EXPLANATORY STATEMENT

Issued by the Authority of the Minister for Climate Change and Water, Senator the Honourable Penny Wong

National Greenhouse and Energy Reporting (Measurement) Amendment Determination 2009 (No.1)

The *National Greenhouse and Energy Reporting Act 2007* (the Act) established the National Greenhouse and Energy Reporting System which is a national framework for reporting greenhouse gas emissions, greenhouse gas projects (abatement actions) and energy consumption and production by Australian corporations.

The National Greenhouse and Energy Reporting (Measurement) Determination 2008 was made under subsection 10 (3) of the *National Greenhouse and Energy Reporting Act 2007* which provides for the Minister to determine methods, or criteria for methods, for the measurement of: (a) greenhouse gas emissions; (b) the production of energy; and (c) the consumption of energy.

This Instrument will amend the *National Greenhouse and Energy Reporting (Measurement) Determination 2008.*

The *National Greenhouse and Energy Reporting (Measurement) Amendment Determination 2009 (No.1)* aims to achieve the following:

- update particular elements of the National Greenhouse and Energy Reporting (Measurement) Determination 2008 for new information (new measurement standards released in 2008 and updated emission factors for scope 2 emissions, which depend on dispatch decisions within the National Electricity Market taken in the last financial year);

- elaborate the methods specified for certain sectors – for example, the solid waste emission source;

- respond to feedback received from stakeholders and from experience gained in the first year of implementation to provide clarification on some issues, such as definitions.

Background

The development of the initial Instrument was the result of comprehensive consultation with business and other stakeholders between May 2005 and June 2008 in relation to the Act, the regulations under the Act and the Instrument itself.

The initial Instrument was the subject of specific consultations including through the release by the Department of Climate Change for public comment of two documents: the *National Greenhouse and Energy Reporting System, Technical Guidelines for the Estimation of Greenhouse Emissions and Energy at Facility-level: Energy, Industrial Process and Waste Sectors in Australia - Discussion Paper* and a related overview paper. Over 70 formal submissions were received from interested organisations and individuals.

Reflecting their active engagement in the development of the System so far, these organisations and individuals were invited to submit additional comments on the Determination in late 2008. The intended amendments to the Determination reflect the result of these submissions and other feedback received as well as experience gained by the Department during the first implementation year of the National Greenhouse and Energy Reporting System.

The draft of amendments to the Determination was made available for public comment in May 2009. Submissions and feedback were received from this round of consultation from which an updated Amendment Determination was drafted.

The amendments to the Determination have been grouped into three schedules:

Schedule 1: General amendments;
Schedule 2: Amendments on waste; and
Schedule 3: Minor amendments relating to UNFCCC Categories.

After a short overview section, the explanatory material on each of the amendments is arranged in accordance with the schedule list in Attachment A. Documents incorporated by reference are described in a list in Attachment B.

The Instrument would be a legislative instrument for the purposes of the *Legislative Instruments Act 2003*.

The Instrument will commence day after registration and apply to the 2009-2010 financial year.

New developments in estimation technologies and methods both in Australia and overseas mean that it is likely that certain aspects of the Determination will be amended again next year. In consultation with the relevant industries, future amendments to the Determination will focus on review and refinement to the methods for coal mining, carbon capture and storage, solid waste disposal and wastewater treatment, among others.

Overview National Greenhouse and Energy Reporting (Measurement) Determination 2008

The National Greenhouse and Energy Reporting Act 2007 ('the Act') established the legislative framework for a national greenhouse and energy reporting system. The Act provides for an integrated reporting system that will provide the basis for:

- informing government policy formulation and the Australian public;
- meeting Australia's international reporting obligations;
- assisting Commonwealth, State and Territory government programs and activities;
- underpinning the introduction of an emissions trading scheme in the future; and
- avoiding duplication of similar reporting requirements in the States and Territories..

The Act makes reporting mandatory for corporations whose energy production, energy use, or greenhouse gas emissions meet certain specified thresholds.

This Determination is made under subsection 10 (3) of the Act and provides methods, and criteria for methods, for the estimation and measurement of the following items arising from the operation of facilities:

(a) greenhouse gas emissions;

(b) the production of energy; and

(c) the consumption of energy.

The structure of the Determination is designed to facilitate the integration of corporate and facility level data provided under the Act with international data standards on greenhouse emissions.

The scope of the Determination is given by the following categories of emission sources:

The emission sources are:

- **Fuel combustion**: emissions from the combustion of fuel for energy (see chapter 2);
- **Fugitive emissions** from the extraction, production, flaring, processing and distribution of fossil fuels (see chapter 3);
- **Industrial process emissions** where a mineral, chemical or metal product is formed using a chemical reaction that generates greenhouse gases as a by-product (see chapter 4); and
- **Waste** emissions from waste disposal - either in landfill, as management of wastewater or from waste incineration (see chapter 5).

The most important source is fuel combustion, which accounts for over 60 per cent of the emissions reported in the national greenhouse gas inventory.

The scope of the Determination does not include land based emissions covered by the IPCC categories 'Agriculture' and 'Land Use, Land Use Change and Forestry'. Emissions from fuel combustion for land based industries are, nonetheless, covered by this Determination.

Methods of measurement

Emissions are rarely measured through direct observation and are most often estimated by reference to readily observable variables that are closely related to greenhouse gas emissions such as the quantity of fossil fuels consumed.

