IPART Energy Sustainability Schemes

Project Impact Assessment with Measurement and Verification

PIAM&V Method Requirements

April 2023

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The Independent Pricing and Regulatory Tribunal

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Acknowledgment of Country

IPART acknowledges the Traditional Custodians of the lands where we work and live. We pay respect to Elders both past and present.

We recognise the unique cultural and spiritual relationship and celebrate the contributions of First Nations peoples.

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PIAM&V Method Requirements

The PIAM&V Method Requirements (April 2023) (**PIAM&V Method Requirements**) are published by the Scheme Administrator under the *Energy Savings Scheme Rule of 2009* (**ESS Rule**). They have been developed to provide further guidance for Accredited Certificate Providers (**ACPs**), auditors and Measurement and Verification Professionals (**M&V Professionals**) and to address changes in the ESS Rule that commenced on 14 April 2023.

Under clause 7A.16 of the ESS Rule, ACPs must comply with PIAM&V Method Requirements when using the PIAM&V Method.

How to use this document

The PIAM&V Method Requirements is structured so that each section has 2 parts:

1. **Method Requirements**: The Method Requirement parts contain the PIAM&V Method Requirements that ACPs must comply with under clause 7A.16 of the ESS Rule.
2. **Explanatory text**: The explanatory text provides further guidance, including examples and additional information, to assist ACPs, M&V Professionals and auditors to better understand the scope and operation of the requirements. To the extent an ACP deviates from the approach outlined in the explanatory text, the Scheme Administrator expects that an ACP will provide further explanation in order to demonstrate how the approach it has taken complies with the Act, the ESS Rule and the PIAM&V Method Requirements.

Commencement

The PIAM&V Method Requirements (April 2023) commence on 14 April 2023.

Previous PIAM&V Method Requirements

The PIAM&V Method Requirements dated 21 February 2020 and Published in Energy Savings Scheme Notice 04/2020 are hereby repealed.

For the avoidance of doubt, the PIAM&V Method Requirements (No 2) dated December 2021 and Published in Energy Savings Scheme Notice 02/2021 are not repealed.

How this document relates to the PIAM&V Method Guide

The PIAM&V Method Requirements should be read in conjunction with other guidance materials, including the PIAM&V Method Guide. While the PIAM&V Method Guide offers guidance regarding the PIAM&V Method, the PIAM&V Method Requirements must be complied with under clause 7A.16(c) of the ESS Rule. A contravention of a PIAM&V Method Requirement by an ACP is a contravention of the ESS Rule.

Terms defined under the ESS Rule

Where this document uses a term which is defined under the ESS Rule, that term is to be given its defined meaning under the ESS Rule.

1 Required records

Method Requirements

1.1 In relation to the PIAM&V Method, an ACP must prepare or commission the following documents for each Implementation:

a. Measurement and Verification Plan (**M&V Plan**) with a sampling plan (if using the Sampling Method)

b. Preliminary Measurement and Verification Professional Report (**Preliminary M&V Professional Report**)

c. Spreadsheets or tools that develop energy models and calculate Energy Savings

d. Measurement and Verification Report (**M&V Report**)

e. Measurement and Verification Professional Report (**M&V Professional Report**).

Explanatory Text

Required records and reasoning are addressed in various subclauses in clause 7A of the ESS Rule. The PIAM&V Method Guide sets out that the M&V Plan and M&V Report are required documents and form part of the minimum required records. An example M&V Plan, which sets out the typical information requirements, is provided in Appendix A of the PIAM&V Method Guide and is available on the ESS Website.

A template M&V Professional Report is available on the ESS Website and should be used by M&V Professionals to complete the M&V Professional Report. A template for the Preliminary M&V Professional Report will also be made available on the ESS Website for M&V Professionals to use.

2 Measurement Period where Eligible Fuel consumption is subject to seasonal variation

Method Requirements

2.1 An ACP must include evidence in the M&V Report that the Measurement Periods for the

a. Baseline Energy Model, and

b. Operating Energy Model

include one or more complete operating cycles of the End-User Equipment (**EUE**).

2.2 Evidence that is provided by an ACP in support of Requirement 2.1 must

a. demonstrate Eligible Fuel usage patterns over one or more complete operating cycles of the EUE and

b. demonstrate how the relevant variables are captured in the Measurement Period.

2.3 When developing the Measurement Periods for the Baseline Energy Model and the Operating Energy Model, ACPs must take all reasonable steps to reduce statistical bias.

