitan or non-metropolitan area of the State or Territory is sourced from NGER reporting for the year ending 30 June 2009.

The Regulator is to convert the ratio of tCO_2-e per GJ calculated above, to tCO_2-e per tonne of LNG based on:

- The average GJ per tonne of LNG production that meets the criteria set out in clause 336, measured over the previous financial year as submitted by the applicant; or

- If the audit company or auditor mentioned in 604 (2) is unable to provide an opinion in its audit report on matters mentioned in 604 (d) then a default factor of 54.5 GJ per tonne of LNG must be applied.

  Note: The average GJ per tonne of LNG needs to be reported to the Regulator as part of an application with supplementary allocation under paragraph 710 (2) (f). The auditor needs to set out in its reasonable assurance opinion according to subparagraph 604 (7) (d) (iii) whether this average GJ per tonne is presented fairly in all material respects.

The clause describes that metropolitan areas are defined including:

- the area that is on, or east of, the Great Dividing Range in New South Wales, and includes Queanbeyan; and
- Canberra, Melbourne, Brisbane, Adelaide and Perth.

This is the same meaning as described in subclause 907 (14).

Example:

A small-scale LNG plant operated in the non-metropolitan area of Western Australia, and the applicant reports that average GJ per tonne of LNG was 54.2 in the previous financial year, the $SSLF_t$, equals:

3.9 tCO_2-e per TJ ÷ 1000 GJ per TJ × 54.2 GJ per tonne of LNG = 0.211