The Determination provides Methods that allow for both direct emissions monitoring and the estimation of emissions through the tracking of observable, closely-related variables. This framework reflects the approaches of the international guidelines governing the estimation of national greenhouse gas inventories and, similarly, national practice such as for the *EU Guidelines for the Monitoring and Reporting of Greenhouse Gas Emissions* and the *US Environment Protection Agency.*

At its simplest, emissions may be estimated by reference to reportable data such as fossil fuel consumption, evidenced by invoices, and the use of specified emission factors provided in the Determination. For emissions from fuel combustion, for example, data on fuel consumption would be multiplied by a specific emission factor for that fuel to generate an emissions estimate. A similar approach has been used for over a decade in the voluntary reporting program *Greenhouse Challenge Plus* and before that, *Greenhouse Challenge*.

Greater levels of complexity and measurement effort may in some circumstances produce better estimates of emissions at facility level. This may result from, for example, sampling and analysing a fuel consumed for its carbon content and other qualities that will affect actual emissions generated by its combustion at a facility. In Australia, this kind of approach to emissions estimation is already widely used in the electricity industry - in part for commercial reasons and in part because of the reporting processes under the *Generator Efficiency Standards* program.

Direct monitoring of emissions is also potentially an important approach to emissions estimation. While not common, such direct monitoring already occurs in some form in some instances such as in the coal industry, where state legislation requires the monitoring of methane levels for health and safety reasons.

Each of these broad approaches has been incorporated into the Determination as Methods for the estimation of emissions.

In particular four Methods have been described which provide a framework for emissions estimation for a range of purposes.

By drawing on existing emission estimation practices where possible the Determination aimed to minimise the reporting burden on corporations. As indicated above, there are many instances where higher methods (2, 3 and 4 set out below) already reflect current commercial or regulatory practice.

The provision for Reporters to select Methods for the estimation of emissions also allows Reporters to make their own judgments to balance the costs of using the higher methods with the benefits of potentially improved emission estimates.

A framework for Method selection

The four Methods in the Determination can be broadly described by the following:

Method 1: the National Greenhouse Accounts default method

Method 1 provides a class of estimation procedures derived directly from the methodologies used by the Department of Climate Change for the preparation of the *National Greenhouse Accounts*. The use of methodologies from the *National Accounts* anchors Method 1 within the international guidelines adopted by the UN Framework Convention on Climate Change for the estimation of greenhouse emissions.

Method 1 specifies the use of designated emission factors in the estimation of emissions. These emission factors are national average factors determined by the Department of Climate Change using the Australian Greenhouse Emissions Information System (AGEIS).

Although significantly updated, this Method is very similar in approach to that used by many corporations for over a decade to report emission estimates under the *Greenhouse Challenge Plus* program.

Method 1 is likely to be most useful for emission sources where the source is relatively homogenous, such as from the combustion of standard liquid fossil fuels, where the emissions resulting from combustion will be very similar across most facilities.

Method 2: a facility-specific method using industry sampling and Australian or international standards listed in the Determination or equivalent for analysis of fuels and raw materials to provide more accurate estimates of emissions at facility level.

Method 2 enables corporations to undertake additional measurements - for example, the qualities of fuels consumed at a particular facility - in order to gain more accurate estimates for emissions for that particular facility.

Method 2 draws on the large body of Australian and international documentary standards prepared by standards organisations to provide the benchmarks for procedures for the analysis of, typically, the critical chemical properties of the fuels being combusted.

Method 2 is likely to be most useful for fuels which exhibit some variability in key qualities, such as carbon content, from source to source. This is the case for coal in Australia.

Method 2 is based on existing technical guidelines used by reporters under the *Generator Efficiency Standards* program. The possibility to report using this, higher order, approach is extended by the Determination from the electricity industry to all major consumers of fossil fuels.

Method 3: a facility-specific method using Australian or international standards listed in the Determination or equivalent standards for both sampling and analysis of fuels and raw materials

Method 3 is very similar to Method 2, except that it requires, additionally, Reporters to comply with Australian or equivalent documentary standards for sampling (of fuels or raw materials) as well as documentary standards for the analysis of fuels.

Method 4: direct monitoring of emission systems, either on a continuous or periodic basis.

Method 4 provides for a different approach to the estimation of emissions. Rather than analysing the chemical properties of inputs (or in some case, products). Method 4 aims to directly monitor greenhouse emissions arising from an activity. This approach can provide a higher level of accuracy in certain circumstances, depending on the type of emission process, however, it is more likely to be more data intensive than other approaches. Such monitoring already occurs, for example, in underground coal mines reflecting the nature of the emission process and the importance of relatively accurate data to support health and safety objectives.

As for Methods 2 and 3, there is a substantial body of documented procedures on monitoring practices and state and territory government regulatory experience that provide the principal sources of guidance for the establishment of such systems.

Reporter may select different methods for each source. For example, the Reporter may select different methods for different fuels and different methods for individual gases, subject to certain restrictions. In part, these differences reflect Method availability. For example, for

solid fuels, only Method 1 has been provided for methane and nitrous oxide, reflecting the minor nature of the emission sources, whereas four methods are available for carbon dioxide.

Energy

Methods for the estimation of the energy content of fuels produced and fuels consumed is addressed in Chapter 6 of the Determination. Data collected for the estimation of emissions from fuel combustion serve a dual purpose as the data for the consumption of energy. Separate collections are required for the production of energy.

Scope 2 emissions

The Determination principally deals with Scope 1 emissions. These are direct emissions that arise on-site from the activities of a corporation. There are a wide variety of emission sources that require a range of procedures to be described to cover the complexity of the emission pathways.

Scope 2 emissions arise principally at an electricity generator as a result of the purchase of electricity by a corporation. The method for the estimation of scope 2 emissions is given in chapter 7.

ATTACHMENT A

National Greenhouse and Energy Reporting (Measurement) Amendment Determination 2009 No.1: Schedule 1

Part 1.2 Division 1.1.2 Definitions and Interpretations

The first set of amendments relate principally to the provision of additional definitions. Comments on the amendments are detailed in the table.