Explanatory Text

Measurement Periods must include one or more complete operating cycles of the EUE

Clause 7A.5(f1) of the ESS Rule requires an ACP to ensure that the Measurement Period includes time periods during which Independent Variables may reasonably be expected to lead to the Implementation increasing consumption of the relevant Eligible Fuel. In practice, this requires an ACP to ensure that Measurement Periods cover a complete operating cycle. An operating cycle means the time period required for EUE within the Measurement Boundary to witness one complete operating cycle from maximum energy consumption and demand to minimum.

The Office of Environment and Heritage's (**OEH**) *Measurement and Verification Operational Guide - Best practice M&V processes* (**OEH M&V Guide**) indicates that industry practice is to include a complete 12-month operating cycle in Measurement Periods for implementations involving temperature-affected energy use. That is, for implementations with Independent Variables related to weather conditions and/or ambient temperature, a typical operating cycle is 12 months.

The OEH M&V Guide is supported by guidance provided in the International Performance Measurement and Verification Protocol Core Concepts (**IPMVP Core Concepts**), which notes the need for caution in Measurement Period selection. While not directly applicable to the ESS Rule in all respects, the IPMVP Core Concepts provides relevant guidance on Measurement Period selection.

Where an ACP elects to use less than 12 months of data for the Measurement Period of either the Baseline Energy Model or the Operating Energy Model, the ACP must demonstrate that the shorter Measurement Period represents the complete operating cycle for the EUE.

Changes to EUE within the Measurement Boundary following the Implementation of the Recognised Energy Saving Activity do not justify the use of a shorter Measurement Period. If changes within the Measurement Boundary have occurred (for example the addition of new EUE), then this may be a Non-Routine Event for the purposes of the ESS Rule.

Statistical bias

Statistical bias may be introduced into the model when the Measurement Period for the Baseline or Operating Energy Models represents incomplete years (e.g. 9, 10, 13 or 18 months). This is because incomplete years may under or over represent some periods of operation. To reduce statistical bias, ACPs should use complete years (e.g. 12, 24 or 36 months) of continuous data during the baseline and operating Measurement Periods. This is consistent with the approach used by the IPMVP.

All energy models should be checked for statistical bias. Statistical bias may be reduced by selecting Measurements Periods which:

- are the same length (e.g. 12 months), where appropriate
- are integer multiples of the operating cycle, not fractions of the operating cycle.

3 Normal operating conditions

Method Requirements

3.1 Measurements of the Independent Variables and Site Constants must:

a. consider the context of the EUE within the Site; and

b. be made under Normal Operating Conditions.

3.2 Non-Routine Events must be recorded in the M&V Report.

3.3 An ACP must define and document the Normal Operating Conditions of the EUE for the measurements taken.

Explanatory Text

Measurement of Independent Variables and Site Constants

The requirement that ACPs consider the context of the EUE within the Site is intended to assist ACPs in identifying projects in which the context of the Site may affect the measurement of Independent Variables and Site Constants. For example, refrigeration within an air-conditioned building is less likely to be affected by ambient conditions than refrigeration in an unconditioned space. The Independent Variable for this project may therefore be inside temperature rather than ambient temperature.

Clauses 7A.3(a) and 7A.4(a) of the ESS Rule require that Baseline and Operating Energy Models respectively are based on measurements taken under Normal Operating Conditions. The term Normal Operating Conditions is defined in clause 10.1 of the ESS Rule. It means the normal operating conditions of the EUE over one complete operating cycle, from maximum energy consumption and demand to minimum.

Non-Routine Events must be recorded in the M&V Report

Clause 7A.5B1 of the ESS Rule requires ACPs to identify and record any Non-Routine Events occurring within the Measurement Boundary and during any of the Measurement Periods or the Implementation Period. ACPs must make Non-Routine Adjustments using and complying with the PIAM&V Method Application Requirements for Non-Routine Events. Where a Non-Routine Event is identified and an adjustment made, they must be documented in the M&V Report.

Defining and documenting Normal Operating Conditions

Requirement 3.3 provides that ACPs must define and document the Normal Operating Conditions of the EUE for the measurements taken. It is not sufficient to simply state that the EUE was operating under normal conditions. The ACP must define and describe the normal operating conditions both before and after the Implementation. These conditions will be different for each site and may include but are not limited to:

- the original EUE's load factor, duty cycle or other operating parameters describing its use and the frequency and consistency of care and maintenance
- that the EUE modified, replaced or installed as part of the Implementation is properly installed, maintained and used in accordance with the equipment manufacturer's instructions
- the normal hours of operation of the EUE across one or more complete operating cycles
- weather conditions (if applicable) (e.g. if the average temperature, cooling degree days or heating degree days during the Normal Year are significantly different from the Measurement Period, then it is unlikely to represent normal operating conditions)
- normal production levels (if large variations in production represents normal operation, then this should be documented in the M&V Plan and the M&V Report and supported by evidence).

