IPART
New South Wales

Independent Pricing and Regulatory Tribunal

Method Guide
Metered Baseline Methods

Clause 8.5 – Method 1: Baseline per unit of output

Clause 8.6 – Method 2: Baseline unaffected by output

Clause 8.7 – Method 3: Normalised baseline

Energy Savings Scheme
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Contents

1 About this guide

This guide details how the Metered Baseline Method (MBM) of the NSW Energy Savings Scheme (ESS) operates, the eligibility requirements to use the MBM, and how to calculate energy savings using one of the following methods:

- Method 1 - Baseline per Unit of Output (clause 8.5 of the ESS Rule[1])
- Method 2 - Baseline Unaffected by Output (clause 8.6 of the ESS Rule)
- Method 3 – Normalised Baseline (clause 8.7 of the ESS Rule).

The *Application Form: Part B – Method Details Metered Baseline Methods* (Application Form: Part B - Method Details)[2] can be found on the apply for accreditation webpage for this method. The Application Form: Part B - Method Details can be completed by applicants using the information provided in this guide.

The guide also identifies the appropriate documents and records you will need to collect/generate as minimum evidence to demonstrate eligible energy savings from your RESA under the MBM.

Separate guides are available for the following methods:

- NABERS (clause 8.8 of the ESS Rule).

Available here:
http://www.ess.nsw.gov.au/Methods_for_calculating_energy_savings/NABERS_Baseline

- Aggregated Metered Baseline (clause 8.9 of the ESS Rule).

Available here:
http://www.ess.nsw.gov.au/Methods_for_calculating_energy_savings/Aggregated_Metered_Baseline.

2 Method overview

The MBM is typically used for activities in industrial or commercial premises where:

- energy savings result in a significant reduction in site electricity consumption that is readily identifiable through metering, and
- representative historical site electricity consumption data is available.

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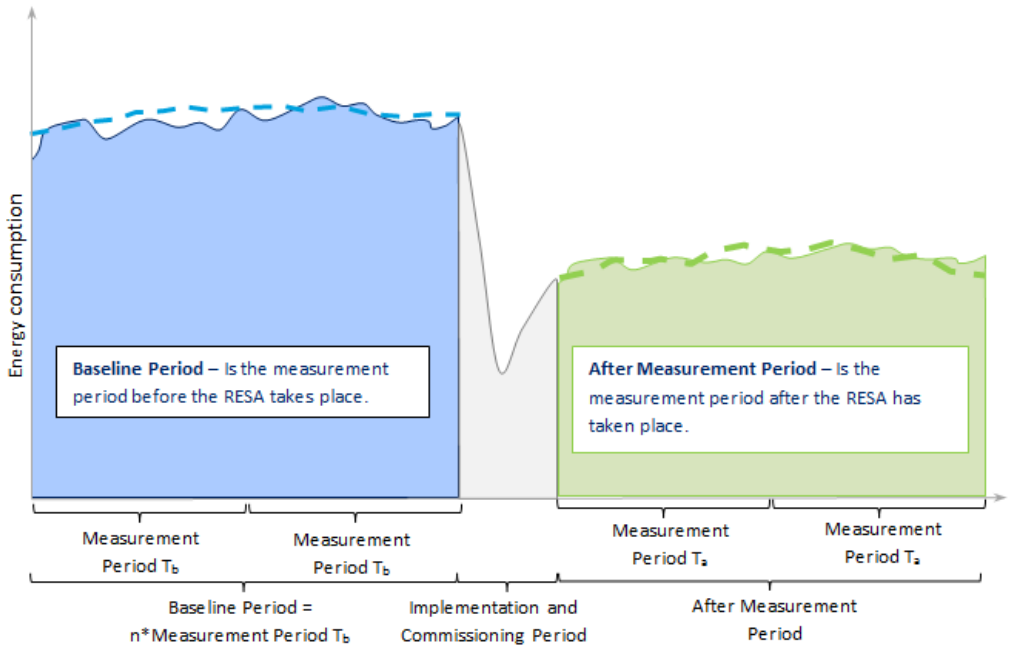
1 *Energy Savings Scheme Rule of 2009*

2 The Application Form: Part B – Method Details can be found on the ESS website at: http://www.ess.nsw.gov.au/Methods_for_calculating_energy_savings/Metered_Baseline_Methods/Apply_for_Metered_Baseline_Methods

The MBM uses measurements of electricity consumption **before** and **after** the RESA implementation. The difference in electricity consumption between these two periods is used to calculate the energy savings from the RESA.

Figure 2.1 below illustrates the timeline of an MBM RESA and the different measurement periods.

Figure 2.1 Schematic timeline of an MBM RESA



The **baseline period** is the period **before** the RESA implementation. It establishes the baseline electricity consumption of the site. It is made up of one or many **measurement periods**[3] **T_b** (e.g. one day, one month or one year).

The duration of the measurement periods T_b becomes the base time unit from which energy savings calculations will be made.

The **implementation and commissioning period** is the time period in which the new processes or end user equipment are installed and tested.

The **after measurement period** is the period **after** the RESA implementation. It establishes the new levels of electricity consumption and is the period over which energy savings calculations will be made.

The after measurement period includes as many **measurement periods**[4] **T_a** the expected RESA lifetime will allow.

3 "T_b" – Acronym to identify the words "Time before".
4 "T_a" – Acronym to identify the words "Time after".

When determining the length of the measurement periods T_b, you should consider that measurement periods T_a must be of the same duration. This will be the frequency with which you will be able to create Energy Savings Certificates (ESCs).

The baseline period and after measurement periods are explained in detail in Sections 5, 6 or 7 depending on the method you are using.

The MBM relies on the remainder of the site operating as it did before the RESA is implemented. It should not be used where changes (other than the RESA) are anticipated during the life of the RESA because the results will not reasonably reflect the energy savings resulting from the RESA.

The MBM applies a **confidence factor** to reduce the upfront estimated energy savings, corresponding to their certainty. This is determined based on the size of the energy savings relative to the unexplained variance in the baseline.

Sections 2.1, 2.2 and 2.3 of this guide provide introductory information on each of the methods listed in Section 1 above.

2.1 MBM - Baseline per unit of output - Method 1

The MBM baseline per unit of output method is defined in clause 8.5 of the ESS Rule under which energy savings are calculated using Method 1 (see Appendix A.1 of this guide).

Method 1 should be used to quantify energy savings where electricity consumption is **strongly linked to output** from a site (e.g. aluminium smelting).

Another method must be used where the relationship between electricity consumption and output from the site is non-linear, or where there are multiple products or changes in raw materials affecting consumption.

2.2 MBM - Baseline unaffected by output method - Method 2

The MBM baseline unaffected by output method is defined in clause 8.6 of the ESS Rule under which energy savings are calculated using Method 2 (see Appendix A.2 of this guide).

Method 2 should be used to quantify energy savings where consumption **is not linked to output from a site**. For example, when a RESA is implemented at a production site for which the production set-up and electricity consumption remains similar regardless of whether 1 or 1,000 units are produced.

This method may also be used at sites in which a service is provided (e.g. in schools, hospitals, retail stores and hotels) where the amount of electricity

used remains reasonably constant regardless of the number of people using the service.

2.3 MBM - Normalised baseline method - Method 3

The MBM normalised baseline method is defined in clause 8.7 of the ESS Rule under which energy savings are calculated using Method 3 (see Appendix A.3 of this guide).

Method 3 should be used where **an explainable variation to electricity consumption at the site can be removed through normalisation** against some other factor(s). That is, variations to your electricity baseline can be removed to create a normalised baseline.

Variables used to normalise the electricity consumption must correspond to specific activities or situations that cause the change in the total electricity consumption. For example:

- variations in ambient conditions (i.e. electricity consumption is strongly related to outside temperature and therefore the consumption will change from one period to another), or
- variations in production processes or production inputs at certain times of the year (i.e. where seasonal produce varies and takes more electricity to process, or where part of the plant is shut down for the same period every year).

You should be able to justify that the factors are a cause of the variation in the baseline and not the result of spurious correlation. For example, reduced production could be caused by sales dropping off and this in turn would result in less electricity consumed. This is not considered relevant when determining a normalisation factor.

Option C of the *International Performance Measurement and Verification Protocol* (IPMVP) can be used for guidance as to the normalisation of baselines, particularly for complex cases.[5]

3 Method eligibility

A number of requirements must be met to allow the creation of ESCs under the MBM methods. These are outlined below:

[5] Efficiency Valuation Organisation, 2012 "*International Performance Measurement and Verification Protocol, Concepts and Options for Determining Energy and Water Savings - Volume I*", available at http://www.evo-world.org/

Evidence boxes

The evidence required to support energy savings, for each implementation, is highlighted in these boxes.

Evidence must be collected and retained to support the creation of ESCs from energy savings. You must have the evidence at the time ESCs are registered. Your evidence may be audited at any time.

If the RESA involves multiple implementations, or takes place at multiple sites, the required evidence must be collected and retained for each implementation.

3.1 Energy saver

Only an Accredited Certificate Provider (ACP) that is also an eligible energy saver can create ESCs using the MBM. There are two types of energy saver, as described below.

Original energy saver

Under the MBM, the energy saver is the person who is liable (contractually or otherwise) to pay for the electricity consumption at the site at the implementation date.[6]

Nominated energy saver

If you are not the original energy saver, you may become the energy saver by obtaining a nomination from the original energy saver. This nomination needs to be obtained **on or before the implementation date** for you to be eligible to create ESCs.

If you are applying for a single site RESA, and you are not the original energy saver, you must provide a copy of the signed nomination form with your application.

If you are applying for a multi-site RESA, you must describe the process of how you will obtain nomination in future from the original energy savers of each implementation under this RESA in Part B of your application.

You can find the Nomination Form template for the MBM methods explained in this guide in the following link:

http://www.ess.nsw.gov.au/Methods_for_calculating_energy_savings/Metered_Baseline_Methods

6 Clauses 8.5.3, 8.6.3 and 8.7.3 of the ESS Rule.

Box 3.1 Evidence of the energy saver

The energy saver can be evidenced by:

- A current electricity bill showing the name and address of the original energy saver. The address listed on the electricity bill must match the implementation address.

  Where the electricity bill does not match the implementation address (e.g. it is addressed to a PO Box) additional documentation must be provided linking the electricity bill to the implementation address.

- Other documentation showing that the original energy saver is liable for the electricity used. The documentation must show:
  - the address of the implementation, and
  - the party responsible for paying the electricity costs.

Examples of such documents include a tenancy agreement stating that the tenant is responsible for the electricity used, or an internal company invoice showing responsibility for electricity costs.

3.2 Implementation and implementation date

For the MBM, the implementation date is the earlier of:

- the start date of the first **after** measurement period[7], or
- the date on which the reduction of electricity consumption commenced due to the implementation (i.e. the date when the implementation was completed and normal operations commenced).[8]

You can only create ESCs from implementations where:[9]

- the implementation date is after your accreditation date, and
- if you are the nominated energy saver, the nomination of the original energy saver is obtained prior to the implementation date.

This means that you will need to be accredited before or at the time you are undertaking the work the subject of the RESA.

You are required to provide your estimated implementation date in Part B of your application.

Please note that the actual implementation date would need to be advised to the Scheme Administrator at a later stage, when works have been completed.

7 The first **after** measurement period is the first period for which an ACP intends to create ESCs.
8 Clauses 8.5.2, 8.6.2 and 8.7.2 of the ESS Rule.
9 Clauses 5.2 and 6.2 of the ESS Rule.

Box 3.2 Evidence of the implementation date

The implementation date can be evidenced by:

- tax invoices evidencing completion of works and equipment installed, or
- a completion or commissioning report (if available).

If normal operations are to commence after a commissioning period, details of the commissioning process should be included in the nomination form or in formal project documentation.

