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NSW GOVERNMENT Department of Industry

NSW ENERGY SAVINGS SCHEME

Rule Change 2016-2017

Consultation Paper

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NSW Energy Savings Scheme Rule Change 2016-2017 Consultation Paper

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More information

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Acknowledgments

Office of Environment and Heritage

Foreword

This paper is intended to explain the policy intent and detail behind the proposed changes to the Energy Savings Scheme Rule and seek stakeholder feedback. The changes being proposed are part of the NSW Government's commitment to continuous improvement of the ESS. The NSW Government is seeking input from stakeholders to ensure the proposed changes are appropriate and reflect industry standards.

Written submissions

The release of this paper starts a **four week** consultation period. The Department of Industry encourages stakeholders to provide written comments by COB 23 December 2016 to:

Manager Sustainable Energy Programs
Operations and Programs Branch
NSW Department of Industry, Resources and Energy Division
energysavings.scheme@industry.nsw.gov.au

Stakeholder Forum

As part of this consultation period, the Office of Environment and Heritage and the Department of Industry will be holding an information forum to discuss the proposed changes and answer any stakeholder queries. The forum will be on 7 December 2016 at the Sydney Masonic Centre. To register your interest in attending the forum, please visit http://register.environment.nsw.gov.au/ess-forum-rule-change.

Contents

1 Introduction

The NSW Energy Savings Scheme (ESS) is the premier energy efficiency program in NSW. The *Electricity Supply Act 1995* (the Act) provides that the primary objective of the ESS is to create a financial incentive to reduce the consumption of energy by encouraging energy saving activities. The ESS works by placing an obligation on NSW energy retailers and other liable parties to purchase Energy Savings in the form of Energy Savings Certificates (ESCs) each year. These certificates are created by an Accredited Certificate Provider (ACP) when an energy user undertakes an eligible Energy Savings activity.

The Act allows the Minister for Industry, Resources and Energy to approve rules (the ESS Rule) that set out how ESCs can be created, including eligible applicants, types of eligible activities, and calculation methods and Energy Savings factors.

The Rule amendment process

In 2014 and 2015 the NSW Government consulted on a statutory review of the ESS and on proposed reforms. The ESS Review process is documented at http://www.resourcesandenergy.nsw.gov.au/energy-consumers/sustainable-energy/efficiency/scheme/energy-saving-scheme-review.

The ESS Review Position Paper outlined the government's intention to proceed with annual updates to the ESS Rule. The regular annual updates to the ESS Rule are intended to:

- incorporate stakeholder feedback and evaluation results
- maintain the effectiveness of the ESS Rule, through updates to savings factors, and adding activity schedules for new technologies
- complement changes to building and equipment standards
- incorporate new methods or sub-methods for Energy Savings, and
- make other enhancements to the ESS Rule to maintain its integrity and/or reduce transaction costs.

The NSW Government also intends to conduct a major review of the ESS Rule every three years. The most recent major review was in 2015-16.

As part of this 2016-2017 annual review of the ESS Rule, the Office of Environment and Heritage has conducted targeted consultation with ESS stakeholders on proposed changes. Stakeholder feedback from this targeted consultation has been considered in preparing this paper.

This consultation paper, and a draft Rule showing proposed changes

This consultation paper discusses the proposed changes for the 2016-2017 annual update to the ESS Rule. Section 2 considers changes to the general body of the ESS Rule while sections 3 to 5 consider proposed changes to particular eligible methods for generating Energy Savings under the ESS (Project Impact Assessment with Measurement and Verification (PIAM&V) Method, Metered Baseline Method and Deemed Energy Savings Method respectively). A glossary is provided in section 6.

A draft version of the ESS Rule (the draft ESS Rule) showing proposed changes is available to read alongside this consultation paper at http://www.resourcesandenergy.nsw.gov.au/energy-consumers/sustainable-energy/efficiency/scheme.

The draft ESS Rule shows all proposed changes to the ESS Rule as coloured additions or strikethroughs. Where minor changes have been made for clarity or consistency they are shown coloured in the draft ESS Rule but are not considered in this consultation paper. Where a date is marked as 'DD MM YY' this will be provided in the final amended version of the ESS Rule when published in 2017.

2 General ESS Rule

2.1 Data Requirements

Refer to the draft ESS Rule: §6.8

Clause 6.8 of the ESS Rule establishes data collection requirements to monitor and evaluate the impact of the ESS. Currently Electricity Savings and Gas Savings are required to be reported via the ESS Portal per implementation. There are four sub-methods under the Deemed Energy Savings Method under which implementations could involve multiple Activity Definitions. As these Activity Definitions cover various technology types, it is proposed that the data reporting requirements are changed to require Electricity Savings and Gas Savings reporting at the Activity Definition level for some sub-methods.

The Home Energy Efficiency Retrofits (HEER) sub-method includes building fabric, lighting, heating and cooling activities in households and small businesses. The High Efficiency Appliances for Business (HEAB) sub-method includes refrigeration, air-conditioning and motors. HEER currently includes Activity Definitions that calculate Gas Savings, however there has been no activity under this sub-method to date. New activities are proposed for HEAB in this Rule change (see section 5.6) that calculate Gas Savings. Gas Savings, Electricity Savings and technology type is therefore a diverse data set that isn't currently captured at an Activity Definition level under HEER and HEAB. This data is crucial for government to set baselines and evaluate the impact and effectiveness of these sub-methods in the ESS.

It is proposed to expand clause 6.8 to require ACPs to provide Electricity Savings and Gas Savings data for each Activity Definition Implementation under clause 9.8 and 9.9 of the Deemed Energy Savings Method. This would give greater transparency of the types of technology that are being installed under the ESS. The data will help further development of the ESS and evaluate the types of upgrades that are driving Energy Savings in NSW.

To minimise the administration burden of additional data requirements we are proposing to only require this data for the HEER and HEAB sub-methods as this is where it offers most value.

The Sale of New Appliances (SONA) and Removal of Old Appliances (ROOA) sub-methods cover Energy Savings from common household appliances, such as TVs, fridges and washing machines. As Recognised Energy Saving Activities (RESA) using these sub-methods often include a large number of implementations and may involve more than one Activity Definition the administrative costs of the RESA could significantly increase if these sub-methods are subject to additional reporting requirements. As the End-User Equipment is an appliance that reduces electricity consumption, and as this is already reported, it is considered that no additional data is required for the SONA and ROOA sub-methods.

