IPART

Independent Pricing and Regulatory Tribunal
New South Wales

Commercial Lighting Energy Savings Formula

Method Guide

Energy Savings Scheme

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1 About this document

The NSW Energy Savings Scheme (**ESS**) seeks to reduce energy consumption in NSW by creating financial incentives for organisations to invest in energy saving projects.

The other objects of the ESS are to:

- assist households and businesses to reduce energy consumption and energy costs
- make the reduction of greenhouse gas emissions achievable at a lower cost, and
- reduce the cost of, and need for, additional energy generation, transmission and distribution infrastructure.[1]

Electricity retailers and other mandatory participants (**Scheme Participants**) are obliged to meet energy saving targets. Energy savings can be achieved by installing, improving or replacing energy saving equipment. Persons that become Accredited Certificate Providers (**ACPs**) can create energy savings certificates (**ESCs**) from these activities and then sell those ESCs to Scheme Participants. The Independent Pricing and Regulatory Tribunal of NSW (**IPART**) is both the Scheme Administrator and Scheme Regulator of the ESS.[2]

This document provides guidance about how the Commercial Lighting Energy Savings Formula of the Deemed Energy Savings method (**Commercial Lighting method**) of the ESS operates, some of the key requirements that must be met when using the method, and how to calculate energy savings for a Recognised Energy Saving Activity (**RESA**) and create ESCs. This document should be used by:

- applicants seeking accreditation as a certificate provider, to assist them in completing their application,[3] and
- those persons who are already ACPs, to assist them in accurately calculating energy savings using this method.

1.1 Legislative requirements

This document is a guide only and is not legal advice. The legal requirements for ACPs participating in the ESS are set out in:

- Part 9 of the *Electricity Supply Act 1995* (**Act**)
- Part 6 of the *Electricity Supply (General) Regulation 2014* (**Regulation**), and
- the *Energy Savings Scheme Rule of 2009* (**ESS Rule**).

1 *Electricity Supply Act 1995*, section 98(2)
2 *Electricity Supply Act 1995*, sections 153(2) and 151(2)
3 A full explanation of the application process is provided in the Application Guide www.ess.nsw.gov.au/How_to_apply_for_accreditation/The_application_process. Please ensure you read this document and the Application Guide in full before applying for accreditation.

ACPs are also required to meet any additional accreditation conditions as set out in their Accreditation Notice.

1.2 Related documents

As noted throughout this guide, the following documents and tools provide further information and assistance on the method:[4]

- Evidence Manual – Commercial Lighting Energy Savings Formula
- Commercial Lighting Fact Sheet
- Commercial Lighting Post Implementation Declaration, and
- Commercial Lighting Calculation Tool.

You can also contact the Scheme Administrator if you have further questions.

2 Method overview

The Commercial Lighting method can be used to calculate energy savings and create ESCs from the following activities:

- upgrades of building lighting
- upgrades of lighting for roads and public spaces, and
- upgrades of lighting for traffic signals.

This guide covers upgrades of building lighting and lighting for roads and public spaces only. If you plan to apply for accreditation for upgrades of lighting for traffic signals, please contact the Scheme Administrator.

This guide does not provide information about the Public Lighting Method, which provides an alternative method to calculate energy savings from upgrades of public lighting where:

- the luminaire is owned and/or maintained by a Distributor[5] or Roads and Maritime Services (**RMS**), or
- a Council or RMS that is the customer of a Distributor requests the upgrade from the Distributor that owns the luminaire in writing.

Please refer to the Public Lighting page of the ESS website for further information.[6]

2.1 Building lighting

Building lighting is defined as lighting equipment affixed to commercial/industrial premises that are classified under the Building Code of Australia (BCA)[7] as:

4 Refer to: www.ess.nsw.gov.au/Methods_for_calculating_energy_savings/Commercial_Lighting
5 *ESS Rule*, cl 10 - 'Distributor' refers to a person who owns, operates or controls a distribution system
6 Refer to: www.ess.nsw.gov.au/Methods_for_calculating_energy_savings/Public_Lighting_Method
7 The Building Code of Australia (BCA) forms Part 1 and Part 2 of the National Construction Code (NCC).

- Class 3, 5, 6, 7, 8, 9 or 10(b) buildings, or
- the common areas of a Class 2 building.

Refer to Appendix A for more information on building classifications.

Effectively, this means the method can be applied to lighting upgrades at most non-residential premises – including industrial facilities, public facilities (such as schools and health centres), office buildings, and shopping centres. Additionally the method can be applied to lighting upgrades in stairways, corridors and shared areas of multiple unit residential buildings such as apartment buildings.

2.2 Lighting for roads and public spaces

Lighting for roads and public spaces is defined as lighting covered by the *AS/NZS 1158: Lighting for Roads and Public Spaces* standard series or *AS/NZS 60598.2.3 Luminaires - Particular requirements - Luminaires for road and street lighting* or both. Effectively, this means the method can be applied to lighting upgrades on roads[8] located between the boundaries of adjoining properties (ie, outside the boundaries of any private property) where the visual needs of motorists are dominant and in outdoor spaces of a public nature (eg, public squares, parks, beaches, etc) where the visual needs of pedestrians are dominant.

The AS/NZS 1158 series defines two main categories of lighting for roads and public spaces:

- **Category V Lighting (Vehicular traffic)**. This is lighting for roads where the visual requirements of motorists are dominant – eg, traffic routes. This category includes subcategories ranging from V1 to V5, which relate to the level of traffic on the road among other things.
- **Category P Lighting (Pedestrian Areas).** This is lighting for roads and other outdoor public spaces where the visual requirements of pedestrians are dominant – eg, local roads, outdoor shopping precincts, or outdoor carparks.[9]

The appropriate lighting category, subcategory and requirements for the particular road or public space your RESA relates to must be determined by (or in consultation with) the appropriate authority concerned (eg, road and traffic authorities, local councils, RailCorp, etc).

The lighting equipment installed as part of the lighting upgrade must comply with all parts of the AS/NZS 1158 series that are applicable to the road or public space where the upgrade will take place.[10] Where the lighting upgrade deviates from the requirements of the AS/NZS 1158 series, these deviations must be justified, as required by the standard.[11]

8 **Road** is defined as the right of way between boundaries of adjoining properties. It could include laneways, pathways, footpaths, etc. Please refer to the AS/NZS 1158.0 Standard for the definition.

9 Please refer to AS/NZS 1158 Standard for the complete listing of all subcategories.

10 Clause 9.4.1 (b) requires that the lighting upgrade meets or exceed the relevant lighting standard for each upgrade, to the satisfaction of the Scheme Administrator.

11 Appendix E of AS 1158.3.1 and Appendix D of AS 1158.1.1 list the mandatory documentation for demonstrating compliance with AS/NZS 1158.

3 Requirements that must be met

The information below is guidance about the requirements of the method. This is not an exhaustive list of requirements, and you should ensure that you are familiar with your obligations under the Act, Regulation, ESS Rule and any conditions of your accreditation.

3.1 Energy saver

An ACP can only calculate energy savings and create ESCs if the ACP is the 'energy saver' under the ESS Rule. The ACP must be the energy saver as at the implementation date. An energy saver can be either:

- **the original energy saver** – which, under the Commercial Lighting method, is the purchaser (discussed below), or
- **the nominated energy saver** – which is someone the original energy saver has nominated as the energy saver by completing a Nomination Form.[12]

An ACP that is the original energy saver must be accredited as an ACP **prior to** the implementation date in order to create ESCs from an implementation.

An ACP that is a nominated energy saver must:

- be **accredited** as an ACP **prior** to the implementation date and before the nomination is made,[13]
- have a documented procedure for obtaining the nomination from the original energy saver, and
- be **nominated** by the original energy saver **on or before** the implementation date. The nomination is taken to occur on the date that the nomination form is signed by the original energy saver**.**

3.2 Purchaser

In general, the purchaser is the person who purchases or leases the goods or services that enable the relevant Energy Savings to be made. However, the following persons cannot be a "purchaser" and therefore cannot be an original energy saver under the Commercial Lighting method:

- an ACP that is not the owner, occupier or operator of the relevant site,[14] and
- a person who purchases the goods or services for the purpose of reselling the End-User Equipment, unless the resale will be an inclusion in a contract for the sale of land or a strata scheme lot.[15]

12 Available at: www.ess.nsw.gov.au/Accredited_Certificate_Providers/Templates
13 The ESS website provides information on applying to become an ACP at: www.ess.nsw.gov.au/How_to_apply_for_accreditation.
14 ACPs that are the nominated energy saver will typically fall under this category.
15 Wholesalers will typically fall under this category.

