# EXPLANATORY STATEMENT

*Carbon Credits (Carbon Farming Initiative) Act 2011*

*Carbon Credits (Carbon Farming Initiative—Refrigeration and Ventilation Fans) Methodology Determination 2015*

## Background: Emissions Reduction Fund

The *Carbon Credits (Carbon Farming Initiative) Act 2011* (the ***Act***) enables the crediting of greenhouse gas abatement from emissions reduction activities across the economy. Greenhouse gas abatement is achieved either by reducing or avoiding emissions or by removing carbon from the atmosphere and storing it in soil or trees.

The *Carbon Farming Initiative Amendment Act 2014* establishes the Emissions Reduction Fund (ERF). The ERF has three elements: crediting emissions reductions, purchasing emissions reductions, and safeguarding emissions reductions.

Emissions reduction activities are undertaken as offsets projects. The process involved in establishing an offsets project is set out in Part 3 of the Act. An offsets project must be covered by, and undertaken in accordance with, a methodology determination.

Subsection 106(1) of the Act empowers the Minister to make, by legislative instrument, a methodology determination. The purpose of a methodology determination is to establish procedures for estimating abatement (emissions reduction and sequestration) from eligible projects and rules for monitoring, record keeping and reporting. These methodologies will help ensure that emissions reductions are genuine—that they are both real and additional to business as usual.

In deciding to make a methodology determination the Minister must have regard to the advice of the Emissions Reduction Assurance Committee (ERAC), an independent expert panel established to advise the Minister on proposals for methodology determinations. The Minister must not make or vary a methodology if the ERAC considers it inconsistent with the offsets integrity standards, which are set out in section 133 of the Act. The Minister will also consider any adverse environmental, economic or social impacts likely to arise as a result of projects to which the determination applies.

Offsets projects that are undertaken in accordance with the methodology determination and approved by the Clean Energy Regulator (the Regulator) can generate Australian Carbon Credit Units (ACCUs), representing emissions reductions from the project.

Project proponents can receive funding from the ERF by submitting their projects into a competitive auction run by the Regulator. The Government will enter into contracts with successful proponents, which will guarantee the price and payment for the future delivery of emissions reductions.

Further information on the ERF is available on the Department of the Environment website at: www.environment.gov.au/emissions-reduction-fund.

**Background: Refrigeration and Ventilation Fans**

The *Carbon Credits (Carbon Farming Initiative—Refrigeration and Ventilation Fans) Methodology Determination 2015* (the Determination) applies to projects that improve the energy performance of fans in ***refrigeration systems***, and ***ventilation fans*** servicing commercial and industrial buildings and the common areas of residential buildings. By improving the efficiency of fans, less electricity is consumed and emissions associated with the generation of electricity are reduced.

Under this Determination, a ***refrigeration and ventilation fan project*** would involve:

- ***high efficiency fan installations*** servicing refrigeration or building ventilation systems; and
- ***small motor fan upgrades*** to replace inefficient shaded pole or permanent split capacitor fan motors servicing refrigeration or building ventilation systems with electronically commutated (EC) motors.

The Determination provides for installations, modifications and replacements to be undertaken in multiple buildings or refrigeration systems under a single project.

Under the Determination, the reduction in energy consumption from high efficiency fan installations is estimated using equations that compare the power consumption of the installed fan with the power consumption of a fan with a market average level of efficiency. For small motor fan upgrades, a regression equation quantifies the difference in efficiency between the replaced shaded pole or permanent split capacitor motor of a driven fan and an electronically commutated motor. Default annual operating hours are used to determine a capacity factor which reflects the portion of the year in which the fan is operating. The Determination also specifies capacity factors for fans in refrigeration systems which account for cycling of compressors.

For ventilation fans (excluding building space heating or space cooling fans), the Determination makes use of annual operating hours based on the building type. The building type relates to the Building Code of Australia building classifications and, where appropriate, the Australian and New Zealand Standard Industrial Classification of the primary business activity undertaken in the building in which the fan is installed. For fans providing space heating and cooling, the annual operating hours are based on the National Construction Code climate zone for the building location.

The Determination specifies that high efficiency fan installations must have a motor input power greater than or equal to 0.125 kilowatts and less than or equal to 185 kilowatts. However, it does not specify the particular types of fans that must be installed as part of the project, providing flexibility for project proponents to determine which fans are most appropriate to use for a particular application. For small motor fan upgrades, the replaced and EC motor input power must be equal to or less than 0.175 kilowatt. These fans could be employed in a broad range of applications including ventilation systems servicing underground car parks and hospitals, and refrigeration systems such as refrigerated display cabinets and cold storage warehouses.

Project proponents who could use this Determination include owners, operators or tenants of commercial and industrial buildings, bodies corporate of residential apartments, local and state governments, and manufacturers or suppliers of fans.

## Application of the Determination

The Determination sets out detailed rules for implementing and monitoring offsets projects that reduce greenhouse gas emissions associated with refrigeration and building ventilation system fans.

Proponents are encouraged to read the Determination in combination with any applicable regulations, rules, and guidance documents.

The Determination reflects the requirements of the Act's offsets integrity standards to ensure that emissions reductions are real and additional to business as usual. The offsets integrity standards require that an eligible project should result in carbon abatement that is unlikely to occur in the ordinary course of events and is eligible carbon abatement under the Act. In summary, the offsets integrity standards also require that:

- amounts are measurable and capable of being verified;
- the methods used are supported by clear and convincing evidence;
- material emissions which are a direct consequence of the project are deducted; and
- estimates, assumptions or projections used in the determination should be conservative.

Project proponents wishing to implement projects under the Determination must make an application to the Regulator under section 22 of the Act. They must also meet the general eligibility requirements for an offsets project set out in subsection 27(4) of the Act, which include compliance with the requirements set out in the Determination, and the additionality requirements in subsection 27(4A) of the Act. The additionality requirements are:

- the newness requirement, which sets the criteria to determine whether a project has begun to be implemented;
- the regulatory additionality requirement, which sets the criteria to determine whether a project is required to be carried out by or under a law of the Commonwealth, a State or a Territory; and
- the government program requirement.

Subsection 27(4A) of the Act provides that a methodology determination may specify requirements in lieu of the newness requirement or the regulatory additionality requirement. The Determination does not specify any requirements in lieu, and the general requirements would apply to eligible refrigeration and ventilation fan projects.

## Public consultation

The Determination is a combination of the previous drafts of the *Carbon Credits (Carbon Farming Initiative – Refrigeration and Ventilation Fans Upgrades) Determination 2015* and the *Carbon Credits (Carbon Farming Initiative – High Efficiency Fan Installations) Determination 2015*. Previous drafts on which this Determination is based were developed in collaboration with the Regulator and in consultation with a group of experts from the built environment, refrigeration and fan industry sectors. The group reviewed versions of the draft determinations prior to the creation of this Determination.

Both of the draft determinations were released for public consultation. The exposure draft of the *Carbon Credits (Carbon Farming Initiative – Refrigeration and Ventilation Fans Upgrades) Determination 2015* was published on the Department's website for public consultation from 17 March 2015 to 15 April 2015. Two submissions were received.

The exposure draft of the *Carbon Credits (Carbon Farming Initiative – High Efficiency Fan Installations) Determination 2015* was published on the Department's website for public consultation from 11 June 2015 to 9 July 2015. Three submissions were received.

Details of non-confidential submissions are provided on the Department of the Environment website, www.environment.gov.au.

**Determination details**

Details of the Determination are at Attachment A. Numbered sections in this Explanatory Statement align with the relevant sections of the Determination. The definition of terms highlighted in ***bold italics*** can be found in the Determination.

Attachment A

## Details of the Methodology Determination

### Part 1 Preliminary

1 Name

Section 1 sets out the full name of the Determination, which is the *Carbon Credits (Carbon Farming Initiative—Refrigeration and Ventilation Fans) Methodology Determination 2015.*

2 Commencement

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

3 Authority

Section 3 provides that the Determination is made under subsection 106(1) of the Act.

4 Duration

Under subparagraph 122(1)(b)(i) of the Act, a methodology determination remains in force for the period specified in the determination. The Determination will remain in force for the duration set out in this section unless revoked in accordance with section 123 of the Act or section 42 of the *Legislative Instruments Act 2003*.

