Amendments to the PIAM&V Method

Energy Savings Scheme

IPART
Independent Pricing and Regulatory Tribunal
New South Wales

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WHAT

The requirements for the Project Impact Assessment with Measurement and Verification (**PIAM&V**) Method have changed due to recent amendments to the *Energy Savings Scheme Rule of 2009* (**ESS Rule**).

The Scheme Administrator is consulting on proposed changes to the PIAM&V application for accreditation process and has established acceptable approaches for the use of the PIAM&V Method, including in relation to the use of the sampling method (refer clause 7A.20 of the ESS Rule).

WHY

Changes to remove simpler options from the PIAM&V application for accreditation process are proposed in order to bring it in line with that used for other methods. The proposed changes recognise the increased maturity of the method, the available guidance and the level of industry knowledge and experience (refer **Attachment A**).

Amendments to the ESS Rule included a number of changes to the PIAM&V Method, including the option to use sampling to determine energy models for multi-site activities. The Scheme Administrator has established acceptable approaches for use of the PIAM&V Method under clause 7A.16 of the ESS Rule (refer **Attachment B**).

WHO

Existing accredited certificated providers (**ACPs**) using the sampling method of PIAM&V will be affected by these changes, as will those intending to apply to use the sampling method (either through an amendment or a new application for accreditation).

Applicants interested in applying for accreditation for the PIAM&V Method may also be impacted by the proposed changes to the application process.

WHAT NEXT

IPART invites written comment on the amendments to the application process proposed in Attachment A. **Submissions are due by COB 14 June 2017.**

Please email your response to ESS@ipart.nsw.gov.au. All feedback will be considered as confidential.

The acceptable approaches for use of the PIAM&V Method outlined in Attachment B **apply from the date of this notice** and will be included in the next update of the PIAM&V Method Guide, which will be published on the ESS website following the completion of the consultation process outlined below.

The information in this fact sheet will be discussed at our next ESS stakeholder forum being held on **30 May 2017**. For more information about the forum please visit the ESS website.

Attachment A – Proposed amendments to the PIAM&V application for accreditation process

1. Overview

The Scheme Administrator is consulting on amendments to the PIAM&V application for accreditation process.

2. Current process

The current PIAM&V Method Guide sets out three options for applications, depending on the level of M&V information the applicant may have to support their application (refer section 6.1 of the PIAM&V Method Guide). It includes three application options, as follows:

- Option 1 is the minimum information that can be provided to be considered for accreditation and will focus on the eligibility of the applicant for accreditation and general record keeping processes.
- Option 2 can be used to demonstrate a more thorough understanding of the method, by the provision of a proposed M&V Plan and baseline energy model and all supporting information.
- Option 3 requires a fully worked example, demonstrating the application of baseline and operating energy models in an M&V report, calculations for ESC creation for an implementation, and a completed M&V Professional report. If the activity is implemented prior to accreditation, it can only be used for demonstration purposes.

ACPs accredited under either Option 1 or Option 2 have certain conditions placed on their accreditation that may limit their ability to create ESCs until they provide further information to the Scheme Administrator, or successfully complete an audit. Once these conditions are met, ACPs can then submit an application for amendment of their conditions to the Scheme Administrator

3. Proposed new process

Amendments to this process are proposed to remove options 1 and 2 to align the application requirements with other calculation methods, where applicants are required to provide sufficient information to demonstrate their ability to implement and calculate energy savings in accordance with the requirements of the particular calculation method. The minimum requirements for an application for PIAM&V were initially lowered (ie, three application options) in recognition of the complexity of the new PIAM&V Method, the minimal amount of guidance, training and industry expertise available to support potential ACPs and the fact that ACPs had to be accredited before implementing projects (under clause 6.2 of the ESS Rule).

The Scheme Administrator considers that the M&V industry has matured considerably since the introduction of the PIAM&V Method in the ESS Rule in 2014. As such, it is considered an appropriate time to increase the level of information required to be provided in an

application for accreditation to ensure applicants have sufficient expertise to correctly apply the PIAM&V Method. Existing ACPs previously accredited via the Option 1 or Option 2 application pathway would not be impacted by the changes, as the changes only relate to the information required to be submitted as part of an application for accreditation (and an application for amendment if adding the PIAM&V Method to an existing accreditation).

Applicants seeking accreditation to use the PIAM&V Method would be required to submit a full project example to demonstrate their capability to use the method (as required under the current Option 3). A project example would be required for each energy model type the applicant applies for,[1] and must be in relation to an existing/historical implementation. If the application is for regression analysis and estimate of the mean, then only one example for regression analysis would be required.

