

# **Method Guide**

## **Aggregated Metered Baseline**

### **Metered Baseline Method**

**Energy Savings Scheme**  
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## 1 About this guide

This guide details how the Aggregated Metered Baseline Method of the NSW Energy Savings Scheme (ESS) operates under the NSW Energy Savings Scheme (ESS), what eligibility requirements apply for this method, and how energy savings are calculated. This guide should be used by:

- ▼ applicants who are seeking accreditation, to assist them in completing their application, and
- ▼ those persons already accredited (Accredited Certificate Providers (ACPs)), to assist them in accurately calculating energy savings for this method.

The *Application Form: Part B – Method Details Aggregated Metered Baseline* (Application Form: Part B - Method Details)<sup>1</sup> 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.

## 2 Method overview

The Aggregated Metered Baseline Method provides a way to calculate and create Energy Savings Certificates (ESCs) for energy savings that occur across a group of electricity customers using statistical techniques. Statistical knowledge is required in order to successfully conduct energy savings activities under this method.

The Aggregated Metered Baseline Method may be used to calculate energy savings for most energy saving activities, but is generally best suited to activities where:

- ▼ Energy savings are small on a site by site basis.
- ▼ Energy savings vary greatly from site to site.
- ▼ There is uncertainty over the amount of energy that will be saved, or the length of time for which energy savings will continue.

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<sup>1</sup> 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/Aggregated\\_Metered\\_Baseline/Apply\\_for\\_Aggregated\\_Metered\\_Baseline](http://www.ess.nsw.gov.au/Methods_for_calculating_energy_savings/Aggregated_Metered_Baseline/Apply_for_Aggregated_Metered_Baseline)

## 3 Method eligibility

A number of requirements must be met for the creation of ESCs using the Aggregated Metered Baseline Method. These are outlined below.

### 3.1 Energy saver

Only an ACP, who is also an energy saver, can create energy savings using the Aggregated Metered Baseline Method. There are two types of energy saver, as described below.

#### Energy saver by definition

Under the Aggregated Metered Baseline Method, the energy saver is the person who holds the measured electricity consumption data for all the sites in the population as at the implementation date.<sup>2</sup>

#### Becoming the energy saver through nomination

Alternatively, the holder of the measured electricity consumption data can nominate an ACP as the energy saver by completing a nomination form generated from the [Nomination Form Template](#)<sup>3</sup> specific to the method, which is available on the ESS website. This nomination must be made before the implementation date.

### 3.2 Purchaser

The purchaser is not applicable to this method.

### 3.3 Implementation and implementation date

Implementations and implementation dates are used to determine the amount of energy saved in megawatt hours (MWh), the number of, and from when, ESCs can be created.

An implementation under the Aggregated Metered Baseline Method is the delivery and monitoring of an energy savings initiative (the treatment<sup>4</sup>) to sites in the population.<sup>5</sup> For example, a program delivered to a number of houses to

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<sup>2</sup> See section 3.3 for the definition of implementation date.

<sup>3</sup> The Nomination Form Template can be found on the ESS website at: [http://www.ess.nsw.gov.au/Methods\\_for\\_calculating\\_energy\\_savings/Aggregated\\_Metered\\_Baseline](http://www.ess.nsw.gov.au/Methods_for_calculating_energy_savings/Aggregated_Metered_Baseline)

<sup>4</sup> See section 3.4 for a definition of treatment.

<sup>5</sup> See section 3.4 for a definition of population.



assist them to reduce their electricity consumption through equipment or behavioural changes.

The implementation date is the start date of the implementation period. This date is important, as only implementations after the date the energy saver is registered as an ACP and (where applicable) nominated by the holder of the electricity consumption data, are eligible.

### **3.3.1 Pre-implementation period**

Electricity consumption data measured prior to the treatment commencing can be used in the calculation of energy savings. The time period where data is available before the implementation date is called the pre-implementation period.

Pre-implementation period data is necessary to calculate the observed energy savings under method 5.3 and 5.4 of the ESS Rule.<sup>6</sup>

If you use data from the pre-implementation period, you must specify before the implementation date a period for which the pre-implementation data is available for all sites.

### **3.3.2 Implementation period**

The time period over which the electricity consumption will be measured to create ESCs is called the implementation period. The implementation period must be:

- ▼ over a continuous time period
- ▼ at least three months long, and
- ▼ no longer than 15 months.