Section 4 provides that the Determination will be in force from its commencement (as provided for in section 2) until the day before it would otherwise be repealed under subsection 50(1) of the *Legislative Instruments Act 2003*.

Instruments are repealed under that provision on the first 1 April or 1 October following the tenth anniversary of registration of the Determination on the Federal Register of Legislative Instruments. In accordance with subparagraph 122(1)(b)(i) of the Act, paragraph 4(b) of the Determination sets out the time that the Determination would expire.

If the Determination expires in accordance with section 122 of the Act or is revoked under section 123 of the Act during a crediting period for a project to which the Determination applies, the Determination will continue to apply to the project during the remainder of the crediting period under subsections 125(2) and 127(2) of the Act. Project proponents may apply to the Regulator during a reporting period to have a different methodology determination apply to their projects from the start of that reporting period (see subsection 128(1) of the Act).

Under section 27A of the Act, the Emissions Reduction Assurance Committee may also suspend the processing of applications under a determination if there is reasonable evidence that the methodology determination does not comply with one or more of the offsets integrity standards. This does not impact applications for declaration already received by the Regulator before such a suspension, or declared eligible offset projects which apply the determination.

## 5 Definitions

Section 5 defines a number of terms used in the Determination.

Generally, where terms are not defined in the Determination but are defined in section 5 of the Act, they have the meaning given by the Act.

Under section 23 of the *Acts Interpretation Act 1901*, words in the Determination in the singular number include the plural and words in the plural number include the singular.

Where a definition refers to an Australian Standard (AS) or International Organisation for Standardisation (ISO) standard, the standard may be purchased through the distributor SAI Global, at www.saiglobal.com. In applying a definition that references an AS or ISO standard, the version(s) of the standard current on the date this Determination comes into force would apply (see section 8 of this Explanatory Statement). This ensures that any changes to definitions in updated AS or ISO standards are not automatically applied under the Determination, as this could have unintended consequences for the scope or application of the Determination. The only exception is the reference to ISO 9001 in section 16, as outlined in section 16 of this Explanatory Statement.

Key definitions in section 5 of the Determination include those set out below.

***ANZSIC*** is defined to mean the Australian and New Zealand Standard Industrial Classification, jointly developed by the Australian Bureau of Statistics (ABS) and Statistics New Zealand, as applicable at the end of each reporting period for the purposes of Schedule 2 of this Determination. These classifications are published on the ABS website, www.abs.gov.au.

***eligible fan type*** means each of the following:

- an axial-flow fan;
- a cross-flow fan;
- a mixed-flow fan;
- a centrifugal backward-curved fan;
- a centrifugal radial bladed fan;
- a centrifugal forward-curved fan.

These are the fan types that, subject to the other requirements in this Determination, can be involved in a high efficiency fan installation project. Section 6 includes technical specifications for five of the six fan types, based on definitions in European Union regulations.

***eligible small motor type*** means each of the following:

- a shaded pole motor;
- a permanent split capacitor motor.

These are the small motors that, subject to the other requirements in this Determination, may be replaced with an EC motor under a small motor fan upgrade.

***refrigeration system*** means any of the following types:

- a refrigerated display cabinet;
- a freezer cabinet;
- a walk-in cool room;
- a cold storage warehouse.

A refrigeration system includes each part (including fans such as condenser fans, evaporator fans, and cooled air circulation fans) that operates as an integral part of the system.

***variable speed drive*** means a control system that consists of an electronic power converter (such as a variable voltage controller for a direct current motor) that:

- is integrated, or functions as one system, with a motor and a fan; and
- adapts the electrical power supplied to the motor continuously (rather than through a series of discrete settings) in order to control the mechanical power output of the motor according to temperature, pressure, humidity, or feedback from carbon monoxide or carbon dioxide sensors.

This definition distinguishes variable speed drives from other forms of controls for the purpose of calculating abatement under this determination.

***ventilation fan*** means:

- a ducted or partition ventilation fan; or
- a heating/cooling ventilation fan;

that is not a refrigeration fan.

Ducted or partition ventilation fans provide ventilation service to buildings covered by the building type in schedule 2. The operating hours of these fans should be representative of the operating hours of the building type they are servicing. Therefore these fans are assigned the capacity factor based on the building operating hours. The definition of ducted or partition ventilation fans excludes heating/cooling ventilation fans that only operates when heating or cooling is required. As these fans only operate for part of the building operating hours, they are assigned a lower capacity factor based on the climate zone in which the building is located.

This definition covers a range of fans servicing chillers, condensers and air conditioning systems, car park exhaust fans, and fans for gas furnace heating systems servicing building ventilation, space heating and space cooling systems. It is intended to cover a range of fans for which the calculations in the method, including the capacity factors, are appropriate. The definition is therefore not intended to cover fans that are installed within a building to cool transport equipment—such as lifts, for industrial production purposes—such as draught fans for industrial boilers—or for applications such as laundry dryers that do not relate to building ventilation, space heating or space cooling.

## 6 Definitions for eligible fan types (other than cross flow fans)

This determination requires that fans be of an eligible fan type. Section 6 provides the definitions of five of the six eligible fan types based on a fan flow angle ($\alpha$) and, where specified, a fan blade angle ($\beta$). For a fan to be eligible, these must be in the range specified within the table. These definitions are based on draft definitions for the European Union regulations that will come into force in 2020. Current European Union (EU) fan regulations are set out in Commission Regulation (EU) No. 327/2011 of 30 March 2011.

Section 6 outlines the requirements for each eligible fan type in terms of fan flow and fan blade angles, and provides definitions and diagrammatic descriptions of these parameters. Defining these parameters precisely ensures that fans must be correctly classified by type, and limits eligibility to fans that meet these precise definitions.

For cross-flow fans the Determination adopts the definition from the European Union regulations that are due to come into force in 2020, which refers to the gas path through the impeller being essentially at right angles to its axis both entering and leaving the impeller at its periphery.

## 7 Standards referred to in this determination

This determination refers to a number of standards for definitions and fan testing requirements. In applying definitions and test requirements from standards referred to in this section, the version of the standard that must be used is the one that existed on the date this determination came into force.

Where an Australian standard is referred to, the equivalent international standard may also be used. This enables test results performed according to the relevant international standards to be used in the calculations.

## 8 References to factors and parameters from external sources

The calculation of the net abatement amount in the Determination includes factors and parameters determined from other sources.

Section 8 specifies that such factors or parameters should be determined by using the version of the external source that is current at the end of the reporting period, unless the Determination specifies otherwise (see paragraph 8(2)(a)) or it is not possible to define or calculate the factor or parameter by reference to the instrument or writing as in force at the end of the reporting period (see paragraph 8(2)(b)). This ensures that factors and parameters are based on the most current information.

It is not expected that paragraph 8(2)(b) would apply under this determination. However, if paragraph 8(2)(b) does apply, it is expected that project proponents would use the version of legislative instruments in force at the time at which monitoring or other actions were conducted (see section 10 of the *Acts Interpretation Act 1901* and section 13 of the *Legislative Instruments Act 2003* which operate such that references to external documents which are legislative instruments are to versions of those instruments as in force from time to time).

Subsection 37(6) sets out reporting requirements to be followed when paragraph 8(2)(b) applies.

## Part 2 Refrigeration and ventilation fan projects

9 Refrigeration and ventilation fan projects

The effect of paragraphs 27(4)(b) and 106(1)(a) of the Act is that a project must be covered by a methodology determination, and that the methodology determination must specify the kind of offsets project to which it applies.

Section 9 provides that the Determination apply to an offsets project that involves the activity of undertaking one or more high efficiency fan installations or one or more small motor fan upgrades. Activities undertaken must reasonably be expected to result in eligible carbon abatement. Projects covered by these activities are refrigeration and ventilation fan projects.

Subsection 9(3) sets out the requirements for high efficiency fan installation activities.

The requirements include:

- the fan must have a motor input power greater than or equal to 0.125 kilowatts and less than or equal to 185 kilowatts;
- the fan must be a fan of the following type:
    - an axial-flow fan;
    - a cross-flow fan;
    - a mixed-flow fan;
    - a centrifugal fan, with a backward-curved, radial or forward-curved impeller design;
- the fan must have an operating efficiency that is greater than or equal to the high efficiency threshold for the fan as calculated in accordance with Schedule 1; and
- where fans are replaced or modified, the nominal motor power of the project fan must not be materially greater than that of the original fan.

