31 January 2023

Attachment 9.1: Public lighting services

Ausgrid's 2024-29 Regulatory Proposal

Empowering communities for a resilient, affordable and net-zero future.

Ausgrid

Contents

1. Introduction

Ausgrid is one of the largest providers of public lighting services in Australia. We own, operate and maintain more than 260,000 public lights across our network area, which spans 22,275 square kilometres and encompasses 33 local council areas. Local councils are our key customers, representing over 99% of public lights on our network.

Public lighting is an essential service that promotes safety of communities and roadway users. We aim to deliver an effective and efficient service meeting today's needs and enabling future needs.

1.1 Overview

Ausgrid's public lighting services encompass the provision, construction and maintenance of public lighting assets within its network area. Whilst public lighting services are separately identified and regulated, they are delivered by Ausgrid's network business, which enables economies to be made in forecasting, planning and operations.

This attachment describes:

- The regulatory framework in which public lighting operates;
- The methods by which Ausgrid delivers public lighting services;
- How Ausgrid makes investment decisions on new and replacement public lighting assets;
- The maintenance regimes in place for all public lighting assets;
- The various components of operational and capital expenditure;
- How the forecast costs of these activities meet the prudency and efficiency requirements set out in the National Electricity Rules (**NER**); and
- How the proposed prices for public lighting services are built up from these costs.

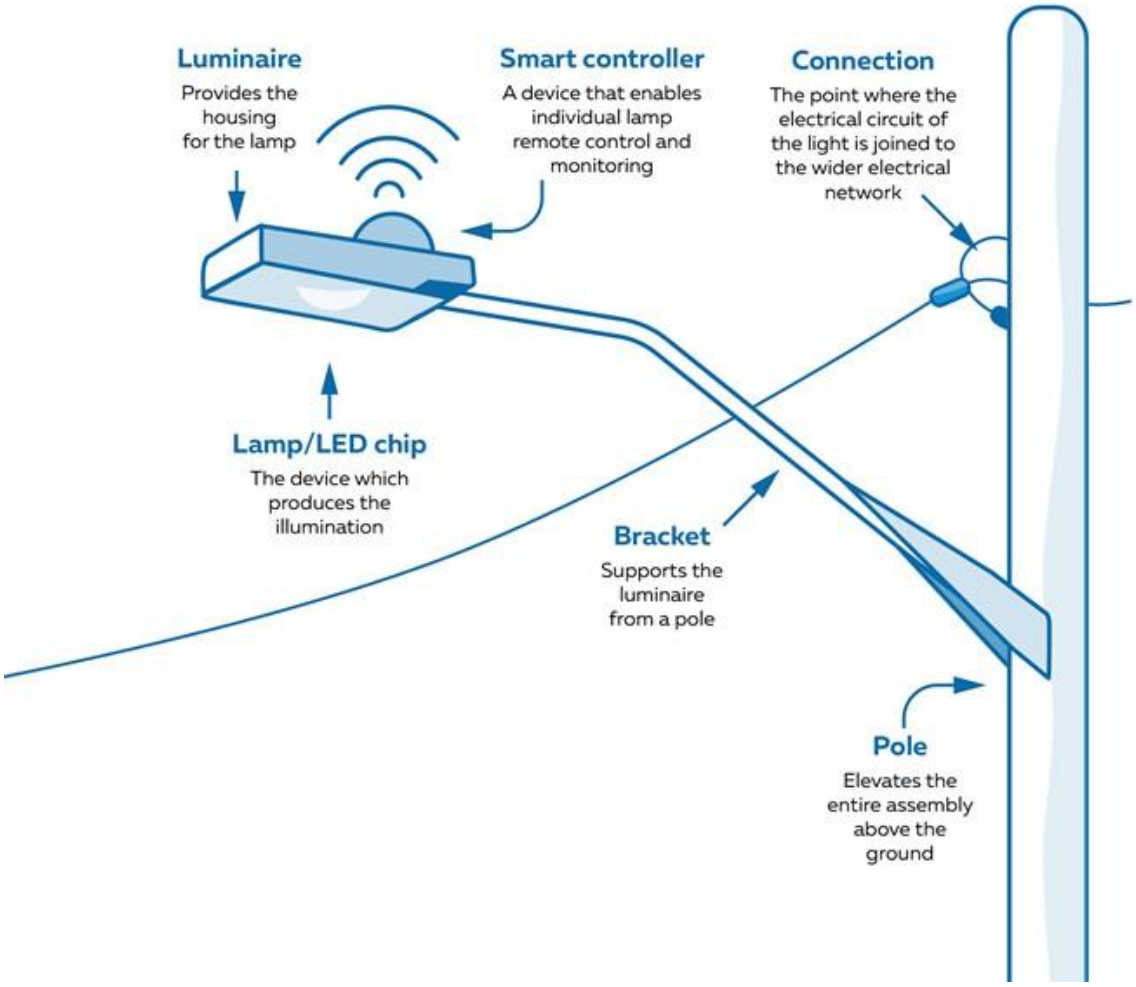
1.2 What do our public lighting services involve?