Table: Summary of Comments on individual amendment items

Item	Commentary
[1]	Provides a definition of the emission source crude oil transport
[2]	Provides a definition of fuel.
[3]	Provides a definition of gaseous fuel.
[4]	Provides a definition of independent expert
[5]	Facilitates the extension of methods currently available to integrated steelworks to all integrated metalworks.
[6]	Provides a definition of liquid fuel.
[7]	Provides a definition of main electricity grid and marketable crude oil.
[8]	Provides a definition of petroleum based greases.
[9]	Provides a definition of raw sugar.
[10]	Provides a definition of solid fuel.
[11]	Provides a definition of source.
[12]	Provides complete references for two documents.

Part 1.2 General

[13] Many of the estimation methods will be undertaken with reference to documentary standards developed by, inter alia, standards organisations. Section 1.9 of the Determination indicates that these standards instruments or other writing must be in force at a particular date to be applicable. The amendment updates the date by which a standard, instrument of other writing must be in force to have application in this Determination – 1 July 2009. It is intended that the Determination will be reviewed at periodic intervals to consider development of new standards

[14] This amendment provides a list of sources defined in the Determination, as follows:

Item	Category of source	Source of emissions
1	Fuel combustion	
1A		Fuel combustion
2	Fugitive emissions	
2A		Underground mines
2B		Open cut mines
2C		Decommissioned underground mines
2D		Oil or gas exploration
2E		Crude oil production
2F		Crude oil transport
2G		Crude oil refining
2H		Natural gas production or processing (other than emissions that are vented or flared)
2I		Natural gas transmission
2J		Natural gas distribution
2K		Natural gas production or processing - flaring
2L		Natural gas production or processing - venting
2M		Carbon capture and storage
3	Industrial processes	
3A		Cement clinker production
3B		Lime production
3C		Use of carbonates for the production of a product other than cement clinker, lime or soda ash
3D		Soda ash use
3E		Soda ash production

Item	Category of source	Source of emissions
3F		Ammonia production
3G		Nitric acid production
3H		Adipic acid production
3I		Carbide production
3J		Chemical or mineral production, other than carbide production, using a carbon reductant
3K		Iron, steel or other metal production using an integrated metalworks
3L		Ferroalloys production
3M		Aluminium production
3N		Other metals production
3O		Emissions of hydrofluorocarbons and sulphur hexafluoride gases
4	Waste	
4A		Solid waste disposal on land
4B		Wastewater handling (industrial)
4C		Wastewater handling (domestic or commercial)
4D		Waste incineration

Part 1.3 – Method 4 – Direct measurement of emissions

[15] The amendment to section 1.28 provides cross references to relevant parts of the Determination for the measurement of relevant variables for the purpose of estimation of emission factors.

CHAPTER 2 FUEL COMBUSTION

Part 2.1 Preliminary

The principle greenhouse gas generated by the combustion of fossil fuels for energy is carbon dioxide. The quantity of gas produced depends on the carbon content of the fuel and the degree to which the fuel is fully combusted (i.e. the oxidation factor, which usually ranges between 98% and 99.5%). Small quantities of methane and nitrous oxide are also produced, depending on the actual combustion conditions. Methane may be generated when fuel is heated, but only partially burnt, and depends on combustion temperatures and the level of oxygen present. Nitrous oxide results from the reaction between nitrogen and oxygen in the combustion air.

The principle purpose of the combustion of fossil fuels in the Australian economy is for the consumption or use of energy. This chapter addresses the general case of the estimation of emissions from the combustion of fossil fuels for that purpose. Fuels used as carbon reductants—for example, as in the production of steel—are addressed in Chapter 4.

This chapter provides methods for the estimation of emissions from fuel combustion. The chapter is divided into parts – Parts 2.2, 2.3 and 2.4 address the estimation of emissions from solid, gaseous and liquid fuels and Parts 2.5, 2.6 and 2.7 address a series of miscellaneous issues.

Comments on the amendments are detailed in the table.

Table: Summary of Comments on individual amendment items to chapter 2

Item	Commentary
[16]	This amendment clarifies that electricity generators must use a method higher than method 1 for the estimation of carbon dioxide emissions, as indicated in the Explanatory Statement that accompanied the *Determination 2008.* This amendment also clarifies that this condition applies to the estimation of emissions for the main fuel only.
[17]	Simplifies the choice of method for the measurement of energy content of fuels to ensure that one estimate of energy content is used for all calculations concerning estimates of the of energy consumed and for emissions of individual greenhouse gases.
[18]	as for [17]
[19]	Confirms that 'as fired' means 'as combusted'.

[20]	As for [19]
[21]	As for [19]
[22]	As for [17]
[23]	As for [19]
[24]	As for [19]
[25]	As for [19]
[26]	As for [19]
[27]	Ensures consistency in expression of this section with similar sections in the Determination.
[28]	Provides clarification on the appropriate use of the nominated standard in the note.
[29]	Provides for the use of on-line analysers for the analysis of the carbon content of solid fuels, under certain conditions.
[30]	Ensures consistency in expression of this section with similar sections in the Determination.
[31]	Ensures consistency in expression of this section with similar sections in the Determination.
[32]	Together with [33], [34] and [35], simplifies and constrains the choice of criterion for the measurement of the quantity of fuel consumed to ensure that consistent measurements of the quantity of fuel consumed are made over time.
[33]	As for [32]
[34]	As for [32]
[35]	As for [32]
[36]	As for [16]
[37]	As for [17]
[38]	As for [17]
[39]	As for [17]