The fan after replacement or modification must satisfy the points above.

The fan that results from the above is an ***installed HE fan***.

Subsection 9(6) sets out the requirements for a small motor fan upgrade activity.

The requirements include:

- the original fan must be driven by a shaded pole or permanent split capacitor motor;
- the project fan is driven by an EC motor that replaces the original fan;
- the EC motor must have an input power less than or equal to 0.175 kilowatts; and
- the nominal motor power of the project fan must not be materially greater than that of the original fan.

The EC driven fan that results from the above is an ***installed SM fan***.

Some activities under this determination are capable of qualifying as either a high efficiency fan installation or a small motor fan upgrade. Where this is the case, the project proponent is required to elect to treat such activities as one or the other in the first reporting period for the purposes of this determination, and the election applies for the entire crediting period.

## Part 3 Project Requirements

### Division 1 General requirements for refrigeration and ventilation fan projects

10 Operation of this Part

The effect of paragraph 106(1)(b) of the Act is that a methodology determination must set out requirements that must be met for a project to be an eligible offsets project. Under paragraph 27(4)(c) of the Act, the Regulator must not declare that a project is an eligible offsets project unless the Regulator is satisfied that the project meets these requirements.

Part 3 of the Determination specifies a number of requirements that must be met in order for a refrigeration and ventilation fan project to be an eligible offsets project. These requirements are set out in sections 10 to 19.

11 Information to be included in application for declaration

Section 22 of the Act provides that a person may apply to the Regulator for the declaration of an offsets project as an eligible offsets project. Section 11 of the Determination sets out the required information to be included in the application for refrigeration and ventilation fan projects.

For each fan to be installed, modified or replaced that is identified at the time of the application, information would need to be provided on, among others:

- whether the activity is one of installation, modification or replacement;
- whether it is a ventilation fan or a refrigeration fan;
- the installed, modified or replaced fan's motor input power;
- for a refrigeration fan, the type of refrigeration system in which the fan is to be installed (i.e. refrigerated display cabinet, freezer cabinet, walk-in cool room or cold storage warehouse);
- for a ventilation fan, the type of ventilation fan (i.e. ducted or partition ventilation fan or heating/cooling ventilation fan);
- for a ducted or partition ventilation fan, the BCA classification of the type of building involved (for example, office building, supermarket, warehouse, food processing plant, apartment or farm construction);
- for a heating/cooling ventilation fan, the NCC climate zone in which the building is located;
- for a high efficiency fan installation, the installation category, eligible fan type and in the case of a modification or replacement, the nominal motor power of the fan before and after modification or replacement;
- for a small motor fan upgrade, the motor type prior to the upgrade activity and the nominal motor power of the fan before and after the modification or replacement; and
- the brand, manufacturer and model number.

For each high efficiency fan installation and each small motor fan upgrade that is not individually identified at the time of application, the proponent would need to provide a description of the class of installation, modification or replacement.

For each small motor fan upgrade proponents would also need to provide information on how any fan removed from a building or refrigeration system as part of the project, or in association with it, would be disposed of.

The concept of class in relation to fans that are not identified at the time of application is intended to reduce the amount of information required in an application by allowing project proponents to group information about similar activities. The concept of a fan that is not identified at the time of application is intended to allow project proponents to have a refrigeration and ventilation fans project approved as part of an eligible offsets project in circumstances where the proponent is not able to provide all details about each fan to be installed, modified or replaced at the time of making the application. Two activities are of the same class if they share similar characteristics, such as the same type of fan, the same building type, NCC climate zone, or type of refrigeration system.

Specific details about each fan would need to be provided later, in the proponent's offsets report, if the fan is included in a calculation undertaken in accordance with Part 4 (see section 37). Records would also need to be kept about each fan that is part of the project in accordance with Part 5.

## 12 Fans excluded from this Determination

Ventilation fans could be installed in, for example, general building and building utility ventilation systems; or air conditioning and air handling systems (including evaporative systems) in, for example, retail buildings. Other examples include installing fans in chillers, condensers, or cooling towers servicing building ventilation, space heating and space cooling applications.

However section 12 excludes certain fan types and fan applications from a refrigeration and ventilation fans project. This is because the building type used to provide operating hours in the Determination does not necessarily provide a robust estimate of operating hours for industrial activities undertaken within particular classes of building. Furthermore, many of the equations used in the Determination are derived from AS/NZ ISO 12759:2013 which excludes certain fan types and fan applications, which are accordingly excluded from the Determination. The fans excluded from the method are:

- fans for industrial processes, other than fans used to ventilate the space enclosed by the building envelope;
- fans used exclusively for smoke and emergency smoke extraction;
- fans for potentially explosive atmospheres; and
- jet fans for use in car parks and tunnel ventilation.

Potentially explosive atmospheres include the air in industrial buildings with high concentrations of flammable gases, and any other circumstance in which sparks in a fan motor could cause the air and other gases flowing through the fan to combust.

Other similar identified applications not eligible under the method due to their infrequent operation are:

- fans that are used exclusively for pressurising stairwells;
- fans used in a fume cupboard; and
- fans other than heating/cooling ventilation fans which are operated infrequently, such as fans for emergency operations.

The Determination also excludes fans for which calculations are not explicitly provided in the method. This includes ventilation fans that are installed in a building that does not have a building type in Schedule 2, and fans for which efficiency grades are not specified in Schedule 5—such as cross-flow fans with installation categories A or C.

Proponents with projects involving fans used in industrial equipment may be able to undertake a project using the *Carbon Credits (Carbon Farming Initiative—Industrial Electricity and Fuel Efficiency) Methodology Determination 2015*.

13 Requirement for fans and components to be new

To ensure that fans installed, modified or replaced as part of the project continue to operate for the whole crediting period, section 13 of the Determination requires all fans and parts used to modify existing fans to be new at the date of commission.

**Division 2 Additional requirements for high efficiency fan installations**

14 General requirements relating to high efficiency fan installation

Section 14 of the Determination sets out the general requirements that each high efficiency fan installed as part of a project would need to comply with.

The general requirements are:

- the fan must be installed as a driven fan; and
- the installation or replacement of a fan must not consist only of the installation or replacement of an appliance that is purchased as a complete, stand-alone unit.

Subsection 14(2) prevents the installation of a fan as part of an appliance that is purchased as a complete, stand-alone unit, but does not prevent the replacement of a fan in such an appliance, provided only the fan, and not the entire appliance, is replaced. The requirement for a fan to not be installed as part of a complete appliance does not apply when the fan is a major component of the energy consumption of the appliance installed, as is the case for many air handling units.

When a high efficiency fan is installed as part of the project, other improvements to air handling systems or refrigeration systems could be made at the same time. However, under the Determination, abatement is only credited for the installation of high efficiency fans.

15 Efficiency requirement for replacement fans

Section 15 sets out an additional requirement that applies where, as part of a high efficiency fan installation, a fan (the replacement fan) is replacing an existing refrigeration or ventilation fan (the original fan) of an eligible fan type. In such cases the market average efficiency grade of the fan type of the replacement fan must not be less than the market average efficiency grade of the fan type of the original fan.

This is to ensure that the replacement fan will always have an efficiency grade that is greater than or equal to the grade applying to the original fan, thus resulting in genuine emissions reductions. The market average efficiency grades of a particular fan type can be found in Schedule 5 of the Determination.

The market average and high efficiency grades were determined from a survey of sales data from several of the largest fan manufacturers which indicated the best and worst efficiencies for each fan type, and the highest sellers. The market average determined from this survey is the mid-point between the European Tier 1 regulated efficiency grade from January 2013, and the Tier 2 grade from January 2015. This reflects the relatively lower efficiency of fans sold in the Australian market relative to the regulated European market.

Analysis and professional judgment was applied in setting the high efficiency grade to ensure that the purchase and use of fan units delivers above business as usual (BAU) efficiency, and will continue to perform above BAU for a period of 5 to 7 years. High efficiency grades have been set at 5 per cent above the European Tier 2 level, with the exception of centrifugal backward-curved fans with housings, where the high efficiency grade has been set at the European Tier 2 level. For centrifugal backward curved fans without housings the European Tier 3 level was adopted because 5 per cent above Tier 2 would have exceeded Tier 3.

