



Public Lighting Upgrade Activity Guide

10 December 2018



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Introduction to this guide

Accredited persons (APs) must comply with Victorian Energy Upgrades (VEU) program requirements when undertaking public lighting upgrade (activity 27) to create Victorian energy efficiency certificates (VEECs).

About this guide

Use this guide for assistance in meeting the specific requirements of public lighting upgrades under the VEU program.

- Section 1 explains the eligibility criteria for lighting upgrades under the program
- Section 2 explains the variables you will use to create VEECs for activities
- Section 3 lists upgrade installer requirements
- Section 4 details requirements for each activity you undertake, including compliance with external standards
- Section 5 lists record keeping and evidence requirements for your upgrades
- Section 6 is a step-by-step guide on how to create VEECs using the public lighting upgrade activity under the program.

Who should use this guide

You should use this guide if you are:

- seeking accreditation to undertake this activity. It will help you to understand the activity and evidence requirements you must meet to create and register VEECs
- accredited to undertake public lighting upgrades. It will help you understand the evidence you need to calculate energy savings and register VEECs for this activity.

Before you begin

This activity is complex, both administratively and technically. Participants should dedicate considerable time to understand the activity requirements, even if you have considerable experience in the lighting industry.

To further understand how to participate in this activity, including your obligations, review the following documents:

- VEEC Assignment Form Template - Public Lighting Upgrade (Activity 27)
- AS/NZS 1158 Compliance Declaration Template - Public Lighting Upgrade (Activity 27)

- Obligations and Program Guide for Accredited Persons

The above documents can be accessed from www.esc.vic.gov.au/public-lighting and www.esc.vic.gov.au/veu-accredited-persons.

Seeking assistance

If you are unsure about aspects of undertaking this activity, and cannot find the answer in this guide or the documents listed above, contact us on (03) 9032 1310 or veu@esc.vic.gov.au.

Legal context for this guide

We have prepared this guide as a general summary of relevant parts of:-

- Victorian Energy Efficiency Target Act 2007 (the VEET Act)
- Victorian Energy Efficiency Target Regulations 2018 (the VEET Regulations)
- Victorian Energy Upgrades Specifications 2018 (the VEU specifications)
- Victorian Energy Efficiency Target Guidelines (the VEET guidelines)

View these documents at: www.esc.vic.gov.au/veu-legislation

This guide should not be relied upon as substitute for legal advice and should be read in conjunction with the above source documents. In the event of inconsistency between this guide and the source documents, the content in the source documents apply.

1. Introduction to public lighting upgrades

Public lighting upgrade is defined as a lighting upgrade that is undertaken in a public open space that is owned by a distribution company, council or responsible road authority.

1.1. Which upgrades are eligible?

For your public lighting upgrade to be eligible under the VEU program:

- The upgrade must be undertaken in accordance with activity requirements.
- The product installed must be eligible.
- You must be accredited by us to undertake the public lighting upgrade activity.

Eligible upgrade activities

For an upgrade to be eligible:

- The treatment of the works as part of the same upgrade must be reasonable and defensible.
- The upgrade must have been completed after the date on which you lodged your application for accreditation or application for additional activity approval.
- The existing lighting equipment must be connected to an electricity supply before the upgrade if it is decommissioned.
- The existing lighting equipment must be connected to an electricity supply both before and after the upgrade, and must be operable after the upgrade, if it is not decommissioned.
- You must have all necessary documentation to verify the pre-upgrade (baseline) lighting situation.

Eligible products

Any product installed as part of a public lighting upgrade must either:

- be approved by Australian Energy Market Operator (AEMO), and appear on latest version of the AEMO NEM Load Table, at time of installation
- be approved by us for listing in our Register of Products by the time of VEEC creation.

However, a product (including AEMO approved products) must be listed in our Register of Products in order to enable the creation of VEECs in our registry system.

Learn more about applying for public lighting product approval, or having AEMO approved products added to our register, by reading our Lighting Product Application Guide, available at www.esc.vic.gov.au/veu-product-applicants.

Appropriate accreditation

You must be accredited by us, for public lighting upgrade (activity 27) in order to undertake this activity.

Find out how to become accredited for this activity at www.esc.vic.gov.au/become-veu-accredited

2. Calculating the number of eligible VEECs

The number of VEECs awarded for your public lighting upgrade depends on a number of variables.

The number of VEECs you receive for a given upgrade is based on the deemed abatement associated with that upgrade. The deemed abatement is calculated using assumptions about an upgrade's energy saving factors, which may vary from the actual abatement.

The VEEC calculation method is explained in part 27 of the VEU specifications, and is detailed in Appendix C of this guide. An explanation of some of the key calculation variables is provided in Section 2.2 below.

2.1. Upgrades: Areas and calculation zones

To calculate the baseline and upgrade energy use for a given upgrade, you must subdivide the upgrade into smaller components (known as calculation zones). How you subdivide the upgrade into calculation zones depends on the specific project. A calculation zone is a series of lamps for which all of the variables of the greenhouse gas emissions reduction equation are common.

The **baseline calculation** for the project must be divided into calculation zones containing common incumbent lamps with the same nominal lamp power, asset lifetime and control device.

The **upgrade calculation** for the project must be divided into calculation zones with a common upgrade lamp, lighting control device installed and asset lifetime reference.

This information, and the definition of a calculation zone, is represented in Figure 1. Even for simple upgrades, there will normally be at least two calculation zones - one for the baseline and one for the upgrade. Complex upgrades may require many more. The online upload form can accommodate up to 50 calculation zones.