[40]	As for [17]
[41]	As for [17]
[42]	Ensures consistency in expression of this section with similar sections in the Determination.
[43]	Together with [44] and [46], simplifies the choice of criterion for the measurement of the quantity of fuel consumed to ensure that consistent measurements of the quantity of fuel consumed are made over time.
[44]	As for [43]
[45]	Clarifies that standard conditions apply on a dry gas basis.
[46]	As for [43]
[47]	Provides for more choice for the measurement of emissions from the use of petroleum based oils and petroleum based greases used as lubricants, if data is available on waste oils captured.
[48]	As for [47]
[49]	As for [47]
[50]	As for [47]
[51]	As for [43]
[52]	As for [17]
[53]	Provides a definition of stationary and transport energy purposes.
[54]	As for [47]
[55]	As for [47]
[56]	As for [17]
[57]	As per [19]
[58]	As for [17]
[59]	Ensures consistency in expression of this section with similar sections in the Determination.

[60]	As for [47]
[61]	As for [47]
[62]	As for [47]
[63]	Together with [64], [65] and [66], simplifies the choice of criterion for the measurement of the quantity of fuel consumed to ensure that consistent measurements of the quantity of fuel consumed are made over time.
[64]	As for [63]
[65]	As for [63]
[66]	As for [63]
[67]	Correction to cross reference.
[68]	References the updated standard.
[69]	As for [68]

CHAPTER 3 Fugitive emissions from fuels

Part 3.2 Coal Mining

The major sources of emissions from this category include emissions from underground mining activities, open cut mining activities and emissions from decommissioned mines.

Other sources of emissions arising from the production processes, such as from the combustion of fuels for energy, are not described in this chapter and must be estimated using the Methods described in other chapters.

Comments on the amendments are detailed in the table.

Table: Summary of Comments on individual amendment items

Item	Commentary
[70]	Simplifies measurement methods to be used by underground coal mines for the measurement of fugitive emissions to ensure that all mines use the same method (method 4).

[71]	As for [70]
[72]	As for [70], removes redundant paragraph.
[73]	Correction to units.

Part 3.3 Oil and Gas: fugitive emissions

This part addresses methods for the estimation of fugitive emissions from the oil or gas industry. Comments on the amendments are detailed in the table.

Table: Summary of Comments on individual amendment items

Item	Commentary
[74]	Clarifies that the scope of the part applies also to coal seam methane as well as natural gas (as explained in *the 2006 IPCC Guidelines for National Greenhouse Gas Inventories*, IPCC, 2006).
[75]	Refinement to name of source
[76]	Refinement to name of source
[77]	Refinement to name of source
[78]	Refinement to name of source
[79]	Refinement to name of source
[80]	Refinement to name of source
[81]	Ensures consistency in expression of this section with similar sections in the Determination.
[82]	Provides for the use of new information on gas leakage rates by pipeline material, as published by the American Gas Association.
[83]	Provides for the use of new information on gas leakage rates by pipeline material, as published by the American Gas Association.

CHAPTER 4 INDUSTRIAL PROCESS EMISSIONS (UNFCCC CATEGORY 2)

The major Industrial process emissions categories include:

1. mineral products—generally from the consumption of carbonate materials (such as limestone);

2. chemical products—generated mainly by the consumption of fuels as feedstocks or carbon reductants (ie for their carbon qualities rather than for heat and power);

3. metal products—generally from the use of fuels as carbon reductants (ie for their carbon qualities rather than for heat and power);

4. synthetic gas emissions—the release of halocarbons, perfluorocarbons and sulphur hexafluoride either as fugitive emissions or leakages from their use.

Other sources of emissions arising in the course of the production of products from the industries mentioned in this chapter, such as from the combustion of fuels for energy, are not described in this chapter and must be estimated using the Methods described in other chapters.

Comments on the amendments are detailed in the table.

Table: Summary of Comments on individual amendment items

Item	Commentary
[84]	Provides a refinement to the measurement method for the estimation of emissions from cement clinker production.
[85]	as per [84]
[86]	Provides for consistent treatment of the production of lime in the ferrous and non-ferrous metals.
[87]	Refinement to name of source
[88]	Provides clarification of the source to ensure consistent treatment of the use of carbonates that lead to the generation of carbon dioxide emissions whether from calcining or any other process.
[89]	Refinement to name of source
[90]	Provides clarification of the source to ensure consistent treatment of the use of carbonates that lead to the generation of carbon dioxide emissions whether from

	calcining or any other process.
[91]	Provides clarification of the source to ensure consistent treatment of the use of carbonates that lead to the generation of carbon dioxide emissions whether from calcining or any other process.
[92]	Provides clarification of the source to ensure consistent treatment of the use of carbonates that lead to the generation of carbon dioxide emissions whether from calcining or any other process.
[93]	Provides clarification of the source to ensure consistent treatment of the use of carbonates that lead to the generation of carbon dioxide emissions whether from calcining or any other process.
[94]	Provides clarification of the source to ensure consistent treatment of the use of carbonates that lead to the generation of carbon dioxide emissions whether from calcining or any other process.
[95]	Refinement to name of source
[96]	As for [94]
[97]	As for [94]
[98]	As for [94]
[99]	As for [94]
[100]	As for [94]
[101]	As for [17]
[102]	As for [17]
[103]	Ensures consistency in expression of this section with similar sections in the Determination.
[104]	Together with [105] and [106], simplifies the choice of criterion for the measurement of the quantity of carbonate consumed to ensure that consistent measurements of the quantities are made over time.
[105]	As for [104]
[106]	As for [104]