Where the fan type of the original fan is not of an eligible type (i.e. not of a type appearing in Schedule 5), then this section does not apply.

16 Requirements relating to testing for high efficiency fan installations

As the abatement for high efficiency fan installations is calculated based on the difference in efficiency between a high efficiency fan and a market average fan, projects undertaking this activity must test fan efficiency in accordance with this section.

The testing may be done by or on behalf of the manufacturer or supplier of the fan or the project proponent. Subsection 16(3) requires that testing be done by a ***NATA equivalent testing laboratory*** in accordance with AS ISO 5801 – 2004, or a testing laboratory with ISO 9001 certification for testing to AS ISO 5801 – 2004. These requirements apply at the time of testing, and the wording of paragraph 16(3)(b) provides for the use of any version of ISO 9001 for which certification was permissible at the time of testing.

Subsection 16(4) sets out that the testing must occur under the following conditions:

- the model of the fan must be tested as a driven fan when the impeller is operating at optimum efficiency;
- it must be tested using the installation category that most closely resembles the configuration of the fan to be installed; and
- the motor input power at optimum efficiency for the impeller size being tested is not materially different from the motor input power of the same fan with the impeller size as installed as part of the project.

Subsection 16(5) sets out that the model of the fan must be tested to measure the following parameters:

- fan shaft power, for a fan that has a shaft;
- fan impeller power, for a fan that does not have a shaft;
- the fan's motor efficiency;
- fan air power, if tested using installation type B or installation type D;
- fan static air power, if tested using installation type A or installation type C; and
- fan motor input power, if tested using same drive, motor and transmission as the fan to be installed, modified or replaced.

The term 'fan air power' is often referred to as 'total fan air power' or 'total air power'.

## Division 3 Additional requirements for small motor fan upgrades

17 Additional requirements for small motor fan upgrades

Section 17 sets out the following requirements for a small motor fan upgrade activity to be eligible:

- each replaced or modified fan must be in working order and providing refrigeration or ventilation services immediately before the commencement of the replacement or modification, and
- the refrigerated space serviced by the fan or space enclosed by the building envelop that are ventilated by the fan must not be undergoing structural change or be part of a reconstruction project that requires development approval under State or Territory law.

The method assumes that it is common practice to select EC motors when an existing fan is not working, and therefore requires that replaced or modified fans must be in working order.

The requirement for the space to not be undergoing structural change or be part of a reconstruction project that requires development approval does not apply in instances where the development approval is only required because of the fan upgrade. For example, if all the planned works in a building does not need development, and the addition of fan upgrade created the need to seek development approval, then in this instance, the development is only required because of the fan upgrade and therefore not captured under the exclusion.

It is assumed that if new construction or structural change requires development approval, under normal circumstances, development laws require all the equipment in the building to be upgraded to meet minimum standards in the National Construction Code and as a result new efficient fan units will be installed as part of the broader construction or structural change project. As such projects would be business as usual, they are not supported by this Determination.

Subsections 17(4) and 17(5) provide that all parts of a modified fan unit must be compatible with the EC motor, and other parts of the unit must be replaced or modified to meet this requirement, if necessary.

Replacement of an appliance as a stand-alone unit or as a complete air handling unit is not an eligible small motor fan upgrades activity because the fans make up only a small portion of the energy consumption of the complete unit, and fans installed in these units cannot generally be selected separately. Therefore small motor fan upgrades must not include installation of an appliance that is purchased as a complete, stand-alone unit, such as air conditioning unit or refrigerated display or freezer cabinets.

Subsection 17(6) does not prevent a project proponent from undertaking a small motor fan upgrade by installing a complete, stand-alone unit and additionally replacing the fan in the unit.

## 18 Disposal of fans and other components

Section 18 would apply if, as part of small motor fan upgrade activities, a fan (or other components of a fan assembly) is removed from a building or from a refrigeration system. The removed fan or fan assembly components must be disposed of and not refurbished or re-used. This prevents leakage, whereby replaced fans, inefficient fans or fan assembly components could remain in use with no overall reduction in emissions.

The requirement not to refurbish or re-use replaced equipment would not prevent the removed equipment being broken down into components and those components being recycled.

For example, a project proponent could comply with this section by rendering the fans or other components of a fan assembly unusable or unrefurbishable before disposing of them.

Under section 41 of the Determination, project proponents would be required to keep a record of the disposal of fans and other components of a fan assembly, including evidence that the disposal was conducted in accordance with this section and any other applicable legislative requirements.

The requirement to dispose of fan and other component that are removed only applies to the small motor fan upgrades activity. A key assumption underpinning the calculation of abatement for this activity is that working fan motors and other components replaced through the activity would continue to service the ventilation or refrigeration system in which they are installed. The disposal requirement prevents a potential increase in emissions from reusing inefficient motors and components in another fan, which would otherwise use more efficient motors and components (for example new motors and components). The calculations do not take account of such increases in emissions (or leakage) and therefore the disposal requirement applies to this activity.

By contrast, the high efficiency fan installation activity applies to situations where the purchase of a fan with market average efficiency would have occurred in the baseline scenario. In these situations the activity is unlikely to lead to additional re-use of existing fans or components beyond what would have occurred in the absence of the project. As a result the method does not apply any limitations on disposal to high efficiency fan installation activities.

19 Requirement relating to testing for small motor fan upgrades

As abatement for small motor fan upgrades is based on the difference in efficiency between a fan with an EC motor and a fan with an eligible small motor type fan as a function of motor input power, projects undertaking this activity must test fan efficiency in accordance with this section.

Specifically, section 19 provides that for each fan and each motor that is installed or modified as part of a small motor fan upgrade, the project proponent must possess standard test reports that comply with AS ISO 5801–2004, or supplier product specifications that are based on such tests that indicate the motor input power ($P_{E,i}$) of the motor or the fan.

## Part 4 Net abatement amount

### Division 1 Preliminary

20 Operation of this Part

Paragraph 106(1)(c) of the Act provides that a methodology determination must specify how to calculate the carbon dioxide equivalent net abatement amount for a reporting period for a project that is an eligible offsets project. This is called the ***net abatement amount*** in the Determination.

21 Overview of gases accounted for in abatement calculations

This section provides a summary of the emissions sources that are assessed in the Determination in order to determine the net abatement amount. The emissions sources which would need to be taken into account when calculating abatement for the project are set out in the following table:

**Greenhouse gases and emissions sources**

| Item | Relevant emissions calculation | Emissions source | Greenhouse gas |
|---|---|---|---|
| 1 | Baseline emissions<br>Project emissions | Electricity consumption | Carbon dioxide ($CO_2$)<br>Methane ($CH_4$)<br>Nitrous oxide ($N_2O$) |

22 Fans to be used in calculations

Subsection 22(1) and (2) set out that for the purposes of working out the net abatement amount for a reporting period, the project proponent must include only fans that were installed, modified or replaced as part of a high efficiency fan installation or a small motor fan upgrade meeting the requirements set out in Part 2 and Part 3 of the Determination.

The project proponent is given the discretion to choose to exclude a particular fan from the calculations for the period. This may occur in instances where the project proponent is not confident that the fan meets the requirements in parts 2, 3, 4 and 5 of the Determination. For example, this may be a result of loss of key records for the fan. The project proponent must not include a fan in the calculations for the period if, at any time during the reporting period, the unit was decommissioned or removed.

Subsection 22(3) provides that if a fan could be classified as either an installed HE fan or an installed SM fan, the project proponent must elect to classify the fan as either an installed HE fan or an installed SM fan. The classification in the first offsets report in which the fan is included must be retained for the duration of the crediting period or until the fan is excluded. That is, once a fan is classified and reported on it must remain as that classification throughout the crediting period. A fan's classification cannot change from one report to the next after it has been reported on.

## Division 2 Calculating net abatement amount

23 Summary of this Division

The net abatement amount for a refrigeration and ventilation fan project is the sum of the abatement from the high efficiency fan installation activities and the small motor fan upgrade activities comprising the project.

24 Equation 1— net abatement amount ($A$)

***Equation 1*** sets out how to calculate the net abatement amount for the project for a reporting period. This is worked out by adding together the abatement for the high efficiency fan installation activities and the small motor fan upgrade activities comprising the project. The abatement for high efficiency fan installation activities is worked out using equation 2, provided by section 26. The abatement for small motor fan upgrade activities is worked out using equation 10, provided by section 34.