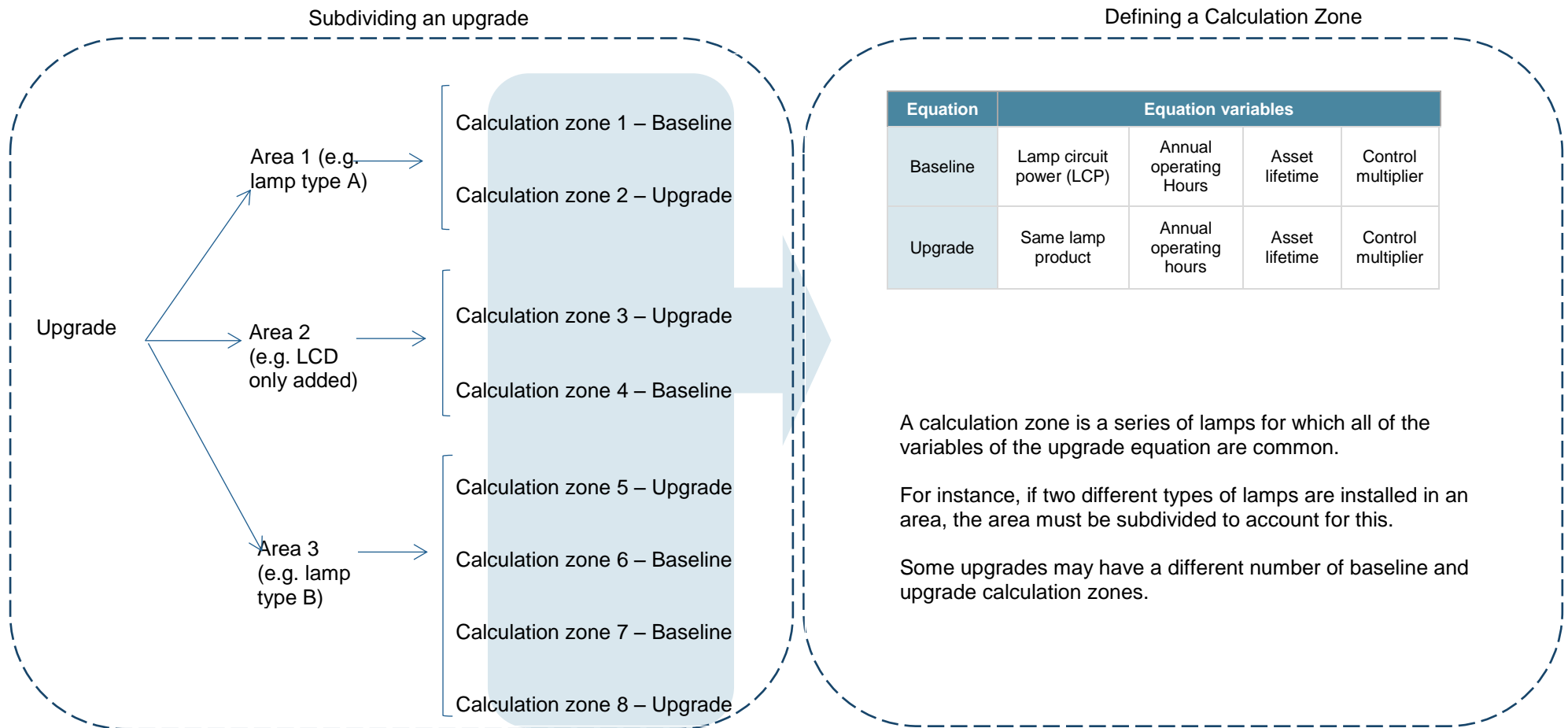


Figure 1: Dividing an upgrade project into calculation zones

2.2. Calculation variables

2.2.1. Lamp circuit power

One factor in the VEEC calculation is the lamp circuit power (LCP), which refers to the combined power draw of the lamp and its control gear (light source). Use Table 1 to determine the LCP

Table 1: LCP for public lighting upgrades

Condition	LCP value
1. If the Victorian load is listed in the latest version of the AEMO Load Table	The Victorian load (W) in the AEMO Load Table
2. If the Victorian load is not listed in the latest version of the AEMO Load Table	The nominal device rating (W) in the AEMO Load Table
3. If the Victorian load or nominal device rating is not listed in the latest version of the AEMO Load Table	The value determined by Table 15 for the relevant upgrade light source
4. If the Victorian load or nominal device rating is not listed in the latest version of the AEMO Load Table and the light source is not in Table 15	The value determined by the commission for that type of upgrade light source

For conditions 1 and 2 in Table 1, you can access the AEMO load table at www.aemo.com.au

For condition 3 in Table 1, the LCP is determined by adding a default factor to the nominal lamp power (NLP) of the lamp as set out in Table 15 in Appendix C.

For condition 4 in Table 1, you must apply to us for an LCP determination. Email your application to veu@esc.vic.gov.au with your laboratory tests for the lamp and its control gear.

2.2.2. Asset lifetime

An upgrade's asset lifetime variable depends on the type of upgrade undertaken (see Table 2). You may need to select different asset lifetimes for a single project.

When entering VEEC creation data for an upgrade activity, you must select the same asset lifetime for the baseline ('before') calculation zone and the upgrade ('after') calculation zone **for each area of the upgrade activity.**

Table 2: Asset lifetime for lifetime calculations for public lighting upgrades

Condition met by lighting upgrade	Asset lifetime (years)
Luminaire replacement: The existing luminaire is replaced	10
Lighting control device: A lighting control device is installed, and no lighting equipment of any other type is installed in the space	5

Luminaire decommissioning: The lamp is removed and not replaced, and either the luminaire or all legacy control gear is removed from the site or from the electrical circuit so that it does not draw any power	10
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2.2.3. Annual operating hours

The annual opening hours awarded for a public lighting upgrade depends on the type of upgrade undertaken as detailed in Table 3.

Table 3: Annual operating hours

Type of area	Annual operating hours (per year)
Road, other than the replacement or installation of traffic signals	4500
A public or outdoor space that is not a sports field	4500

2.2.4. Control multiplier

A control multiplier is another factor in the VEEC calculation. This factor applies when a lighting control device (LCD) is present in either the baseline or upgrade environment. The control multiplier value awarded to a particular activity is detailed in Table 4.

Table 4: Control multiplier values for baseline and upgrade calculations at all sites

Number of LCDs	Types(s) of LCDs	Control multiplier
None	N/A	1.00
One	Occupancy sensor that controls 1 to 2 luminaires	0.55
	Occupancy sensor that controls 3 to 6 luminaires	0.70
	Occupancy sensor that controls more than 6 luminaires	0.90
	Programmable dimmer	0.85
More than one	A combination of one occupancy sensor that controls 1 to 2 luminaires, and any other LCD(s)	0.4 or, if greater, the multiple of the two lowest control multiplier values for the combination of LCDs
	A combination of one occupancy sensor that controls 3 to 6 luminaires, and any other LCD(s)	0.5 or, if greater, the multiple of the two lowest control multiplier values for the combination of LCDs
	Any LCDs, except occupancy sensors that control	0.6 or, if greater, the multiple

1 to 6 luminaires

of the two lowest control multiplier values for the combination of LCDs

An LCD can either be in-built into the upgrade lamp and/or installed as separate devices to the lamp. Table 5 details how the system will apply control multiplier values for the purposes of calculating the number of VEECs based on data entered for an activity’s upgrade zone in the VEEC creation form.