The implementation period must not overlap with the pre-implementation period, but they do not have to be immediately sequential.

If your energy savings initiative will result in energy savings over a period longer than 15 months, you can continue the treatment under a new implementation period.

You must determine and document the length of each implementation period prior to the implementation date, that is, before the start date of the first implementation period.

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<sup>6</sup> See section 4.1 for a definition of observed energy savings and the three calculation methods.

### 3.4 The population

The population is the group of sites from which energy savings are calculated. A site can be either residential or commercial. Each site in the population must be allocated to either the control group or the treatment group prior to the implementation date.

The ACP is free to choose which sites they wish to include in the population. Alternatively, a site may ask to join the population, however that site must be randomly allocated to either the treatment or control group and cannot choose which group it will be assigned to.

A site cannot be removed from the population unless it has been affected by attrition.<sup>7</sup>

#### 3.4.1 Treatment and treatment group

The treatment is the offering of goods or services designed to deliver energy savings to sites in the treatment group.

The treatment group includes all sites within the population that receive the treatment. Therefore if a site in the treatment group is offered the energy saving goods or services but chooses not to receive them, that site is still considered to have received the treatment and must be retained in the treatment group for the purpose of calculating the energy savings unless it affected by attrition.<sup>8</sup>

#### 3.4.2 Control group

The control group includes all sites within the population that do not receive the treatment (that is, they are not offered the energy saving goods or services). The control group is used to estimate the expected electricity consumption of the treatment group, were they not to receive the treatment.

The population must not be targeted with the offer of any goods or services intended to increase the difference in electricity consumption between the control group and treatment group.

#### 3.4.3 Allocating a site to the treatment group or control group

A site must be allocated to either the treatment group or the control group using an unbiased selection method and this allocation must occur before the implementation date. This means that the allocation is conducted using a randomisation technique that ensures every site in the population has the same

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<sup>7</sup> See section 3.4.4 for an explanation of attrition.

<sup>8</sup> See section 3.4.4 for an explanation of attrition.

chance of being assigned to the treatment group. That is, site 'A' must have the same chance of being assigned to the treatment group as site 'B'. This requirement does not mean that the treatment group must be the same size as the control group.

The size of the population, control group and treatment group is not prescribed. You must determine the most cost-effective population size for your business model, and the most effective ratio of treatment group to control group sizes to use when allocating sites.

Segmenting the population into strata may improve the accuracy of energy saving calculations in some circumstances. If you choose to do this, it must be done before allocating the sites within the population to the treatment group or control group. Persons at a site must not be informed of their allocation into either group.

#### **3.4.4 Attrition**

Attrition means the termination of an electricity account in relation to a specific site. The result of attrition is that measured electricity consumption data may not be available for that site during the whole or part of the implementation period. Examples of when attrition occurs include:

- ▼ A customer switching electricity retailer.
- ▼ A customer relocates to a different site.
- ▼ A customer's electricity services at a site are disconnected.

If attrition occurs during an implementation period, it may be managed in two ways, provided all sites affected by attrition are managed in the same manner:

1. The attrition affected sites are removed from the population and any partial measured electricity consumption data from those sites are omitted from the calculation of energy savings.
2. Each attrition affected site is retained in the population only until the last day that the measured electricity consumption data is available for it, following which the site is removed from the population.

Although option 2 above, allows limited energy consumption data for each affected site to be included in the calculation of energy savings, additional steps are required for the purpose of calculating those energy savings. Depending on the method you use to calculate the observed energy savings these additional steps will differ. This is explained further in section 4.1.4 of this guide.

Where an attrition affected site is removed from the population, the reason for the attrition must be recorded.

### 3.5 Measurement of electricity consumption

Measured electricity consumption data refers to the metered amount of electricity consumed by a site over the implementation period, as determined by:

- ▼ Metering data, held by the electricity retailer or network service provider, pro-rated across the implementation period or pre-implementation period as necessary.<sup>9</sup>
- ▼ A metering arrangement compliant with the National Measurement Institute document M6 (Electricity Meters),<sup>10</sup> or
- ▼ A metering arrangement compliant with a benchmark accepted by us.

If you are not using metering data held by an electricity retailer or network service provider, you must notify us of the metering arrangement you intend to use, and obtain written acceptance of this arrangement before the implementation date. You will also need to ensure the installation and reading of metering devices which are comprised in that metering arrangement is done without consideration of whether the site was allocated to the treatment group or control group.