## Division 3 Calculating net abatement from installed HE fans

25 Summary of this Division

The net abatement for a reporting period from all installed HE fans is the sum of the abatement amounts during the reporting period resulting from each installed HE fan.

The abatement amount for each fan is determined by comparing the energy consumption of that fan with the estimated energy consumption of a market average fan of the same type and power, with the same installation category.

26 Equation 2— net abatement amount from installed HE fans ($A_{HE}$)

***Equation 2*** sets out how to calculate the net abatement for high efficiency fan installation activities for a reporting period. This is worked by summing together the abatement amount for each installed HE fan, worked out using equation 3, provided by section 27.

27 Equation 3—abatement amount from each installed HE fan ($A_{HE,i}$)

The abatement amount for each installed HE fan is worked out by multiplying the estimated reduction in energy consumption of the fan by the relevant electricity emissions factor ($EF_{elec,i}$).

In ***Equation 3***, the reduction in energy consumption is calculated as the ratio of the overall efficiency of the high efficiency fan ($\eta_i$), to the overall efficiency of a market average fan ($\eta_{B,i}$). This ratio includes an adjustment by a component mismatch factor ($CM_i$) to account for the loss of efficiency in the higher efficiency fan due to mismatch of components if the fan components are tested separately.

The ratio of efficiency improvement is then adjusted using the part load compensation factor ($C_{C,i}$) from ISO 12759 to adjust for the efficiency improvement that results from installing a variable speed drive or other control system. This adjustment varies with motor input power according to equations 8 or 9 for different control systems. Multi-speed controls or switching controls installed as part of the project are given half the additional credits that a variable

speed drive would provide, in recognition that they only provide discrete adjustments rather than continuous control.

The adjustment for control systems in the parentheses in equation 3 works because the ratio of the overall driven fan efficiency ($\eta_i$) to the baseline fan efficiency ($\eta_{B,i}$) is always greater than one, while the inverse of $C_{C,i}$ is always less than one. The result is that subtracting the inverse of $C_{C,i}$ increases the efficiency difference between $\eta_i$ and $\eta_{B,i}$, thus providing additional credits.

For example, if all fan components have been tested as installed ($CM_i$ equals 1), $\eta_i$ equals 65, $\eta_{B,i}$ equals 60 and $C_{C,i}$ equals 1.088 ($P_{E,i}$ equals 1 kilowatt), then the terms in parentheses equate to:

$$\left(\frac{\eta_i \times CM_i}{\eta_{B,i}} - \frac{1}{C_{C,i}}\right) = \frac{65 \times 1}{60} - \frac{1}{1.088} = 1.083 - 0.919 = 0.164$$

In this example the 8.3 per cent efficiency gain from the high efficiency fan over the market average fan increases to 16.4 per cent with the installation of a variable speed drive as part of the project.

This adjusted efficiency improvement ratio provided by the first set of parentheses is representative of the efficiency improvement of the high efficiency fan over the market average fan, taking into account the effect of a variable speed drive or other controls, if installed, and a component mismatch if applicable.

To determine the reduction in power consumption, the control-adjusted efficiency improvement ratio provided by the first set of parentheses is multiplied by the electrical input power of the high efficiency fan ($P_{E,i}$) to determine energy savings in kilowatt hours. This is then multiplied by the number of days in the reporting period that the fan was in commission ($t_i$), 24 (hours in a day) and the annual capacity factor $CF_i$.

Capacity factors for ducted or partition ventilation fans are determined from the annual operating hours for buildings based on the building type in which the high efficiency fan is installed, using the values in Schedule 2.

Capacity factors for heating/cooling ventilation fans that serve only building space heating or cooling applications are based on the NCC climate zone in which the building is located. For each climate zone and building type, the capacity factor represents the proportion of annual operating hours for which heating or cooling is required. Fans are classified as heating/cooling ventilation fans if they service space heating or cooling systems and are designed or configured to only operate when the space enclosed by the building envelope is being heated or cooled.

Where applicable, the proportionate reduction in power consumption from the first set of parentheses is then adjusted for the reduced heat load for evaporator fans and other fans that circulate refrigerated air.

The adjustment is made by multiplying the change in power by (1+H), where H is either the inverse of the coefficient of performance, or zero when the heat load adjustment is not applicable and is set to zero.

The values of H are derived from the typical coefficients of performance (COP) for refrigeration systems based on operating temperatures, and whether the refrigeration plant is a large centralised system or a stand-alone air cooled refrigeration system. Centralised systems have relatively higher COP values, and COP values are also higher when the difference between ambient temperatures and the operating temperature is smaller. To

ensure conservative abatement estimates while minimising record keeping requirements the assumed COP for cold storage warehouses has been set at 3.9, reflecting the approximately 70:30 split between systems above freezing (with a typical COP of 4.5) and below freezing (with a typical COP of 2.5). For the other types of refrigeration system, which are generally stand-alone air cooled refrigeration equipment, the COP has been set at 2.3, which is considered conservative.

As abatement estimates for axial fans calculated based on the optimum efficiency point are significantly overestimated at low loads and slightly underestimated at high loads, the risk of a non-conservative abatement estimate is greater for these fan types. To ensure conservative abatement for this fan type a discount factor for sub-optimal operation ($DF_i$) of 0.9 is applied to this fan type. This discount factor was chosen in preference to additional design constraints to avoid introducing excessive compliance costs.

The electricity emissions factor to be used refers to scope 2 emissions from the electricity grid to which the site is connected, and is to be taken from the ***NGA Factors document*** publishedon the Department's website from time to time. If the site is connected to an electricity grid for which there is an emissions factor included in the NGA Factors document, then proponents would apply that emissions factor from the NGA Factors document, as in force on the day the project is declared an eligible offsets project. The NGA Factors document will clearly identify the table of emissions factors relevant to this definition.

If the site is connected to a grid other than one of the electricity grids for which emissions factors are included in the NGA Factors document, or a source other than an electricity grid, then the proponent could apply an emissions factor provided by the supplier of the electricity that reflects the emissions intensity of the electricity on the declaration day, or the factor for off-grid electricity published in the NGA Factors document as in force on the day the project is declared an eligible offsets project.

28 Equation 4—motor input power of installed HE fan ($P_{E,i}$)

***Equation 4*** sets out how to calculate the motor input power of a fan used in equation 3, where test results using the same drive, motor and transmission as the high efficiency fan are not available. The motor input power of a high efficiency fan is the power input that flows through the fan motor at optimum efficiency. This is worked out by dividing the fan's mechanical power ($P_{M,i}$) by the product of three efficiencies:

- the transmission efficiency ($\eta_{T,i}$) specified in Schedule 3 that applies to the fan;
- the rated efficiency of the fan's motor ($\eta_{M,i}$); and
- the efficiency of the fan's controller ($\eta_{C,i}$).

All the parameters in equation 4 are as defined in AS/NZS ISO 12759. The fan's mechanical power ($P_{M,i}$) and the rated efficiency of the fan's motor ($\eta_{M,i}$) must be determined from tests in accordance with section 16 of this Determination. Controller efficiency may be ascertained using deemed values, or in accordance with data that the manufacturer or supplier has publicly released in Australia relating to the electrical drive efficiency of the controller corresponding to the point at which the impeller is operating at optimum efficiency.

In equation 4, the mechanical power ($P_{M,i}$) is either the shaft power for fans that have a shaft, or the impeller power for fans that do not have a shaft. Both these terms are derived from AS/NZS ISO 12759.

29 Equation 5—overall driven fan efficiency of installed HE fan ($\eta_i$) for components tested as installed

***Equation 5*** sets out how to calculate the overall driven efficiency of a fan, where fan air power and the electrical input power have been tested using the same drive, motor, and transmission as the installed fan. It is worked out as the ratio of the appropriate measure of fan air power for the installation type ($P_{U,i}$) and the electrical input power of the high efficiency fan ($P_{E,i}$). The fan air power measure ($P_{U,i}$) is either the fan total air power for installation types B or D, or the fan static air power for installation types A or C.