3.2.1 Contribute a net amount of at least $5 per MWh towards the cost of the lighting upgrade

Energy savings may only be calculated using this method if the purchaser has paid a net minimum of $5 per mega-watt hour (**MWh**) of electricity saved (excluding GST). The minimum co-payment must be made before ACPs can apply to register ESCs. In kind payments are not acceptable and co−payments must not be reimbursed either before or after ESC registration. For example, if the upgrade results in 50 MWh of energy savings, the purchaser must contribute **a minimum** of $250 (excluding GST) (ie, $5 x 50 MWh).

ACPs must ensure that any payment made is for the goods and services that make up the lighting upgrade and that evidence of payments being made is provided to the Scheme Administrator. Where the payment includes equipment that is used in the lighting upgrade but is primarily used for other purposes, ACPs must justify why it is appropriate to attribute the cost of the equipment to the lighting upgrade.

3.3 Implementation and implementation date

The ESS Rule defines 'implementations' and 'implementation dates' (explained below). These concepts are used to determine the number of ESCs, and from when they can be created.

3.3.1 Implementation

An implementation is the delivery of an energy saving activity (called a 'RESA' in the ESS Rule)[16] at a site.

3.3.2 Implementation date

For RESAs that use the Commercial Lighting method, the implementation date is the date the lighting upgrade is completed as supported by evidence.

3.4 Lighting equipment

ACPs can replace, modify or install lighting equipment that is classed as 'standard' equipment for lighting upgrades under the ESS. The standard equipment classes are listed and defined (from the ESS Rule) in Appendix D, Table A9.1 of this guide. Each class has a default Lamp Circuit Power (LCP) value, reproduced and listed in Appendix D, Table A9.2. The LCP values are used to calculate the energy savings.

Alternatively, ACPs may replace, modify or install certain 'other' lighting equipment, provided it is eligible and is accepted as meeting specified equipment requirements. The other equipment classes and their LCP values and requirements are listed and defined (reproduced from the ESS Rule) in Appendix D, Table A9.3 and Table A9.4. If an ACP plans

16 A RESA must meet all of the criteria set out in clause 5.3 and 5.4 of the ESS Rule.

to use any of these other equipment classes, they should first read the *Lighting Equipment Requirements – LED Lighting, Induction Lamps and Emerging Lighting Technologies Guide*.[17]

Lighting control systems, such as occupancy sensors, can be installed to reduce electricity consumption by reducing light output when it is not required. ACPs can install these control systems as a standalone upgrade to existing lighting, or as part of a larger lighting refurbishment involving the equipment above.

ACPs must not install T5 Adaptor Kits or Retrofitted Luminaires – LED Linear Lamps as part of the lighting upgrade, as these equipment classes are ineligible for installation under the ESS Rule (see Table A9.4 in Appendix D).

3.4.1 Equipment requirements for lighting for roads and public spaces

If an ACP replaces and modifies lighting for roads and public spaces, the equipment must meet the requirements specified by the standards below:

- *AS/NZS 60598.1.1 Luminaires – General requirements and tests*
- *AS/NZS 60598.2.3 Luminaires – Particular Requirements – Luminaires for road and street lighting* (for Category V lighting – Vehicular Traffic)[18], and
- Table 2.10 of *AS/NZS 60598.3.1 Lighting for roads and public spaces – Pedestrian area (Category P) lighting – Performance and design requirements* (for Category P lighting – Pedestrian Areas)[19].

If an ACP uses equipment of an "Other Equipment Class" (listed in Table A9.3), it must also be accepted under the Scheme Administrator's current Emerging Lighting Technology (**ELT**) process.[20] Requirements for acceptance under this process are summarised in Table A9.4 (Appendix D), but ACPs should review the complete guidance materials provided on ESS website.[21]

3.5 Recycling requirements

Accredited Certificate Providers are responsible for ensuring that lighting equipment removed or replaced during the lighting upgrade is disposed of appropriately. Furthermore, if the implementation:

- is in a Metropolitan Levy Area (ie, an area with a postcode listed in Table A25 of the ESS Rule), and
- has an Implementation Date on or after 15 May 2016,

17 The *Lighting Equipment Requirements – LED Lighting, Induction Lamps and Emerging Lighting Technologies Guide* can be found on the ESS website at: www.ess.nsw.gov.au /Projects_and_equipment/Lighting_Technologies/Using_Lighting_Technologies_for_Commercial_Lighting.

18 As required by Clause 2.11.1 (a) of AS/NZS 1158.1.1

19 As required by Clause 2.10.1 of AS/NZS 1158.3.1

20 More information on how to apply for an ELT to be accepted for use under the ESS can be found here: www.ess.nsw.gov.au/Projects_and_equipment/Lighting_Technologies

21 Refer: www.ess.nsw.gov.au/Projects_and_equipment/Lighting_Technologies

any lighting end-user equipment containing mercury must be recycled in accordance with the recycling requirements of a recycling program such as 'Fluorocycle' or equivalent.[22]

3.6 Electrical work

ACPs must ensure that all electrical work involved in the lighting upgrade is performed by appropriately trained persons and undertaken or completed under the supervision of a licensed electrician. This requirement applies even when the lighting upgrade does not require any wiring work to be conducted or otherwise require an electrician to be present.

3.7 Service levels

ACPs must only create ESCs from lighting upgrades that reduce electricity consumption **without** reducing service levels (including safety levels) below the pre-upgrade levels.[23] For example, ACPs cannot create ESCs from activities that reduce electricity only by the de-lamping of a particular area as this would also reduce service levels.

3.7.1 Performance requirements

ACPs must satisfy the minimum performance requirements for upgrades of building lighting and upgrades of roads and public spaces (outlined below), to the satisfaction of the Scheme Administrator. We may publish additional minimum performance requirements for these upgrades from time to time.

3.7.2 Performance requirements for upgrades of building lighting

For upgrades of building lighting:

- the lighting for each space must satisfy the relevant requirements of AS/NZS 1680 or, where this standard is not applicable, another benchmark agreed to in advance by the Scheme Administrator
- the upgraded lighting system must comply with the requirements of the BCA section F4.4 Safe Movement, and
- the upgraded lighting system must have an Illumination Power Density (IPD) for each space less than or equal to the maximum IPD allowed under BCA part J6.

Building lighting requirements where AS/NZS 1680 applies Upgrades of building lighting must achieve the relevant requirements of AS/NZS 1680. These may include, but are not limited to, the requirements related:

- maintained illuminance accounting for lumen depreciation
- control of glare, and
- uniformity of illuminance.

22 Further information about Fluorocycle can be found here: http://www.fluorocycle.org.au/
23 *ESS Rule*, cl 5.3(b)

Further information about each of these requirements can be found in AS/NZS 1680.

In addition, AS/NZS 1680 includes specific requirements for a range of lighting upgrades. At a minimum, ACPs must satisfy the requirements related to:

- Correlated Colour Temperature[24] and matching existing lighting
- Colour Rendering Index[25] in order to accurately portray colour
- glare, in order to avoid 'disability glare' and 'discomfort glare'
- reflectance off surfaces, and
- daylight effects.

Compliance with the relevant requirements may be checked at the time of audit, so it is advisable to involve the person responsible for providing the lighting solution and upgrade in:

- assessing how these requirements apply to the lighting upgrade, and
- ensuring that the lighting upgrade satisfies the requirements.

Other benchmarks where AS/NZS 1680 does not apply

Where the lighting upgrade is outside the scope of AS/NZS 1680, ACPs may apply to the Scheme Administrator to use another performance benchmark. The application must include:

- the nature of the lighting upgrade
- why AS/NZS 1680 does not apply
- what benchmark or alternative standard is proposed, to use to ensure service levels are appropriate, and
- how each space will meet, as a minimum, the requirements of BCA Section F4.4, 'Safe Movement'.

