Measurement and Verification in the Victorian Energy Efficiency Target scheme

Methods and Variables

19 June 2017

Disclaimer

This publication may be of assistance to you but the State of Victoria and its employees do not guarantee that the publication is without flaw of any kind or is wholly appropriate for your particular purposes and therefore disclaims all liability for any error, loss or other consequence which may arise from you relying on any information in this publication.

Accessibility

If you would like to receive this publication in an alternative format, please telephone the DELWP Customer Service Centre on 136186,
email energysaver.incentive@delwp.vic.gov.au or via the National Relay Service on 133 677 www.relayservice.com.au. This document is also available on the internet at www.delwp.vic.gov.au/energy/legislation/energy-saver-incentive/scheme-documents

Contents

Introduction

The Measurement and Verification method provides methods and variables for project-based activities in the Victorian Energy Efficiency Target (VEET) scheme.

Purpose

This document sets out the methods and variables for calculating the carbon dioxide equivalent (in tonnes) of greenhouse gases to be reduced by carrying out a prescribed activity using the Measurement and Verification method.

Legislation and responsibilities

The VEET scheme is enabled by the Victorian Energy Efficiency Target Act 2007, the Victorian Energy Efficiency Target Regulations 2008, the Victorian Energy Efficiency Target (Project-Based Activities) Regulations 2017 (the PBA Regulations) and the Victorian Energy Efficiency Target Guidelines (the Guidelines).

The Department of Environment, Land, Water and Planning (the department) supports the Minister in overseeing the VEET scheme legislation. This includes the prescribed activities.

This document sets out the rules for defining the methods and variables to be used when carrying out a prescribed activity using the Measurement and Verification method for the purpose set out in the PBA Regulations.

The Essential Services Commission (ESC) is the administrator of the VEET scheme and is responsible for the Guidelines. Participants must also comply with the ESC's requirements, which are published on their website at http://veet.vic.gov.au.

This document should be read in conjunction with the Act, Regulations and material published by the ESC.

Using this document

This document is divided into three sections: **Information to be provided**, **Methods** and **Variables**.

Information to be provided lists the three methods that can be followed and defines the outputs that must be provided in a project impact report.

Methods sets out the calculations that must be undertaken in determining the abatement.

Variables sets out the terms by which projects are defined within energy models, the values for certain variables and the limits to the validity of energy models.

Information to be provided

Information to be provided in an application for approval of a project plan

(1) The application for approval of a project plan must identify one of the following methods intended to be used to calculate the reduction in greenhouse gases:

  (a) a forward projection of savings using a baseline energy model and operating energy model;

  (b) annual reporting of savings using a baseline energy model and measured energy consumption; or

  (c) a combination of (a) and (b) comprising a forward projection followed by annual reporting of savings ('top-up').

Information to be provided in an application for approval of a project impact report

(2) The application for approval of a project impact report must include the following:

  (a) details of the measurement boundary;

  (b) site constants and their standard values;

  (c) a calculation of the carbon dioxide equivalent to be reduced using Equation 1;

  (d) emissions factors used in abatement calculations;

  (e) details of any counted savings;

  (f) the baseline energy model in equation form;

  (g) the accuracy factor;

  (h) for projects using the forward creation method:

   (i) the operating energy model in equation form;

   (ii) a normal year for each independent variable, if relevant;

   (iii) interactive energy savings for the normal year;

   (iv) the decay factor for each year of the forward creation period;

   (v) a calculation of energy savings using Equation 2;

   (vi) a calculation of normal year savings using Equation 4;

  (i) for project using the annual creation or top up method:

   (i) measured energy consumption data for the reporting period;

   (ii) measured values for the reporting period for each independent variable, if relevant;

   (iii) interactive energy savings for the reporting period;

   (iv) previous energy savings calculated using Equation 3 for any previous reporting periods, including any negative energy savings;

   (v) a calculation of energy savings using Equation 3;

   (vi) a calculation of measured annual savings using Equation 5;

  (j) evidence that energy models comply with the statistical requirements;

  (k) evidence that time intervals used to calculate energy savings are eligible time intervals;

  (l) written justification of the steps and decisions taken in completing the calculations.