30 Equation 6—overall driven fan efficiency of installed HE fan ($\eta_i$) for components tested separately

***Equation 6*** sets out how to calculate the overall efficiency of a high efficiency fan ($\eta_i$), for the case where the drive, motor, and transmission used in the fan tests are not the same as those for the installed high efficiency fan. The overall efficiency is a measure of the proportion of mechanical power supplied to the impeller that is converted into air movement. The overall fan efficiency of a high efficiency fan is used to calculate the ratio used in equation 3 to determine the reduction in energy consumption of a high efficiency fan.

This equation sets out that the overall fan efficiency is the product of:

- the fan shaft efficiency, which is the ratio of the appropriate measure of fan air power for the installation type ($P_{U,i}$) to the fan's mechanical power ($P_{M,i}$);
- the transmission efficiency ($\eta_{T,i}$) specified in Schedule 3 that applies to the fan;
- the rated efficiency of the fan's motor ($\eta_{M,i}$); and
- the efficiency of the fan's controller ($\eta_{C,i}$).

In equation 6 the fan air power measure ($P_{U,i}$) is either the fan total air power for installation types B or D, or the fan static air power for installation types A or C. The adjustment for the efficiency of the fan controller accounts for the electric power consumption of variable speed drives, whether or not they are installed as part of the project.

As for equation 4, the mechanical power ($P_{M,i}$) is either the shaft power ($P_{S,i}$) for fans that have a shaft, or the impeller power ($P_{R,i}$) for fans that do not have a shaft.

31 Equation 7—baseline overall energy efficiency of installed HE fan ($\eta_{B,i}$)

***Equation 7*** sets out how to calculate the baseline overall energy efficiency of a fan. This estimates the overall efficiency of a market average fan based on the motor input power of the high efficiency fan. It represents the portion of motor input power that is converted into air movement. The baseline overall energy efficiency of the fan is used to calculate the ratio used in equation 3 to determine the reduction in energy consumption of a high efficiency fan. The calculation uses a regression relationship to adjust the market average efficiency grade ($N_{Ave,i}$) so as to determine an appropriate market average efficiency for a fan of the appropriate type, installation type and motor input power. Division by 100 changes the efficiency proportion to a percentage.

The regression parameters underlying equation 7 are taken from AS/NZS ISO 12759.

In equation 7 the regression coefficient ($a_i$) and the regression constant ($b_i$) are the values specified in Schedule 4 depending on the type of fan.

Where a variable speed drive, multi-speed or switching control was already installed, equation 7 adjusts the market average efficiency of the fan. This adjustment increases the baseline efficiency, reducing the available credits because the existing fan would have lower energy consumption in the baseline.

32 Equation 8 and 9—part load compensation factor of installed HE fan ($C_{C,i}$)

***Equation 8*** sets out how to calculate the part load compensation factor for a high efficiency fan based on the motor input power of the fan. This value is used to adjust the ratio of the overall efficiency of the high efficiency fan and market average fan in equation 3. The equation is based on a regression relationship from AS/NZS ISO 12759.

***Equation 9*** sets out that where a variable speed drive, multi-speed control or switching control system is installed as part of the project, the part load compensation factor increases the energy saving from the project activity to account for the additional energy savings from the installation of a control system. Fans with variable speed drives or other automated control systems can better match energy consumption to load, providing energy savings when operating at part load compared to controlling flow by throttling using dampers and inlet or outlet vanes.

## Division 4 Calculating net abatement from installed SM fans

33 Summary of this Division

The net abatement for a reporting period from all installed SM fans is the sum of the abatement amounts produced by each such fan.

The abatement amount for each installed SM fan is estimated using a formula based on a regression relationship that compares the power consumption of a new fan driven by an EC motor with what would have been the power consumption of that unit had it been driven by a less efficient shaded pole motor or permanent split capacitor motor.

34 Equation 10— net abatement from installed SM fans ($A_{SM}$)

***Equation 10*** provides that, for a reporting period, the net abatement from all installed SM fans is worked out by summing together the abatement amounts for all EC driven fans replaced or modified as part of the activities using equation 11.

35 Equation 11—abatement from each installed SM fan ($A_{SM,i}$)

The abatement amount for each installed SM fan ($A_{SM,i}$) is worked out using ***equation 11*** based on the motor input power of the EC motor driven fan that is installed as part of the project.

Equation 11 uses an established regression relationship (the equation in the first two parentheses) to quantify the difference in power consumption between electronically commutated motors and shaded pole or permanent split capacitor motors. This difference is based on the efficiency difference between the original fan motors and the EC fan motors, with a control parameter adjustment that takes account of control system improvements made as part of the project. This adjustment increases abatement where a

variable speed drive, multi-speed motor or switching control is installed as part of the project.

Where applicable, this reduction in power consumption given by the regression equation (in the first two parentheses) in equation 11 is then adjusted for the reduced heat load for evaporator fans and other fans that circulate refrigerated air. The adjustment is made by multiplying the change in power by (1+H), where H is the inverse of the deemed coefficient of performance, and is explained in section 27.

This adjusted reduction in power consumption is also multiplied by a component mismatch factor of 0.9 to account for the loss of efficiency due to mismatch of components, including the mismatching of impeller (types, diameters, and blade angles) for the application, suboptimal housing or air handling unit designs, and mismatches between the installed motor and existing impellers. This adjustment is included to ensure that abatement calculations for small motor fan upgrades are conservative even though the Determination does not account for the installation type or impeller type used in the upgraded fan unit.

To translate power reductions into savings in energy consumption, the power in Watts is converted into megawatts and multiplied by a capacity factor, by the number of days in the reporting period which the fan was in commission, and 24, representing the number of hours in a day. The capacity factor is the ratio of a fan's annual operating hours, based on application, to the total number of hours in a year. The resulting energy saving figure in megawatt hours is multiplied by the emissions factor for electricity to work out the fan's emissions reduction in the reporting period.

Capacity factors for ducted or partition ventilation fans are determined from the annual operating hours for buildings based on the building type in which the high efficiency fan is installed, using the values in Schedule 2.

Capacity factors for heating/cooling ventilation fans that serve only building space heating or cooling applications are based on the NCC climate zone in which the building is located. For each climate zone and building type, the capacity factor represents the proportion of annual operating hours for which heating or cooling is required. Fans are classified as heating/cooling ventilation fans if they service space heating or cooling systems and are designed or configured to only operate when the space enclosed by the building envelope is being heated or cooled.

For refrigeration fans, industry survey and energy audit data obtained by the Department indicates that condenser fans typically operate 50 to 66 per cent of the time. Considering this range, condenser fans and other fans that remove hot air from the condenser are given a conservative capacity factor of 0.58. Fans installed in cooling towers that provide heat rejection for a refrigeration system are given a conservative capacity factor of 0.29, in view of redundancy and reduced operation due to evaporative cooling. Evaporator fans, which typically operate around 90 per cent of the time, are given a capacity factor of 0.9, as are other cold air circulation fans within refrigeration systems.

The electricity emissions factor to be used refers to scope 2 emissions from the electricity grid to which the site is connected, and is to be taken from the ***NGA Factors document*** published by the Department from time to time. If the site is connected to an electricity grid for which there is an emissions factor included in the NGA Factors document, then proponents would apply that emissions factor from the NGA Factors document, as in force on the day the project is declared an eligible offsets project. The NGA Factors document will clearly identify the table of emissions factors relevant to this definition.

If the site is connected to a grid other than one of the electricity grids for which emissions factors are included in the NGA Factors document, or a source other than an electricity grid, then the proponent could apply an emissions factor provided by the supplier of the electricity that reflects the emissions intensity of the electricity on the declaration day, or the factor for off-grid electricity published in the NGA Factors document as in force on the day the project is declared an eligible offsets project.

Note that in equation 11, the units of the calculations prior to $EF_{elec,i}$ are in megawatt hours and are multiplied by $EF_{elec,i}$ in kilograms per kilowatt hour to give an emissions value in tonnes. Although this combination of units may look incorrect, a parameter in kilograms per kilowatt hour has the same value in tonnes per megawatt hour. Hence the units of tonnes of $CO_2$-e for $A_{SM,i}$ in equation 11 are correct.

## Part 5 Reporting, notification and record-keeping requirements

Subsection 106(3) of the Act provides that a methodology determination may subject the project proponent of an eligible offsets project to specified reporting, notification, record-keeping and monitoring requirements.