Compliance with the performance requirements of the agreed benchmark may be checked at the time of audit, so it is advisable to prepare the application in consultation with the person responsible for providing the lighting solution and upgrade.

Building Code of Australia requirements – all implementations

To calculate energy savings from building lighting upgrades, ACPs need to understand the Building Code of Australia (**BCA**) requirements that apply to lighting – particularly the requirements described in Part J6 and Section F4.4.

After implementation, the lighting upgrade must achieve an Illumination Power Density (**IPD**) that is less than or equal to the maximum IPD for each space, as defined in Part J6 of the BCA. In addition, each space must meet the BCA Section F4.4, 'Safe Movement' requirements. These may be updated from time to time.

24 Correlated Colour Temperature is a measurement of the apparent colour of the light source.

25 Colour Rendering Index is a measurement of how accurately a light source can portray the colour of an object in comparison to an ideal light source such as an incandescent lamp.

Further information about how BCA requirements apply to the calculation of energy savings is provided in the *Evidence Manual Commercial Lighting Energy Savings Formula* (Evidence Manual).[26]

Commercial Lighting Fact Sheet and Post Implementation Declaration – all implementations

ACPs must provide the original energy saver with the *Commercial Lighting Fact Sheet* at the start of the upgrade. Upon completion of the building lighting upgrade, the installer and the original energy saver must complete and sign a *Commercial Lighting Post Implementation Declaration*.[27]

The *Commercial Lighting Post Implementation Declaration* consists of the lighting quality statement, recommended maintenance schedule and customer declaration.

ACPs must keep a copy of the signed declaration and maintenance schedule. Both will be checked at audit and may be checked by the Scheme Administrator.

3.7.3 Performance requirements for upgrades of lighting for roads and public spaces

All upgrades of lighting for roads and public spaces must meet the requirements necessary to facilitate the safe movement of vehicles and pedestrians. These requirements are specified in the relevant parts of AS/NZS 1158.

In addition to facilitating the safe movement of vehicles and pedestrians, ACPs need to consider the other objectives of public lighting:

- discouraging illegal acts, and
- improving the amenity of an area through increased aesthetic appeal.

ACPs will also need to meet the requirements of AS/NZS 1158 for implementations related to these objectives where relevant.

Relevant parts of AS/NZS 1158

The parts of AS/NZS 1158 that are applicable to the lighting upgrade will depend on the lighting category, subcategory and performance requirements of the particular road or public space involved. As noted above, these are matters that must be determined by or in consultation with the responsible authority[28].

These parts may include:

- *AS/NZS 1158.0 – Introduction*

26 The *Evidence Manual* is available on the ESS website at: www.ess.nsw.gov.au/Methods_for_calculating_energy_savings/Commercial_Lighting

27 Both available here: www.ess.nsw.gov.au/Methods_for_calculating_energy_savings/Commercial_Lighting

28 Most authorities responsible for public lighting in NSW (eg, Electricity Distributors, local councils and RailCorp) maintain their own requirements they've deemed necessary including elements of AS/NZS 1158. Demonstrated compliance with such requirements would generally indicate compliance with the relevant requirements of AS/NZS 1158.

- *AS/NZS 1158.1.1 – Vehicular Traffic (Category V) lighting – Performance and design requirements*
- *AS/NZS 1158.1.2 – Vehicular Traffic (Category V) lighting – Guide to design, installation, operation and maintenance*
- *AS/NZS 1158.2 – Computer procedures for the calculation of light technical parameters for Category V and Category P lighting*
- *AS/NZS 1158.3.1 – Pedestrian Area (Category P) lighting – Performance and design requirements*
- *AS/NZS 1158.4 – Lighting for pedestrian crossings*
- *AS/NZS 1158.5 – Tunnels and underpasses*
- *SA/SNZ TS 1158.6 Luminaires – Performance*

The documentation required for demonstrating compliance with the AS/NZS 1158 series is specified in an appendix of the relevant standard. In particular, the documentation related to:

- vehicular lighting (category V lighting) is specified in Appendix D of AS/NZS 1158.1.1
- pedestrian lighting (category P lighting) is specified in Appendix E of AS/NZS 1158.3.1
- pedestrian crossing lighting (category PX) is specified in Appendix D of AS/NZS 1158.4.

ACPs are required to collect and retain the documentation described in the appendices applicable to each lighting upgrade to demonstrate that the upgrade is compliant with the requirements laid out in the AS/NZS 1158 series. This documentation will be checked at audit.

3.8 Minimum requirements for conduct of representatives

The Scheme Administrator has established minimum requirements for the conduct of ACPs and their representatives. This includes ACP responsibilities for:

- training representatives
- maintaining a register of representatives
- ensuring there is a formal, documented, signed and enforceable (legally binding) contract or agreement in place for each representative, and
- providing appropriate customer service.

ACPs are accountable for all ESS activities conducted by employees, third parties and other representatives. This includes all aspects of an activity for which they create ESCs, from the initial engagement with customers, through to the final quality assurance of documents. ACPs will be held responsible for all actions, omissions and information provided by representatives acting on their behalf under the ESS – regardless of any contract or

agreement with other parties. For more information, refer to *ESS Notice 01/2013 (amended July 2014) Minimum requirements for conduct of persons acting on behalf of ACPs.*[29]

3.9 Insurance

ACPs (and any agents/subcontractors[30] involved in the delivery of the RESA) must each be covered by Public Liability Insurance cover of at least $5 million. Insurance cover of this amount must be maintained for the life of the RESA. Public Liability Insurance must, at a minimum, cover the replacement and/or rectification of customer property damaged as a result of work performed by the ACP and/or the ACP's representatives, subcontractors or agents.

Either the ACP or the ACP's representatives, agents or subcontractors must also hold Product Liability Insurance of at least $5 million that covers all products used in the RESA.

ACPs must also:

- provide the Scheme Administrator with current certificates of thier, and their subcontractors'/agents', Public Liability and Product Liability Insurances, within seven days of each renewal, reissue or change of policy, and
- maintain a register of subcontractors/agents that contains copies of their Public Liability Insurance and, if relevant, their Product Liability Insurance.

Compliance with these requirements will be checked at the time of audit.

4 Calculating energy savings

The relevant equations and tables used to calculate energy savings using the Commercial Lighting method are provided in Appendix C and D of this guide. Under the ESS Rule, energy savings comprise both "electricity savings" and "gas savings".

4.1 Electricity savings

The electricity savings from an implementation of the Commercial Lighting method can be calculated using:

- equations 6, 9 and either equation 7 or equation 8 from the ESS Rule
- the relevant tables from Schedule A of the ESS Rule, and
- the Regional Network Factor from Table A24 in Schedule A of the ESS Rule.

All inputs to the equations are provided in Appendix C of this guide, and are explained in detail in the *Evidence Manual* for the method.[31]

29 Refer: www.ess.nsw.gov.au/ESS_Notices_and_Updates
30 That is, any company you are working with involved directly in the installation of lighting equipment.
31 The Evidence Manual is available on the ESS website at: http://www.ess.nsw.gov.au/Methods_for_calculating_energy_savings/Commercial_Lighting

4.2 Gas savings

The gas savings from this method will always be equal to zero (as, under the ESS Rule, gas savings are not calculated for this method and are therefore not applicable to this method).

4.3 Calculation tools

A *Commercial Lighting Calculation Tool*[32] is available on the ESS website to assist ACPs in calculating energy savings under the method. ACPs should use the Commercial Lighting Calculation Tool when equation 7 of the ESS Rule is applicable to the calculation of the baseline energy consumption of the lighting upgrade, ie:

- **Use the Commercial Lighting Calculation Tool if**:
  - the lighting upgrade is part of a refurbishment that would **not** otherwise have been required to comply with the BCA Part J6, or
  - the lighting upgrade is part of a refurbishment that **would** otherwise have been required to comply with the BCA Part J6, and the existing lighting has an IPD that is less than or equal to the maximum IPD allowed under the BCA Part J6.
- **Use the Commercial Lighting Calculation Tool** if the lighting upgrade is part of a refurbishment that is required to comply with the AS/NZS 1158 (ie, for lighting for roads and public spaces).
- **<u>Do not</u> use the Commercial Lighting Calculation Tool if**:
  - the lighting upgrade is part of a refurbishment that **would** have been required to comply with the BCA Part J6, **and**
  - the existing lighting has an IPD that is greater than the maximum IPD allowed under the BCA Part J6.

