DEPARTMENTAL COMMENTARY

National Greenhouse and Energy Reporting (Measurement) Amendment Determination 2010

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, energy consumption and energy 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.

The exposure draft of the *National Greenhouse and Energy Reporting (Measurement) Amendment Determination 2010* is intended to amend the *National Greenhouse and Energy Reporting (Measurement) Determination 2008* and has been made available for public comment.

The *National Greenhouse and Energy Reporting (Measurement) Amendment Determination 2010* aims to achieve the following:

- provide for carbon capture for permanent storage in regulated underground geological formations;
- respond to feedback received from stakeholders following their experience gained in the first year of reporting;
- update particular elements of the *National Greenhouse and Energy Reporting (Measurement) Determination 2008* for new information (updated emission factors for scope 2 emissions, which depend on dispatch decisions within the National Electricity Market taken in the last financial year); and
- elaborate the methods specified for certain sectors – for example, soda ash production.

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

The Instrument will commence on registration and apply to the 2010-2011 financial year.

Notes on the amendments are provided at Attachment A.

Background

The initial *National Greenhouse and Energy Reporting (Measurement) Determination 2008* 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.

A first set of amendments were introduced to the *National Greenhouse and Energy Reporting (Measurement) Determination 2008* in June 2009 reflecting a public consultation process as well as the experience gained by the Department during the first year of implementation.

In October 2009 an invitation to make submissions on the Determination was sent to all organisations registered for reporting under the National Greenhouse and Energy Reporting system as well as those who had previously made submissions. The invitation requested feedback on experiences from the preparation of the first reports under NGERs as well as particular issues including carbon capture and storage, measurement standards and aspects of the methods for the coal mining and landfill sectors.

The proposed amendments reflect the input from submissions received during this consultation process. For certain issues raised, consideration is still being given as to the appropriate response. In these cases, additional information will be included in an Issues Paper scheduled for release mid 2010 which will address amendments under consideration for the June 2011 update of the Determination.

Carbon Capture and Storage (CCS)

The NGER Regulations specify that quantities of carbon dioxide captured and permanently stored should be reported. Currently the NGER Measurement Determination does not specify methods for the estimation of carbon dioxide captured and stored or for the emissions associated with these activities. However, as was indicated in the amendment process in 2009, it was intended that CCS would be an area of focus for later updates of the Determination.

Scope of Amendments for Carbon Capture and Storage

The principal amendments for CCS aim to allow facilities that capture carbon dioxide for permanent storage in an underground geological formation to deduct that amount of carbon dioxide in the emissions estimation process for that facility. The storage must be *permanent* and is defined as such only if the carbon dioxide is transferred to an underground geological formation that is regulated under national or State legislation (see *Defining Carbon Dioxide Captured for Permanent Storage* in the following pages).

Other amendments for CCS provide for the attribution of deductions where there are multiple sources or fuels consumed and for measurement criteria to be applied for the carbon dioxide captured.

The scope of the amendments for CCS reflects the status of the regulatory framework as well as the technology available for permanent storage of carbon dioxide. The CCS regulatory framework is under development and is not yet comprehensive. At present there exists legislation for carbon dioxide storage in offshore underground geological formations and in onshore underground geological formations in Queensland, South Australia, Victoria and Western Australia's Barrow Island.

For all methods in the Determination the approach taken must be consistent with the Australian government's commitments for reporting of emissions under the United Nations Framework Convention on Climate Change and the Kyoto Protocol.

The Intergovernmental Panel on Climate Change (IPCC) guidelines that govern international reporting of emissions by the Australian government requires captured carbon dioxide to be stored permanently before deductions can be made in the national greenhouse accounts. Temporary storage of carbon dioxide or its use, however, must be reported as emissions as the gas ultimately enters the atmosphere relatively quickly.

Consequently, it is necessary to distinguish in reporting between carbon dioxide captured and supplied for a permanent storage use and carbon dioxide captured and supplied for temporary storage and consumption in uses that lead to emissions of carbon dioxide.

The Determination draws on this distinction to limit the application of carbon dioxide capture and storage provisions to permanent storage in regulated underground geological formations. This approach is also consistent with the US EPA proposed rule *Subpart RR- Carbon Dioxide Injection and Geologic Sequestration.* In particular, the US EPA rule does not permit deductions for carbon dioxide captured and stored above ground or stored temporarily above or below ground; nor does it permit deductions for storage of carbon dioxide in cement, calcium carbonate or any other storage method that does not utilise a regulated underground geological formation.