Table 5: How the control multiplier value will be applied based on activity data entered for an upgrade zone

Lamp installed	Integrated LCD features activated?	Other LCD devices installed?	Control multiplier applied
No integrated LCD features	Not applicable	No LCD devices entered	No value applied
		Allowed to install, and enter, any LCD devices in your VEEC claim	Calculated based on LCD devices installed
With integrated LCD features	Yes	Not allowed to enter LCD devices which are the same as that integrated into the lamp in your VEEC claim	Calculated based on LCD features of lamp
		Allowed to install, and enter, LCD devices which are different to that integrated into the lamp in your VEEC claim	Calculated based on combination of LCD features of lamp and LCD devices installed
With integrated LCD features	No	Allowed to install, and enter, any LCD devices in your VEEC claim	Calculated based on LCD devices installed

For baseline zones, control multiplier values will be calculated based on your entries in the LCD fields in the VEEC creation form. If the baseline environment contains a lamp with integrated LCD features, you will need to specify the lamps’ LCD features in the LCD fields in the VEEC creation form.

3. Requirements for personnel undertaking public lighting upgrades

All public lighting upgrades must be undertaken by electricians licensed by Energy Safe Victoria, or suitably qualified lineworkers.

3.1. Product safety, OHS and compliance with standards

You must comply with all relevant laws and regulations, including occupational health and safety (OHS), even if you subcontract the installation to a third party.

To minimise risk and ensure a safe work environment, you and your installers should be aware of the risks applicable to lighting upgrades in public environments including:

- activity installation risks – relating to installers and the general public where installations are associated with working at heights, requiring the use of specialist equipment (e.g. elevated work platforms)
- product risks – risks may also depend on the type of upgrade activity and where that activity is being undertaken.

3.2. Required installer training and qualifications

Public lighting upgrade activities must be undertaken by either:

- a lineworker approved by a relevant body (with training and qualifications set by the Victorian Electricity Supply Industry (VESI))
- a licensed electrician.

It is the responsibility of the upgrade manager and you, as the AP, to ensure all risks have been identified and that all training requirements are met.

3.3. Using subcontractors

You, as the AP, may act as an aggregator to facilitate public lighting upgrades undertaken on assets owned by relevant bodies (such as a distributor). These upgrades will likely involve subcontractors approved by the relevant asset owner. You should ensure that appropriate contractual arrangements are in place between the asset owner and their approved contractors. As the AP, you are responsible for submitting accurate information to us. You should also be aware that if a subcontractor doesn't comply with a relevant law or fails to properly record information about the upgrade, you may be subject to compliance action.

As the use of subcontractors may represent a compliance risk, you must provide information about the contractual arrangements for each upgrade you undertake on the assignment form.

3.4. Role of the upgrade manager

For each upgrade, you must nominate a single person (referred to as the upgrade manager) to legally represent your business to verify the documentation for the upgrade, including, but not limited to the VEEC assignment form and AS/NZS 1158 compliance declaration.

You do not need to directly employ the upgrade manager but they must have the authority to sign on your behalf. Additionally, the role of the upgrade manager, as defined by the assignment form and other program documentation, must be completed by a single person.

3.5. Role of the lineworker/supervising electrician

Similarly, each public lighting upgrade must have a single lineworker/electrician who is nominated as the supervisor. This person must provide relevant details, including their licence or registration number (or equivalent) and sign the VEEC assignment form for the upgrade.

3.6. Role of the lighting designer

A qualified lighting designer, approved by the owner of the public open space which is being upgraded, must declare that the lighting design and installation of the lighting upgrade either meets or deviates from the relevant part or parts of AS/NZS 1158.

This declaration is provided by the lighting designer signing the applicable AS/NZS 1158 compliance declaration described in Sections 5.8 and 5.9.

3.7. Required lighting designer qualifications

A qualified lighting designer (also referred to as design consultant) is any individual approved by the distribution network service provider, responsible road authority or council to be responsible for preparing and/or signing off on the lighting design and the AS/NZS 1158 compliance declaration.

4. Activity requirements

You should be aware of, and adhere to, requirements that apply to public lighting upgrades to ensure that you comply with the legislation.

4.1. Upgrade site

The 'site' or 'address' of the lighting upgrade may refer to:

- a street address
- a unique identifier such as GIS coordinates.

It is important that the site boundary of the lighting upgrade is clearly specified. For example, you should distinguish between a single luminaire upgrade at a specified address, and the replacement of multiple luminaries in a street or suburb.

4.2. Assignment of rights to create VEECs

A consumer may assign their right to create VEECs to an AP. A VEEC assignment form must be completed by both the consumer and the upgrade manager for you to create VEECs and demonstrate compliance with the legislation.

Download the VEEC assignment form template for this activity at www.esc.vic.gov.au/public-lighting.

You must give the consumer a copy of the VEEC assignment form (or a document containing the same information) at the time of signing (for written assignment) or within 10 business days (for electronic assignment). You must also ensure that all personal information collected in the VEEC assignment form is held in accordance with the Information Privacy Principles (IPPs) under the Privacy and Data Protection Act 2014 (Vic).

Details of how to comply can be found at www.privacy.vic.gov.au.

4.3. Decommissioning and recycling requirements

If your public lighting activity involves decommissioning lighting equipment, you must dispose of that equipment prior to VEEC creation in a waste disposal facility of a class determined by us. Table 6 sets out the class of waste disposal facilities we have determined as suitable for lighting equipment decommissioned under the program.