4 Engaging an M&V Professional

Method Requirements

4.1 The written explanatory reasoning required under clause 7A.5A of the ESS Rule must be provided in the form of a Preliminary M&V Professional Report which is consistent with any current template Preliminary M&V Professional Report published by the Scheme Administrator. The Preliminary M&V Professional Report must be prepared by an M&V Professional.

4.2 The Preliminary M&V Professional Report must:

a. be signed and dated by an M&V Professional and the ACP prior to the Implementation Date

b. be based on a review of the M&V Plan and include written explanatory reasoning of the appropriateness of the items listed in clause 7A.5(a)–(g) of the ESS Rule and, regarding the Baseline Energy Model only, the Measurement Procedures for:

i the Independent Variables and Site Constants

ii the baseline Measurement Period, ensuring that the selected Measurement Period represents a complete operating cycle and includes periods for which Independent Variables may reasonably be expected to lead to the Implementation increasing consumption of Eligible Fuels.

4.3 The M&V Professional Report must be signed by an M&V Professional and refer to and consider both the Preliminary M&V Professional Report and the M&V Report.

4.4 If the Measurement Procedures change, these changes must be assessed by an M&V Professional who must deem the amended Measurement Procedures appropriate and provide their written explanatory reasoning in the M&V Professional Report.

Explanatory Text

Preparation of a Preliminary M&V Professional Report is intended to ensure compliance with clauses 7A.5(h) and 7A.5A of the ESS Rule. A template Preliminary M&V Professional Report which covers the obligations in Requirement 4.2(b) is available to M&V Professionals on the ESS Website.

The ESS Rule does not require that the Preliminary M&V Professional Report be submitted to the Scheme Administrator for review prior to the Implementation Date. However, the Preliminary M&V Professional Report will form part of the evidence which is reviewed and tested at audit to ensure that the calculated Energy Savings from the Implementation meet the requirements of the ESS Rule.

The Preliminary M&V Professional Report and M&V Professional Report do not need to be completed by the same M&V Professional.

5 Measurement Boundary

Method Requirements

5.1 In defining the Measurement Boundary for an Implementation, an ACP must document and retain evidence of all items of EUE within the Measurement Boundary as defined in the ESS Rule.

5.2 An ACP must ensure that Energy Savings calculated using measurements from a utility meter have occurred as a result of the Implementation.

Explanatory Text

Clause 7A.5(d) of the ESS Rule requires that the Measurement Boundary be defined. These requirements are intended to provide clarity to ACPs about how to document the Measurement Boundary and instances where care should be taken to ensure Energy Savings calculated using utility meter data are a result of the implementation.

Common examples of Implementations to which Requirement 5 relates include:

- where there are multiple items of equipment measured by the utility meter that are not subject to the Implementation
- where the Measurement Boundary encompasses equipment that is not eligible for ESC creation (e.g. solar photovoltaic or exports of onsite electricity generation to the network)
- where an Implementation occurs across multiple levels of a building or areas of a production facility and a portion of the energy load is shifted outside of the Measurement Boundary (or to another utility meter).

Where these situations arise in the context of an Implementation, ACPs should carefully consider setting the Measurement Boundary to ensure that the measured energy consumption is representative of the energy consumption of the EUE that is the subject of the Implementation.

For example, it may be appropriate to use utility meter data (that is, a whole of site approach) where the ACP can demonstrate that the Energy Savings are greater than 10% of the baseline energy use. If the Energy Savings are less than 10% of the baseline energy use, then the ACP should adjust the Measurement Boundary and install or use existing sub-metering to directly measure the energy consumption of the EUE for the Baseline and Operating Measurement Periods.

Where the utility meter data includes equipment that is not eligible for ESC creation, the ACP should consider segregating the energy consumption of or supply of energy from this equipment so that the energy consumption data from the utility meter can be adjusted accordingly.

6 Independent Variables and Site Constants

Method Requirements

6.1 An ACP must have regard to and document all relevant Independent Variables and Site Constants in the M&V Plan and M&V Report.

6.2 An ACP must ensure that the selected Independent Variables and Site Constants affect the energy consumption of the EUE.

Explanatory Text

It is expected that when using Regression Analysis ACPs will:

- measure energy consumption over a complete operating cycle and use Independent Variables and Site Constants that affect the energy consumption of the EUE
- evaluate how well a particular Regression Analysis explains the relationship between energy use (dependent variable) and Independent Variables.

