

Greenhouse Gas Benchmark Rule (Generation) No. 2 of 2003

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1 Name and commencement

- 1.1 This Rule is the *Greenhouse Gas Benchmark Rule (Generation) No. 2 of 2003* and commences on 23 December 2005.
- 1.2 At its commencement, this Rule amends the *Greenhouse Gas Benchmark Rule (Generation) No. 2 of 2003* that commenced on 11 June 2004 (June Rule), to the extent that this Rule differs from the June Rule.
- 1.3 Without limiting the circumstances in which this Rule applies, this Rule applies to:
- (a) the accreditation of Abatement Certificate Providers (in respect of electricity generation activities) after the commencement of this Rule (regardless of the date of application for accreditation);
 - (b) the calculation and creation of NGACs (in respect of electricity generation activities) registered after the commencement of this Rule (regardless of the date of accreditation of the Abatement Certificate Provider), subject to clauses 1.4 and 1.5; and
 - (c) the ongoing eligibility of a person to remain accredited as an Abatement Certificate Provider for the purpose of the Scheme Administrator exercising its powers under the Act and Regulations, after the commencement of this Rule, to vary, suspend or cancel a person's accreditation as an Abatement Certificate Provider (in respect of electricity generation activities).
- 1.4 A person who, on or before 31 December 2005:
- (a) is accredited as an Abatement Certificate Provider (in respect of electricity generation activities); or
 - (b) has made an application, acceptable to the Scheme Administrator, to become an Abatement Certificate Provider (in respect of electricity generation activities), and is subsequently accredited as an Abatement Certificate Provider under this Rule pursuant to that application,
- may elect (such election to be made only once) to calculate its entitlement to create NGACs in respect of electricity generation activities occurring on or before 31 December 2005 under the October Rule, the June Rule or this Rule. A person will be deemed to have made an election (to apply or not to apply a particular Rule) if the person:
- (c) notifies the Scheme Administrator of its election in writing; or
 - (d) registers any NGACs on or after 11 June 2004 that are consistent only with such an election having been made.

- 1.5 A person who, on or before 31 December 2004, is accredited as an Abatement Certificate Provider (in respect of electricity generation activities) may calculate its entitlement to create NGACs in respect of electricity generation activities occurring on or before 31 December 2007 using the 30% default factor under **Equations 13 and 16** of the October Rule, rather than the 36% default factor under those Equations of this Rule, if the person meets all the criteria to use that 30% default factor under those Equations (and associated clauses and Methods) of the October Rule (whether or not the person satisfied the eligibility criteria for accreditation under the October Rule).
- 1.6 If a person to whom clause 1.4 or 1.5 applies is accredited as an Abatement Certificate Provider after the commencement of this Rule, the Scheme Administrator must assess the application for accreditation using the eligibility criteria under this Rule.

2 Objects of the Rule

The object of this Rule is to provide specific arrangements for the creation and calculation of NGACs through electricity generation and other calculations associated with electricity generation and greenhouse gas emissions.

3 Application of the Rule

Without limiting the persons to whom this Rule applies, this Rule applies to Accredited Abatement Certificate Providers accredited to create NGACs from electricity generation in accordance with Part 8A Division 4 of the Act, the Regulations, and this Rule.

4 Status and Operation of the Rule

This Rule is a Greenhouse Gas Benchmark Rule made under Part 8A of the Act.

5 Eligibility to be an Accredited Abatement Certificate Provider in respect of electricity generation

- 5.1 A person is eligible to be an Accredited Abatement Certificate Provider under this Rule if:
- (a) the person is a *Generator* or *Deemed Retailer*, as those terms are defined in clauses 6.2.1 and 6.3.1 respectively; and
 - (b) the accreditation is in respect of an *electricity generation activity*, as that term is defined in clause 5.2.

Note: Under the Regulations, a person must also have record keeping arrangements with respect to the activity, and the Generating System must be equipped with metering equipment, approved by the Scheme Administrator. Further matters must also be satisfied under the Regulations if the accreditation is in respect of a proposed (rather than existing) Generating System.

- 5.2 An *electricity generation activity* is the generation of electricity:
- (a) after 1 January 2003;
 - (b) by a Generating System;
 - (c) that is or will be exported into the NSW Electricity Network or a Transmission or Distribution System interconnected with the NSW Electricity Network; and

- (d) in a manner that results or will result in reduced emissions of greenhouse gases.

Note: In effect, eligible Generating Systems must export electricity into the main Transmission Systems of the National Electricity Market, or to Distribution Systems currently connected to those systems in NSW, the Australian Capital Territory, Queensland, Victoria and South Australia, and, once Basslink is completed, Tasmania.

The Generating System may export electricity either directly (at a connection point between the Generating System and the NSW Electricity Network or interconnected Transmission or Distribution System), or indirectly (via other network assets).

Where part of the electricity generated from the Generating System is exported, and part is consumed by End-User Equipment within the same End-User Complex as the Generating System, only that part that is exported is eligible to create NGACs under this Rule. The remainder may be separately eligible to create NGACs under the DSA Rule.

6 Persons eligible to create NGACs under this Rule

- 6.1.1 Despite any other provision in this Rule only Accredited Abatement Certificate Providers accredited for the purpose set out in clause 5 may create NGACs under this Rule.
- 6.1.2 A person may not create NGACs in respect of greenhouse gas abatement if that person or another person has previously validly created NGACs or LUACs in respect of the same abatement, whether under this Rule, the June Rule, the October Rule or any other Benchmark Rule.

6.2 The Generator

- 6.2.1 The *Generator* is:
- (a) the person who is registered with NEMMCO as the Generator or the Intermediary, as defined under the National Electricity Code, with respect to a Generating System at the time that the relevant electricity generation activity takes place; or
 - (b) if no person is registered with NEMMCO as the Generator or the Intermediary, as defined under the National Electricity Code, with respect to a Generating System at the time that the relevant electricity generation activity takes place, the owner of the Generating System at that time; or
 - (c) a person nominated, to the satisfaction of the Scheme Administrator, to be the Generator for the purpose of creating NGACs under this Rule (nominee) by one of the following persons (nominator):
 - (i) the person in (a) or (b); or
 - (ii) a person previously nominated to be the Generator under this Rule,provided that:
 - (iii) the nominator has not previously nominated another person to be the Generator, or if the nominator has done so, that previous nomination is not still effective;
 - (iv) the nomination is in writing and signed by the nominator;

- (v) the nominee consents to the nomination; and
- (vi) the nominator (and any previous nominator) continues to meet the criteria to be the nominator for the period of the nomination; or
- (d) a person whom the Scheme Administrator is satisfied will be a person in (a), (b) or (c).

6.2.2 A person will not be entitled to create NGACs unless that person satisfies the criteria in clause 6.2.1(a), (b) or (c) at the time that the relevant electricity generation activity takes place. For this purpose, the export requirements under clause 5.2(c) must be met at the time of generation.

6.2.3 The Scheme Administrator may assume, in the absence of evidence to the contrary and without any obligation to make further enquiries, that the person listed in Schedule B as the owner of the Generating System so listed is the owner of that Generating System at all relevant times.

6.3 The Deemed Retailer

6.3.1 The *Deemed Retailer* is:

- (a) the retail supplier who is entitled to some or all of the electrical output of a Category A Generating System pursuant to the Power Purchase Agreement to which that retail supplier is a party; or
- (b) a person nominated, to the satisfaction of the Scheme Administrator, to be the Deemed Retailer for the purpose of creating NGACs under this Rule (nominee) by one of the following persons (nominator):
 - (i) the person in (a); or
 - (ii) a person previously nominated to be the Deemed Retailer under this Rule, provided that:
 - (iii) the nominator has not previously nominated another person to be the Deemed Retailer, or if the nominator has done so, that previous nomination is not still effective;
 - (iv) the nomination is in writing;
 - (v) the nominee consents to the nomination; and
 - (vi) the nominator (and any previous nominator) continues to meet the criteria to be the nominator for the period of the nomination.

6.3.2 A retail supplier listed in Schedule C is deemed to be the person described in clause 6.3.1(a) with respect to the Generating System so listed, if the Scheme Administrator is satisfied that:

- (a) the Generating System retains its Category A classification; and
- (b) there has been no assignment or novation of the purchaser's rights under the Power Purchase Agreement since 1 January 2003.

- 6.3.3 A person to whom the rights of the retail supplier listed in Schedule C under the Power Purchase Agreement are assigned or novated after 1 January 2003 (whether directly or via a series of assignments or novations) is deemed to be the Deemed Retailer with respect to the Generating System listed in Schedule C, provided that the Scheme Administrator is satisfied that the Generating System retains its Category A classification.

Note: The listing of certain persons and Generating Systems in Schedule C is intended to facilitate the process of accreditation of Deemed Retailers, without requiring an investigation of the matters in clause 6.3.1(a) in every case.

7 Classification of Generating Systems

The Scheme Administrator may determine whether individual generating units or other components constitute one or more Generating Systems, having regard to factors including:

- (a) whether individual generating units:
 - (i) are separately metered;
 - (ii) share common connection infrastructure up to the point where they connect to a Transmission or Distribution System;
 - (iii) are registered as one or more generating systems under the National Electricity Code; and
 - (iv) are accredited as one or more power stations under the RE(E) Act; and
- (b) whether the classification as one or more Generating Systems produces outcomes consistent with the objects of the Scheme.

7.1 Category A

7.1.1 Those Generating Systems the electricity generation of which:

- (a) satisfied the criteria for Category A in the Emissions Workbook;
- (b) was claimed as either Category A or Category F under the arrangements relating to greenhouse strategies in force under the Act before the commencement of Part 8A of that Act (and referred to in the Emissions Workbook); and
- (c) is the subject of a Power Purchase Agreement that has not terminated at the time of classification under this Rule,

are classified as Category A.

7.1.2 The Generating Systems listed in Schedule C are deemed to satisfy clause 7.1.1 if the Scheme Administrator is satisfied that:

- (a) there is a direct electricity supply agreement with respect to the Generating System that was entered into before 1 January 2003; and
- (b) that direct electricity supply agreement has not terminated.

- 7.1.3 Once classified as such, a Category A Generating System retains a Category A classification for the life of the Power Purchase Agreement.
- 7.1.4 For the purposes of this clause 7, a Power Purchase Agreement will not be considered to have terminated merely because rights or obligations under it have been assigned, or it has been novated by substituting one party for another (including by contract or by operation of statute).

7.2 Category B

- 7.2.1 Those Generating Systems listed in Schedule B are classified as Category B.
- 7.2.2 For those Generating Systems against which “(a)” appears in Schedule B, the Net Sent Out Generation is deemed, for the purposes of this Rule, to be 71% of the lesser of:
- (a) what the Net Sent Out Generation would be in the absence of this clause 7.2.2; and
 - (b) the REC Baseline.
- 7.2.3 For those Generating Systems against which “(b)” appears in Schedule B, the Net Sent Out Generation is deemed, for the purposes of this Rule, to be the lesser of:
- (a) what the Net Sent Out Generation would be in the absence of this clause 7.2.3; and
 - (b) the REC Baseline.

Note: The remainder of the generation from these Generating Systems is not eligible under this Rule.

7.3 Category C

Those Generating Systems that are not classified as Category A or B that:

- (a) generate electricity using primarily Fossil Fuels:
 - (i) that had nameplate ratings of 30 MW or less as at 30 June 1997 and for which their first generating unit commenced Commercial Operation before 1 July 1997; or
 - (ii) that had nameplate ratings of greater than 30 MW as at 1 January 2002 and for which their first generating unit commenced Commercial Operation before 1 January 2002; or
- (b) generate electricity using primarily Renewable Energy Sources and for which their first generating unit commenced Commercial Operation before 1 January 1997,

are classified as Category C.

7.4 Category D

Those Generating Systems that are not classified as Category A, B, or C are classified as Category D.

8 NSW Production Baseline

In this clause 8, ORER will be taken to have assigned a REC Baseline even if it has assigned a REC Baseline of nil.