The NGER Regulations currently require facilities involved in carbon capture and storage to report fugitive emissions from transport, injection and the storage site as well as the stock of carbon dioxide stored and the amount of carbon dioxide captured, imported and injected. Future amendments may provide methods where none have been provided in this draft instrument (see *Future Amendments for Carbon Capture and Storage* in the following pages). Methods to estimate fugitive emissions from transport of the carbon dioxide for permanent storage, however, are provided for in these amendments. The amendments for CCS in this Instrument do not provide methods for the estimation of emissions from the process of injection of carbon dioxide into the storage site or emissions from the storage site itself.

Defining Carbon Dioxide Captured for Permanent Storage

For those facilities undertaking capture, the amendments allow for a deduction of the amount of carbon dioxide captured in the process of their estimation of emissions *only if* the captured carbon dioxide is intended for permanent storage in underground geological formations that are also regulated under national or state legislation. These are:

- the Commonwealth's *Offshore Petroleum and Greenhouse Gas Storage Act 2006;*
- *Greenhouse Gas Geological Sequestration Act 2008 (Vic);*
- *Offshore Petroleum and Greenhouse Gas Storage Act 2010 (Vic)*;
- *Greenhouse Gas Storage Act 2009 (Qld);*
- *Petroleum and Geothermal Energy Act 2000 (SA); and*
- *Barrow Island Act 2003 (WA).*

The CCS regulatory framework is in the process of being established. Some states are yet to introduce legislation that deals with CCS while regulations for the Commonwealth legislation, the *Offshore Petroleum and Greenhouse Gas Storage Act 2006*, are yet to be finalized. Future updates of the Determination will consider incorporation of any updates to the Commonwealth and State regulatory frameworks.

Future Amendments for Carbon Capture and Storage

The amendments included in this draft instrument should be considered to be a first step in the process of the development of a comprehensive provision for the treatment of carbon capture and storage in the NGER system.

Several issues in particular will be developed in future iterations.

First, consideration will be given to the use of estimates of emissions from permanent storage sites reported to the Commonwealth Minister under the *Offshore Petroleum and Greenhouse Gas Storage Act 2006* and appropriate Ministers under relevant State legislation governing carbon dioxide storage for future reporting under NGERs.

Second, issues relating to temporary storage of carbon dioxide will also need to be examined during the next amendment process of the Determination in conjunction with issues of compliance and the use of intermediaries for capture and transport of carbon dioxide.

Third, the issue of compliance will be considered particularly given the NGER system will interact with other Commonwealth and State legislation. Further amendments to the NGER system may be required to provide for compliance issues.

Fourth, consideration will also be given to the treatment of intermediaries used in the capture or transport of the carbon dioxide. The amendments included in this draft instrument only provide for a direct transfer of gas from the facility where capture occurs and the licensed storage facility or for an integrated facility that generates, captures and stores the carbon dioxide.

Fifth, consideration will need to be given to the impacts of new Commonwealth and State legislation and the development of new permanent storage types and new permanent storage technologies.

Sixth, while the current proposed amendments for CCS do not provide for deductions of carbon dioxide captured for permanent storage in the metals production (with the exception of integrated metalworks) and waste sectors, it is planned to provide for CCS together with other improvements to the methods for these sectors in future updates.

An Issues Paper is scheduled for release mid 2010 which will address amendments proposed for the June 2011 update of the Determination

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 *Mandatory Reporting Rule.*

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 analysis of 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 are 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 2010: Schedule 1

In this attachment an introduction is given to the amendments for each chapter of the Determination followed by tables containing descriptions of the purpose of each amendment. The item numbers in the tables correspond to the numbered amendments in Schedule 1 of the draft of the *National Greenhouse and Energy Reporting (Measurement) Amendment Determination 2010*.

CHAPTER 1 GENERAL

The proposed amendments to Chapter 1 of the Determination insert a new division which provides for general requirements relating to carbon capture and storage and also add a term to the section on definitions for ferroalloy. The general requirements for carbon capture and storage are applicable to all instances in the Determination where a deduction for carbon capture and storage is permitted. Further amendments in following chapters provide for the deduction of carbon capture and storage in the estimation of emissions at the facility where capture occurred, where appropriate.