Under Parts 17 and 21 of the Act, a failure to comply with these requirements may constitute a breach of a civil penalty provision, and a financial penalty may be payable.

Reporting periods

The Act and subordinate legislation provide for flexible reporting periods generally between six months and two years in duration (with monthly reporting available if abatement in a reporting period meets or exceeds 2,000 tonnes of carbon dioxide equivalent).

Audit requirements

The Act provides for a risk-based approach to auditing emissions reductions. Subsections 13(1) and 76(4) of the Act provide for legislative rules to be made by the Minister, specifying the level of assurance, and the frequency and scope of the audit report that must be provided with offsets reports for different types of projects. These can be found in the *Carbon Credits (Carbon Farming Initiative) Rule 2015*.

Reporting, notification and record-keeping requirements

In addition to the requirements in the Determination, the Act and the *Carbon Credits (Carbon Farming Initiative) Rule 2015* specify other reporting, notification, record-keeping, and monitoring requirements that apply to all ERF projects.

## Division 1 Offsets report requirements

### 36 Operation of this Division

Under paragraph 106(3)(a) of the Act, a methodology determination may set out requirements to include specified information in each offsets report. Division 1 sets out information that would need to be included in an offsets report about a high efficiency fan installation project.

### 37 Information that must be included in an offsets report

Further to requirements under the Act and the *Carbon Credits (Carbon Farming Initiative) Rule 2015*, section 37 sets out specific additional information that would need to be included in each offsets report for a refrigeration and ventilation fan project for a reporting period.

Subsection 37(1) provides that each offsets report must identify each HE fan and each SM fan that was included in a calculation undertaken in accordance with Part 4 for the reporting period, in the form approved by the Regulator.

Subsection 37(2) further provides that each fan must be identified by the street address of the building where the fan is installed and whether the fan was included in the most recent previous offsets report, is an old installation that was excluded from the most recent previous report, or is a new installation that has not been included in a previous report, and the elected

classification as required in subsection 22(3). An old installation is a fan installed in a previous reporting period that has been included in a previous report.

Subsection 37(3) requires that, for each fan or motor that was installed as part of the project, the offsets report must indicate the brand, the manufacturer and the model number.

Under subsection 37(4), further information is required for a fan that was included in calculations for an earlier reporting period, but is not included in the reporting period covered by the offset report. This includes the reason for exclusion and whether the exclusion is temporary or permanent. This information allows for easy comparison of an offsets report with a previous or future report.

Subsection 37(5) further specifies that each fan must be identified by the location of the fan in the form and detail required by the Regulator, whether the fan is a refrigeration fan or a ventilation fan, and its motor input power. For all ventilation fans the report must specify whether the fan is a heating/cooling ventilation fan or a ducted or partition ventilation fan, the building type the fan services, and, for heating/cooling ventilation fans—the NCC climate zone of the building's location. For all installed SM fans, the report must specify whether a control system has been fitted to the motor of the fan; and for all installed HE fans the installation category and eligible fan type must be specified.

Subsection 37(6) specifies additional reporting requirements that apply if it is not possible to define or calculate a factor or parameter by reference to external sources as in force at the end of the reporting period. This information allows the Regulator to assess whether the use of another version of the external sources by the proponent in calculating the abatement is appropriate and justified.

## Division 2 Notification requirements

### 38 Operation of this Division

The effect of paragraph 106(3)(b) of the Act is that a methodology determination may set out notification requirements for an eligible offsets project. Division 2 sets out certain notification requirements.

### 39 Notification requirements

Section 39 requires the project proponent to notify the Regulator of any safety or product performance issues that have been identified with any project components installed or proposed to be installed in relation to the project. For any safety issue, the notification must occur as soon as practicable after the proponent becomes aware of the issue. For product performance issues, the notification must occur within 30 days after the proponent becomes aware of the issue if:

- a product recall notice has been issued in relation to the issue; or
- the sum of the motor input powers of all of the fans that are affected by the issue is more than 5 per cent of the sum of the motor input powers of all of the fans that are installed, modified or replaced as part of the project; or
- the issue affects more than 50 of the fans that are installed, modified or replaced as part of the project.

The requirement related to the motor input powers accounts for cases where a small number of large fans constitute a large proportion of total project abatement.

Section 39 applies to ***project components***, namely:

- a fan installed or proposed to be installed (whether as an installation or as a replacement) as part of the project;
- a component used or proposed to be used to modify a high efficiency fan installed or proposed to be installed as part of the project.

## Division 3 Record-keeping requirements

### 40 Operation of this Division

The effect of paragraph 106(3)(c) of the Act is that a methodology determination may set out record-keeping requirements for an eligible offsets project. Division 3 sets out certain record-keeping requirements.

### 41 Record-keeping requirements

Further to requirements under the Act and the legislative rules, section 41 of the Determination sets out specific record-keeping requirements additional to the requirements specified in the legislative and the regulations.

Subsection 41(1) provides that for each ventilation fan, proponents must keep records of the building type for the purposes of Schedule 2, and the location of the fan within or with respect to the building. Similarly, for each refrigeration fan the proponents must keep records of the type of the refrigeration system and the location of the fan within or with respect to the refrigeration system. Proponents are also required to keep records that demonstrate whether project activities for each fan involved installation of a new fan, or modification or replacement of an existing fan, and the motor input power and nominal motor power of each fan or motor as applicable.

Subsection 41(2) requires the proponent to keep records on each fan type replaced by an installed HE fan, and sufficient records of the ducting arrangements of each installed HE fan to establish the installation category. Proponents must also keep records that demonstrate that the model of each installed HE fan has been tested in accordance with section 16 (including records of certification where applicable); and records of any relevant publications used to determine the controller efficiency ($\eta_{C,i}$) in sections 28 and section 4 of Schedule 1.

Subsection 41(3) sets out a number of additional records that must be recorded for all fans modified or replaced as part of a small motor fan upgrade. These include evidence that the fan after modification or replacement is driven by an electronically commutated motor, the supplier's product specification for any control system fitted, and evidence that the fan that was replaced was driven by a shaded pole or permanent split capacitor motor. In addition, for proponents must keep a record of the disposal of fans or fan assembly components removed as part of small motor fan upgrade activities, including evidence that the disposal was conducted in accordance with section 18 and any other legislative requirements.

## Part 6 Dividing a high efficiency fan installation project

42 Division of project for reporting purposes

Section 42 provides that for the purpose of submitting an offsets report to the Regulator pursuant to subsection 77A(2) of the Act, a project may be divided into parts only if:

- each part would qualify as a high efficiency fan installation project; and
- each part has achieved an abatement of at least 2,000 tonnes CO2-e.

This is to allow flexibility for managing projects and reporting arrangements while minimising excessive administrative burdens.

All fans that are installed, modified or replaced as part of the project, and that are in the same building or in buildings with the same physical address, must be included in a single part of a project divided for the purposes of this section.

## Schedule 1—High efficiency fans installations—operating efficiency and high efficiency threshold

### Division 1 Purpose of Schedule

1 Purpose of Schedule

Schedule 1 sets out how to determine the operating efficiency and the high efficiency threshold for a fan, for the purposes of subparagraphs 8(2)(a)(iii) and (b)(iii) of this Determination.

### Division 2—calculating operating efficiency of fan, $\eta_{Operating,i}$

2 Equation 12—determining operating efficiency of fan, $\eta_{Operating,i}$

***Equation 12*** sets out how to calculate the operating efficiency of a fan ($\eta_{Operating,i}$), which represents the portion of electrical input power that is converted into air movement, adjusted for the effect of a variable speed drive or other control system if installed as part of the project. It is worked out by multiplying the overall efficiency of the fan ($\eta_{Overall,i}$) at its optimal efficiency point by its part load compensation factor ($C_{C,i}$).

The fan's overall efficiency ($\eta_{Overall,i}$) is either the value calculated using equation 13 if the model of the fan has been tested with the same variable speed drive, motor and transmission as the fan, or the value calculated using equation 14.

The part load compensation factor ($C_{C,i}$) from ISO 12759 is used to adjust for the efficiency improvement that results from installing a variable speed drive or other control system. This adjustment varies with motor input power according to equations 16 or 17 for different control systems. Multi-speed controls or switching controls installed as part of the project are given half the additional credits that a variable speed drive would provide, in recognition that they only provide discrete adjustments rather than continuous control.