8.1 Category A

For a Category A Generating System the *NSW Production Baseline* is (in MWh):

- (a) for electricity generated using primarily Fossil Fuels :
 - (i) the maximum amount of electricity to which the Original Deemed Retailer is contractually entitled in a calendar year under the Power Purchase Agreement; or
 - (ii) if no such level is specified in the Power Purchase Agreement that is less than the entire output of the Generating System, the Net Sent Out Generation in a year; or
- (b) for electricity generated using primarily Renewable Energy Sources:
 - (i) if ORER has assigned a REC Baseline and there is not in the Power Purchase Agreement a maximum amount of electricity to which the Original Deemed Retailer is contractually entitled in a calendar year that is less than the entire output of the Generating System, the REC Baseline;
 - (ii) if ORER has assigned a REC Baseline and there is in the Power Purchase Agreement a maximum amount of electricity to which the Original Deemed Retailer is contractually entitled in a calendar year that is less than the entire output of the Generating System, the lower of the REC Baseline and the maximum amount of electricity to which the Original Deemed Retailer is contractually entitled in a calendar year under the Power Purchase Agreement;
 - (iii) if ORER has not assigned a REC Baseline and there is in the Power Purchase Agreement a maximum amount of electricity to which the Original Deemed Retailer is contractually entitled in a calendar year that is less than the entire output of the Generating System, the maximum amount of electricity to which the Original Deemed Retailer is contractually entitled in a calendar year under the Power Purchase Agreement; or
 - (iv) if ORER has not assigned a REC Baseline and there is not in the Power Purchase Agreement a maximum amount of electricity to which the Original Deemed Retailer is contractually entitled in a calendar year that is less than the entire output of the Generating System, the Net Sent Out Generation in a year.

8.2 Category B

8.2.1 For a Category B Generating System for electricity generated using primarily Fossil Fuels there is no *NSW Production Baseline*.

8.2.2 For a Category B Generating System for electricity generated using primarily Renewable Energy Sources the *NSW Production Baseline* is (in MWh):

- (a) for those Generating Systems against which “(a)” appears in Schedule B, 71% of the REC Baseline; and
- (b) in any other case, the REC Baseline.

8.3 Category C

For a Category C Generating System the *NSW Production Baseline* is (in MWh):

- (a) for electricity generated using primarily Fossil Fuels, the average annual Net Sent Out Generation during operations over the five calendar years from 1997 to 2001. If, in those calendar years, there are periods during which, in the view of the Scheme Administrator:
 - (i) there was atypically low output due to rebuilds or other extended off-line periods;
 - (ii) the Generating System was not, or not all units were, commissioned; or
 - (iii) there was atypically high output due to testing,

then the Scheme Administrator may disregard data from those periods, and may extrapolate data from the remainder of the time during the five calendar years from 1997 to 2001 to cover those periods. If the Scheme Administrator considers that a simple mathematical extrapolation does not adequately represent what the output of the whole Generating System during those periods would have been in the absence of the circumstances in (i) to (iii), the Scheme Administrator may instead model typical output patterns based on the characteristics and location of the Generating System and its fuel type to produce notional data for those periods; or

- (b) for electricity generated using primarily Renewable Energy Sources:
 - (i) if ORER has assigned a REC Baseline, the REC Baseline; or
 - (ii) if ORER has not assigned a REC Baseline, the average annual Net Sent Out Generation during operations over the five calendar years from 1997 to 2001. If, in those calendar years, there are periods during which, in the view of the Scheme Administrator:
 - (A) there was atypically low output due to rebuilds or other extended off-line periods;
 - (B) the Generating System was not, or not all units were, commissioned; or
 - (C) there was atypically high output due to testing,

then the Scheme Administrator may disregard data from those periods, and may extrapolate data from the remainder of the time during the five calendar years from 1997 to 2001 to cover those periods. If the Scheme Administrator considers that a simple mathematical extrapolation does not adequately represent what the output of the whole Generating System during those periods would have been in the absence of the circumstances in (i) to (iii), the Scheme Administrator may instead model typical output patterns based on

the characteristics and location of the Generating System and its fuel type to produce notional data for those periods.

8.4 Category D

For a Category D Generating System the *NSW Production Baseline* (in MWh) is zero.

8.5 Allocation of group REC Baselines

8.5.1 For a Category A, B, C or D Generating System which is part of a group of Generating Systems to which ORER has assigned a collective REC Baseline, but for which ORER has not assigned an individual REC Baseline, the Scheme Administrator must, for the purposes of determining the NSW Production Baseline, either:

- (a) allocate a portion of that REC Baseline to each of the Generating Systems in the group of Generating Systems (provided that a zero portion must be allocated to any of the Generating Systems in the group that are classified as Category D); or
- (b) treat the entire group as if it were a single Generating System (which may only be done if the entire group would have the same classification under clause 7).

8.5.2 If the Scheme Administrator allocates a portion of the REC Baseline to each of the Generating Systems in the group of Generating Systems, the portion so allocated has the same effect in this Rule as if it had been a REC Baseline assigned directly to that Generating System by ORER, for all purposes including the calculation of the NSW Production Baseline and the assignment to each Generating System of the number of RECs created by the group.

Note: Where a portion of the REC Baseline is allocated to each of the Generating Systems in the group, the number of RECs created by each Generating System, for the purposes of this Rule, would be deemed to be a proportion of the total number of RECs created by the group, where the relevant proportion of RECs is calculated by reference to the amount of Net Sent Out Generation in excess of that portion of the assigned REC Baseline for each Generating System.

9 Creation of NGACs

A person may only create NGACs under this Rule where the Scheme Administrator has approved the Equations and Methods under this Rule to be used (which approval may be conditional upon applying the Equation or Method in a particular manner that is permitted under this Rule).

9.1 Creation of NGACs from electricity generated by Category A Generating Systems

For electricity generated by a Category A Generating System:

- (a) the Deemed Retailer that is accredited in respect of the Generating System may create the number of NGACs calculated using **Equation 1** where *Eligible Generation* is calculated in **Equation 3**;
- (b) the Generator that is accredited in respect of the Generating System may create the number of NGACs calculated using **Equation 1** where *Eligible Generation* is calculated using **Equation 2**; and
- (c) if a Category A Generating System was modified on or after 1 January 2002 to become a Cogeneration Plant, the Generator that is accredited in respect of that

Generating System may, in addition to any entitlement to create NGACs under clause 9.1(b), create the number of NGACs equal to the number of tonnes of notional greenhouse gas emissions avoided, calculated using **Method 4**.

Equation 1

Number of NGACs that may be created = Eligible Generation x (NSW Pool Coefficient x Emissions Intensity Adjustment Factor – Emissions Intensity)

Where:

- *Number of NGACs that may be created* is in t CO₂-e and is in respect of the time period over which the Eligible Generation occurs
- *Eligible Generation* (in MWh) is assigned in the clause referring to this Equation
- *NSW Pool Coefficient* (in t CO₂-e/MWh) is the NSW Pool Coefficient determined by the Tribunal using clause 9.1 of the Compliance Rule for the year in which the Eligible Generation occurred
- *Emissions Intensity* (in t/MWh) is calculated using **Equation 4**
- *Emissions Intensity Adjustment Factor* is the value in Table 9 of Schedule A to this Rule appropriate to whether the Generating System is connected to a Distribution System or to a Transmission System

Note: The Emissions Intensity Adjustment Factor is intended to adjust the NSW Pool Coefficient.

Equation 2

If Net Sent Out Generation - NSW Production Baseline - RECs Created/MLF is ≤ 0 , then:

Eligible Generation = 0

If Net Sent Out Generation - NSW Production Baseline - RECs Created/MLF is > 0 , then:

Eligible Generation = Net Sent Out Generation – NSW Production Baseline – RECs Created/MLF

Where:

- *Eligible Generation* is in MWh and is in respect of a calendar year or part thereof
- *Net Sent Out Generation* is in MWh and is in respect of a calendar year or part thereof
- *NSW Production Baseline* is the NSW Production Baseline applicable to the Generating System, determined using clause 8
- *RECs Created* (in MWh) is the number of RECs created and registered with ORER in accordance with the RE(E) Act in respect of the same electricity generation by the Generating System in the same year as the *Net Sent Out Generation*
- *MLF* is the marginal loss factor for the Generating System, as defined in the RE(E) Regulation

Note: It is proposed that **Equation 2** will be amended to take account of the *Queensland 13% Gas Scheme*.

Equation 3

If Net Sent Out Generation < NSW Production Baseline, then:

$$\text{Eligible Generation} = \text{Net Sent Out Generation}$$

If Net Sent Out Generation \geq NSW Production Baseline, then:

$$\text{Eligible Generation} = \text{NSW Production Baseline}$$

Where:

- *Eligible Generation* is in MWh and is in respect of a calendar year or part thereof
- *Net Sent Out Generation* is in MWh and is in respect of a calendar year or part thereof
- *NSW Production Baseline* is the NSW Production Baseline applicable to the Generating System, determined using clause 8

Equation 4

$$\text{Emissions Intensity} = \text{Total Greenhouse Gas Emissions} / \text{Sent Out Generation}$$

Where:

- *Emissions Intensity* is in t CO₂-e/MWh
- *Total Greenhouse Gas Emissions* (in t CO₂-e) is determined using clause 10, in respect of the time period over which the Eligible Generation occurs
- *Sent Out Generation* (in MWh) is, in respect of the Generating System, Gross Generation less Auxiliary Electricity Use, both measured over the same time period as the *Total Greenhouse Gas Emissions*
- *Gross Generation* means total electricity generated by a Generating System
- *Auxiliary Electricity Use* means electricity consumed by the Generating System

9.2 Creation of NGACs from electricity generated by Category B Generating Systems

9.2.1 For electricity generated by a Category B Generating System using primarily Fossil Fuels:

- (a) if the Generator is a participant in the Australian Government Generator Efficiency Standards and takes measures on or after 1 January 2002 which, in the view of the Scheme Administrator, improve the efficiency of the Generating System without changing its design or its fuel mix, the Generator that is accredited in respect of the Generating System may create the number of NGACs calculated using **Method 1**; or
- (b) if the Generator takes measures on or after 1 January 2002 that, in the view of the Scheme Administrator, significantly change the design of the Generating System, but not the fuel mix, the Generator that is accredited in respect of the Generating System may create the number of NGACs calculated using **Method 2**; or
- (c) if the Generator takes measures on or after 1 January 2002 that, in the view of the Scheme Administrator, significantly change the fuel mix of the Generating System, the Generator that is accredited in respect of the Generating System may create the number of NGACs calculated using **Method 3**.

9.2.2 In clause 9.2.1, references to the Generator being a participant in the Australian Government Generator Efficiency Standards and taking certain measures include references to any of the

persons in clause 6.2.1 being such a participant and taking such measures or causing such measures to be taken.

Note: A Generator that is accredited in respect of a Category B Generating System may create NGACs by performing better than the lower bound of the Generator Efficiency Standards Greenhouse Intensity value for that type of Generating System or by undertaking a specific abatement project that changes the design or fuel mix. Examples of changing the design or fuel mix would include a turbine upgrade to high efficiency blades or fuel switching to a combination of coal and natural gas.

NGACs may be created by **Methods 1, 2 or 3** from the later of the time that the activity which gave rise to their creation takes effect and 1 January 2003, up to the time it ceases to have effect, but the number of NGACs created must be separately calculated in each period, taking into account the actual performance of the Generating System in that period, the effects of degradation with age and any other factors changing over time.

The Greenhouse Intensity (GI) values calculated under the Generator Efficiency Standards account only for greenhouse gas emissions arising from the combustion of fuels for electricity generation, equivalent to the emissions calculated under **Equations 7, 8 and 9**, and **Equations 14 and 15**. Under **Methods 1, 2 and 3**, improvements to Greenhouse Intensity values are adjusted by the GES Adjustment Factor to also account for emissions associated with the production of Fossil Fuels by using **Equations 10, 11 and 12**.