For those facilities undertaking capture, the proposed amendments to Chapter 1 would allow for a deduction of the amount of carbon dioxide captured from their estimated emissions *only if* the captured carbon dioxide is permanently stored in underground geological formations that are also regulated under national or state legislation. These are:

- the Commonwealth's *Offshore Petroleum and Greenhouse Gas Storage Act 2006;*
- *Greenhouse Gas Geological Sequestration Act 2008 (Vic);*
- *Offshore Petroleum and Greenhouse Gas Storage Act 2010 (Vic)*;
- *Greenhouse Gas Storage Act 2009 (Qld);*
- *Petroleum and Geothermal Energy Act 2000 (SA); and*
- *Barrow Island Act 2003 (WA).*

Part 1.1 Overview, Division 1.1.2 Definitions and Interpretations

Item	Commentary
[1] [2]	Provides definitions

Part 1.2 General, Division 1.2.3 Requirements in relation to carbon capture and storage

The next set of amendments relate to general provisions for the requirements of carbon capture and storage. Comments on the amendments are detailed in the table.

Table: Summary of Comments on individual amendment items

Item	Commentary
[3]	Provides general requirements for carbon capture and storage as a separate division within Part 1.2 of the Determination which deals with general requirements applicable across all or most of the Determination. Specifically this amendment provides: • a definition for *captured for permanent storage*; • the conditions for deducting carbon dioxide that is permanently stored; • rules on how the deduction is to be attributed where there are multiple sources or fuels consumed; and • measurement criteria for carbon dioxide captured. Section 1.19A provides a definition for *captured for permanent storage* which requires the carbon dioxide to be captured by or transferred to a licence or lease holder under prescribed Commonwealth and State legislation governing storage of carbon dioxide in underground geological formations. Section 1.19B outlines the prerequisites for deduction of the carbon dioxide captured for permanent storage. The prerequisites are that the licence or lease holder under the prescribed legislation issues a certificate specifying information on the carbon dioxide captured or transferred and the amount that may be deducted is the amount specified on the certificate. Future amendments catering for compliance issues may include: • a prescribed form for the certificate which is a prerequisite for deduction of carbon dioxide;

- the inclusion of a reference to section 137 of the Criminal Code Act 1995 which outlines the penalties for giving false or misleading information or documents; and
- ensuring full coverage of carbon dioxide storage facilities under NGER reporting commitments.

Section 1.19C sets out how the deduction of carbon dioxide captured is to be attributed where there are multiple sources.

Section 1.19D sets out how the deduction of carbon dioxide captured is to be attributed where there are multiple fuels consumed for a source that generates carbon dioxide that is captured.

Section 1.19E (1) (a) provides for the measurement of the volume of the carbon dioxide stream captured and is consistent with requirements for measurement of gaseous fuels (Division 2.3.6). There are two cases with different criteria available:

> Case 1 (1.19E (1) (a) (i)): where a transfer of the carbon dioxide stream takes place the volume of the carbon dioxide stream can be either the volume as evidenced by invoices (criterion A) or the volume measured using specific measurement standards (criterion AAA).
>
> Case 2 (1.19E (1) (a) (ii)): where no transfer takes place i.e. the same facility captures and stores the carbon dioxide, the volume of the carbon dioxide stream must be measured using specific measurement standards (criterion AAA).

Section 1.19E (1) (b) indicates the ISO standard appropriate for sampling of the carbon dioxide stream and is consistent with Method 3 for combustion of gaseous fuels (Division 2.3.4). An equivalent standard may also be used.

Section 1.19E (1) (c) indicates the ISO standards appropriate for analysis of the concentration of carbon dioxide in the carbon dioxide stream. An equivalent standard may also be used.

In the future, these provisions may need to be elaborated to cater for the case where an intermediary is being considered for use in capture or transport of the carbon dioxide stream. In particular, measurement of the amount of carbon dioxide captured at the point of capture or point of transfer to the intermediary may need to be implemented.

Sections 1.19F to 1.19M are based on sections 2.31 to 2.37 of the Determination which provide for the same criteria that should be met in relation to the measurement of volumes of carbon dioxide as apply for the measurement of gas for fuel measurement.

CHAPTER 2 FUEL COMBUSTION

The proposed amendments to chapter 2 primarily allow for the deduction of carbon dioxide captured for permanent storage in the estimation of a facility's emissions at a facility where capture takes place.

The amendments for deductions of carbon dioxide captured for permanent storage are made for Method 2 and 3 for fuel combustion including solid, gaseous and liquid fuels as well as for petrochemical production where a fuel is consumed as a feedstock. If carbon dioxide is captured for permanent storage reporters would not be able to use method 1, the default method, for estimation of the amount of carbon dioxide generated by combustion.

Facilities that do not undertake capture of carbon dioxide for permanent storage will not be affected by the proposed carbon capture and storage amendments in this Instrument.

Other amendments to chapter 2 provide clarity by

- aligning definitions for stationary and transport energy between gaseous and liquid fuels; and
- amending the formatting of terms used to give internal consistency of presentation within the Determination.