[107]	As for [17]
[108]	Clarifies the units for measurement.
[109]	As for [17]
[110]	Ensures consistent treatment of the use of carbon reductants in the production of chemical and mineral products by extending the treatment of titanium dioxide and synthetic rutile to all chemical and mineral products.
[111]	As for [110]
[112]	As for [110]
[113]	As for [110]
[114]	As for [110]
[115]	As for [110]
[116]	As for [110]
[117]	As for [17]
[118]	As for [110]
[119]	As for [110]
[120]	As for [110]
[121]	As for [110]
[122]	As for [110]
[123]	As for [110]
[124]	As for [110]
[125]	As for [110]
[126]	As for [110]
[127]	Refinement to name of source
[128]	Generalises current treatment of an integrated steelworks to any facility that has integrated within the facility production of both coke and a metal of any kind.
[129]	As for [128]

[130]	As for [128]
[131]	As for [128]
[132]	As for [128]
[133]	As for [128]
[134]	As for [128]
[135]	Refinement to name of source
[136]	As for [17]
[137]	As for [17]
[138]	As for [17]
[139]	Refinement to name of source
[140]	Correction of typographical error in formula.
[141]	Provides clarification of terms S_a and Ash_a
[142]	Ensures consistency in expression of this section with similar sections in the Determination.
[143]	Correction of typographical error in formula.
[144]	Provides clarification of terms S_i and Ash_i
[145]	Refinement to name of source
[146]	Simplifies measurement methods to be used by aluminium producers for the measurement of PFC emissions by excluding the use of method 1 and to ensure that more accurate estimates of emissions are obtained.
[147]	As for [146]
[148]	As for [146]
[149]	As for [146]
[150]	Refinement to name of source
[151]	Correction of typographical error in formula.

[152]	As for [17]
[153]	As for [17]
[154]	As for [17]
[155]	Provides additional methods for the estimation of emissions of hydrofluorocarbons and sulphur hexafluoride (methods 2 and 3) based on established practices for sulphur hexafluoride published by the Energy Networks Association.
[156]	As for [155]
[157]	Simplifies measurement methods to be used by facilities using hydrofluorocarbons and sulphur hexafluoride for the estimation of stock to ensure more accurate estimates of emissions are obtained.
[158]	As for [155]

CHAPTER 5 WASTE

Part 5.1 Preliminary

Section 5.1 sets out the four parts for this chapter: (i) emissions from solid waste disposal on land; (ii) emissions from wastewater handling (domestic or commercial); (iii) emissions from wastewater handling (industrial); and (iv) emissions from waste incineration.

Part 5.2 Emissions from solid waste disposal on land

[159] Clarifies units of measurement.

Other amendments for this sector are detailed in Schedule 2.

Parts 5.3 and 5.4 Emissions from wastewater handing – domestic and commercial – and from wastewater handling – industrial

Emissions of methane and nitrous oxide occur at wastewater handling facilities. Comments on the amendments are detailed in the table.

Table: Summary of Comments on individual amendment items

Item	Commentary
[160]	Correction to units of measurement.
[161]	Clarifies that this Part applies only to specified industries.
[162]	As for [161]
[163]	Provides more detail as to the specification of $Prod_i$.
[164]	Clarifies that these variables have the same meaning as in Part 5.3.
[165]	Clarifies that these variables have the same meaning as in Part 5.3.
[166]	Provides more detail as to the description of the relevant industries.
[167]	As for [166]
[168]	Provides more detail as to the specification of $Prod_i$.

Parts 5.5 Waste Incineration

Comments on the amendments are detailed in the table.

Table: Summary of Comments on individual amendment items

Item	Commentary
[169]	Provides clarification on the measurement of Q_i.
[170]	Provides correction to a cross reference.
[171]	Provides new default value for the carbon content of clinical waste
[172]	Ensures consistency in expression of this section with similar sections in the Determination.
[173]	Ensures consistency in expression of this section with similar sections in the Determination.

CHAPTER 6 ENERGY

Chapter 6 sets out the estimation of the energy content of energy produced and consumed from the operation of a facility during a year.

Calculating the energy content of fuels and energy commodities consumed is an intermediate step in the estimation of emissions of all greenhouse gases from fuel combustion using methods 1, 2 or 3. Consequently the data on energy content serves the dual purpose of estimation of energy consumed and the estimation of emissions.

Comments on the amendments are detailed in the table.

Table: Summary of Comments on individual amendment items

Item	Commentary
[174]	Ensures consistency in expression of this section with similar sections in the Determination.
[175]	Provides refinement to definition.
[176]	Provides refinement to definition.

[177]	Provides refinement to definition.
[178]	As for [17]
[179]	Provides an additional method for the estimation of the energy consumed in the production of electricity from renewable sources.

CHAPTER 7 SCOPE 2 EMISSIONS

There have been a number of minor refinements to the method for the use of scope 2 emission factors. There has also been an update provided to the emission factors to be used, as explained under 'Schedules'.

For background, chapter 7 sets out the method for the estimation of scope 2 emissions arising from the purchase of electricity from an electricity grid. This method has been used by the Greenhouse Challenge Plus for over a decade. The method accommodates electricity measured either in kilowatt hours or gigajoules.

The scope 2 emission factors provided in Part 6 of Schedule 1 are state-based emission factors from on-grid electricity generation calculated systematically from the physical characteristics of the electricity grid. The state-based emission factor calculates an average emission factor for all electricity consumed from the grid in a given state, territory or electricity grid. All emissions attributable to a state territory or grid's electricity consumption are allocated amongst individual consumers in proportion to their relative level of consumption. In effect, the likelihood of a particular generator supplying a particular consumer is assumed to reflect each generator's relative level of supply to the grid. The reason for this approach is that within an electricity grid it is impossible to physically trace or control the actual physical source of electricity received by each customer.