It is not appropriate for a commissioning period to be claimed solely for the purpose of delaying the implementation date to meet the additionality requirements of clause 6.2 of the ESS Rule.

3.3 Measurement of electricity consumption

The MBM may only be used to calculate energy savings if measurements made are of a standard, duration, and to a level of accuracy, satisfactory to the Scheme Administrator.[10]

This means you must properly define:

- the RESA measurement boundary, and
- the appropriate metering equipment.

These requirements are explained in more detail below.

3.3.1 Defining the RESA measurement boundary

You must provide a detailed description of the site and the RESA measurement boundary. This means you must:

- explain how the electricity metering is done at the site,
- identify the parts of the site included within the RESA boundary, and
- explain how you differentiate between what is inside and outside the RESA boundaries.

To set the boundary, you must consider your ability to track future changes to the site and its operations within the RESA boundary. You must be able to identify any effects of changes to the site, outside the RESA boundary, that may affect the RESA. If these "interactive effects" are significant, you must consider expanding the RESA boundary.

Electricity metering must be able to discretely measure reductions in electricity consumption as a result of the RESA, and may act as a de facto

10 Clause 8.1 of the ESS Rule.

RESA boundary. Sub-metering may be used to effectively reduce the size (boundary) of the site considered for baseline calculations, thereby increasing the accuracy of the baseline and hence the "confidence factor".[11]

If you use other sources of energy at the site, such as a gas fired cogeneration system or boiler, you must be able to demonstrate that reductions in electricity consumption are a result of the RESA, and do not result from the substitution of energy from these other sources.

It is possible that an audit of electricity metering arrangements will be required in order to confirm the RESA boundary.

Box 3.3 Evidence of the RESA boundary

You must demonstrate that you have adequate metering in place to define the RESA boundary. This must be evidenced by an electrical line diagram showing the location of the meter(s) used in measuring electricity consumption of your RESA.

3.3.2 Metering equipment

Metering equipment is important in providing reliable measurement of electricity consumption data **before** and **after** the implementation of your RESA. You must use utility meters or other metering equipment acceptable to the Scheme Administrator.[12]

You must describe the metering equipment on site, including:

- an outline of current processes for the testing and calibration of the metering equipment, and
- the persons responsible for these processes.

It is highly recommended that the same meters are used for the **before** and **after** measurement periods; otherwise you will need to adjust your calculations based on the different accuracy.[13]

Meters should be calibrated as recommended by the equipment manufacturer, against relevant standards and following procedures of recognised measurement authorities.

For multi-site applications, you must explain how you will make sure the metering equipment at each site is acceptable, that there is a process in place for testing and calibration of the metering equipment at each site and that the responsible persons will follow the process.

11 See Section 5.2.6, 6.2.4 or 7.2.5 of this guide for method 1, 2 or 3 respectively.
12 Clause 8.4 of the ESS Rule.
13 Chapter 8.11 of the IPMVP Volume 1 provides further guidance relating to metering equipment and issues.

Box 3.4 Evidence of the metering equipment

The adequacy of the metering equipment must be evidenced with:

- provision of the metering equipment details, including:
  - meter application, e.g. AC Electric Power (watts) or AC Energy (watt-hours),
  - meter category, e.g. true RMS watt meter or watt-hour meter,
  - meter type, e.g. digital meter that measures watts and/or watt-hours and uses digital sampling (IEEE 519-1992) to properly measure distorted waveforms,
  - meter make and model number, and
  - other details, such as whether any recent audits of metering equipment have been undertaken.

  Documentation can include manuals, photographs, etc.
- calibration records including testing and calibration process and responsibilities.

The calibration record of the metering equipment must show the last calibration date and validation date.

4 Selecting the appropriate MBM method for your RESA

This section provides information about the three MBM methods, which are the subject of this guide, to help you select the one that is appropriate for the site characteristics, operations and specific activities that are the subject of the RESA.

Please note that **the Scheme Administrator has to agree that the MBM method you are proposing to use is the most appropriate for your RESA**.[14]

Consequently, you are required to provide as part of your application:

- sufficient information to justify your choice of the relevant method, and
- the evidence specified in this guide for your proposed method.

If your proposed RESA does not meet the criteria for the particular MBM method that you have selected, you will not be eligible to use that particular method and you will be requested to reconsider your proposed method.

If your proposed RESA does not meet the eligibility requirements for any of the MBM methods, you should consider a different method under the ESS Rule to calculate energy savings. Please consult the ESS Rule to determine whether you can apply for a different method and contact IPART for further clarification.[15]

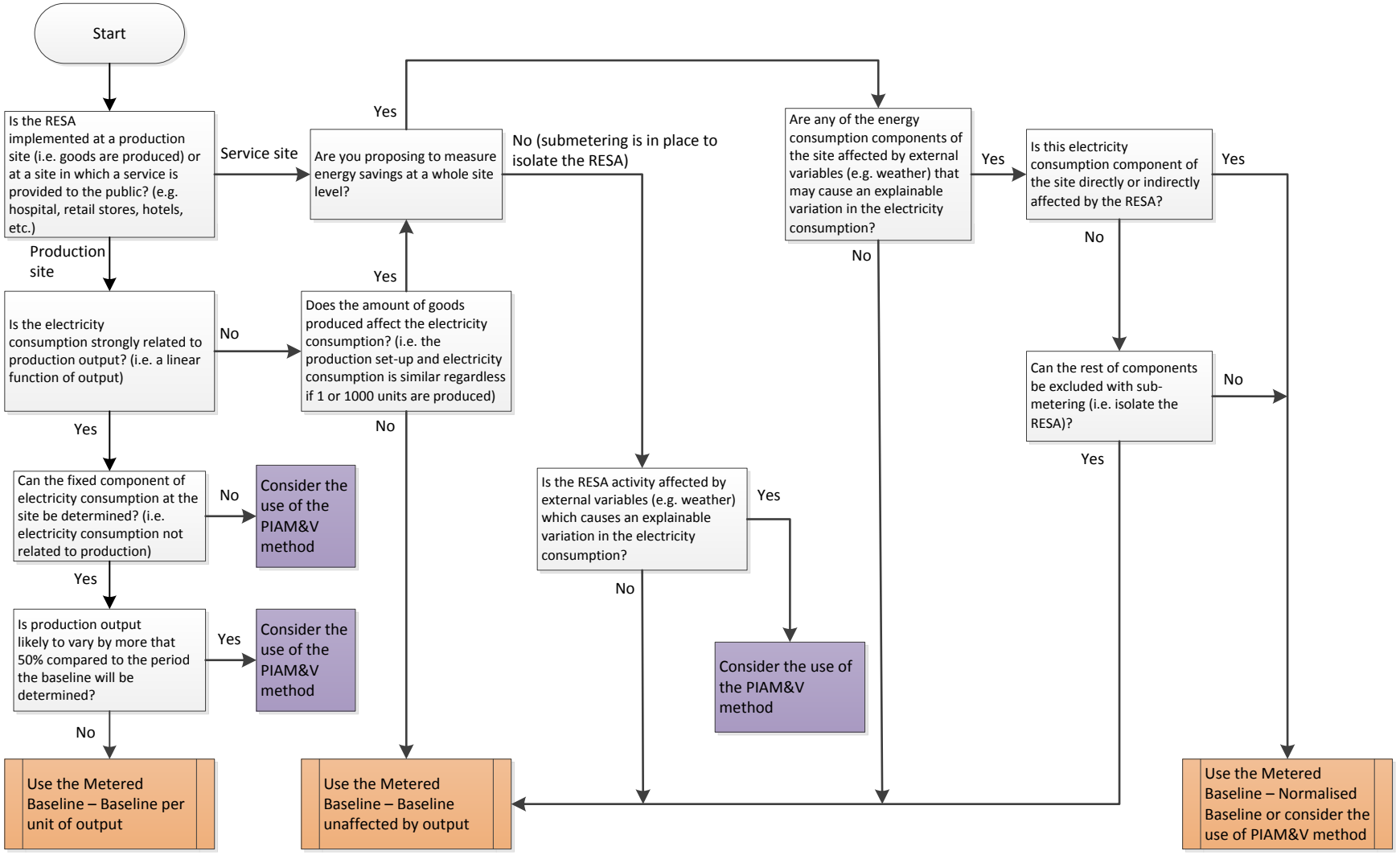
[14] Clause 6.5A(a) of the ESS Rule.

[15] ESS@ipart.nsw.gov.au

The decision tree provided in Figure 4.1 will assist you in determining whether your RESA is eligible under any of the three methods.

Sections 4.1, 4.2 and 4.3 of this guide provide further information about the criteria you have to fulfil to use a particular method.

Figure 4.1 Decision tree for selecting an appropriate MBM method for your RESA



4.1 MBM - Baseline per unit of output method – Method 1

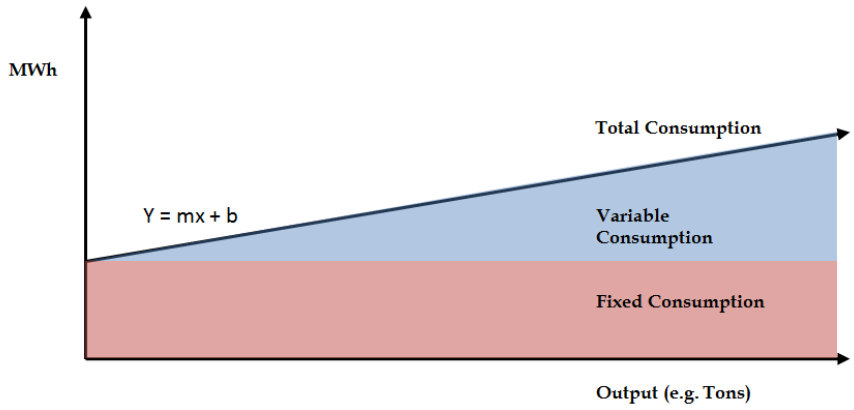
This method should be used if electricity **consumption is strongly linked to output**.

If you propose to use this method you will need to satisfy certain criteria identified in clause 8.5.1[16] of the ESS Rule. These criteria are described below.

1. The electricity consumption for the site is a linear function of output

A linear regression model must be developed to verify that the relationship between the electricity consumption and the output at the site is linear. The model should be presented as an x-y scatter graph, with electricity consumption on the y-axis and output on the x-axis. The equation of the line should be clearly stated on your graph. As part of your application, you must include a statistical analysis (including, but not limited to, the R^2 value) to demonstrate that the relationship is reasonable. Statistically an R^2 value equal to or higher than 0.75 indicates a good correlation.[17]

The graph below represents the relationship between electricity consumption and output, with consumption (y) being a function of output (x).



For a multi-site RESA, you must describe how you will verify that the electricity consumption is a linear function of output at each site.

2. The fixed electricity consumption, which is the consumption of electricity at the site that does not vary with variations in output, can be measured or estimated

This fixed electricity consumption is the proportion of electricity consumption that would remain constant if the relevant site (e.g. a production plant) were not

16 Clause 8.5.1 (a)-(c) of the ESS Rule.

17 Refer to Section B2.2.1 "Coefficient of determination (R^2)" in Appendix B of the "*International Performance Measurement and Verification Protocol, Concepts and Options for Determining Energy and Water Savings - Volume I*", available at http://www.evo-world.org/

to produce anything for a given period of time. This can be determined by estimating or extrapolating back to zero output from measurements taken during plant downtime or can be estimated mathematically from multiple periods.

The fixed electricity consumption must:

- be a reasonable reflection of the consumption that is unaffected by output,
- lead to energy savings calculations that are reasonable, and
- be measured over a period **before** the implementation and commissioning period of the RESA commences (the duration of which is equal to the measurement period).