Method 1 – GES Gain

Step (1) Select a measurement period, acceptable to the Scheme Administrator, to which the following calculations apply.

Step (2) From the Australian Government Generator Efficiency Standards Methodology (GES), and applying the definitions contained therein, calculate:

- the *Reference Total Greenhouse Gas Emissions* (in tonnes of carbon dioxide equivalent) for each fuel used in the Generating System over the measurement period and based on reference plant performance, being the sum of:
 - (a) the *Reference Equivalent CO₂ From Fuel Burning* (m_{CO₂ equiv.}) (in tonnes of carbon dioxide equivalent), calculated using GES; and
 - (b) if the fuel is a Fossil Fuel, the sum of the fugitive emissions associated with the production of the Fossil Fuel (in tonnes of carbon dioxide equivalent), calculated using **Equations 10, 11 and 12**;

- the *GES Adjustment Factor* for the combined fuel used in the Generating System, calculated as follows:

$$\left\{ \sum_F \text{Reference Total Greenhouse Gas Emissions (tonnes)} \right\} / \left\{ \sum_F \text{Reference Equivalent CO}_2 \text{ From Fuel Burning (tonnes)} \right\}$$

where *F* is each fuel used in the Generating System over the measurement period

- *Actual GI value* (in kg CO₂-e/MWh sent out) applicable to the Generating System during that measurement period, calculated using the GES.
- *Reference GI value* (GI_R) (in kg CO₂-e/MWh) applying at the output factor achieved by the

Generating System during that measurement period, calculated using the GES.

- *Lower GI value* ($GI_{LL\text{lower}}$) (in kg CO₂-e/MWh) applying at the output factor achieved by the Generating System during that measurement period and taking into account performance degradation with age and the GES tolerance band, calculated using the GES.

Step (3) For the purposes of this Rule:

- there can only be a *GES Gain* if *Actual GI* < *Lower GI value*
- the *GES Gain* is:

$$(\text{Lower GI value} - \text{Actual GI value}) \times \text{GES Adjustment Factor}$$

Note: For example, if over a given period the plant operates at an average 85% output factor, the Actual GI value is 708 kg CO₂-e/MWh and the lower GI value at 85% output factor is 721 CO₂-e/MWh, and the *GES Adjustment Factor* is 1.07, then the *GES Gain* is 14 kg CO₂-e/MWh.

Step (4) The number of NGACs that may be created per measurement period is:

$$\{ \text{GES Gain (in kg CO}_2\text{-e/MWh)} / 1000 \} \times \{ \text{Net Sent Out Generation} - \text{RECs Created} / \text{MLF} \}$$

Where:

- *Net Sent Out Generation* (in MWh) is, in respect of the Generating System, Net Sent Out Generation during the measurement period by reference to which the Generator seeks to create NGACs
- *RECs Created* (in MWh) is the number of RECs created and registered with ORER in accordance with the RE(E) Act in respect of the same electricity generation by the Generating System in the same year as the *Net Sent Out Generation*
- *MLF* is the marginal loss factor for the Generating System, as defined in the RE(E) Regulation

Note: If, in the above example, the Generating System Net Sent Out Generation is 850,000 MWh, RECs Created is 1,000 with a marginal loss factor of 0.98, the number of NGACs that could be created is $14 / 1,000 \times (850,000 - 1,000 / 0.98) = 11,886$ tonnes CO₂-e.

Method 2 –Performance Improvement Gain

Step (1) Select a measurement period, acceptable to the Scheme Administrator, to which the following calculations apply.

Step (2)

From the Australian Government Generator Efficiency Standards Methodology (GES), and applying the definitions contained therein, calculate:

- the *Reference Total Greenhouse Gas Emissions* (in tonnes of carbon dioxide equivalent) for each fuel used in the Generating System over the measurement period and based on reference

plant performance, being the sum of:

- (a) the *Reference Equivalent CO₂ From Fuel Burning* ($m_{CO_2 \text{ equiv.}}$) (in tonnes of carbon dioxide equivalent), calculated using GES; and
 - (b) if the fuel is a Fossil Fuel, the sum of the fugitive emissions associated with the production of the Fossil Fuel (in tonnes of carbon dioxide equivalent), calculated using **Equations 10, 11 and 12**;
- the *GES Adjustment Factor* for the combined fuel used in the Generating System, calculated as follows:

$$\left\{ \sum_F \text{Reference Total Greenhouse Gas Emissions (tonnes)} \right\} / \left\{ \sum_F \text{Reference Equivalent CO}_2 \text{ From Fuel Burning (tonnes)} \right\}$$

where F is each fuel used in the Generating System over the measurement period

- *Actual GI value* (in kg CO₂-e/MWh sent out) applicable to the Generating System during that measurement period, calculated using the GES.
- *Reference GI value* (GI_R) (in kg CO₂-e/MWh) applying at the output factor achieved by the Generating System during that measurement period, calculated using the GES.
- *Lower GI value* ($GI_{L,Lower}$) (in kg CO₂-e/MWh) applying at the output factor achieved by the Generating System during that measurement period and taking into account performance degradation with age and the GES tolerance band, calculated using the GES.

Step (3)

Initiate a Performance Improvement Testing Regime, acceptable to the Scheme Administrator, which establishes the reference performance of the Generating System prior to undertaking the performance improvement(s).

The Performance Improvement Testing Regime must be consistent with recognised methodologies for assessing the performance of Generating Systems, be tailored to the specific characteristics of the Generator System being assessed and include a clear procedure for determining the *Percentage Performance Improvement*.

Step (4)

After completing the performance improvement(s) to the Generating System, continue with the Performance Improvement Testing Regime initiated in Step (3), and determine the *Percentage Performance Improvement* for the Generating System for the measurement period.

Step (5)

Adjust the existing Reference GI (GI_R) and Lower GI ($GI_{L,Lower}$) curves, over the normal plant operating range, in a downwards direction in direct proportion to the *Percentage Performance Improvement* determined in Step (4). The two new curves are designated Reference GI ($GI_{R,Improved}$) and Lower GI ($GI_{L,Lower,Improved}$).

Step (6)

For the output factor achieved during a given measurement period, the *Performance Improvement Gain* in emissions intensity is the difference between the $GI_{L,Lower,Original}$ on the original curve (age and tolerance adjusted) and the $GI_{L,Lower,Improved}$ on the curve created in Step (5) (age and tolerance adjusted). Hence, the *Performance Improvement Gain* is:

$$(GI_{L,Lower,Original} - GI_{L,Lower,Improved}) \times (GES \text{ Adjustment Factor})$$

There can only be a *Performance Improvement Gain* if $GI_{L,Lower,Improved} < GI_{L,Lower,Original}$

Step (7) The number of NGACs that may be created per measurement period is:

$$\{\text{Performance Improvement Gain (kg CO}_2\text{-e/MWh)} / 1000\} \times \{\text{Net Sent Out Generation}\}$$

Where:

- *Net Sent Out Generation* (in MWh) is, in respect of the Generating System, Net Sent Out Generation during the measurement period by reference to which the Generator seeks to create NGACs

Step (8)

If the NGAC calculation under this Method involves a Renewable Energy Source, the use of which has or will be used to create RECs, no NGACs can be created.

Step (9)

If **Method 1** is used subsequently to calculate *GES Gain*, then the improved *Lower GI* value ($GI_{L,Lower,Improved}$) will be substituted for the original *Lower GI* value ($GI_{L,Lower,Original}$), so as to avoid double-counting of *GES Gain* after the performance improvement. Hence, the *GES Gain* at a specified Generating System output factor is:

$$(GI_{L,Lower,Improved} - \text{Actual GI value}) \times GES \text{ Adjustment Factor}$$

Note: For example, a Generating System has upgraded all its Low Pressure (LP) turbines to high efficiency blading. Before the unit was taken out of service for the upgrade, a test was carried out at 90% output factor which resulted in an actual GI of 1020 kg CO₂-e/MWh sent out. A second test was done when the unit was returned to service, again at 90% output factor, resulting in an actual GI of 1000 kg CO₂-e/MWh sent out. The before and after tests showed that the upgrade resulted in a GI improvement of 20 kg CO₂-e/MWh sent out at 90% output factor.

From the before and after test results, the Percentage Performance Improvement is:

$$(1020 - 1000) / 1020 = 2.0\% \text{ (round to one decimal place)}$$

The Percentage Performance Improvement could also be determined by conducting a Heat Rate Test or Valve Full Open Test using equivalent steam conditions for the before and after redesign tests. The difference in sent out thermal efficiency of the Generating System

between tests can be used to determine the Percentage Performance Improvement.

Using the results of the before and after tests, two new GI curves ($GI_{R,Improved}$ and $GI_{L,LowerImproved}$) are developed over the operating range of the Generating System, using the shape of the original GES GI reference curve (GI_R) which is itself derived from original plant design or test data.

The before and after GI curves are used to calculate the GI improvement due to the turbine upgrade at different output factors. This will set the GI improvement attributable to the turbine upgrade, irrespective of other factors relating to the GES methodology.

Say, in the year following the upgrade, the plant generates 900,000 MWh at an output factor of 70%, and creates no RECs in the year. The original $GI_{L,LowerOriginal}$ value (before the upgrade) was 1077 kg CO₂-e/MWh sent out and the $GI_{L,LowerImproved}$ value (after the upgrade) is $1077 \times (1-0.020) = 1055$ kg CO₂-e/MWh sent out. The GES Adjustment Factor for the year is 1.025. From this data, the Performance Improvement Gain is:

$$(1077 - 1055) \times 1.025 = 23 \text{ kg CO}_2\text{-e/MWh sent out.}$$

The number of NGACs that may be created due to the turbine upgrade is:

$$23 / 1000 \times 900,000 = 20,700 \text{ tonnes CO}_2\text{-e}$$

During the same year, refurbishment work has been carried out on the boiler airheaters as part of the GES commitment. The Generating System generates 900,000 MWh at an output factor of 70%, and the Actual GI is 1050 kg CO₂-e/MWh. This is lower than the $GI_{L,Lower,Improved}$ value of 1055 kg CO₂-e/MWh. Hence the *GES Gain* is:

$$(1055 - 1050) \times 1.025 = 5.1 \text{ kg CO}_2\text{-e/MWh sent out}$$

The number of NGACs that may be created due to the *GES Gain* is:

$$5.1 / 1000 \times (900,000 - 0) = 4,590 \text{ tonnes CO}_2\text{-e}$$

This is in addition to the number of NGACs that may be created due to the previous performance improvement, the effects of which have not been reversed.

For Performance Improvement Gains, the testing regime used in Steps 3 and 4 could include repeating at regular intervals to assess the impact of performance improvement(s), and the latest test results must be used to calculate the Percentage Performance Improvement that is used in subsequent calculations.

Method 3 – Fuel Switch Gain

Step (1) Select a measurement period, acceptable to the Scheme Administrator, to which the following calculations apply.