This approach minimises information requirements for the system and produces factors that are relatively easy to interpret and apply, and which are used to support a range of specific government programs and policies. Consistent adoption of these 'physical' state-based emission factors ensures the emissions generated in each state are fully accounted for by the end-users of the purchased electricity and double counting is avoided.

It is recognised that this approach does not serve all possible policy purposes and that alternative, more data-intensive approaches are possible. Reporters will be able to provide additional data on a voluntary basis on consumption of certain renewable products.

Background to Scope 2 factor estimates

The scope 2 emission factors reflect data that are based on:

- on-grid activity only;
- state-based activity;
- annual financial year averages;
- physical characteristics of the electricity supply and demand.

The estimated electricity emission factors have been aligned with the definitions used in *The Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard* of the World Resources Institute/World Business Council for Sustainable Development (the GHG Protocol).

The emission factor for scope 2 is defined in terms of energy sent out on the grid rather than energy delivered because this effectively ensures that end users of electricity are allocated only the scope 2 emissions attributable to the electricity they consume and not the scope 2 emissions attributable to electricity lost in transmission and distribution. The latter are allocated to the transmission and distribution network. This follows the GHG Protocol guidance that scope 2 emissions be reported by the organisation owning or controlling the plant or equipment where the electricity is consumed. Companies that own or control transmission and distribution networks report their transmission and distribution loss emissions under scope 2.

The emission factors are calculated as financial year averages based on electricity generation within each state and territory and take into account interstate electricity flows (where they exist) and the emissions attributable to those flows. To reduce volatility scope 2 emission factors are calculated as a three-year moving average.

Comments on the amendments are detailed in the table.

Table: Summary of Comments on individual amendment items

Item	Commentary
[180]	Provides refinement to definition.
[181]	Provides refinement to definition.
[182]	Provides refinement to definition.
[183]	Provides refinement to definition.
[184]	Provides definition of main electricity grid.

[185]	Provides for provision of a method for the estimation of scope 2 emissions for facilities not connected to the main electricity grid.

CHAPTER 8 ASSESSMENT OF UNCERTAINTY

Chapter 8 provides guidance on how to estimate uncertainty of the emission estimates for the facilities that make up a corporation.

The update (amendment [186]) provides additional guidance to assist in standardising the estimation of uncertainty process.

Additional default parameters have been provided for users of method 1 methodologies.

Additional material has been included in the Determination on how to aggregate uncertainties obtained for individual sources and at individual facilities to the registered corporation level. This material has been drawn from the publication known as *GHG Protocol guidance on uncertainty assessment in GHG inventories and calculating statistical parameter uncertainty (September 2003) v1.0* issued by the World Resources Institute and the World Business Council on Sustainable Development.

SCHEDULES

Schedule 1 of the Determination sets out the energy content and emission factors for use in the estimation of emissions from fuel combustion using Method 1. In general, energy content factors have been drawn from the Australian Bureau of Agricultural and Resource Economics (ABARE) Energy Statistics while emission factors have been mainly derived from the *National Greenhouse Accounts* or, in the case of some fuels with smaller consumption levels, factors have been derived from the *2006 IPCC Guidelines for National Greenhouse Gas Inventories,* prepared by the Intergovermental Panel on Climate Change..

Comments on the amendments are detailed in the table.

Table: Summary of Comments on individual amendment items

Item	Commentary
[187]	Provides refinement to definition to align with the definition in the *National Greenhouse and Energy Reporting Regulations 2008*.
[188]	As for [19]
[189]	Clarification of the conditions for which the stated default factors apply to compressed natural gas (ie at standard conditions).

[190]	Update to method 1 emission factor for ethane. The new estimate is more representative of fuel qualities in Australia. The source has been changed from ABARE$_2$ 2007 *Energy in Australia 2006*, produced for Department of Industry, Tourism and Resources, pages 77-79, Commonwealth of Australia ,Canberra to ABARE$_1$ 2007 *Fuel and Electricity Survey – Fuel Codes*, Australian Bureau of Agricultural and Resource Economics *www.abareconomics.com/publications_html/surveys/surveys/surveys.html*, Commonwealth of Australia, Canberra.
[191]	Provision of updated scope 2 emission factors to reflect the latest available data on dispatch of generators by emissions intensity.
[192]	Provision of additional energy content factors for specified energy commodities. The source of these content factors is: for uranium: ABARE$_2$ 2007 *Energy in Australia 2006*, produced for Department of Industry, Tourism and Resources, pages 77-79, Commonwealth of Australia ,Canberra for sulphur: ABARE$_1$ 2007 *Fuel and Electricity Survey – Fuel Codes*, Australian Bureau of Agricultural and Resource Economics *www.abareconomics.com/publications_html/surveys/surveys/surveys.html*, Commonwealth of Australia, Canberra For hydrogen: Derived from stoichiometry.
[193]	Correction to name of product.
[194]	Refinement to name of source.

National Greenhouse and Energy Reporting (Measurement) Amendment Determination 2009 (No.1): Schedule 2: Amendments relating to waste

Division 5.2.2 Method 1 – emissions of methane released at landfill

Emissions from solid waste disposal are estimated using data on the receipt of solid waste materials at the landfill and the Tier 2 FOD model provided in the *2006 IPCC Guidelines for National Greenhouse Gas Inventories,* except in certain circumstances specified below.

Section 5.4 also sets out the circumstances in which an alternative approach to the estimation of emissions will apply. The alternative approach will apply to those small number of facilities that capture methane generated by the landfill and where the estimates of the quantity of methane captured for combustion (either at the landfill or elsewhere) exceed 75 per cent of the estimated emissions generated by the landfill according to the application of the Tier 2 FOD model.