3. **The output at the site for the after measurement period must not have changed by more than 50% from the average output over the baseline period**

Verification that the output is not going to vary or has not varied by more than 50% from the average output over the baseline period is required every time a measurement period T_a in the after measurement period finishes. You must explain how you will verify this at each site, every time a measurement period T_a finishes.

Box 4.1 Evidence to justify the use of the MBM – Baseline per unit of output method – Method 1

To be able to use the MBM – Baseline per unit of output method you must provide the following evidence:

- a linear regression model to verify that the relationship between the electricity consumption and the output at each site is linear,
- an explanation of how you will determine the "fixed" electricity consumption at each site, or the calculation itself, and
- a process that will be used to check that the output has not varied by more than 50% from the average output over the baseline period, every time a measurement period finishes for each site.

4.2 MBM - Baseline unaffected by output method - Method 2

This method should be used to quantify energy savings where **electricity consumption is independent of output** from a production or service site.

If you choose to use this method you will need to satisfy the criterion identified in clause 8.6.1(a) of the ESS Rule in that **the consumption of all energy sources from the site must be independent of output**.

This method should be used when a RESA is implemented at a production site and the electricity consumption at that site remains similar regardless of whether 1 or 1,000 units are produced.

This method may also be used at sites at which a service is provided (e.g. in schools, hospitals, retail stores and hotels), where the amount of electricity used

remains reasonably constant regardless of the number of people using the service.

If this method is to be used for a RESA implemented at a production facility, a linear regression model must be developed to verify that the relationship between **electricity consumption and output at the site is not linear**.

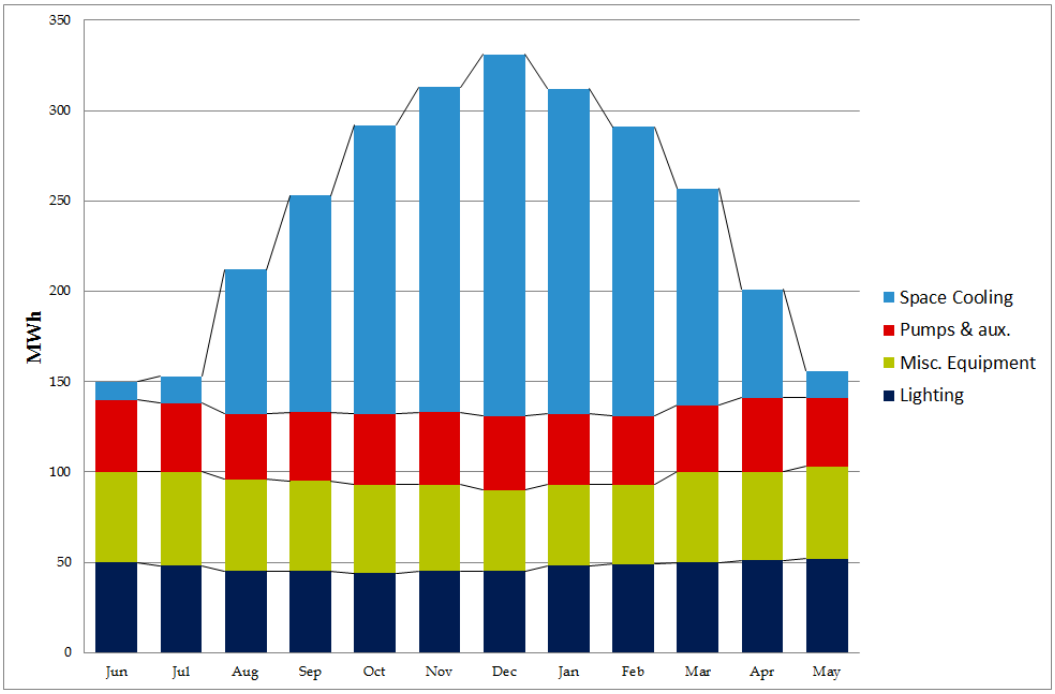
However, in both scenarios (production or service site), depending on the RESA boundary, you may be asked to verify that there are not any external variables that may cause a variation in the electricity consumption at the site, such as weather (see Figure 4.1 above).

The following example provides additional guidance to understand the criterion.

Example

Figure 4.2 below shows a typical electricity load curve at a particular site:

Figure 4.2 Electricity Consumption (MWh) – load curve for building in temperate climate zone



In this example, you can see that the electricity consumption related to **"Space Cooling"** is heavily affected by the weather (i.e. the load increases in the warmer months). Under this scenario, there are 3 possible options:

1. If the RESA involves upgrades to the space cooling equipment, you can use the MBM – Normalised Baseline method (see Section 4.3 of this guide), or
2. If the RESA:
   - does not involve upgrades to the space cooling equipment, and

- the electricity consumption of the end-user equipment the subject of the RESA cannot be isolated with sub-metering,

you can use the MBM – Normalised Baseline method (see Section 4.3 of this guide), or

3. If the RESA:
   - does not involve upgrades to the cooling equipment, and
   - the electricity consumption of the end-user equipment the subject of the RESA can be isolated with sub-metering,

   then you may be eligible to use the MBM – Baseline unaffected by output method.

Depending on the RESA boundary, scenarios 2 and 3 may also be suitable for a Project Impact Assessment with Measurement & Verification (PIAM&V) accreditation. More information about the PIAM&V method is available here:

http://www.ess.nsw.gov.au/Methods_for_calculating_energy_savings/Project_Impact_Assessment_with_MV

Box 4.2 Evidence to justify the use of the MBM – Baseline unaffected by output method – Method 2

To be able to use the MBM – Baseline unaffected by output method you must provide the following evidence:

- For a production site: a linear regression model to verify that the relationship between electricity consumption and output at the site is not linear.
- For a service site: evidence that verifies that electricity consumption remains reasonably constant regardless the amount of people serviced.
- For either production or service site cases: a process or an analysis which demonstrates that no external variables affect the electricity consumption at each site.

4.3 MBM - Normalised baseline method - Method 3

This method should be used where an **explainable variation to electricity consumption at the site can be removed** through normalisation against some other factor(s). That is, variation in the electricity consumption caused from known changes in the conditions, under which the baseline is determined at the site, can be removed to create a normalised baseline.

If you propose to use this method, you will need to satisfy the criterion identified in clause 8.7.1(a) of the ESS Rule in that:

- the **normalisation variables**, in respect of which the **total consumption** is normalised, are variables corresponding to the specific activities that are a reason for change in total consumption.

Therefore, the normalisation variables should:

- correspond to specific activities or situations that cause the change in the total electricity consumption. These causes must be identifiable **physical facts** that affect the energy consumption of the equipment, and
- be expected to change routinely during the "after" measurement periods, as could be the case with, for example:
  - weather conditions (e.g. heating or cooling degree days, or both)
  - substitution of the input mix of a manufacturing process, or
  - periodic or seasonal increases in production.

To evidence this, you must verify that there is a **statistical correlation** between electricity consumption at the site and the normalisation variables you have identified.

Information from the process or operations affected by normalisation variables could be sourced from plant production logs, metering, meteorology data or other appropriate records. Depending on the complexity of your site, further information such as engineering drawings or more technical information may be necessary in order to meet these requirements.

For further guidance on the development of appropriate normalisation coefficients to account for the variation of **total consumption** you should refer to the IPMVP, Volume 1.[18]

Box 4.3 Evidence to justify the use of the MBM – Normalised Baseline method

To be able to use the MBM – Normalised Baseline method you must provide the following evidence:

- A linear regression model to verify the relationship between electricity consumption and the proposed normalisation variable(s) you have selected for each site. You must include a statistical analysis (including, but not limited to, the R^2 value) to demonstrate that the relationship is reasonable. Statistically, an R^2 value equal to or higher than 0.75 indicates a good correlation.

4.4 Next steps

Once you have selected the most appropriate MBM method for your RESA and the RESA satisfies the corresponding criteria, you will have to either:

- for Method 1 - MBM – Baseline per unit of output, follow instructions in Section 5 of this guide and complete Section 2 of the Application Form: Part B - Method Details[19]

[18] Efficiency Valuation Organisation, 2012 "*International Performance Measurement and Verification Protocol, Concepts and Options for Determining Energy and Water Savings - Volume I*", available at http://www.evo-world.org/

- for Method 2 - MBM – Baseline unaffected by output, follow instructions in Section 6 of this guide and complete Section 3 of the Application Form: Part B - Method Details[20], or
- for Method 3 - MBM – Normalised Baseline, follow instructions in Section 7 of this guide and complete Section 4 of the Application Form: Part B - Method Details[21].

We will assess whether your choice of Method 1, 2 or 3 is appropriate. If necessary, we may ask you to provide additional information to support your choice.

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19 The Application Form: Part B – Method Details can be found on the ESS website at: http://www.ess.nsw.gov.au/Methods_for_calculating_energy_savings/Metered_Baseline_Methods/Apply_for_Metered_Baseline_Methods

20 The Application Form: Part B – Method Details can be found on the ESS website at: http://www.ess.nsw.gov.au/Methods_for_calculating_energy_savings/Metered_Baseline_Methods/Apply_for_Metered_Baseline_Methods

21 The Application Form: Part B – Method Details can be found on the ESS website at: http://www.ess.nsw.gov.au/Methods_for_calculating_energy_savings/Metered_Baseline_Methods/Apply_for_Metered_Baseline_Methods

5 Calculation of energy savings using the MBM - Baseline per unit of output method – Method 1

Clause 8.5 of the ESS Rule describes the MBM - Baseline per unit of output method (Method 1), and steps through the calculation of energy savings for this method (see Appendix A.1 of this guide).

This section follows the steps and formulae contained in method 1, and will assist you to:

- develop the calculation spreadsheet you are required to submit as part of your application, and
- identify the evidence you must collect when implementing this method.

All formulae used should be clearly stated and referenced from the ESS Rule or other relevant source allowable under the ESS Rule in your calculation spreadsheet.

5.1 Step 1 – Selecting the measurement period

Step 1 requires you to select the measurement period that will be the duration of time over which all measurements in this method will be taken[22].

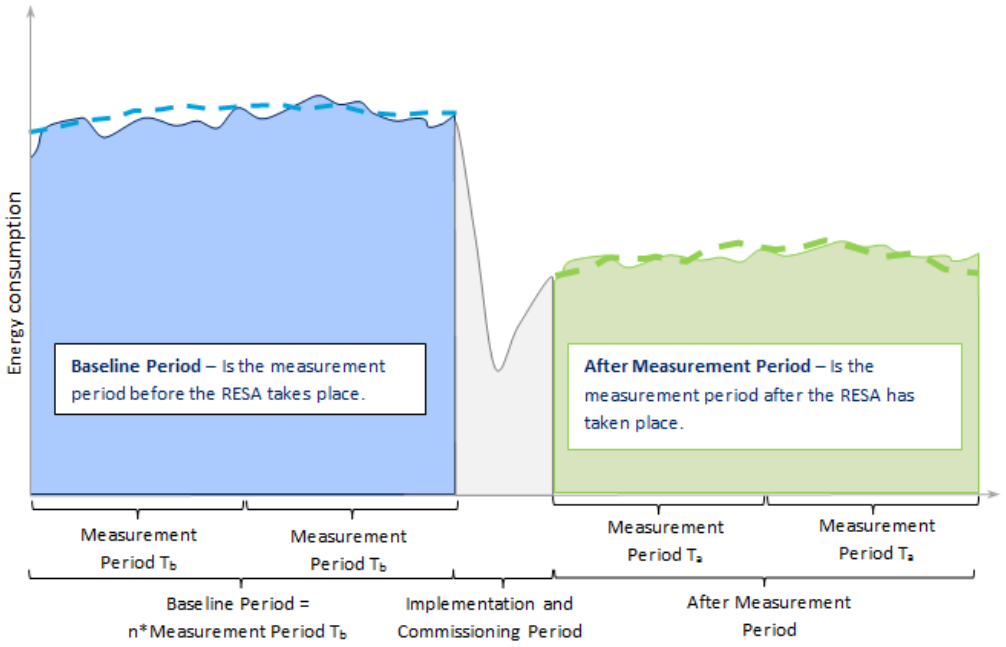
You must define the measurement period used for your calculations by defining the following discrete periods:

- the baseline period, which is made up of one or many measurement periods T_b before implementation of the RESA,
- the implementation and commissioning period, and
- the after measurement period, which will be made up of as many measurement periods T_a after implementation of the RESA as the expected RESA lifetime will allow.

