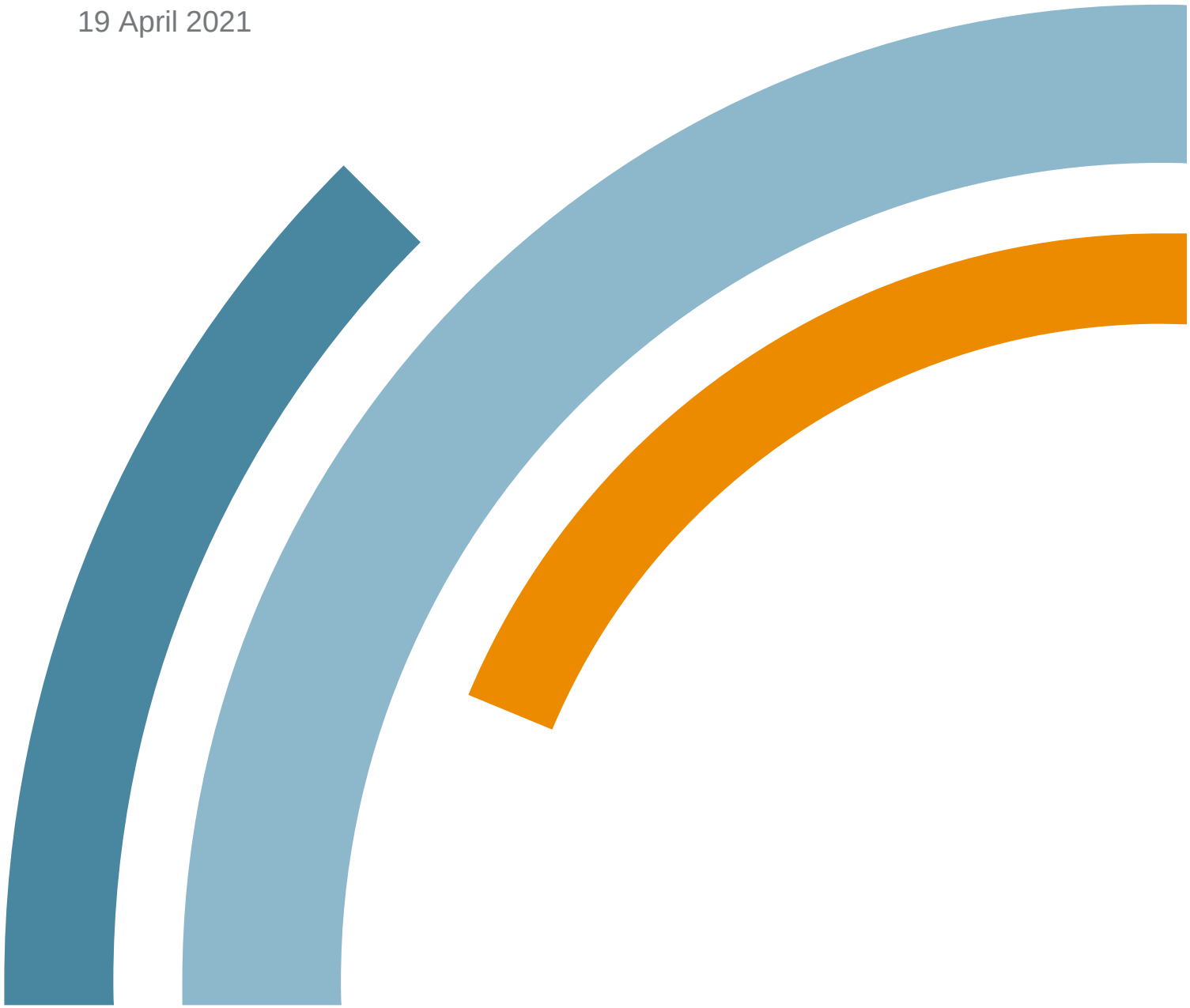
ESSENTIAL SERVICES COMMISSION

Victorian Energy Upgrades

Measurement and Verification Method Activity Guide

Project-Based Activities

19 April 2021



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1. Introduction

The Victorian Energy Upgrades program is a Victorian Government initiative which commenced on 1 January 2009. The program was established under the Victorian Energy Efficiency Target Act 2007 (the VEET Act) and is administered by the Essential Services Commission in accordance with the Victorian Energy Efficiency Target Regulations 2018 (the principal VEET Regulations) and the Victorian Energy Efficiency Target (Project-Based Activities) Regulations 2017 (the PBA Regulations).

The VEU program is designed to make energy efficiency improvements more affordable, contribute to the reduction of greenhouse gases, and encourage investment, employment and innovation in industries that supply energy efficiency goods and services.

Under the program, accredited businesses can offer discounts and special offers on selected energy saving products, appliances and other energy efficiency improvements in homes, businesses or other non-residential premises. The greater the greenhouse gas reduction, the greater the potential saving.

There are many abatement methods or 'prescribed activities' in the VEU program. Undertaking project-based activities (PBA) using measurement and verification (M&V) is an eligible prescribed activity under the PBA Regulations.

1.1. Purpose of this document

The purpose of this document is to help you understand the PBA M&V method and provide important information about your obligations when undertaking PBA M&V projects.

This document explains how to participate in the PBA M&V method under the VEU program. This method is more administratively and technically complex than some other activities available under the program. You will need to spend time reviewing the method's processes and requirements to understand how it works, even if you have years of experience in the energy efficiency industry.

For instructions on compliance requirements, including a detailed description of all the documents required for each step of the PBA M&V process, please refer to **Measurement and Verification Method Compliance Requirements** available at www.esc.vic.gov.au/m-and-v

1.2. How this document is structured

This activity guide begins by explaining key concepts and issues – see Section 3 of this document. You will need to understand this section before reading the other sections of this document.

Sections 3 to 6 of this document explain the process for participating in the M&V method. Section 4 introduces the technical M&V concepts used in the PBA M&V method. Section 5 details the end-to-end process, starting with becoming accredited and finishing with the registration of Victorian energy efficiency certificates (VEECs). It is one example of how you might engage with the program. Every business is different, and the specifics of your arrangements may differ, but Section 5 should provide an easy way to find the information you need quickly. Section 6 provides additional information which may also be useful when carrying out a PBA M&V project, including what to do when something about the project changes.

1.3. Legal context for this document

The commission has prepared this activity guide to assist with the interpretation of relevant parts of the following legislation:

- Victorian Energy Efficiency Target Act 2007
- Victorian Energy Efficiency Target Regulations 2018
- Victorian Energy Efficiency Target (Project-Based Activities) Regulations 2017
- Measurement and Verification in Victorian Energy Upgrades – Specifications
- Victorian Energy Efficiency Target Guidelines

The above documents can be accessed at www.esc.vic.gov.au/veu-legislation

This document should not be relied upon as substitute for legal advice and should be read in conjunction with the above source documents. In the event of inconsistency between this activity guide and the above source documents, the content in the source documents takes precedence in the order shown.

2. Before you begin

This is not the only document you will need to understand how to participate in this activity. The following documents referred to in this document will be important throughout your involvement in the VEU program in addition to the regulatory documents listed in the previous section. You should access these documents and keep them handy, especially if you are new to the VEU program. These are available at www.esc.vic.gov.au/veu

- Measurement and Verification Method Compliance Requirements
- Application Guide for Accredited Persons
- Lighting Product Application Guide
- Guide for Approved Measurement and Verification Professionals

Understand your compliance obligations

Participating in VEU can be challenging, especially at the start. Make sure you understand how the program works before engaging in any projects, including all relevant program guidance documentation and the end-to-end process described in Section 5 of this document.

3. Key concepts and issues

There are a range of concepts and terminologies specific to undertaking M&V projects in the VEU program.

While some key concepts are used in deemed activities under the VEU program, many of the concepts in this document are specific to undertaking PBA M&V projects.

To participate in the program you should familiarise yourself with all the key concepts and issues, even if you're an experienced energy efficiency practitioner. The use of these concepts to design, carry out, measure and verify M&V projects are described in greater detail in Section 4, and the process used to carry out a project is described in Section 5.

If you are unsure about any of these concepts, in the first instance please refer to the resources listed in Section 2 of this document and the International Performance Measurement and Verification Protocol – Concepts and Options for Determining Energy and Water Savings Volume 1 2012 (IPMVP). If you have further questions, please contact VEU support on (03) 9032 1310 or veu@esc.vic.gov.au

3.1. Project-based activities

The PBA Regulations provide for project-based activities in the VEU program.

Prior to the introduction of PBA, prescribed activities under the VEU program used deeming methods only. Deeming estimates an activity's abatement of electricity or gas based on average values for all activities across Victoria. PBA currently uses one of two methods for quantifying abatement, either measurement and verification (M&V) or benchmark rating. Both methods rely on site specific measurements to determine a project's baseline and post-activity energy consumption.

The M&V method is based on the International Performance Measurement and Verification Protocol, which is used to measure and model on site energy consumption.

M&V projects are technology neutral: they potentially allow multiple technologies, techniques, upgrades and abatement methods to be combined in one project. This is not possible under deemed activities in the VEU program.

The reliance on actual measurements or site-specific modelling allows abatement to be project specific, even if the upgrade happens over different parts of a single site. Multiple similar sites undergoing the same upgrades may be considered a single project.

3.2. Relationship with other prescribed activities

There are many types of prescribed activities which can generate VEECs in the VEU program.

A PBA M&V project is a stand-alone prescribed activity. You (as the AP) do not have to refer to existing activities, except for lighting upgrades. All lighting upgrades under the VEU program require any lighting equipment installed to be on the Register of Products (www.veu-registry.vic.gov.au/register-products), and the old lighting equipment and control gear must be de-commissioned in accordance with the principal VEET Regulations and as detailed in Section 6.3 of this document.

3.3. Ineligible activities

The following activities are ineligible to create VEECs under project-based activities:

- activities that must be undertaken to meet mandatory statutory or regulatory requirements
- activities that have negative effects on production or service levels (including safety levels)
- activities that also create Renewable Energy Certificates (RECs) under the Commonwealth Renewable Energy Target (RET) for the same abatement, except for some hot water systems that can create small-scale technology certificates (STCs) under the Small-scale Renewable Energy Scheme in addition to Victorian energy efficiency certificates (VEECs)
- activities that also claim benefits for the same abatement under the scheme established under the Commonwealth's Carbon Credits (Carbon Farming Initiative) Act 2011 for the issue of Australian Carbon Credit Units (ACCUs) in relation to eligible offset projects
- activities that will cause a net increase in greenhouse gas emissions.

3.4. Eligible activities

There are six eligibility tests a project must satisfy to take part under project-based activities. They are:

- Who is the project owner?
- What type of energy is saved?
- Is the premises eligible?
- Is the activity eligible?
- Is the activity additional and does it result in genuine abatement?
- Do you have the appropriate accreditations and approvals at the time of the project?

The eligibility conditions of each test are described in subsequent sections.

3.4.1. Project ownership

Project ownership focuses on who is responsible for the project, and the entity entitled to the certificates. To establish project ownership, you as the accredited person (AP) need to substantiate your right to undertake the project and identify affected stakeholders. Elements of project ownership are:

- owner
- energy consumer.

Owner

You must establish site ownership. This site-owning entity may be an individual or organisation which may or may not be you (the AP).

Energy consumer

The energy consumer may be the site owner, or they may be a tenant, an operator, or some other entity. You as the AP may also be the energy consumer in respect to a project site.

Section 16(1) of the VEET Act states that the right to create certificates is held by the entity who consumes the electricity or gas. You must therefore establish the entity who consumes the electricity or gas and obtain permission from them to undertake the project.

You are also required to provide evidence of the energy consumer's knowledge and interest in the project activities progressing. Where you are not also the energy consumer, you must provide a **Registration of Interest Form** signed by the site energy consumer. This document provides assurance to us that the energy consumer is aware of the project and is interested in you submitting an application but does not give you the right to create certificates with respect to the abatement, however. Assignment of rights occurs following completion of the project using a **VEEC Assignment Form for Project-Based Activities**.

If you have multiple projects with the same client, you only need the client to sign a single Registration of Interest Form where the following criteria are met:

- the projects are going to be undertaken or submitted to the commission within the same twelve month period
- each relevant project site address is listed on the form.

Each scoping plan application you make to the commission should include a copy of this form.

If you have a project with multiple clients, then each client (where they are individual energy consumers with a separate NMI) will need to sign a separate Registration of Interest Form. These show that all clients involved are aware of and are interested in the project activities progressing. Each client will also need to sign separate VEEC Assignment Forms which must be included when you are submitting the first impact report for the project.

In the event the energy consumer is not the site or equipment owner, such as in a tenancy situation, we may require proof that both parties are aware of and agree to the project. This may involve the energy consumer countersigning the Registration of Interest Form and VEEC Assignment Form.

Note that obtaining permission to undertake the project may also include obtaining licences or planning and development approvals from local, state and/or federal regulatory bodies where applicable.

Once these requirements are met, you (the AP) are then the project owner for the purposes of the VEU program.

3.4.2. Energy sources affected

The energy sources affected are those within the project boundary. These will generally be fixed electricity and mains gas utilities. Where other energy types are affected, or where the project involves fuel switching, you must provide details of each energy source, including:

- the type of renewable energy source
- average energy content of the new fuel
- difference in emissions factors between the original and new fuel.

A project can generate certificates if the modelled energy source is electricity, gas, or a form of renewable energy which has a non-zero emissions factor. Please refer to Section 4.11 for more details on using renewable energy in PBA M&V projects. For clarity, projects that save coal, oil, and petroleum based products are not eligible.

3.4.3. Eligible premises

To be an eligible premises, a site must fulfil three essential criteria:

- it must be in Victoria
- it must either be a business or non-residential premises, unless it meets eligibility criteria for residential premises[1]
- it must **not** be a new building, unless the commission is satisfied that
  - a baseline energy model has been established using measurements taken prior to the upgrade on the completed building, which has been built to at least meet energy efficiency or greenhouse gas emissions requirements in any minimum standard or mandatory requirement under any legislation, and
  - that this baseline energy model provides a reasonably accurate and reliable estimate of measured energy consumption.

[1] A residential premises may be eligible provided the project relates to common services within the building. For example, a project can involve the upgrade of residential common area services such as the car park of an apartment building, but it cannot involve the upgrade of services to a single apartment within the building.

3.4.4. Eligible projects

There is no limitation regarding the type of technology that could be used in a project as long as abatement is achieved. PBA M&V is technology neutral.

For an M&V project to be eligible, it must meet the following conditions:

- the project must have been **completed after** the date you lodged your application for accreditation approval
- the project must not commence until after the scoping plan application is approved, and until we have received an application for project plan approval
- if the project is across multiple sites, the site and upgrade must be sufficiently similar
- any lighting products installed as part of the activity must have been listed on the Register of Products before you lodge the next impact report for the project, and meet all other product requirements as detailed in Section 6.3 of this document
- you must be able to source all documentation to verify the pre- and post-activity conditions
- project applicants must be approved to undertake PBA by the commission prior to applying. Therefore, projects cannot commence prior to accreditation
- If the project creates certificates by switching to a source of renewable energy generation, no certificates can be claimed for energy exported beyond the measurement boundary.

Contact us if you need further clarification regarding how to determine whether your project is eligible.

A project which involves fuel switching from bottled LPG to a lower emission energy source could be potentially eligible. In general, greenhouse gas reductions as a result of reducing the use of bottled gas (either natural gas or LPG) can be eligible under PBA.

An electricity generator which will save non-grid electricity could potentially be eligible to participate in PBA. There is no specific restriction on non-grid electricity savings under PBA (unless the electricity is generated via renewable means in which case no certificates can be claimed for energy exported beyond the measurement boundary).

A project that reduces kVA without reducing energy consumption (in kWh) is not eligible to create certificates. Given that certificates are awarded based upon the amount of greenhouse gas abatement achieved, for a project to be eligible to create certificates, it must reduce the

site's energy consumption in terms of kWh or GJ. Currently projects that only affect kVA are not eligible.

3.4.5. Additionality and genuine abatement

To ensure that the VEU program is encouraging projects that would not have otherwise occurred, as the commission we are required to assess the additionality of activities under the program. You are required to satisfy us that your project is additional and will likely produce genuine abatement.