Table 6: Recycling requirements for lighting equipment

Type of lighting equipment	Eligible disposal facilities
Mercury-containing equipment: Lamps that use mercury for their operation and any other lighting equipment potentially contaminated with mercury as a result of in-house recycling or disassembling attempts	A licensed recycling facility ¹ : A facility licensed by the EPA to accept D121 waste for the purpose of recycling at that facility (i.e. has a license with treatment code R4 for D121 waste)

This requirement does not preclude you from transporting your equipment to a licensed temporary holding facility² that will forward your equipment to a licensed recycling facility for recycling. As evidence of proper disposal and decommissioning, you must obtain and maintain a recycling invoice from the licensed recycling facility for the decommissioned lighting equipment prior to VEEC creation.

A list of facilities and their EPA license conditions is available from <https://portal.epa.vic.gov.au>

Details of your decommissioning practices must be supplied to us for review before you are accredited to undertake this activity.

4.4. Compliance with AS/NZS 1158

Lighting upgrades for roads (other than the replacement or installation of traffic signals) and public or outdoor spaces (other than a sports field) must either:

- meet the installation and performance requirements of the relevant part or parts of AS/NZS 1158
- deviate from the installation and performance requirements of the relevant part or parts of AS/NZS 1158 (see Section 4.5).

The AS/NZS 1158 series covers lighting schemes for roads and outdoor spaces. The standard provides for lighting to be designed with three aims:

- The safe movement of people (this is the primary aim)
- The discouragement of illegal acts
- Contribution to the amenity of an area through increased aesthetic appeal.

AS/NZS 1158 is divided into two main categories:

¹ Facilities licensed to recycle mercury-containing waste by the relevant environmental protection regulator in other jurisdictions, are also considered a licensed recycling facility for the purposes of this determination.

² A facility licensed by the EPA to accept D12 waste for storage pending recycling or accumulation of material intended for recycling (i.e. has a license with treatment codes D15 and/or R13 for D121 waste).

- Category V – lighting designed for roads where the needs of motorists are the most important factor.
- Category P and PX – lighting designed for roads and outdoor spaces where the needs of pedestrians are the most important factor³.

The standard sets out the installation and performance and design requirements of the public lighting upgrade dependant on the needs of the installation. For public lighting upgrades, performance and design requirements may differ in accordance with the requirements of the asset owner. The identification of the performance and design needs of the public lighting upgrade activity, including the lighting design requirements to determine the light output should be completed via consultations with the client (i.e. the energy consumer or asset owner).

Refer to Appendix A: List of relevant standards in the AS/NZS 1158 series for list of the relevant parts of the AS/NZS 1158 standard. APs engaged in public lighting upgrade activities should have a copy of these standards.

Depending on the installation environment, you may be required to have the documentation described in the appendices in the relevant part of AS/NZS 1158. These outline the documentation required for demonstrating compliance. Additionally, please see Section 5.8 for our evidentiary requirements.

4.5. Deviation from AS/NZS 1158

If the light output of the lighting upgrade specified in the lighting design deviates from the requirements of the relevant part or parts of AS/NZS 1158, you must engage a lighting designer to:

- identify the deviations to the relevant part or parts of AS/NZS 1158
- outline why the deviations are justified
- declare and sign-off that the deviations are acceptable.

The energy consumer must also sign-off on the deviations to demonstrate acceptance of the lighting design. Please refer to Section 5.9 for detailed information about the required documentation if the public lighting upgrade deviates from AS/NZS 1158.

³ This includes requirements for installations for the environment: carpark – general (open air)

5. Record keeping and evidence requirements

You must collect evidence to verify that each upgrade has been undertaken in accordance with the VEET Regulations and VEU specifications. You are also required to maintain documentation for each upgrade and provide it to us upon request.

A summary of the evidence requirements is provided in Appendix B.

5.1. Record keeping obligations

You must keep appropriate records, which we may request, to verify all details of the lighting upgrade which relate to the calculation of greenhouse gas abatement and the creation of VEECs. Your records must be an auditable record of the work undertaken in each area of the site. If your documentation fails to provide an auditable record of the work undertaken, you may be required to surrender VEECs equivalent to those which cannot be verified.

5.2. Geo-tagged photograph obligations

You must take geo-tagged photographs to verify lighting upgrades that:

- are clear and in focus
- include any relevant markings
- include a date stamp showing the date the photographs were taken
- include the GPS derived latitude and longitude coordinates. This should be stored in the metadata and generated automatically by the device used to take the geo-tagged photographs.

5.3. Evidence of assignment of rights to create VEECs

You must ensure that the assignment form captures all the relevant installation information.

Table 7: Evidence of assignment of rights to create VEECs

Documentation	Description
VEEC assignment form	All fields in the VEEC assignment form must be completed and correctly filled in.

5.4. Evidence of commercial transaction and energy consumer

You must have proof of the commercial transaction relating to the installation, including evidence of the energy consumer⁴.

Table 8: Evidence of commercial transaction and energy consumer

Documentation	Description
Contract between the energy consumer (e.g. the council) and the asset owner/relevant body (e.g. the distribution company)	The contract must include: <ul style="list-style-type: none">• the name, address and ABN of the energy consumer• ownership of the luminaire• that the upgrade has been requested and approved in writing by the asset owner (only applicable where the energy consumer is not the owner of the luminaire).

5.5. Evidence of lighting upgrade – baseline and upgrade

You must provide evidence of all baseline and upgrade lighting equipment.

Table 9: Evidence of baseline and upgrade lighting equipment

Documentation	Description
Lighting inventory (such as a public lighting inventory)	A lighting inventory showing the location and specifications of the existing and installed lighting equipment.

5.6. Evidence of electrical compliance

You must ensure that all work undertaken complies with relevant standards. Upgrades performed by lineworkers approved by the asset owner are not required to complete a Certificate of Electrical Safety (COES)

Table 10: Evidence of electrical compliance

Documentation	Description
Certificate of Electrical Safety (COES) ⁵	A COES must be provided if one is required by law. The certificate must detail:

⁴ In accordance with Section 16(2A) of the VEET Act, the energy consumer is the person responsible for the payment of electricity for the upgraded lighting asset. In instances, where there are multiple energy consumers, a lead energy consumer must be identified. A lead energy consumer is the nominated energy consumer for the purposes of assigning rights for the VEECs created by a public lighting upgrade activity, where multiple bodies or persons are responsible for the payment of electricity for the lighting asset to be upgraded. The onus is on the AP to provide evidence of the energy consumer.