Question 1 Is the proposal to require Electricity and Gas Savings data at an Activity Definition level for the HEER and HEAB sub-methods reasonable?

Question 2 Do you think Electricity Savings and Gas Savings data should be reported at an Activity Definition level for the SONA and ROOA sub-methods?

3Project Impact Assessment with Measurement and Verification Method

The Project Impact Assessment with Measurement and Verification (PIAM&V) Method provides a flexible, measurement and verification based approach for ACPs to calculate Energy Savings. The PIAM&V Method is designed to incentivise a broad range of energy saving activities, including those not currently covered by the existing Deemed Energy Savings Method. The Method accounts for changes in operating conditions, which means that Energy Savings from a large variety activities can be accurately estimated. The NSW Government has identified changes to improve the balance between transaction costs and accuracy of saving calculations.

3.1Effective Range

Refer to the draft ESS Rule: §7A.8

The Effective Range requirement is in place to ensure that energy models for PIAM&V, both Baseline Energy Models and Operating Energy Models, are not used to calculate savings for operating conditions outside the conditions that the models represent. ACPs are encouraged to ensure Measurement Periods cover a wide range of scenarios to maximise the Energy Savings. Effective Range is established for each energy model based on the Independent Variable measurements taken during the measurement period to develop the model.

The Effective Range is currently defined as between 95% of the minimum measured value and 105% of the maximum measured value of each Independent Variable. Stakeholders have identified that this has a number of unintended consequences:

1. The extension on the upper limit is disproportionally larger than the extension on the lower limit.
2. When the measured values are negative, the Effective Range is smaller than the measured range.
3. The Effective Range can also be influenced by the scale and/or the unit used in the measurements.

The NSW Government proposes to change the calculation of Effective Range to be +/- 5% of the difference between maximum and minimum measured values for each Independent Variable, consistent with the original policy intent.

The proposed changes also clarify that it is not necessary to define an Effective Range for Site Constants. The requirement to exclude any time periods where the Site Constants are not their standard value from the Energy Savings calculation remains for single Site energy models (see Clause 7A.5(g) of the ESS Rule).

Under a multiple Site energy model, the Site Constants may vary from Site to Site, and the range of values that these Site Constants may take is now covered by the proposed Representativeness test, discussed in section 3.2.2.

3.2PIAM&V sampling sub-method

Refer to the draft ESS Rule: §7A.20

The PIAM&V sampling sub-method allows the use of an energy model developed from measurements at multiple Sites to predict Energy Savings across a Population, with the potential to reduce measurement costs while maintaining the accuracy of the saving estimates.

When using single Site models, energy consumption measurements must be taken at every Site before and after the Implementation, and energy models are developed to be specific to each single Site.

With the PIAM&V sampling sub-method, ACPs can measure energy consumption at a number of Sample Sites, establish models for calculating Energy Savings based on these measurements, and then apply the models to the rest of the Population.

Multiple Site energy models can be developed with both Independent Variables and Site Constants as model variables. Both Independent Variables and Site Constants need to be measured at the Sample Sites. However, where the models are used to calculate Energy Savings at sites in the rest of the Population, only the Site Constants need to be measured at these sites. In this way, the Sampling Method can be thought of as a deemed Energy Savings formula that is developed by the ACP and is specific to the RESA.

Table 3.2 is included below to explain the difference between using a Single Site model and a Multiple Site model under the PIAM&V sampling sub-method. An example of how the PIAM&V sampling sub-method could be applied to a RESA which involves improving the energy efficiency of HVAC systems is shown in Box 3.2.

Table 3.2 Comparison of Single Site and Multiple Site models

		Single Site model	Multiple Site model (PIAM&V sampling sub-method)
Independent Variable(s)	*Measurement*	Must be measured and recorded for all Sites (unless not required for model, eg Estimate of the Mean)	Must be measured and recorded for all Sample Sites (unless not required for model, eg Estimate of the Mean)
	Normal year values	Must be provided for all Independent Variables for all Sites (unless not required for model, eg Estimate of the Mean)	
Site Constant(s)	*Measurement*	Must be measured and recorded for all Sites	
	Normal year value	Must be provided for all Sites	
Energy consumption	*Baseline and Operating*	Must be measured for all Sites during the Measurement Period	Must be measured for all Sample Sites during the Measurement Period
Energy model types	*Regression Analysis*	Regression Analysis on the relationship between independent variable(s) and energy usage.	Regression Analysis on the relationship between independent variable(s), site constant(s) and energy usage.
	Estimate of the Mean	Estimate of the Mean for each Site	Estimate of the Mean for Sample Sites
	Computer Simulation	Simulated calculation required for each Site	Simulated calculation for Sample Sites

The PIAM&V sampling sub-method is currently closed to new accreditations. Changes are proposed in clause 7A.1(c) to remove this restriction and allow new applications.

Clause 7A.20 has also been introduced to propose further requirements for the use of the PIAM&V sampling sub-method to develop multiple Site energy models. The policy intent of the proposed requirements in this clause are discussed below.

3.2.1 Eligibility Requirement

The PIAM&V sampling sub-method is designed to calculate Energy Savings from Implementations with similar characteristics. Under the new proposed sub-clause 7A.20(a), ACPs must define a set of Eligibility Requirements that must be met by all sites in the population. Eligibility Requirements are a set of criteria defined by ACPs and used to ensure that only sites with similar characteristics are included in the Population.

The Eligibility Requirements will be used to objectively test if a site can be included in the Population. The Eligibility Requirements must be defined based on:

1. the existing End-User Equipment at the Site (eg. AC motor, refrigeration systems, resistance heater):
2. End-Use Services being provided by the End-User Equipment (see Table A17 of the ESS Rule for a list of End-Use Services);
3. The Recognised Energy Saving Activity to be undertaken (eg. replacing AC motors with DC motors, installing VSD on motors);
4. Site Constants (eg, climate zone, annual operating hours, size of motor); and
5. any additional requirements as Published by the Scheme Administrator

ACPs can include new Sites into the Population over time, but they must ensure that only Sites that meet the Eligibility Requirements are included in the Population. The Eligibility Requirements must be deemed appropriate for the Implementation by a Measurement and Verification Professional.

3.2.2 Representativeness

The Baseline and Operating Energy Model developed from data from the Sampled Sites must be representative of the Population. For instance, if an ACP proposed to upgrade household pool management systems in NSW, and the proposed Population of sites included households in different BCA Climate Zones, then the Sampled Sites would need to include households in each of those BCA Climate Zones.