To satisfy us that a project is additional, you must demonstrate that the project is:

- not required by law
- not also claiming benefits under a prescribed greenhouse gas scheme
- not underway prior to scoping plan approval.

Not required by law

Projects that are required by law are those that have a qualitative or quantitative requirement for the energy consumer, you as the AP, or other affected stakeholders to undertake all or part of an activity. Certain projects may be considered not additional if external requirements compel the project to take place. This includes complying with energy efficiency or greenhouse gas emissions requirements in any minimum standard or mandatory requirement under legislation.

You will need to provide a signed declaration that the project is not required by law.

Not also claiming benefits under a prescribed greenhouse gas scheme for the same abatement

Benefits cannot be claimed for the project under both the VEU program as well as another prescribed greenhouse gas scheme for the same abatement, except for some hot water systems. You may elect to design an M&V project's measurement boundary such that aspects of the project which are claiming benefits under a prescribed greenhouse gas scheme are metered and separated from the aspects that are claiming VEECs. For further details on measurement boundary please refer to Section 4.6. For clarity, prescribed greenhouse gas schemes are the Commonwealth's Carbon Credits (Carbon Farming Initiative) Act 2011, and the Renewable Energy (Electricity) Act 2000, excluding the hot water systems listed under Part 2, Division 4B of that act.

To satisfy the commission that the project is not claiming benefits for the same abatement under a prescribed greenhouse gas scheme, both the AP and the energy consumer are required to sign a declaration, and consent under s10 of the VEET Act to allow the commission to disclose the details of the project to prescribed schemes to verify their statement. The energy consumer must also provide this consent in the Registration of Interest Form.

Not underway prior to scoping plan approval

No work for the project can have commenced prior to scoping plan approval, except activities described as exempt in regulation 6(6) of the PBA Regulations. For details of scoping plan approval, refer to Section 5.3 of this document. This rule only applies to work undertaken on-site in-situ. However, you can start work on a project before getting scoping approval if it is just building part of the equipment such as a frame off-site.

Prior to obtaining scoping approval you can reasonably undertake procurement, off-site work, or some other types of work, if that work is not in-situ and it does not affect any other equipment within the measurement boundary in any way.

3.4.6. Appropriate commission accreditation and approvals

To be eligible to participate in the VEU program and create VEECs, a project must have:

- an AP approved with the commission to participate in PBA. This process is described in Section 5.2
- a scoping plan, a project plan and impact report(s) lodged and approved with the commission. These are described in Sections 5.3, 5.4 and 5.9 respectively.

4. Measurement and verification concepts

Measurement and verification (M&V) is the process of using measurements to reliably determine savings resulting from an energy management program. Savings cannot be directly measured, since they represent the absence of energy use. Instead, savings are determined by comparing measured use before and after project implementation, with appropriate adjustments for changes in conditions.

The IPMVP provides methods, with different levels of cost and accuracy, for determining savings, either for the whole facility or for individual energy conservation measures (ECM).

4.1. M&V plan

The IPMVP specifies the contents of a measurement and verification plan (M&V plan). This M&V plan adheres to fundamental principles of M&V, and if followed, will produce verifiable savings reports (impact reports). The M&V plan and approach taken must be validated by a qualified professional who is on our Register of Approved Measurement and Verification Professionals (www.veu-registry.vic.gov.au/register-measurement-verification-professionals). For clarity, the approved measurement and verification professional (AM&VP) may not be involved in writing the plan, but it must be validated by them before lodgement of the impact report with the commission.

Monitoring and measurement managers operating an M&V project are required to complete an M&V plan in line with the IPMVP and its terminology, and include:

- the chosen energy conservation measure
- M&V option
- basis of adjustment
- measurement boundary
- analysis procedure
- meter specifications
- expected accuracy.

The M&V plan should provide a justification for each choice made and adequately describe quality assurance procedures for:

- data collection and storage
- data loss and gaps
- calculation accuracy
- review approach
- equipment and system testing
- calibration process

- other relevant quality assurance controls.

The M&V plan should also include all relevant information for participating in the PBA M&V method, including:

- if the project involves lighting equipment, details of any lighting products that are to be replaced (including zones, number of lamps, wattages, use hours and details of lighting control devices such as sensors if applicable)
- if the project involves lighting equipment, details of any lighting products that are to be installed (including zones, number of lamps, wattages, expected use hours and details of lighting control devices such as sensors if applicable)
- if using forward creation details of which decay factor is intended to be used (including all inputs for the persistence model, if applicable)
- if the project involves HVAC upgrades, details of whether electricity or gas is used for heating
- if option B from the IPMVP is used, details of the sub-metering used, including whether it is a temporary installation, calibration details and meter specifications.

An approved measurement and verification professional (AM&VP) is not required to review or sign off on the M&V plan. The AM&VP is only required at the impact report stage. However, as the AP you could decide to hire an AM&VP to review, or even develop the M&V plan. This AM&VP would not be able to review the impact report (as they would not be sufficiently independent).

Where you do not have experience in M&V, we strongly recommend that you engage an expert to provide professional advice when developing the M&V plan – whether this is an AM&VP (who can't be used later), or another M&V professional with appropriate qualifications and experience.

4.2. Options for determining savings

The monitoring and measurement manager is required to develop the M&V plan using savings options B or C from the IPMVP. Options A and D are not eligible in PBAs at this time. The approach and results must be validated by the AM&VP.

4.2.1. Option B: Retrofit isolation, all parameter measurement

Option B requires all relevant field parameters to be measured. Measurement frequency ranges from short-term to continuous, depending on the expected variations in the savings and the length of the operating period.

Savings are determined from short-term or continuous measurements of baseline and reporting period energy, and/or engineering calculations based upon measured values. Refer to Section

4.7.2 of the IPMVP for more information on option B. Note that non-routine adjustments are not eligible for PBA in the VEU program.

4.2.2. Option C: Whole facility

In option C, energy use is continuously measured at the whole facility throughout the reporting period. Analysis of the baseline allows calculation of savings. These are commonly used for multifaceted energy management programs that affect many systems in a facility. In order to use this option, the expected energy savings should be 10% or more of the baseline energy consumption. Refer to Section 4.8 of the IPMVP for more information on option C. Note that non-routine adjustments are not eligible for PBA in the VEU program.

4.2.3. Choosing between options

You will need to provide evidence to justify which option has been selected. The choice between options B and C depends on the size of the project to the size of the facility it occurs in, as well as the financial cost and project complexity compared to the amount of VEECs expected as a return. One report suggests that each IPMVP option will cost the client the following percentages of total project costs:

- Option B = 3-10%
- Option C = 1-3% (if meters are already installed)[2].

Option C can be used where savings exceed 10% of the baseline energy use. That way the change can be confidently identified in facility wide metering, even when the reporting period is shorter than two years. Where savings cannot be confidently identified on facility wide meters or where expected savings are less than 10% of baseline energy consumption, option B should be used with specific metering installed on a smaller project area.

Some projects may use a combination of these options. For example, a project may choose to sub-meter one upgrade (option B) but use the whole site measurement boundary (option C) for the remainder of the upgrades. In this case, different methods of VEEC calculation may be used. See Section 4.3 for more details.

If the project has multiple sites and similar activities, the measurement boundaries must be determined in consistent manner across each which will generally mean using the same IPMVP option.

[2] Birr, D & Donahue, P, “Meeting the Challenge – How Energy Performance contracting Can Help Schools Provide Comfortable, Healthy, and Productive Learning Environments”, The National Association of Energy Services Companies (NAESCO) and the US Environmental Protection Agency, 2001, pp. 32-33

IPMVP's Section 4.11 offers more guidance on selecting between options B and C for any specific project, and IPMVP's Appendix A contains examples of each option. If you are unsure about the choice between options, you should seek advice from an M&V professional.

4.3. M&V VEEC calculation methods

There are three methods for calculating and creating VEECs for M&V projects:

- forward creation method using normal year energy savings
- annual creation method using measured annual energy savings
- forward creation with 'top up' method, which uses forward creation, followed by the annual creation method.

The M&V VEEC calculation methods are defined in Measurement and Verification in Victorian Energy Upgrades – Specifications (M&V specifications), found at www.esc.vic.gov.au/veu-legislation

The forward creation method uses Equations 1, 2 and 4, while the annual creation method uses Equations 1, 3 and 5. A brief explanation of each is provided in Sections 4.3.1 and 4.3.2. You should ensure you fully understand these methods and equations.

The choice between the three methods will depend on:

- the risk factors of the upgrade
- project cash-flow requirements
- the administration required
- the AP's business preference.

Projects with multiple measurement boundaries can choose to use a different method to calculate VEECs for each measurement boundary. For example, a project may calculate VEECs using forward creation for the section of the site that used option B and annual creation for the rest of the site which used option C. Projects with essentially identical upgrades occurring at multiple sites must choose method(s) which are consistent across all sites.

As forward creation uses an operating energy model to represent future energy consumption, there is a related reduction in the accuracy of abatement compared to annual creation. For this reason, forward creation has the following restrictions:

- Forward creation cannot be used when projects are easily reversible (for example: changes related to behaviour, set-point changes, or equipment that is easily switched off). Where there is any doubt over this, or if savings resulting from behaviour change are more than 20% of the total savings, forward creation may not be possible, and we may decide that annual creation is the only viable method.

- Forward creation is limited to 50,000 VEECs per project. Note that this total applies to the combined VEECs for all sites in a project, not per site.
- Forward creation cannot be used for a measurement boundary if it has previously used annual creation.

You will need to consider these and other factors when deciding between the creation methods. You should seek independent technical and financial advice if you are unsure.

4.3.1. Forward creation method using normal year energy savings

Forward creation allows you to create VEECs earlier in the project. After energy consumption is modelled following completion of the project, up to ten years of certificates can be created at once. This may have cash flow benefits. To forward create certificates for a given measurement boundary, at least two energy models based on measured values are required – a baseline energy model (before the project) and an operating energy model (from the **operating period** after the project). Energy savings for future years are determined by comparing the two models after they have been normalised. More detail is provided in Section 4.4 and in the 'Calculating savings using forward creation' section below.

The baseline period must cover a full operating cycle. If this is less than twelve months you may need to provide us with justification and include relevant evidence showing that the selected period includes a full range of operating conditions.

An impact report must be prepared and lodged following measurement of the operating period. If your project has multiple sites, you can choose to submit the impact reports for each site separately or at the same time. The operating period(s) in this case can be anything up to 24 months long: it can be a relatively short metered measurement, or it can be a 24 month long metered measurement.

The operating period for a measurement boundary cannot start until after the project works end date for that measurement boundary.

The period chosen should reflect the full operating cycle of the equipment measured, and evidence should be provided to us justifying the use of this timeframe. We may not accept short periods for some project types, in which case a longer period must be selected.

Shorter measurement periods can affect VEEC creation in several ways:

For **estimate of the mean** you may only be able to forward create VEECs for part of the year if we are not satisfied the measurement period can reflect operation across the full year

For **regression analysis** you will only be able to forward create VEECs for part of the year if the value of an independent variable for some time intervals in the normal year are outside of the variable's effective range.

Even if the decision to use a shorter period is made for business reasons, selection of both baseline and operating periods must be justified so that we can be satisfied that genuine abatement has occurred.

Calculating savings using forward creation

If **regression analysis** is used to forward create certificates, both the baseline and operating energy models must be normalised to the same conditions by using values for the independent variables which represent a **normal year** (refer to Section 4.4.4) The difference in energy consumption between the two normalised regression models is the determined annual savings from which VEECs can be forward created. For estimate of the mean, this annual savings value is based on the difference between the mean energy consumption in the baseline and operating periods.

For forward creation, this savings value is used to create VEECs for that year or part thereof, and up to nine additional years at once. However, the ability to maintain those savings over time is expected to reduce in most cases. Forward creation therefore also requires the use of a persistence model to estimate the decline in abatement over time, described in Section 4.13.

Forward creation has less administration, as it only requires one impact report, however note that you have three opportunities to refine these savings figures for each site in a project based on measured data, so you can submit up to three forward creation reports for each site (see Section 4(c) of M&V specifications). Savings from forward creation are calculated using Equations 1, 2 and 4 below.

Equation 1

$$\text{VEECs} = \sum_j \left(electricity\ savings_j \times electricity\ emissions\ factor_j \times RF_j \right) + \sum_j \left(gas\ savings_j \times gas\ emissions\ factor_j \right) + \sum_j \left(renewable\ energy\ savings_j \times renewable\ emissions\ factor_j \right) - \sum_j \left(counted\ savings_j \right)$$

Where:

- *j* is the measurement boundary number in the case that there are multiple measurement boundaries under one project
- savings = baseline energy consumption – upgrade energy consumption for each fuel type calculated for the chosen creation method using the relevant Equation 2 or 3
- counted savings are described in Section 4.10 of this document.

- The regional factors for metropolitan and regional Victoria, and the emissions factors for electricity, gas and liquefied petroleum gas are listed in M&V specifications.
- *Renewable emissions factor* is the relevant emissions factor for the each affected renewable energy source. The emissions factor for solar, wind, hydroelectric, geothermal and ocean energy is zero. The emission factor 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 - August 2016 published by the Commonwealth Department of the Environment.

Equation 2 - Energy savings using forward creation method

$$energy\ savings = \sum_i (normal\ year\ savings \times (AF \times DF_i)^{\frac{normal\ year\ energy\ savings}{|normal\ year\ energy\ savings|}}$$

Where:

- i is a year of the maximum time period for forward creation for the project.
- $normal\ year\ savings$ is calculated using Equation 4.
- AF is the accuracy factor for the relevant measurement boundary determined using Table 2 where the "relative precision" means the relative precision of the normal year savings at 90% confidence level.
- DF_i is the decay factor for the relevant measurement boundary for year i set out in Table 1, or determined by applying a persistence model approved by the commission as part of the application for impact report approval to all products installed as part of the activity that were not previously installed at the premises where the project is undertaken.

Equation 4 - Normal year energy savings

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

Where for each measurement boundary:

- t is an eligible time interval in the normal year.
- $E_{BM,t}$ is the energy consumption for *t* from the baseline model.
- $E_{OM,t}$ is the energy consumption for *t* from the operating model.
- E_{int} is the total interactive energy savings for the project in the normal year, up to a maximum of $0.1 \times \sum_t (E_{BM,t} - E_{OM,t})$.

The forward creation method's maximum period is ten years from the implementation start time (the date and optionally the time at which all physical project works for all measurement boundaries within a project are complete).

4.3.2. Annual creation method using measured annual energy savings

The annual creation method allows VEECs to be created for measured energy savings for the immediately preceding year. The method depends on setting a baseline model for each measurement boundary for a prior year and then measuring the energy consumed in that measurement boundary during the **reporting period**.

The reporting period is either the twelve month period immediately following the project works end date of the relevant measurement boundary (for the first reporting period) or the twelve month period immediately following the end of the previous reporting period for that measurement boundary. If a project only has one measurement boundary, the project works end date is the same as the implementation start time. If it has multiple boundaries, the implementation start time is the same as the last project works end date for the whole project (the date and time at which project works for the last measurement for the project are finished). There can be a maximum of ten reporting periods for each measurement boundary.

Each baseline energy model is adjusted to reporting period conditions – for each time interval, the independent variables take on their respective values from the relevant reporting period. As such, the adjusted baseline model indicates what the energy consumption would have been in the measurement boundary during the reporting period, had the energy conservation measure not been installed. The difference between the measured energy consumption in the reporting period and the energy consumption determined from the adjusted baseline energy model is the determined **annual savings** from which VEECs can be created. The following year (i.e. the following reporting period), a new impact is reported by comparing measured energy consumption with the same baseline energy model adjusted to that reporting period's conditions, and so on for subsequent years.

There is more administration required in preparing and lodging an annual impact report every year for ten years compared to forward creation, but more VEECs could be created overall as the actual abatement is measured, rather than using an estimate of the decline in abatement over time.

The method depends entirely on measured values, and so is limited by the project lifetime, up to a maximum of ten years. The annual creation method uses Equations 1, 3 and 5. Equation 1 was described in Section 4.3.1.

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

$$energy\ savings = \ measured\ annual\ energy\ savings \times AF^{\frac{measured\ annual\ energy\ \ savings}{|measured\ annual\ energy\ savings|}} \pm previous\ energy\ savings$$

where for each measurement boundary:

- $measured\ annual\ savings$ is calculated using Equation 5.