Figure 5.1 below provides a schematic timeline of the measurement period and its components.

[22] Consider conditions in clauses 8.3 and 8.5.1(d) for the variable electricity baseline when determining the measurement period.

Figure 5.1 Schematic timeline of an MBM RESA's measurement period



Due to key eligibility requirements of the ESS Rule, only activities undertaken after accreditation are eligible to create ESCs.[23] Therefore, you will need to consider carefully the date you expect to submit your application for assessment to the Scheme Administrator as the implementation(s) must occur after you have been granted an accreditation.

The fact that the implementation date must be after the accreditation date means that the best time to apply for accreditation will be before the implementation and commissioning period.

Box 5.1 Supporting evidence and information for the selected measurement periods

You are required to provide supporting documents to justify the use of the proposed baseline period, the after measurement period and the length of the measurement periods T_b and T_a.

The evidence provided must support the rationale for the:

- baseline period that has been selected,
- number of measurement periods T_b your baseline period comprises,
- after measurement period (i.e. the RESA expected lifetime), and
- number of measurement periods T_a that the expected RESA lifetime will allow.

Sections 5.1.1 to 5.1.6 of this guide provide further information that will assist you in determining appropriate measurement periods.

23 Clause 6.2 of the ESS Rule.

5.1.1 Determining the baseline period

The **baseline period** is the total period consisting of *n* measurement periods T_b before implementation of the RESA.

The baseline period must exclude any time periods that are not representative of normal operating conditions of the site (e.g. plant shutdown, major maintenance, etc).

Determining the baseline period is a critical element for all RESAs using the MBM. As such, we may require additional information of how the baseline has been determined, and may reject applications if insufficient evidence is provided to support calculations of the baseline period or the measurement periods T_b.

Box 5.2 Supporting evidence for the baseline period

If you are applying to be accredited to use this method, you will need to provide supporting evidence in your application. You will also need to retain this evidence for each site once you are accredited. In your application you will need to:

- attach supporting documents for the measurement periods T_b to justify use of the proposed baseline period,
- provide the rationale for why these measurement periods T_b have been selected, and
- state how many "*n*" measurement periods T_b have been or will be used as the basis for the baseline period calculations.

The baseline electricity consumption is calculated using data from periods immediately preceding the RESA implementation date, up to a maximum of five years. Where this is not possible, due to data unavailability or other reasons, the baseline electricity consumption may be set using other periods we consider acceptable.[24]

If this is the case, you may propose to use an alternative baseline period. However, you will be required to:

- demonstrate to the Scheme Administrator that periods immediately preceding the implementation date are not suitable, and
- provide appropriate evidence for this.

This request must be made as part of your application. Requests will be considered on a case by case basis.

5.1.2 Measurement periods T_b

The **measurement period T_b** is a defined period **before** implementation of the RESA that is representative of electricity use at the site. It becomes the base unit from which baseline calculations are made.

[24] See ESS Rule clause 8.5.1(d) for the MBM Baseline per unit of output.

One or more measurement periods T_b will constitute the baseline period. The measurement periods T_b must be:

- a minimum of one (1) day and a maximum of one (1) year, or
- a regular cycle of electricity consumption that can be multiplied (by an integer number) to represent the electricity consumption before the implementation of the RESA.

You must define measurement periods T_b from before the implementation of the RESA, which are representative of electricity use.

For example, a period of six months for a plant with discrete summer and winter operating cycles, or one year for a site with continuous output through the year.

Please list each measurement period T_b by filling in the table provided in the relevant part of the Application Form: Part B - Method Details[25].

5.1.3 Implementation and commissioning period

The **implementation and commissioning period** is the time period in which the new process or end user equipment is installed and tested to verify if it functions according to its design specifications. When the performance of the new end user equipment or process is deemed satisfactory, normal operations are considered to have commenced.

5.1.4 Determining the after measurement period

The **after measurement period** is the period over which energy savings calculations can be made. This period is the duration of the expected lifetime of the RESA (e.g. new equipment expected lifetime) and it comprises as many measurement periods T_a as the expected RESA lifetime will allow.

5.1.5 Measurement period T_a

The **measurement period T_a** is a defined period **after** implementation of the RESA that must be of the same duration as the measurement period T_b.

Please list each proposed measurement period T_a by filling in the table provided in the relevant part of the Application Form: Part B - Method Details[26].

[25] The Application Form: Part B – Method Details can be found on the ESS website at: http://www.ess.nsw.gov.au/Methods_for_calculating_energy_savings/Metered_Baseline_Methods/Apply_for_Metered_Baseline_Methods

[26] The Application Form: Part B – Method Details can be found on the ESS website at: http://www.ess.nsw.gov.au/Methods_for_calculating_energy_savings/Metered_Baseline_Methods/Apply_for_Metered_Baseline_Methods

5.1.6 Measurement periods and ESC creation

When determining T_b and T_a measurement periods, you should also take into account the frequency with which you wish to create ESCs, as you will be required to undertake actual measurements for an entire measurement period T_a before you can create any ESCs.

For example, if you propose measurement periods T_b of one year, then you will need to accumulate data for one year for the measurement period T_a before you can create any ESCs. Similarly, if you choose three month measurement periods T_b, you could create ESCs after data for each three month measurement period T_a has been collected.

However, please note that the length of the measurement periods T_b and T_a is likely to impact on the **confidence factor** approved as part of your application. Shorter measurement periods T_b and T_a are likely to decrease the confidence factor and result in a decrease in the total number of ESCs you can create overall.

5.2 Step 2 – Determining the energy savings

Once you have determined the measurement periods, method 1 now requires you to:

1. complete steps 2A to 2D of method 1 for the baseline measurement periods T_b, and
2. complete steps 2E to 3 of method 1 for each measurement period T_a after implementation of the RESA for which you intend to create ESCs (this will occur after accreditation).

These steps are explained in more detail in the sections below.

Where the data is not yet available at the time of application for accreditation, you will need to provide a model of your calculation spreadsheet.

Following accreditation, all the data that was not available at the time of application will need to be updated in your calculation spreadsheet model. This spreadsheet model will be used to calculate the energy savings (i.e. data for measurement periods before implementation and data corresponding to periods after implementation) and it has to be approved by the Scheme Administrator prior to your RESA being accredited.

5.2.1 Step 2A - Determine the fixed electricity consumption (in MWh)

The **fixed electricity consumption** is the proportion of electricity consumption that would remain constant if the production plant were to be taken off-line for a given period of time. As the fixed electricity consumption is not expected to change as a result of the RESA, it is based solely on the period *before* implementation of the RESA.

Fixed electricity consumption may be estimated and extrapolated from electricity consumption measured during periods when the plant was offline. Alternatively, fixed electricity consumption can be estimated or determined mathematically from multiple periods. It must be a reasonable reflection of the consumption unaffected by output, and lead to energy savings calculations that are reasonable.

The fixed electricity consumption is determined and applied to all the proposed measurement periods T_b contained within the baseline period. Use Step 2A of method 1 (in Appendix A.1 of this guide), and the data of the entire baseline period, to determine the fixed electricity consumption.

You are required to provide the details of the proportion of electricity comprising the fixed electricity consumption (in megawatt-hours i.e. MWh) at the site before the RESA is implemented by filling in the table provided in the Application Form: Part B - Method Details[27].

Box 5.3 Supporting evidence of how fixed electricity consumption is derived or measured

You are required to support (with evidence) how your proposed figure accounting for the fixed electricity consumption has been derived or measured with the results of:

- any sub-metering equipment on site, or
- an extrapolation from electricity bills.

5.2.2 Step 2B – Calculate the variable consumption (in MWh/units of output)

For calculating the **variable consumption T_b** for each measurement period T_b you will need the following inputs:

- the total consumption T_b (in MWh), and
- the output T_b (number of units of output).

Each of these components is outlined below.

Total Consumption T_b for the site

The total consumption of the site corresponds to the total metered amount of electricity consumed at the site before implementation of your RESA for each of the measurement periods T_b you have defined.

You will need to provide the total metered amount of electricity consumed at the site before implementation of your RESA, for each of the measurement periods T_b you have nominated as part of your Application Form: Part B – Method Details.

[27] The Application Form: Part B – Method Details can be found on the ESS website at: http://www.ess.nsw.gov.au/Methods_for_calculating_energy_savings/Metered_Baseline_Methods/Apply_for_Metered_Baseline_Methods

Box 5.4 Supporting evidence for how total consumption is calculated or measured

You are required to support the figures for total electricity consumption with the results of:

- any sub-metering equipment on site, or
- data provided by the electricity retailer (using the utility's revenue grade meters).

Determining the output T_b for the site

Output T_b (or production) is the number of units of production output for each of the measurement periods T_b.

You must provide details of the output from the site (within the RESA boundary) as an input into Step 2B of method 1 (Appendix A.1 of this guide). To do this, you must provide details of the total output from the site **before** implementation of your RESA for each of the measurement periods T_b you have defined.

The **output T_a**, which is the output from the site after implementation of your RESA, will be an ongoing input to your calculation methodology and will need to be input for each measurement period T_a for which you propose to create ESCs.[28]

In each case, the output (e.g. litres, tonnes, pieces, etc.) must be the same in the T_b and T_a measurement periods.

Please provide the total output at the site before implementation of your RESA, for each of the measurement periods T_b you have nominated as part of your Application Form: Part B – Method Details.

In addition, you are required:

- to provide projections of future output for the next three years, and
- to identify clearly and explain how you measured and/or calculated the values.

[28] Refer to Section 5.2.5 of this guide (calculate reduced electricity consumption).

Box 5.5 Supporting evidence for output

To evidence the output amount at the site, you must provide:

- a detailed explanation of how you measured and/or calculated the production output or units of production, and
- evidence to support this (e.g. electronic product inventories, stock control, loading dock records).

Calculate the variable consumption T_b

Once you have calculated the above two parameters for "*n*" measurement periods T_b, along with the fixed electricity consumption, you can calculate the variable consumption T_b (in MWh / unit of output) for each of the measurement periods T_b, using the formula in Step 2B of method 1 (Appendix A.1 of this guide):

$$Variable\ Consumption_{Tb} = (Total\ Consumption_{Tb} - Fixed\ Electricity\ Consumption)/Output_{Tb}$$

5.2.3 Step 2C – Calculate the variable electricity baseline (in MWh/units of output)

The variable electricity baseline is calculated as per Step 2C of method 1 and is measured in MWh /unit of output. It is the average of all the variable consumption values calculated in Step 2B for the entire baseline period:

$$Variable\ Electricity\ Baseline = \{\sum_{T=1}^{n} Variable\ Consumption_{Tb}\} / n$$

5.2.4 Step 2D - Calculate the baseline variability (in MWh/units of output).

The baseline variability (in MWh/units of output) is calculated based on the highest and lowest values of electricity used per unit of output over the baseline period. It is the unexplained variance in the baseline for each measurement period T_b.

The baseline variability will differ based on the number of measurement periods T_b used to calculate the baseline electricity consumption.

Step 2D of method 1 prescribes how to calculate baseline variability, depending on the number of measurement periods T_b you have nominated.