In this last instance, the ESS Rule requires the use of equation 8 to determine the baseline energy consumption of the lighting upgrade, which is not supported by the Commercial Lighting Calculation Tool. ACPs must contact the Scheme Administrator when undertaking this type of upgrade for further guidance.

ACPs can develop their own calculation tool if they wish, but the Scheme Administrator recommends ACPs calibrate its outputs against the Scheme Administrator tool.

The Commercial Lighting Calculation Tool is not compatible with all systems and is provided by the Scheme Administrator on an unsupported basis. Accordingly, IPART will not be able to assist with all queries or issues encountered when using the tool.

4.4 Calculating energy savings from upgrades that involve both building and road/public space lighting

If a particular implementation includes a combination of Building Lighting and Lighting for Roads and Public Spaces, ACPs must calculate energy savings for each space separately.

[32] The Commercial Lighting Calculation Tool is available on the ESS website at: www.ess.nsw.gov.au/Methods_for_calculating_energy_savings/Commercial_Lighting

If ACPs are using the calculation tool provided by the Scheme Administrator, they must use the different functionality provided by the tool for the implementation separately:

- one version of the tool with the functionality to calculate energy savings from all spaces classified as 'Building Lighting', and
- another version of the tool with the functionality to calculate energy savings from all 'Lighting for Roads and Public Spaces' areas.

Spaces classified as Building Lighting must comply with the requirements for Building Lighting, and areas classified as Lighting for Roads and Public Spaces must comply with the requirements for Lighting for Roads and Public Spaces. Where an upgrade is both Building Lighting and Lighting for Roads and Public Spaces, the requirements of both methods apply.

4.5 How are ESCs created under the method?

The *Evidence Manual* provides instructions on how to register ESCs and defines the requirements for keeping records that verify the energy savings achieved.

The *Evidence Pack* that accompanies the *Evidence Manual* can be used to record and store data to meet these requirements.[33]

4.6 How do you apply for accreditation to create ESCs using the method?

To become an ACP and generate ESCs from projects that use the Commercial Lighting Energy Savings Formula method, you need to complete an application that is tailored to this method.

An application has multiple parts, which are explained in the *Application Guide for ESS Accreditation* (**Application Guide**).[34] As a minimum, applicants will have to provide:

- Application Form: Part A - General Details,[35] and
- Application Form: Part B - Method Details.[36]

A full explanation of the application process is provided in the *Application Guide*.

33 The Evidence Pack is available on the ESS website at: http://www.ess.nsw.gov.au/Methods_for_calculating_energy_savings/Commercial_Lighting

34 The *Application Guide* for ESS Accreditation is available on the ESS website at: http://www.ess.nsw.gov.au/How_to_apply_for_accreditation/Apply_now_-_guides_and_application_forms

35 The *Application Form: Part A - General Details* is available on the ESS website at: http://www.ess.nsw.gov.au/How_to_apply_for_accreditation/Apply_now_-_guides_and_application_forms

36 The *Application Form: Part B - Method Details Commercial Lighting Energy Savings Formula* is available on the ESS website at: http://www.ess.nsw.gov.au/How_to_apply_for_accreditation/Apply_Now_-_Guides_and_Application_Forms

5 Glossary

Words which are defined in the ESS Rule and which are used in this Method Guide have the same meaning in this Method Guide as in the ESS Rule, unless the context requires otherwise.

Acronym	Description
ACP	Accredited Certificate Provider
BCA	Building Code of Australia forming part of the National Construction Code (NCC)
Building lighting	End-user-equipment lighting affixed to a commercial/industrial premises which is classified under the BCA as Class 3, 5, 6, 7, 8, 9, or 10(b) buildings or the common area of a Class 2 building
CFL	Compact fluorescent lamp
Control gear	The lighting ballast, transformer or driver
Control system	A system for controlling the light output of a Luminaire, including: occupancy sensor, daylight-linked control, programmable dimming, manual dimming, or voltage reduction unit
Downward light output	The luminous flux (measured in lumens) emitted in the downwards direction, equivalent to the light output from a lamp or luminaire when installed flush with a ceiling
ESCs	Energy Savings Certificates
ESS	Energy Savings Scheme
Evidence Manual	Evidence Manual – Commercial Lighting Energy Savings Formula
Evidence Pack	Evidence and Certificate Registration Pack – Commercial Lighting Energy Savings Formula
Glare	Difficulty seeing in the presence of a very bright light and possibly causing discomfort or inability to see
Implementation	The delivery of a RESA at a site
Implementation date	The date when the lighting upgrade was completed
IPART	Independent Pricing and Regulatory Tribunal – the Scheme Administrator
IPD	Illumination Power Density
Illuminance	The amount of light that falls on a surface per unit area, which is sometimes referred to as the “Lighting Level” (measured in Lux)
Lamp	An artificial source of visible light
Lamp life	The expected operating lifetime of a lamp, in hours, measured in accordance with Table A9.6 of Schedule A of the ESS Rule
LCP	Lamp circuit power, which is the power drawn by a single lamp and its associated control gear
Licensed electrician	A person that holds a licence to carry out low voltage electrical work in NSW without supervision, and is registered as an electrical contractor to contract, or offer to contract, or to carry out electrical installation work
Light output	The luminous flux (measured in lumens) emitted by a lamp or luminaire
Lighting upgrade	The replacement of existing lighting End-User Equipment (EUE) with new lighting EUE that consumes less electricity, or the modification of existing lighting EUE resulting in a reduction in the consumption of electricity compared to what would have otherwise been consumed
Lumen	The unit of luminous flux, which is a measure of the total amount of

Acronym	Description
	visible light emitted from a light source
Lumen Depreciation	The decrease in lumen output from a lamp over time
Luminaire	The apparatus that distributes, filters or transforms the light emitted from a light source, including lamps, control gear and all components necessary for fixing and protecting the lamps, including the troffer
Lux	The unit of Illuminance (1 lux equals 1 lumen per square metre (lm/m^2)
Maintained emergency lighting	Maintained emergency exit sign or always-on maintained emergency luminaire as defined in AS 2293.1
MWh	Megawatt hour (unit of energy)
NLP	Nominal lamp power, the manufacturer's rated value (or tested value, as acceptable to the Scheme Administrator) for power drawn by a single lamp
Nominated energy saver	Refer section 3.1 of this document
Original energy saver	Refer section 3.1 of this document
Purchaser	Refer to section 3.2 of this document
RCP	Reflected Ceiling Plan
RESA	Recognised Energy Saving Activity

Appendices

A Building Code of Australia (Part A3 – Classification of Buildings and Structures)

Part A3 of the BCA – Volume 1 – 2016 classifies buildings and structures. Under the ESS, only premises in the following BCA classes are eligible for commercial lighting upgrades:

- Class 3, 5, 6, 7, 8, 9 or 10(b) buildings, or
- the **common areas**[37] of a Class 2 building.

Under Part A3.3 of the BCA "Multiple Classification", different areas within the same building may be classified in different BCA classes.

This appendix provides a transcript of Part A3 of the BCA.

PART A3 – Classification of Buildings and Structures

A3.1 - Principles of Classification

The classification of a building or part of a building is determined by the purpose for which it is designed, constructed or adapted to be used.

A3.2 - Classifications

Buildings are classified as follows:

Class 1: one or more buildings which in association constitute –

(a) **Class 1a** – a single dwelling being –

(i) a detached house; or

(ii) one of a group of two or more attached dwellings, each being a building, separated by a *fire-resisting* wall, including a row house, terrace house, town house or villa unit; or

(b) **Class 1b** –

(i) A boarding house, guest house, hostel or the like –

[37] Please note that the ESS Rule defines "Common areas" as:
- For buildings owned under strata title, the common property as defined in either the *Strata Schemes (Freehold Development) Act 1973 (NSW)*, or *Strata Schemes (Leasehold Development) Act 1986 (NSW)*; or
- For buildings not owned under strata title (e.g., under company title), the non-residential property of BCA Class 2 buildings

A. with a total area of all floors not exceeding 300 m^2 measured over the enclosing walls of the Class 1b; and

B. in which no more than 12 persons would ordinarily be resident; or

(ii) 4 or more single dwellings located on one allotment and used for short-term accommodation,

which are not located above or below another dwelling or another Class of building other than a *private garage*.