- AF is the accuracy factor determined using Table 2 where the "relative precision" means the relative precision of the measured savings at 90% confidence level.
- $previous\ energy\ savings$ 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 5 - Measured annual energy savings

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

Where for each measurement boundary:

- t is an eligible time interval in the reporting period.
- $E_{BM,t}$ is the energy consumption for t from the baseline model.
- $E_{meas,t}$ is the measured energy consumption for *t*.
- E_{int} is the total interactive energy savings for the project in the reporting period, up to a maximum of $0.1 \times \sum_t (E_{BM,t} - E_{meas,t})$.

4.3.3. Forward creation with 'top up'

The 'forward creation with top up' method combines features of the previous two methods. This gives the benefit of creating large numbers of VEECs earlier in a project, while maximising the total number by refining estimates with more accurate measured data rather than accepting the decay in the persistence model. It is administratively more complex than forward creation or annual creation.

To use this method, you will need to have an operating period **and** a reporting period for each measurement boundary for the first year following project works. These may be the same time period, or they may be different (however that reporting period must be a twelve month period which starts immediately after the implementation start time). For the first 'normal year' (i.e. the forward creation part), you should use Equations 1, 2 and 4.

Each 'top up' year - **including** the first year - needs a reporting period (i.e. the annual creation part), where you measure and model every twelve month period from the site's project works end date. For this, you should use Equations 1, 3 and 5. You only need submit an impact report to us once the number of VEECs created through the 'top up' method exceeds those already registered through forward creation. This impact report should contain all of the modelling for each twelve month period from the project's project works end date until that twelve month period. Following the submission of this first impact report using Equations 1, 3 and 5, you must submit an impact report to us every twelve months, until the project ends.

4.4. Baseline and operating energy models

There are two statistical modelling methods used in PBA M&V. These are regression analysis and estimate of the mean which are briefly described in the sections below.

4.4.1. Regression analysis

Regression analysis is a method used to describe a statistical relationship between a dependent variable (in this case energy consumption) and one or more independent variables. Software which is used to develop a regression model can also be used to determine certain statistical characteristics of the model, including bias fit (the degree to which the model describes the relevant data set, also known as R^2) and the uncertainty due to modelling error (also known as t-stat).

If regression analysis is used, the energy model must:

- be based on the value of the measured energy consumption and independent variables during the baseline period where site constants are at their normal values
- be based on at least 80% of the total number of time intervals in the baseline period
- have at least six times as many independent observations of the independent variables as the number of independent variables in the energy model.

A regression energy model requires six times the number of measurements of an independent variable for each independent variable within the model. For example, if you have only one independent variable (e.g. production volume), then you need at least six measurements of production volume within the model. If you have two independent variables (e.g. production volume and ambient temperature), then you need at least twelve measurements of each.

4.4.2. Estimate of the mean

In some cases, it won't be possible to develop a satisfactory energy model using regression analysis – this may be because no independent variables have been identified which affect energy consumption and/or which may result in a poor model fit R^2. In these cases, estimate of the mean can be used to show the mean energy consumption over the relevant measurement period. An example may be a fixed speed pump, whose energy consumption might be consistent and therefore may not be modelled accurately using regression analysis.

If an estimate of the mean is used, the baseline energy model must:

- be based on the value of the measured energy consumption during the baseline period, 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%
- be based on at least 80% of the total number of time intervals in the baseline period.

The coefficient of variation or relative standard deviation is the ratio of the standard deviation to the mean. It shows the extent of variability in relation to the average. A coefficient greater than 15% suggests that energy consumption within the measurement boundary is inconsistent.

Estimate of the mean can only be used if the coefficient of variation of the measured energy consumption over the period is less than 15%.

4.4.3. Energy models

Baseline energy model

A baseline energy model is a model that quantifies electricity, gas, or renewable energy use (i.e. energy use) inside a project measurement boundary and represents conditions before the project is undertaken. A baseline energy model can be established by regression analysis or an estimate of the mean.

For both regression analysis and estimate of the mean, the baseline period must end no more than 24 months before the project works start date[3]: it can be a relatively short metered measurement, or it can be a long metered measurement.

Operating energy model

An operating energy model is a model that quantifies energy use after the project is undertaken, and is used only when forward creation is used to create VEECs. An operating energy model can be established by regression analysis or an estimate of the mean.

For both regression analysis and estimate of the mean, the operating period must not start before the project works end date for a given measurement boundary and must end no later than 24 months after that project works end date.

Statistical requirements for regression models

When you use regression analysis, you must also use a residual test to ensure that the model is appropriate for your data. The residual tests should be an analysis of the residuals plotted against the independent variable to provide justification of the modelling approach and to identify whether the models could be improved. Where a potential improvement to a model can be made, this may also be an indication that the uncertainty associated with that model is underestimated.

[3] except for easily reversible PBA M&V projects, where baseline data can be measured after works are undertaken, provided the site can be returned to a pre-project state during measurement.

Selecting the measurement periods

For all projects, you must select a measurement period from which to develop your baseline energy model, called the baseline period. If you are using forward creation, you must also select a measurement period from which to develop your operating energy model, called the operating period. Annual creation uses only a baseline energy model[4].

The baseline measurement period must cover a full operating cycle. If this is less than twelve months you may need to provide us with justification and include relevant evidence showing that the selected period includes a full range of operating conditions. We may not accept a baseline measurement period of less than twelve months.

The operating measurement period can be selected in one of three different ways:

1. You can select a twelve month measurement period. By using a twelve month measurement period you may be eligible to claim VEECs for up to a full year's worth of savings plus any eligible forward creation depending on the method chosen[5].
2. You may be able to select a measurement period which is shorter than twelve months and justify that it represents a full year. If you are using **estimate of the mean** you must assure us that it includes a full range of operating conditions, and therefore reflects a full operating cycle and can be used to explain a full twelve months of energy consumption. You must provide us with evidence and justification of this. By using an eligible full operating cycle, you may be eligible to claim VEECs for up to a full year's worth of savings[5]. If using **regression analysis** you should ensure that the measurement period allows the full effective range to be met, otherwise you may not be able to claim VEECs for the full year.
3. You can make a business decision to select a shorter period which does not include a full range of operating conditions and which may not reflect a full operating cycle. In this case, only a proportion of each year's savings[5] may be eligible to be used to claim VEECs.

If **regression analysis** is used to develop an energy model, then in each case above the actual portion of the twelve month period which is eligible to be used to create VEECs (i.e. the number of eligible time intervals) will depend on the effective range of the independent variables used. Regardless, you must still justify the period chosen with reference to operating conditions and the chosen independent variables. Note that you do not need to use the same length for your baseline and operating measurement periods (and for annual creation you may choose a baseline measurement period that is less than twelve months), but you should consider the effect of the

[4] For annual creation, measurements after the project works end date for the relevant measurement boundary do not require development of a model. Impact is simply based upon the measured energy consumption over each twelve month period immediately following the project works end date.

[5] If you are using forward creation, the eligible portion of a year's energy savings will be multiplied by a decay factor to include future savings.

chosen lengths on the effective range. In general, the longer the measurement period, the less likely that you will have ineligible time intervals due to issues with the effective range. For more details on effective range please refer to Section 4.5.

For some projects that use **estimate of the mean** you may be able to use a relatively short measurement period which is reflective of that equipment's complete operating cycle and justify that this can describe its energy consumption over the whole year. However, we may not accept short periods for some project types where this is not reflective of the full cycle of operation or you cannot provide evidence that shows this operating cycle, in which case a longer period must be selected.

Regardless, energy models must use measured energy consumption data from at least 80% of the time intervals from the respective measurement period. For example, if you have 365 data measurements over a year for the baseline measurement period, at least 292 points must be used in the baseline model. To ensure validity of the data, the measurement period should be based on continuous measurement. Regardless, the time intervals in the measurement period must be continuous (refer to Section 4.5 for further details).

An energy model must not be used to calculate energy savings if we are not satisfied, having regard to advice from an AM&VP, that the model provides a reasonably accurate and reliable estimate of measured energy consumption. For more information, refer to the IPMVP.

Measurements, modelling and the design of the data collection/modelling regime can be carried out by a competent M&V practitioner; however, the approved AM&VP who is selected to validate this work during the impact report stage cannot be involved in this.

4.4.4. Normal year

A **normal year** is used in the case of forward creation and comprises a set of values for a continuous twelve month period for each independent variable and site constant used in the energy models.

The normal year must reflect the expected **mean, variance and range** for the independent variables in a typical year within the maximum time period for forward creation.

You must provide the following for each time interval in the normal year:

- a value for each independent variable
- a value for each site constant.

The normal year must represent a full twelve month operating cycle for the independent variables used to develop the energy models, and it cannot be averaged over a number of years. For

example, where an independent variable is based on daily ambient temperature, a normal year must include the full seasonality associated with that variable across the year. Such information can be found using typical meteorological year data. A ten year average for each daily temperature would not be appropriate, as this data would not have the expected variance and range for a typical year.

The normal year can either be the baseline year, the operating period year, or some other determined typical year that complies with the requirements stated in this section and the requirements for effective range. The values of each independent variable in a time interval in the normal year must be within +/- 5% of the effective range for that time interval to be eligible for VEEC creation (Refer to Section 4.5 for more detail on effective range).

The normal year can also be used where the period under consideration includes events outside the ordinary e.g. unusual heatwaves, floods etc. For further guidance see Chapter 4.5.3 of the IPMVP.

4.5. Measurement frequency, time intervals and effective range

The **measurement frequency** is how often measurements are taken during a given time period. A **time interval** is the segment of time between regular measurements and its length is therefore determined by the measurement frequency. For example, if the measurements are completed daily, then measurement frequency is considered to be daily and the time interval is the length of one day between the measurements.

The requirements for measurement frequency, time intervals and eligible time intervals are:

- The length of a time interval is determined by the nominated measurement frequency for that measurement boundary.
- The time intervals must be continuous.
- The length of a time interval used to calculate electricity, gas or renewable energy savings may differ; however, unless the measurement frequency is determined by utility data intervals, time intervals used to calculate savings of the same measurement boundary must be the same length. This means that for the same measurement boundary, time intervals used to create the baseline model must be the same length as those used to either create the operating energy model (in the case of forward creation) or measure energy consumption in the reporting period (in the case of annual creation), unless utility data dictates a different length time interval.
- Whilst the time intervals for both periods must be the same length, the baseline measurement period does not need to be the same length as the operating measurement period (however this may have implications for the effective range).
- Each time interval must include a measured value of energy consumption, independent variables and site constants, for each fuel type.

- The time interval is eligible if all site constants are at standard values and the value of each independent variable X is an amount that is within the eligible range as described in Section 4.5.1 below.

4.5.1. Effective range

The effective range is an important parameter that determines whether a specific time interval can be used for VEEC creation in Equations 4 and 5. A time interval is eligible if all its corresponding independent variables meet the following criteria:

$$X_{min} - 0.05X_{max-min} < X_i < X_{max} + 0.05X_{max-min}$$

Where:

- X_i is the value of the independent variable corresponding to a given time interval in the nominated normal year (for forward creation) or the reporting period (for annual creation).
- $X_{max-min}$ is the difference between the maximum and minimum values of the independent variable in the effective range
- X_{min} is the minimum value of the independent variable in the effective range
- X_{max} is the maximum value of the independent variable in the effective range.

This means that a time interval is eligible for VEEC creation where the value of the all independent variables is within their respective **eligible range**, which is:

- greater than the minimum value of the effective range minus 5% of the difference between the maximum and minimum values of the effective range
- less than the maximum value of the effective range plus 5% of the difference between the maximum and minimum values of the effective range.

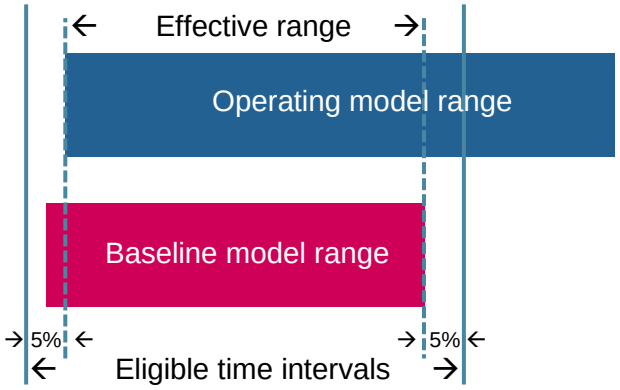
If any values of the independent variables are beyond this eligible range, then that corresponding time interval is ineligible for VEEC creation.

A shorter operating measurement period which does not cover the full operating cycle and range of values for each independent variable may affect your VEEC claim. For example, for a forward creation project with a monthly measurement frequency, if the value of an independent variable in one month of the nominated normal year falls outside of the eligible range, then you can only claim VEECs for up to a maximum of eleven months for each year. This exclusion of the out-of-range value from the normal year will result in a reduced VEEC creation for every year within the period of forward creation.

Forward creation effective range

For forward creation, the effective range is the overlap between the range of values of independent variables used to develop the baseline energy model and the range of values of independent

variables used to develop the operating energy model. In forward creation, either the operating or baseline measurement period may be too short and affect the effective range and eligible time intervals. A time interval within the nominated normal year is eligible for VEEC creation if the value of all corresponding independent variables fall within their **eligible range** (refer to Figure 1 and the above equation). Where the value selected for the independent variable in a given time interval in the normal year falls outside of that range, that interval is ineligible to be used for VEEC creation and that time interval is excluded from the normal year. Refer to Section 4.4.4 of this document and Section (19)(e)(iv) of M&V specifications for further details.

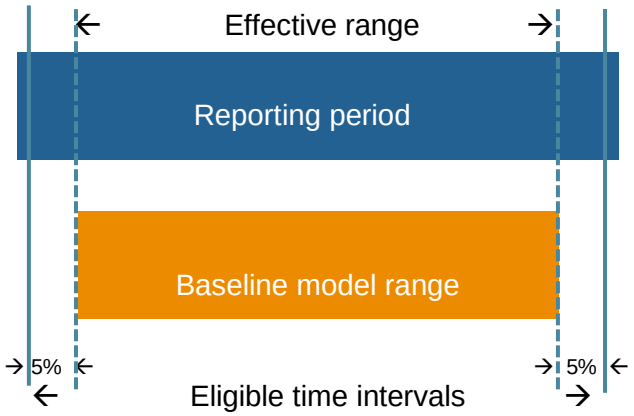


You must choose a normal year such that all independent variable values fall within the eligible time interval range, as depicted above

Figure 1: Forward creation – relationship between normal year, baseline period and operating period to determine effective range and therefore the eligibility of time intervals

Annual creation effective range

For annual creation, the effective range is simply the range of values of the independent variables used to create the baseline energy model (refer to Figure 2 and the above equation). In annual creation method, a reporting period is a fixed twelve month period; therefore, only a shorter baseline measurement will affect the effective range and eligible time intervals for VEEC creation. For a reporting period time interval to be eligible, the values of all corresponding independent variables must sit within their **eligible range**. Where the value selected for the independent variable in a given time interval in the reporting period falls outside of that range, that interval is ineligible to be used for VEEC creation and that time interval is excluded from the reporting period. (refer to Section (19)(e)(iv) of M&V specifications for further details).



Any reporting period time intervals where the independent variable values fall outside of the eligible period cannot be used for savings calculations

Figure 2: Annual creation – relationship between baseline period and reporting period to determine effective range and therefore the eligibility of time interval

4.6. Measurement boundaries

A measurement boundary is the limit of a project activity. It defines what is affected by that project activity and includes all energy consuming products installed, removed, adjusted or otherwise affected in implementing that activity, and every device co-metered with those products.

It may be necessary to have more than one measurement boundary to describe the impact of a project activity. For example, it may be necessary to have a gas measurement boundary and an electricity measurement boundary. If there are multiple sites in a project then there will also be multiple measurement boundaries, with at least one per site.

A project is undertaken to install a cogeneration plant to offset electricity consumption. However, as a result of this, gas consumption increases significantly and cannot be treated as an interactive effect. Therefore, there must be a measurement boundary for electricity consumption and a measurement boundary for gas consumption to describe the impact of the activity, so that energy consumption for both sources can be determined before and after installation.