- If you used more than two measurement periods T_b in your calculations, halve the difference between the maximum variable consumption T_b and minimum variable consumption T_b recorded across all your measurement periods T_b:

Baseline Variability = (maximum Variable Consumption$_{Tb}$ - minimum Variable Consumption$_{Tb}$)/ 2

- If you used two or less measurement periods T_b in your calculations, the baseline variability is 10% of the variable electricity baseline.

5.2.5 Step 2E - Calculate reduced electricity consumption (in MWh)

To calculate the reduced electricity consumption for each measurement period T_a for your RESA, use Step 2E of method 1.

Reduced Electricity Consumption = (*Output*$_{Ta}$ x *Variable Electricity Baseline* + *Fixed Electricity Consumption*) - *Total Consumption*$_{Ta}$.

Where:

- T_a denotes a time period, after the implementation date, the duration of which is equal to the measurement period T_b,
- Total consumption T_a (in MWh) is the consumption of electricity for the site measured by metering that consumption over a measurement period T_a, and
- Output T_a is the number of units of output during the time period T_a (as explained in Section 5.2.2 above).

This step must be repeated for each measurement period T_a for which you propose to create ESCs.

5.2.6 Step 2F - Calculate confidence factor

The confidence factor reflects the degree of uncertainty in the calculations, information and assumptions that you have used. To calculate the confidence factor, use Step 2F of method 1:

Confidence Factor = 1 - (Baseline Variability / Variable Electricity Baseline)

5.2.7 Step 2G – Calculate energy savings (in MWh)

To calculate the energy savings (in MWh) resulting from implementation of the RESA, perform the following calculation specified in Step 2G of method 1:

Energy Savings = Reduced Electricity Consumption x *Confidence Factor*

5.2.8 Step 3 – Adjust for negative values

The final step is to adjust where the energy savings is a negative value. In this case:

If Energy Savings < 0, then *Energy Savings = 0*

All the calculation formulae and steps must be clearly identified in the calculation spreadsheet you are required to submit as part of your Application Form: Part B - Method Details.

For the calculation of ESCs, please refer to Section 8 of this guide.

6 Calculation of energy savings using the MBM - Baseline unaffected by output method - Method 2

Clause 8.6 of the ESS Rule describes the MBM - Baseline unaffected by output method (Method 2), and steps through the calculation of energy savings for this method (see Appendix A.2 of this guide).

This section follows the steps and formulae contained in method 2, and will assist you to:

- develop the calculation spreadsheet you are required to submit as part of your application, and
- identify the evidence you must collect when implementing this method.

All formulae used should be clearly stated and referenced (from either the ESS Rule or other relevant source allowable under the ESS Rule) in your calculation spreadsheet.

6.1 Step 1 – Selecting the measurement period

Step 1 requires you to select the measurement period that will be the duration of time over which all measurements in this method will be taken.[29]

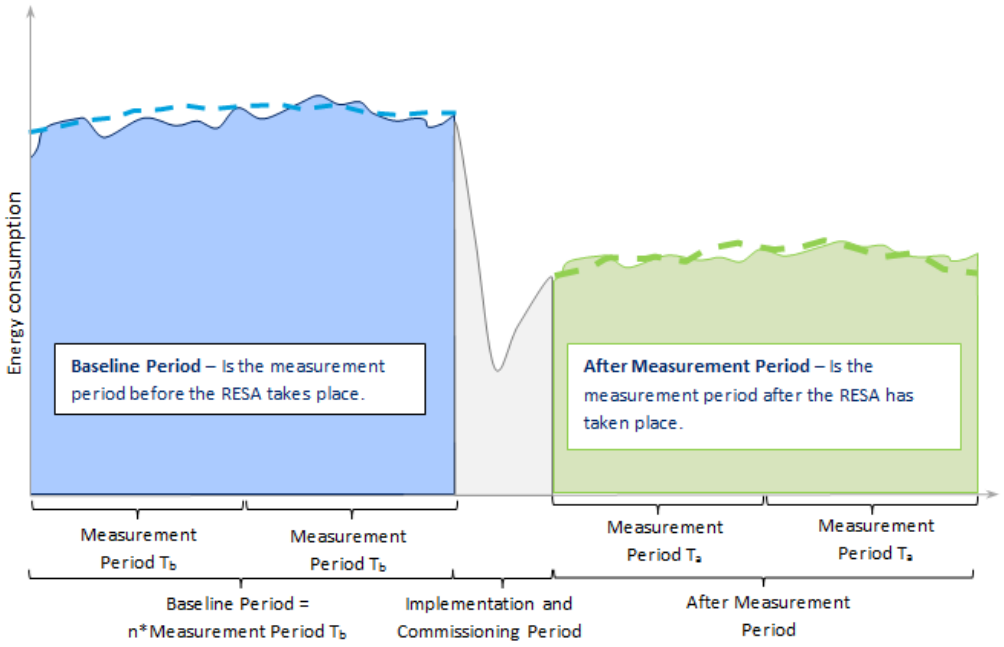
You must define the measurement period used for your calculations by defining the following discrete periods:

- the baseline period, which is made up of one or many measurement periods T_b before implementation of the RESA,
- the implementation and commissioning period, and
- the after measurement period, which will be made up of as many measurement periods T_a after implementation of the RESA a the expected RESA lifetime will allow.

Figure 6.1 below provides a schematic timeline of the measurement period and its components.

[29] Consider conditions in clauses 8.3 and 8.6.1(b) for the electricity baseline when determining the measurement period.

Figure 6.1 Schematic timeline of an MBM RESA's measurement period



Due to key eligibility requirements of the ESS Rule, only activities undertaken after accreditation are eligible to create ESCs.[30] Therefore, you will need to consider carefully the date you expect to submit your application for assessment to the Scheme Administrator as the implementation(s) must occur after you have been granted an accreditation.

The fact that the implementation date must be after the accreditation date means that the best time to apply for accreditation will be before the implementation and commissioning period.

Box 6.1 Supporting evidence and information for the selected measurement periods

You are required to provide supporting documents to justify the use of the proposed baseline period, the after measurement period and the length of the measurement periods T_b and T_a.

The evidence provided must support the rationale for the:

- baseline period that has been selected,
- number of measurement periods T_b your baseline period comprises,
- after measurement period (i.e. the RESA expected lifetime), and
- number of measurement periods T_a that the expected RESA lifetime will allow.

Sections 6.1.1 to 6.1.6 of this guide provide further information that will assist you in determining appropriate measurement periods.

30 Clause 6.2 of the ESS Rule.

6.1.1 Determining the baseline period

The **baseline period** is the total period consisting of *n* measurement periods T_b before implementation of the RESA.

The baseline period must exclude any time periods that are not representative of normal operating conditions of the site (e.g. plant shutdown, major maintenance, etc).

Determining the baseline period is a critical element for all RESAs using the MBM. As such, we may require additional information of how the baseline has been determined, and may reject applications if insufficient evidence is provided to support calculations of the baseline period or the measurement periods T_b.

Box 6.2 Supporting evidence for the baseline period

If you are applying to be accredited to use this method, you will need to provide supporting evidence in your application. You will also need to retain this evidence for each site once you are accredited. In your application you will need to:

- attach supporting documents for the measurement periods T_b to justify use of the proposed baseline period,
- provide the rationale for why these measurement periods T_b have been selected, and
- state how many "*n*" measurement periods T_b have been or will be used as the basis for the baseline period calculations.

The baseline electricity consumption is calculated using data from periods immediately preceding the RESA implementation date, up to a maximum of five years. Where this is not possible, due to data unavailability or other reasons, the baseline electricity consumption may be set using other periods we consider acceptable.[31]

If this is the case, you may propose to use an alternative baseline period. However, you will be required to:

- demonstrate to the Scheme Administrator that periods immediately preceding the implementation date are not suitable, and
- provide appropriate evidence for this.

This request must be made as part of your application. Requests will be considered on a case by case basis.

6.1.2 Measurement periods T_b

The **measurement period T_b** is a defined period **before** implementation of the RESA that is representative of electricity use at the site. It becomes the base unit from which baseline calculations are made.

[31] See ESS Rule clause 8.6.1(b) for the MBM Baseline unaffected by output.

One or more measurement periods T_b will constitute the baseline period. The measurement periods T_b must be:

- a minimum of one (1) day and a maximum of one (1) year, or
- a regular cycle of electricity consumption that can be multiplied (by an integer number) to represent electricity consumption before the implementation of the RESA.

You must define measurement periods T_b from before the implementation of the RESA, that are representative of electricity use.

For example, a period of six months for a plant with discrete summer and winter operating cycles, or one year for a site with continuous output through the year.

Please list each measurement period T_b by filling in the table provided in the relevant part of the Application Form: Part B - Method Details[32].

6.1.3 Implementation and commissioning period

The **implementation and commissioning period** is the time period in which the new process or end user equipment is installed and tested to verify if it functions according to its design specifications. When the performance of the new end user equipment or process is deemed satisfactory, normal operations are considered to have commenced.

6.1.4 Determining the after measurement period

The **after measurement period** is the period over which energy savings calculations can be made. This period is the duration of the expected lifetime of the RESA (e.g. new equipment expected lifetime) and it comprises as many measurement periods T_a as the expected RESA lifetime will allow.

6.1.5 Measurement period T_a

The **measurement period T_a** is a defined period **after** implementation of the RESA that must be of the same duration as the measurement period T_b.

Please list each proposed measurement period T_a by filling in the table provided in the relevant part of the Application Form: Part B - Method Details[33].

[32] The Application Form: Part B – Method Details can be found on the ESS website at: http://www.ess.nsw.gov.au/Methods_for_calculating_energy_savings/Metered_Baseline_Methods/Apply_for_Metered_Baseline_Methods

[33] The Application Form: Part B – Method Details can be found on the ESS website at: http://www.ess.nsw.gov.au/Methods_for_calculating_energy_savings/Metered_Baseline_Methods/Apply_for_Metered_Baseline_Methods

6.1.6 Measurement periods and ESC creation

When determining T_b and T_a measurement periods, you should also take into account the frequency with which you wish to create ESCs, as you will be required to undertake actual measurements for an entire measurement period T_a before you can create any ESCs.

For example, if you propose a measurement periods T_b of one year, then you will need to accumulate data for one year for the measurement period T_a before you can create any ESCs. Similarly, if you choose three month measurement periods T_b, you could create ESCs after data for each three month measurement period T_a has been collected.

However, please note that the length of the measurement periods T_b and T_a is likely to impact on the **confidence factor** approved as part of your application. Shorter measurement periods T_b and T_a are likely to decrease the confidence factor and result in a decrease in the total number of ESCs you can create overall.

6.2 Step 2 – Determining the energy savings

Once you have determined your measurement periods, method 2 now requires you to:

1. complete steps 2A and 2B of method 2 for the baseline measurement periods T_b, and
2. complete steps 2C to 3 of method 2 for each measurement period T_a after implementation of the RESA for which you intend to create ESCs (this will occur after accreditation).

These steps are explained in more detail in the sections below.

Where the data is not yet available at the time of application for accreditation you will need to provide a model of your calculation spreadsheet.

Following accreditation, all the data that was not available at the time of application will need to be updated in your calculation spreadsheet model. This spreadsheet model will be used to calculate the energy savings (i.e. data for measurement periods before implementation and data corresponding to periods after implementation) and it has to be approved by the Scheme Administrator prior to your RESA being accredited.

6.2.1 Step 2A - Calculate the electricity baseline (in MWh)

For calculating the **electricity baseline** you will need first to determine **total consumption T_b** (in megawatt-hours i.e. MWh) of the site.

The total consumption T_b of the site corresponds to the total metered amount of electricity consumed at the site before implementation of your RESA, for each of the measurement periods T_b you have defined.

You will need to provide the total metered amount of electricity consumed at the site before implementation of your RESA, for each of the measurement periods T_b you have nominated as part of your Application Form: Part B – Method Details.