Step (2)

From the Australian Government Generator Efficiency Standards Methodology (GES), and applying the definitions contained therein, calculate:

- the emission factors for carbon dioxide (F_{CO_2}), methane (F_{CH_4}), nitrous oxide (F_{N_2O}) for each fuel used in the Generating System and *Equivalent Carbon Dioxide Emission Factor* (F_{CO_2-e}).
- the *Reference Boiler Efficiency* (h_B), *Turbine Efficiency* (h_T), *Auxiliaries Percentage* and *Sent Out Thermal Efficiency* (h_{SO}) for each fuel used in the Generating System applicable to the output factor during that measurement period.
- the *Gross Calorific Value* ($Q_{gr,p,as}$) for each fuel used in the Generating System.
- the *Reference Total Greenhouse Gas Emissions* (in tonnes of carbon dioxide equivalent) for each fuel used in the Generating System over the measurement period and based on reference plant performance, being the sum of:
 - (a) the *Reference Equivalent CO₂ From Fuel Burning* ($m_{CO_2 \text{ equiv., Fuel Switch}}$) (in tonnes of carbon dioxide equivalent), calculated using GES; and
 - (b) if the fuel is a Fossil Fuel, the sum of the fugitive emissions associated with the production of the Fossil Fuel (in tonnes of carbon dioxide equivalent), calculated using **Equations 10, 11 and 12**;
- the *GES Adjustment Factor* for the combined fuel used in the Generating System, calculated as follows:

$$\left\{ \sum_F \text{Reference Total Greenhouse Gas Emissions (tonnes)} \right\} / \left\{ \sum_F \text{Reference Equivalent CO}_2 \text{ From Fuel Burning (tonnes)} \right\}$$

where F is each fuel used in the Generating System over the measurement period

- the weighted average *Equivalent Carbon Dioxide Emission Factor* ($F_{CO_2-e,av}$) and *Fuel Gross Calorific Value* ($Q_{g,p,as,av}$), weighted according to the tonnage of each fuel consumed in the Generating System and the weighted average *Reference Sent Out Thermal Efficiency* ($h_{SO,av}$) weighted according to the energy of each fuel consumed in the Generating System.
- *Actual GI value* (in kg CO₂-e/MWh sent out) applicable to the Generating System in that measurement period.
- *Reference GI* ($GI_{R,Fuel \text{ Switch}}$) (in kg CO₂-e/MWh) applying at the output factor achieved by the Generating System during that measurement period.
- *Adjusted Reference GI* ($GI_{R,Fuel \text{ Switch,Adj}}$) (in kg CO₂-e/MWh), calculated as follows:

$$\text{Reference GI (kg CO}_2\text{-e/MWh)} \times \text{GES Adjustment Factor}$$

- *Adjusted Lower GI value* ($GI_{L,Lower,Fuel \text{ Switch,Adj}}$) (in kg CO₂-e/MWh) applying at the output factor achieved by the Generating System during that measurement period and taking into account performance degradation with age and the GES tolerance band.

Step (3)

For the original fuel(s) applying before the change in fuel mix, calculate using the methodology in

Step(2):

- *Reference Total Greenhouse Gas Emissions* (in tonnes of CO₂ equivalent)
- *GES Adjustment Factor* for original fuel(s)
- *Reference GI* ($GI_{R,Original}$) (in kg CO₂-e/MWh) applying at the output factor achieved by the Generating System during that measurement period.
- *Adjusted Reference GI* ($GI_{R,Original,Adj}$) (in kg CO₂-e/MWh)
- *Adjusted Lower GI value* ($GI_{L,Lower,Original,Adj}$) (in kg CO₂-e/MWh) applying at the output factor achieved by the Generating System and taking into account performance degradation with age and the GES tolerance band.

Step (4)

For the output factor achieved during that measurement period, the *Fuel Switch Gain* in emissions intensity is:

$$GI_{L,Lower,Original, Adj} - GI_{L,Lower,Fuel Switch, Adj}$$

There can only be a *Fuel Switch Gain* if the $GI_{L,Lower,Fuel Switch, Adj} < GI_{L,Lower,Original, Adj}$

Step (5)

The number of NGACs that may be created per measurement period is:

$$\{\text{Fuel Switch Gain (kg CO}_2\text{-e/MWh) / 1000}\} \times \{\text{Net Sent Out Generation}\}$$

Where:

- *Net Sent Out Generation* (in MWh) is, in respect of the Generating System, Net Sent Out Generation during the measurement period by reference to which the Generator seeks to create NGACs

Step (6)

If the fuel switch involves the introduction of Waste Coal Mine Gas, then the Waste Coal Mine Gas attracts an additional abatement benefit. The number of additional NGACs that may be created is calculated using **Equation 13**.

If the fuel switch involves the introduction of landfill gas, sewage gas, or fugitive methane from other Renewable Energy Sources or Qualifying Putrescible Waste or methane manufactured from Qualifying Putrescible Waste, then the use of that gas attracts an additional abatement benefit. The number of additional NGACs that may be created is calculated using:

- **Equation 16** for landfill gas, sewage gas or fugitive methane from other Renewable Energy Sources; or
- **Method 5** for Qualifying Putrescible Waste or methane manufactured from Qualifying Putrescible Waste.

Step (7)

If the fuel switch involves the introduction of a Renewable Energy Source, the use of which has or

will be used to create RECs, no NGACs can be created in respect of the activity that has been or will be used to create RECs.

Step (8)

If **Method 1** is used subsequently to calculate *GES Gain*, then the fuel switch Lower GI value ($GI_{L,Lower,Fuel\ Switch,Adj}$) will be substituted for the original Lower GI value ($GI_{L,Lower,Original, Adj}$), so as to avoid double counting of *GES Gain* after the fuel switch. The *GES Gain* at a specified plant output factor is:

$$GI_{L,Lower,Fuel\ Switch,Adj} - \text{Adjusted Actual GI value}$$

where:

$$\text{Adjusted Actual GI value} = \text{Actual GI (kg CO}_2\text{-e/MWh)} \times \text{GES Adjustment Factor}$$

Note:

For example, a coal fired power station installs supplementary gas burners on its boilers and, in the following year, the plant generates 1,000,000 MWh at an output factor of 60% with 5% of the total fuel (by weight) being supplied from natural gas. No RECs are created from the plant in that period. The Actual GI is 950 kg CO₂-e/MWh.

The emission factors for carbon dioxide, methane and nitrous oxide for coal and natural gas are calculated yielding a F_{CO₂-e} of 1.85 and 2.58 kg CO₂-e/kg fuel for coal and natural gas respectively and hence a weighted average F_{CO₂-e,av} of 1.885 kg CO₂-e/kg fuel. Since coal and natural gas impact boiler efficiency and auxiliary load differently, the Reference Sent Out Thermal Efficiency (h_{SO}) is calculated for each fuel at 60% output factor, yielding 32.03% and 31.64% respectively and a weighted average h_{SO,av} of 31.99%. The Gross Calorific Value for coal and natural gas is 22.0 and 50.0 MJ/kg respectively, yielding a weighted average Q_{gr,p,as,av} of 23.3 MJ/kg. For the new fuel mix, the Reference GI (GI_{R,Fuel Switch}) is calculated to be 909 kg CO₂-e/MWh. The emissions associated with the production of coal and natural gas were calculated using **Equations 10, 11 and 12** to yield a GES Adjustment Factor of 1.026. The *Adjusted Reference GI* (GI_{R,Fuel Switch,Adj}) is calculated to be 933 kg CO₂-e/MWh and the Adjusted Lower GI value (GI_{L,Lower,Fuel Switch,Adj}) is 970 kg CO₂-e/MWh. For the original coal only, the GES Adjustment Factor is 1.025 and the Adjusted Reference GI and Adjusted Lower GI value are calculated yielding a GI_{R,Original,Adj} and GI_{L,Lower,Original, Adj} of 968 and 1,007 kg CO₂-e/MWh respectively.

From this data, the Fuel Switch Gain is:

$$1,007 - 970 = 37 \text{ kg CO}_2\text{-e/MWh sent out}$$

The number of NGACs that may be created due to the fuel switch is:

$$37 / 1000 \times (1,000,000 - 0) = 37,000 \text{ tonnes CO}_2\text{-e}$$

Under the GES commitment, work is also carried out to improve the performance of the sootblowing system. The plant is 12 years old. The work on the sootblowing system also improves the plant's efficiency and the Adjusted Actual GI is 970 kg CO₂-e/MWh which is less than the Adjusted Lower GI Value (GI_{L,Lower,Original} = 1,007 kgCO₂-e/MWh). Under **Method 1**, it may be possible to create NGACs from the efficiency improvement. Under **Method 3**, however, the Adjusted Lower GI value is changed down to the GI_{L,Lower,Fuel Switch, Adj} value so as to avoid double counting. The Adjusted Actual GI of 975 kg CO₂-e/MWh is not

less than the $GI_{L, Lower, Fuel Switch}$ value of 970 kg CO₂-e/MWh, so the GES Gain is zero and no NGACs may be created due to *GES Gain*.

If, in the above example, the gas was not natural gas but Waste Coal Mine Gas sourced from a coal mine, the additional NGACs that could be created are calculated (using **Equation 13**) as:

$1.32 \text{ (Energy content of waste coal mine gas in PJ)} \times 18 \text{ (kt CH}_4\text{/PJ default CH}_4\text{ conversion factor)} \times 21 \times 1000 = 499,000 \text{ tonnes CO}_2\text{-e}$

9.2.3 For electricity generated by a Category B Generating System using primarily Renewable Energy Sources, the Generator that is accredited in respect of the Generating System may create the number of NGACs calculated using **Equation 1** where the *Eligible Generation* is calculated using **Equation 2**.

9.2.4 For electricity generated in a year by a Category B Generating System using Fossil Fuels (primarily) co-fired with Renewable Energy Sources, the Generator that is accredited in respect of the Generating System may, in addition to any entitlement to create NGACs under clause 9.2.1, create using this Rule the number of NGACs calculated using **Equation 5**.

Equation 5

Number of NGACs that may be created = {Net Sent Out Generation x NSW Pool Coefficient x Energy Content of Renewable Energy Source x $h_{SO,RE}$ / (Energy Content of Renewable Energy Source x $h_{SO,RE}$ + Energy Content of Fossil Fuel x $h_{SO,FF}$)} - (RECs Created/MLF)

If this amount is less than or equal to zero, then the Number of NGACs that may be created = 0.

Where:

- *Number of NGACs that may be created* is in t CO₂-e and is in respect of the time period over which the Net Sent Out Generation occurs
- *Net Sent Out Generation* is in MWh and is in respect of a calendar year or part thereof
- *NSW Pool Coefficient* (in t CO₂-e/MWh) is the NSW Pool Coefficient determined by the Tribunal using clause 9.1 of the Compliance Rule for the year in which the Net Sent Out Generation was generated
- *Energy Content of Renewable Energy Source* is in PJ
- $h_{SO,RE}$ is the thermal efficiency of the Generating System attributed to the Renewable Energy Source only
- *Energy Content of Fossil Fuel* is in PJ
- $h_{SO,FF}$ is the thermal efficiency of the Generating System attributed to the Fossil Fuel only
- *RECs Created* (in MWh) is the number of RECs created and registered with ORER in accordance with the RE(E) Act in respect of the same electricity generation by the Generating System in the same year as the *Net Sent Out Generation*
- *MLF* is the marginal loss factor for the Generating System, as defined in the RE(E) Regulation

9.3 Creation of NGACs from electricity generated by Category C Generating Systems

9.3.1 For electricity generated by a Category C Generating System using primarily Fossil Fuels, the Generator that is accredited in respect of the Generating System may in each year select to either:

- (a) create the number of NGACs calculated using **Equation 1** where *Eligible Generation* is calculated using **Equation 2**; or
- (b) create the number of NGACs according to the following (as applicable):
 - (i) if the Generator is a participant in the Australian Government Generator Efficiency Standards and measures are taken on or after 1 January 2002 which, in the view of the Scheme Administrator, improve the efficiency of the Generating System without changing its design or its fuel mix, the Generator that is accredited in respect of the Generating System may create the number of NGACs calculated using **Method 1**; or
 - (ii) if the Generator takes measures on or after 1 January 2002 that, in the view of the Scheme Administrator, change the design of the Generating System but not its fuel mix, the Generator that is accredited in respect of the Generating System may create the number of NGACs calculated using **Method 2**; or
 - (iii) if the Generator takes measures on or after 1 January 2002 that, in the view of the Scheme Administrator, significantly change the fuel mix of the Generating System, the Generator that is accredited in respect of the Generating System may create the number of NGACs calculated using **Method 3**; or
- (c) create the number of NGACs under both (a) and (b), provided that in this case, references to Net Sent Out Generation in **Methods 1, 2 and 3** will be deemed to be references to the lesser of the Net Sent Out Generation and the Generator's NSW Production Baseline.