ACPs will need to define a Representativeness Test to determine whether the Sample Sites are representative of the Population by demonstrating that the distribution of the Site Constant among the Sample Sites are representative of the distribution of the Site Constant in the Population. In the example above, this could involve testing whether the Sample Sites cover all the BCA Climate Zones over the proposed Population.

In cases where new sites are added to the Population, ACPs will need to ensure that the Representativeness Tests are met by reviewing the existing sample and deciding if new Sample Sites should be included. In the example above, if new Sites are introduced to the Population that are located in a different BCA Climate Zone, then Sites from this BCA Climate Zone must be added to the Sampled Sites to expand the Energy Model.

3.2.3 Measurement and statistical requirements

When using regression analysis or estimate of the mean to calculate Energy Savings, minimal measurement and statistical requirements apply as per clause 7A.2(a). The Rule requires that:

1. when using Estimate of the Mean, the Coefficient of Variation of the energy consumption over the Measurement Period is less than 15%;
2. when using Regression Analysis, the number of independent observations is at least the sum of six times the number of Independent Variables and six times the number of Site Constants, where relevant.

Regarding item 2, there will be cases where there are no Site Constants included in the energy models. In this situation Site Constants do not need to be included in the calculation of number of required independent observations.

It is proposed that these requirements will also apply to each Sample Site for a Multiple Site model where the PIAM&V sampling sub-method is used.

In addition, it is proposed that the minimum number of Sample Sites must be at least six times the number of Site Constants in the energy model. This is to ensure there is a sufficient number of Sample Sites to establish the energy model, and represents proposed change from the current drafting of the ESS Rule which refers to 'number of model parameters'.

3.2.4 Bias

Bias in the process of selecting Sample Sites can potentially lead to over or under estimation of the Energy Savings in the Population. While bias cannot be fully eliminated, reasonable steps must be taken to minimise bias. A simple random sample is an unbiased sampling technique. It is proposed that any Sampling Method that deviates from a simple random sample must include steps taken to minimise bias. The process for selecting Sample Sites must be deemed appropriate by a Measurement and Verification (M&V) Professional.

3.2.5 Normal year

Currently the M&V Professional is required to provide written explanation that the Normal Year is appropriate for each Implementation as per 7A.7(d).

Under the PIAM&V sampling sub-method, each Site in the Population where the Energy Savings activity is undertaken is an Implementation.

It is proposed that for a multiple Site model, the procedure for determining the Normal Year for each Site is reviewed and deemed appropriate by the Measurement and Verification Professional, rather than each Implementation.

Question 3 Are these proposed requirements reasonable and sufficient?

Question 4 Should the business classification also be included in the minimum Eligibility Requirements, or is End-Use Service sufficient?

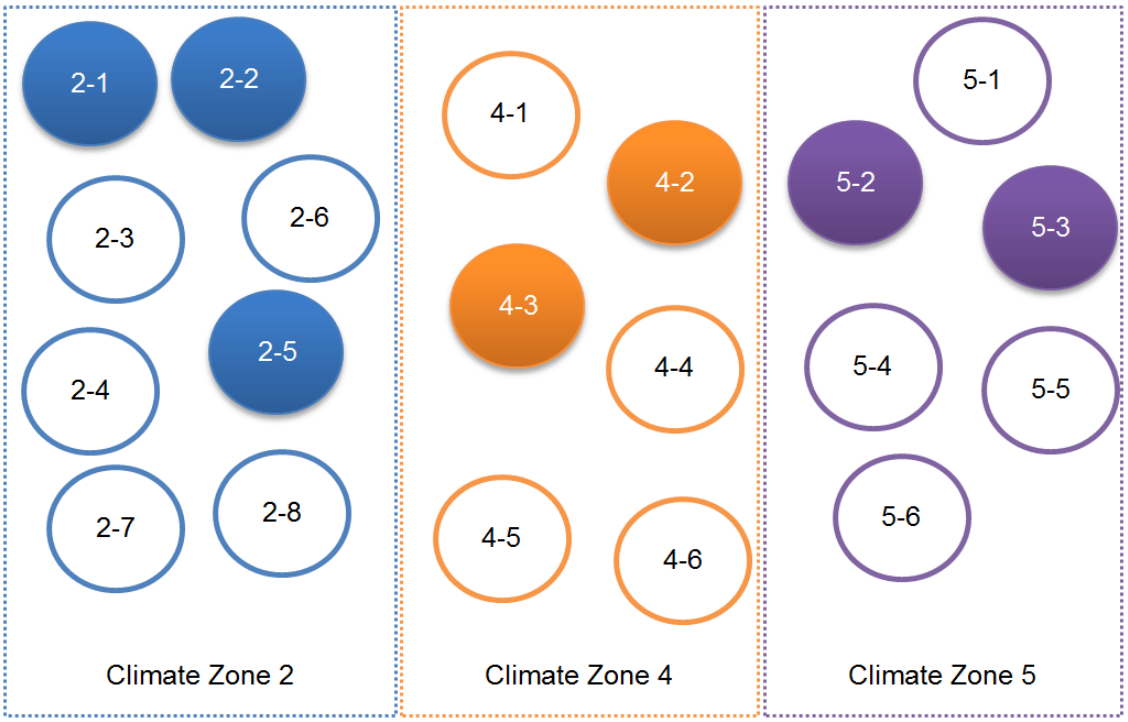
Question 5 Is the measurement and statistical requirement for Regression Analysis when using the PIAM&V sampling sub-method reasonable?

Question 6 Is the requirement for the minimum number of Sample Sites to be 6 times the number of Site Constants appropriate?

Box 3.2 Example: Using the PIAM&V Sampling sub-method to measure Energy Savings on HVAC systems

XYZ Company has invented a new technology to reduce energy usage of commercial HVAC systems. They plan to roll out this technology to 20 stores across NSW, covering 3 BCA Climate Zones. They have engaged an ACP to identify the potential ESCs that can be generated from this project so that they can build a better business case for their client.

After preliminary research, they have identified one Site Constant (climate zone) and one independent variable (cooling degree days (CDDs)). The Site Constant has three potential values across the Population, and the Sites in the Population fall across these three Climate Zones.