Energy consuming equipment or components may be excluded from a measurement boundary if it is impractical or disproportionately costly to measure changes in the energy consumption resulting from the project. We must be advised and assured with appropriate evidence that the change in the energy consumed is insignificant; or the changes in energy consumption are accounted for in the interactive energy savings.

4.7. Measured energy consumption

Measured energy consumption is the measured energy consumed by all equipment within the measurement boundary. The energy consumption cannot be determined from an engineering calculation – energy consumption must be directly measured. Where a project has many similar activities at the same site, measured energy consumption for that site can be determined from measurements of a sample of the activities at that site, if we are advised and satisfied that:

- the measured energy consumption of each activity can be reasonably described by the same energy model
- the sampling methods produce a random sample
- calculation of the relative precision used to determine the accuracy factor includes quantification of the impact of the sampling.

If you measure energy consumption in a condition which is different from the real working conditions you will need to justify this and provide evidence that differences in energy consumption between the two conditions is not statistically significant.

4.8. Site constants and standard values

A site constant is a parameter of the project site that affects the energy consumed within the measurement boundary but does not vary under normal operating conditions. Site constants include parameters like floor area for a building, or the number of shifts in a day. It must be an unaltered number that applies to each time interval. Each measurement boundary must have one or more site constants monitored and recorded.

A standard value is the value the site constant is expected to have under normal operating conditions. An M&V professional can advise on the appropriate identification of site constants.

4.9. Interactive energy savings

Interactive energy savings are energy savings due to the project that are outside the notional measurement boundary. They can be either a positive saving or a negative saving (where energy consumption increases) and have been excluded from the measurement boundary due to being insignificant or sufficiently small relative to total energy savings for a project.

> Total interactive energy savings are limited to a maximum of 10% of the savings determined using the energy models, for all energy sources.

An example is savings in heating, ventilation and air conditioning (HVAC) due to lighting upgrades; more efficient lighting products produce less heat, meaning that air conditioning does not need to

work as hard. This saves additional energy in the HVAC system in summer, and costs more heating energy in winter.

Interactive energy savings must be estimated with a repeatable method that uses site- and project-specific data. The method must be a generally accepted estimation approach for the energy type involved and must be used to estimate interactive energy savings in all calculations for the project.

An M&V professional can advise on the appropriate identification of interactive energy savings.

A site may have multiple measurement boundaries, provided there are no interactive effects between these boundaries.

4.10. Counted savings

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

An adjustment may be made to counted savings in respect of activities prescribed by the principal VEET Regulations if one of the following occurs:

- For projects using the forward creation method, where the adjustment corrects for the proportion of eligible time intervals in the normal year.
- The adjustment corrects for the number of years that the savings coincide with the remaining eligible annual reporting periods.
- The adjustment is required for compliance with Regulation 14(b) of the PBA Regulations.

If your client has undertaken an additional energy saving project after the baseline period, and this additional abatement cannot be considered to be a part of the approved project plan, then the abatement relating to this cannot be claimed as VEECs. These additional savings must be accounted for as ‘counted savings’ in Equation 1.

4.11. Renewable energy and other onsite generation

4.11.1. Installing renewable energy generation as part of a project

A project may create VEECs by using renewable energy generation in the following ways:

- installing renewable energy generating products which reduce the energy consumed within the measurement boundary
- fuel switching to a renewable energy source which reduces the greenhouse gas emitted from the measurement boundary, including the installation of a solar photovoltaic (PV) array.

If energy generating products are installed as part of the project (i.e. if they are used to claim VEECs), then they must be included within the measurement boundary. No certificates can be claimed for energy exported to the grid.

If energy generating equipment is installed as part of a project and it is already being used to claim benefits under another prescribed greenhouse gas scheme, then it is not eligible to claim VEECs. Please refer to Section 3.4.5 for further details.

If a new renewable energy source is introduced for which savings are claimed and which has a non-zero emissions factor, then the emissions associated with that source must be accounted for in VEEC calculations as a negative saving (according to the emission factors referenced in the M&V Specifications).

4.11.2. Sites with existing or future renewable energy

A project site may already have or is planning to install an onsite renewable energy source which is generating and possibly exporting energy. For the purposes of PBA M&V this generation may be able to be treated as an energy source for the measurement boundary if the following conditions are met, however other restrictions may also apply:

- the project does not impact the energy consumption or generation of that equipment
- the site is connected to the grid
- the site does not have an export cap which would mean that any increase in excess energy due to energy savings is unable to be exported or consumed

If the energy source is eligible and meets these conditions, consumption of that source will need to adopt the appropriate gas or electricity emissions factor depending on whether it is LPG, natural gas or electricity. You will then need to provide an equation in the M&V plan showing how this energy source and any export will be accounted for in energy consumption calculations.

If it does not meet one of the above conditions, then it may not be eligible. For example, energy consumption may be reduced by a project, which in turn makes more electricity generated by onsite solar PV available for export. If that additional generation cannot be exported due to a cap, then the excess generation does not result in abatement. In this event that excess would need to be added to the energy consumption for that time interval.

Energy purchased from renewable sources as part of an energy retailer agreement, such as Greenpower, does not count as a renewable energy source for the purposes of PBA M&V. As such if the site has such an agreement in place this is unlikely to affect its eligibility to create VEECs for energy savings under the method.

4.11.3. Solar inverter recommendations

Although there are already requirements for grid connection of energy systems via inverters, including AS/NZS 4777 and specific Distribution Network Service Provider (DNSP) requirements, we recommend that sites have appropriate interconnectivity arrangements in place to enable future grid and customer benefits. To achieve this, inverters should ideally have appropriate technical capability to:

- participate in future dynamic connection agreements
- facilitate 'a direct trip scheme' from the electricity distributor's control centre.

4.12. Impact assessment

The impact is the difference in electricity, gas or renewable energy used within a measurement boundary after an M&V project has been carried out. Impact assessment data measures the condition at a project site after a project has been undertaken.

For forward creation, the impact is the difference between the energy consumption determined from the baseline energy model and the energy consumption determined from the operating energy model. In this case both models must be normalised using routine-adjustment such that all independent variables for each time interval take their values from the normal year (refer to Section 4.4.4 for an explanation of the normal year). The impact assessment must be determined using measurements from an operating period which occurs within 24 months of the project works end date (i.e. the date and optionally the time that the project works are complete and it is brought back into service).

For annual creation, the impact is the difference between the energy consumption determined from the baseline energy model and the measured energy consumption for each time interval in the reporting period. In this case, the baseline energy model must be routine-adjusted such that all independent variables for each time interval take on their values from the reporting period. The reporting period starts on the project works end date (i.e. immediately when project works are complete and it is brought back into service), or immediately after the previous reporting period. There can be up to ten reporting periods.

In case of any unforeseen changes during the project, the baseline cannot be adjusted to account for those changes. Non-routine baseline adjustments are not currently allowed under PBA. This is one of the ways that PBA differs from the IPMVP (International Performance Measurement and Verification Protocol). Some ways of mitigating against these unforeseen changes are through ensuring the measurement boundary is as small as possible or using site constants to exclude the portions of data where the unforeseen event occurred.

Measurements, modelling and the design of the impact assessment/modelling regime can be carried out by a competent M&V practitioner; however, the AM&VP who is selected to validate this work during the impact report stage cannot be involved in this.

The AM&VPs report must be included with the application for impact report approval, and we must have approved both before VEECs can be created.

4.13. Persistence model

The persistence model provides an estimate of the expected lifetime of an energy consuming product (in whole years). It applies a decay factor representing the annual decline in performance due to the type of product, how it is used and the environment it is used in.

The persistence model is only relevant if a forward creation model is used. It is not relevant for annual creation.

There are currently three options for persistence models:

- the NSW Office of Environment and Heritage (OEH) persistence model range (refer to the PIAM&V tool and user guide found on the OEH website)
- apply to the commission to use an alternative model
- the default persistence model (shown in Table 1)

We do not currently have our own persistence model aside from the default model, which is not technology specific. The OEH PIAM&V tool provides specific persistence models for a range of technologies and will provide greater validity than the default model. If the technology you are using is not found in the PIAM&V tool, then you can consider either using the default model or proposing your own model.

You can propose a persistence model if you have significant experience and/or significant data on a product. We, the commission, must approve a persistence model before it can be used as part of the impact report. You should discuss the proposed persistence model with us as early as possible in the project (preferably at the project plan stage) to determine its eligibility.

Consider these points when choosing a persistence model:

- Where two or more alternative persistence models could be valid for use, you must use the model which best describes the project type and its installation environment (i.e. the most valid model).
- When choosing between equally valid persistence models, the most conservative persistence model must be used.
- If multiple upgrades are occurring within a single measurement boundary then the most conservative model must be used.

You will need to provide us with valid justification to use the model which is not the most conservative. We may reject the use of a persistence model if it is not assured that the model provides the most conservative set of yearly decay factors when applied to more than one product. Refer to Table 2 in M&V specifications for more detail on what we may consider as acceptable.

The default persistence model is shown in Table 1 below.

Table 1: Default persistence model with decay factor over time

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

4.14. Uncertainty and accuracy calculations

Measuring any physical quantity includes errors. In this case errors are the differences between observed and true energy use.

The accuracy of any measured value is properly expressed as the range the true value is expected to fall in, with the level of confidence.

A meter measures consumption as 5,000 units with a precision of ±100 units, and a confidence level of 95%. This means that 95% of the readings of the same true value are expected to be between 4,900 and 5,100 units, otherwise known as the 95% confidence interval.

Two key drivers in dealing with uncertainty and accuracy in M&V projects are:

- establishing the energy consumers' acceptable savings accuracy during the M&V planning process
- reporting the savings with no more significant digits than the least number of significant digits in metered quantities, estimates or constants used in quantification.

These are described in more detail in subsequent sections.

4.14.1. Accuracy factor

The acceptable accuracy factor relates to the level of uncertainty that you as the AP are prepared to accept. The accuracy factor is determined by the relative precision of reported savings, which is based on the combined precision of measurements, modelling and sampling across the lifetime of the project. It will impact the number of VEECs which can be created for an activity (refer to Equations 2 and 3 in Section 4.3). The more precise the reported energy savings are, the greater the accuracy factor and therefore the greater the number of VEECs which can be created for an activity.

Businesses and you as the AP are encouraged to check the calibration of existing and installed meters and check if they are correctly installed in suitable locations. You need to weigh up the extra cost of more precise metering versus the reduction in VEECs that may be created as a result of less precise metering or estimation. You should seek independent M&V and financial advice if unsure.

When determining savings, it is feasible to quantify many uncertainty factors, but usually not all of them. Therefore, when planning an M&V process, you report both quantifiable uncertainty factors and qualitative elements of uncertainty. The objective is to recognise and report all uncertainty factors, either qualitatively or quantitatively.

To ensure acceptable levels of uncertainty, errors must be managed when developing and implementing the M&V plan. Process characteristics which should be carefully reviewed to manage accuracy are:

- Instrumentation – measurement equipment errors are due to calibration, inexact measurement, or improper meter selection installation or operation.
- Modelling – the inability to find mathematical forms that fully account for all variations in energy use. Modelling errors can be due to inappropriate functional form, inclusion of irrelevant variables, or exclusion of relevant variables.
- Sampling – use of a sample of the full population of items or events to represent the entire population introduces error as a result of the variation in values within the population, or biased sampling. Sampling may be done in either a physical sense (i.e. only 2% of the lighting fixtures are measured) or a temporal sense (instantaneous measurement only once per hour).
- Interactive effects (beyond the measurement boundary) that are not fully included in the savings computation methodology.
- Estimation of parameters rather than measurement. You can minimize the variation between the parameter's estimated value and its true value through careful review of the ECM design, careful estimating of the parameter, and careful ECM inspection after installation.

Methods of quantifying, evaluating and reducing some of these uncertainties are discussed in Appendix B of the IPMVP. Chapter 8.5 discusses some issues in establishing the correct level of uncertainty for any project. Appendix B - 1.2 defines how large savings must be, relative to statistical variations in baseline data, for results to be valid. The model for relating accuracy factors to the relative precision of data is found in Table 1 in M&V specifications. It is also shown in Table 2 below.

Table 2: Accuracy factors for mean and regression analysis methods based on relative precision

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

4.14.2. Metering

Using a meter other than a utility meter may be a requirement for your project. However, when choosing a meter, you should consider the risk of data issues which may affect your ability to perform measurement and verification of the project. We recommend that you consider, as a minimum, the following items:

- the benefits to the project
- costs (including cost of the meter, installation, equipment shut down during installation, testing and commissioning, etc.)
- accuracy and precision
- data collection and management methods (including frequency and granularity of readings, data storage and maintaining any cloud-based services, etc.)
- power supply of the meter and any data storage device (including the effect of any interruptions on data storage capability)
- maintenance (including recalibration needs, fault detection and alerts, etc.).

Meter calibration

How precise the metering for your project is depends on what type of metering suits the project or budget and is decided on by you. Using a fiscal utility meter for gas or electricity is assumed to be 100% accurate, and we will not require evidence of the precision or calibration. An example is using a NMI (the National Metering Identifier given to each electricity meter connected to the national electricity network) to meter electricity or MIRN (the Metering Identification Reference Number given to each gas meter connected to the natural gas network) to meter gas for the project. However, for all other energy metering equipment, such as use of sub meters or portable meters, we require you to provide evidence of the equipment's precision. This may be a manufacturer's statement and documentation showing that it is within the recommended calibration period (i.e. a calibration certificate). Note that we can assume a brand new meter is at calibration for the first calibration period; only a record of purchase and install would be needed.

If you cannot produce any evidence, or the documents you have provided show that the equipment is out-of-date, then we will assess how close to the specified precision the metering is (which is likely to be based on how far outside the calibration period this is). Also note that calibrating the equipment after the measurement has been done will only count for future measurements and not prior measurements.

Further discussion on use and calibration of meters can be found in section 6.2.2.2 of IPMVP Core Concepts.

4.14.3. Significant digits

Significant digits are covered in more detail in Section 8.12 of the IPMVP. The key takeaway is that the accuracy of project metering must be designed with the acceptable project accuracy in mind.

The significant digits of a number are the digits that carry meaning. This includes all digits except:

- leading zeros
- trailing zeros when they are merely placeholders
- spurious digits.

Spurious digits appear when calculations are carried out to greater precision than the original data, or measurements are reported to a greater precision than the equipment supports. These create false precision. Numbers are often rounded to avoid reporting insignificant figures for simplicity rather than to indicate measurement precision.

The key rule is to report the savings with no more significant digits than the least number of significant digits in metered quantities, estimates or constants used to calculate them. For instance, if the least accurate meter measures four significant figures, then all results calculated from that value must be reported in no more than four significant figures. VEEC figures are rounded in one step at the end for each measurement boundary.

4.15. Missing data

Data loss and how it will be measured must be established in the M&V plan. The M&V plan must identify a method for dealing with missing or erroneous data in the measurement periods. There are different options when dealing with missing data for dependent and independent variables.

The impact report should clearly identify all instances of missing data along with how these were dealt with, giving reasons for the option chosen as well as any relevant evidence to support this.

Dependent variable data

Where dependent variable data is missing, you should deal with this in the following order:

1. Consider moving the measurement period
2. Use site constants to remove ineligible time intervals (i.e. when site constant is not at its normal value)
3. Remove the time interval giving clear reasons for omission.

Independent variable data

Where independent variable data is missing, you should deal with this in the following order:

1. Use a value from an equivalent time period to replace that data, where appropriate (e.g. the same interval in a comparable year).
2. Move the measurement period to avoid having missing data.
3. Propose another option to us, justifying why options one and two are not appropriate for your project.

For further information, please refer to IPMVP (International Performance Measurement and Verification Protocol), 2019 Measurement & Verification – Issues and Examples section 4.13.

5. How to apply for a PBA measurement and verification project

5.1. Introduction

The key steps for carrying out a project and creating VEECs for measurement and verification projects are:

- apply to be an AP for PBA
- submit scoping plan
- submit project plan
- undertake baseline data collection/modelling
- undertake project activities
- undertake impact assessment
- assign rights to VEEC creation
- have impact report validated by an approved measurement and verification professional
- submit impact report to the commission
- VEEC creation and registration.

A process map is shown in Figure 3. Each step is described in the following sections.