If the 75 per cent threshold is exceeded, (that is, if the quantity of methane captured exceeds 75 per cent of the estimated methane generated at the landfill) then it is intended that emissions would be estimated as [1/0.75] x quantity of methane captured.

This mixed approach ensures that where a more accurate estimate of emissions generated by the landfill is available – ie based on the quantity of emissions captured – that this better data is substituted for the Tier 2 FOD model-generated emissions data.

The choice of 75 per cent as the threshold value reflects advice in the Department of Environment and Heritage publication, *National Pollution Inventory – Emission Estimation Manual for Municipal Solid Waste (MSW) Landfills, Version 1.2,* May 2005, that this constitutes the most common assumption about capture efficiency of landfill sites. It also aligns with the recent issue by the US Environment Protection Agency of rules for the estimation of emissions from landfills in the United States.

Reporters are able to use Method 2 to establish higher capture efficiencies than the 75 per cent indicated in Method 1. That is, reporters are not limited to the 75 per cent cap if they are able to demonstrate through the use of method 2 that the capture efficiency at the landfill is higher.

Looking further ahead, it is intended that a method 4 – direct monitoring of emissions – be developed in future. Further development work and consultation is required to establish the appropriateness of various monitoring techniques, however, before their inclusion in the Determination.

Comments on the amendments are detailed in the table.

Table: Summary of Comments on individual amendment items

Item	Commentary
[1]	Simplifies description of sources by removing reference to UNFCCC category classification numbers.
[2]	Simplifies description of sources by removing reference to UNFCCC category classification numbers.
[3]	Simplifies description of sources by removing reference to UNFCCC category classification numbers.
[4]	Clarifies that the scope of this source is restricted to landfills that have been a) open to receive waste after 1 July 2008 and b) which generate emissions greater than 10,000 tonnes of CO_2-e.
[5]	Clarifies the units of the variable.
[6]	Amends the provision to ensure consistent treatment of methane captured for combustion, methane that is flared and methane that is captured and transferred offsite.
[7]	Provides an elaboration of the current method to clarify the steps to be taken in estimating the tonnages of wastes disposed in the landfill, providing explicit treatment of the relationship between waste received over the weighbridge and waste disposed at the landfill.
[8]	As for [7]
[9]	As for [7]
[10]	As for [7]
[11]	As for [7]
[12]	As for [7]
[13]	Clarifies definition of inert waste that is consistent with the default values specified with the amendments.
[14]	Provides additional methods for estimating waste mix types disposed in the landfill. New default waste mix type percentages based on recent research have

	been made available for use in the absence of data at the landfill.
[15]	As for [7]
[16]	Ensures consistency in expression of this section with similar sections in the Determination
[17]	As for [7]
[18]	As for [7]
[19]	As for [7]

Division 5.2.3 Method 2 – emissions of methane released at landfill

[20]	Provides an elaboration of method 2 by setting out the steps that must taken by landfill operators to undertake empirical measurements to establish key parameters for the estimation of emissions at the landfill. The approach draws on *Guidance on monitoring landfill gas surface emissions* published by the Environment Agency of the United Kingdom in September 2004.
[21]	as for [20]

Division 5.2.4 Method 3 – emissions of methane released at landfill

[22]	Updates the approach to be taken for method 3 in light of the elaboration of method 2.

Parts 5.3 and 5.4 Emissions from wastewater handing – domestic and commercial – and from wastewater handling – industrial

Comments on the amendments are detailed in the table.

Table: Summary of Comments on individual amendment items

Item	Commentary
[23]	Amends the provision to ensure consistent treatment of methane captured for combustion, methane that is flared and methane that is captured and transferred offsite.
[24]	Provides for wastewater facilities to capture up to 100% of methane generated where they are able to utilise high quality measurements for data on organic carbon inputs under method 2.
[25]	Amends the provision to ensure consistent treatment of methane captured for combustion, methane that is flared and methane that is captured and transferred offsite.
[26]	Provides for wastewater facilities to capture up to 100% of methane generated where they are able to utilise high quality measurements for data on organics carbon inputs under method 2.

National Greenhouse and Energy Reporting (Measurement) Amendment Determination 2009 (No.1): Schedule 3: Amendments relating to UNFCCC Categories

The intent of this series of amendments is to simplify and clarify the description of sources by removing references to UNFCCC category numbering systems. The description of sources is now self contained within the Determination. Removing the references to UNFCCC category numbers will also ensure that, when the UNFCCC number systems change internationally, as seems likely in the next few years, there will be no need to amend the Determination in future for this reason.

Comments on the amendments are detailed in the table.

Table: Summary of Comments on individual amendment items

Item	Commentary
[1]	Simplifies description of the outline of principal sources by removing references to UNFCCC category classification numbers.
[2]	Removes redundant definition.
[3]	Removes reference to UNFCCC category.
[4]	Simplifies description of the source by removing references to UNFCCC category classification numbers.
[5]	As for [4]
[6]	As for [4]
[7]	As for [4]
[8]	As for [4]
[9]	As for [4]

[10]	As for [4]
[11]	As for [4]
[12]	As for [4]
[13]	As for [4]
[14]	As for [4]
[15]	As for [4]
[16]	As for [4]
[17]	As for [4]
[18]	As for [4]
[19]	As for [4]
[20]	As for [4]
[21]	As for [4] with additional description of source derived from the *2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 1,* IPCC Japan. The IPCC definitions draw heavily on the American Petroleum Institute Compendium for the estimation of greenhouse gas emissions, which provides the basis for the method 2 in the Detemination.
[22]	As for [4] with additional description of source derived from the *2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 1,* IPCC Japan. The IPCC definitions draw heavily on the American Petroleum Institute Compendium for the estimation of greenhouse gas emissions, which provides the basis for the method 2 in the Detemination..
[23]	As for [4]
[24]	As for [4]
[25]	As for [4]
[26]	As per [4] with additional description of source derived from the *2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 1,* IPCC Japan. The IPCC definitions draw heavily on the American Petroleum Institute Compendium for the estimation of greenhouse gas emissions, which provides the basis for the method 2 in the Detemination.