The ACP first establishes a list of Eligibility Requirements based on the following:

- End-User Equipment: HVAC system
- End-Use Services: Air cooling
- The activity: applying the technology invented by XYZ Company
- Site constant: Climate Zone of the Site

As there is one Site Constant, the ACP needs to select a minimum of 6 Sample Sites. To make sure that the Sample Sites are representative, the ACP divides the Population into different Climate Zones and randomly selects two Sample Sites from each zone (sites with a filled circle in the figure above). By doing so, the ACP ensures that the distribution of Site Constants (2, 4, 5) in Sample Sites is consistent with the distribution of the Population, and removes bias by performing a stratified random sample selection.

The ACP then takes measurements of baseline energy consumption and records values of the Independent Variable. After performing implementations on the sample sites, the ACP takes measurements of operating energy consumption and records values of the Independent Variable. The ACP establishes a regression model based on the measurements in a form similar to:

*Baseline Energy = a1*Climate Zone + b1 * CDDs + c1*
*Operating Energy = a2*Climate Zone + b2 * CDDs + c2*

Providing the Effective Range established from the Sample Sites covers the range of the whole Population, the ACP then uses the energy models at the rest of the sites in the population to calculate Energy Savings and ESCs.

Using the PIAM&V sampling sub-method, the ACP avoids having to take measurements of energy consumption and Independent Variable at non-Sample Sites, reducing measurement costs.

4 Metered Baseline Method

4.1 NABERS for Hospitals

Refer to the draft ESS Rule: §8.8

The NABERS sub-method of the Metered Baseline Method currently covers all of the commercially focused energy performance rating methodologies of NABERS, which includes offices, hotels, shopping and data centres.

The NABERS sub-method allows ESCs to be calculated from Energy Savings using measured and verified performance data for projects where the savings are great enough to compare against baseline energy consumption for a site, using a historic or benchmark NABERS rating.

The NABERS program is proposing to launch another rating tool to measure the energy performance of public hospitals. It is proposed to expand the ESS Metered Baseline NABERS sub-method to allow Energy Savings to be calculated for NABERS rated hospitals.

Although the relevant values have not yet been released, the draft Rule shows 'XX' placeholders for when the new rating tool is launched.

This change will provide more opportunities for businesses to access incentives to drive the energy efficiency market in NSW.

Question 7 Is the proposal to expand the ESS Metered Baseline NABERS sub-method to include hospitals appropriate?

5 Deemed Energy Savings Method

The Deemed Energy Savings Method allows ESCs to be calculated for the lifetime Energy Savings for straightforward commercial and residential projects using simple tools and look-up tables. This simplifies Energy Savings calculations and makes it easier to participate in the ESS. In addition, ESCs can be claimed upfront after implementation, thereby offsetting capital costs.

5.1 General Changes

5.1.1 Equipment Requirements and product approvals

Refer to the draft ESS Rule: §9.2A and relevant deemed sub-methods in the schedules of the draft ESS Rule from p.66 onwards

Under the Deemed Energy Savings Method, the Scheme Administrator may establish product acceptance processes to ensure that equipment requirements are met, such as the Emerging Lighting Technology product acceptance process. Minor changes have been proposed to the current requirements to ensure consistency between sub-methods and allow operation of Scheme Administrator acceptance processes. It is also the policy intent to allow the Scheme Administrator to accept or reject an application if the requirements of 9.2A.3 have not been met. It is proposed that this be stipulated in a new sub-clause, 9.2A.5A.

5.1.2 Purchaser Co-payment

Refer to the draft ESS Rule: §9.4 and §9.8

It is proposed that the requirements around the purchaser co-payment of $5/MWh of Electricity Savings in the Commercial Lighting sub-method and a net amount of least $90 in the HEER sub-method are clarified to state that the payment must have been completed at the time the Energy Savings Certificates are registered for the Implementation.

The evidence requirements for the purchaser co-payment have recently been updated by the Scheme Administrator, and they will continue to work with Auditors to ensure all Rule requirements are met.

The purchaser co-payment requirement was introduced in 2014 to ensure that consumers are engaged with the project, and to help ensure customers receive quality products that are fit for purpose. The NSW Government remains committed to these objectives, and committed to working with stakeholders to ensure the requirements in the ESS Rule deliver these objectives without introducing unnecessary red-tape and increases in compliance costs.

Question 8 Are there changes to ESS Rule requirements around the purchaser co-payment that could meet the objectives of consumer engagement and quality lighting outcomes while reducing red-tape and compliance costs?

5.2 Sale of New Appliances

The Sale of New Appliances (SONA) sub-method provides incentives for householders to purchase new appliances that are more efficient than the market average. Incentives are provided for appliances that carry energy ratings labels and have been tested according to the relevant Australian Standard.

Appliances currently in the ESS are clothes washers, clothes dryers, dishwashers, refrigerators, freezers and televisions.

5.2.1 Adjustment to the SONA Equipment Energy Savings

Refer to the draft ESS Rule: §9.3

The Equipment Energy Savings for the Sale of New Appliances (SONA) sub-method in Schedule B of the ESS Rule are calculated using a baseline based on 2015 sales data and do not reflect the energy efficiency of products now sold in the appliance market.

We propose to adjust the Equipment Energy Savings to use a baseline that reflects the sales weighted average star rating of appliance sales in 2016.

The 0.5 star threshold above the sales weighted average star rating under which appliances would not be eligible to create ESCs remains. For example, if the sales weighted average star rating for an appliance is 2.1 stars, an appliance with a 2.5 star rating would no longer have an Equipment Energy Savings factor. This would ensure that incentives continue to be targeted at appliances above the market average star rating in between annual updates to the ESS Rule.

It is proposed that the Equipment Energy Savings tables be updated to provide Energy Savings factors for appliances with ratings up to 10 stars and 6 stars, depending on the appliance category.

Activity definition B1 has also been revised to clarify that combination washer-dryers may only count the wash cycle, meaning you can't claim Energy Savings for the drying function.

Question 9 Do you agree with the proposal to update the SONA Equipment Energy Savings tables?

5.3 Commercial Lighting

The Commercial Lighting sub-method allows ACPs to generate ESCs for projects which improve the efficiency of lighting in commercial buildings.

5.3.1 Air-conditioning Multipliers

Refer to the draft ESS Rule: §9.4 Table A10.5

The air-conditioning multiplier in Table A10.5 seeks to calculate the interactive effects of a lighting project on the air-conditioning system. Lighting systems convert only a fraction of their electrical input into useful light output. Much of the rest of the energy used is released directly as heat into the space. If this space is conditioned, any upgrade of the lighting system that reduces input power:

- reduces the amount of heat that must be removed when the space is being cooled, and
- increases the amount of heat that must be delivered when the space is being heated.