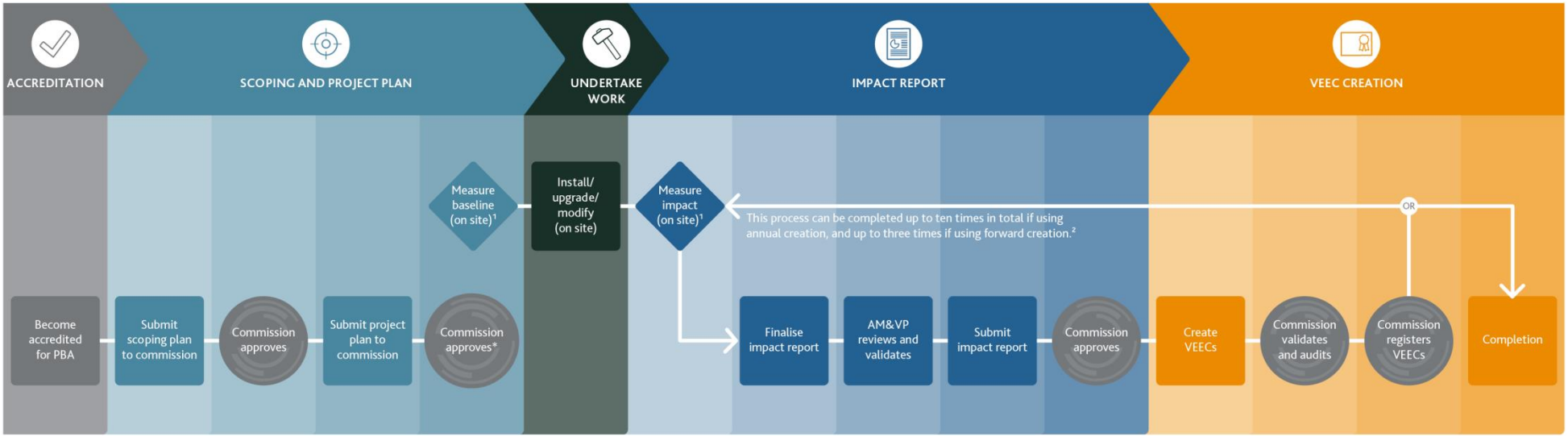
5.2. Apply to be an accredited person

We must have approved a project proponent to undertake PBA under the PBA Regulations before you can create VEECs from these types of projects.

If you are not yet accredited, the process is described in the Application Guide for Accredited Persons.

If you are already an AP and want to apply to participate in PBA, the application process is different from previous schedules and uses a different form. The process is described in the Application Guide for Accredited Persons and the Project-Based Activities Application Form which are both available at www.esc.vic.gov.au/become-veu-accredited.

The AP approval process for PBA is simpler than the AP accreditation process for other schedules.



[1] The baseline and impact measurements must be completed before the end of the stage indicated. These measurements can take up to 24 months. In some special cases, the baseline can be measured after the work is completed.

[2] Please refer to our guidance documents for more information on reporting and VEEC creation cycles.

[3] You can start undertaking work on site before this stage is completed. You can also submit the scoping plan and project plan at the same time.

Figure 3: Process map – project-based activities – measurement and verification

This process map shows the steps businesses must follow in order to create Victorian energy efficiency certificates (VEECs) from measurement and verification projects.

5.3. Submit scoping plan

This section explains how to prepare and apply for scoping plan approval. Further details of scoping plan requirements are found in Section 5.3.1. Scoping and project plan applications are made using your VEU Registry account at www.veu-registry.vic.gov.au

The scoping plan covers a range of elements of the M&V project. The purpose of the scoping plan is to provide us with an understanding of what you plan to do, without requiring details that may not be able to be provided at this early stage of the project's development.

Having the approval in principle in two parts means that you can gain conditional approval in principle from the commission for the scoping plan, before proceeding to collect the information required for the project plan. This allows you to gain confidence that the project is likely to be eligible, before spending the money and time that it may take to gather the more detailed information required for the project plan.

Applications for scoping plan approval are made using your account at www.veu-registry.gov.au. The primary document required for this application is the Scoping Plan Approval Form.

The scoping plan must be conditionally approved in principle and a project plan application submitted to and acknowledged by the commission before any physical work on the M&V project can commence[6].

Scoping plans can be submitted at the same time as project plans using a Scoping and Project Plan Approval Form. In this case, once we have assessed and approved the scoping plan, we will contact you to inform you of your progress and check if there needs to be any changes to the project plan. You will then have the opportunity to update and re-submit. If no changes are needed, we will assess the submitted project plan.

For a combined application for scoping and project plan approval, the primary document is the Scoping and Project Plan Approval Form.

For a standalone application for scoping plan approval, the primary document is the **Scoping Plan Approval Form**.

These documents are available at www.esc.vic.gov.au/m-and-v

[6] There are some exceptions to this, such as the installation of metering. A full list of these exceptions can be found in Regulation 6 (6) of the PBA Regulations.

For a detailed list of what information must be included in the application for scoping plan approval, please refer to Measurement and Verification Method Compliance Requirements, available at www.esc.vic.gov.au/m-and-v

Before you begin you may need to estimate the number of VEECs a project will generate, in order to fulfil project activities such as providing a quote for a job, developing a business case, and other related scenarios.

As PBA M&V allows many different types of abatement technologies and energy reduction techniques, we do not provide a VEEC calculator for this purpose. It is a requirement of participation in PBA M&V that you have the requisite knowledge, or access to an expert with the requisite knowledge, in order to complete the engineering calculations necessary for these activities. Whilst not necessary, it is therefore recommended that APs participating in PBA M&V have access to an M&V expert who can assist in developing and implementing their project.

5.3.1. Scoping plan – detailed requirements

The scoping plan covers the following:

- project ownership, including providing evidence of the energy consumer's agreement to the project via a **Registration of Interest Form** (described in Section 3.4.1 of this document)
- additionality (described in Section 3.4.5 of this document)
- project purpose (described below).

We require the Registration of Interest Form as evidence that the energy consumer knows about the project and agrees to you submitting a scoping plan for approval. This stops speculative applications being submitted to us. However, please note that this document **does not** bind the energy consumer to any agreement with the AP or guarantee that the project will be undertaken. The project will not be made publicly listed until later in the process when the project plan is approved in principle.

The application for scoping plan approval requires you to explain what the project involves and how this aligns with the activity's eligibility requirements. The project purpose should establish:

- project name
- project site(s)
- expected commencement date
- description
- the service(s) affected
- energy sources affected

If the project involves multiple sites you must describe the similarity of sites and upgrades.

Each is described in more detail below. The scoping plan is also used to assess additionality, as described in Section 3.4.5 of this document.

Project name

The project name is the public reference and identifier for the project, and will be shown on the Register of Approved Project Plans, found at www.veu-registry.vic.gov.au/register-projects. You should nominate your preferred name for the project. That name:

- must be unique
- must not mislead about the project's ownership or purpose
- must not contain language inappropriate for a publicly listed project.

For example, the name can use the following convention: [company name]_[site]_[project purpose]_[start date] e.g. Packaging Company_Moorabbin_Boiler Upgrade_Dec 2017.

If you or the energy consumer are concerned about having certain details publicly listed, such as the name of the company, you do not need to have this explicitly stated in the project name. However, project names that do not give the correct purpose and start date cannot be used.

Project site(s)

The location should be an address, where available. A lot number or equivalent or GIS coordinate can be used where no other location identifying reference is available.

For a multi-site project, all site addresses must be provided at scoping plan stage.

Expected commencement date

The expected commencement date, also known as the project works start date, is the date on which physical works for the purpose of the project are expected to commence at that site.

Description

The description is your explanation of the project. Use this section to describe the activities being undertaken as part of the project.

This is a high level description and should provide us with a basic understanding of everything that is being proposed, and whether this falls within the general scope of the relevant M&V project.

Service(s) affected

Each measurement boundary will have service(s) which are affected by the upgrade. Use this section to explain which service(s) will be affected by which measurement boundary. For multi-site projects the service(s) affected must be similar across all sites within the project. We may refuse a scoping approval if the upgrade does not meet this requirement.

Energy sources affected

The energy sources affected are the electricity and gas sources within each measurement boundary. These will generally be fixed electricity and mains gas utilities. Where other energy types are affected, or where the project involves fuel switching, provide details of each energy source. Refer also to Section 3.4.2 of this document for further details). For multi-site projects the energy sources must be essentially identical across all sites within the project. We may refuse a scoping approval if the upgrade does not meet this requirement.

5.4. Submit project plan

This section explains how to prepare and submit an application for project plan approval. Further details of project plan requirements are found in Section 5.4.1. Scoping and project plan applications are made using your VEU Registry account at www.veu-registry.vic.gov.au

The project plan includes the specific details of the project which builds on the description provided in the scoping plan. The purpose is to provide us with a detailed picture of exactly what you plan to do under the project.

The project plan can be provided at the same time as the scoping plan; however, it is not required at that stage.

As of 1 July 2021, 'placeholder'[7] project plan applications will not be considered as having been received by us. These have been accepted since 2017, while the M&V method has been new to the VEU program. However, we have noticed that some projects have not delivered a complete project plan until after the project is complete and post-project measurements and modelling have taken place. Retrospective planning is not the intention or purpose of a project plan application.

The actual measurement and verification of the project does not need to be included in a project plan, however we do expect to see how you intend to carry out the project – including the measurement and verification – before project works are complete and the affected energy consuming equipment is back in service. All work must take place in accordance with the approved project plan.

We understand that sometimes projects move very quickly in the real world and this might not be possible. If you believe that you have a valid reason to submit an incomplete project plan you should contact us as soon as practicable to approve this approach. You will still be expected to

[7] 'Placeholder' project plans are plans submitted to us that are not complete, contain blank documents or copies of other project plans, or are otherwise incomplete for the purposes of the specified project.

provide a complete project plan application before project completion. Project plans not meeting these conditions may be considered ineligible and as such, will be rejected.

From 1 July 2021, you cannot start work on a project where a **complete** project plan has yet to be received by us, unless you have contacted us to approve submission of an incomplete project plan.

All work must take place in accordance with the approved project plan. It is strongly recommended that you await full approval in principle for the project plan from the commission before beginning work on the project as M&V projects can have significant cost implications for you as the AP, site owners and/or energy consumers. The benefits of starting work on the project early should be weighed against the potential consequences of the project plan not being approved.

The project plan must be acknowledged as having been received by the commission **prior** to the project works start date.

The primary document required for this application is the **Project Plan Approval Form**. If you are submitting this application at the same time as the application for scoping plan approval, you should use the Scoping and Project Plan Approval Form.

These documents are available at www.esc.vic.gov.au/m-and-v

Further details of what must be included with the application for project plan approval are listed in Measurement and Verification Method Compliance Requirements.

5.4.1. Project plan – detailed requirements

Specific requirements will vary by M&V project; however, they will all cover the following:

- project team
- project delivery schedule
- project details
- M&V plan

These are described in more detail in the subsequent sections.

Project team

The project team includes the positions required for successful delivery of the project. These will include the following:

- key roles **–** described in detail in Section 7.3
- expert advisors – described in detail in Section 7.6
- agents – described in detail in Section 7.7

You will be required to identify the key roles during the operation and administration of the project. You must identify the responsibilities each of the key roles will have for specific elements of the project. These may include planning, design, delivery or administrative tasks.

You may also engage expert advisors to support the successful delivery of your activity or to provide advice on our compliance requirements. In addition to key personnel and expert advisors, you may nominate an agent to act on your behalf. Agents may be responsible for the program administration for the project, or could play large roles, up to and including a full service agent who undertakes the project on behalf of the AP.

Project delivery schedule

The project delivery schedule will outline the timing for implementation of the project. This will identify key dates and any relevant tolerances. These timings form the approved implementation approach, with all key timings included. This may include, but is not limited to:

- baseline start and end dates
- project works start date
- project works end date (or operational date) which forms the start date for the first reporting period for annual creation methods for that measurement boundary
- proposed start and end dates for the operating period (for forward creation methods).

The project may consist of a single activity or upgrade; however, the M&V method allows for multiple or ongoing essentially identical activities at similar sites to be undertaken under the PBA Regulations.

As the AP, you should note that the project works end date is the date and optionally the time that all project upgrades within a measurement boundary are completed (this includes testing and commissioning). The last project works end date for the project is the implementation start time, which marks the beginning of the maximum time period for forward creation, if relevant.

Project details

The project plan builds on the details provided in the scoping plan. The detailed description should provide information on the specific equipment being used, how the upgrade will take place and other relevant details related to the project.

The primary focus of the project description is to:

- establish geographical and/or system bounds for the activity. For multi-site projects you must describe how the proposed measurement boundaries are consistent for each site
- identify which type of activity is being undertaken
- explain how the activity will result in measurable abatement including an estimate of greenhouse gas reduction (refer to Section 5.4.2 for specific requirements)

- provide the commission with confidence that as the AP you understand how to implement a successful project of the type described
- provide an estimate of total project costs.

Specific requirements are set out in the PBA Regulations, M&V specifications, the VEET guidelines, guides published on the commission website, and any relevant standards.

M&V plan

APs operating an M&V project are required to complete an M&V plan in line with the principles in Chapter 4 of EVO 10000–1:2014 International Performance Measurement and Verification Protocol (IPMVP) Core Concepts. You are required to develop the plan using option B or C from the IPMVP. Options A and D are not eligible for M&V projects at this time.

The M&V plan will include items described in Section 4 of this document, such as measurement boundary, VEEC calculation approach, M&V option, and uncertainty. For a comprehensive list of the requirements of an M&V plan refer to Measurement and Verification Method Compliance Requirements.

5.4.2. How much detail to provide in the estimate of carbon dioxide abatement

At the project plan stage, the commission must be assured that the project will result in genuine abatement. As such, an estimate of the carbon dioxide equivalent of greenhouse gases to be reduced by the project must be provided as part of the project plan. This estimate must be provided with some basic calculations to show how the abatement will occur, and where a project includes several energy saving activities, how much abatement is due to each activity.

The impact report must show, with a degree of statistical precision, the energy which has been saved due to the project, and VEECs are created using this information. As such, the abatement estimate calculations at the project plan stage do not need to be accurate, or to a high level of detail. However, they do need to clearly indicate how the savings estimate has been determined including the main assumptions made. Overall the savings estimate must ensure that the project plan indicates two things:

- the applicant holds or can access the knowledge, skills or capacity to deliver the project described in the application, and
- the project will result in genuine abatement.

5.5. Undertake baseline data collection/modelling

The baseline is the main piece of evidence that you will need to collect in order to show site conditions before any project activity is undertaken. This is achieved with a baseline energy model. Specific requirements are set out in Section 4.4.3 of this document, the PBA Regulations, M&V

specifications, the VEET guidelines, guides published on www.esc.vic.gov.au/m-and-v and any relevant standards.

A baseline energy model is a model established by regression analysis or an estimate of the mean that quantifies energy use before the project is undertaken. Getting the right baseline data is absolutely essential to the PBA measurement and verification method measuring genuine abatement. Getting the baseline wrong means it is likely that VEECs will not be able to be created for a project, as it may be impossible to redo the baseline.

When developing the baseline energy model, you must follow the process outlined in the M&V plan submitted as part of the project plan. If there are any differences in the process, we must have approved your variation for the project plan before you submit your impact report.

To create VEECs, you must have collected all the relevant baseline information specified in Section 4.4.3 of this document and stored it according to the requirements of the VEET Act. You need to produce a baseline model using either regression analysis or an estimate of the mean.

There are several other types of information you will need to gather for your records, beyond the data you need to create VEECs using the online system. Ensure you consult the relevant section of the Measurement and Verification Method Compliance Requirements. Contact the VEU support team if you are still unsure of your obligations.

The approved project plan requires you to collect baseline data on energy consumption and relevant factors that influence the energy consumption for the duration of the baseline period.

Once data collection is complete, you must undertake statistical data analysis and establish a baseline model. This must be done correctly: failure to adequately capture the baseline conditions could render the entire project incapable of creating VEECs.

The baseline data and model is submitted as part of the application for impact report approval, after the actual project works have been completed and the impact measured. Refer to Section 5.9 for further detail on impact report requirements.

A baseline energy model must not be used to calculate energy savings until we are satisfied that the model provides a reasonably accurate and reliable estimate of measured energy consumption. We may take advice from an approved M&V professional, and we can withhold approval unless it is assured that the model is accurate.