### 3.6 Accredited statistician

Prior to the implementation date, you must engage a statistician accredited by the Statistical Society of Australia Inc. (SSAI)<sup>11</sup> who is approved by us. The accredited statistician must verify in writing:<sup>12</sup>

- ▼ The method for allocating sites to either the treatment group or the control group is unbiased.
- ▼ The analysis method for calculating the observed energy savings under Methods 5.2, 5.3 or 5.4 of the ESS Rule has been chosen and is valid.
- ▼ If Method 5.4 of the ESS Rule is used, the explanatory variables and any interactions between them have been documented.
- ▼ The lengths of the implementation and any pre-implementation period have been determined and documented.

You cannot deviate from the methods verified by the statistician during the implementation period. If you wish to modify these methods for a subsequent implementation period, you must obtain a new verification in writing from an

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<sup>9</sup> The measurements and estimates of electricity consumption must have occurred in accordance with the National Energy Retail Rules and the Electricity Supply (General) Regulation 2001 (NSW)

<sup>10</sup> <http://www.measurement.gov.au/Publications/PARrequirements/Documents/NMI%20M%206-1.pdf>

<sup>11</sup> <http://www.statsoc.org.au/careers-accreditation/professional-accreditation/find-a-statistician/>

<sup>12</sup> The statistician's accreditation must be current at the time of the verification.

accredited statistician prior to the commencement of the subsequent implementation period, that is, before the implementation date.

## 4 Calculation of energy savings

The energy savings resulting from an implementation period of the Aggregated Metered Baseline Method are the observed energy savings of the population (calculated using one of the three methods outlined in section 4.1), less any uplift energy savings (as outlined in section 4.2).

### 4.1 Calculating the observed energy savings over the implementation period

The observed energy savings are the statistically significant energy savings within the population for an implementation period. The observed energy savings includes all apparent energy savings including energy savings resulting from programs or initiatives that are not part of the treatment.

Under the ESS Rule, you may calculate the observed energy savings for each implementation period using one of three methods, which must be selected prior to the implementation date:

- ▼ Method 5.2: Time-aggregated energy consumption during the implementation period, outlined in section 4.1.1.
- ▼ Method 5.3: Time-aggregated energy consumption during both the implementation and pre-implementation periods, outlined in section 4.1.2.
- ▼ Method 5.4: Regression modelling, outlined in section 4.1.3.

Methods 5.3 and 5.4 require the use of a pre-implementation period to calculate the observed energy savings. If you do not have pre-implementation period data you must use method 5.2 to calculate the energy savings. If you have pre-implementation data you can choose the calculation method that best suits your circumstances.

Methods 5.2 and 5.3 determine energy savings by subtracting the measured energy consumption of the treatment group<sup>13</sup> from that of the control group<sup>14</sup>.

The observed energy savings are only eligible if they are statistically significant. A hypothesis test is used to determine whether energy savings are statistically significant.

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<sup>13</sup> This represents the reduced consumption with energy savings activity in place.

<sup>14</sup> This represents the estimated energy consumption for the treatment group where the energy savings activity is not in place.

Method 5.4 utilises the variation in the treatment group, in addition to the variation in the control group. This may result in a variance larger than necessary to be statistically significant, and require you to use explanatory variables to offset this.

The sections below outline the three calculation methods. You should consult with your accredited statistician on which method of calculating the observed energy savings is best suited for your circumstances.

#### **4.1.1 Method 5.2: Time aggregated energy consumption during the implementation period**

**Method 5.2** of the ESS Rule must be used if you do not have pre-implementation data. You may also use this method if you do not wish to use pre-implementation data.

Method 5.2 calculates the observed energy savings by subtracting the mean daily energy consumption of the treatment group during the implementation period from that of the control group and then multiplying this difference by the number of days in the implementation period.

Method 5.2 consists of the following steps:

1. Calculate the mean daily energy consumption of the treatment group and control group, respectively.
2. Using the mean daily energy usage of the control group and treatment group and the standard error for the control group mean, perform a hypothesis test to verify that the treatment group energy consumption was lower than the estimated energy consumption without the energy saving activity.
3. If the hypothesis test shows the mean daily treatment group energy consumption to be significantly lower than that of the control group, then subtract the mean daily treatment group energy consumption from the mean daily control group energy consumption and multiply this by the number of days in the implementation period for each site in the population to obtain the observed energy savings.