Industry data and stakeholder feedback suggests that the current air-conditioning multiplier in the Commercial Lighting sub-method is too high.

We propose to reduce the air-conditioning multiplier in Table A10.5 from 1.3 to 1.07 for air-conditioned spaces. Reducing the multiplier will help ensure certificates created reflect actual Electricity Savings in commercial lighting upgrades.

The proposed factor of 1.07 is based on an analysis of historical weather data for locations in NSW. Using the weather data to calculate heating degree days and cooling degree days, the heating season and cooling season[1] were estimated at 48% and 91% respectively. These figures total to more than 100% and reflect that systems can operate in both heating and cooling mode on the same day.

Question 10 Are the percentages of cooling season and heating season reflective of an average of how often buildings across NSW are in cooling and heating mode respectively?

5.3.2 Control Gear for fluorescent lamps

Refer to the draft ESS Rule: §9.4 Table A9.2

In the ESS Rule the Lamp Circuit Power applied to the ballast of linear, circular or compact fluorescent Lamp is determined by both its energy efficiency index (EEI) rating and technology type, be it electronic or magnetic.

Stakeholders have raised that there are products which don't fit into the current Control Gear classification of ballasts in Table A9.2 because of the technology type requirement. It is proposed to amend this classification to be based solely on the EEI rating of the ballast in accordance with AS4783.2:2002 Performance of electrical lighting equipment. This will simplify the Rule and make it easier to interpret.

Question 11 Do you agree with the proposed amendments to Table A9.2?

5.4Public Lighting Energy Savings Formula

The Public Lighting Energy Savings Formula under Clause 9.4A provides opportunities for ESCs to be generated for the installation of energy efficient public lighting equipment. This includes cases where the existing equipment is owned by a Distributor and regulated by the Australian Energy Regulator.

Some rewording of Clause 5.4(c) in the ESS Rule may be made in order to make this intent clear, although this rewording is not yet included in the draft ESS Rule provided for consultation.

Question 12 Do you wish to be part of a targeted consultation on potential rewording of Clause 5.4(c) in order to make this clear?

[1] i.e. the percentage of the year that the air-conditioning system may run in heating mode or cooling mode respectively

5.5 Home Energy Efficiency Retrofits

The HEER sub-method provides financial incentives through the ESS to expand the energy efficiency market and deliver lower cost, high quality retrofits to homes and small businesses in NSW. Significant changes were implemented during the 2015-2016 ESS Rule change aimed at simplifying the sub-method to reduce costs and make it easier for businesses that deliver the retrofits. Eligible upgrade activities include lighting, air-conditioning, gas water and space heaters, pool pumps, showerheads, and various building fabric upgrades.

The HEER sub-method currently is mostly designed to facilitate upgrades in the home, although certain small businesses are eligible too. Given that costs are often higher for small business to participate in the other commercially focused methods of the ESS the NSW Government is proposing to make changes to provide better access for the small business sector and drive the sustainable growth of the energy efficiency market.

The energy consumption for small business and households can be quite different even though the incentive provided is currently the same. It is important we aim to provide an incentive that more accurately represents the Energy Savings that can be achieved in a small business.

5.5.1 Definition of Small Business Building and Residential Building

Refer to the draft ESS Rule: §9.8 and 10.1

Small Business Buildings and Residential Buildings are currently eligible to claim Energy Savings under the Home Energy Efficiency Retrofits (HEER) and Return of Old Appliances (ROOA) sub-methods of the ESS Rule.

The Small Business Building Definition limits Energy Savings to BCA class 6 buildings which are shops or other buildings for the sale of goods or supply of services. In practice, small businesses can operate in other BCA building classes and are not limited solely to Class 6 buildings. Class 5, 7b and 8 are also suitable for a small business to operate within, but are currently excluded.

As such the NSW Government is proposing to amend the ESS definition for a Small Business Building to include BCA classification 5, 7b and 8 buildings.

The current definition of a Residential Building includes BCA Classifications 1, 2, and a Non-habitable Building on the same site. Class 4 buildings which are singular dwellings within Class 5, 6, 7, 8 or 9 buildings are currently excluded. The intent of the HEER sub-method is to allow Energy Savings to be calculated for a building classed as a dwelling in NSW.

As such the NSW Government is proposing to expand the ESS definition for a Residential Building to include BCA Class 4 buildings – a dwelling in a building that is Class 6.

These two proposals will expand the market for energy efficiency service providers and will provide small businesses and households with greater access to the ESS.

Question 13 Do you agree with amending the definition for Small Business Building to allow Energy Savings to be calculated for BCA class 5, 7b and 8 buildings? If not please indicate why and provide us with an evidence base to support your justification.

Question 14 Do you agree with amending the definition for Residential Building to allow Energy Savings to be calculated for BCA class 4 buildings? If not please indicate why and provide us with an evidence base to support your justification

5.5.2 Small Business Building default savings factors

Refer to the draft ESS Rule: §9.8 Activity E1 - E5 and E11

In the 2014 ESS Rule change the NSW Government allowed Small Business Buildings, defined as BCA class 6 buildings less than 200m^2 floor space, to access ESS incentives using the Home Energy Efficiency Retrofits (HEER) sub-method. It was assumed that while businesses may have higher operating hours than households, the increase in hours of use would mean equipment would reach their lifetime Energy Savings over a shorter period of time. Given the deemed savings calculation, it was assumed that the increase in operating hours would balance the decrease in lifetime length. Therefore for simplicity, the NSW Government deemed using the same operating hours and lifetime savings for households and for small businesses.

Submissions received from stakeholders during the 2014 ESS Rule Change consultation period suggested that business default savings factors should be different to residential savings factors. They also recommended that default operating hours provided in the HEER lighting activities should reflect the Commercial Lighting Energy Savings Formula. It is proposed to provide separate Electricity Savings Factors for small businesses in the lighting activities. Further work is required to do this for the building fabric, air-conditioning and gas activities and is not planned for inclusion in this 2016-2017 ESS Rule amendment.