Part 2.2 Emissions released from the combustion of solid fuels, Division 2.2.3 Method 2 — estimating carbon dioxide using default oxidation factor

The following set of amendments provide for the deduction of carbon dioxide captured for permanent storage in the estimation of emissions at a facility where capture takes place.

[4]	Amends the formula to include the terms required to allow for deduction of carbon dioxide permanently stored.
[5]	Provides definitions for the terms in the formula required to allow for deduction of carbon dioxide permanently stored and a note which provides a cross reference to the general requirements for deduction of carbon captured for permanent storage.

Part 2.2 Emissions released from the combustion of solid fuels, Division 2.2.3 Method 2 — estimating carbon dioxide using an estimated oxidation factor

The following set of amendments provide for the deduction of carbon dioxide captured for permanent storage in the estimation of emissions at a facility where capture takes place.

[6]	As for [4], amends the formula to include the terms required to allow for deduction of carbon dioxide permanently stored.
[7]	As for [5], Provides definitions for the terms in the formula required to allow for deduction of carbon dioxide permanently stored and a note which provides a cross reference to the general requirements for deduction of carbon captured for permanent storage.

Part 2.3 Emissions released from the combustion of gaseous fuels, Division 2.3.2 Method 1 — emissions of carbon dioxide, methane and nitrous oxide

Amendments [8] to [10] align fuel combustion of gaseous fuels with fuel combustion of liquid fuels by inserting the same definition used in liquid fuels for stationary and transport energy purposes and providing cross references and additional text which clarify that the application of the division is for both stationary and transport energy purposes.

[8]	Clarifies that the quantity of gaseous fuel combusted can be for the purpose of stationary energy or transport energy which aligns this provision with an existing provision for liquid fuels.
[9]	Provides the reference within the Determination where emission factors for transport energy purposes should be taken.
[10]	Clarifies the definitions of stationary energy purposes and transport energy purposes which align this provision with the provision for liquid fuels.

Part 2.3 Emissions released from the combustion of gaseous fuels, Division 2.3.3 Method 2 — emissions of carbon dioxide from the combustion of gaseous fuels

The following set of amendments provide for the deduction of carbon dioxide captured for permanent storage and also correct some formatting of terms used in equations for emissions estimates.

Facilities that do not undertake capture of carbon dioxide for permanent storage will not be affected by the proposed carbon capture and storage amendments in this Instrument.

[11]	As for [4], amends the formula to include the terms required to allow for deduction of carbon dioxide permanently stored.
[12]	Corrects formatting
[13]	Provides definitions for the terms in the formula required to allow for deduction of carbon dioxide permanently stored and a note which provides a cross reference to the general requirements for deduction of carbon captured for permanent storage.
[14 - 17]	Corrects formatting
[18]	Clarifies that the application of item 2 in the table includes fugitive emissions.
[19-20]	Updates a standard.

Part 2.4 Emissions released from the combustion of liquid fuels, Division 2.4.2 Method 1 — emissions of carbon dioxide, methane and nitrous oxide from liquid fuels other than petroleum based oils or greases

[21]	Provides clarification in the presentation of the definition for transport energy purposes.

Part 2.4 Division 2.4.3 Method 2 — emissions of carbon dioxide from liquid fuels other than petroleum based oils or greases

The following set of amendments provide for the deduction of carbon dioxide captured for permanent storage in the estimation of emissions at a facility where capture takes place.

Facilities that do not undertake capture of carbon dioxide for permanent storage will not be affected by the proposed carbon capture and storage amendments in this Instrument.

[22]	As for [4], amends the formula to include the terms required to allow for deduction of carbon dioxide permanently stored.
[23]	Corrects formatting
[24]	As for [5] provides definitions for the terms in the formula required to allow for deduction of carbon dioxide permanently stored and a note which provides a cross reference to the general requirements for deduction of carbon captured for permanent storage.
[25]	Corrects formatting
[26-29]	Updates a standard

Part 2.5 Emissions released from fuel use by certain industries, Division 2.5.3 Energy — petrochemical production

The following set of amendments provide for the deduction of carbon dioxide captured for permanent storage in the estimation of emissions at a facility where capture takes place.

Facilities that do not undertake capture of carbon dioxide for permanent storage will not be affected by the proposed carbon capture and storage amendments in this Instrument.