- the location of the lighting upgrade
- the type and number of baseline lighting equipment
- the type and number of upgrade lighting equipment.

5.7. Evidence of decommissioning and recycling of lighting equipment

All existing lighting equipment must be decommissioned and recycled in accordance with the VEET Regulations.

Table 11: Evidence of decommissioning and recycling

Documentation	Description
Evidence of decommissioning and recycling	<p>The following document must be provided prior to VEEC creation:</p> <ul style="list-style-type: none"> • A third-party recycling invoice clearly showing an itemised breakdown of the disposed lighting equipment (showing the lamp type, type of control gear and type of fitting/luminaire).

5.8. Evidence of AS/NZS 1158 compliance

If the lighting upgrade is of a kind for which AS/NZS 1158 is designed, you must demonstrate that the lighting design complies with the relevant part or parts of that standard, and also demonstrate that the energy consumer has accepted the lighting design prepared by the lighting designer.

Table 12: Evidence of AS/NZS 1158 compliance

Documentation	Description
Lighting design	<p>A lighting design prepared by the lighting designer that:</p> <ul style="list-style-type: none"> • sets out the location and specifications of all existing lighting equipment in the area to which the lighting design applies • sets out the location and specification of all lighting equipment to be installed in the area to which the lighting design applies • includes information demonstrating that all the required values of the

⁵ An appendix may be provided with a COES where there is insufficient space in the 'description of work undertaken' box to provide an accurate description of all the electrical installation work performed. Where an appendix is used with a COES, the following criteria must be fulfilled: (i) each page of the attachment must detail the COES number (ii) the number of pages contained within the attachment must be detailed on the COES and (iii) the COES and each page of the attachment must be signed by the electrician responsible for the lighting upgrade

	light technical parameters for all subcategories within the upgrade have been met.
AS/NZS 1158 compliance declaration	<p>A declaration by the lighting designer declaring that the lighting output of the lighting upgrade specified in the lighting design complies with the relevant part or parts of AS/NZS 1158.</p> <p>The energy consumer must also sign the compliance declaration to accept the lighting design prepared by the lighting designer.</p>

5.9. Evidence of AS/NZS 1158 deviation

If the lighting upgrade deviates from the relevant part or parts of AS/NZS 1158, you must justify the deviations and set out the reasons why they are justified. The energy consumer must demonstrate acceptance of the lighting design prepared by the lighting designer.

Table 13: Evidence of AS/NZS 1158 compliance exemption if upgrade deviates from standard

Documentation	Description
Lighting design	<p>A lighting design prepared by the lighting designer that:</p> <ul style="list-style-type: none"> sets out the location and specifications of all existing lighting equipment in the area to which the lighting design applies sets out the location and specification of all lighting equipment to be installed in the area to which the lighting design applies meets all other requirements of the asset owner and energy consumer includes information demonstrating that the light output of the upgrade lamp or luminaire to be either equivalent or superior to the replaced lamp or luminaire includes information detailing the light technical parameters (LTP) for the lighting upgrade (where applicable).
AS/NZS 1158 compliance declaration (complete Part D2: AS/NZS 1158 deviation declaration)	<p>A declaration by the lighting designer that:</p> <ul style="list-style-type: none"> the lighting design deviates from AS/NZS 1158 the deviations are justified in accordance with the standard sets out the way in which the deviations are justified. <p>The energy consumer must also sign the compliance declaration to accept the lighting design prepared by the lighting designer.</p>

6. Public lighting upgrade process

This section provides you with an end-to-end process for undertaking a public lighting upgrade under the program.

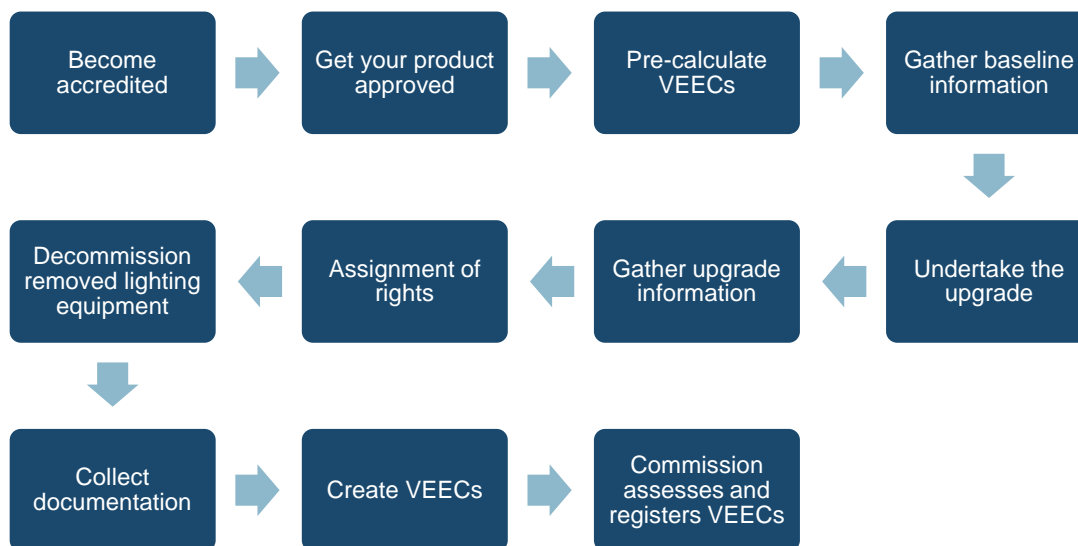


Figure 2: Process for undertaking public lighting upgrade

6.1. Become accredited

You must be accredited, to create VEECs. Visit www.esc.vic.gov.au/become-veu-accredited for information on how to become accredited.

6.2. Get your product approved

To create VEECs for any lighting upgrade, the product installed must be listed as an approved product on our Register of Products.

Learn more about getting your lighting products approved in our Lighting Product Application Guide at www.esc.vic.gov.au/veu-product-applicants.

6.3. Pre-calculate VEECs

To quote for a job or develop a business case, you may need to estimate the number of VEECs an upgrade will generate. You can use the calculator at www.veu-registry.vic.gov.au/calculators for calculating single baseline and upgrade scenario.