It is proposed to expand the eligible BCA classifications to include 5, 6, 7b and 8 buildings in the Definition of a Small Business Building. Set operating hours are provided for commercial lighting upgrades (§9.4 & 9.4A) according to the BCA building classification in Table A10.3 of the ESS Rule. It is logical to apply these same hours to the eligible small business BCA classifications in the HEER lighting activities. Using a single figure for deemed operating hours would avoid the need for separate Electricity Savings Factor tables based on BCA building classification and keep the activities and sub-method simple to use. It is proposed to use the average operating hours of all of the eligible Small Business BCA classifications in Table A10.3, which equates to 4,200 hours.

The permanence of Energy Savings are less guaranteed in Lamp Only replacements as the lamp can easily be replaced with a less efficient equivalent technology. Therefore Energy Savings for Lamp Only replacements are limited to a maximum of 10 years or 30,000 hours in the Commercial Lighting sub-method to account for the rated lifetime of products. It is proposed to also limit Energy Savings for Lamp only replacements to 30,000 hours for small businesses in HEER.

The lifetime deeming period was increased to 15 years in Activity Definitions E1 and E5 to account for the reduced operating hours in residential applications, resulting in a slower rate of lamp degradation. The proposal above to increase the business hours better accounts for the lifetime Energy Savings and so it is proposed that the lifetime deeming period be limited to 10 years to align with the Commercial Lighting sub-method. The 15 year deeming period for residential buildings in activities E1 and E5 will remain the same.

These changes will incentivise more small businesses to undertake energy efficiency upgrades through the ESS and help them reduce costs through bill savings.

Question 15 Do you agree with the following? If not please indicate why and provide us with an evidence base to support your justification:

- ***Provide separate Electricity Savings Factors for Small Business Buildings based on 4,200 operating hours in Activity Definitions E1, E4 and E5.***
- ***Provide a separate Deemed Activity Electricity Savings equation based on 3,000 operating hours in Activity E11.***
- ***Provide separate Electricity Savings Factors for Small Business Buildings based on 3,000 operating hours for 'LED Lamp only – ELV' replacements in Activity Definition E1 and E3.***
- ***Provide separate Electricity Savings Factors for Small Business Buildings based on 1,000 operating hours in Activity Definitions E2.***

- ***Provide a Lifetime deeming period of 10 years for Small Business Buildings.***

5.5.3 ELV Halogen to 240V LED

Refer to the draft ESS Rule: §9.8 Activity E1

The Home Energy Efficiency Retrofits (HEER) sub-method currently allows Energy Savings to be calculated for replacing an extra low voltage (ELV) or a mains voltage (240V) halogen downlight with an equivalent voltage LED. Stakeholders have raised the issue that the Rule currently doesn't allow for the replacement of an ELV halogen with a 240V LED.

The NSW Government is proposing to expand Activity E1 to allow Energy Savings to be calculated when replacing an ELV halogen downlight with a 240V LED. This will allow businesses to offer more services to end-users who wish to access incentives through the scheme. It will also provide greater opportunities for households and businesses to participate in the ESS and harmonise with the other State Schemes.

Question 16 Do you agree with the proposal to expand Activity E1 to allow Energy Savings to be calculated when replacing an ELV halogen downlight with a 240V LED?

5.5.4 Replacing a T8 or T12 Luminaire with a LED Luminaire

Refer to the ESS Rule: §9.8 Activity E5

The current 10W banding for the LCP in Table E5.1 is too large to accurately reflect the efficiency of LED tubes. LED tubes are available in a variety of lamp circuit powers (LCPs) which means the 10W banding is too coarse to reward the variations in Energy Savings between different tubes. For example, common LED replacement products for 36W T8 lamps are rated at 22W. These products are effectively assigned an LCP of 30W in the ESS Rule, which is not representative of their actual efficiency. It is proposed that the banding is split into 5W increments which will provide more representative Electricity Savings Factors for more efficient products.

Question 17 Is the proposal to replace the 10W banding in Table E5.1 with 5W banding appropriate?

5.6 High Efficiency Appliances for Businesses

The Installation of High Efficiency Appliances for Business (HEAB) sub-method allows ESCs to be created more simply for some technologies for use in businesses. The sub-method can be used for a range of technologies that have been tested against Australian Standards and so can be assigned lifetime Energy Savings with high confidence.

5.6.1 Installing a New High Efficiency Air-conditioner in Small Business Buildings

Refer to the draft ESS Rule: §9.9 Activity F4

Small Business Buildings and Residential Buildings are currently not eligible to claim Energy Savings under Activity Definition F4 (Install a New High Efficiency Air-conditioner) of the HEAB sub-method. They are instead eligible to claim ESCs for air-conditioners under activities D3 and D4 of the Home Energy Efficiency Retrofits sub-method.

It is proposed to expand the number of eligible BCA classifications to allow more Small Business Buildings participate in the HEER sub-method. These additional BCA classifications will thus become ineligible to create Energy Savings under Activity Definition F4 when previously they could. It is proposed to allow Small Business Buildings generate Energy Savings under Activity Definition F4, and under the HEER sub-method. This will allow participants chose which sub-method best suits their project. It will also remove red tape and provide greater access for businesses to participate in the ESS.

Question 18 Do you agree with the proposal to expand the eligible BCA classifications under the HEAB sub-method?

5.6.2 Business operating hours for Chillers and Air-conditioners

Refer to the draft ESS Rule: §9.9 Activity F2 and F4

The Activity Definitions F2 and F4 of the HEAB sub-method's equivalent full load operating hours (EFLH) were based on the *Regulatory Impact Statement: Minimum Energy Performance Standards for Air Conditioners: 2011.*

Stakeholders have suggested that the deemed hours for F4 are more reflective of residential usage and that the Energy Savings achieved wouldn't provide enough of a financial incentive to justify a business's participation in the ESS. This seems to be reflected in the limited number of ESC registrations that have been recorded in the HEAB sub-method.

In February 2016, E3 released the *Consultation Regulation Impact Statement – Air Conditioners and Chillers* and the average annual operating hours for business were found to be greater than in the 2011 Regulatory Impact Statement.

We propose to amend the Equivalent Full Load Hours in Activity Definitions F2 and F4 to align with the 2016 consultation Regulation Impact Statement. More specifically we propose:

- In Activity Definition F2 – Install a new high efficiency liquid chilling package, Table F2.1: ELFH (hours) increased to 2323
- In Activity Definition F4 – Install a new high efficiency air-conditioner, Table F4.1:
    - Cooling operating hours increased to 628 (hours p.a)
    - Heating operating hours increased to 157 (hours p.a)

Question 19 Do you agree with the proposed hours? If not please indicate why not and provide us with an evidence base to support your justification.