Methods

Calculation of carbon dioxide equivalents of greenhouse gases

(3) The carbon dioxide equivalent (in tonnes) of greenhouse gases to be reduced by undertaking a project is calculated using Equation 1, where variables are determined in accordance with sections (7) to (19).

Equation 1 – Carbon dioxide equivalent to be reduced

$$carbon\ dioxide\ equivalent =$$
$$electricity\ savings\ x\ electricity\ emissions\ factor\ x\ RF$$
$$+\ gas\ savings\ x\ gas\ emissions\ factor$$
$$+\ renewable\ energy\ savings\ x\ renewable\ emissions\ factor$$
$$-\ counted\ savings$$

where:

(a) *electricity savings* is calculated in MWh using Equation 2 or 3, taking references to "energy" in Equations 2 to 5 of this Division to mean "electricity".

(b) *RF* is the regional factor, which is 0.98 if the project is undertaken in metropolitan Victoria or 1.04 if the project is undertaken in regional Victoria, as defined in Schedule 27 of the VEET Regulations 2008.

(c) *gas savings* is calculated in GJ using Equation 2 or 3, taking references to "energy" in Equations 2 to 5 of this Division to mean "gas".

(d) *renewable energy savings* is calculated using Equation 2 or 3, taking references to "energy" in Equations 2 to 5 of this Division to mean "renewable energy".

(e) *counted savings* is a variable determined in accordance with section (11).

(f) *emissions factors* are provided in section (9).

Equation 2 – Energy savings using forward creation method

$$energy\ savings = \sum_i (normal\ year\ savings \times AF \times DF_i)$$

where:

(a) i is a year of the maximum time period for forward creation for the project.

(b) *normal year savings* is calculated using Equation 4.

(c) AF is the accuracy factor.

(d) DF_i is the decay factor for year i.

Equation 3 – Energy savings using annual creation or top up method

$$energy\ savings =$$

$$measured\ annual\ energy\ savings \times AF \pm previous\ energy\ savings$$

where:

(a) *measured annual energy savings* is calculated using Equation 5.

(b) *AF* is the accuracy factor determined using Table 1, where the "relative precision" means the relative precision of the measured savings at 90% confidence level.

(c) *previous energy savings* is the total amount of energy savings calculated using this equation for the previous reporting period (if any), including negative energy savings (if any).

Equation 4 – Normal year energy savings

$$normal\ year\ savings = \sum_t (E_{BM,t} - E_{OM,t}) + E_{int}$$

where:

(a) t is an eligible time interval in the normal year.

(b) $E_{BM,t}$ is the energy consumption for t from the baseline model.

(c) $E_{OM,t}$ is the energy consumption for t from the operating model.

(d) E_{int} is the total interactive energy savings for the project in the normal year.

Equation 5 – Measured annual energy savings

$$measured\ annual\ energy\ savings = \sum_t (E_{BM,t} - E_{meas,t}) + E_{int}$$

where:

(a) t is an eligible time interval in the reporting period.

(b) $E_{BM,t}$ is the energy consumption for t from the baseline model.

(c) $E_{meas,t}$ is the measured energy consumption for t.

(d) E_{int} is the total interactive energy savings for the project in the reporting period.

Conditions and circumstances under which a certificate cannot be created

(4) A certificate cannot be created using Equation 2 for a prescribed activity if:

(a) creating the certificate would result in more than 50,000 certificates being created for the prescribed activity; or

(b) certificates have previously been created for the prescribed activity using Equation 3; or

(c) certificates have previously been created for the prescribed activity using Equation 2 three times.

Time at which prescribed activity is undertaken and reduction in greenhouse gas emissions occurs

(5) The project is taken to have been undertaken at the end of:

    a. for the purposes of creating certificates using a reduction in greenhouse gases calculated using Equation 2—the operating period; or

    b. for the purposes of creating certificates using a reduction in greenhouse gases calculated using Equation 3—the reporting period.

(6) The reduction in greenhouse gas emissions that results from a project is taken to have occurred 6 months after the end of:

    a. for the purposes of creating certificates using a reduction in greenhouse gases calculated using Equation 2—the operating period; or

    b. for the purposes of creating certificates using a reduction in greenhouse gases calculated using Equation 3—the reporting period.