You will need to enter information relating to both the baseline and the upgrade zones. The type of upgrade you are undertaking (based on asset lifetime reference) determines the data you will need

to enter – there will be some fields which must be left blank. To assist you in using the calculator, Figure 3 details the data you'll need to enter into our calculator based on the upgrade type.

	Baseline		
Asset lifetime reference:	Luminaire replacement	Lighting control device	Luminaire decommissioning
Baseline: Area type			
Baseline: Asset lifetime reference			
Baseline: Lamp ballast combination			
Baseline: Quantity			
Baseline: Nominal lamp power			
Baseline: Type of first LCD			
Baseline: Type of second LCD			
	Upgrade		
Asset lifetime reference:	Luminaire replacement	Lighting control device	
Upgrade: Lamp ballast combination			
Upgrade: Quantity			
Upgrade: Asset lifetime reference			
Upgrade: Nominal lamp power			
Upgrade: Lamp circuit power			
Upgrade: Type of first LCD			
Upgrade: Type of second LCD			
Postcode			
Key		Do <u>not</u> enter data into this cell	
		You <u>must</u> enter data in this cell	
(RM ref: C/18/24126)		Inputs optional	

Figure 3: VEEC calculator - variable data requirements

6.4. Gather baseline information

Verify the baseline environment by collecting any necessary baseline data you need for VEEC creation prior to performing the upgrade. Evidence requirements are outlined in Section 5.

6.5. Undertake the upgrade and gather information

Ensure you comply with other relevant legislation, such as OHS, while performing the upgrade, and that you collect all evidence requirements. Evidence requirements are outlined in Section 5.

6.6. Assignment of rights

An important part of the VEEC creation process is the valid assignment of the right to create VEECs from the consumer to you. You must ensure the signatory has the legal authority to sign on behalf of the consumer entity.

6.7. Decommission and recycle removed lighting equipment

Lighting equipment that is replaced or removed must be decommissioned and disposed of in accordance with the VEET Regulations (see Section 4.3). See Section 5.7 for record keeping requirements.

6.8. Collect documentation and create VEECs online

Prior to creating certificates for this activity, ensure you have collected the required documents for the upgrade as specified in Section 5. You may be asked to submit some or all of these documents as part of our assessment process.

To create VEECs for this activity, you can upload the activity using either a bulk upload form or the online user interface on the VEU Registry. Different upgrade types have different data input requirements. The user interface has been designed to accommodate all upgrade types, so it is important you input the correct data in the relevant field – you must also leave some fields blank.

Figure 4 shows the user interface for this activity through a series of screenshots. Figure 5 outlines the data inputs required for the upgrade. The LCD fields should only be completed if a lighting control device was present in the baseline environment, or installed as part of an upgrade.

Tabs system

The user interface is divided into two tabs. The 'Detail' tab collects high level information about the upgrade, and the 'Calculations' tab collects the data required to perform the abatement calculations. Navigate between them using the tab names as marked below.

Detail tab

The 'Detail' tab in the Activity 27 user interface is used for entering comprehensive information about a lighting upgrade project. It includes fields for:

- Activity Date: 13-Jul-2016
- Sector: Business
- Activity: 14.20 - Lighting Upgrade - Business
- Own Reference
- Brief Description of the Upgrade
- Upgrade Commencement Date *
- Activity Date *
- Building approval reference number *
- Building approval certifying authority *
- Business/Company Name *
- ABN / ACN
- Industry/Business Type *
- Number of Levels *
- Floor Space (m2) *
- Floor Space Upgraded Area (m2)
- Unit Type
- Unit Number
- Level Type
- Level Number
- Street Number *
- Street Name *
- Street Type *
- Street Type Suffix
- Town / Suburb *
- State *
- Postcode *
- Authorised Signatory First Name *
- Authorised Signatory Last Name *
- Authorised Signatory Phone Number *
- Contractual Arrangements (who undertook work) *
- Contractual details (if other)
 - 1500 - lighting design method *
 - 1500 - Qualifications of lighting designer
 - 1500 - Designer qualification details
 - 1500 - Light level verification *
 - 1500 - Qualifications of light level verifier
 - 1500 - Verifier qualification details
- Certificate of Electrical Compliance Number
- Electrician Licence Number *
- Upgrade Manager Company Name *
- Upgrade Manager First Name *
- Upgrade Manager Last Name *
- Upgrade Manager Phone Number *
- Unrecognised Address Justification
- Internal Duplicate Justification
- External Duplicate Justification

Figure 4: Activity 27 user interface

Calculations tab

The calculations tab contains a grid designed to accommodate the data requirements of a range of upgrade scenarios.

A: Area Name	B: Space Type	C: Space Type (Unlisted)	D: BCA Classification	E: Baseline/Upgrade	F: Area of Calc. Zone	G: Lamp Ballast Combination	H: Lamp Category	I: Quantity	J: BASELINE Asset Lifetime Reference	K: UPGRADE Asset Lifetime Reference	L: Product Brand	M: Product Model	N: Rated Lifetime Hours	O: Nominal Lamp Power	P: Type of First Controller	Q: Type of Second Controller	R: VRU Product Brand	S: VRU Product Model	T: HVAC A/C?	
Calc Zone 01																				
Calc Zone 02																				
Calc Zone 03																				
Calc Zone 04																				
Calc Zone 05																				

Maximum of 50 calculation zones

The user interface and upload form can accommodate up to 50 calculation zones. If you require additional calculation zones please contact us.

Scenarios		Area type	Baseline/ Upgrade	Lamp ballast combination	Quantity	Asset lifetime reference	Product brand	Product model	Integrated LCD activated	Nominal lamp power	First LCD type	Second LCD type
1	Luminaire replacement	█	Baseline	█	█	█	□	□	□	█	█	█
2	Lighting control device	█	Baseline	█	█	█	□	□	□	█	█	█
3	Luminaire decommissioning	█	Baseline	█	█	█	□	□	□	█	█	█
4	Luminaire replacement	█	Upgrade	█	█	█	█	█	█	□	█	█
5	Lighting control device	█	Upgrade	█	█	█	□	□	□	█	█	█
6	Other	█	Upgrade	█	█	█	█	█	█	█	█	█

Key □ Do not enter data into this cell █ You must enter data in this cell █ Inputs optional (RM ref: C/18/24126)

Figure 5: VEEC creation - variable data requirements

6.9. Commission assesses VEEC creation claims

Before you create VEECs for a public lighting upgrade, the creation data you submit must first pass preliminary validation checks.