Clause 7A.2(a)(ii)(b) requires a Regression Analysis to meet minimum statistical requirements as stated in Table A22 of the ESS Rule. ACPs and M&V Professionals must use these requirements when evaluating whether the Independent Variables are appropriate for the Implementation. If the Regression Analysis does not meet the thresholds in Table A22, it may be an indication that selected Independent Variables are not appropriate, some other relevant Independent Variables are not included, or that the functional form of the energy model (e.g. linear) is not appropriate. In these instances, ACPs must improve the fit of the model by considering the use of other (or adjusting the number of) Independent Variables or a different functional form for the energy model (e.g. non-linear or multiple linear models based on seasonal effects).

ACPs should also consider consulting with the M&V Professional to determine whether additional Independent Variables are appropriate for the Implementation. In some cases the use of additional Independent Variables or a different functional form for the energy model may not meet the minimum statistical requirements.

The M&V Professional should assess the selection and evaluation process for Independent Variables and Site Constants in the M&V Professional Report.

The terms Independent Variable and Site Constant are defined in clause 10.1 of the ESS Rule. Unlike the IPMVP, the ESS Rule specifically relates the energy consumption of the EUE to the Independent Variable and Site Constants, rather than the energy consumption of the system or the facility. To comply with the definitions in the ESS Rule, an Independent Variable or Site Constant must affect the energy consumption of the EUE. As such, temperature would not be an appropriate Independent Variable for a lighting upgrade, as the electricity consumption of lighting is not temperature dependent.

7 Accuracy Factor

Method Requirements

7.1 When calculating relative precision of the model an ACP must consider all material sources of error associated with the development of the model. This should include, but not be limited to, the following sources of error:

a. data uncertainty, being the uncertainty generated from insufficient data either in terms of quantity or time period

b. measurement uncertainty

c. modelling uncertainty, including uncertainty generated using estimates and assumptions.

Explanatory Text

ACPs must ensure that all material sources of error are accounted for when calculating the relative precision of the model. Potential sources of error that should be considered by an ACP when determining the relative precision include:

- using utility meter data to estimate the energy consumption of specific items of EUE rather than directly measuring the energy consumption of the EUE
- inclusion of Independent Variables that are not relevant or do not affect the energy consumption of the EUE,
- functional form of the energy model (e.g. linear or non-linear relationship)
- insufficient data, either in terms of quantity ((i.e. sample frequency or gaps in data points) or duration of the measurement period.

Additional guidance is available in the IPMVP Core Concepts Uncertainty Assessment for IPMVP.

8 Estimate of the Mean model

Method Requirements

8.1 An ACP must assign a value for each time period in each Measurement Period for relevant:

a. Independent Variable(s) and Site Constant(s) for Regression Analysis
b. Site Constant(s) for an Estimate of the Mean.

8.2 An ACP must demonstrate that the use of an Estimate of the Mean model is appropriate. This includes:

a. assessing if there are Independent Variables that significantly affect energy consumption
b. measuring likely Independent Variables to ensure that they do not have a significant effect on the energy consumption.

8.3 The ACP must document:

a. the process used to determine that an Estimate of the Mean energy model is appropriate
b. all potential Independent Variables that were tested and why the variables were excluded from the model
c. that the selected Measurement Periods include one or more complete operating cycles.

Explanatory Text

An energy model established using an Estimate of the Mean must meet the statistical requirement that the Coefficient of Variation of the energy consumption over the Measurement Period is less than 15% (clause 7A.2(a)(i) of the ESS Rule). Where an Estimate of the Mean is used, it is important to ensure that energy consumption data for a complete operating cycle has been analysed to determine if there are any relevant Independent Variables.

In accordance with Requirement 2.1, ACPs must use a complete operating cycle to determine the type of energy model to use. Where relevant Independent Variables are identified and the Coefficient of Variation of the energy consumption over the Measurement Period is less than 15%, ACPs may choose to use an Estimate of the Mean rather than Regression Analysis. In all instances, the ACP should document the process used to identify if relevant Independent Variables are present. It is not sufficient to state that an Estimate of the Mean was used and therefore there are no relevant Independent Variables.

Under clause 7A.6 of the ESS Rule, among other things, a value for the Site Constant(s) must be assigned for each time period in each Measurement Period. It is not sufficient to assign one value for the Site Constant, even if the Site Constant does not change. For example, if hourly data is used to estimate energy consumption at a Site for a year, the ACP must assign a value for the Site Constant(s) for every hourly value used. That is, 8,760 occurrences of the Site Constant(s) must be recorded even if the Site Constant(s) does not change.