Variables

Terms

(7) Measurement boundary

   (a) The measurement boundary of a project must include:

      (i)   all energy consuming products installed or removed in implementing the project; and

      (ii) all energy consuming products for which energy consumption is affected by the project, unless (b) applies; and

      (iii) all energy generating products installed or removed in implementing the project; and

      (iv) every product that is co-metered with energy consuming products referred to in (i), (ii) or (iii).

Note: energy generating products may not export energy outside of the measurement boundary.

   (b) An energy consuming product or a component of an energy consuming product may be excluded from the measurement boundary if:

      (i)   it is impractical or disproportionately costly to measure changes in the energy consumed by the product that result from implementation of the project and the change in the energy consumed is minor or trivial; or

      (ii) changes in the energy consumed by the product is accounted for in the interactive energy savings.

(8) Site constants

   (a) Each project must have one or more site constants.

   (b) A site constant is a parameter of the premises where the project is undertaken that affects the energy consumed within the measurement boundary but does not vary under normal operating conditions.

   (c) For each site constant a standard value must be defined, which is the value the site constant is expected to have under normal operating conditions.

(9) Emissions factors

   (a) For the purposes of Equation 1, the emissions factor:

      (i)   for electricity is 1.095;

      (ii) for natural gas is 0.05523;

      (iii) for liquefied petroleum gas is 0.0642;

      (iv) for solar, wind, hydroelectric, geothermal and ocean energy is zero;

      (v)   for any other renewable energy is the relevant emissions factor for the renewable energy listed in Section 2.1 of the National Greenhouse Accounts Factors published by the Commonwealth Department of the Environment in August 2016.

(10) Reporting period

    (a) The reporting period, in relation to a project, is a 12 month period commencing:

        (i) Immediately after the implementation start time for the project; or

        (ii) immediately after another reporting period but not later than 9 years after the implementation start time.

           Note: this means there can be a maximum of 10 reporting periods.

(11) Counted savings

    (a) Counted savings are the reduction of carbon dioxide equivalent (in tonnes) of greenhouse gases represented by certificates created in respect of activities undertaken within the measurement boundary after the end of the baseline period.

    (b) An adjustment may be made to counted savings in respect of activities prescribed by the Victorian Energy Efficiency Target Regulations 2008 if:

        (i) for projects using the forward creation method, where the adjustment corrects for the proportion of eligible time intervals in the normal year; or

        (ii) the adjustment corrects for the number of years that the savings coincide with the remaining eligible annual reporting periods; or

        (iii) the adjustment is required for compliance with Regulation 14(2) of the Victorian Energy Efficiency Target (Project-Based Activities) Regulations 2017.

(12) Baseline energy model and operating energy model

    (a) A baseline energy model or operating energy model is a model established by:

        (i) regression analysis that:

        – is based on the values of the measured energy consumption and independent variables during the baseline period (for a baseline energy model) or operating period (for an operating energy model) where site constants are at their normal values; and

        – is based on at least 80% of the total number of time intervals in the baseline period (for a baseline energy model) or the operating period (for an operating energy model); and

        – has at least six times as many independent observations of the independent variables as the number of independent variables in the energy model; or

        (ii) An estimate of the mean that:

        – is based on the values of the measured energy consumption during the baseline period (for a baseline energy model) or operating period (for an operating energy model), where site constants are at their normal values and where the coefficient of variation of the measured energy consumption over the period is less than 15%; and

        – is based on at least 80% of the total number of time intervals in the baseline period (for a baseline energy model) or the operating period (for an operating energy model).

    (b) The baseline period referred to in (a):

        (i) must not end more than 24 months before the day work for the purposes of the project has commenced at the premises; and

        (ii) must end before the day and time that work for the purposes of the project has commenced at the premises, unless (c) applies.

(c) The baseline period may end after the day that work for the purposes of the project has commenced at the premises if the effects of the project can be temporarily suspended so that conditions prior to the project being undertaken can be measured.

(d) The operating period referred to in (a) must not start before the implementation start time and must end no later than two years after the implementation start time.

(13) Accuracy factor

(a) The accuracy factor is determined using Table 1, where the "relative precision" means the relative precision of the normal year savings at 90% confidence level.

(14) Maximum time period for forward creation

(a) The maximum time period for forward creation in relation to a project is 10 years, commencing immediately after the implementation start time of the project.