#### **4.1.2 Method 5.3: Time aggregated energy consumption during the implementation and pre-implementation periods**

**Method 5.3** of the ESS Rule may be used when you have pre-implementation data that provides a better estimate of observed energy savings, and you do not wish to use regression modelling.

Method 5.3 calculates the observed energy savings from the change in energy consumption between the implementation period and the pre-implementation

period, by subtracting the change in electricity consumption of the treatment group from that of the control group.

The method requires that you have measured energy consumption data for the population over the implementation and pre-implementation periods. The pre-implementation period must cover the same time period in a previous year as the implementation period. That is, both pre-implementation and implementation periods must have the same length and be from the same time of year.

Method 5.3 consists of the following steps:

4. Calculate the difference in mean daily energy use between the implementation period and the pre-implementation period for each site in the population.
5. Calculate the mean change in daily energy use between the implementation and pre-implementation period for the treatment group and the control group.
6. Perform a hypothesis test to verify that the change in energy consumption from the pre-implementation period to the implementation period with the treatment (using treatment group data) was significantly lower than the estimated change without the treatment (using control group data).
7. If the hypothesis test shows the change in electricity consumption for the treatment group to be significantly less than the change in electricity consumption for the control group, subtract the mean treatment group energy change from the estimated energy change (using control group data) and multiply it by the number of days in the implementation period for each site in the treatment group to obtain the observed energy savings.

#### 4.1.3 Method 5.4 Regression modelling

**Method 5.4** of the ESS Rule may be used where you have pre-implementation data and can incorporate explanatory variables into the calculation through regression modelling to produce a better estimate of the observed energy savings. This method should only be considered if you have the relevant knowledge and experience to perform regression modelling.

The method requires that you have measured energy consumption data for the population over the implementation and pre-implementation periods. You can also incorporate additional explanatory variables into the model to provide a better estimate of the energy savings.

Method 5.4 consists of the following steps:

8. Calculate for each site in the population, the mean daily energy use over the implementation period and pre-implementation period respectively.

9. Create the evaluation data set, which consists of one observation for each site in the population for mean daily energy use, a variable indicating whether the site is in the treatment group or the control group and other appropriate explanatory variables.
10. Estimate the average treatment effect per day by estimating a regression via weighted least squares. Using the estimated average daily treatment effect, perform a hypothesis test to verify that the average daily treatment effect is statistically significant.
11. If the hypothesis test shows a statistically significant average daily treatment effect, multiply the average daily treatment effect by the number of days in the implementation period for each site to obtain the observed energy savings.

#### **4.1.4 Calculation of observed energy savings where attrition has occurred**

If you have chosen to include sites affected by attrition in the calculation of energy savings you must ensure these sites are included in a manner that complies with the methods set out in section 3.4.4 of this guide.

In addition, Method 5.4 of the ESS Rule requires an extra step to be included in the calculation if attrition affected sites are included. The process for including these sites is explained in step 3B of Method 5.4

However, attrition affected sites can be included in Methods 5.2 and 5.3 of the ESS Rule without the need for any additional steps.

#### **4.1.5 Finite population correction**

The hypothesis tests used in methods 5.2 and 5.3 of the ESS Rule allow the use of optional finite population correction. Without finite population correction the calculation of the standard error assumes that the sample size is much smaller than the population size, that is, the population size is infinite.

Finite population correction reduces the standard error by adjusting for the added precision gained by sampling a larger percentage of the population, increasing the likelihood of satisfying the hypothesis test.

Including both finite population factors will produce a greater reduction in the standard error than including just one, leading to a greater likelihood of satisfying the hypothesis test.

### **4.2 Calculation of uplift energy savings**

Uplift energy savings are energy savings within the population, which are estimated to have occurred as a result of activities that were not part of the



treatment. The estimated uplift energy savings are subtracted from the observed energy savings to determine the energy savings resulting from the treatment.

We may provide you with an estimate for the uplift energy savings, which we will calculate on a case by case basis using either Method 5.5 of the ESS Rule or another method that we publish. If we do not provide you with an estimate, the uplift energy savings will be zero.

Please contact us<sup>15</sup> to confirm whether we will provide you with an estimate of uplift energy savings for the implementation period for which intend to calculate energy savings.