[30]	Provides for a reference to the new subsection (3) which allows for deduction of carbon dioxide for permanent storage.
[31]	As for [4] and [5], amends the formula to include the terms required to allow for deduction of carbon dioxide permanently stored; and provides definitions for the terms in the formula required to allow for deduction of carbon dioxide permanently stored; and provides a note which provides a cross reference to the general requirements for deduction of carbon captured for permanent storage..
[32]	Provides for a reference to the new subsection (3) which allows for deduction of carbon dioxide for permanent storage.
[33]	As for [4], and [5], amends the formula to include the terms required to allow for deduction of carbon dioxide permanently stored; and provides definitions for the terms in the formula required to allow for deduction of carbon dioxide permanently stored; and

	provides a note which provides a cross reference to the general requirements for deduction of carbon captured for permanent storage..

CHAPTER 3 FUGITIVE EMISSIONS

Part 3.2 Coal mining — fugitive emissions, Division 3.2.2 Method 4 – extraction of coal

The following set of amendments provide for the deduction of carbon dioxide captured for permanent storage in the estimation of emissions at a facility where capture takes place.

Facilities that do not undertake capture of carbon dioxide for permanent storage will not be affected by the proposed carbon capture and storage amendments in this Instrument.

[34]	Amends heading.
[35]	Notes that a method is available for estimation of emissions from carbon capture and storage.
[36]	As for [4], amends the formula to include the terms required to allow for deduction of carbon dioxide permanently stored.
[37]	As for [5], provides definitions for the terms in the formula required to allow for deduction of carbon dioxide permanently stored and a note which provides a cross reference to the general requirements for deduction of carbon captured for permanent storage.

Part 3.2 Coal mining — fugitive emissions, Division 3.2.3 Total gas contained by gas bearing strata

[38]	Clarifies the application of the term ΣQ_{ijtr} to apply to carbon dioxide that is captured for permanent storage and provides a note with a cross reference to the general requirements for deduction of carbon captured for permanent storage.

Part 3.2 Coal mining — fugitive emissions, Division 3.2.4 Method 1 — decommissioned underground mines

[39]	Clarifies the definition of F_{dm} to reflect the cumulative amount of flooding that has occurred at the mine since it was closed.
[40]	Clarifies the calculation to multiply by the number of years since the mine was decommissioned to give the true proportion of mine volume filled with water.

Part 3.3 Oil and natural gas — fugitive emissions, Division 3.3.2 Oil or gas exploration

The proposed amendments [41] to [57] all apply to Part 3.3 Oil and natural gas – fugitive emissions. They provide clarification of the methods to be used for the estimation of emissions from leaks and from vents from the oil and gas sector. The amendments comprise two parts:

1. clarification of the definitions of vent and leakage emission sources, and their associated estimation methodologies, by referencing specific sections of the American Petroleum Institute's (API) *Compendium of Greenhouse Gas Emissions Methodologies for the Oil and Gas Industry*; and
2. improvements to the structure of the reporting of vent emissions across the various oil and gas source categories in the Determination.

Improvements to the structure of the reporting of vent emissions were required as currently, consistent with historical practice, the reporting of venting emissions across the whole sector is directed to one category, 3.3.9 Natural gas production and processing, rather than in the specific sectors where the venting emissions may occur, such as 3.3.3.2 Crude oil production and 3.3.2 Oil or gas exploration. The amendments therefore make it possible to allocate estimated vent emissions from Crude oil production and Oil or gas exploration to the 3.3.3.2 Crude oil production and 3.3.2 Oil or gas exploration source categories.

[41]	Inserts heading
[42]	Improves the structure of the reporting of vent emissions across Part 3.3 of the Determination.
[43]	Provides clarification that the division applies to fugitive emissions from venting
[44]	As for [42], this is related to the improved structure of reporting of vent emissions across Part 3.3 of the Determination.

[45]	Clarifies the subdivision heading by including the word 'leak'.

Part 3.3 Oil and natural gas — fugitive emissions, Division 3.3.3 Crude oil production

[46]	Provides clarification that the division applies to fugitive emissions from venting.
[47]	Provides clarification that the division applies to fugitive emissions from venting.
[48] to [50]	Provide clarification on the type of equipment that result in leaks that are classified as 'general leaks' in crude oil production by reference to the appropriate sections in the American Petroleum Institute (API) *Compendium of Greenhouse Gas Emissions Methodologies for the Oil and Gas Industry*.

Part 3.3 Oil and natural gas — fugitive emissions, Subdivision 3.3.3.3 Method 2 — crude oil production (flared) emissions of methane and nitrous oxide

[51]	As for [42], improves the structure of the reporting of vent emissions across Part 3.3 of the Determination.
[52]	As for [42], improves the structure of the reporting of vent emissions across Part 3.3 of the Determination; and provides clarification of the methods available for the estimation of fugitive emissions from deliberate releases from process vents, system upsets and accidents.