(15) Normal year

(a) A normal year is a set of values for a 12 month period for each independent variable used in the baseline energy model and the operating energy model.

(b) A value in a normal year must be provided for each time interval.

(c) A normal year must reasonably represent the expected mean, range and variation of the independent variables used in the baseline energy model and operating energy model in an average year of the maximum time period for forward creation.

(16) Interactive energy savings

(a) Interactive energy savings are energy savings attributable to the project that are outside the measurement boundary.

(b) The total interactive energy savings are limited to a maximum of:

(i) in a normal year, 10% of the difference between the energy consumption calculated using the baseline energy model and the energy consumption calculated using the operating energy model for eligible time intervals in the normal year, for all energy sources.

(ii) in a reporting period, 10% of the difference between the energy consumption calculated using the baseline energy model and the measured energy consumption for eligible time intervals in the reporting period, for all energy sources.

(c) Interactive energy savings must be estimated in accordance with a repeatable method that:

(i) uses data recorded for the premises where the project is undertaken; or

(ii) is consistent with generally accepted estimation approaches in the science and engineering field applicable to the kind of effects being estimated.

(d) The same method must be used to estimate interactive energy savings in all calculations for the project.

(17) Decay factor

    (a) The decay factor for a year is determined using Table 2 or by applying a persistence model.

    (b) A persistence model must meet the following requirements:

        (i)   it provides a reasonable estimate of the expected lifetime of an energy consuming product in whole years; and

        (ii) it provides a decay factor representing the decline in performance of the product each year by taking into account:

           –   the type of the energy consuming product; and

           –   how the energy consuming product is used; and

           –   the environmental characteristics of the premises where the energy consuming product is used; and

        (iii) the model provides the most conservative set of yearly decay factors when applied to more than one energy consuming product.

(18) Measured energy consumption

    (a) The measured energy consumption is the energy consumed by all products within the measurement boundary.

    (b) If the project includes undertaking multiple similar activities at the same premises, the measured energy consumption can be determined from measurements taken for a sample of the activities if:

        (i)   the measured energy consumption of each activity can be reasonably described by the same energy model; and

        (ii) the sampling methods used produce a random sample; and

        (iii) the calculation of the relative precision used to determine the accuracy factor includes quantification of the impact of the sampling.

(19) Time intervals

    (a) The accredited person must nominate a measurement frequency.

    (b) The length of a time interval is determined by the measurement frequency.

    (c) The first time interval in a period must start at the start of the period, and each subsequent time interval in the period must start immediately after the previous time interval ends.

    (d) The length of a time interval used to calculate electricity, gas or renewable energy savings may differ; however, time intervals used to calculate savings of the same energy source must be of the same length.

    (e) A time interval in a period is an eligible time interval if, with respect to that time interval:

        (i)   if the period is a reporting period, values for the measured energy consumption have been obtained; and

        (ii) values for all independent variables have been obtained; and

        (iii) if the period is a reporting period, all site constants are at their standard values; and

        (iv) the value of each independent variable is an amount that is:

           –   no less than the minimum value of the effective range minus 5% of the difference between the maximum and minimum values of the effective range; and

    – no more than the maximum value of the effective range plus 5% of the difference between the maximum and minimum values of the effective range.

(f) The effective range referred to in (e) is:

    (i) if the time interval is in the reporting period—the range of values of the variable used to develop the baseline energy model; or

    (ii) if the time interval is in the normal year—the range of values that are in both:

        – the range of values of the variable used to develop the baseline energy model; and

        – the range of values of the variable used to develop the operating energy model.

Table 1 – Accuracy factor

Relative precision	Accuracy factor if an energy model for the project is developed using an estimate of the mean	Accuracy factor if all energy models for the project are developed using regression analysis
< 25%	0.9	1
25% to < 50%	0.8	0.9
50% to < 75%	0.7	0.8
75% to < 100%	0.5	0.6
100% to < 150%	0.3	0.4
150% to < 200%	0.1	0.2
>=200%	0	0

Table 2 – Decay factor

Year (i)	Decay factor
1	1.00
2	0.80
3	0.64
4	0.51
5	0.41
6	0.33
7	0.26
8	0.21
9	0.17
10	0.13

delwp.vic.gov.au