9.3.2 In clause 9.3.1, references to the Generator being a participant in the Australian Government Generator Efficiency Standards and taking certain measures include references to any of the persons in clause 6.2.1 being such a participant and taking such measures or causing such measures to be taken.

9.3.3 For electricity generated by a Category C Generating System using primarily Renewable Energy Sources, the Generator that is accredited in respect of the Generating System may create the number of NGACs calculated using **Equation 1** where *Eligible Generation* is calculated using **Equation 2**.

9.4 Creation of NGACs from electricity generated by Category D Generating Systems

9.4.1 For electricity generated by a Category D Generating System using primarily Fossil Fuels, the Generator that is accredited in respect of the Generating System may in each year select to either:

- (a) create the number of NGACs calculated using **Equation 1** where *Eligible Generation* is calculated using **Equation 2**; or
- (b) create the number of NGACs according to the following (as applicable):

- (i) if the Generator is a participant in the Australian Government Generator Efficiency Standards and measures are taken which, in the view of the Scheme Administrator, improve the efficiency of the Generating System without changing its design or its fuel mix, the Generator that is accredited in respect of the Generating System may create the number of NGACs calculated using **Method 1**; or
- (ii) if the Generator takes measures that, in the view of the Scheme Administrator, change the design of the Generating System but not the fuel mix, the Generator that is accredited in respect of the Generating System may create the number of NGACs calculated using **Method 2**; or
- (iii) if the Generator takes measures that, in the view of the Scheme Administrator, significantly change the fuel mix of the Generating System, the Generator that is accredited in respect of the Generating System may create the number of NGACs calculated using **Method 3**.

9.4.2 In clause 9.4.1, references to the Generator being a participant in the Australian Government Generator Efficiency Standards and taking certain measures include references to any of the persons in clause 6.2.1 being such a participant and taking such measures or causing such measures to be taken.

9.4.3 For electricity generated by a Category D Generating System using primarily Renewable Energy Sources, the Generator that is accredited in respect of the Generating System may create the number of NGACs calculated using **Equation 1** where *Eligible Generation* is calculated using **Equation 2**.

9.5 Creation of additional NGACs from electricity generated using landfill gas and sewage gas, manufactured methane, oxidation of Qualifying Putrescible Waste or cogeneration from Renewable Energy Sources

In respect of electricity generated by a Generating System that is entitled to create RECs:

- (a) using landfill gas, sewage gas;
- (b) using methane manufactured from Qualifying Putrescible Waste;
- (c) using oxidation of Qualifying Putrescible Waste; or
- (d) that is a Cogeneration Plant for which the appropriate fuel identified in Step (2) of **Method 4** is a Fossil Fuel,

the Generator that is accredited in respect of the Generating System may create the number of NGACs calculated using **Equation 6** in addition to any NGACs that it is entitled to create according to clauses 9.1 to 9.4 (unless such additional NGACs have been created under Step 6 of Method 3).

Note: Clause 9.5(a) relates to fugitive methane that would otherwise be vented as a by-product of a waste disposal or treatment process. Clause 9.5(b) applies to methane manufactured from material that would otherwise have been disposed of in a landfill, anaerobic pond, windrow or by other means which would lead to the venting of methane as a by-product. Clause 9.5(c) applies to the oxidation of waste that would otherwise have been disposed of in a landfill or a windrow.

The Scheme recognises the double greenhouse benefit of using these energy sources to generate electricity to the extent that the electricity is sent out to a Distribution System or Transmission system. Clause 9.5 allows NGACs to be created in recognition of the greenhouse benefits of avoiding the emission of methane to the atmosphere and using heat in cogeneration that would otherwise be wasted, which is in addition to the greenhouse benefit of electricity generation from fuel sources with lower emissions.

Note, however, that NGACs may not be created under both clauses 9.1 to 9.4 and clause 9.5:

- If no RECs are created, there will not be an entitlement to create NGACs under both clauses 9.1 to 9.4 and clause 9.5. This is because NGACs created under clause 9.5 are by reference to the number of RECs created. However, in this case both greenhouse benefits will be taken into account in the calculations under clauses 9.1 to 9.4.
- If, on the other hand, all of the electricity generated is used to create RECs (thus disallowing the creation of NGACs under clauses 9.1 to 9.4), NGACs may be created under clause 9.5 in addition to those RECs, to the extent that the electricity is sent out to a Distribution System or Transmission system. Although both RECs and NGACs may be created in this case, they are created in respect of different abatement and therefore it is consistent with any accreditation conditions or undertakings that disallow the creation of RECs or NGACs in respect of the same greenhouse gas abatement.

Equation 6

Number of additional NGACs that may be created = Number of RECs Created arising from Net Sent Out Generation/MLF x (NSW Pool Coefficient x Emissions Intensity Adjustment Factor – NSW Pool Coefficient - Emissions Intensity)

Where:

- *Number of additional NGACs that may be created* is in t CO₂-e and is in respect of the time period over which the *Number of RECs Created* are calculated
- *NSW Pool Coefficient* (in t CO₂-e/MWh) is the NSW Pool Coefficient determined by the Tribunal using clause 9.1 of the Compliance Rule for the year in which the electricity generated occurred
- *Net Sent Out Generation* is in MWh and is in respect of a calendar year or part thereof
- *Number of RECs Created* (in MWh) is the number of RECs created and registered with ORER in accordance with the RE(E) Act in respect of electricity generated over the time period in respect of which the Generator would have been entitled to create NGACs (had the Generator not created RECs instead) according to clauses 9.1 to 9.4
- *Emissions Intensity* (in t CO₂-e/MWh) is calculated using **Equation 4**
- *Emissions Intensity Adjustment Factor* is the value in Table 9 of Schedule A to this Rule appropriate to whether the Generating System is connected to a Distribution System or to a Transmission System
- *MLF* is the marginal loss factor for the Generating System, as defined in the RE(E) Regulation

9.6 Creation of NGACs from electricity generated using Native Forest Bio-Material

Despite any other provision in this Rule, an Accredited Abatement Certificate Provider must not create NGACs in respect of the whole or any part of the electricity generated by any Generating System in a particular year if it generated any electricity in that year in violation of the provisions of the *Protection of the Environment Operations (General) Amendment (Burning of Bio-Material) Regulation 2003*.

Note: Clause 9.6. refers to limits and conditions relating to the implementation of the NSW Government policy on the use of forest biomass for electricity generation.

9.7 Adjustment of number of NGACs that may be created for GGAP funded projects

- 9.7.1 Despite any other provision in this Rule, if on or after 1 January 2003 approval for GGAP funding has been granted for a project, the maximum number of NGACs that an Accredited Abatement Certificate Provider can create under this Rule from the number of tonnes of carbon dioxide equivalent of greenhouse gas emissions abated by the project equals the percentage of the total number of NGACs that it is otherwise entitled to create under this Rule from that project corresponding to the percentage of project funding that is not provided by GGAP.

Note: For example, if GGAP funding represents 20% of total project funding, then the Accredited Abatement Certificate Provider can only create NGACs for 80% of the eligible abatement achieved.

10 Emissions Calculations

10.1 Total Greenhouse Gas Emissions

10.1.1 Subject to clauses 10.2 and 10.3, the *Total Greenhouse Gas Emissions* in tonnes of carbon dioxide equivalent from a Generating System is the total of:

- (a) for each Fossil Fuel used, the sum of:
 - (i) CO₂ emissions at the point of combustion (in tonnes), calculated using **Equation 7**; and
 - (ii) CH₄ emissions at the point of combustion (in tonnes of carbon dioxide equivalent), calculated using **Equation 8**; and
 - (iii) N₂O emissions at the point of combustion (in tonnes of carbon dioxide equivalent), calculated using **Equation 9**; and
 - (iv) if the Fossil Fuel is natural gas, fugitive CO₂ emissions associated with the production of the Fossil Fuel (in tonnes of carbon dioxide equivalent) calculated using **Equation 10**; and
 - (v) if the Fossil Fuel is natural gas, fugitive CH₄ emissions associated with the production of the Fossil Fuel (in tonnes of carbon dioxide equivalent), calculated using **Equation 11**;
 - (vi) if the Fossil Fuel is black coal, the total of fugitive CH₄ emissions associated with the production of the Fossil Fuel for mines from which coal is sourced (in tonnes of carbon dioxide equivalent), where the fugitive CH₄ emissions associated with the production of the Fossil Fuel for each mine are calculated using **Equation 12**,less:
 - (vii) if the Fossil Fuel is Waste Coal Mine Gas (whether Waste Coal Mine Gas from the same mining operations was flared or vented prior to its use in the Generating System), fugitive CH₄ emissions avoided directly through the use of Waste Coal Mine Gas (in tonnes of carbon dioxide equivalent), using **Equation 13**; and
- (b) for each Renewable Energy Source used, the sum of:
 - (i) CH₄ emissions at the point of combustion (tonnes of carbon dioxide equivalent), calculated using **Equation 14**; and
 - (ii) N₂O emissions at the point of combustion (tonnes of carbon dioxide equivalent), calculated using **Equation 15**,less:
 - (iii) if the fuel is landfill gas, sewage gas, or fugitive methane from other Renewable Energy Sources, fugitive CH₄ emissions avoided through the use of the fuel (in tonnes of carbon dioxide equivalent), calculated using **Equation 16**; and

- (iv) if the fuel is Qualifying Putrescible Waste or methane manufactured from Qualifying Putrescible Waste, nominal fugitive CH₄ emissions avoided through the use of the fuel (in tonnes of carbon dioxide equivalent), calculated using **Method 5**.

10.1.2 Where, in **Equations 7 to 16** or **Method 5**, a factor, method or methodology is to be approved by the Scheme Administrator, the Relevant Entity must submit the proposed factor, method or methodology to the Scheme Administrator, justify its adoption and document its application.

Equation 7

CO₂ emissions at the point of combustion = Energy Content of Fossil Fuel x CO₂ emission factor x combustion factor x 1000

Where

- *CO₂ emissions at the point of combustion* is in t CO₂-e
- *Energy Content of Fossil Fuel* (in PJ) is the actual Energy Content of the Fossil Fuel or, if this is not known by the Relevant Entity, the Scheme Administrator may approve an estimation methodology.
- *CO₂ emission factor* (in kt CO₂/PJ) is the CO₂ emission factor approved by the Scheme Administrator or, in the absence of such approval, the factor for that Fossil Fuel and equipment type in Table 3 of Schedule A to this Rule.
- *Combustion factor* is the combustion factor approved by the Scheme Administrator or, in the absence of such approval, the factor for that Fossil Fuel in Table 4 of Schedule A to this Rule.

Equation 8

CH₄ emissions at the point of combustion = Energy Content of Fossil Fuel x CH₄ emission factor x 1000 x 21

Where

- *CH₄ emissions at the point of combustion* is in t CO₂-e
- *Energy Content of Fossil Fuel* (in PJ) is the actual Energy Content of the Fossil Fuel or, if this is not known by the Relevant Entity, the Scheme Administrator may approve an estimation methodology.
- *CH₄ emission factor* (in kt CH₄/PJ) is the factor for that Fossil Fuel and equipment type in Table 5 of Schedule A to this Rule or another CH₄ emission factor approved by the Scheme Administrator.

Equation 9

N₂O emissions at the point of combustion = Energy Content of Fossil Fuel x N₂O emission factor x 1000 x 310

Where

- *N₂O emissions at the point of combustion* is in t CO₂-e
- *Energy Content of Fossil Fuel* (in PJ) is the actual Energy Content of the Fossil Fuel or, if this is not known by the Relevant Entity, the Scheme Administrator may approve an estimation methodology.
- *N₂O emission factor* (in kt N₂O/PJ) is the factor for that Fossil Fuel and equipment type in Table 5 of Schedule A to this Rule or another N₂O emission factor approved by the Scheme Administrator.