Box 6.3 Supporting evidence of how total consumption is calculated or measured

You are required to support (with evidence) the figures for total electricity consumption with the results of:

- any sub-metering equipment on site, or
- data provided by the electricity retailer (using the utility's revenue grade meters).

Once you have determined the total consumption T_b of the site, use Step 2A of method 2 under clause 8.6 of the ESS Rule (Appendix A.2 of this guide) to calculate the **electricity baseline** using each measurement period T_b:

$$\textit{Electricity Baseline} = \{\sum_{T=1}^{n} \textit{Total Consumption}_{Tb}\} \; / \; n$$

6.2.2 Step 2B - Calculate baseline variability (in MWh)

The **baseline variability** is calculated based on the highest and lowest values of electricity used in the baseline period. It is the unexplained variance in the baseline for each measurement period T_b.

The baseline variability calculation will differ based on the number of measurement periods T_b contained within the baseline period.

Step 2B of method 2 prescribes how to calculate baseline variability, depending on the number of measurement periods T_b you have nominated:

- If you used two or more measurement periods T_b in your calculations, halve the difference between the maximum total consumption T_b and minimum total consumption T_b, recorded across all your measurement periods T_b:

$$\textit{Baseline Variability} = (\textit{maximum Total Consumption}_{Tb} - \textit{minimum Total Consumption}_{Tb} \; / \; 2$$

- If you used only one measurement period T_b in your calculations, the baseline variability is 10% of the electricity baseline.

6.2.3 Step 2C - Calculate reduced electricity consumption (in MWh)

To calculate the reduced electricity consumption for each measurement period T_a for your RESA, use Step 2C of method 2:

$$\textit{Reduced Electricity Consumption} = \textit{Electricity Baseline} - \textit{Total Consumption}_{Ta}$$

Where:

- T_a denotes a time period, after the implementation date, the duration of which is equal to the measurement period T_b, and
- Total Consumption T_a (in MWh) is the consumption of electricity for the site measured by metering that consumption over a measurement period T_a.

This step must be repeated for each measurement period T_a for which you propose to create ESCs.

6.2.4 Step 2D - Calculate confidence factor

The confidence factor reflects the degree of uncertainty in the calculations, information and assumptions that you have used. To calculate the confidence factor for your RESA, use Step 2D of method 2:

$$Confidence\ Factor = 1 - (Baseline\ Variability / Electricity\ Baseline)$$

6.2.5 Step 2E – Calculate energy savings (in MWh)

To calculate the energy savings (in MWh) resulting from implementation of the RESA, perform the following calculation specified in Step 2E of method 2:

Energy Savings = *Reduced Electricity Consumption* x *Confidence Factor*

6.2.6 Step 3 – Adjust for negative values

The final step is to adjust where the energy savings is a negative value. In this case:

If Energy Savings < 0, then *Energy Savings* = *0*

All the calculation formulae and steps must be clearly identified in the calculation spreadsheet you are required to submit as part of your Application Form: Part B – Method Details.

For the calculation of ESCs, please refer to Section 8 of this guide.

7 Calculation of energy savings using the MBM - Normalised baseline method - Method 3

Clause 8.7 of the ESS Rule describes the MBM - Normalised baseline method (Method 3), and steps through the calculation of energy savings for this method (see Appendix A.3 of this guide).

This section follows the steps and formulae contained in method 3, and will assist you to:

- develop the calculation spreadsheet you are required to submit as part of your application, and
- identify the evidence you must collect when implementing this method.

All formulae used shall be clearly stated and referenced (from either the ESS Rule or other relevant source allowable under the ESS Rule) in your calculation spreadsheet.

7.1 Step 1 – Selecting the measurement periods

Step 1 requires you to select the measurement period that will be the duration of time over which all measurements in this method will be taken.[34]

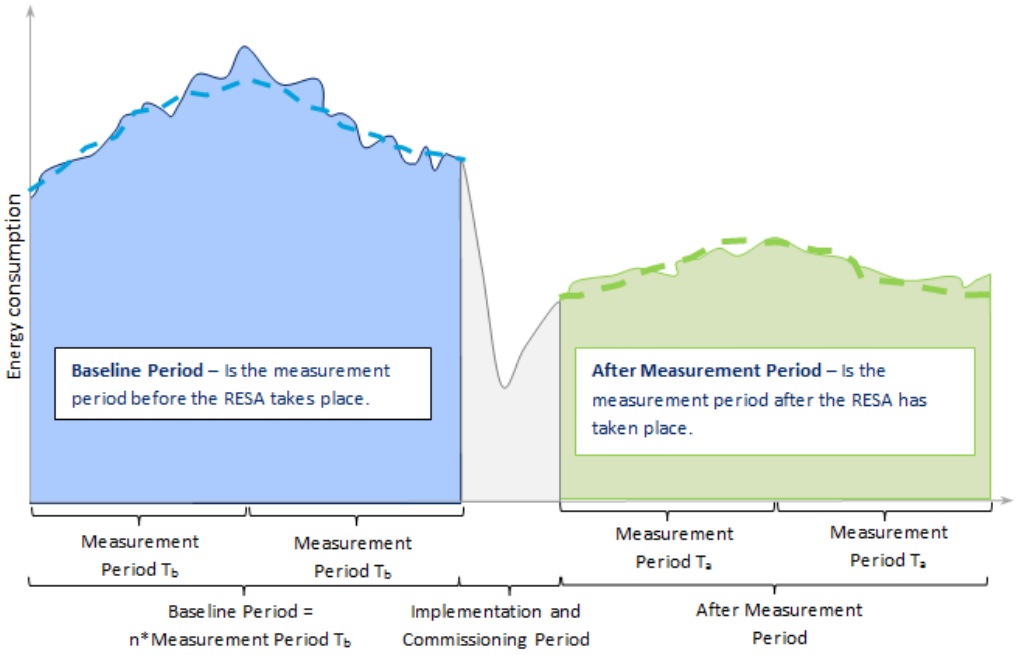
You must define the measurement period used for your calculations by defining the following discrete periods:

- the baseline period, which is made up of one or many measurement periods T_b before implementation of the RESA,
- the implementation and commissioning period, and
- the after measurement period, which will be made up of as many measurement periods T_a after implementation of the RESA as the expected RESA lifetime will allow.

Figure 7.1 below provides a schematic timeline of the measurement period and its components.

[34] Consider clauses 8.3 and 8.7.1(b) for the normalised energy baseline when determining the measurement period.

Figure 7.1 Schematic timeline of an MBM RESA's measurement period



Due to key eligibility requirements of the ESS Rule, only activities undertaken after accreditation are eligible to create ESCs.[35] Therefore, you will need to consider carefully the date you expect to submit your application for assessment to the Scheme Administrator as the implementation(s) must occur after you have been granted an accreditation.

The fact that the implementation date must be after the accreditation date means that the best time to apply for accreditation will be before the implementation and commissioning period.

Box 7.1 Supporting evidence and information for the selected measurement periods

You are required to provide supporting documents to justify the use of the proposed baseline period, the after measurement period and the length of the measurement periods T_b and T_a.

The evidence provided must support the rationale for the:

- baseline period that has been selected,
- number of measurement periods T_b your baseline period comprises,
- after measurement period (i.e. the RESA expected lifetime), and
- number of measurement periods T_a that the expected RESA lifetime will allow.

Sections 7.1.1 to 7.1.6 of this guide provide further information that will assist you in determining appropriate measurement periods.

35 Clause 6.2 of the ESS Rule.

7.1.1 Determining the baseline period

The **baseline period** is the total period consisting of *n* measurement periods T_b before implementation of the RESA.

The baseline period must exclude any time periods that are not representative of normal operating conditions of the site (e.g. plant shutdown, major maintenance, etc).

Determining the baseline period is a critical element for all RESAs using the MBM. As such, we may require additional information of how the baseline has been determined, and may reject applications if insufficient evidence is provided to support calculations of the baseline period or the measurement periods T_b.

Box 7.2 Supporting evidence for the baseline period

If you are applying to be accredited to use this method, you will need to provide supporting evidence in your application. You will also need to retain this evidence for each site once you are accredited. In your application you will need to:

- attach supporting documents for the measurement periods T_b to justify use of the proposed baseline period,
- provide the rationale for why these measurement periods T_b have been selected, and
- state how many "*n*" measurement periods T_b have been or will be used as the basis for the baseline period calculations.

The baseline electricity consumption is calculated using data from periods immediately preceding the RESA implementation date, up to a maximum of five years. Where this is not possible, due to data unavailability or other reason, the baseline electricity consumption may be set using other periods we consider acceptable.[36]

If this is the case, you may propose to use an alternative baseline period. However, you will be required to:

- demonstrate to the Scheme Administrator that periods immediately preceding the implementation date are not suitable, and
- provide appropriate evidence for this.

This request must be made as part of your application. Requests will be considered on a case by case basis.

7.1.2 Measurement periods T_b

The **measurement period T_b** is a defined period **before** implementation of the RESA that is representative of electricity use at the site. It becomes the base unit from which baseline calculations are made.

36 See ESS Rule clause 8.7.1(b) for the MBM Normalised Baseline.

One or more measurement periods T_b will constitute the baseline period. The measurement periods T_b must be:

- a minimum of one (1) day and a maximum of one (1) year, or
- a regular cycle of electricity consumption that can be multiplied (by an integer number) to represent electricity consumption before implementation of the RESA.

You must define measurement periods T_b from before the implementation of the RESA, that are representative of electricity use.

For example, a period of six months for a plant with discrete summer and winter operating cycles, or one year for a site with continuous output through the year.

Please list each measurement period T_b by filling in the table provided in the relevant part of the Application Form: Part B - Method Details[37].

7.1.3 Implementation and commissioning period

The **implementation and commissioning period** is the time period in which the new processes or end user equipment is installed and tested to verify if it functions according to its design specifications. When the performance of the new end user equipment or processes is deemed satisfactory, normal operations are considered to have commenced.

7.1.4 Determining the after measurement period

The **after measurement period** is the period over which energy savings calculations can be made. This period is the duration of the expected lifetime of the RESA (e.g. new equipment expected lifetime) and it comprises as many measurement periods T_a as the expected RESA lifetime will allow.

7.1.5 Measurement period T_a

The measurement period T_a is a defined period **after** implementation of the RESA that must be of the same duration as the measurement period T_b.

Please list each proposed measurement period T_a by filling in the table provided in the relevant part of the Application Form: Part B - Method Details[38].

[37] The Application Form: Part B – Method Details can be found on the ESS website at: http://www.ess.nsw.gov.au/Methods_for_calculating_energy_savings/Metered_Baseline_Methods/Apply_for_Metered_Baseline_Methods

[38] The Application Form: Part B – Method Details can be found on the ESS website at: http://www.ess.nsw.gov.au/Methods_for_calculating_energy_savings/Metered_Baseline_Methods/Apply_for_Metered_Baseline_Methods

7.1.6 Measurement periods and ESC creation

When determining T_b and T_a measurement periods, you should also take into account the frequency with which you wish to create ESCs, as you will be required to undertake actual measurements for an entire measurement period T_a before you can create any ESCs.

For example, if you propose a measurement periods T_b of one year, then you will need to accumulate data for one year for the measurement period T_a before you can create any ESCs. Similarly, if you choose three month measurement periods T_b, you could create ESCs after data for each three month measurement period T_a has been collected.

However, please note that the length of the measurement periods T_b and T_a is likely to impact on the **confidence factor** approved as part of your application. Shorter measurement periods T_b and T_a are likely to decrease the confidence factor and result in a decrease in the total number of ESCs you can create overall.

7.2 Step 2 – Determining the energy savings

Once you have determined your measurement periods, method 3 now requires you to complete steps 2A to 2F. Method 3 also requires you to complete steps 2D to 3 for each measurement period T_a for which you intend to create ESCs (after you are accredited).