Class 2: a building containing 2 or more *sole-occupancy units* each being a separate dwelling.

Class 3: a residential building, other than a building of Class 1 or 2, which is a common place of long term or transient living for a number of unrelated persons, including:

(a) a boarding-house, guest house, hostel, lodging house or backpackers accommodation; or

(b) a residential part of a hotel or motel; or

(c) a residential part of a *school*; or

(d) accommodation for the aged, children or people with disabilities; or

(e) a residential part of a *health-care building* which accommodates members of staff; or

(f) a residential part of a *detention centre*.

Class 4: a dwelling in a building that is Class 5, 6, 7, 8 or 9 if it is the only dwelling in the building.

Class 5: an office building used for professional or commercial purposes, excluding building of Class 6, 7, 8, or 9.

Class 6[38]: a shop or other building for the sale of goods by retail or the supply of services direct to the public, including -

(a) an eating room, café, restaurant, milk or soft-drink bar; or

(b) a dining room, bar, shop or kiosk part of a hotel or motel; or

(c) a hairdresser's or barber's shop, public laundry, or undertaker's establishment; or

(d) market or sale room, showroom, or *service station*.

Class 7: a building which is -

38 NSW uses an alternative definition for class 6 to that specified in Part A3. Refer to Appendix 'New South Wales' for more information on NSW specific amendments.

(a) **Class 7a** - a *carpark*; or

(b) **Class 7b** - for storage, or display of goods or produce for sale by wholesale.

Class 8: a laboratory, or a building in which a handicraft or process for the production, assembling, altering, repairing, packing, finishing, or cleaning of goods or products is carried on for trade, sale, or gain.

Class 9: a building of a public nature -

(a) **Class 9a** - a *health-care building*, including those parts of the building set aside as a laboratory; or

(b) **Class 9b** - an *assembly building*, including a trade workshop, laboratory or the like in a primary or secondary school, but excluding any other parts of the building that are of another Class; or

(c) **Class 9c** - an *aged care building*.

Class 10: a non-habitable building or structure -

(a) **Class 10a –** a non-habitable building being a *private garage*, carport, shed, or the like; or

(b) **Class 10b –** a structure being a fence, mast, antenna, retaining or free-standing wall, *swimming pool*, or the like.

(c) **Class 10c –** a *private bushfire shelter.*

A3.3 - Multiple Classifications

Each part of the building must be classified separately, and -

(a)

(i) where parts have different purposes – if not more than 10% of the *floor* area of a *storey*, being the minor use, is used for a purpose which is a different classification, the classification applying to the major use may apply to the whole *storey*; and

(ii) the provisions of (i) do not apply when the minor use is a laboratory of Class 2,3 or 4 part; and

(b) a plant room, machinery room, lift motor room, boiler room or the like must have the same classification as the part of the building in which it is situated; and

(c) if a building has parts of different classification, each part must comply with all the relevant provisions for its classification.

Part A3.4 – Parts with more than one classification

(a) Notwithstanding A3.3, a building or part of a building may have more than one classification applying to the whole building or to the whole of that part of the building.

(b) If a building or part of a building has more than one classification applying to the whole building or part in accordance with (a), that building or part must comply with all the relevant provisions of the BCA for each classification.

Terms in Italics have a specific meaning defined in the BCA (NCC).[39]

39 Building Code of Australia (BCA), which is also referred to as the National Construction Code (NCC).

B List of relevant standards in the AS/NZS Series

B.1 AS/NZS 1680 Series – Building Lighting

A list of standards making up the AS/NZS 1680 series, and the areas specifying design values are provided below:

AS/NZS 1680.0 – Safe Movement

AS/NZS 1680.1 – General Principles and Recommendations

- Section 3 – Task Visibility

AS/NZS 1680.2.1 - Specific Applications, Circulation Spaces and other General Areas

- Appendix D – Specific Recommendations for Circulation Spaces and Other General Areas

AS/NZS 1680.2.2 - Specific Applications, Office and Screen-based Tasks

- Appendix E – Specific Recommendations for Office and Screen-Based Visual Tasks

AS/NZS 1680.2.3 - Specific Applications, Educational and Training Facilities

- Appendix D – Specific Recommendations for Educational and Training Facilities

AS/NZS 1680.2.4 – Interior Lighting, Industrial Tasks and Processes

- Appendix E – Specific Recommendations for Industrial Tasks and Processes

AS/NZS 1680.2.5 – Interior Lighting, Hospital and Medical Tasks

- Appendix F – Specific Recommendations for Hospital and Medical Tasks

Please note that any values contained in any AS/NZS 1680.2 series Standard take precedence over AS/NZS 1680.1

AS/NZS 1680.3 – Measurement, calculation and presentation

AS/NZS 1680.4 - Lumen Maintenance

B.2 AS/NZS 1158 Series – Lighting for Roads and Public Spaces

AS/NZS 1158.0 - Introduction

AS/NZS 1158.1.1 – Vehicular Traffic (Category V) lighting – Performance and design requirements

AS/NZS 1158.1.2 – Vehicular Traffic (Category V) lighting – Guide to design, installation, operation and maintenance

AS/NZS 1158.2 – Computer procedures for the calculation of light technical parameters for Category V and Category P lighting

AS/NZS 1158.3.1 – Pedestrian Area (Category P) lighting – Performance and design requirements

AS/NZS 1158.4 – Lighting for Pedestrian crossings

AS/NZS 1158.5 – Tunnels and underpasses

SA/SNZ TS 1158.6 Luminaires - Performance

In order to demonstrate compliance with the standard, you must refer to the following parts:

- Appendix D of AS/NZS 1158.1.1 specifies the documentation required to demonstrate vehicular lighting (category V lighting) is compliant with the standard
- Appendix E of AS/NZS 1158.3.1 specifies the documentation required to demonstrate pedestrian lighting (category P lighting) is compliant with the standard, and
- Appendix D of AS/NZS 1158.4 specifies the documentation required to demonstrate pedestrian crossing lighting (category PX) is compliant with the standard.

C Equations and inputs to calculations[40]

Equation 6

For each Implementation:

Electricity Savings = [Baseline Consumption - Upgrade Consumption] x *Regional Network Factor*

Where:

- *Baseline Consumption*, in MWh, is calculated:
  - using **Equation 7**, if the Lighting Upgrade is part of a refurbishment that would not have been required to comply with the BCA Part J6, had the Lighting Upgrade component of the refurbishment not occurred;
  - using **Equation 7** if the Lighting Upgrade is part of a refurbishment that would have been required to comply with the BCA Part J6, had the Lighting Upgrade component of the refurbishment not occurred and where the existing lighting meets or is below the maximum IPD requirements of the BCA Part J6; or
  - using **Equation 8** if the Lighting Upgrade is part of a refurbishment that would have been required to comply with the BCA Part J6, had the Lighting Upgrade component of the refurbishment not occurred, and where the existing lighting does not meet the IPD requirements of the BCA Part J6.
- *Upgrade Consumption*, in MWh, is calculated using **Equation 9**
- *Regional Network Factor*, is the value from **Table A24** of Schedule A corresponding to the postcode of the Address of the Site or Sites where the Implementation(s) took place.

Equation 7

Baseline Consumption (MWh) =

$$\sum_{Each\ Incumbent\ Lamp} (LCP \times Asset\ Lifetime \times Annual\ Operating\ Hours \times CM \times AM) \div 10^6$$

Where:

- *Each Incumbent Lamp* means each Lamp and Control Gear in the pre-existing lighting system;
- *LCP*, in Watts, is the default lamp circuit power corresponding to that type of Lamp and Control Gear for that End-User Equipment as set out in **Table A9.2** or **Table A9.4** of Schedule A, representing the power drawn by the Lamp, plus the losses of its Control Gear;
- *Asset Lifetime*, in years, is the default lifetime of the Lighting Upgrade for the relevant End-User Equipment as used in **Equation 9**;
- *Annual Operating Hours*, in hours/year, is the default number of hours per annum that the upgraded lighting system is expected to operate for the relevant building and space type as set out in **Table A10.2** of Schedule A ;
- *CM* is the control multiplier. If the Lamp is connected to a Control System, the factor for the control multiplier shall be applied for the relevant End-User Equipment or activity as set out in **Table A10.4** of Schedule A to this Rule, otherwise CM = 1.0; and.
- *AM* is the air-conditioning multiplier for the space as used in **Equation 9**.