You may be required to provide us with data, including the addresses of sites in the population and measured electricity consumption data for the implementation period, to allow us to provide you with an estimate of the uplift energy savings.

Activities that may result in uplift energy savings include:

- ▼ Other ESS activities (performed by you or another ACP) that are not part of the treatment.
- ▼ Activities that reduces electricity consumption by generating electricity from another source, or by converting non-renewable energy (such as gas) to provide equivalent goods or services.
- ▼ Activities eligible to create tradeable certificates under the Commonwealth's Renewable Energy Target (RET) scheme.<sup>16</sup>

## 5 Applying for accreditation

A completed application tailored to this energy savings method is required to become an ACP and generate ESCs. An application has multiple parts, which are explained in the *Application Guide for ESS Accreditation* (Application Guide).<sup>17</sup> As a minimum, you will have to provide:

- ▼ Application Form: Part A - General Details, available at [http://www.ess.nsw.gov.au/Methods\\_for\\_calculating\\_energy\\_savings/Aggregated\\_Metered\\_Baseline/Apply\\_for\\_Aggregated\\_Metered\\_Baseline](http://www.ess.nsw.gov.au/Methods_for_calculating_energy_savings/Aggregated_Metered_Baseline/Apply_for_Aggregated_Metered_Baseline)

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<sup>15</sup> [ESS@ipart.nsw.gov.au](mailto:ESS@ipart.nsw.gov.au) or (02) 9290 8452.

<sup>16</sup> Any activity eligible to create tradeable certificates under the *Renewable Energy (Electricity) Act 2000 (Cth)*.

<sup>17</sup> The Application Guide can be found on the ESS website at: [http://www.ess.nsw.gov.au/Methods\\_for\\_calculating\\_energy\\_savings/Aggregated\\_Metered\\_Baseline/Apply\\_for\\_Aggregated\\_Metered\\_Baseline](http://www.ess.nsw.gov.au/Methods_for_calculating_energy_savings/Aggregated_Metered_Baseline/Apply_for_Aggregated_Metered_Baseline)

- ▼ Application Form: Part B - Method Details, available at [http://www.ess.nsw.gov.au/Methods\\_for\\_calculating\\_energy\\_savings/Aggregated\\_Metered\\_Baseline/Apply\\_for\\_Aggregated\\_Metered\\_Baseline](http://www.ess.nsw.gov.au/Methods_for_calculating_energy_savings/Aggregated_Metered_Baseline/Apply_for_Aggregated_Metered_Baseline).

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

## 6 Glossary

**Table 6.1 Aggregated Metered Baseline Definitions**

Acronym	Description
Accredited statistician	A person accredited by the Statistical Society of Australia Inc. at the time of carrying out the verification in accordance with clause 8.9.7(e) of the ESS Rule, and accepted by the Scheme Administrator for the purposes of the ESS Rule.
ACP	Accredited Certificate Provider
Control group	The group of sites in the population selected to not be offered the Treatment.
Energy savings	The reduction in energy electricity consumption arising from the implementation of a RESA.
ESCs	Energy Savings Certificates
ESS	Energy Savings Scheme
Evidence Package	The <i>Aggregated Metered Baseline Evidence Package</i>
Implementation	The delivery of an energy savings initiative to sites in a population.
Implementation date	The start date of the implementation period.
Implementation period	A measurement period after the treatment is provided to the treatment group, from which energy savings are measured.
IPART	Independent Pricing and Regulatory Tribunal of NSW
<i>Nominated</i> energy saver	A person nominated to be the energy saver by the <i>original</i> energy saver under the provisions of clause 5.2 (b) of the ESS Rule.
Observed energy savings	The measured energy savings of the population over an implementation period, including energy savings resulting from activities not related to the treatment.
<i>Original</i> energy saver	The person who holds the measured electricity consumption data for all the sites in the population at the implementation date, as defined in clauses 5.2 and 8.9.10 of the ESS Rule.
Population	The group of sites from which energy savings is calculated.
Pre-implementation period	A measurement period prior to the implementation

	period.
RESA	Recognised Energy Saving Activity.
Treatment	The offering of goods or services intended to reduce electricity consumption at a site.
Treatment group	The group of sites in the population who receive the treatment.
Uplift energy savings	Energy savings that are the result of activities not part of the treatment, including other ESS activities.

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