Equation 10

Fugitive CO₂ emissions associated with the production of the Fossil Fuel = Energy Content of Fossil Fuel x CO₂ emission factor x 1000

Where

- *Fugitive CO₂ emissions associated with the production of the Fossil Fuel* is in t CO₂-e
- *Energy Content of Fossil Fuel* (in PJ) is the actual Energy Content of the Fossil Fuel or, if this is not known by the Relevant Entity, the Scheme Administrator may approve an estimation methodology.
- *CO₂ emission factor* (in kt CO₂/PJ) is the factor for that Fossil Fuel in Table 2 of Schedule A to this Rule or another CO₂ emission factor approved by the Scheme Administrator.

Equation 11

Fugitive CH₄ emissions associated with the production of the Fossil Fuel = Energy Content of Fossil Fuel x CH₄ emission factor x 1000 x 21

Where

- *Fugitive CH₄ emissions associated with the production of the Fossil Fuel* is in t CO₂-e
- *Energy Content of Fossil Fuel* (in PJ) is the actual Energy Content of the Fossil Fuel or, if this is not known by the Relevant Entity, the Scheme Administrator may approve an estimation methodology.
- *CH₄ emission factor* (in kt CH₄/PJ) is the factor for that Fossil Fuel in Table 2 of Schedule A to this Rule or another CH₄ emission factor approved by the Scheme Administrator.

Equation 12

Fugitive CH₄ emissions associated with the production of the Fossil Fuel for each mine = (Mass of coal sourced from mine x CH₄ emission factor / 1000) x 21

Where

- *Fugitive CH₄ emissions associated with the production of the Fossil Fuel* is in t CO₂-e
- *Mass of coal sourced from mine* is in t
- *CH₄ emission factor* (in kg CH₄/ t) is the weighted average for the State from which the coal was sourced in Table 1 of Schedule A to this Rule or another CH₄ emission factor approved by the Scheme Administrator.

Equation 13

Fugitive CH₄ emissions avoided directly through the use of Waste Coal Mine Gas = Energy Content of waste methane used as Fossil Fuel x CH₄ conversion factor x 1000 x 21

Where

- *Fugitive CH₄ emissions avoided through the use of waste coal mine gas* is in t CO₂-e
- *Energy Content of waste methane used as Fossil Fuel* (in PJ) is the actual Energy Content of the waste methane used as Fossil Fuel or, if this is not known by the Relevant Entity, a value determined in accordance with an estimation methodology approved by the Scheme Administrator, or a value determined on the assumption that, for electricity converted to Net Sent Out Generation, Sent Out Generation represents 36% of the total Energy Content of all Fossil Fuels used (waste methane used as Fossil Fuel and any supplementary fuel used).
- *CH₄ conversion factor* (in kt CH₄/PJ) is 18 or another conversion factor approved by the Scheme Administrator for this purpose.

Equation 14

CH_4 emissions at the point of combustion = Energy Content of Renewable Energy Source x CH_4 emission factor x 1000 x 21

Where

- *CH₄ emissions at the point of combustion* is in t CO₂-e
- *Energy Content of Renewable Energy Source* (in PJ) is the actual Energy Content of the Renewable Energy Source or, if this is not known by the Relevant Entity, the Scheme Administrator may approve an estimation methodology.
- *CH₄ emission factor* (in kt CH₄/PJ) is the factor for that Renewable Energy Source and equipment type in Table 5 of Schedule A to this Rule or another CH₄ emission factor approved by the Scheme Administrator.

Equation 15

N_2O emissions at the point of combustion = Energy Content of Renewable Energy Source x N_2O emission factor x 1000 x 310

Where

- *N₂O emissions at the point of combustion* is in t CO₂-e
- *Energy Content of Renewable Energy Source* (in PJ) is the actual Energy Content of the Renewable Energy Source or, if this is not known by the Relevant Entity, the Scheme Administrator may approve an estimation methodology.
- *N₂O emission factor* (in kt N₂O/PJ) is the factor for that Renewable Energy Source and equipment type in Table 5 of Schedule A to this Rule or another N₂O emission factor approved by the Scheme Administrator.

Equation 16

Fugitive CH_4 emissions directly avoided through the use of the fuel = Energy Content of waste methane used as Renewable Energy Source x CH_4 conversion factor x 1000 x 21

Where

- *Fugitive CH₄ emissions directly avoided through the use of the fuel* is in t CO₂-e
- *Energy Content of waste methane used as Renewable Energy Source* (in PJ) is the actual Energy Content of the waste methane used as a Renewable Energy Source or, if this is not known by the Relevant Entity, a value determined in accordance with an estimation methodology approved by the Scheme Administrator, or a value determined on the assumption that, for electricity converted to Net Sent Out Generation, Sent Out Generation represents 36% of the total Energy Content of all energy sources used (waste methane used as a Renewable Energy Source and any supplementary energy sources used).
- *CH₄ conversion factor* (in kt CH₄/PJ) is 18 or another conversion factor approved by the Scheme Administrator.

10.2 Adjustment of Total Greenhouse Gas Emissions for Cogeneration Plant

- (a) For a Cogeneration Plant, the Total Greenhouse Gas Emissions calculated in clause 10.1 may be reduced by the amount of notional greenhouse gas emissions avoided (in tonnes of carbon dioxide equivalent) through use of the heat that would otherwise be wasted, calculated using **Method 4**.

- (b) If a Category A Generating System was modified on or after 1 January 2002 to become a Cogeneration Plant, then any calculations by a Deemed Retailer under clause 10.2(a) in respect of that Generating System must be adjusted so as not to include the notional greenhouse gas emissions which may be calculated under clause 9.1(c).
- (c) For a Cogeneration Plant providing heat which was generated from Waste Coal Mine Gas, landfill gas, sewage gas, manufactured methane, or oxidation of Qualifying Putrescible Waste, from the combustion of which clause 9.5, or equation 13 or equation 16 was or will be used to calculate NGACs, no additional NGACs (in the context of clause 9.5) arising from fugitive methane emissions avoided shall be attributable to the Cogeneration Plant, for the purposes of Method 4.

Note: The Generator who is entitled to create NGACs under clause 9.1(c) may nonetheless grant the Deemed Retailer this right by a nomination under clause 6.2.1(c).

Method 4

Step (1) Determine the amount of heat used from the Cogeneration Plant:

- by identifying the amount of heat used from the Cogeneration Plant; or
- if not known by the Relevant Entity, 70% of the Energy Content of the fuel, less the Energy Content of the Gross Generation.

Step (2) Identify the appropriate fuel for the notional greenhouse gas emissions avoided as follows:

- If the Cogeneration Plant uses Fossil Fuel, the fuel for the notional greenhouse gas emissions avoided is:
 - (i) if the Cogeneration Plant replaces an existing boiler or there is another boiler also supplying heat to the user of the cogenerated heat, the actual fuel for that boiler; or
 - (ii) in other cases, the main fuel used in the Cogeneration Plant
- If the Cogeneration Plant uses a Renewable Energy Source, the fuel for the notional greenhouse gas avoided is
 - (iii) if there was a pre-existing boiler or other heating process using Fossil Fuels, the pre-existing fuel or a combination of fuels similar to the combination of the fuels displaced; or
 - (iv) if there was no pre-existing boiler or other heating process using Fossil Fuels but natural gas is connected at the site, natural gas; or
 - (v) in other cases, the Renewable Energy Source.

Step (3) Calculate the amount of notional fuel avoided:

- a) if the notional fuel is a Fossil Fuel, by dividing the amount of heat used from the Cogeneration Plant by:
 - (vi) if the fuel for the notional greenhouse gas emissions avoided is natural gas, 0.80;
 - (vii) if the fuel for the notional greenhouse gas emissions avoided is coal, 0.70;
 - (viii) or otherwise, 0.75; or
- b) if the fuel for the notional greenhouse gas emissions avoided is a Renewable Energy Source, zero

Step (4) For the appropriate fuel identified using Step (2) and the amount of notional fuel avoided calculated in Step (3), the notional emissions avoided are calculated in accordance with the equations appropriate to that fuel in clause 10.1, subject to clause 10.2(c).

Method 5

Step (1) Identify the Alternative Disposal Method for the Putrescible Waste, as:

- windrows only (ie 100% of the Putrescible Waste used in the methane manufacturing or oxidation process would have been disposed of in windrows);
- landfills only (ie 100% of the Putrescible Waste used in the methane manufacturing or oxidation process would have been disposed of in landfills);
- anaerobic lagoons only (ie 100% of the Putrescible Waste used in the methane manufacturing process would have been disposed of in anaerobic lagoons);
- a combination of two or more of windrows, landfills or anaerobic lagoons (with the percentage of each to be specified);
- another method approved by the Scheme Administrator;
- a combination of another method approved by the Scheme Administrator and one or more of windrows, landfills or anaerobic lagoons (with the percentage of each to be specified).

If the Scheme Administrator does not approve the identification of any of the above Alternative Disposal Methods the default Alternative Disposal Method is windrows only.

Step (2) Calculate the Alternative Disposal Method CH₄ Production Factor.

- If the Alternative Disposal Method is windrows only, landfill only or anaerobic lagoons only, the Alternative Disposal Method CH₄ Production Factor is either a value calculated by a method approved by the Scheme Administrator, or the value corresponding to that Alternative Disposal Method in Table 10 of Schedule A to this Rule.
- If the Alternative Disposal Method is another method approved by the Scheme Administrator, the Alternative Disposal Method CH₄ Production Factor is either a value calculated by a method approved by the Scheme Administrator, or the value corresponding to the value for windrows only in Table 10 of Schedule A to this Rule.
- If the Alternative Disposal Method is a combination, the Alternative Disposal Method CH₄ Production Factor is either a value calculated by a method approved by the Scheme Administrator, or the value corresponding to the value for windrows only in Table 10 of Schedule A to this Rule.

Step (3) Calculate an average Qualifying Putrescible Waste Factor over the period for which NGACs are being calculated, by a method approved by the Scheme Administrator, which could include a waste characterisation study taking into account variations arising from seasonality, location of source of waste, and other relevant factors.

- If the Scheme Administrator does not approve the calculation of the Qualifying Putrescible Waste Factor, the default Qualifying Putrescible Waste Factor is 0.8.

Note: The RE(E) Act and RE(E) Regulation prevent the creation of RECs from any waste products derived from fossil fuels (eg plastics), so where clause 9.5(b) is being used to calculate a number of NGACs from a number of RECs, the Qualifying Putrescible Waste Factor in Step (3) of this Method should NOT be adjusted to net out waste products derived from Fossil Fuels.

Step (4) Calculate an average Process CH₄ Production Factor over the period for which NGACs are

being calculated, by a method approved by the Scheme Administrator.

- If the Scheme Administrator does not approve the calculation of the Process CH₄ Production Factor, the default Process CH₄ Production Factor is 70%.

Step (5) Calculate the Nominal fugitive CH₄ emissions avoided through the use of the fuel:

Nominal fugitive CH₄ emissions avoided through the use of the fuel = Energy Content of Putrescible Waste or manufactured methane used as a Renewable Energy Source x CH₄ conversion factor x 1000 x 21 x Qualifying Putrescible Waste Factor x Putrescible Waste Decomposition Factor x (Alternative Disposal Method CH₄ Production Factor/Process CH₄ Production Factor)

Where

- *Nominal Fugitive CH₄ emissions avoided through the use of the fuel* is in t CO₂-e
- *Energy Content of Putrescible Waste or manufactured methane used as a Renewable Energy Source* (in PJ) is the actual Energy Content of the Putrescible Waste or manufactured methane used as a Renewable Energy Source or, if this is not known by the Relevant Entity, a value determined in accordance with an estimation methodology approved by the Scheme Administrator, or a value determined on the assumption that, for electricity converted to Net Sent Out Generation, Sent Out Generation represents 36% of the total Energy Content of all energy sources used (Putrescible waste or manufactured methane used as a Renewable Energy Source and any supplementary energy sources used)
- *CH₄ conversion factor (in kt CH₄/PJ)* is 18 or another conversion factor approved by the Scheme Administrator
- *Qualifying Putrescible Waste Factor* is calculated under Step (3)
- *Putrescible Waste Decomposition Factor* is the proportion of Qualifying Putrescible Waste that decomposes to gaseous products and is:
 - 1.0 for Putrescible Waste; and
 - 0.2 for Wood Waste, or another factor approved by the Scheme Administrator.
- *Alternative Disposal Method CH₄ Production Factor* is calculated under Step (2)
- *Process CH₄ Production Factor* is calculated under Step (4)

Note: The Putrescible Waste Decomposition Factor is a measure of the proportion of the Waste which would decompose in 50 years. For Wood Waste which would otherwise have been disposed of in a landfill, it will reflect the fact that the lignin content will not decompose and may inhibit the decomposition of other components of the material, as well as recent research that many wood products change little in some landfills. An alternative factor could be derived using the latest version of the “Australian Methodology for the Estimation of Greenhouse Gas Emissions and Sinks 2003: Waste,” National Greenhouse Gas Inventory Committee, Canberra (available from the Australian Greenhouse Office).