5.6.3 Proposed Deemed Gas Efficiency Activity Definitions

Refer to the draft ESS Rule: §9.9 and Schedule F

Amendments to the *Electricity Supply Act 1995* and *Electricity Supply (General) Regulation 2014* were made in 2015 to expand the ESS to include gas from 1 January 2016. In April 2016, changes to the ESS Rule were gazetted to allow calculations of Gas Savings, including under the Metered Baseline Method and the Project Impact Assessment with Measurement and Verification Method. These project based methods are typically suited to medium to large bespoke gas efficiency projects. They allow the proponent to measure and claim the full amount of savings generated by a project. However, many gas efficiency opportunities can benefit from simple deemed methods that involve lower transaction costs for businesses.

To provide a financial incentive for these smaller projects, the NSW Government has developed four new draft deemed Activity Definitions under clause 9.9 and Schedule F - High Efficiency Appliances for Business. These

Activity Definitions are based on conservative calculations as they provide incentives upfront with no measurement and verification of the savings. This makes them administratively simple to use and they can be applied to much smaller projects than would otherwise be possible.

The Activity Definitions have been developed based on well-established engineering calculations and energy-use databases. Below you will find a brief explanation of the assumptions, factors and calculations underpinning each Activity Definition.

In order to calculate Gas Savings under clause 9.9, it is proposed that a Gas Savings calculation and definition of Deemed Equipment Gas Savings be included in Equation 17 under Schedule F - High Efficiency Appliances for Business.

All four proposed gas Activity Definitions can be applied in multi-dwelling residential, commercial and industrial buildings. This is because some of these buildings rely on large centralised water heaters that are not covered under Schedule D - Home Energy Efficiency Retrofits (clause 9.8).

Question 20 Are the Building Code of Australia building classifications appropriate in each of the four proposed Activity Definitions?

Question 21 Should there be additional requirements for any End-user Equipment if they will use biogas or another Gas variant?

Deemed Equipment Gas Savings calculations

The calculation used for the proposed gas Activity Definitions F8 through F10 is based on increasing steam boiler and water heater efficiency. The calculation is as follows:

$$Deemed\ Equipment\ Gas\ Savings = P \times DEI \times 0.206 \times Lifetime \times 8760 \div 1000$$

Where (the wording of the below terms are adjusted for each of the Activity Definitions):

- *P,* is the nameplate capacity of the Gas fired steam boiler or Gas fired water heater, in kW, to which the Activity Definition applies.
- *DEI,* is the Default Efficiency Improvement (as a fraction, not as a percentage) for installing and/or replacing End-User Equipment.
- *0.206,* is the assigned load utilisation factor for all Gas fired steam boilers and Gas fired water heaters.
- *Lifetime,* is the number of years that savings will be deemed (as specified in tables).
- *8760,* is the number of hours in a year.
- *1000,* is the conversion factor for Deemed Equipment Gas Savings to be in MWh.

Nameplate capacity (P)

The Nameplate Capacity of a steam boiler or water heater (specified in the ESS Rule as a Gas fired steam boiler or Gas fired water heater, from here on in this paper the term boiler is used for simplicity) is its rated capacity to transfer heat to the working fluid. This is recorded in the boiler documentation and is normally attached as a physical nameplate. The boiler nameplate also includes other important information such as the date of manufacture, serial number and the fuel type.

Sometimes a boiler will be down-rated, meaning that a smaller burner is installed or the burner is limited and the boiler is certified safe for a lower heating load, etc. As the annual estimated gas use of a boiler is calculated based on the nameplate capacity, we have chosen to use the down-rated capacity in the Activity Definitions. For boiler replacements, the replacement boiler nameplate capacity must be used in order to prevent over-estimation of gas use from previously oversized boilers. In cases where multiple boilers are replacing a single boiler, or vice versa, evidence will need to be provided that the combined replacement

capacity does not exceed that of the existing capacity by more than 10%. The 10% leeway has been included as a suitable replacement boiler may not have exactly the same nameplate capacity as the existing boiler.

Note that nameplate capacity is the maximum amount of useful heat output of the boiler, not the fuel heat input, which will be greater.

Question 22 Is there a form of evidence that can be provided that would prove that a steam boiler or water heater has or has NOT been down-rated?

Default Efficiency Improvement (DEI)

The Default Efficiency Improvement is a measure of the improvement in a boiler's ability to transfer its input energy to steam or hot water, expressed as a fraction.

Boiler replacement

The Default Efficiency Improvement for a boiler replacement is based on an assumed efficiency improvement from installing a new boiler. On average, the older the boiler, the more gas you'll save by replacing it. The main reasons for this are:

- The fact that newer boilers are now designed to be more efficient, particularly the burner, and
- In general, efficiency of older boilers has degraded over time.

New Gas fired boilers are purchased with a guaranteed efficiency at a maximum continuous rating (MCR) producing a specified quantity of steam or hot water at a specified temperature and pressure. There is a minimum efficiency rating under this standard that is required in the Activity Definitions in order to receive credit for purchasing a new boiler. These factors, together with the wide variability in operating conditions across industry, were taken into account when calculating the DEIs for boiler replacements.

An Equipment Requirement has been included that all replacement boilers with a nameplate rating of 1000 kW or more must have a minimum turndown of 4:1. Turndown relates to the boiler's ability to fire at different rates, thereby being able to respond to variable demand without cycling off and losing energy through pre and post purge of the combustion chamber. The threshold has been set at 1000 kW because the feature may not be cost effective for smaller boilers.

It is also proposed that in order to ensure Gas Savings are achieved, an Equipment Requirement that an oxygen trim system must be included on replacement End-User Equipment with a nameplate capacity of 2000 kW.

As boilers have a relatively long asset life with a range of efficiency retrofit options, the Asset Life has been set at 10 years.

Question 23 Are the savings factors representative of the average efficiency improvements achieved by replacing a boiler?

Question 24 Is the turn-down ratio requirement of 4:1 for replacement End-User Equipment with a nameplate capacity of 1000 kW or more reasonable? Will it help ensure that Gas Savings are achieved?

Question 25 An Equipment Requirement that an oxygen trim system must be included on replacement End-User Equipment with a nameplate capacity of 2000 kW has been included in the proposed Rule text (Schedule F8). Is this reasonable? Will it help ensure that Gas Savings are achieved?

Question 26 Is it necessary to further define Gas fired steam boilers or water heaters by referring to definitions in standards AS/NZS1200:2000 and AS3500.0:2003?