The example may be for a historical project. For example, if you intend to implement a RESA at multiple sites, you would be able to apply to become accredited using information from an implementation that has already occurred – to demonstrate your ability to calculate energy savings in accordance with the requirements of the PIAM&V Method. ESCs would not be able to be created for historical implementations, however, as ESCs can only be created for implementations with an implementation date that is after the date of accreditation. The project example(s) would need to be evidenced by the following documents:

- an example M&V Plan
- an example M&V Report
- copies of any completed spreadsheets / tools used to calculate energy savings and develop the models, and
- an example Sampling Plan (if using the sampling method).

[1] Energy model types include: Estimate of the Mean, Regression Analysis & Computer Simulation.

Attachment B – Acceptable approaches for use of the PIAM&V Method

1. Overview

The Scheme Administrator has established acceptable approaches for the use of the PIAM&V Method under clause 7A.16 of the *Energy Savings Scheme Rule of 2009* (**ESS Rule**), as follows:

- documentation that must be developed and retained as a record for all implementations (refer section 2 of this attachment)
- approaches for the use of the sampling method (clause 7A.20 of the ESS Rule, refer section 3 of this attachment), and
- approaches for the use of the computer simulation energy model type (clause 7A.2(iii) of the ESS Rule, refer section 4 of this attachment).

2. Documentation for all implementations

2.1. Documents that must be developed

You must develop (and retain as a record) the following documents for each implementation (or population, if using the sampling method):

- Measurement & Verification Plan (M&V Plan)
- Measurement & Verification Report (M&V Report), and
- Sampling Plan (if applicable).

A short description of each document is provided in the following sections.

2.2. M&V Plan

Development of a detailed M&V Plan is central to the successful use of M&V for estimating energy savings.

The M&V Plan is typically used to: set out the measurement approach; explain the parameters used (and not used) in the energy models; and, explain the approach that will be used to calculate energy savings resulting from an activity. The OEH Measurement and Verification Operational Guide, and the IPMVP (both referenced above) provide detailed guidance on the development and use of M&V Plans. Additional guidance is also provided in Appendix D of the PIAM&V Method Guide. An example M&V Plan can be found in Appendix E of the PIAM&V Method Guide.

2.3. M&V Report

You must also develop an M&V Report summarising the outcomes of the implementation. It should describe project implementation details, energy models used (and their development

process) and calculation of energy savings, including all M&V parameters and assumptions used in the calculations.

For PIAM&V, the M&V Report can be used to record how energy models meet the requirements of the ESS Rule, by including sub-headings to check off that each of the ESS Rule requirements has been addressed.

The M&V Report should describe how each of the parameters used in the energy models was derived, so that all assumptions and inputs to the calculation spreadsheets can be referenced and verified by the M&V Professional (see section 3.9 of the PIAM&V Method Guide) or at audit if required.

Calculation tools

Spreadsheets and tools used in the calculation of energy savings and development of energy models (eg, regression analysis) must be developed and maintained, as supporting information for the M&V Report.

Calculation of energy savings must be done in accordance with the relevant PIAM&V equations outlined in the ESS Rule. Refer to section 4 and Appendix A of the PIAM&V Method Guide for more details on how to calculate energy savings. The PIAM&V Tool developed by OEH can assist in the calculation of energy savings with forward creation for a single site model.

2.4. Sampling Plan

If using the sampling method, you must also develop a sampling plan. It should describe your sampling approach and how it meets the requirements of clauses 7A.7(e) and 7A.20 of the ESS Rule. Further information is provided in section 3.6 below.

3. Use of the sampling method

The sampling method is designed to reduce measurement costs while maintaining the accuracy of energy saving estimates. You may only take energy measurements at eligible representative sample sites to establish energy models. The energy models developed for the sample sites can then be applied to all sites of the population.

Key definitions and acceptable approaches for use of the sampling method are described in the sections below. You must describe how you will meet each of these requirements in the sampling plan.

3.1. Population and eligibility requirements

The population is a set of sites that have similar characteristics, where similar implementations are taking place. You can include as many sites in the population as you like, as long as they meet the eligibility requirements.

The eligibility requirements are a set of requirements that must be defined and documented in your sampling plan prior to the selection of sites. These requirements are in place to ensure that only sites with similar characteristics are included in the population. The

sampling plan should be developed for the whole population, rather than for each individual site.