[27]	As for [4]
[28]	As for [4] with additional description of source derived from the *2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 1,* IPCC Japan. The IPCC definitions draw heavily on the American Petroleum Institute Compendium for the estimation of greenhouse gas emissions, which provides the basis for the method 2 in the Detemination.
[29]	As for [4]
[30]	As for [4] with additional description of source derived from the *2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 1,* IPCC Japan. The IPCC definitions draw heavily on the American Petroleum Institute Compendium for the estimation of greenhouse gas emissions, which provides the basis for the method 2 in the Detemination.
[31]	As for [4]
[32]	As for [4]
[33]	Clarifies that the scope of the chapter on industrial processes does not include emissions from fuel combusted for energy production.
[34]	As for [4]
[35]	As for [4]
[36]	As for [4]. Also clarifies that all activities that consume carbonates and which generate carbon dioxide emissions as a result are included in the source. Ensures consistent treatment of emissions generated from calcining of the carbonates and emissions generated through other reactions.
[37]	As for [4]
[38]	As for [4]
[39]	As for [4]
[40]	As for [4]
[41]	As for [4]
[42]	As for [4]. Also clarifies that all activities that consume carbon reductants in the production of a chemical or mineral product are included in this source. Ensures consistent treatment of emissions from the use of carbon reductants in the

	production of all chemical or mineral products. Extends the method previously applied to two identified industries, production of titanium dioxide and synthetic rutile.
[43]	Facilitates the extension of methods currently available to integrated steelworks to all integrated metalworks.
[44]	As for [4]
[45]	As for [4]
[46]	As for [4]
[47]	As for [4]
[48]	As for [4]
[49]	Ensures consistency in expression of this section with similar sections in the Determination
[50]	As for [4]
[51]	As for [4]
[52]	As for [4] with additional description of source derived from the *2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 1,* IPCC Japan.
[53]	As for [4]
[54]	As per [4] with additional description of source derived from the *2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 1,* IPCC Japan.
[55]	As for [4]
[56]	As for [4]

ATTACHMENT B

Documents Incorporated by Reference

Chapter 1 General

Section 1.8
The following document can be found at:
http://climatechange.gov.au/reporting/publications/index.html

- *National Greenhouse Energy and Reporting (Measurement) Technical Guidelines 2009*

The following guideline can be found at:
http://www.ghgprotocol.org/calculation-tools/all-tools

- *GHG Uncertainty protocol guidance on uncertainty assessment in GHG inventories and calculating statistical parameter uncertainty* (September 2003) v1.0

Chapter 2 Fuel Combustion

Section 2.66 Blended Solid Fuels
The following standard can be obtained at: http://www.saiglobal.com/shop/Script/search.asp

- D6866–08 - Determining the Bio-based Content of Solid, Liquid and Gaseous Samples Using Radiocarbon Analysis

Section 2.67 Blended Liquid Fuels
The following standard can be obtained at: http://www.saiglobal.com/shop/Script/search.asp

- D6866–08 - Determining the Bio-based Content of Solid, Liquid and Gaseous Samples Using Radiocarbon Analysis

Chapter 5 Waste

Section 5.11 Waste Mix Types
The following standard can be obtained at: http://www.saiglobal.com/shop/Script/search.asp

- ASTM 5231-92(2008) - Standard Test Method for Determination of the Composition of Unprocessed Municipal Solid Waste, 2008.

Section 5.17F
The following guideline can be found at: http://www.environment-agency.gov.uk/static/documents/Business/lftgn07_surface_936575.pdf

- Environment Agency of the United Kingdom, *Guidance on monitoring landfill gas surface emissions* (September 2004).

Section 5.17G
The following standard can be obtained at: http://www.saiglobal.com/shop/Script/search.asp

- AS/NZS 4323.4:2009 - Stationary source emissions - Area source sampling - Flux chamber technique

The following guideline can be found at: http://www.environment-agency.gov.uk/static/documents/Business/lftgn07_surface_936575.pdf

- Environment Agency of the United Kingdom, *Guidance on monitoring landfill gas surface emissions* (September 2004).

Section 5.17H
The following standard can be obtained at: http://www.saiglobal.com/shop/Script/search.asp

- AS/NZS 4323.4:2009 - Stationary source emissions - Area source sampling - Flux chamber technique

The following guideline can be found at: http://www.environment-agency.gov.uk/static/documents/Business/lftgn07_surface_936575.pdf

- Environment Agency of the United Kingdom, *Guidance on monitoring landfill gas surface emissions* (September 2004).

Section 5.17J
The following standard can be obtained at: http://www.saiglobal.com/shop/Script/search.asp

- AS/NZS 4323.4:2009 - Stationary source emissions - Area source sampling - Flux chamber technique

The following guideline can be found at: http://www.environment-agency.gov.uk/static/documents/Business/lftgn07_surface_936575.pdf

- Environment Agency of the United Kingdom, *Guidance on monitoring landfill gas surface emissions* (September 2004).

The following information can be obtained at:
http://www.bom.gov.au/climate/cdo/about/about-stats.shtml

- Bureau of Meteorology and known as *Climate statistics for Australian locations*