10.3 Other waste fuel, waste heat, waste materials, and other waste outputs

10.3.1 This clause 10.3 applies to electricity that is generated from:

- (a) a waste fuel that is otherwise vented or flared;
- (b) heat that is otherwise wasted but that is not heat produced by a Cogeneration Plant;

- (c) outputs of industrial processes (primarily using Fossil Fuels) that would otherwise be wasted, including but not limited to industrial waste steam; or
- (d) waste materials that would otherwise be burned, incorporated in durable products, or landfilled;

other than those that are dealt with elsewhere in this Rule.

Note: Naturally occurring heat sources are dealt with as Renewable Energy. Landfill, sewage and Waste Coal Mine Gas are dealt with under clause 10.1.

10.3.2 *Heat that would otherwise be wasted or waste fuel that would otherwise be flared or vented*

If electricity is generated from the burning of a waste fuel that would otherwise be flared or heat that would otherwise be wasted, the *Total Greenhouse Gas Emissions* from that electricity generation are zero.

10.3.3 *Useful organic material*

If organic material that could otherwise be incorporated in durable products is used for electricity generation, the *Total Greenhouse Gas Emissions* from its combustion are to be calculated as if the material were a Fossil Fuel using clause 10.1.

10.3.4 *Organic material otherwise placed in landfill*

If organic material that would otherwise be landfilled is used for electricity generation, the *Total Greenhouse Gas Emissions* from its combustion are to be calculated as if the material were a Renewable Energy Source using clause 10.1.

10.3.5 *Methane from industrial processes*

If methane from an industrial process (primarily using Fossil Fuels), that would otherwise be vented, is used for electricity generation, the *Total Greenhouse Gas Emissions* from its combustion are to be calculated as if the material were Waste Coal Mine Gas using clause 10.1.

10.3.6 *Fuel other than methane from industrial processes*

If waste fuel other than methane from an industrial process (primarily using Fossil Fuels), that would otherwise be vented, is used for electricity generation, the *Total Greenhouse Gas Emissions* from its combustion are to be calculated as if the material were a Fossil Fuel using clause 10.1.

10.3.7 *Other waste fuel, waste heat, waste materials, or waste outputs*

For an energy source from which electricity is generated and to which this clause 10.3 applies, the Scheme Administrator may determine the means by which *Total Greenhouse Gas Emissions* are to be calculated using the following principles:

- (a) The calculation of the *Total Greenhouse Gas Emissions* must be consistent with the National Greenhouse Gas Inventory Methodology. Categories of emissions not covered by the National Greenhouse Gas Inventory Methodology cannot be taken into account;

Note: An example of a category of emissions not covered by the National Greenhouse Gas Inventory Methodology is emissions from the spontaneous combustion of waste coal.

- (b) The combustion emissions produced by the Generating System from any energy sources to which this clause 10.3 does not apply must also be taken into account; and
- (c) For a Cogeneration Plant, the *Total Greenhouse Gas Emissions* calculated may be reduced by the amount of notional greenhouse gas emissions avoided through use of the waste heat, on the same principles as for Cogeneration Plant using Fossil Fuel or Renewable Energy Sources in clause 10.2.

10.3.8 For the purpose of this clause 10.3, the Scheme Administrator will determine whether a material, heat, a fuel, or another waste output to which this clause applies would or could be otherwise used or utilised.

11 Definitions and Interpretation

11.1 In this Rule:

“**Act**” means the *Electricity Supply Act 1995*.

“**Alternative Disposal Method**” is the waste disposal method approved by the Scheme Administrator as the most likely alternative waste disposal method for the Qualifying Putrescible Waste used in a methane manufacturing or oxidation process.

“**Australian Government Generator Efficiency Standards Methodology**” means the calculation methodology as set out in:

- (a) the most recent published versions (from time to time) of
 - (i) *Program Guidelines: Generator Efficiency Standards, Australian Greenhouse Office*;
 - (ii) *Technical Guidelines: Generator Efficiency Standards, Australian Greenhouse Office*; and
- (b) other Generator Efficiency Standards guidelines as published and amended from time to time by the Australian Greenhouse Office.

“**Benchmark Rules**” means the rules under Part 8A, Division 11 of the Act.

“**Cogeneration Plant**” means a Generating System that produces useful heat as well as electricity.

“**Commercial Operation**” means receiving any payment for electricity generated by a Generating System, after completion of testing to meet conditions of any licences or authorisations prior to those licences or authorisations being granted or becoming effective.

“**Compliance Rule**” means *Greenhouse Gas Benchmark Rule (Compliance) No. 1 of 2003*.

“**Deemed Retailer**” is defined in clause 6.3.1.

“**Distribution System**” is a “distribution system” (as that term is defined in the National Electricity Code) in respect of which a person is registered as a “Network Service Provider” under the National Electricity Code.

“**DSA Rule**” means *Greenhouse Gas Benchmark Rule (Demand Side Abatement) No. 3 of 2003*.

“Emissions Workbook” means the methodology described in the document entitled *Greenhouse Gas Emissions from Electricity Supplied in NSW: Emissions Workbook* published by the Ministry of Energy and Utilities in October 2000.

“End-User Complex” is as defined in the DSA Rule.

“End-User Equipment” means electricity consuming equipment that is not associated with the generation of electricity or generated ancillary loads.

“Energy Content” of a fuel source is to be considered as its higher heating value (HHV).

“Fossil Fuel” means black coal, brown coal, natural gas, fuels derived from petroleum, coal seam methane, or Waste Coal Mine Gas.

“Generating System” means a system comprising one or more of the physical generators of electricity and all the related equipment capable of functioning as a single entity.

“Generator” is defined in clause 6.2.1.

“GES” means the Commonwealth Generator Efficiency Standards Methodology.

“GGAP” means the Greenhouse Gas Abatement Program administered by the Australian Greenhouse Office of the Commonwealth.

“Green Waste” means trimmings, prunings, and clippings from gardening activities and vegetation management, including grass, leaves, mulches, branches, twigs and loppings.

“Gross Generation” is defined in Equation 4.

“Intermediary” means a person who is registered by NEMMCO as a Generator instead of another person who would be registered as such under the National Electricity Code.

“June Rule” means the *Greenhouse Gas Benchmark Rule (Demand Side Abatement) No. 3 of 2003* as in force on 11 June 2004 and is defined in clause 1.2.

“Native Forest Bio-Material” has the same meaning as in the *Protection of the Environment Operations (General) Amendment (Burning of Bio-Material) Regulation 2003*.

“Net Sent Out Generation” means the amount of electricity supplied to a Transmission or Distribution System less the amount of electricity supplied to the Generating System from the Transmission or Distribution System.

“NGAC” (New South Wales Greenhouse Abatement Certificate) is a transferable abatement certificate under section 97F of the Act, which is created in accordance with this Rule, the DSA Rule or the Sequestration Rule.

“NSW Electricity Network” means all electricity Transmission Systems and Distribution Systems located in New South Wales.

“NSW Pool Coefficient” is defined in section 97AB of the Act and determined by the Tribunal under section 97BF of the Act, in accordance with clause 9.1 of the Compliance Rule. The relevant NSW Pool Coefficient for the purposes of this Rule is that for the year in which the abatement occurred.

“NSW Production Baseline” is determined in accordance with clause 8 of this Rule.

“October Rule” means the *Greenhouse Gas Benchmark Rule (Generation) No. 2 of 2003 as in force* on 3 October 2003.

“ORER” means the Commonwealth Office of the Renewable Energy Regulator established under the RE(E) Act.

“Original Deemed Retailer” has the same meaning as the Deemed Retailer in clause 6.3.1(a).

“Performance Improvement Testing Regime” means a documented procedure, acceptable to the Scheme Administrator, used to establish reference performance for a Generating System and then to assess the ongoing performance of that Generating System against its established reference performance. Performance Improvement Testing Regimes must be consistent with recognised methodologies for the assessing the performance of Generating Systems, be tailored to the specific characteristics of the Generating System being assessed and include a clear procedure for determining the Percentage Performance Improvement.

“Percentage Performance Improvement” means the percentage figure that represents the improvement in greenhouse intensity of the Generating System resulting from performance improvement(s) that have been undertaken.

Note: This percentage figure could be based on improvements in sent out heat rate, sent out thermal efficiency or greenhouse intensity of the Generating System. Derivation of the Percentage Performance Improvement must be clearly described in the Performance Improvement Testing Regime.

“Power Purchase Agreement” means the direct electricity supply agreement that gave rise to the eligibility of the electricity generation of a Generating System to be classified as Category A under the Emissions Workbook, and includes (with respect to a Generating System listed in Schedule C) a direct electricity supply agreement which satisfies clause 7.1.2.

“Process CH₄ Production Factor” means

- (i) if CH₄ is manufactured from Qualifying Putrescible Waste, the percentage of carbon in the Qualifying Putrescible Waste that is converted to CH₄ in the process by which the CH₄ used in the Generating System is manufactured from Putrescible Waste; or
- (ii) if Qualifying Putrescible Waste is oxidised, the percentage of carbon in the Qualifying Putrescible Waste that is oxidised.

“Putrescible Waste” means waste that contains organic matter capable of being decomposed by micro-organisms within 50 years, and includes materials such as food wastes, offal, food-contaminated paper, Green Waste, and that proportion of Wood Waste which decomposes.

“Qualifying Putrescible Waste” means the Putrescible Waste, used in a process which manufactures methane from Putrescible Waste or oxidises Putrescible Waste, that is other than paper, cardboard or other materials that the Scheme Administrator disqualifies on the grounds that they are of non-renewable origin or that their inclusion encourages unsustainable use of materials.

“Qualifying Putrescible Waste Factor” means the mass of Qualifying Putrescible Waste divided by the total mass of Putrescible Waste used in a process which manufactures methane from Putrescible Waste or oxidises Putrescible Waste or Wood Waste.

“REC” means a renewable energy certificate as defined in section 97AB of the Act.

“REC Baseline” is the electricity production baseline assigned to a Generating System by the ORER for the purpose of calculating the number of RECs that may be created under the RE(E) Act or, if the

REC Baseline assigned to a Generating System is not provided to the Scheme Administrator, an estimate of the baseline made by the Scheme Administrator from published data using the method prescribed in the RE(E) Act or RE(E) Regulation.

“**RE(E) Act**” means the *Renewable Energy (Electricity) Act 2000* (Cth).

“**RE(E) Regulation**” means the *Renewable Energy (Electricity) Regulations 2001* (Cth).

“**Regulations**” means regulations made pursuant to Part 8A of the Act.

“**Relevant Entity**” means, as the context requires, an applicant, an Accredited Abatement Certificate Provider, or a Category B Generator providing information for the calculation of the NSW Pool Coefficient.

“**Renewable Energy Source**” means an *eligible renewable energy source* under the RE(E) Act.

“**Scheme**” means the arrangements under Part 8A of the Act, Parts 8A and 8B of the Regulation and the Benchmark Rules.

“**Scheme Administrator**” is defined in section 97AB of the Act.