40 Extract of the ESS Rule, as updated from time to time.

Equation 8

Baseline Consumption (MWh)=

$$\sum_{Each\ Space} (IPD \times Area \times Asset\ Lifetime \times Annual\ Operating\ Hours \times AM) \div 10^6$$

Where:

- *Each Space* means each portion of space within the Site requiring a different IPD as defined in Part J6 of the BCA;
- *IPD*, in Watts/m^2, is the maximum allowable IPD for each space, as required by Table J6.2a of the BCA. For simplicity, the Scheme Administrator may take a weighted average of similar IPDs in the Commercial Lighting Energy Savings Formula.
- *Area*, in m^2, is the area of Each Space;
- *Asset Lifetime*, in years, is the default lifetime of the Lighting Upgrade for the relevant End-User Equipment as used in **Equation 9**;
- *Annual Operating Hours*, in hours/year, is the default number of hours per annum that the upgraded lighting system is expected to operate for the relevant building and space type as set out in **Table A10.2** of Schedule A; and
- *AM* is the air-conditioning multiplier for the space as used in **Equation 9**.

Equation 9

Upgrade Consumption (MWh) =

$$\sum_{Each\ Upgrade\ Lamp} (LCP \times Asset\ Lifetime \times Annual\ Operating\ Hours \times CM \times AM) \div 10^6$$

Where:

- *Each Upgrade Lamp* means each Lamp and Control Gear in the upgraded lighting system.
- *LCP*, in Watts, is the default lamp circuit power corresponding to that type of Lamp and Control Gear for that End-User Equipment as set out in **Table A9.2** or **Table A9.4** of Schedule A, representing the power drawn by the Lamp, plus the losses of its Control Gear;
- *Asset Lifetime*, in years, is the default lifetime of the Lighting Upgrade for the relevant End-User Equipment as set out in **Table A10.1** of Schedule A, or another value accepted by the Scheme Administrator;
- *Annual Operating Hours*, in hours/year, is the default number of hours per annum that the upgraded lighting system is expected to operate for the relevant building and space type as set out in **Table A10.2** of Schedule A.
- *CM* is the control multiplier. If the Lamp is connected to a Control System, the factor for the control multiplier shall be applied for the relevant End-User Equipment or activity as set out in **Table A10.4** of Schedule A, otherwise CM = 1.0; and
- *AM* is the air-conditioning multiplier for the space, after Implementation, as set out in **Table A10.5** of Schedule A.

D Tables from the ESS Rule

Table A9.1: Standard Equipment Classes for Lighting Upgrades

Equipment Class	Definition
T12 linear fluorescent Lamp	A double-capped fluorescent Lamp as defined by *AS/NZS 4782.1 Double-capped fluorescent lamps – Performance specifications* with a tube diameter of 38.1mm. These are also referred to as T38.
T8 linear fluorescent Lamp	A double-capped fluorescent Lamp as defined by *AS/NZS 4782.1 Double-capped fluorescent lamps – Performance specifications* with a tube diameter of 25.4mm. These are also referred to as T26.
T5 linear fluorescent Lamp	A double-capped fluorescent Lamp as defined by *AS/NZS 4782.1 Double-capped fluorescent lamps – Performance specifications* with a tube diameter of 15.9mm. These are also referred to as T16.
T5 or T8(T9) Circular fluorescent Lamp	A double-capped circular fluorescent Lamp with a typical tube diameter of 16mm or 29mm as defined by *AS/NZS 4782.1 Double-capped fluorescent lamps – Performance specifications*. These are also referred to as T9.
Compact fluorescent Lamp with non-integrated ballast (CFLn)	An externally ballasted single-capped fluorescent Lamp as defined by *AS/NZS 60901 Single-capped fluorescent lamps-Performance specifications*. The Lamp may include an internal means of starting and pre-heated cathodes.
Compact fluorescent Lamp with integrated ballast (CFLi)	A Self-ballasted compact fluorescent Lamp as defined by *AS/NZS 4847 Self-ballasted lamps for general lighting services*
Tungsten halogen Lamp (240V)	A Tungsten halogen Lamp as defined in *AS 4934 Incandescent lamps for general lighting service*, with a rated voltage of 240V.
Tungsten halogen Lamp (ELV)	A Tungsten halogen Lamp as defined in *AS 4934 Incandescent lamps for general lighting service*, with an ELV rating, typically 12V. These Lamps run off an Extra-low voltage lighting converter (ELC) as defined in *AS 4879.1*
Infrared coated (IRC) halogen Lamp (ELV)	An ELV Tungsten halogen Lamp as defined in *AS 4934* where the halogen globe is coated with a reflective infrared coating which improves the efficiency of the globe.
Metal halide Lamp	A discharge Lamp classified as a Metal halide Lamp as defined *by IEC 61167 Metal halide lamps – Performance specification.*
Mercury vapour Lamp	A discharge Lamp classified as a High-pressure mercury vapour Lamp as defined by *IEC 60188 High-pressure mercury vapour lamps – Performance specifications.*
High pressure sodium (HPS) Lamp	A discharge Lamp classified as a High pressure sodium vapour Lamp as defined by *IEC 60662 High-pressure sodium vapour lamps.*
Lighting for Roads and Public Spaces or Traffic Signals (other than LED lighting)	Lighting for Roads and Public spaces as defined by *AS 1158 Lighting for roads and public spaces.*

Table A9.2: Lamp Circuit Power (LCP) values for Standard Equipment Classes

Equipment Class	Control Gear	LCP (Watts)	Notes
T8 or T12 linear fluorescent Lamp or T8(T9) or T12 circular fluorescent Lamp	Ballast, EEI = A1	NLP + 2	
	Ballast, EEI = A2	NLP	
	Ballast, EEI = A3	NLP + 2	
	Ballast, EEI = B1	NLP + 6	
	Ballast, EEI = B2	NLP + 8	
	Ballast, EEI = C	NLP + 10	
	Ballast, EEI = D	NLP + 12	
	EEI unknown (Electronic ballast)	NLP + 2	
	EEI unknown (Magnetic ballast)	NLP + 10	
T5 linear fluorescent Lamp or T5 circular fluorescent Lamp	Ballast, EEI = A1	1.13 × NLP + 2.5	
	Ballast, EEI = A2	1.08 × NLP + 1.5	
	Ballast, EEI = A3	1.13 × NLP + 2.5	
	EEI = Unknown (Electronic ballast)	1.13 × NLP + 2.5	
Compact fluorescent Lamp with non-integrated ballast (CFLn)	Ballast, EEI = A1	NLP + 3	
	ballast, EEI = A2	NLP + 1	
	ballast, EEI = A3	NLP + 3	
	ballast, EEI = B1	NLP + 5	
	ballast, EEI = B2	NLP + 7	
	ballast, EEI = C	NLP + 9	
	ballast, EEI = D	NLP + 11	
	EEI unknown (Electronic ballast)	NLP + 3	
	EEI unknown (Magnetic ballast)	NLP + 3	
Compact fluorescent Lamp with integrated ballast (CFLi)	Built In	NLP	
Tungsten halogen Lamp (240V)	Built In	NLP	
Tungsten halogen Lamp (ELV) or Infrared coated (IRC) halogen Lamp (ELV)	Magnetic transformer	1.25 × NLP	Maximum NLP of removed Lamp = 35W
	Electronic transformer	1.08 × NLP	
Metal halide Lamp	Magnetic ballast (reactor type)	1.05 × NLP + 14	
	Magnetic ballast (constant wattage type)	1.07 × NLP + 22	
	Electronic ballast	1.10 × NLP + 0.9	

Equipment Class	Control Gear	LCP (Watts)	Notes
Mercury vapour Lamp	Magnetic ballast	1.03 × NLP + 11	
High pressure sodium (HPS) Lamp	Magnetic ballast	1.05 × NLP + 13	
Lighting for Roads and Public Spaces or Traffic Signals (other than LED lighting)	Built in or Independent	Lighting Load Table Published by AEMO or relevant regulator.	An entire traffic signal unit or Integrated Luminaire is used as the basis for calculation, rather than individual Lamps.