Part 3.3 Oil and natural gas — fugitive emissions, Division 3.3.6 Natural gas production or processing, other than emissions that are vented or flared

[53] to [55]	Provide clarification on the type of equipment that result in leaks that are classified as 'general leaks' in natural gas production and processing by reference to the appropriate sections in the American Petroleum Institute (API) *Compendium of Greenhouse Gas Emissions Methodologies for the Oil and Gas Industry*.
[56]	Improves consistency of the text and provides a clarification of the available

	methods for division 3.3.9..
[57]	Provides clarification on the allocation of the sections in the American Petroleum Institute (API) *Compendium of Greenhouse Gas Emissions Methodologies for the Oil and Gas Industry* to processes that result in deliberate releases from process vents, system upsets and accidents.

Part 3.4 Carbon capture and storage

The following amendment provides for the fugitive emissions of carbon dioxide from carbon capture and storage activities and in particular from the transport of carbon dioxide captured for permanent storage.

In the general amendments for carbon capture and storage in Chapter 1, the facility that captures the carbon dioxide may only deduct from their estimate of carbon dioxide generated the amount of carbon dioxide that is either transferred to a regulated underground geological storage site or, if there is no transfer, injected into the regulated underground geological storage site.

The fugitive emissions of carbon dioxide from its transport up until the point of transfer are accounted for in the emission estimate for the facility that generates the carbon dioxide and undertakes the capture. The amendment 58 allows the fugitive emissions from transport of the carbon dioxide captured from the point of transfer to the point of injection to be estimated.

The following amendment 58 also allows for the estimation of fugitive emissions from the transport of carbon dioxide where there is no point of transfer due to the facility undertaking the capture also being the regulated underground geological storage site. In this case the fugitive emissions from transport of the carbon dioxide are from the point of capture to the point of injection.

58	Provides for the estimation of fugitive emissions from the transport of carbon dioxide captured for permanent storage.

CHAPTER 4 INDUSTRIAL PROCESSES EMISSIONS

Part 4.2 Industrial processes — mineral products, Division 4.2.1 Cement Clinker Production

The following set of amendments provide for the deduction of carbon dioxide captured for permanent storage in the estimation of emissions at a facility where capture takes place.

Facilities that do not undertake capture of carbon dioxide for permanent storage will not be affected by the proposed carbon capture and storage amendments in this Instrument.

[59]	As for [4], and [5], amends the formula to include the terms required to allow for deduction of carbon dioxide permanently stored; provides definitions for the terms in the formula required to allow for deduction of carbon dioxide permanently stored; provides measurement requirements for the carbon dioxide captured for permanent storage.
[60]	As for [4], amends the formula to include the terms required to allow for deduction of carbon dioxide permanently stored.
[61]	As for [5], provides definitions for the terms in the formula required to allow for deduction of carbon dioxide permanently stored; and a note which provides a cross reference to the general requirements for deduction of carbon captured for permanent storage

Part 4.2 Industrial processes — mineral products, Division 4.2.2 Lime Production

The following set of amendments provide for the deduction of carbon dioxide captured for permanent storage in the estimation of emissions at a facility where capture takes place.

Facilities that do not undertake capture of carbon dioxide for permanent storage will not be affected by the proposed carbon capture and storage amendments in this Instrument.

[62]	As for [4], and [5], amends the formula to include the terms required to allow for deduction of carbon dioxide permanently stored; provides definitions for the terms in the formula required to allow for deduction of carbon dioxide permanently stored; provides a note which provides a cross reference to the general requirements for deduction of carbon captured for permanent storage; and provides measurement requirements for the carbon dioxide captured for permanent storage;
[63]	As for [4], amends the formula to include the terms required to allow for deduction of carbon dioxide permanently stored.
[64]	Clarifies the referenced section of the 2006 IPCC Guidelines.

[65]	As for [5], provides definitions for the terms in the formula required to allow for deduction of carbon dioxide permanently stored.

Part 4.2 Industrial processes — mineral products, Division 4.2.3 Use of carbonates for production of a product other than cement clinker, lime or soda ash

The following set of amendments provide for the deduction of carbon dioxide captured for permanent storage in the estimation of emissions at a facility where capture takes place.

Facilities that do not undertake capture of carbon dioxide for permanent storage will not be affected by the proposed carbon capture and storage amendments in this Instrument.

