Commercial and Industrial Demand Savings (PIAM&V DM); Commercial or Industrial Only	Activity No.
	CD1

1. ACTIVITY SPECIFIC DEFINITIONS

Commercial energy demand is defined as energy which is consumed in South Australia in commercial or industrial premises classified under the Building Code of Australia as either Class 3, 5, 6, 7, 8, 9, 10 or Common Areas of Class 2.

PIAM&V stands for Project Impact Assessment with Measurement & Verification, it is a method for calculating and verifying energy efficiency savings resulting from upgrades and improvements

Baseline Energy Model is either an Estimate of the Mean or a Regression Analysis that estimates the electricity or gas consumption that would occur if the Activity was not conducted

Operating Energy Model is either an Estimate of the Mean or a Regression Analysis that estimates the electricity or gas consumption that occurs after the Activity is conducted

Estimate of the Mean is based on energy consumption measurements and (where relevant) Independent Variables and Site Constants, where the Coefficient of Variation of the energy consumption over the Measurement Period is less than 15 per cent

Regression Analysis is a mathematical function for approximating the relationship between energy consumption, Independent Variables and Site Constants, and where the number of independent observations is at least six times the number of Independent Variables in the energy model, and includes, but is not limited to, linear regression and mixed models.

Independent Variable means a parameter that varies over time, can be measured, and affects the energy consumption of the Equipment

Site Constant means a parameter that does not vary over time under normal operating conditions and affects the energy consumption of the Equipment

Effective Range means the range over which values of Independent Variables for which the Baseline Energy Model or Operating Energy model is valid

Coefficient of Variation is the sample standard deviation expressed as a percentage of the sample mean

Measurement and Verification Professional is a person accredited under a framework approved by ESCOSA

Normal Year is the values for all Independent Variables and Site Constants over a typical year for operation of the equipment

Measurement Procedures are the procedures for measurements that are deemed suitable for the Activity by a Measurement and Verification Professional, including, but not limited to, start and end dates, frequency, the equipment and energy uses included (measurement boundary), equipment used, accuracy and calibration of that equipment, applicability of the period of measurement to the Activity

Measurement Period means the duration of time over which measurement of energy consumption will be taken for the purposes of calculating Energy Savings

Persistence Model means a model that estimates the expected lifetime of Activity equipment in years, and the Decay Factor for each year.

Decay Factor means a number between 0 and 1 which quantifies the decay of energy savings due to equipment degradation over time

Upgrade means the replacement and/or modification of Existing Energy using Equipment with New equivalent Equipment resulting in a reduction in the consumption of energy compared to what would have otherwise been consumed.

Gas means a fuel consisting of hydrocarbons or predominantly of hydrocarbons that is in a gaseous or vapour form when it is at the pressure and temperature of its normal pipeline transportation and utilisation conditions, but does not include anything declared by regulation not to be gas

2. ACTIVITY DESCRIPTION (SUMMARY)

The Activity involves an upgrade to the energy efficiency of Commercial or Industrial equipment that results in energy savings as calculated in accordance with this specification.

3. ACTIVITY ELIGIBILITY REQUIREMENTS

(1) The existing equipment must be in working order at time of the Baseline Energy Model measurements.

(2) All calculations, including the procedures used, be deemed appropriate for the Implementation by a Measurement and Verification Professional, with their written explanatory reasoning provided, including, but not limited to, the Baseline Energy Model, Operating Energy Model, Independent Variables, Site Constants, Measurement Procedures (including measurement period), Effective Range, Accuracy Factor, Normal Year, Decay Factors, and (if used) Persistence Model.

(3) The Baseline Energy Model must:

- Be dependent on Independent Variables and Site Constants (where relevant) that are established by measurements taken under normal operating conditions.
- Have a measurement period that spans at least one full operating cycle from maximum energy use to minimum.
- Fairly represent the operating conditions of a normal cycle.
- Be no more than 3 years earlier than the end date of the Measurement Period.
- Have an end date that occurs before the Activity is implemented.
- Be deemed appropriate for the Implementation by a Measurement and Verification Professional, with their written explanatory reasoning provided.

(4) The Operating Energy Model must:

- Be dependent on Independent Variables and Site Constants (where relevant) that are established by measurements taken under normal operating conditions.
- Have a Measurement Period that spans at least one full operating cycle from maximum energy use to minimum.
- Estimate annual energy consumption based on a Normal Year.
- Have a start date that occurs after the Activity is implemented.

- Be deemed appropriate for the Implementation by a Measurement and Verification Professional, with their written explanatory reasoning provided.

(5) Normal Year Energy Savings and Measured Energy Savings must exclude any time periods for which any of the measured Independent Variables are less than 95 per cent of the minimum or greater than 105 per cent of the maximum of the Effective Range of that independent Variable for either the Baseline Energy Model or Operating Energy Model; or where the Site Constants are not their standard value.

(6) The maximum time period for forward creation is either:

- if a Persistence Model is used, a period not exceeding the expected lifetime of the Equipment in whole years, as determined by that Persistence Model; and
- not more than 10 years after the Implementation Date.

(7) The calculations used to determine Normalised Energy Savings must be:

- recorded using a calculator approved by ESCOSA that allows for data retention and calculation validation, or
- recorded using a statistical calculation program, with all input and output data, calculation programming settings, and the program version used recorded and retained. This includes (but is not limited to) any scripts, procedures, spreadsheets or other programs used to calculate savings.

(8) Multiple Activities may be conducted at a single premises. Normalised Energy Savings that have been credited in previous years or as a separate Activity for any equipment within the measurement boundary of the Activity are treated as Counted Energy Savings for this Activity.