5.6. Undertake project activities

“Project activities” is the carrying out of projects and control measures that result in electricity and/or fossil fuel gas savings (abatement). The **project works start date** is the date at which project works commence within a given measurement boundary, and the first project works start date for a project cannot occur before the project’s scoping plan application has been approved

and the project plan application has been submitted. The PBA Regulations includes a list of activities related to the project which may occur before scoping plan approval under Regulation 6(6). Measurement of the impact cannot happen before the project works end date for a measurement boundary. Once all project works are complete (including all measurement boundaries), the **implementation start time** occurs. For a project with multiple measurement boundaries (such as where a project includes multiple sites), the implementation start time is the same as the last **project works end date** for the project. If the project only has one measurement boundary, the implementation start time is the same as the project works end date.

For forward creation, the operating period for each measurement boundary cannot begin until its respective project works end date, and for annual creation the first reporting period begins immediately after this date.

For an installation to be eligible under VEU, it must comply with all relevant laws and regulations, including those relating to OH&S and product safety. This applies to all projects – including where you subcontract any work to a third party.

As an AP you can use subcontractors to undertake project work on their behalf. However, the AP remains responsible for ensuring the certificates created comply with the VEET Act and regulations.

As the use of subcontractors is a compliance risk, you may be required to provide information about the contractual arrangements for each project you undertake. This information is recorded on the VEEC Assignment Form for Project-Based Activities and may be requested when you create the VEECs associated with each project.

The highest priority during the project works is that all relevant OH&S laws, standards and precautions are observed. You will also need to ensure that your staff and/or subcontractors collect any relevant compliance information about the project processes.

5.7. Undertake impact assessment

The impact assessment determines the abatement that has been achieved by the project, and therefore how many VEECs can be created. Specific requirements for impact assessment are set out in Section 4.12 of this document, the PBA Regulations, M&V specifications, the VEET guidelines, guides published on the commission website, and any relevant standards.

The method for assessing the impact depends on the method of VEEC creation. For annual creation, impact assessment is achieved using actual measurements of energy consumption from the reporting period with the baseline energy model. For forward creation this is achieved by comparing an operating energy model using measurements of energy consumption from the operating period with the baseline energy model. An operating energy model is a model established using regression analysis or estimate of the mean that quantifies energy use after the

project is undertaken. The requirements of an operating energy model are described in Section 4.4.3. Getting the right operating model data is essential to the M&V methodology measuring genuine abatement.

As with baseline models, an operating energy model must not be used to calculate energy savings if we are not satisfied that the model provides a reasonably accurate and reliable estimate of measured energy consumption.

If you choose to use software other than Microsoft Excel to model the impact of the project, you will be required to demonstrate/run this modelling in a virtual meeting with us. This meeting will be recorded and stored as supporting evidence for your project.

5.8. Assignment of VEEC creation rights

The relevant energy consumer for a project holds the right to any VEECs that can be created.

Before VEECs can be created, there must be an assignment of rights between the energy consumer and the AP in accordance with Section 8 of the VEET guidelines.

Once the project has been carried out, the energy consumer must complete and sign a VEEC Assignment Form for Project-Based Activities when assigning their right to create VEECs to a third-party AP, which is submitted along with the first impact report. This form collects the information necessary for you to create certificates and demonstrate compliance with the legislation.

You must ensure that the person signing on behalf of the client, the 'authorised signatory', does indeed bear legal authority to sign on the behalf of that entity. In the event of multiple energy consumers, you will need to provide an assignment form for each energy consumer.

Where you (the AP) are also the energy consumer and you are carrying out a project at your own site, you must still assign the rights to create VEECs to yourself. Therefore, even in this case a VEEC assignment form must still be filled out by the energy consumer, which in this case is you (the AP). You must provide both the declaration for the upgrade manager representing the AP and the declaration for the authorised signatory representing the energy consumer.

You may customise the coversheet for your own VEEC assignment form to incorporate additional explanatory text, company logos and other features. When applying for accreditation, you will need to provide a copy of your proposed form for our review, as part of your accreditation application process. No other changes to the form will be allowed.

You must give a copy of the form to consumers at the time of signing. Additionally, you must ensure that all personal information collected in this form is held in accordance with the Information

Privacy Principles (IPPs) under the Privacy and Data Protection Act 2014 (Vic). Details of how to comply can be found at www.privacy.vic.gov.au

5.9. Supply impact report to the commission

This section explains how to prepare and apply for project impact report approval. Further details of impact report requirements are found in Sections 5.9.1 and 5.9.2. The application must be submitted using www.veu-registry.vic.gov.au.

After the project has been implemented (i.e. project works are complete and brought back into service), and savings have been determined, an impact report can be lodged with the commission. The impact report must be submitted to us using the Impact Report Approval Form.

To submit an impact report application, your project must have received approval in principle (i.e. both your scoping plan application and project plan application must have been approved by the commission).

The primary document required for this application is the **Impact Report Approval Form**.

This document is available at www.esc.vic.gov.au/m-and-v

The impact report quantifies and reports the difference in energy use between the correct adjusted baseline and the adjusted operating energy model (for forward creation) or measured energy consumption from the reporting period (for annual creation) after a project. The impact report must include:

- baseline model and supporting data,
- operating model and supporting data,
- reported savings,
- the details of the savings calculation for each energy type in the project, and
- all other supporting evidence as stated in Measurement and Verification Method Compliance Requirements.

Begin by completing the Impact Report Approval Form. You must provide an answer to all applicable questions. The impact report approval form prompts for the attachment of several documents. A full description of each required evidence document type can be found in the Measurement and Verification Method Compliance Requirements.

You are only able to create VEECs once an impact report has been approved. If you have submitted an application for impact report approval, you are unable to submit an additional application for impact report approval until your existing application has been approved. For forward creation with top up, you can only submit an annual creation report after creating VEECs

from the forward creation report. Please refer to Section 5.9.1 for further details on the timing of impact report submission.

The impact report's content is described in Regulation 11(3) of the PBA Regulations and also M&V specifications issued under Regulation 18 of the PBA Regulations.

5.9.1. How often an application for impact report approval is required

When impact reports can be submitted depends on the method of VEEC creation that is being used for the project. Projects which are using annual creation need to lodge impact reports each year. Projects which are using forward creation only need to lodge impact reports once following the end of the operating period (or the final operating period, for a multi-site project). Those using a mix of forward creation with annual top-up will need to submit an impact report for the forward creation and then further annual impact reports for the top ups. Further VEECs (other than those created in advance through forward creation) cannot be created until the amount forward created has been exceeded.

If your project has multiple addresses, then you can submit one impact report to account for all addresses.

An example of forward creation with top-up – The maximum amount of VEECs able to be created using the forward creation method is 50,000. If your project is expected to create 60,000 VEECs, then you might wish to forward create 50,000 and then 'top-up' for the additional VEECs. The 50,000 VEECs could be created with the first impact report. Further VEECs could only be created once the project generates more than 50,000 VEECs. The other 10,000 VEECs would come from annual creation.

Projects which use both forward creation and annual creation for separate measurement boundaries may submit an impact report following the operating period for the forward creation portion and thereafter annually for the annual creation (top up) portion. You only need to submit a top up report once total savings on site exceed total savings claimed using forward creation. However, the first top up report must account for all annual energy consumption dating back to the implementation start time.

Multi-site projects must choose VEEC creation method(s) consistently across all sites.

5.9.2. Project impact report – detailed requirements

The following sections will explain the requirements of each section of the impact report approval form.

Applicant details

This section simply asks to confirm the details of the AP, and the project's name, address and contact details.

Project details

This section asks several high level questions about the outcomes of the project. You are asked to confirm that no changes have been made to the project and its team without applying for a variation (refer to Section 6.2 for details on project variations).

If the PBA project involved a lighting upgrade, you are asked to confirm that the lighting products used are listed on the commission's Register of Products, and that all old lighting equipment was properly decommissioned. Evidence of this must be provided. Please refer to Section 6.3 of this document and Measurement and Verification Method Compliance Requirements for further details of these requirements.

You must also confirm which energy sources were affected by the project, and that the reduction in greenhouse gas emissions was completed in accordance with the requirements of the PBA Regulations. Where the project included a reduction in service levels to correct over-servicing, a full justification must be included in this section. Please refer to Measurement and Verification Method Compliance Requirements for further details of these requirements. Finally, this section also asks for the total cost of the project.

Project completion

This section asks for key project dates and evidence of project completion for each measurement boundary, which occurs on the **project works end date** for that measurement boundary. Project works are considered complete when all changes have been completed, including commissioning, and the changes are brought into service.

You will be asked to confirm the baseline measurement period start and end dates (refer to Section 4.4.3 for more detail about the baseline measurement period), as well as the start and end dates of the project works. You must also submit final as-built engineering drawings.

Measurement and verification plan compliance

The measurement and verification plan compliance section provides a check list of what should be included in the project impact report document, and a measurement and verification plan compliance document. Check each of these off as completed.

The measurement and verification compliance document should confirm that the completed work described in the impact report reflects the M&V plan which was submitted as part of the project plan application. Please note that this can be included as a section of the project impact report document. If so, that should be indicated on the form so that the commission analyst can easily

find the document. If any changes to the M&V plan are required, a Variation Approval Form must be submitted. The process for variations is described in Section 6.2 of this document. A full description of the contents of a measurement and verification compliance document is found in Measurement and Verification Method Compliance Requirements.

Project impact report

For a comprehensive list of everything the project impact report needs to cover, please refer to the **Impact Report Checklist** and relevant sections of **Measurement and Verification Method Compliance Requirements**. These documents are available at www.esc.vic.gov.au/m-and-v

The project impact report is expected to be a document which explains how the project resulted in abatement. It must contain data, reasoning, justification and evidence for a number of criteria. This information allows the commission to verify the pre- and post-project conditions so that an accurate calculation of abatement can be confirmed. This document can also include the measurement and verification compliance information.

Savings should be reported to the correct number of significant digits (see Section 4.14.3) with a statement of possible errors. Any deviations from the project plan and its M&V plan should also be reported with reasons for the deviation, and an estimate of the effects on the final savings reported. You must also include a comparison between the savings estimate provided in the M&V plan and the savings determined at the impact report stage. Any significant difference(s) between the estimated and actual savings must be explained and justified.

Certain aspects of the project impact report, or background information pertaining to the report, can or should be provided to us as a separate document. For example, calculation sheets can be provided as Microsoft Excel files, which allow an analyst to follow the mathematical operations from raw data, to modelling and finally to abatement and uncertainty calculations. We will assess the mathematical and statistical validity of calculations and models against the IPMVP, having regard to the verification report from an AM&VP.

The information submitted as part of the project impact report or any of its attachments must be the exact same information provided to the AM&VP for completion of their verification report, which is described later in this section under the topic *Approved measurement and verification professional's (AM&VP) verification report*. If there are any discrepancies between these two sets of information, this may render a project ineligible to create VEECs.

The Project impact report section of the form includes a series of check lists for you to complete in order to confirm that all of the required information has been included.

The following sections should be included in a project impact report (a full description of their required contents is found in Measurement and Verification Method Compliance Requirements):

- baseline information
- operating/reporting period information
- abatement calculations
- decay factor (if applicable).

In addition to the above, this section of the form asks you to indicate the chosen method(s) of VEEC creation and the chosen IPMVP method(s), along with justification for this. Depending on your project you may choose a different method of VEEC creation and IPMVP method for different measurement boundaries within a site. The methods you choose should be consistent with the methods selected in the project plan application or they need to have been changed through an application for variation.

Approved measurement and verification professional's (AM&VP) verification report

Each impact report must be accompanied by a verification report from an AM&VP. This is an independent third party assessment of your impact report. To be an AM&VP, the individual must have been approved by the commission and listed on the Register of Approved Measurement and Verification Professionals at www.veu-registry.vic.gov.au/register-measurement-verification-professionals

For clarity, the AM&VP cannot write the impact report. A project team member such as the monitoring and measurement manager can do this. However the process, content and approach taken must be validated by the AM&VP before you submit the impact report to us. We will not accept impact reports that have not been validated by an AM&VP.

The AM&VP's verification report will either be a **basic verification report** or a **detailed verification report**.

A basic verification report assesses the M&V process, ensuring that it is IPMVP compliant and that the M&V plan that was included in the project plan was adhered to. To be eligible to submit a basic verification report, the AM&VP must be completely independent from the project. This means they cannot have been involved with the project in any way prior to receiving the impact report. They do not need to be independent from the AP undertaking the project provided they can demonstrate sufficient internal processes to ensure the AM&VP has been and is independent from the project at all times. The commission will carry out the remainder of the assessment.

A detailed report assesses everything in a basic report, and it also assesses the modelling, calculations of abatement back to references and raw data, checks that all the numbers are correct and verifiable. The commission will only need to carry out very basic checks following this type of verification report. Both types of report may be subject to an audit following VEEC creation (refer to Section 6.1 for further details). To be eligible to submit a detailed verification report, the AM&VP must be completely independent from the project as well as the AP. This means they cannot have

been involved with the project in any way prior to receiving the impact report, and they cannot be an employee of the AP, including subsidiary companies.

Further detail of the AM&VP's role can be found in the Guide for Approved Measurement and Verification Professionals, published at www.esc.vic.gov.au/m-and-v

Evidence of assignment of VEEC creation rights

The first time an impact report is submitted it must be accompanied by a VEEC Assignment Form for Project-Based Activities. This process only occurs once for each energy consumer. Where a project requires multiple impact reports (e.g. in the case of annual creation, or where an impact report is submitted to provide an updated operating energy model) an assignment form is **not** required each time. Section 5.8 explains the concept of assigning rights to create VEECs.

5.10. VEEC creation and registration

5.10.1. How to create VEECs

For PBA, VEECs can only be created with respect to an approved impact report. For details on how to apply for impact report approval, please refer to Section 5.9.

To create VEECs, an AP must submit certain information to the commission through the VEU Registry. The AP must be approved to undertake M&V projects.

Note that for multi-site projects, an activity creation record must be submitted separately for each address showing the number of VEECs for that address only.

When creating a PBA activity, the 'activity date' refers to either the operating period end date (if using forward creation) or the reporting period end date (if using annual creation).

5.10.2. The commission validates VEECs

To successfully create VEECs, the data uploaded for an activity must pass the website's validation and address verification checks. After you press the 'Save' button for validated activities, the VEECs associated with that activity are then created and are assigned a unique ID number. We then assess those certificates and decide whether to register them or not.

5.10.3. The commission registers VEECs

We (the commission) have powers to decide whether we register or do not register VEECs based on the results of the validation of the impact report and any audit undertaken. You should initially expect every PBA project to be audited before VEECs are registered. Audit frequency and timing

may change as you participate in M&V projects, decreasing with low risk rating, or increasing with high risk rating. The audit and risk assessment parts of the validation process are described in Section 6.1.

Once validated, we will raise and forward an invoice in due course for the accepted number of VEECs in order to complete the registration process. Once payment is received, we register the certificates and notify you, the AP that the certificates are now valid and therefore available to be traded and/or surrendered to the commission.

6. Other important points to consider

6.1. Your project may be subject to an audit

6.1.1. Auditing of projects

Projects using PBA methods may be the subject of an audit following VEEC creation. All early PBA projects submitted by APs are highly likely to be the subject of an audit prior to VEEC registration. While every PBA project may not be audited by the commission, the frequency and timing of projects selected for audit may change for each AP depending on the project dimensions such as technology involved, complexity and VEEC materiality of the project.

If a project is the subject of an audit, it will be carried out by one or more staff members of the VEU Audit & Compliance team. The audit is likely to occur between the VEEC creation and registration stages, after the impact report has been approved by the VEU Technical Services Group.

The audit will involve the verification of supporting documentation collected during the scoping plan, project plan and impact report stages. The VEU Audit & Compliance team may also contact the energy consumer as a part of the audit to verify project details and operational aspects of the project. During this process, the VEU Audit & Compliance team may request additional supporting documentation from the energy consumer to validate the VEECs claimed. If the information collected from the energy consumer does not match the project documentation submitted by the AP to the commission, the VEU Audit & Compliance team may contact the AP to verify further details.