“**Sent Out Generation**” is defined in Equation 4.

“**Sequestration Rule**” means *Greenhouse Gas Benchmark Rule (Carbon Sequestration) No. 5 of 2003*.

“**Transmission System**” is a “transmission system” (as that term is defined in the National Electricity Code) in respect of which a person is registered as a “Network Service Provider” under the National Electricity Code.

“**Tribunal**” has the meaning given to it under the Act.

“**Waste Coal Mine Gas**” means coal seam gas drained from mines for the purpose of coal mining operations (regardless of the period of time between draining the gas from the coal mine and use of the mine for coal mining operations), and includes coal seam gas drained from closed coal mines.

Note: In the case of methane drained from an operating coal mine, the drainage must occur from seams covered by a current coal mining lease. For future generation projects, evidence is required that a coal mining plan is in place, and there must be a coal mining lease covering the coal seams to be drained before any NGACs can be created. For closed coal mines, drainage of methane must occur from seams that either are or have been covered by a coal mining lease.

In establishing whether gas is being drained as a complementary activity to coal mining operations, consideration may be given to the mining program or development plan applicable to the mining lease.

References to “coal mining lease(s)” over the area are references to a mining tenement, however called, of the relevant jurisdiction, which authorises mining of coal.

“**Wood Waste**” means the waste stream made up of wood and wood products that have not been salvaged. It does not include Green Waste.

11.2 Notes in this Rule do not form part of the Rule.

- 11.3 A reference in this Rule to an entitlement to create a number of NGACs is to be taken as an entitlement to create a lesser number of NGACs.
- 11.4 For the purpose of this Rule the terms and expressions used in this Rule have the same meaning as in the Act or as defined in Part 8A of the Act, except the terms that are expressly defined in this Rule.
- 11.5 A reference to accreditation in respect of a Generating System means accreditation in respect of electricity generation activities from the Generating System.

Schedule A - Tables

Table 1: Fugitive Emissions from Coal

State	Class of mine	kg CH ₄ /t mined	kg CH ₄ /t post-mine	kg CH ₄ /t combined
NSW	Underground Class A	10.40	0.77	11.17
	Underground Class B	0.54	0	0.54
	Open Cut	2.17	0	2.17
	Weighted average	3.67	0	3.67
	Coal tailings	0	0	0
Qld	Underground Class B	0.54	0	0.54
	Open Cut	0.81	0	0.81
	Weighted average	0.76	0	0.76
	Coal tailings	0	0	0
Vic	Open Cut	0	0	0

Table 2: Fugitive Emissions from Natural Gas

State	kt CO ₂ /PJ	kt CH ₄ /PJ
All States	2.60	0.089

Table 3: Carbon Dioxide Emission Factors

Fuel Type	Fuel	kt CO ₂ /PJ
Coal	Coal used in public electricity generation (ASIC 3611)	92.0
	Coals used in steel industry	93.0
	Black coal used by other industry	90.0
	Brown coal used by industry	88.3
	Coke	119.5
	Coal by-products (gaseous)	37.0
	Coal by-products (coal tar and BTX)	81.0
	Brown coal briquettes	105.0
Petroleum	Liquefied petroleum gas	59.4
	Naphtha	66.0
	Lighting kerosene	69.7
	Power kerosene	69.7
	Aviation gasoline	68.0
	Aviation turbine fuel	69.7
	Heating oil	69.7
	Fuel oil	73.6
	Automotive diesel oil (ADO)	69.7
	Industrial diesel fuel (IDF)	69.7
	Refinery fuel	68.1
	Other petroleum products	68.6
	Solvents	66.0
	Lubricants and greases	73.7
	Bitumen	80.7
Gaseous*	Natural gas - NSW	50.8
	Natural gas - Victoria	51.0
	Natural gas - SA	50.8
	Natural gas - Queensland	51.1
	Natural gas - ACT	50.8
	Natural gas - Tasmania	51.0
	Town gas (tempered LPG)	59.0

Biomass	Wood and wood waste (dry)	94.0
	Bagasse	96.8

*Note: where the Fossil Fuel is Waste Coal Mine Gas, the applicable factor under Table 3 is the applicable State factor for natural gas.

Table 4: Carbon Dioxide Combustion Factors

Fossil Fuel	Carbon Dioxide Combustion Factor
black coal	0.990
brown coal	0.990
natural gas	0.995
coal seam methane	0.995
waste coal mine gas	0.995
fuels derived from petroleum	0.990

Table 5: Methane and Nitrous Oxide Default Emission Factors

Sector	Fuel	Equipment	kt CH ₄ /PJ	kt N ₂ O/PJ	
Electricity	Black coal	Tangentially fired	0.0009	0.0008	
		Pulverised wall	0.0009	0.0008	
	Brown coal	Tangentially fired	0.0009	0.0014	
		Natural gas ^a	Boiler	0.0001	0.0001
			Internal combustion	0.2400	0.0001
	Fuel oil/residual oil	Turbine	0.0080	0.0001	
		Boiler	Internal combustion	0.0008	0.0006
			Internal combustion	0.0040	0.0006
	Distillate/diesel	Boiler	Internal combustion	0.0000	0.0006
			Internal combustion	0.0040	0.0006
Turbine		0.0040	0.0006		
Industrial	Black coal	Boiler	0.0013	0.0008	
	Natural gas ^a	Boiler	0.0012	0.0001	
	Fuel oil	Boiler	0.0008	0.0006	
	Residual oil	Boiler	0.0028	0.0006	
	Distillate	Boiler	0.0001	0.0006	
	Wood	Boiler	0.0042	0.0041	
	Bagasse	Boiler	0.0100	0.0041	
Commercial	Black coal	Boiler	0.0013	0.0008	
	Natural gas ^a	Boiler	0.0011	0.0001	
	Residual oil	Boiler	0.0013	0.0006	
	Distillate oil	Boiler	0.0006	0.0006	
	Wood	Boiler	0.0034	0.0041	
Household	Wood	Open fireplace	2.6860	0.0041	
	Wood	Closed heater	0.1480	0.0041	

a These factors may also apply to waste coal mine gas, landfill gas and sewage gas.

Table 6: Default Distribution Loss Factors to be used by retail suppliers

	Distribution Loss Factor
ACTEWAGL	1.059
Country Energy	1.072
AGLE	1.054
Australian Inland	1.078
CitiPower	1.055
TXU	1.059
Energex	1.057
EnergyAustralia	1.053
Ergon	1.057
Ferrier Hodgson	1.053
Integral	1.055
Origin	1.053
Pulse	1.056
Auspower	1.054
For any other retail suppliers that are not listed here	1.053

Table 7: Default Distribution Loss Factors

	Distribution Loss Factor
EnergyAustralia	1.053
Integral	1.055
Country Energy	1.078
NSW (weighted)	1.058
Victoria	1.060
SA	1.068
Queensland	1.058
Tasmania	1.054

Table 8: Default Transmission Loss and Scaling Factors

State	Transmission Loss Factor	Transmission Scaling Factors
New South Wales	1.026	0.975
Victoria or South Australia	1.026	0.975
Queensland	1.046	0.956
Tasmania	1.010	0.990

Table 9: Emissions Intensity Adjustment Factors

Connection	Emissions Intensity Adjustment Factor
At End-User Complex	the Distribution Loss Factor applying at the End-User Complex under the National Electricity Code or if no Distribution Loss Factor applies to the End-User Complex under the National Electricity Code, the default Distribution Loss Factor for that Distribution System from Table 7 in this Schedule
To Distribution System	1.0
To Transmission System	Transmission Scaling Factor for the State where the Generating System is located from Table 8 in this Schedule

Table 10: Methane manufacture factors

Alternative Disposal Method	Alternative Disposal Method CH₄ production factor
Windrows only	0.15
Landfills only	0.50
Anaerobic Ponds only	0.30

Schedule B - Category B Generators

Name	Owner	Type
Vales Point	Delta Electricity	Steam/Coal
Mt Piper	Delta Electricity	Steam/Coal
Wallerawang	Delta Electricity	Steam/Coal
Munmorah	Delta Electricity	Steam/Coal
Eraring	Eraring Energy	Steam/Coal
Brown Mountain (b)	Eraring Energy	Hydro
Burrinjuck (b)	Eraring Energy	Hydro
Hume (b)	Eraring Energy	Hydro
Keepit (b)	Eraring Energy	Hydro
Shoalhaven (b)	Eraring Energy	Hydro/pump storage
Warragamba (b)	Eraring Energy	Hydro
Broken Hill GT	Eraring Energy	Gas turbine
Bayswater	Macquarie Generation	Steam/Coal
Liddell	Macquarie Generation	Steam/Coal
Guthega (a)	Snowy Hydro Trading	Hydro
Tumut 1 (a)	Snowy Hydro Trading	Hydro
Tumut 2 (a)	Snowy Hydro Trading	Hydro
Tumut 3 (a)	Snowy Hydro Trading	Hydro
Blowering (a)	Snowy Hydro Trading	Hydro
Murray 1 (a)	Snowy Hydro Trading	Hydro
Murray 2 (a)	Snowy Hydro Trading	Hydro
Redbank	Redbank Power	Steam/Coal

- (a) refer to clause 7.2.2.
- (b) refer to clause 7.2.3.

Schedule C - Category A Generating Systems

Name	Type	Deemed Retailer(*)
Smithfield, NSW	Gas-fired cogeneration	Integral Energy
Tower, NSW	Waste mine gas	Integral Energy
Appin, NSW	Waste mine gas	Integral Energy
Kembla Grange	Hydro	Integral Energy
Belrose, NSW	Landfill gas	Energy Australia
Foreshore Park, NSW	Photovoltaic cell	Energy Australia
National Innovation Centre, NSW	Photovoltaic cell	Energy Australia
Lucas Heights 1, NSW	Landfill gas	Energy Australia
Corio, Vic	Landfill gas	Origin Energy
Yarrawonga Hydro, Vic	Hydro	Origin Energy
Alfred Hospital, Vic	Gas-fired cogeneration	Origin Energy
Royal Melbourne Hospital, Vic	Gas-fired cogeneration	Origin Energy
St Vincents Hospital, Vic	Gas-fired cogeneration	Origin Energy
Austin Hospital, Vic	Gas-fired cogeneration	Origin Energy
Vansdorf, Vic	Gas-fired cogeneration	AGL Victoria Pty Ltd
Broadmeadows, Vic	Landfill gas	AGL Electricity Ltd
Clayton, Vic	Landfill gas	AGL Victoria Pty Ltd
Springvale, Vic	Landfill gas	AGL Victoria Pty Ltd
Pedler Creek, SA	Landfill gas	AGL South Australia Pty Ltd
Tea Tree Gully, SA	Landfill gas	AGL South Australia Pty Ltd
Wingfield 1, SA	Landfill gas	AGL South Australia Pty Ltd
Wingfield 2, SA	Landfill gas	AGL South Australia Pty Ltd
Highbury, SA	Landfill gas	AGL South Australia Pty Ltd
Browns Plains, Qld	Landfill gas	Energex
Burrendong, NSW	Hydro	Country Energy
Wyangala, NSW	Hydro	Country Energy
Nymboida, NSW	Hydro	Country Energy
Copeton, NSW	Hydro	Country Energy
Oakey, NSW	Hydro	Country Energy
Harwood , NSW	Bagasse	Country Energy
Glenbaun, NSW	Hydro	Energy Australia
Blue Rock Dam, Vic	Hydro	TXU Electricity Ltd
Cardinia Dam, Vic	Hydro	TXU Electricity Ltd
Eildon Dam, Vic	Hydro	TXU Electricity Ltd
Glenmaggie Dam, Vic	Hydro	TXU Electricity Ltd
William Hovell Dam, Vic	Hydro	TXU Electricity Ltd
Thompson Dam, Vic	Hydro	TXU Electricity Ltd
Berwick Power Station, Vic	Landfill gas	TXU Electricity Ltd

* Reference to a deemed retailer includes any subsequent retailer owner of those assets