(9) Installation of lighting is not an eligible Activity in this specification. Normalised Energy Savings credited for lighting upgrades using another specification within the measurement boundary for this Activity are treated as Counted Energy Savings for this Activity.

(10) Installation of solar PV is not an eligible Activity in this specification. If the measurement boundary for the Activity includes solar PV, the Measurement and Verification Professional must ensure that the Normalised Energy Savings do not benefit from increased solar PV generation.

(11) The Normalised REPS Gigajoules for this Activity must not exceed 100,000 GJ.

4. INSTALLED PRODUCT REQUIREMENTS

(1) The new equipment must come with a minimum 2 years replacement warranty.

(2) At the time of installation, the new equipment must:

- If the equipment is a lighting product, be on the list of products accepted for installation under the NSW ‘Energy Savings Scheme’ (ESS), as published by the ESS Administrator, or
- comply with the applicable Australian standards.

5. MINIMUM INSTALLATION REQUIREMENTS

(1) Any electrical installations related to the Activity must be performed by a licensed electrical worker under the supervision of a licensed electrical contractor. Any electric wiring must comply with the latest AS/NZS 3000 wiring rules.

(2) The Activity must be completed and certified in accordance with any relevant code or codes of practice and other relevant legislation applying to the Activity, including any licensing, registration, statutory approval, Activity certification, health, safety, environmental or waste disposal requirements

(3) All removed equipment must be removed in accordance with the Environment Protection (Waste to Resources) Policy 2010 under the *Environment Protection Act 1993*. No dangerous materials can be disposed of in a landfill, instead it must be disposed of responsively.

6. REPORTING REQUIREMENTS

For verification purposes, the following records will be retained in relation to the Activity:

(1) Site Name

(2) Site Address

(3) The classification of the premises in accordance with Australian and New Zealand Standard Industrial Classification (ANZSIC) codes at the divisional level

(4) Date of Activity

(5) Explanatory reasoning by a Measurement and Verification Professional that confirms that the measurement and verification approach taken to calculate Normalised Energy Savings for the Activity is appropriate, in accordance with the requirements of the Activity Eligibility Requirements in this specification

(6) A measurement and verification plan for the Activity developed prior to the Date of Activity.

(7) Energy saved calculated in accordance with the activity energy saving requirements in this specification, including a copy of data and assumptions used, and where relevant, input and output data, programming settings, and completed version of the calculator used. Calculations must be presented in a format specified by ESCOSA, if relevant.

7. ACTIVITY ENERGY SAVINGS

The Normalised REPS Gigajoules achieved from undertaking this activity is equal to either:

a) Normal Year Energy Savings:

Normalised Energy Saving (GJ) = $\sum_i$ (Normal Year Electricity Savings × Accuracy Factor × Decay Factor$_i$) × 3.6 × Productivity Factor + $\sum_i$ (Normal Year Gas Savings × Accuracy Factor × Decay Factor$_i$ × Gas Normalisation Factor)× 3.6 – Counted Energy Savings

For all years *i* over the Maximum Time Period for Forward Creation.

Or

b) Measured Energy Savings:

Normalised Energy Saving (GJ) = (Measured Electricity Savings × Accuracy Factor) × 3.6 × Productivity Factor + (Measured Gas Savings × Accuracy Factor × Gas Normalisation Factor) × 3.6 – Counted Energy Savings

Where:

- the Productivity Factor = **1.207**
- Normal Year Electricity or Gas Savings is the electricity (or gas) consumption in MWh estimated using the Baseline Energy Model minus the electricity (or gas) consumption in MWh estimated using the Operating Energy Model for the Normal Year.
- Measured Electricity or Gas Savings is the electricity (or gas) consumption in MWh estimated using the Baseline Energy Model minus the measured annual electricity (or gas) consumption in MWh.
- Accuracy Factor is the value corresponding to the energy model type and relative precision of the energy savings estimate at a 90 per cent confidence level, listed in Table A23 of the Version of the Energy Savings Scheme Rule which is in force on the date the project is implemented.
- Decay Factor is equal to 1 if the Normal Year Electricity (and/or Gas) Savings are negative, and either the value set by a Persistence Model for each year or the value corresponding to the relevant year since the Date of the Activity specified in Table A16 of Schedule A of the Energy Savings Scheme Rule
- Counted Energy Savings is the total Normalised Energy Savings that have been credited in previous years or as a separate Activity for any equipment within the measurement boundary of the Activity.
- the *Gas Normalisation Factor* = 0.4

8. GUIDANCE NOTES (INFORMATIVE ONLY – NOT MANDATORY)

An example of the type of tool for calculating Normalised Energy is the Project Impact Assessment with Measurement and Verification tool maintained by the NSW Government for the Energy Savings Scheme.

ESCOSA may specify the format of calculation presentation for consistency and to assist with compliance functions. For example, this may require calculations to be presented in a format consistent with the Project Impact Assessment with Measurement and Verification tool maintained by the NSW Government for the Energy Savings Scheme.

Examples of the Measurement and Verification Professional accreditation frameworks which could be considered by ESCOSA include those by the NSW Energy Savings Scheme Administrator or the Victorian Energy Upgrades Regulator as a Measurement and Verification Professional.

This specification requires that measurement periods for the Baseline and Operating Energy Model cover at least one full operating cycle from maximum energy use to minimum. Note that care should be taken to capture an appropriate Effective Range of the Independent Variables for the models to avoid exclusion of Normalised Energy Savings (see 3(5)).