These steps are explained in more detail in the sections below.

When preparing your application, you will need to develop a model of your calculation spreadsheet that is designed to include all of the steps below for each measurement period T_a.

Following accreditation, all the data that was not available at the time of application will need to be updated in your calculation spreadsheet model. This spreadsheet model will be used to calculate the energy savings (i.e. data for measurement periods before implementation and data corresponding to periods after implementation) and it has to be approved by the Scheme Administrator prior to your RESA being accredited.

7.2.1 Step 2A – Calculate the normalised consumption (in MWh)

For calculating the **normalised consumption T_b** you will need first to determine the **total consumption T_b** (in MWh) of the site.

The total consumption T_b of the site corresponds to the total metered amount of electricity consumed at the site before implementation of your RESA, for each of the measurement periods T_b you have defined.

You will need to provide the total metered amount of electricity consumed at the site before implementation of your RESA, for each of the measurement periods

T_b you have nominated as part of your Application Form: Part B – Method Details.

Box 7.3 Supporting evidence of how total consumption is calculated or measured

You are required to support (with evidence) the figures for total electricity consumption with the results of:

- any sub-metering equipment on site, or
- data provided by the electricity retailer (using the utility's revenue grade meters).

Once you have determined the total consumption T_b for each of the measurement periods T_b, use Step 2A of method 3 to calculate the normalised consumption T_b (in MWh) for n time periods T_b. This is done by normalising the total consumption T_b to determine the consumption that would have occurred for the measurement period T_b had the conditions at the time of measurement period T_a existed, using:

(a) a set of normalisation coefficients, which are one or more coefficients calculated to account for the variation in total consumption T_b per unit of change for each corresponding normalisation variable used in (b) below, and

(b) a set of values, which are the difference between the values of the normalisation variables for each time period T_b, and the values of the normalisation variables for one time period T_a, determined by measurements or other data sources.

As part of your Application Form: Part B – Method Details, you must provide details of the reasons for the variation in total consumption T_b before the implementation of your RESA. Reasons for the variation of your electricity consumption in the baseline period may include, for example:

- variations in ambient conditions,
- variations in input characteristics, or
- change in goods manufactured at certain times of the year.

For each of the reasons, and to account for the variation in total consumption T_b before the implementation of your RESA, you must calculate an appropriate **normalisation coefficient**[39] to account for the variation of total consumption T_b. You must also develop a set of values to correlate the normalisation variables between the periods before (measurement periods T_b) and after (measurement periods T_a) implementation of the RESA.

Regression analysis and other forms of mathematical modelling can determine the number of normalisation coefficients (independent variables) that contribute to the variation of total consumption T_b.

39 Normalisation coefficients refer to regularly changing parameters affecting the site energy use, and are also called independent variables.

For further guidance on the development of appropriate normalisation coefficients, you should refer to the IPMVP, Volume 1.[40]

7.2.2 Step 2B – Calculate the normalised energy baseline (in MWh)

Use Step 2B of method 3 to calculate the **normalised electricity baseline** for each of the ***n*** measurement periods T_b:

$$\textit{Normalised Energy Baseline} = \{\sum_{T=1}^{n} \textit{Normalised Consumption}_{Tb}\} \; / \; n$$

7.2.3 Step 2C - Calculate baseline variability (in MWh)

The **baseline variability** is calculated based on the highest and lowest normalised values of electricity used in the baseline period. It is the unexplained variance in the baseline for each measurement period T_b.

The baseline variability will differ based on the number of measurement periods T_b used to calculate the reduced electricity consumption as a result of your RESA.

Step 2B of method 3 prescribes how to calculate baseline variability, depending on the number of measurement periods T_b you have nominated.

- If you used two or more measurement periods T_b in your calculations, halve the difference between the maximum normalised consumption T_b and minimum normalised consumption T_b, recorded across all your measurement periods T_b:

$$\textit{Baseline Variability} = (\textit{maximum Normalised Consumption}_{Tb} - \textit{minimum Normalised Consumption}_{Tb})/2$$

- If you used only one measurement period T_b in your calculations, the baseline variability is 10% of the normalised electricity baseline.

7.2.4 Step 2D - Calculate the reduced electricity consumption (in MWh)

To calculate the **reduced electricity consumption** for each measurement period T_a for your RESA, use Step 2D of method 3:

$$\textit{Reduced Electricity Consumption} = \textit{Normalised Electricity Baseline} - \textit{Total Consumption}_{Ta}$$

Where:

- T_a denotes a time period, after the implementation date, the duration of which is equal to the measurement period T_b, and

[40] Efficiency Valuation Organisation, 2012 "International Performance Measurement and Verification Protocol, Concepts and Options for Determining Energy and Water Savings - Volume I", available at http://www.evo-world.org/

- **Total Consumption T_a** (in MWh) is the consumption of electricity for the site measured by metering that consumption over a measurement period T_a.

This step must be repeated for each measurement period T_a for which you propose to create ESCs.

7.2.5 Step 2E - Calculate confidence factor

The **confidence factor** reflects the degree of uncertainty in the calculations, information and assumptions that you have used. To calculate the confidence factor for your RESA, use Step 2E of method 3:

Confidence Factor = 1 - (Baseline Variability / Normalised Electricity Baseline)

7.2.6 Step 2F – Calculate energy savings (in MWh)

To calculate the energy savings (in MWh) resulting from implementation of the RESA, perform the following calculation specified in Step 2F of method 3:

Energy Savings = Reduced Electricity Consumption x *Confidence Factor*

7.2.7 Step 3 – Adjust for negative values

The final step is to adjust where the energy savings is a negative value. In this case:

If Energy Savings < 0, then *Energy Savings* = 0

All the calculation formulae and steps must be clearly identified in the calculation spreadsheet you are required to submit as part of your Application Form: Part B – Method Details.

For the calculation of ESCs, please refer to Section 8 of this guide.

8 Creating Energy Savings Certificates

This section provides instructions on how to create ESCs under the MBM methods, once you are accredited. For each of the MBM methods, the energy savings for a measurement period T_a are taken to have occurred on the last date of that period.[41]

8.1 Implementation summary

To register ESCs from your implementation(s), please complete the clause 6.8 submission form[42] and submit it to the Scheme Administrator for processing. Please follow the instructions provided in the ESS Portal:

http://www.ess.nsw.gov.au/ESS_Portal

8.2 Number of sites that can be registered for each bundle

It is up to you to decide how many implementations you want to bundle together to create ESCs, but you must register all certificates from a bundle at the one time and you cannot split energy savings from one implementation across bundles.

The number of implementations included in any one bundle should be guided by:

- the ESC creation limit specified in your accreditation notice, as you must be able to register all the ESCs at the same time (for example, if you have a limit of 5,000 ESCs, you cannot register 6,000 ESCs at the one time), and
- the cost of registering the ESCs (each ESC has a registration fee of $0.70).

Remember you are required to undertake actual measurements before you can create any ESCs.

For example, if you propose measurement periods T_b and T_a of one year, then you will need to accumulate data for that one year period after the implementation before you can create any ESCs.

Depending on your accreditation conditions, data may have to be reassessed by the Scheme Administrator before you can create ESCs.

41 Clauses 8.5.4, 8.6.4 and 8.7.4 of the ESS Rule.

42 http://www.ess.nsw.gov.au/Registry/Creating_certificates

9 Applying for accreditation

A completed application tailored to this energy savings method is required for a person to become an ACP and create ESCs under this method.

An application has multiple parts, which are explained in the **Application Guide**.[43] As a minimum, you will have to provide:

- Application Form: Part A - General Details, available at www.ess.nsw.gov.au/How_to_apply_for_accreditation
- Application Form: Part B - Method Details, available at http://www.ess.nsw.gov.au/Methods_for_calculating_energy_savings/Metered_Baseline_Methods/Apply_for_Metered_Baseline_Methods

For a full explanation of the application process, please read the Application Guide.[44]

9.1 Required information to be considered for accreditation

To be considered for accreditation you will need to submit, at a minimum:

- Application Form: Part A - General Details, available at www.ess.nsw.gov.au/How_to_apply_for_accreditation
- Application Form: Part B - Method Details, available at http://www.ess.nsw.gov.au/Methods_for_calculating_energy_savings/Metered_Baseline_Methods/Apply_for_Metered_Baseline_Methods, depending on the MBM method for which you are applying to be accredited.
  - Partial response required – information corresponding to the measurement period(s) T_b, and
- Energy savings calculation spreadsheet model (with estimated data of the measurement period(s) T_a, i.e. a hypothetical project).

The information that you submit will be considered by the Scheme Administrator, and may be sufficient to accredit your RESA and therefore to allow you to implement your RESA. However, to allow you to create ESCs for your implementation(s), the Scheme Administrator will need to set an audit regime, an ESC creation limit and conduct an additional assessment of data after the completion of the first measurement period T_a.

To provide sufficient information for the Scheme Administrator to consider setting an audit regime and ESC creation limit, you must submit the following information once the first measurement period T_a has passed.

- Application Form: Part A - General Details, available at www.ess.nsw.gov.au/How_to_apply_for_accreditation

43 www.ess.nsw.gov.au/How_to_apply_for_accreditation.

44 The Application Guide can be found at www.ess.nsw.gov.au/How_to_apply_for_accreditation

- Application Form: Part B - Method Details, available at http://www.ess.nsw.gov.au/Methods_for_calculating_energy_savings/Metered_Baseline_Methods/Apply_for_Metered_Baseline_Methods, depending on the MBM method for which you are applying to be accredited.
  - Full response required, and
- Energy savings calculation spreadsheet with actual metered data.

For a full explanation of the process, please read the "Application Assessment" section of the Application Guide.

10 Glossary

Table 10.1 Metered Baseline Methods definitions

Term	Definition
ACP	Accredited Certificate Provider.
After Measurement Period	A time period after the RESA implementation which can consist of one or more measurement periods T_a (depending on the lifetime of the equipment that is the subject of the RESA).
Baseline Period	A time period before the RESA implementation which can consist of one or more measurement periods T_b.
Confidence Factor	A factor applied to the energy savings calculations, which determines unexplained variance in the baseline electricity consumption.
ESCs	Energy Savings Certificates.
ESS	Energy Savings Scheme.
ESS Rule	Energy Savings Scheme Rule of 2009.
Fixed Electricity Consumption	The consumption of electricity at the site that does not vary with changes in output.
Implementation	The delivery of a RESA at a particular site.
Implementation and Commissioning Period	The time period in which the new process or end user equipment is installed and tested to verify if it functions according to its design specifications.
Implementation date	The earlier of the start date of the first measurement period T_a or the date on which the reduction of electricity consumption commenced due to the implementation.
IPART	Independent Pricing and Regulatory Tribunal.
IPMVP	International Performance Measurement and Verification Protocol, published by the Efficiency Valuation Organization.
Measurement Period	A time period before or after the RESA implementation, which is the duration of time over which measurement of energy consumption is undertaken for the purposes of calculating energy savings.
Measurement Period T_b	A time period before implementation of the RESA that is representative of electricity use on the site in the absence of the implementation of the RESA. It is the base unit from which baseline calculations are made.
Measurement Period T_a	A time period after implementation of the RESA that must be of the same duration as the measurement period T_b.

MWh	Megawatt-hour (unit of energy).
Output	The number of units of output or production during each time period.
PIAM&V	The Project Impact Assessment with Measurement and Verification Method, as defined in clause 7A of the ESS Rule.
Regression Analysis	A method to determine the relationship between energy consumption and production or independent variables.
RESA	Recognised Energy Saving Activity.
Site	The location of the end-user equipment affected by a RESA, as defined by: a) an address b) a unique identifier, as specified for the relevant Implementation that identifies the affected end-user equipment, or c) another method accepted by the Scheme Administrator.