[66]	Clarifies that the application of the division does not apply to carbon dioxide emissions from the consumption of a carbonate in the production of soda ash or following the application to soil.
[67]	As for [4], amends the formula to include the terms required to allow for deduction of carbon dioxide permanently stored.
[68]	As for [5] provides definitions for the terms in the formula required to allow for deduction of carbon dioxide permanently stored.

Part 4.2 Industrial processes — mineral products, Division 4.2.4 Soda ash use and production

[69]	Clarifies the application of the division by describing the inputs and outputs of the production process which include the carbon inputs of coke and calcium carbonate and the products containing carbon, sodium bicarbonate and soda ash.
[70]	Clarification of the facility for which the available methods must be used.
[71]	As foreshadowed in the NGERs Measurement Technical Guidelines 2009, the previous method for soda ash, which attributed carbon dioxide emissions to the coke consumed in the process, is being replaced by a carbon balance method. The carbon balance approach utilises estimates of the carbon entering the facility and the carbon exiting the facility and assumes the difference between the two is the carbon converted to carbon dioxide and emitted. The carbon balance approach has also been used elsewhere in the Determination in Division 2.5.3 Energy – petrochemical production and in Division 4.4.1 Iron, steel

	or other metal production using an integrated metalworks. The method 2 and 3 for soda ash also allows for a deduction for carbon captured and permanently stored in line with other provisions for CCS in this Instrument.

Part 4.3 Industrial processes — chemical industry, Division 4.3.1 Ammonia production

The following set of amendments provide for the deduction of carbon dioxide captured for permanent storage in the estimation of emissions at a facility where capture takes place.

Facilities that do not undertake capture of carbon dioxide for permanent storage will not be affected by the proposed carbon capture and storage amendments in this Instrument.

[72]	As for [4], and [5], amends the formula to include the terms required to allow for deduction of carbon dioxide permanently stored; provides definitions for the terms in the formula required to allow for deduction of carbon dioxide permanently stored; provides a note which provides a cross reference to the general requirements for deduction of carbon captured for permanent storage; and provides measurement requirements for the carbon dioxide captured for permanent storage;
[73]	Amends method 3 for ammonia production to allow for deduction of carbon dioxide permanently stored by referencing method 2 for ammonia production.

Part 4.4 Industrial processes — metal industry, Division 4.4.1 Iron, steel or other metal production using an integrated metalworks

The following set of amendments provide for the deduction of carbon dioxide captured for permanent storage in the estimation of emissions at a facility where capture takes place.

.Facilities that do not undertake capture of carbon dioxide for permanent storage will not be affected by the proposed carbon capture and storage amendments in this Instrument.

[74]	Clarifies the reference to method 1 means the method 1 in section 4.66.
[75]	As for [4], and [5], amends the formula to include the terms required to allow for deduction of carbon dioxide permanently stored; provides definitions for the terms in the formula required to allow for deduction of carbon dioxide permanently stored;

	provides a note which provides a cross reference to the general requirements for deduction of carbon captured for permanent storage; and provides measurement requirements for the carbon dioxide captured for permanent storage;
[76]	Amends method 3 for Division 4.4.1 to allow for deduction of carbon dioxide permanently stored by referencing method 2 for Division 4.4.1.

Part 4.4 Industrial processes — metal industry, Division 4.4.2 Ferroalloys production

[77-78]	Clarifies the application of the Division is to ferroalloy, silicomanganese and silicon production and includes emissions of carbon dioxide from the oxidation of a fossil fuel electrode; and provides a definition of ferroalloy.

Part 4.4 Industrial processes — metal industry, Division 4.4.3 Aluminium production (carbon dioxide emissions)

[79] to [84]	Clarifies that the division applies to consumption of all carbon anodes in the production process.
[85]	Clarifies that the division applies to emissions of carbon dioxide from the consumption of a fossil fuel reductant and the oxidation of a fossil fuel electrode.

CHAPTER 5 WASTE

Part 5.3 Wastewater handling (domestic and commercial), Division 5.3.2 Method 1 — methane released from wastewater handling (domestic and commercial)

[86]	Amends the definition of COD_{sl} to be the sum of the two main types of sludge removed from wastewater treated, primary sludge (COD_{psl}) and waste activated sludge (COD_{wasl}). Definitions of COD_{psl} and COD_{wasl} are also provided.
[87]	Provides a relationship between primary sludge (COD_{psl}) and volatile solids (VS_{psl}) to allow conversion between the two for those facilities measuring volatile

	solids. Similarly for COD_{wasl} and VS_{wasl}; and provides definitions for primary sludge and waste activated sludge.