Where the audit has shown that the VEECs claimed have not been created in accordance with the VEET Act, PBA regulations, the VEET guidelines and other commission documents; the VEU Audit & Compliance team may not recommend the VEECs or a portion of the VEECs to be registered. This may also mean the AP can resubmit corrected documentation (such as modelling and calculations) in order to support the adjusted amount of VEECs claimed.

6.1.2. Enforcement

Where investigation has shown unintentional non-compliance with the VEET Act, Regulations made under the VEET Act, the VEET guidelines and other commission documents and requirements, the commission may

- warn the AP
- reprimand the AP and/or
- impose a condition or restriction on the accreditation of the AP.

Where an AP without reasonable excuse does not comply with a direction to produce documents, or provides false or misleading information, the penalty is 60 penalty units for an individual, and 240 penalty units for a body corporate. The value of a penalty unit is set annually by the Department of Treasury and Finance, and is updated on 1 July each year.

If the commission considers that an AP has breached undertakings given under the VEU program or improperly created VEECs, the commission may suspend or revoke their accreditation and issue a certificate surrender notice to that person.

The penalty for failing to comply is 600 penalty units and an additional 1 penalty unit for each certificate that the person fails to surrender in accordance with the order.

6.2. Submit a variation when something changes

A variation is any change to an approved or conditionally approved M&V project and/or the project team running it. Changes can be expected in any large project, especially in the early stages. Some variations, such as the forward creation of more VEECs based on improved measurements, can be proposed right up until final VEEC creation.

Once a scoping or project plan has been submitted, we must approve any proposed change(s). An application for variation, for which the relevant change has already been made in practice, may not be approved, depending on the nature of the variation. We therefore strongly encourage applicants to await our decision before making any changes.

Please note – it is not a requirement that you seek a variation before making a change, however we **strongly** advise seeking approval first. It is in your interest to inform us of any changes as early as possible, to confirm that the variation will be eligible before proceeding. This may also result in faster processing times.

Unapproved changes (especially from the project plan) that affect the result of impact reports could result in VEECs not being created for the project. In addition, a project cannot create VEECs while a variation request is being processed.

Some project details can be changed readily after approval. These include changes to site ownership, project scope, project boundaries and most key project roles. Other conditions cannot be changed readily and may warrant a new project application. These include a change of AP, a change of location (or project sites if there are multiple sites within the project) or change of purpose. Table 3 lists the types of variations that can and can't be made.

Table 3: Acceptable and unacceptable variations for M&V projects

The commission will consider variations for	The commission will not consider variations for
Site ownership	Requests not made on the standard Variation Approval Form
Lighting products and their configuration including lamps, luminaires and any lighting control devices such as sensors to be used	The AP, except in exceptional circumstances
Project measurement boundaries	Changes to the project's physical location (including adding or removing sites for a multi-site project)
Increase in the scope of the project, if the purpose hasn't changed	Changes to the type of energy conservation measure
Reduction in the scope of the project	Changes to the project's purpose
Modelling approach	Adding affected services to the list approved in the scoping plan
VEEC creation method	Any addition of activities outside of the site boundary
Fix mismatch in boundaries between the project plan and the impact report	Any change that makes genuine abatement unlikely
The IPMVP option	Any change that introduces unacceptable risk to the project
Impact reports that significantly over-create VEECs	Any change that removes additionality
Other factors, if compelling reasons exist	Projects that are still processing another variation i.e. one variation is allowed at a time
Changes to the project organisational structure, including required skills, qualifications and experience required for each project role to be undertaken	Unreasonably frequent changes
	Multiple revisions of previously made changes
	Any change that fails requirements set out in the VEET Act, Regulations made under the VEET Act, the VEET guidelines and guides published on the commission website
	Changing the method used to calculate abatement – for example, changing from benchmarking to M&V

Changes in project team personnel are handled differently. In this case the need for change must be communicated as soon as possible, and you will need to recruit replacements with the same or

higher skills and experience as those set out in the project plan, so that you still have the capacity to carry out the agreed project.

A simple process has been put in place to enable variation applications. A Variation Approval Form (available on www.esc.vic.gov.au/m-and-v) should be submitted using your VEU Registry account along with any updated scoping or project plan applications (and any other relevant documents). The variation is submitted by creating a new 'New Variation' on the 'Variations' tab under the relevant project listing. The variation approval form is a relatively short form which allows you to communicate the proposed variation quickly. It enables us to quickly assess if we will consider the variation. Larger variations are likely to be bespoke, and in such cases we will issue a request for further information following receipt of the short variation application. Table 4 outlines what changes require you to submit a variation application for approval. If you are unsure whether your change needs a variation, please contact us.

Table 4: Changes that require an application for variation – M&V projects

Matters that require a variation	Matters that do not require a variation
Scope of the project, if purpose hasn't changed, including reducing the project scope	Changes to project dates
Changes to the IPVMP option	Lighting products and their configuration including lamps, luminaires and any lighting control devices such as sensors to be used, where this was indicated in the application for **scoping** plan approval
Lighting products and their configuration including lamps, luminaires and any lighting control devices such as sensors to be used, where this was indicated in the application for **project** plan approval	Increases in the level of insurance held
Changes to the project's participation in other prescribed greenhouse gas schemes	Changes in project cost
Changes to site ownership	Changes to planning approval requirements
VEEC creation method	Changes to the implementation model
	Changes for some indicative information included in an M&V plan in the application for **project** plan approval (e.g. independent variables, site constants and sources of uncertainty)
	Changes to key roles responsible for the delivery of the project, including the use of agents and expert advisors

Should you wish to vary your project, you should discuss it with us as soon as possible. If the variation will be considered, you can lodge more details and seek approval.

A variation must be submitted before the next stage of the process can be approved. For example, if you are applying for a variation to the project plan after the works are completed, we will need to approve this variation before the impact report can be approved.

If it won't be considered, you can either proceed with the original plan, or lodge a new project.

For clarity, a decision to not consider a variation is a rejection of the variation. Note also that a decision to consider a variation is not an approval; any such approval requires a full assessment of a larger application. We can approve small variations based only on the variation application if warranted.

6.3. How to use products under PBA M&V

To use products in an M&V project, you must ensure the following criteria are met:

- any lighting product(s) installed are listed on the Register of Products (found at www.veu-registry.vic.gov.au/register-products) prior to submitting the first impact report for the project
- any lighting product(s) removed as part of the project must be decommissioned in accordance with the VEET Act, Regulations made under the VEET Act, and VEET guidelines
- any mercury containing lighting product(s) replaced as part of the installation has been disposed of in a class of waste disposal facility as determined by the commission
- any lighting product(s) replaced as part of the installation were not installed for the purposes of being decommissioned as part of the project (i.e. the baseline environment is not altered prior to the installation).

You only need to use registered products and provide proof of decommissioning for lighting projects. Non-lighting equipment does not need to be registered or decommissioned.

Lighting products that can be used in M&V projects are those listed in the Register of Products for Activities 21, 27, 34 and 35. Alternatively, they may be another type of lighting product which would not ordinarily be listed under any of these Activities.

Any project that involves a lighting upgrade must provide us with details about what products are removed, what products they are replaced with, any additional products that are installed (including details of any sensors that any of these products use) and an explanation of the zoning for the lights (this could be done by providing a floorplan).

APs and VEU Registry account holders (including manufacturers) seeking to add a new lighting product to the Register of Products for use in an M&V project must submit an application under the appropriate Activity to the commission using the online product application tool via your VEU Registry account. For example, Activity 34 is likely to be the most appropriate register if you wish to

use a highbay lamp in an M&V project. The commission can then verify that the product can meet the minimum criteria required by the principal VEET Regulations for that Activity.

For more information about the product application and assessment process, please refer to the Lighting Product Application Guide (found at www.esc.vic.gov.au/veu-product-applicants), which contains a detailed step-by-step guide to getting a product listed for each prescribed activity category on the Register of Products.

If the installation environment is unusual and the lighting product may therefore not normally fit under Activity 21, 27, 34 or 35, or if you are unsure how to proceed, please contact the VEU support team for further information on how to apply for the product to be listed on the register. It is recommended that this is done as early as possible (prior to submission of your scoping plan).

Decommissioning requirements do not apply to projects which do not involve lighting equipment removal. We understand that in many of these cases, some equipment needs to be left in situ – for example as a backup, or for maintenance purposes. This is acceptable since the old equipment is unlikely to be used, except during maintenance or equipment failure situations.

6.4. How and why the commission may cancel a project

We, the commission, may move to cancel projects for which project plan approval has been awarded if we are satisfied that there has been an unreasonable delay in the work commencing to undertake the activities specified in the application for project plan approval.

Should we have grounds to believe that such a delay has occurred, we will investigate the project. If the investigation results in us deciding to cancel the project, a cancellation report will be compiled and a notice of intent to cancel will be sent to you, the AP. This notice will ask you to provide reasons why you believe the project should not be cancelled.

You then have 28 days to respond. If an adequate response is not received, we will send a notice of cancellation, and remove the project from the Register of Approved Project Plans so that VEECs cannot be created for that project.

6.5. How and why an AP may relinquish a project

Relinquishment is a means by which to end a project early. This is an option if circumstances change and it is clear that the project won't succeed as planned. As the AP, you have the option to request relinquishment of a project at any stage by applying to the commission in writing and receiving confirmation from the commission. You may request for your projects to be relinquished by selecting the appropriate option on the specific project page within the VEU Registry and receiving written confirmation from the commission. If you are considering relinquishing a project, you should discuss it with us as soon as possible

6.6. Time limits for creating certificates

Section 17(2) of the VEET Act states that a certificate must be created no later than 6 months after the end of the year in which the reduction in greenhouse gas emissions that results from the prescribed activity occurs.

For projects using forward creation, the greenhouse gas emissions reduction is taken to have occurred 6 months after the end of the operating period. This means that:

- If the end of the operating period falls in January to June, the certificates must be created not later than June the following year.
- If the end of the operating period falls in July to December, the certificates must be created not later than June the year after the following year.

For projects using annual or top up creation, the greenhouse gas emissions reduction is taken to have occurred 6 months after the end of the reporting period. This means that:

- If the end of the reporting period falls in January to June, the certificates must be created not later than June the following year.
- If the end of the reporting period falls in July to December, the certificates must be created not later than June the year after the following year.

Refer to Table 5 below for further clarity on the timing of certificate creation.

Table 5: Timing of greenhouse gas reduction and certificate creation

Operating or reporting period ends on	Certificates must be created by	Total time allowance (to the nearest month)
1 January 2018	30 June 2019	18 months
30 June 2018	30 June 2019	12 months
1 July 2018	30 June 2020	24 months
31 December 2018	30 June 2020	18 months
1 January 2019	30 June 2020	18 months
30 June 2019	30 June 2020	12 months
1 July 2019	30 June 2021	24 months
31 December 2019	30 June 2021	18 months

6.7. Record keeping requirements

In addition to the requirements set out in Section 72 of the VEET Act, you must keep records and documents which provide evidence of the following, to the extent applicable:

- the records referred to in Section 5.8 of this activity guide in relation to assignments of rights to create certificates
- sales, purchase and/or service records of each product or service which constitutes a prescribed activity for which certificates have been created, including make and model number, if applicable the street address and postcode of the *consumer* (if in a residential premises) or the ABN/ACN, business name, address and postcode (if in a business or non-residential premises)
- all raw baseline data, baseline model and other supporting information, raw operating data, operating model and all supporting information, metering accuracy and calibration information and equipment specifications
- any additional record keeping requirement set out by the commission.

Records should be kept in case of audit by the commission, for a period of six years from the date on which the final certificate for the PBA project has been registered.

7. Roles and responsibilities

7.1. Commission powers

The PBA Regulations give the commission powers to administer PBAs that as the AP you should be aware of. They include:

- The commission may grant or refuse a scoping approval.
- The commission may grant or refuse a project plan.
- The commission may publish approved project plans on a public register, naming the project, the AP, the project's location, the method intended to calculate energy savings and any other non-commercially-sensitive information as the commission requires.
- The commission must not approve a project plan if the commission is not satisfied that the project is likely to reduce greenhouse gas emissions.
- The commission may cancel a project plan approval after 28 days written notice if the commission is satisfied that the project is unreasonably delayed or unable to satisfy the requirements of the PBA Regulations.
- The commission may grant or refuse a variation to a scoping approval or project plan.
- The commission may approve or refuse an application to be registered as an approved measurement and verification professional (AM&VP).
- The commission may publish a register of AM&VPs and may remove people from the register after 28 days written notice.
- The commission may approve or refuse an impact report.

- The commission may decide a VEEC is not eligible for registration, if the commission is not satisfied that the activity meets the requirements of the VEET Act and regulations.

7.2. Role of the accredited person (AP)

Each project must have a nominated project owner to be responsible for the project. This organisation or natural person is required to apply to the commission for accreditation as the AP. For clarity, the AP can be an organisation; it does not have to be a natural person.

We may approve an organisation or natural person as an AP once all requested information has been lodged and assessed, and all necessary fees have been paid within a specified time frame.

Where the AP is a natural person, it is not necessary for them to be directly employed by the project owner, but they must have the authority to sign on the project owner's behalf. Where the AP is an organisation, the roles of the AP on VEU program documentation must be completed by one natural person.

You as the AP must ensure that the VEECs created with respect to a project are compliant with the VEET Act, Regulations made under the VEET Act and VEET guidelines. If you feel unsure about the obligations and risks associated with being an AP, you should seek independent legal advice.

As the AP you are required to identify what the key roles in a project are, provide a suitable explanation of each of these roles, and record who is filling them.

You can use subcontractors to undertake project work on your behalf. However you remain responsible for ensuring the VEECs created comply with the VEET Act, Regulations made under the VEET Act and VEET guidelines. You may be required to provide information about the contractual arrangements for each contractor for each activity you undertake.

For an installation to be eligible under the VEU program, the AP must ensure it complies with all relevant laws and regulations, including those relating to occupational health & safety (OH&S) and product safety, among others. This applies to all installations – including where you subcontract the installation work to a third party.

The AP must also keep all records relevant to all project activities in the manner and for the period specified in the VEET Act. For clarity, this means for six years from the date on which the final certificate for the PBA project has been registered.

7.3. Key project roles

The key roles are responsible for delivery of specific critical elements of the project. All projects must have, as a minimum, an upgrade manager, a risk manager and a monitoring and measurement manager, described in the following sections. For smaller projects, this may all be

you (the AP) alone; however, larger and more complex projects are likely to have several key roles responsible for a range of functions.

As part of the project plan, you will be required to provide an organisation chart indicating the description of the responsibilities and functions for each of these mandatory roles and who is filling them. In addition to this, you will need to identify any relevant skills, qualifications and/or experience for each.

Some examples of other key roles may include lead engineer, operations manager, safety manager, etc. You are not required to nominate a specific individual to fill the key roles identified; however, you may provide this if someone has been appointed.

For M&V projects, where you are using an internal M&V expert to oversee your project planning and baseline who is not filling one of the key roles described in Sections 7.3.1 to 7.3.3 below, they will need to note this as a key role. Any expert advisors as described in Section 7.6 must also be listed.

Each of the three mandatory roles (upgrade manager, monitoring and measurement manager, and risk manager) are described in the sections below.

7.3.1. Role of the upgrade manager

For each upgrade, you must nominate a single natural person to legally represent the project owner to verify the upgrade documentation, including the assignment of rights. This person is referred to as the ‘upgrade manager’.

It is not necessary for the upgrade manager to be directly employed by the AP, but they must have the authority to sign on the AP’s behalf. The roles of the upgrade manager on program documentation must also be completed by one person.

7.3.2. Role of the risk manager

For each upgrade, you must nominate a single person who is responsible for managing safety, risk and monitoring/anticipating issues that might arise during the course of the project. This person is referred to as the ‘risk manager’.

It is not necessary for the risk manager to be directly employed by the AP. The role of the risk manager on program documentation must also be completed by one person.

7.3.3. Role of the monitoring and measurement manager

For each project, you must nominate a single person responsible for monitoring independent variables, static factors and the like. This person is the ‘monitoring and measurement manager’.

It is not necessary for the monitoring and measurement manager to be directly employed by the AP. The roles of the monitoring and measurement manager on program documentation must be

completed by one person. The monitoring and measurement manager can design the measurement and verification plan (M&V plan), and must oversee it. The monitoring and measurement manager cannot be the approved M&V professional for a project (see Section 7.5).