3 Equations 13 and 14—Calculation of overall driven fan efficiency $\eta_{,i}$

***Equation 13*** sets out how to calculate the overall driven efficiency of a fan ($\eta_{,i}$), where fan air power and the electrical input power have been tested using the same drive, motor, and transmission as the installed fan. It is worked out as the ratio of the appropriate measure of fan air power for the installation type ($P_{U,i}$) and the electrical input power of the high efficiency fan ($P_{E,i}$). The fan air power measure ($P_{U,i}$) is either the fan total air power for installation types B or D, or the fan static air power for installation types A or C.

***Equation 14*** adjusts the overall driven efficiency of a fan ($\eta_{,i}$) by a component mismatch factor of 0.9, derived from ISO 12759, to account for the loss of efficiency in the higher efficiency fan due to mismatch of components if the fan components are tested separately.

4 Equation 15—calculation of motor input power, $P_{E,i}$

***Equation 15*** sets out how to calculate the motor input power of a fan used in equations 13 and 14, where test results using the same drive, motor and transmission as the high efficiency fan are not available. The motor input power of a high efficiency fan is the power input

provided to the fan motor at optimum efficiency. This is worked out by dividing the fan's mechanical power ($P_{M,i}$) by the product of three efficiencies:

- the transmission efficiency ($\eta_{T,i}$) specified in Schedule 3 that applies to the fan;
- the rated efficiency of the fan's motor ($\eta_{M,i}$); and
- the efficiency of the fan's controller ($\eta_{C,i}$).

All the parameters in Equation 15 are as defined in AS/NZS ISO 12759. The fan's mechanical power ($P_{M,i}$) and the rated efficiency of the fan's motor ($\eta_{M,i}$) must be determined from tests in accordance with section 16 of this Determination. Controller efficiency may be ascertained using deemed values, or in accordance with data that the manufacturer or supplier has publicly released in Australia relating to the electrical drive efficiency of the controller—corresponding to the point at which the impeller is operating at optimum efficiency.

In equation 15, the mechanical power ($P_{M,i}$) is either the shaft power for fans that have a shaft, or the impeller power for fans that do not have a shaft. Both these terms are derived from AS/NZS ISO 12759.

5 Equation 16 and 17—calculating part load compensation factor for controller of fan, $C_{C,i}$

***Equation 16*** sets out how to calculate the part load compensation factor for a high efficiency fan based on the motor input power of the fan. This value is used to determine the operating efficiency in equation 12. The equation is based on a regression relationship from AS/NZS ISO 12759.

In ***equation 17***, an adjustment is made to credit the installation of multi-speed controls or switching controls as part of the project. These control systems are given half the additional credits that a variable speed drive would provide, in recognition that they only provide discrete adjustments rather than continuous control.

**Division 3—Calculating high efficiency threshold for the fan**

6 Equation 18—determining the high efficiency threshold for the fan

***Equation 18*** sets out how to calculate the high efficiency threshold for a fan based on the motor input power of the fan. For a fan to be eligible (i.e. a high efficiency fan), the installed fan's operating efficiency (calculated in equation 18) must be greater than this calculated high efficiency threshold. The equation is based on a regression relationship that adjusts the high efficiency grade ($N_{HE,i}$) to determine an appropriate high efficiency threshold for a fan of the appropriate type, installation type and motor input power. Division by 100 changes the efficiency proportion to a percentage.

The regression parameters underlying equation 18 are taken from AS/NZS ISO 12759, while Section 15 describes how the high efficiency grade has been established for each installation type.

**Schedule 2— Building types and capacity factors**

For ducted or partition ventilation fans, Schedule 2 contains deemed capacity factors based on annual operating hours for different building types. Building types are determined with reference to the versions of the BCA building classifications and the ANZSIC classifications that apply at the end of each reporting period.

The annual operating hours of ducted or partition ventilation fans are aligned, wherever possible, with the values included in the *Carbon Credits (Carbon Farming Initiative—Commercial and Public Lighting) Methodology Determination 2015*.

For heating/cooling ventilation fans, Schedule 2 contains deemed capacity factors based on the number of annual heating or cooling hours that fall during the opening hours of the building type and the applicable National Construction Code (NCC) climate zone. For simplicity, to develop the schedule each NCC climate zone was characterised using weather data collected from the major city or cities contained within it. The version of the NCC climate zone maps that should be used is the version that applies at the end of each reporting period.

NCC climate zone maps and the BCA are published on the Australian Building Codes Board website, www.abcb.gov.au.

The cooling capacity factor is for fans that exclusively serve space cooling applications, such as air conditioners that are not reverse cycle, and that only run when the cooling system is operating. Similarly, the heating capacity factor is used for fans that exclusively serve heating systems, such as fans for electric resistance heaters or boilers, and that only run when the heating system is operating.

Heating and cooling capacity factors apply to fans that provide both space heating and space cooling, such as reverse cycle air conditioning systems, and that only run when heating or cooling systems are operating. Proponents must select the appropriate capacity factor for the application.

Cooling or heating requirements were determined using half hourly data, with cooling assumed necessary when the wet bulb temperature is above 15°C, and heating requirement when the dry bulb temperature is below 18°C. The “cooling or heating” value is the sum of the times heating or cooling are required, without double-counting of times at which the algorithm determines that both heating and cooling are required.

**Schedule 3—High efficiency fan installations—transmission efficiency**

Schedule 3 contains transmission efficiency levels for different types of transmissions. Values are taken from section B.3 of AS/NZS ISO 12759:2013. The terminology of high efficiency and low efficiency transmission types are taken from European Union regulations, as they are better defined than the relevant categories in AS/NZS ISO 12759:2013 (i.e. V-belt, flat belt and split).

European Union (EU) fan regulations are set out in Commission Regulation (EU) No. 327/2011 of 30 March 2011.

**Schedule 4—High efficiency fan installations—regression coefficients and regression constants**

Schedule 4 sets out the regression coefficients and constants to be used in the calculations for eligible fans based on fan type and motor input power. The regression coefficients and constants are taken from AS/NZS ISO 12759:2013 and estimate the efficiency increase with motor input power for each fan type.

**Schedule 5—High efficiency fan installations—static and total efficiency benchmarks**

Schedule 5 sets out the market average efficiency and high efficiency grades to be used in the calculations for eligible fans based on the applicable fan type and installation category. The basis for these values is explained in section 16 of this Explanatory Statement.

**Schedule 6—Small motor fan upgrades—regression coefficients and regression constants**

Schedule 6 sets out the regression coefficients and constants to be used in the calculations for each small motor fan upgrade based on motor input power. These factors are based on a regression equation developed using published efficiency and power data for a large sample of fan motors.

**Schedule 7—Small motor fan upgrades—control parameters**

Schedule 7 sets out the control system parameters to be used in the calculations for small motor fan upgrades. These are based on estimates of potential savings for variable speed drives in the *Energy Management and Conservation Handbook* (published by Taylor and Francis, 2007).

Attachment B

## Statement of Compatibility with Human Rights

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

***Carbon Credits (Carbon Farming Initiative— Refrigeration and Ventilation Fans) Methodology Determination 2015***

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

**Overview of the Legislative Instrument**

The *Carbon Credits (Carbon Farming Initiative—Refrigeration and Ventilation Fans) Methodology Determination 2015* (the Determination) sets out the detailed rules for implementing offsets projects that avoid greenhouse gas emissions by reducing energy consumption associated with fans. The Determination applies to fan installations and upgrades undertaken in refrigeration systems such as refrigerated display cabinets and cold storage warehouses, as well as fans ventilating commercial and industrial buildings.

Project proponents wishing to implement the Determination must make an application to the Clean Energy Regulator (the Regulator) and meet the eligibility requirements set out under the Determination. Offsets projects that are approved by the Regulator can generate Australian Carbon Credit Units, representing emissions reductions from the project. Project proponents can receive funding from the Emissions Reduction Fund by submitting their projects into a competitive auction run by the Regulator. The Government will enter into contracts with successful proponents, which will guarantee the price and payment for the future delivery of emissions reductions.

**Human rights implications**

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

**Conclusion**

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

**Greg Hunt, Minister for the Environment**