Table A9.3: Other Equipment Classes for Lighting Upgrades

Equipment Class	Definition
T5 adaptor kit	Any equipment that enables a T8 or T12 Luminaire to accommodate or provide physical support to a T5 Lamp or Luminaire.
Retrofit Luminaire - LED Linear Lamp	A T5, T8 or T12 Luminaire that has been retrofitted with an LED linear Lamp in place of the linear fluorescent Lamp. This cannot involve modification to the wiring of the Luminaire other than removal, replacement or modification of the starter.
LED Lamp Only – ELV	An LED Lamp that runs off an existing Extra-low voltage lighting converter (ELC) designed for retrofitting into an existing Luminaire or Lamp holder. These are typically used as a replacement for ELV Tungsten halogen Lamps.
LED Lamp Only – 240V Self Ballasted	A self-ballasted LED Lamp as defined by AS/NZS IEC 62560 Self-ballasted LED lamps for general lighting services by voltage > 50 V. These Lamps are connected directly to a 240V supply.
Induction Luminaire	A gas discharge Lamp in which the power required to generate light is transferred from outside the Lamp envelope to the gas via electromagnetic induction.
LED Lamp and Driver	A LED-reflector Lamp and matching LED Driver intended as an alternative to a Mirrored Reflector Halogen Lamp
Modified Luminaire –LED Linear Lamp	A T5, T8 or T12 luminaire that has been modified for use with an LED linear Lamp. This involves modifying, removing or rendering redundant any wiring or structure of the Luminaire, beyond the replacement of a starter.
LED Luminaire – fixed type	An LED Luminaire intended for use as a fixed luminaire as defined in AS/NZS 60598.2.1 Luminaires – Particular requirements – Fixed general purpose luminaires.
LED Luminaire – Linear Lamp	An LED Luminaire intended for use as an alternative to a linear fluorescent Luminaire, where the Luminaire houses a matching Linear LED tube or a linear array of integrated LEDs. Where the Luminaire uses a Linear LED tube, the Luminaire must not be compatible with a linear fluorescent Lamp.
LED Luminaire – floodlight	An LED Luminaire intended for use as a floodlight as defined in AS/NZS 60598.2.5 Luminaires – Particular requirements - Floodlights
LED Luminaire – recessed	An LED Luminaire intended for use as a recessed luminaire as defined in AS/NZS 60598.2.2 Luminaires – Particular requirements – Recessed luminaires
LED Luminaire – high/lowbay	An LED Luminaire intended for use as high-bay or low-bay lighting.
LED Luminaire – streetlight	An LED Luminaire intended for use as a streetlight as defined in AS/NZS 60598.2.3 Particular requirements – Luminaires for road and street lighting.
LED Luminaire – emergency lighting	An LED Luminaire intended for use as an Emergency lighting luminaire as defined in AS/NZS 60598.2.22 Particular requirements – Luminaires for emergency lighting.
LED Luminaire – hospital use	An LED Luminaire intended for use in the clinical areas of a hospital or health care building as defined in AS/NZS 60958.2.25 Particular requirements – Luminaires for use in clinical areas of hospitals and health care buildings.
Other Emerging Lighting Technology	Any lighting equipment not defined above.

Table A9.4: Lamp Circuit Power (LCP) values and Equipment Requirements for other Equipment Classes for Lighting Upgrades

Equipment Class	Control Gear	LCP Value	Equipment Requirement (Equipment being installed)	Equipment Requirement (Equipment being removed)
T5 Adaptor Kit	Not Applicable (ineligible)	As Published by the Scheme Administrator	Ineligible	Must demonstrate the LCP to the satisfaction of the Scheme Administrator.
Retrofit Luminaire - LED Linear Lamp	Not Applicable(ineligible)	As Published by the Scheme Administrator	Ineligible	
LED Lamp Only – ELV	Built In + Existing Magnetic Transformer	1.25 × NLP as Published by Scheme Administrator	Must meet product requirements and minimum performance specifications for Lamp Life, electro-magnetic compatibility (where applicable), lumen efficacy, power factor and LCP as evidenced by: (a) a certification scheme accepted by the Scheme Administrator, including but not limited to a Standard Luminaire list; and (b) test reports from an accredited laboratory, in accordance with requirements Published by the Scheme Administrator; or (c) compliance with a relevant AS/NZS standard for the relevant Equipment Class recognised by the Scheme Administrator; or (d) demonstrated product acceptance under schedules of the VEET scheme recognised as relevant by the Scheme Administrator including compliance with any additional Equipment Requirements Published by the Scheme Administrator.	
	Built In + Existing Electronic Transformer	1.08 × NLP as Published by Scheme Administrator		
LED Lamp Only – 240V Self Ballasted	Built In	As Published by the Scheme Administrator		
Induction Luminaire	Built In or Independent			
LED Lamp and Driver				
Modified Luminaire- LED Linear Lamp				
LED Luminaire – fixed type				
LED Luminaire – Linear Lamp				
LED Luminaire – floodlight				
LED Luminaire – recessed				
LED Luminaire – high/lowbay				
LED Luminaire – streetlight				
LED Luminaire – emergency lighting				
LED Luminaire – hospital use				
Other Emerging Lighting Technology				

Table A9.5: Control gear for Lighting Upgrades

Control Gear	Definition
Magnetic ballast	A Ferromagnetic ballast as defined in *AS/NZS 4783 Performance of electrical lighting equipment – Ballasts for fluorescent lamps*
Electronic ballast	An A.C. supplied electronic ballast as defined in *AS/NZS 4783 Performance of electrical lighting equipment – Ballasts for fluorescent lamps*
Magnetic ballast (reactor type)	An electromagnetic ballast that use an inductor or autotransformer to limit the current and provide the voltage necessary to ignite the Lamp. These ballasts do not include any means of regulating the light output.
Magnetic ballast (constant wattage type)	An electromagnetic ballast that uses a combination of inductive and capacitive components to provide a regulated power output (constant wattage) to the Lamp
Magnetic transformer	A magnetic isolating transformer as defined in *AS/NZS 4879.1 Performance of transformers and electronic step-down convertors for ELV lamps - Test method - Energy performance.*
Electronic transformer	An electronic step-down convertor as defined in *AS/NZS 4879.1 Performance of transformers and electronic step-down convertors for ELV lamps - Test method - Energy performance.*

Table A9.6: Default Lamp Life for Lighting Upgrades

Type of Lamp	Lamp Life (hours)
Standard equipment classes defined in Table A9.1	As per product labelling.
Other equipment classes defined in Table A9.3	As Published by the Scheme Administrator.

Table A10.1: Asset Lifetimes for Lighting Upgrades

Activity	Asset Lifetime (years)
Replacement of : • Luminaire, or • Control Gear (not integrated into Lamp).	Lighting for Roads and Public Spaces or Traffic Signals: 12 years All other lighting: 10 years
Replacement of: • Lamp Only.	Lamp Life ÷ Annual Operating Hours (Where Lamp Life is measured in accordance with Table A9.6 and is a maximum of 30,000 hours) Maximum Asset Lifetime = 10 years for Building Lighting and 12 years for Lighting for Roads and Public Spaces or Traffic Signals
Installation of: • Control System as listed in Table A10.4 where the Lighting Upgrade only consists of the installation of a Control System	Maximum Asset Lifetime = 5 years