Question 27 Are the 80% and 85% efficiency requirements for replacement steam boilers and water heaters reasonable? Is there an evidence base to support alternative efficiency requirements?

Question 28 Should any warranty requirements be included for steam boilers, water heaters or any other technologies?

Oxygen trim systems and replacement burners

These activities include the installation of an oxygen trim system with a flue oxygen level signal being sent to the boiler's existing burner, or replacing a burner with a newer, more efficient burner (with or without oxygen trim). The DEI is a measure of the reduction in heat lost from the stack through inefficient burner operation. This results in decreased gas use.

The key mechanism for efficiency improvement from these activities is a reduction in the excess air used by the burner to achieve combustion. The DEI was calculated from the theoretical savings delivered through this mechanism. These results were compared with actual savings data from several installations to determine a savings value that is reasonable across a range of projects.

Question 29 There is a wide range of quality in new burners and oxygen trim systems. Are there (a) distinguishing features of either system, or (b) testing standards to determine quality and expected lifetimes that should be considered as an equipment requirement to ensure that savings are achieved?

Economisers

The DEI for an economiser installation is a measure of the Gas Savings achieved by recovering heat from the exhaust into another liquid stream, such as boiler feed water.

The savings calculations are based on the minimum performance requirements. It is assumed that heat can be recovered from boiler exhaust gas to just above dew point, and that there is a suitable stream of receiving water for the recovered heat. These assumptions are reinforced in the eligibility and equipment requirements. A conservative efficiency factor was also applied to the heat exchanger.

Question 30 Is a stack test a good measure of the minimum and maximum stack temperature? What would be suitable evidence of the results of this test? Should a position on the stack be specified to measure temperature?

Sensor based blowdown

The Energy Savings from changing from a timed to a sensor based blowdown system is difficult to estimate. If a timed system is operating properly and checked regularly, it can be very efficient. The advantage of using a sensor based system is that the control can respond to changes in total dissolved solid (TDS) concentrations in the feed water that may fluctuate based on make-up water concentrations or the amount of condensate returned. This automated control reduces blowdown events, thereby saving energy.

The assumption made in Activity Definition F11 is that a sensor-based system will achieve a 1% efficiency improvement. This percentage applies to systems that have both high and low blowdown requirements.

Heat recovery from blowdown flash steam and/or via a heat exchanger

The DEI for a boiler blowdown heat recovery project is an estimate of the energy saved by recovering flash steam and by recovering energy from the residual blowdown condensate via a heat exchanger.

The Energy Savings assume that the recovered heat will reduce the overall output required by the boiler. The amount of energy saved is estimated from an average blowdown rate of 2%. The amount of flash steam generated from 2% blowdown and the enthalpy of both the flash steam and the blowdown condensate have been calculated using standard thermodynamic calculations. The savings from the heat exchanger are based on the assumption that the energy from the flash steam has already been recovered, and that the energy is being recovered to boiler make-up water.

Question 31 Is a 2% average blowdown a reasonable basis for the calculations?

Load utilisation factor (LUF)

The load utilisation factor (LUF) for a boiler is defined as the actual gas usage of that boiler in a year, divided by the gas that the boiler would have used were it to be firing at 100% for the whole year (8760 hours). It is therefore a measure of the average firing rate of the boiler, including the time that the boiler is shut down.

Load utilisation factors were estimated using hourly gas interval data from the 491 businesses across several states in Australia. The maximum site load was estimated from the top 0.05% of hourly intervals. Since boilers are the major gas load in many businesses, the load utilisation factor can be estimated directly from the overall gas usage on the site. The accuracy of this assumption was tested against actual boiler operating data collected at several sites.

There were difficulties analysing the data by ANZSIC code. For this reason, we took the 40th percentile of the mean LUF to ensure that the figure is conservative for 60% of the sample. This figure is 0.206.

Question 32 Is there an evidence base that demonstrates that one or multiple industry sectors are significantly disadvantaged by the approach to estimating LUF?

Potential Activity Definition for Insulation

The NSW Government is considering including an additional Activity Definition under clause 9.9, Schedule F - High Efficiency Appliances for Business for insulating pipes, valves and tanks. This would provide an incentive to insulate equipment containing or conveying hot water or steam that has been heated by a Gas fired steam boiler or Gas fired water heater, thereby reducing heating demand on the boiler and reducing Gas use.

Through consultation with industry and data from thermal imaging surveys, it is clear that some pipes, valves and tanks are uninsulated. What is unclear, is how much of this equipment should be insulated under current Australian Standards, National Construction Code (NCC) specifications, or Work Health and Safety (WHS) requirements. Standards and codes also changed over time and are usually not retrospective. So some uninsulated equipment may still be compliant under the standards or codes that applied when it was installed.

The objective of a deemed insulation Activity Definition would be to provide an incentive to insulate pipes, valves and tanks beyond the relevant Australian Standard, NCC specification or WHS requirement.

One way this could be done is to provide an incentive to install insulation that has a higher R value than the current standards or codes. Initial consultation has indicated that going beyond NCC requirements could be challenging. There are already space restrictions in ceiling and wall cavities in commercial and multi-dwelling residential buildings. Even bringing existing piping up to the current NCC specifications may not be practical.

There may be a case to incentivise increases in R value for equipment covered under the Australian Standards. However, it would first need to be established that there are savings to be made in going beyond the standard, and that there is a significant opportunity across industries.

There may also be equipment that falls outside the scope of Australian Standards the NCC and WHS regulations. There could be a case for providing an incentive to insulate this equipment, however these gaps have yet to be identified.

The last consideration would be to provide an incentive to insulate equipment that did not require insulation at the time of installation. One of the challenges with approach would be to prove which version of the code or standard applied, and that the project is additional to these requirements.

Question 33 Are there pipes, valves or tanks in multi-dwelling residential, commercial or industrial buildings that aren't currently insulated? If so, why not?

Question 34 Is there a case to provide an incentive to go beyond current Australian Standards or NCC specifications for insulating pipes, valves and tanks? If so, how?

6 Glossary

Acronym	Definition
AMB	**Aggregated Metered Baseline**
ESS	**Energy Savings Scheme**
LED	**Light Emitting Diode**
M&V	**Measurement and Verification**
NABERS	**National Australian Building Environmental Rating Scheme**
NSW	**New South Wales**
PIAM&V	**Project Impact Assessment with Measurement and Verification**