After you press the 'create' button for your validated activities, the VEECs associated with your upgrade are created and assigned a unique identifier. We then assess your created VEECs and decide whether to register them.

If you are new to the public lighting activity, your VEEC creation claims will begin as a 'stage 1' stream. In this stage, we will request you submit the documentation associated with your first few upgrades. Once we are satisfied with the quality and reliability of your activity documentation, we will move your creation claims to a 'stage 2' stream and you will no longer have to submit documentation for each upgrade in order to have your VEECs assessed and registered.

For creation claims in the stage 2 stream, instead of performing desk audits on every upgrade, we use a risk analytics tool to monitor and highlight risk factors in your creation data. We update our risk analytics tool based on trends in the scheme, information about you and your installers, data on specific types of product, and other factors. All stage 2 stream VEEC creations are subject to this process, allowing us to focus our assessment on higher risk creations.

We may still request you submit documentation for a particular upgrade. Regardless, you must always retain complete and accurate documentation for each upgrade you have undertaken.

6.10. Commission registers VEECs

Once your VEEC creation claims have been validated, we will provide you with an invoice for the VEEC registration fee of \$1 per VEEC. Once payment is received, we will register your VEECs and notify you that the VEECs are available to be traded and/or surrendered to us.

7. Glossary

Terms	Definition
Control gear	Control gear means a device for the control of one or more light sources but does not include a lighting control device. Examples: Ballasts, transformers, capacitors and step-down converters such as drivers.
Decommission	Decommission means disable and render permanently unusable.
Electronic ballast	Electronic ballast means a mains-supplied AC to DC inverter for starting and operating one or more light sources generally at a high frequency.
Energy consumer	Energy consumer, in relation to a prescribed activity, means the person who is the consumer of electricity or gas in respect of whom a prescribed activity is undertaken within the meaning of Section 16 of Victorian Energy Efficiency Target Act 2007.
Lamp circuit power (LCP)	Lamp circuit power, in relation to a non-integrated luminaire, means: <ul style="list-style-type: none"> • the power drawn by the lamp, and • the power losses of any associated control gear, which are divided equally between the lamp and any other lamps associated with the control gear.
Light output	Light output means the luminous flux emitted by a lamp or luminaire (measured in lumens).
Lighting control device (LCD)	Lighting control device means a device that is used to control the light output of a luminaire. Examples: occupancy sensors, daylight-linked controls, programmable dimmers, manual dimmers and voltage reduction units.
Lighting equipment	Lighting equipment includes: <ul style="list-style-type: none"> • lamps • luminaires • lighting control devices • control gear.
Luminaire	Luminaire means a non-integrated luminaire or a LED integrated luminaire.
Nominal lamp power (NLP)	Nominal lamp power (NLP) means the manufacturer's rated value for power drawn by a light source (in Watts).
Occupancy sensor	Occupancy sensor means a lighting control device that uses a motion sensor to detect the presence of people in a space and adjusts the output of a luminaire in that space accordingly.
Programmable dimmer	Programmable dimmer means a lighting control device that can automatically select a luminaire's light output according to the time of day.
VEEC	VEEC means a Victorian Energy Efficiency VEEC created under Section 17 of the Victorian Energy Efficiency Target Act 2007.

Appendix A: List of relevant standards in the AS/NZS 1158 series

Relevant part of AS/NZS 1158 standard	Title
AS/NZS 1158: Lighting for roads and public spaces series comprising -	
AS/NZS 1158.0:2005	Lighting for roads and public spaces—Part 0: Introduction
AS/NZS 1158.1.1:2005	Lighting for roads and public spaces—Vehicular traffic (Category V) lighting—Part 1.1: Performance and design requirement
AS/NZS 1158.1.2:2010	Lighting for roads and public spaces—Vehicular traffic (category V) lighting—Part 1.2: Guide to design, installation, operation and maintenance
AS/NZS 1158.2:2005	Lighting for roads and public spaces— Part 2: Computer procedures for the calculation of light technical parameters for Category V and Category P lighting
AS/NZS 1158.3.1:2005	Lighting for roads and public spaces— Pedestrian area (Category P) lighting— Part 3.1: Performance and design requirements
AS/NZS 1158.4:2015	Lighting for roads and public spaces—Part 4: Lighting of pedestrian crossings
AS/NZS 1158.5:2014	Lighting for roads and public spaces—Part 5: Tunnels and underpasses
SA/SNZTS 1158:6:2015	Lighting for roads and public spaces—Part 6: Luminaires— Performance

Appendix B: Evidence checklist

Evidence type	Document	Description
Assignment of right to create VEECS	VEEC Assignment form	A completed and signed VEEC assignment form.
Energy consumer	Contract	A contract between the energy consumer (e.g. the council) and the asset owner/relevant body (e.g. the distribution company).
Lighting upgrade – baseline and upgrade	Lighting inventory (such as a public lighting inventory)	A lighting inventory showing the location and specifications of the existing (baseline) and installed (upgrade lighting equipment).
Electrical compliance	Certificate of Electrical Safety (COES)	A completed and signed COES if one is required by law.
Recycling of lighting equipment	Third-party recycling invoices	<ul style="list-style-type: none"> • A third-party recycling invoice specific to the upgrade activity, or • A third-party bulk recycling invoice accompanied by a reconciliation list.
Evidence of AS/NZS 1158 compliance	Lighting design	A lighting design.
	Compliance declaration	AS/NZS 1158 compliance declaration.
Evidence of AS/NZS 1158 deviation	Lighting design	A lighting design.
	Compliance declaration	AS/NZS 1158 compliance declaration (complete Part D2: AS/NZS 1158 deviation declaration).

Appendix C: VEEC calculation for public lighting upgrades

VEECs are calculated using the following equation:

$$GHG\ eq.\ reduction = (Baseline - Upgrade) \times Lifetime \times Regional\ factor$$

- GHG eq.: Greenhouse gas equivalent
- Regional factors that apply are 0.98 for upgrades undertaken in metropolitan Victoria and 1.04 for upgrades undertaken in regional Victoria.