You must also demonstrate that you have a process to determine that each site you include in the population meets the eligibility requirements.

The eligibility requirements must be defined based on:

- the existing end-user equipment at the site
- end-use services being provided by the end-user equipment
- the RESA to be implemented
- site constants, and
- any additional requirements as published by the Scheme Administrator.

3.2. Sample sites and the representativeness test

Sample sites are sites where energy measurements are taken to develop an energy model of the population. The process of selecting sample sites should be random and minimise bias.

You have to define and use a representativeness test to ensure that the distribution of the site constant among the sample sites is representative of the distribution of the site constant across the whole population.

The minimum number of sample sites per population must be at least six times the number of site constants. Each site constant may have only one value, or may have a number of different values. In cases where a site constant has a number of different values, six sample sites may not be sufficient to establish robust energy models.

Additional statistical requirements (such as confidence levels, precision and coefficient of variation) should be applied to determine the minimum number of sample sites for large, unknown populations. Refer to 'Minimum sample size' in section 3.6 for more details.

Where possible, the same sample sites should be selected to conduct baseline and operating measurements. If this is not feasible, ACPs must document the reasons for selecting different sites for baseline and operating samples.

3.3. Implementation and implementation date

ESCs must be calculated for each individual implementation. Under the sampling method, each site is considered an implementation, and the population consists of multiple implementations.

You must record the implementation date for each implementation, including implementations on sample sites and non-sample sites. Each implementation can have a different implementation date. Each sample site can also have a different start and end date for measurement periods.

Energy savings cannot be calculated until the operating energy model is established, which is determined by the latest end date of all the measurement periods for the sample sites. The example provided in Table 1 below shows how the earliest ESC creation date for sample and non-sample sites is influenced by the operating energy model measurement period.

Table 1 Implementation date and ESC creation under sampling

Implementation no.	Sample site (Y/N)	Implementation date	Operating model measurement period end date	Earliest ESC creation date
1	Yes	1 January 2017	1 June 2017	11 July 2017
2	No	1 December 2016	N/A	11 July 2017
3	Yes	1 February 2017	1 July 2017	11 July 2017
4	Yes	11 February 2017	11 July 2017 (latest)	11 July 2017

Note: this is not the complete list of implementations for this population. Implementation no. 4 has the latest measurement end date among all sample sites.

3.4. Adding new sites to the population

New sites can be added to the population after the sampling plan has been implemented and the energy model developed, as long as they meet the eligibility requirements. You must keep records of the procedures you undertake to ensure that all new sites meet the eligibility requirements.

As new sites are added to the population, you must use the representativeness test to check if existing sample sites are still representative of the population. In cases where the existing sample sites fail the representativeness test, new sample sites must be selected (refer to 'Additional sample sites' in section 3.6 below.

If new sample sites are selected as a result of new sites being added to the population, measured data from new sites must be used to update the energy models for the sample.

You must use the updated energy models to calculate energy savings for all new sites added to the population. For sites in the original population, the original energy models may be used until the updated energy models are developed. Only one set of energy models can be valid for a population at any time.

3.5. Interactive effects

You should provide written justification on how interactive effects are calculated or estimated for sites in the population in the M&V Plan.

Implementations at different sites may incur different levels of interactive effects. In this case, you must describe how interactive effects for each site will be determined. For example, you may provide a description of how a reduction of energy consumption on a lighting system will impact the energy consumption of a HVAC system.

Further, systems in different Building Code of Australia (**BCA**) Climate Zones may also incur different levels of interactive effects. An example is shown in Table 2 below.

Table 2 Example of interactive effects

HVAC system	BCA Climate Zone	Interactive effect multiplier
No	All	Nil
Yes	4	0.01
Yes	5	0.04
Yes	6	-0.04

3.6. Sampling plan

You must describe your proposed sampling approach in a sampling plan. The sampling plan must describe how you will meet each of the requirements set out in clauses 7A.7(e) and 7A.20 of the ESS Rule.

The sampling method described in your sampling plan must be reviewed and deemed appropriate by an M&V Professional with their written explanatory reasoning provided.

The sampling plan must include the information outlined in the following sections.

Eligibility requirements

Table 3 lists the elements that should be included in the eligibility requirements.