Part 5.4 Wastewater handling (industrial), Division 5.4.3 Method 2 — methane released from wastewater handling (industrial)

[88]	Corrects typographical error.

Part 5.5 Waste Incineration

[89]	Numbers the paragraph in the section.
[90]	Ensures consistency with similar sections in the Determination in relation to incidental emissions.

CHAPTER 6 ENERGY

Part 6.1 Production

[91]	Ensures consistency with similar sections in the Determination in relation to incidental emissions.

CHAPTER 8 ASSESSMENT OF UNCERTAINTY

Part 8.3 How to assess uncertainty when using method 1

[92-93]	Related to clarifications of the definitions in relation to source

Part 8.3 How to assess uncertainty when using method 1

[94]	Clarifies the nomenclature used for the formula in order to differentiate this section from the preceding section 8.12.

[95 - 96]	Clarifies the nomenclature used for the definitions in order to differentiate this section from the preceding section 8.12.

SCHEDULE 1 ENERGY CONTENT FACTORS AND EMISSION FACTORS

Part 2 Fuel combustion — gaseous fuels

[97]	Corrects the formatting for the energy content factor for ethane.

Part 4 Fuel combustion — fuels for transport energy purposes

[98]	Provides default emission factors for new vehicle control standards.

Part 6 Indirect (Scope 2) emission factors from consumption of purchased electricity from grid

[99]	New Scope 2 factors based on actual production in 2007, 2008 and 2009 financial years.

SCHEDULE 3 CARBON CONTENT FACTORS FOR FUELS

[100]	Corrects the subtitle for changed numbering of references

Part 2 Gaseous fuels

[101]	Corrects the carbon content factor for ethane to align with the energy content factor for ethane in Schedule 1 Part 2.

Part 5 Carbonates

[102]	Provides the carbon content factors required for the new carbon balance method for soda ash production as referenced in amendment [71]. These carbon content

	factors are based on common formula weights and carbon ratios.

ATTACHMENT B

Documents Incorporated by Reference

Chapter 1 General

Section 1.19A Meaning of *captured for permanent storage*

The following document can be found at:
http://www.comlaw.gov.au/ComLaw/Legislation/ActCompilation1.nsf/current/bytitle/63163B84A4841195CA257694000F9B58?OpenDocument&mostrecent=1

- *Offshore Petroleum and Greenhouse Gas Storage Act 2006*

The following document can be found at:
http://www.legislation.vic.gov.au/

- *Greenhouse Gas Geological Sequestration Act 2008*

The following document can be found at:
http://www.legislation.qld.gov.au/OQPChome.htm

- *Greenhouse Gas Storage Act 2009*

The following document can be found at:
http://www.legislation.sa.gov.au/index.aspx

- *Petroleum and Geothermal Energy Act 2000*

The following document can be found at:
http://www.slp.wa.gov.au/legislation/statutes.nsf/default.html

- *Barrow Island Act 2003*

Section 1.19E Measurement criterion for carbon dioxide captured

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

- ISO 6974
  - Part 1 (2000)
  - Part 2 (2001)
  - Part 3 (2000)
  - Part 4 (2000)
  - Part 5 (2000)
  - Part 6 (2002)

Chapter 3 Fugitive emissions from fuels

Section 3.49

The following document can be found at:
http://www.api.org/ehs/climate/new/upload/2004_COMPENDIUM.pdf

- *"API Compendium"- Compendium of Greenhouse Gas Emissions Estimation Methodologies for the Oil and Gas Industry, 2004.*

Section 3.72
The following document can be found at:
http://www.api.org/ehs/climate/new/upload/2004_COMPENDIUM.pdf

- *"API Compendium"- Compendium of Greenhouse Gas Emissions Estimation Methodologies for the Oil and Gas Industry, 2004.*

Section 3.84
The following document can be found at:
http://www.api.org/ehs/climate/new/upload/2004_COMPENDIUM.pdf

- *"API Compendium"- Compendium of Greenhouse Gas Emissions Estimation Methodologies for the Oil and Gas Industry, 2004.*

Chapter 4 Industrial processes emissions

Section 4.32
The following standard can be obtained at: http://www.saiglobal.com/shop/Script/search.asp

- *ASTM C25-06, Standard Test Methods for Chemical Analysis of Limestone, Quicklime, and Hydrated Lime.*

Section 4.33
The following standard can be obtained at: http://www.saiglobal.com/shop/Script/search.asp

- *ASTM C50-00, Standard Practice for Sampling, Sample Preparation, Packaging, and Marking of Lime and Limestone Products.*