Lifetime is calculated as follows:

$$Lifetime = Asset\ lifetime \times Annual\ operating\ hours \times 10^{-6}$$

- Asset lifetime: See Table 2 for reference values
- Annual operating hours: Defined based on space in which upgrade occurs. See Table 3 for reference values.

The baseline and upgrade calculation are detailed below.

Baseline calculation ('before')

The following equation is used to calculate the baseline energy consumption for all sites:

$$Baseline = \sum_{each\ incumbent\ light\ source} LCP \times CM \times GHG\ coefficient$$

- LCP: The lamp circuit power, usually taken from Table 14. If the type of lamp being replaced is not listed in Table 14, then refer to Table 15. If the type of lamp is not listed in Table 14 or Table 15, you must apply to us to have a value approved (see Section 2.2.1)
- CM: The control device multiplier, as outlined in Table 4
- GHG coefficient: The Greenhouse gas coefficient, which is 1.095

Upgrade calculation ('after')

The following equation is used to determine the upgrade energy consumption for all sites:

$$Upgrade = \sum_{each\ incumbent\ light\ source} LCP \times CM \times GHG\ coefficient$$

- LCP: The lamp circuit power, usually taken from Table 14. If the type of lamp being installed is not listed in Table 14, then refer to Table 15. If the type of lamp is not listed in Table 14 or Table 15, you must apply to us to have a value approved (see Section 2.2.1)
- CM: The control device multiplier, as outlined in Table 4
- GHG coefficient: The Greenhouse gas coefficient, which is 1.095.

Table 14: Upgrade calculation variables for public lighting upgrades with lamp being replaced listed in AEMO Load tables

Input type	Condition	Input value
LCP	If the Victorian load is listed*	The Victorian load (W)*
	If the Victorian load is not listed*	The nominal device rating (W)**

** Regulation 15(3) of the VEET Regulations incorporates the latest version of the AEMO Load Table, on which these inputs will be listed.

Table 15: Lamp circuit power (LCP) calculations for baseline and upgrade calculations for public lighting upgrades in absence of AEMO Load Table figures

Type of incumbent or upgrade light source	LCP for incumbent light source	LCP for upgrade light source
T8 or T12 linear fluorescent or circular fluorescent lamp with ballast (EEI of A or electronic with no EEI marked)	NLP	NLP
T8 or T12 linear fluorescent or circular fluorescent lamp with ballast (EEI of \geq B or magnetic with no EEI marked)	NLP + 6	NLP + 6
T5 linear fluorescent lamp with T5 adaptor and magnetic ballast***	$NLP \times 0.94 + 1.78$	N/A
T5 linear fluorescent or circular fluorescent lamp with ballast	$NLP \times 1.08 + 1.5$	$NLP \times 1.08 + 1.5$
Compact fluorescent lamp with non-integral ballast (EEI of A or electronic with no EEI marked)	NLP + 1	NLP + 1
Compact fluorescent lamp with non-integral ballast (EEI \geq B or magnetic ballast with no EEI marked)	NLP + 5	NLP + 5
Compact fluorescent lamp with integral ballast	NLP	NLP
Tungsten incandescent or halogen lamp (mains voltage)	$NLP \times 0.7$	NLP
Tungsten incandescent or halogen lamp with ELC	NLP (being no greater than 37 watts) $\times 1.163$	$NLP \times 1.163$
Metal halide lamp with magnetic ballast	$NLP \times 1.058 + 18$	$NLP \times 1.058 + 18$

Type of incumbent or upgrade light source	LCP for incumbent light source	LCP for upgrade light source
Metal halide lamp with electronic ballast	$NLP \times 1.096 + 0.9$	$NLP \times 1.096 + 0.9$
Mercury vapour lamp with ballast	$NLP \times 1.033 + 11$	$NLP \times 1.033 + 11$
High pressure sodium lamp with magnetic ballast	$NLP \times 1.051 + 13$	$NLP \times 1.051 + 13$
LED lamp with integrated driver with no associated legacy ballast connected	NLP	NLP
Non-integrated LED lamp with remote driver or ELC	$NLP \times 1.1$	$NLP \times 1.1$
LED lamp with integrated driver, connected with a non-integral legacy ballast used for a T8 or T12 linear or circular fluorescent lamp, marked with EEI of A or electronic ballast with no EEI marked	NLP	NLP
LED lamp with integrated driver, connected with a non-integral legacy ballast used for a T8 or T12 linear or circular fluorescent lamp, marked with EEI of $\geq B$ or magnetic ballast with no EEI marked	$NLP + 6$	$NLP + 6$
LED lamp with integrated driver, connected with a legacy ballast used for a T5 linear or circular fluorescent lamp	$NLP \times 1.08 + 1.5$	$NLP \times 1.08 + 1.5$
LED lamp with integrated driver, connected with a legacy ballast used for a CFL, marked with EEI of A or electronic ballast with no EEI marked	$NLP + 1$	$NLP + 1$
LED lamp with integrated driver, connected with a legacy ballast used for a CFL, marked with an EEI of $\geq B$ or a magnetic ballast with no EEI marked	$NLP + 5$	$NLP + 5$
LED integrated luminaire	NLP	NLP
Non-integrated LED luminaire with remote driver	$NLP \times 1.1$	$NLP \times 1.1$
LED lamp with integrated driver, connected with a legacy magnetic ballast used for HID lamps	$1.033 \times NLP + 11$	$1.033 \times NLP + 11$
LED lamp with integrated driver, connected with a legacy electronic ballast used for HID lamps	$1.096 \times NLP + 0.9$	$1.096 \times NLP + 0.9$
Induction lamp with integrated ballast	NLP	NLP
Induction lamp with non-integrated ballast	$NLP \times 1.056$	$NLP \times 1.056$
Self-ballasted Mercury Vapour lamp	NLP	NLP

Type of incumbent or upgrade light source	LCP for incumbent light source	LCP for upgrade light source
Other	As determined by us	As determined by us

*** T5 adaptors as a light source are not an eligible type of upgrade lighting equipment for this activity.

Document version control

Version	Amendments made	Date published
1.0	First release	10 December 2018