Table A10.2: Operating Hours for Lighting Upgrades by space type

Space Type	Annual Operating Hours (hours per annum)
Auditorium, church and public hall	2,000
Board room and conference room	3,000
Carpark – general (undercover) and Car Park - entry zone (first 20 m of travel)	7,000
Carpark – general (open air)	4,500
Common rooms, spaces and corridors in a BCA Class 2 building	7,000
Control room, switch room, and the like	Value in Table A10.3 for BCA Classification of the surrounding space
Corridors	Value in Table A10.3 for BCA Classification of the surrounding space
Courtroom	2,000
Dormitory of a BCA Class 3 building used for sleeping only or sleeping and study	3,000
Entry lobby from outside the building	Value in Table A10.3 for BCA Classification of the surrounding space.
Health-care - children's ward, examination room, patient ward, all patient care areas including corridors where cyanosis lamps are used	6,000
Kitchen and food preparation area	Value in Table A10.3 for BCA Classification surrounding space
Laboratory - artificially lit to an ambient level of 400 lx or more	3,000
Library - stack and shelving area, reading room and general areas	3,000
Lounge area for communal use in a BCA Class 3 building or BCA Class 9c aged care building	7,000
Maintained Emergency Lighting	8,500
Museum and gallery - circulation, cleaning and service lighting	2,000
Office	3,000
Plant room	Value in Table A10.3 for BCA Classification of the surrounding space
Restaurant, café, bar, hotel lounge and a space for the serving and consumption of food or drinks	5,000
Retail space including a museum and gallery whose purpose is the sale of objects	5,000
School - general purpose learning areas and tutorial rooms	3,000
Sole-occupancy unit of a BCA Class 3 building	3,000
Sole-occupancy unit of a BCA Class 9c aged care building	6,000
Storage with shelving no higher than 75% of the height of the aisle lighting	5,000
Storage with shelving higher than 75% of the height of the aisle lighting	5,000

Space Type	Annual Operating Hours (hours per annum)
Service area, cleaner's room and the like	Value in Table A10.3 for BCA Classification of the surrounding space
Toilet, locker room, staff room, rest room and the like	Value in Table A10.3 for BCA Classification of the surrounding space
Wholesale storage and display area	5,000
Other spaces not defined above	Value in Table A10.3 for BCA Classification of space

Table A10.3: Annual Operating Hours for Lighting Upgrades by building type

Building Classification	Annual Operating Hours (hours per annum)
BCA Class 2 buildings (Common Areas)	7,000
BCA Class 3 buildings (Common Areas)	7,000
BCA Class 3 buildings (other than Common Areas)	3,000
BCA Class 5 buildings	3,000
BCA Class 6 buildings	5,000
BCA Class 7 buildings	5,000
BCA Class 7 (a) buildings (open air car parks)	4,500
BCA Class 7 (a) buildings (undercover car parks)	7,000
BCA Class 8 buildings (other than ANZSIC Division C, Manufacturing)	3,000
BCA Class 8 buildings (ANZSIC Division C, Manufacturing)	5,000
BCA Class 9a and 9c buildings	6,000
BCA Class 9b buildings	2,000
BCA Class 10b buildings	1,000
Roads and Public Spaces	4,500
Traffic Signals	8,760

Table A10.4: Control Systems and Control Multipliers for Lighting Upgrades

Control System	Definition	Control Multiplier (CM)
Occupancy Sensor	Control device that uses a motion sensor to detect the presence of people in the Space and adjusts the light output of the Luminaire. Each Occupancy Sensor must control a maximum of 6 Luminaires.	0.7
Daylight-Linked Control	Control device that uses a photoelectric cell to measure ambient daylight levels to automatically vary Luminaire light output. Each Luminaire must be located close to a significant source of daylight. (Not applicable to Carpark – general (open air) space type as referenced in Table A10.2 and BCA Class 7 (a) buildings (open air car parks) and Roads and Public Spaces building type as referenced in Table A10.3)	0.7

Control System	Definition	Control Multiplier (CM)
Programmable Dimming	Luminaire light output controlled by pre-selected light levels (scenes) which are automatically selected according to time of day, photoelectric cell and/or Occupancy Sensor. Scenes must reduce lighting power.	0.85
Manual Dimming	Control device that allows a user to control Luminaire light output using a knob, slider or other manual input mechanism or by manually selecting a pre-programmed light level (scene).	0.9
Multiple Control Systems	Programmable Dimming and Manual Dimming	0.76
	Any other combination of 2 or more control systems above.	0.6
Voltage Reduction Units (VRU)	A control device that reduces the voltage applied to the Luminaire after start-up, when used with appropriate Luminaires.	As approved by Scheme Administrator
Specialised Occupancy Sensor	An Occupancy Sensor defined in Table A10.4A	CM in Table A10.4A as applicable

Table A10.4A: Occupancy Sensor Control Multipliers for Lighting Upgrades

Control System	Definition	Control Multiplier (CM) A (See Definition in 10.1)	Control Multiplier (CM) B (See Definition in 10.1)
Occupancy Sensor 1	Control device that uses a motion sensor to detect the presence of people in the Space and adjusts the light output of the Luminaire. Each Occupancy Sensor must control a maximum of 2 Luminaires.	0.55	0.55 + 0.45 * ($LCP_{low\ power}$/ LCP)
Occupancy Sensor 2 in a Carpark – general (undercover) of a BCA class 2, 5 and 7a building.	Control device that uses a motion sensor to detect the presence of people in the parking area of a BCA class 2, 5 or 7a building and adjusts the light output of the Luminaire.	0.3	0.3 + 0.7 * ($LCP_{low\ power}$/ LCP)
Occupancy Sensor 3 in a fire stairs of a BCA class 2, 5 and 7a building.	Control device that uses a motion sensor to detect the presence of people in the fire stairs of a BCA class 2, 5 or 7a building and adjusts the light output of the Luminaire.	0.15	0.15 + 0.85 * ($LCP_{low\ power}$/ LCP)
Occupancy Sensor 4 in a corridor of a BCA class 2 building.	Control device that uses a motion sensor to detect the presence of people in the corridor area of a BCA class 2 building and adjusts the light output of the Luminaire.	0.25	0.25 + 0.75 * ($LCP_{low\ power}$/ LCP)

Table A10.5: Air-conditioning Multipliers for Lighting Upgrades

Space Air-conditioning system	Air-conditioning Multiplier (AM)
Space air-conditioned during normal operating hours by a refrigerant based air-conditioner	1.07
Data Centre spaces air-conditioned by a refrigerant-based air conditioner.	1.3
Refrigerated rooms	1.3
All other spaces	1

Table A17: End-Use Services

End-Use Services
Air heating and cooling
Air handling, fans, ventilation
Water heating
Water/liquid pumping
Refrigeration and freezing
Lighting

End-Use Services
Cooking
Home entertainment
Computers, office equipment
Communications
Cleaning, washing
Process heat
Air compression
Process drives
Milling, mixing, grinding
Transport
People movement, lifts, escalators
Materials handling, conveying
Other machines
Electricity supply
Unknown
Other End-Use Services as Published by the Scheme Administrator

Table A18: Business Classifications

Business Classification
A Agriculture, Forestry and Fishing
B Mining
C Manufacturing
D Electricity, Gas, Water and Waste Services
E Construction
F Wholesale Trade
G Retail Trade
H Accommodation and Food Services
I Transport, Postal and Warehousing
J Information Media and Telecommunications
K Financial and Insurance Services
L Rental, Hiring and Real Estate Services
M Professional, Scientific and Technical Services
N Administrative and Support Services
O Public Administration and Safety
P Education and Training
Q Health Care and Social Assistance
R Arts and Recreation Services
S Other Services
Residential
Unknown

Table A24: Regional Network Factors

Postcode of Site where Implementation occurred	Regional Network Factor
2311-2312	1.03
2321	1.03
2324	1.03
2329	1.03
2338-2490	1.03
2536-2537	1.03
2545-2551	1.03
2579-2599	1.03
2619-2739	1.03
2787	1.03
2791-2844	1.03
2850-2880	1.03
3585	1.03
3644	1.03
4383	1.03
All other postcodes	1

Table A25: Metropolitan Levy Area by postcode

Metropolitan Levy Area postcodes
2000-2011
2015-2050
2052
2060-2077
2079-2090
2092-2097
2099-2122
2125-2148
2150-2168
2170-2179
2190-2200
2203-2214
2216-2234
2250-2251
2256-2265
2267
2278
2280-2287
2289-2300
2302-2308
2314-2327

Metropolitan Levy Area postcodes
2334-2335
2500
2502
2505-2506
2508
2515-2519
2525-2530
2533-2536
2538-2541
2555-2560
2563-2567
2570
2571
2575-2579
2622
2745
2747-2750
2753-2763
2765-2770
2775