Appendices

A Equations and inputs for Methods 1, 2 and 3

Sections D.1 to D.3 below are extracts from the ESS Rule of the calculation methods for each MBM method.

A.1 Method 1 - MBM - Baseline per unit of output

Step (1) Select a **Measurement Period** acceptable to the Scheme Administrator, which will be the duration of time over which all measurements in this method will be taken and that is:

a) a minimum of one day and a maximum of one year, and

b) if there is a regular cycle to the consumption of electricity on the site, an integer multiple of the period of that cycle.

Step (2) Determine **Energy Savings** by completing steps (2A) to (2G), and for each time period $\mathbf{T_a}$ by reference to which the Accredited Certificate Provider seeks to create Energy Savings Certificates by repeating steps (2E) to (3) for each such period.

Step (2A) Determine the **Fixed Electricity Consumption** (in MWh), which is the consumption of electricity for the site that does not vary with variations in output, and is:

- determined by estimating or extrapolating from measurements taken during plant downtime or estimated or determined mathematically from multiple periods,
- a reasonable reflection of the consumption unaffected by output, and will lead to Energy Savings calculations that are reasonable, and
- over a period $\mathbf{T_b}$ before Energy Savings commence and the duration of which is equal to the Measurement Period.

Step (2B) Calculate **Variable Consumption**$_{\mathbf{Tb}}$ (in MWh / unit of output) for ***n*** time periods $\mathbf{T_b}$ as follows:

$$Variable\ Consumption_{Tb} = (Total\ Consumption_{Tb} - Fixed\ Electricity\ Consumption) / Output_{Tb}$$

Where:

- $\mathbf{T_b}$ denotes a time period, before the Implementation Date, the duration of which is equal to the Measurement Period, and where each time period is mutually exclusive with each other such time period,
- **Total Consumption**$_{\mathbf{Tb}}$ (in MWh) is the consumption of electricity for the site measured by metering that consumption over each time period $\mathbf{T_b}$,
- **Output**$_{\mathbf{Tb}}$ is the number of units of output during each time period $\mathbf{T_b}$, and

- n is the number of time periods, $\mathbf{T_b}$, where n must be at least 1.

Step (2C) Calculate **Variable Electricity Baseline** (in MWh / unit of output):

$$\textit{Variable Electricity Baseline} = \{\sum_{T=1}^{n} \textit{Variable Consumption}_{Tb}\} / n$$

Step (2D) Calculate **Baseline Variability** (in MWh / unit of output), which is the unexplained variance in the baseline, as follows:

If n > 2:

Baseline Variability = (maximum *Variable Consumption*$_{Tb}$ – minimum *Variable Consumption*$_{Tb}$) / 2

Where:

- maximum **Variable Consumption**$_{\mathbf{Tb}}$ is the maximum value of **Variable Consumption**$_{\mathbf{Tb}}$ over n time periods $\mathbf{T_b}$, and
- minimum **Variable Consumption**$_{\mathbf{Tb}}$ is the least value of **Variable Consumption**$_{\mathbf{Tb}}$ over n time periods $\mathbf{T_b}$.

If n≤ 2:

Baseline Variability = 10% of *Variable Electricity Baseline*

Step (2E) Calculate **Reduced Electricity Consumption** (in MWh) for the time period $\mathbf{T_a}$ (after the Implementation Date) for which the Accredited Certificate Provider seeks to create Energy Savings Certificates as follows:

Reduced Electricity Consumption = (*Output*$_{Ta}$ x *Variable Electricity Baseline* + *Fixed Electricity Consumption*) - *Total Consumption*$_{Ta}$

Where:

- $\mathbf{T_a}$ denotes a time period, after the Implementation Date, the duration of which is equal to the **Measurement Period**
- **Total Consumption**$_{\mathbf{Ta}}$ (in MWh) is the consumption of electricity for the site measured by metering that consumption over a time period $\mathbf{T_a}$, and
- **Output**$_{\mathbf{Ta}}$ is the number of units of output during the time period $\mathbf{T_a}$.

Step (2F) Calculate the **Confidence Factor** as follows:

Confidence Factor = 1 - (*Baseline Variability* / *Variable Electricity Baseline*)

Step (2G) Calculate **Energy Savings** (in MWh) for each time period $\mathbf{T_a}$ by reference to which the Accredited Certificate Provider seeks to create Energy Savings Certificates as follows:

Energy Savings = *Reduced Electricity Consumption* x *Confidence Factor*

Step (3) Ensure **Energy Savings** are non-negative.

If *Energy Savings* < 0:
Energy Savings = 0

A.2 Method 2 - MBM - Baseline unaffected by output

Step (1) Select a **Measurement Period** acceptable to the Scheme Administrator, which will be the duration of time over which all measurements in this method will be taken and that is:

a) a minimum of one day and a maximum of one year, and

b) if there is a regular cycle to the consumption of electricity on the site, an integer multiple of the period of that cycle.

Step (2) Determine **Energy Savings** by completing steps (2A) to (2E), and for each time period $\mathbf{T_a}$ by reference to which the Accredited Certificate Provider seeks to create Energy Savings Certificates by repeating steps (2C) to (3) for each such period.

Step (2A) Calculate **Electricity Baseline** (in MWh) as follows:

$$\textit{Electricity Baseline} = \{\sum_{T=1}^{n} \textit{Total Consumption}_{Tb}\} \; / \; \mathrm{n}$$

Where:

- $\mathbf{T_b}$ denotes a time period, before the Implementation Date, the duration of which is equal to the Measurement Period, and where each time period is mutually exclusive with each other such time period,
- **Total Consumption**$_{\mathbf{Tb}}$ (in MWh) is the consumption of electricity for the site measured by metering that consumption over each time period $\mathbf{T_b}$, and
- n is the number of time periods, $\mathbf{T_b}$, where n must be at least 1.

Step (2B) Calculate **Baseline Variability** (in MWh), which is the variance in the baseline, as follows:

If n > 1:

Baseline Variability = (maximum *Total Consumption*$_{Tb}$ – minimum *Total Consumption*$_{Tb}$) / 2

Where:

- maximum **Total Consumption**$_{\mathbf{Tb}}$ is the maximum value of **Total Consumption**$_{\mathbf{Tb}}$ over n time periods $\mathbf{T_b}$; and
- minimum **Total Consumption**$_{\mathbf{Tb}}$ is the least value of **Total Consumption**$_{\mathbf{Tb}}$ over n time periods $\mathbf{T_b}$

If n =1:

Baseline Variability = 10% of *Electricity Baseline*

Step (2C) Calculate **Reduced Electricity Consumption** (in MWh) for the time period $\mathbf{T_a}$ (after the Implementation Date) for which the Accredited Certificate Provider seeks to create Energy Savings Certificates as follows:

$$\textit{Reduced Electricity Consumption} = \textit{Electricity Baseline} - \textit{Total Consumption}_{Ta}$$

Where:

- $\mathbf{T_a}$ denotes a time period, after the Implementation Date, the duration of which is equal to the Measurement Period; and
- **Total Consumption**$_{\mathbf{Ta}}$ (in MWh) is the consumption of electricity for the site measured by metering that consumption over a time period $\mathbf{T_a}$

Step (2D) Calculate **Confidence Factor** as follows:

$$\textit{Confidence Factor} = 1 - (\textit{Baseline Variability} / \textit{Electricity Baseline})$$

Step (2E) Calculate **Energy Savings** (in MWh) for the time period $\mathbf{T_a}$ for which the Accredited Certificate Provider seeks to create Energy Savings Certificates as follows:

$$\textit{Energy Savings} = \textit{Reduced Electricity Consumption} \times \textit{Confidence Factor}$$

Step (3) Ensure **Energy Savings** are non-negative.

If $\textit{Energy Savings} < 0$:
$\textit{Energy Savings} = 0$

A.3 Method 3 - MBM - Normalised Baseline

Step (1) Select a **Measurement Period** acceptable to the Scheme Administrator which will be the duration of time over which all measurements in this method will be taken and that is:

c) a minimum of one day and a maximum of one year, and

d) if there is a regular cycle to the consumption of electricity on the site, an integer multiple of the period of that cycle.

Step (2) Determine Energy Savings by completing steps (2A) to (2F) and for the time period $\mathbf{T_a}$ for which the Accredited Certificate Provider seeks to create Energy Savings Certificates, by repeating steps (2D) to (3) for each such period.

Step (2A) Calculate **Normalised Consumption**$_{\mathbf{Tb}}$ (in MWh) for *n* time periods $\mathbf{T_b}$ by normalising the **Total Consumption**$_{\mathbf{Tb}}$ to determine the consumption that would have occurred for period $\mathbf{T_b}$ had the conditions at time $\mathbf{T_a}$ existed, using:

(a) a set of normalisation coefficients, which are one or more coefficients calculated to account for the variation in **Total Consumption**$_{\mathbf{Tb}}$ per unit of change for each corresponding normalisation variable used in Step(2A)(b), and

(b) a set of values, which are the difference between the values of the normalisation variables for each time period $\mathbf{T_b}$, and the values of the normalisation variables for one time period $\mathbf{T_a}$, determined by measurements or other data sources.

Where:

- $\mathbf{T_b}$ denotes a time period, before the Implementation Date, the duration of which is equal to the Measurement Period, and where each time period is mutually exclusive with each other such time period
- $\mathbf{T_a}$ denotes a time period, after the Implementation Date, the duration of which is equal to the Measurement Period,
- **Total Consumption**$_{\mathbf{Tb}}$ (in MWh) is the consumption of electricity for the site measured by metering that consumption over each time period $\mathbf{T_b}$,
- *n* is the number of time periods, $\mathbf{T_b}$, where *n* must be at least 1, and
- **Normalisation Variables** are the variables in respect of which the **Total Consumption**$_{\mathbf{Tb}}$ is normalised and must correspond to factors that are a reason for change in **Total Consumption**$_{\mathbf{Tb}}$.

Step (2B) Calculate **Normalised Energy Baseline** (in MWh) as follows:

$$\textit{Normalised Energy Baseline} = \{\sum_{T=1}^{n} \textit{Normalised Consumption}_{Tb}\} \,/\, \mathrm{n}$$

Step (2C) Calculate **Baseline Variability** (in MWh), which is the unexplained variance in the baseline, as follows:

If n > 1:

Baseline Variability = (maximum *Normalised Consumption*$_{Tb}$ – minimum *Normalised Consumption*$_{Tb}$) / 2

Where:

- maximum **Normalised Consumption$_{Tb}$** is the maximum value of **Normalised Consumption$_{Tb}$** over *n* time periods **T_b**, and
- minimum **Normalised Consumption$_{Tb}$** is the least value of **Normalised Consumption$_{Tb}$** over *n* time periods **T_b**

If n =1:

Baseline Variability = 10% of *Normalised Energy Baseline*

Step (2D) Calculate **Reduced Electricity Consumption** (in MWh) for the time period **T_a** (after the Implementation Date) for which the Accredited Certificate Provider seeks to create Energy Savings Certificates, as follows:

Reduced Electricity Consumption = *Normalised Electricity Baseline* – *Total Consumption*$_{Ta}$

Where:

- **T_a** denotes a time period, after the Implementation Date, the duration of which is equal to the Measurement Period, and
- **Total Consumption$_{Ta}$** (in MWh) is the consumption of electricity for the site measured by metering that consumption over a time period **T_a**.

Step (2E) Calculate **Confidence Factor**:

Confidence Factor = 1 - (*Baseline Variability* / *Normalised Electricity Baseline*)

Step (2F) Calculate **Energy Savings** (in MWh) for each time period **T_a** by reference to which the Accredited Certificate Provider seeks to create Energy Savings Certificates:

Energy Savings = *Reduced Electricity Consumption* x *Confidence Factor*

Step (3) Ensure **Energy Savings** are non-negative:

If *Energy Savings* < 0:
Energy Savings = 0