Table 3 Eligibility requirements

Eligibility requirement	Description
a. Existing end-user equipment	▼ The sampling plan must describe the type and operational characteristics of existing EUE prior to each implementation. ▼ Ensure the description is precise and covers the common characteristics of the existing EUE throughout the population. It must include the technical specifications of the equipment. For example, it could be 'a domestic electric resistance hot water system', or 'a refrigerated display cabinet that is not rated as high-efficiency within the meaning of AS 1731.14'. ▼ Any site with existing EUE that does not fit within the defined requirements must not be included in the population.
b. End-use services being provided	▼ The sampling plan must describe the end-use services being provided at the site. It may include one or more items from Table A17 of the ESS Rule. ▼ Any site that includes EUE that does not provide the services as defined under this requirement must not be included in the population.
c. RESA to be undertaken	▼ You must provide a concise description of the RESA by: – Describing the activity and explaining how the activity will reduce the consumption of energy, and – Providing details of the equipment that will be in place after the implementation of the RESA (including technical details and specifications of the new or modified equipment). ▼ Any site that does not meet this requirement must not be included in the population.

Eligibility requirement	Description
d. Site constant	▼ All site constants that are used to develop energy models must be described in the sampling plan. The sampling plan should include the values (or the range of values) of each site constant that will be included in the energy model. ▼ For example, if the site constant is BCA Climate Zone, and the values of BCA Climate Zone are 2, 4 or 5, you must include these values in the eligibility requirements. Any site that is located in a different BCA Climate Zone will not be eligible to be included in the population.

How the eligibility requirements are applied

The sampling plan must describe the process that will be implemented to ensure that only sites that meet the eligibility requirements are included in the population. This process must describe the tests that will be applied to determine which sites are eligible.

For instance, you could create a template with a list of eligibility requirements and steps for project managers to test if a site meets these requirements.

Distribution of site constants

The sampling plan must describe the expected distribution of site constants across the population.

For example, if the site constant is BCA Climate Zone, and the values of BCA Climate Zone are 2, 4 or 5 (as defined in the eligibility requirements), you must estimate the distribution of the population among these values. The estimation can be in the form of either percentage or number of sites.

Representativeness test

The sampling plan must define a representative test to determine if the sample sites are representative of the whole population. Sample sites are representative if the distribution of the site constant among sample sites is similar to the estimated distribution of the site constant among the population.

For example, if it is estimated that 50% of the population is located in Climate Zone 3, then you should ensure that approximately 50% of the sample sites are located in this zone.

Additional sample sites

The sampling plan must define conditions under which additional sites are included in the sample to ensure they are representative (as defined in the representativeness test). These conditions are usually a deviation between the estimated and the actual distribution of the site constant among the population. For example, the sites in the original sample (based on the estimated distribution of the site constant in the population) may have the following distribution:

Climate Zone	Percentage of total sample sites
3	50%
5	50%

If it was later determined that 90% of the sites in the actual population were from Climate Zone 5, then additional sample sites would have to be selected from Climate Zone 5 to ensure that sample sites are representative of the population.

Minimum sample size

The sampling plan must show that the minimum number of sample sites will be at least six times the number of site constants. For large, undefined populations, a sample size determination method developed in accordance with the IPMVP or equivalent M&V standards should be used to calculate the initial number of sample sites.

Bias minimisation

There are a number of sources from which bias might be introduced to sampling. For example, you may only measure energy consumption where metering equipment is in place.

The sampling plan must describe how you will minimise bias in the sample site selection process.

Normal year determination procedure

The sampling plan must include a procedure to determine normal year values for the population. The procedure must be applied to each site of the population, as the normal year values may differ from site to site.

For example, if the independent variable used in the energy models is Cooling Degree Days (**CDDs**), the procedure to calculate normal year CDD values for each site may consider use of typical meteorological year data from the closest weather station.

To satisfy the requirements under clause 7A.7(e) of the ESS Rule, the M&V Professional must deem the procedure appropriate for the implementation and provide written explanatory reasoning.

Interactive energy savings and persistence model determination procedure

Similar to the normal year procedure, the sampling plan should describe the process to determine interactive energy savings, persistence models, counted energy savings and any other relevant M&V parameters for each site of the population.

4. Use of the computer simulation energy model type

Under clause 7A.2(iii) ACPs may use computer simulation software that is commercially available and has been approved by the Scheme Administrator. The computer simulation software must calculate energy consumption for specified time intervals and be based on engineering equations and user-defined parameters relevant to the energy user equipment that is being modelled. In addition, ACPs using computer simulation must determine and justify the accuracy requirements of the calibrated computer simulation model in accordance with industry standards.