7.4. Combined roles

All the roles of AP, upgrade manager, risk manager and monitoring and measurement manager can be done by the same person. The approved measurement and verification professional (described in Section 7.5 below) cannot fulfil any other role.

As the AP, you are required to identify what the key roles are, provide a suitable explanation of each of these roles, identify the qualifications and skillset of a person required to fill that role, and record who is filling them.

7.5. Role of the approved measurement and verification professional (AM&VP)

For each project, you must nominate a single person to validate the approach taken in, and content of the impact report and check that the M&V plan and impact report are consistent.

This person is referred to as the approved measurement and verification professional (AM&VP). This person must be accredited by the commission. AM&VPs are listed on the Register of approved M&V professionals at www.veu-registry.vic.gov.au/register-measurement-verification-professionals. A Guide for Approved Measurement and Verification Professionals and an Application for Approved Measurement and Verification Professionals Form are available on www.esc.vic.gov.au/m-and-v

To be eligible to submit a basic verification report, the AM&VP must be completely independent from the project. This means they cannot have been involved with the project in any way prior to receiving the impact report. They do not need to be independent from the AP undertaking the project provided they can demonstrate sufficient internal processes to ensure the AM&VP has been and is independent from the project at all times.

A detailed report assesses everything in a basic report, and it also assesses the modelling, calculations of abatement back to references and raw data, checks that all of the numbers are correct and verifiable. To be eligible to submit a detailed verification report, the AM&VP must be completely independent from the project as well as the AP. This means they cannot have been involved with the project in any way prior to receiving the impact report, and they cannot be an employee of the AP, including subsidiary or parent companies.

The role of the AM&VP must be completed by one person. The AM&VP cannot carry out any other role in the M&V project.

For more details on AM&VPs and the requirements of basic and detailed verification reports, please refer to Section 5.9.2 of this document and the Guide for Approved Measurement and Verification Professionals.

7.6. Expert advisors

An expert advisor is a third party advisor engaged by you to assist in development of the project. The expert advisor is an individual with relevant expertise in the methodology or technology being used and generally will have industry experience and/or relevant tertiary qualifications.

Expert advisors are optional. If an AM&VP has been engaged to assist in developing the M&V plan or project, they should be listed in the project plan as an expert advisor.

You can engage an expert advisor who is also an AM&VP to help develop aspects of your project which may include your project plan, M&V plan, baseline, and impact report. For clarity, to avoid any potential for a conflict of interest, the AM&VP acting as an expert advisor must be a different person to the AM&VP being engaged to validate the impact report for the same project.

7.7. Using subcontractors and agents

As an AP, you can use subcontractors to undertake installations on your behalf. However, all responsibility for the compliance of the PBA project with the VEET Act, Regulations made under the VEET Act and VEET guidelines rests with you. Non-compliant projects will not be tolerated and may be subject to enforcement action. As the use of subcontractors is a compliance risk, you may be required to provide information about the contractual arrangements for each project you undertake.

APs and energy consumers may also nominate an agent or agents that will represent them for the purposes of aspects of the project. An agent is someone nominated by the AP to engage with the commission, on their behalf. An agent may be engaged to perform a variety of tasks, from administrative and program participation tasks, to operating elements of the project.

If you nominate an agent, the agent is not responsible for delivery of the project. As the AP you continue to be responsible for any action undertaken during participation in VEU.

The specific responsibility and function of the agent will govern what evidence needs to be provided to satisfy us that the agent can perform their function safely and effectively.

If you decide to use an agent, you need to provide the agent written authority to act on your behalf. You will also need to let us know if and when we can expect to deal with the agent on your behalf.

Where you have nominated an agent, you must indicate what that agent will be doing for the project, when we should contact the agent instead of you, and provide a summary of the agent's experience with similar types of projects.

You may also be acting solely as a certificate aggregator. If so you are responsible to ensure any certificate you create complies with the VEET Act, Regulations made under the VEET Act and VEET guidelines.

8. Risk management

8.1. Insurance

PBA projects will generally be larger scale with higher costs and larger risks than other activities carried out under the VEU program. As the AP you are encouraged to seek guidance on the appropriate type and level of insurance for your project.

You are required to have public liability cover of at least $5 million, product liability cover of at least $5 million and professional indemnity cover of at least $5 million to undertake PBA. This must include cover for rectification.

However, you can apply for a waiver of these requirements if you are undertaking projects on your own site. The Insurance Waiver Declaration form is available at www.esc.vic.gov.au/m-and-v. If you are undertaking projects on your own sites you are advised to seek guidance and apply your own judgement on the appropriate type and level of insurance for the project. For clarity, the commission is not mandating the level of insurance needed for APs running projects on their own sites; the commission expects these APs to determine their own insurance needs.

Given their key role in the M&V process, the AM&VP must have a minimum professional indemnity coverage of $5 million.

Other expert advisors to any project are also encouraged to have professional indemnity insurance, and you are encouraged to consider this when contracting expert advisors. M&V projects will generally have large budgets, and any consequences of acting on inaccurate advice may also be large.

The commission encourages APs and experts to consider increasing the value of all types of insurance coverage in line with the value of the project, the risks involved and the consequences of any flow-on effects.

For projects not undertaken at your own site, if you provided all of the requested insurance details as part of your application for PBA accreditation and it is in date and valid, then you do not need to provide this again as part of a project application other than declaring that you have sufficient cover for insurance. If you did not provide some of this information with your application for accreditation or you held less than the minimum required level, then you will be prompted to provide evidence of this with your first Scoping Plan Approval Form. If your

insurance has expired, you will be prompted to provide an updated record when you next submit an application to us.

8.2. Product safety and occupational health and safety (OH&S)

It is a requirement that all product installers participating in the VEU program are fully licensed and have completed appropriate safety training.

Further, for an installation to be eligible under VEU, it must comply with all relevant laws and regulations, including those relating to OH&S and product safety. This applies to all project activities, including where you or the energy consumer subcontracts the installation (or modification) work to a third party. For APs who are solely undertaking certificate aggregation for the project, you will still need to satisfy yourselves that the energy consumer is capable of carrying out (or engaging someone to carry out) the project in a safe manner.

Under 10(c) of the principal VEET Regulations, VEECs cannot be created if the AP knew, or ought to have known, that the prescribed activity was not undertaken in accordance with the provisions of the Electricity Safety Act 1998, the Gas Safety Act 1997, the Occupational Health and Safety Act 2004, the Building Act 1993 or their respective regulations.

If the commission becomes aware that a project does not meet these provisions, the commission may not register VEECs, and may refer the matter to the relevant regulator to investigate.

8.2.1. Installing or modifying equipment – important information

If you are planning on installing new equipment or modifying/adjusting existing ones as part of a project, you should ensure that you thoroughly understand the OH&S, compliance and warranty implications. You should also satisfy yourself that the equipment you plan to install or modify do not pose any unreasonable risks to your staff, sub-contractors or to your client and the public, either during the activities or after them.

Importantly, you should understand that ‘modifying’ existing equipment may effectively create a ‘new’ product from a legal viewpoint. This means that you could become responsible for that equipment’s compliance with relevant safety and compatibility laws and standards. Further, the modification may void the warranty provided by the original manufacturer, meaning you may be considered liable should the equipment malfunction after the activity date.

The Electricity Safety Act 1998 and Electricity Safety (Installations) Regulations 2009 requires a Certificate of Electrical Safety (or an agreed exemption) for all electrical installation work. In Victoria, this is overseen by Energy Safe Victoria (ESV). This document, where required, must be retained on file by the AP should the commission require an audit. This document must detail the modification work performed on each equipment type modified. ESV also oversees gas installation regulations, while plumbing standards are overseen by the Victorian Building Authority (VBA).

If you feel unsure about the obligations and risks associated with your planned activities, you should seek independent legal and/or other expert advice.

8.3. Approvals and permits

You should ensure that you clearly understand the approvals and permits required for any project activity you engage in. Failure to apply for and comply with all relevant approvals and permits may lead to enforcement action being taken against you by the relevant body.

If you feel unsure about the approvals and permits required for an upgrade project, you should seek independent legal and expert advice.

9. Where to get help

If you encounter difficulties when participating in this activity, you should in the first instance consult the guidance material listed in Section 2 of this document.

If you are unable to resolve your issue using the publicly available material, please contact VEU support team on (03) 9032 1310 or veu@esc.vic.gov.au

Glossary

The following abbreviations and terms are used throughout this activity guide.

Term or abbreviation	
ABN	Australian Business Number
ACN	Australian Company Number
AIP	Approval in principle
AM&VP	Approved measurement and verification professional
AP	Accredited person
ECM	Energy conservation measure
ESC	Essential Services Commission
ESV	Energy Safe Victoria
HVAC	Heating, ventilation and air conditioning
IPMVP	International Performance Measurement and Verification Protocol
IPPs	Information privacy principles
OH&S	Occupational health and safety
M&V	Measurement and verification
M&V specifications	Measurement and Verification in Victorian Energy Upgrades – Specifications
M&V Plan	Measurement and verification plan
NAESCO	National Association of Energy Services Companies
PBA	Project-based activities
PBA Regulations	Victorian Energy Efficiency Target (Project-Based Activities) Regulations 2017
Prescribed greenhouse gas schemes	Commonwealth's Carbon Credits (Carbon Farming Initiative) Act 2011, and the Renewable Energy (Electricity) Act 2000
principal VEET Regulations	Victorian Energy Efficiency Target Regulations 2018
RECs	Renewable energy certificates
RET	Commonwealth Renewable Energy Target
RFI	Request for further information
Activity 34	VEU program building based lighting upgrade

Term or abbreviation	
STCs	Small-scale technology certificates
The VEET Act	Victorian Energy Efficiency Target Act 2007
The VEET guidelines	Victorian Energy Efficiency Target Guidelines
VBA	Victorian Building Authority
VEECs	Victorian energy efficiency certificates
VEET	Victorian Energy Efficiency Target

Key Terms

The following key terms are used throughout this activity guide and are the basis of the PBA M&V method. Note – there may be some differences in terminology from IPMVP.

Key term	Definition	Refer to
Project works start date	In relation to a measurement boundary is the date, and optionally the time, at which physical works commence in that measurement boundary. This does not include any activities described in PBA Regulation 6(6)	Section 5.6
Project works end date	In relation to a measurement boundary is the date, and optionally the time, at which the project works are completed within that measurement boundary, meaning that normal operations are capable of commencing after all changes to be implemented by the project within that measurement boundary, including any testing and commissioning are completed.	Section 5.6
Implementation start time	In relation to a project is the date, and optionally the time, normal operations are capable of commencing after all changes to be implemented by the project, including any testing and commissioning, are completed. This is the same as the last project works end date for a project, where a project has more than one measurement boundary.	Section 5.6
Scoping plan	Provides information to the commission about the intended project, without needing to provide details that may not be available at the early stage of project development.	Section 5.3
Project plan	Provides specific details to the commission about the project.	Section 5.4
Project impact report	Submitted to the commission after a project has been implemented and the savings have been determined. Must be approved before VEECs can be created.	Section 5.9
Variation	Required when certain details of the project change, after the scoping and/or project plans have been approved. Some changes are unacceptable and may require a new project application.	Section 6.2
Baseline period	A period of measurement used to create a baseline model. It includes measurement of energy consumption, independent variables and site constants inside a project boundary and represents conditions before the project is undertaken.	Section 4.3.3
Operating period	A period of measurement used to create an operating model. It measures the energy consumption inside a project boundary and represents conditions after the project is undertaken. In the forward creation of VEECs the difference in energy use between the ‘normalised’ baseline and operating energy models is used.	Section 4.4.3

Key term	Definition	Refer to
Reporting period	A period of measurement used to create an operating model. It includes measurement of energy consumption, independent variables and site constants inside a project boundary and represents conditions after the project is undertaken. The reporting period can only be used for annual creation of VEECs by comparing the measured energy consumption with that predicted by the baseline energy model. An impact report must be submitted every year.	Section 4.3.2
Regression analysis	A statistical method used to model energy use inside the measurement boundary for: • baseline energy model • operating energy model.	Section 4.4.1
Estimate of the mean	A statistical method used to model energy use inside the measurement boundary for: • baseline energy model • operating energy model.	Section 4.4.2
Forward creation	Can be used to create VEECs for up to ten years' worth of future savings earlier in the project using an 'operating period'. Requires use of Equations 1, 2 and 4.	Section 4.3.1
Normal year	A set of values within a continuous twelve month period for each independent variable used in the energy models. A value in a normal year must be provided for each time interval. These values are used to 'normalise' both the baseline and the operating model when using forward creation. 'Normal' year values can be the baseline year. The independent variable values for a normal year must be within +/-5% of the effective range for that variable for the corresponding time interval to be eligible.	Section 4.4.4
Annual creation	Can be used to create VEECs using energy savings measured each year during the 'reporting period' and reported each year for up to ten years. Requires use of Equations 1, 3 and 5.	Section 4.3.2
Annual savings	The difference in measured energy consumption in the reporting period (12 months following the upgrade) and the energy consumption determined from the adjusted baseline energy model.	Section 4.3.2
Effective range	A parameter that affects the validity of a model and is used to determine whether a calculation can be done for a specific time interval. Projects with a narrow effective range may receive fewer VEECs.	Section 4.5
Measurement boundary	The boundary that defines what activities are included in and excluded from the project. All energy consuming products within the measurement boundary must be measured.	Section 4.6

Key term	Definition	Refer to
Counted savings	Energy savings where the reduction of carbon dioxide equivalent of greenhouse gases is represented by certificates created as a result of activities undertaken within the measurement boundary after the end of the baseline period.	Section 4.10
Measurement frequency	The frequency of measurements taken during a given measurement period. This defines the length of the time intervals for a measurement boundary.	Section 4.5
Measured energy consumption	The measured energy consumed by all the equipment within the measurement boundary.	Section 4.7
Site constants	A parameter that affects the energy consumed within the measurement boundary but does not vary under normal operating conditions.	Section 4.8
Accuracy factor	The level of uncertainty the AP is prepared to accept. It is determined by the relative precision of reported savings.	Section 4.14.1
Persistence model	An estimate of the expected lifetime of an energy consuming product. It applies a decay factor representing the annual decline in performance as a result of product type, product use and environment.	Section 4.13
Decay factor	Determined by applying a persistence model to products installed as part of the project that had not been previously installed at the project premises.	Section 4.13
Interactive energy savings	Energy savings that are a result of the project but are outside the measurement boundary.	Section 4.9
Time interval	The segment of time between regular measurements taken during a given period. Eligible time intervals contain representative data which can be used to develop an energy model or report energy consumption.	Section 4.5

Document version control

Version	Amendments made	Date published
V1.0	Creation of new Explanatory note - project-based activities – measurement and verification– part 1: activity guidance	1 August 2017
V1.1	Removal of Option A of the IPMVP	17 November 2017
V2.0	Updated document template and added further guidance including applications for impact report approval and VEEC assignment	14 December 2017
V3.0	Re-structured and consolidated document. Revised description of scoping and project plan requirements to match latest version of application forms. Removed requirement that persistence models are published on a public register	16 February 2018
V3.2	Included 'Key terms'. Expanded on definition of effective range and included diagrams. Included additional information on changes to a project that require an application for variation (Table 4).	24 September 2018
V4.0	Renamed document as Measurement and Verification Method Activity Guide. Updated terminology, document names, hyperlinks to VEU Registry pages, use of URLs. Updated requirements for AM&VP independence for basic verification reports. Updated the time at which lighting products need to be listed on the Register of Products.	11 December 2018
V4.1	Added multi-premises project requirements. Clarified project eligibility, effective range, missing data, renewable energy, saving estimates, registration of interest, insurance and audits. Updated variation requirements. Added new lighting and photographic evidence requirements. Corrected minor errors.	12 September 2019
V4.2	Minor updates to align with M&V Specifications v4.0	18 December 2020
V4.3	Expanded on metering requirements and included recommendation on solar inverters. Added requirements about complete project plan applications being submitted before project works end. Included guidance around metering. Clarified requirements for site constants and missing data. Changed 'activity start date' and 'activity end date' terminology. Added clarification on auditing.	11 February 2021
V4.4	Clarification of how to deal with missing dependent and independent data. Updated requirements for using modelling software other than Microsoft Excel. Clarified ABN/ACN evidential requirements.	19 April 2021