We provide, construct and maintain public lighting infrastructure to meet the standards set by NSW Public Lighting Code[1] (**the Code**) and the needs of our public lighting customers.

We provide these services to many customers including councils, community groups and government associations. There are more than 260,000 public lights in Ausgrid's network area, which are typically installed on major and residential roadways. **Figure 1.1** shows a typical public lighting asset.

[1] NSW Department of Industry, Resources & Energy, NSW Public Lighting Code, 1 July 2019.

Figure 1.1 Public lighting components



1.3 Objectives

Ausgrid's public lighting proposal is based on achieving a set of objectives which helps to ensure the prices proposed are reasonable for the level of service we offer in response to customer needs. These objectives have been developed to provide an efficient and effective service to our customers while complying with the NSW Public Lighting Code[2] (the Code).

There are three key objectives underlying our public lighting proposal, set out below.

1. Optimise total life cycle cost for Ausgrid and our customers

Ensuring that Ausgrid operates prudently and efficiently is fundamental to providing the required service at the lowest cost. This includes:

- Improving labour productivity;
- Reducing overheads through continuously improving efficiency;
- Rationalising Ausgrid's lighting portfolio; and
- Offering cost-effective, energy efficient, lighting technologies.

[2] NSW Department of Industry, Resources & Energy, NSW Public Lighting Code, 1 July 2019.

2. Maintaining network performance as described in the Public Lighting Code

The Code describes minimum performance standards and practices for the provision of public lighting services. This document references the Australian Standard (AS1158 Lighting for roads and public spaces) for public lighting which details the illumination and other technical requirements for various roadway scenarios. Ausgrid will maintain compliance with the Code throughout the 2024-29 period.

3. Cost reflective prices

For the 2024-29 period, Ausgrid has reviewed the underlying components that are used to build-up maintenance and capital pricing to confirm they remain cost reflective. As an example, LED luminaire material prices reflect lower current market prices, as opposed to rolling forward the FY19 material price with CPI escalation.

At a high level, cost reflectivity will ensure Ausgrid can recover the cost incurred in providing the public lighting service. It also means customers have a sound basis for decisions about technology and whether to seek an alternative third party to provide public lighting services.

1.4 Transition to LED public lighting

As part of our vision for communities to have the power in a resilient, affordable, net zero future, we are committed to working with councils to facilitate the transition to LED luminaires for all public lighting in our area. LED luminaires are more energy-efficient than traditional luminaires, reducing the energy used to provide public lighting by an average of 60% across our portfolio of public lights. They also last longer and require less maintenance. As a result, they lower the overall cost of providing public lighting.

We are currently part way through the transition, so our public lighting infrastructure includes a combination of legacy[3] luminaires and new LED luminaires.

Since 2018, we have replaced approximately 150,000 legacy luminaires with LED luminaires in streetlights, mainly on minor roads (for example residential roads) across our network. This represents 80% of all streetlights on minor roads and 58% of all public lights.

In 2022-23, we started replacing legacy luminaires on major roads (high traffic roads), including introducing smart controls.[4] We plan to start replacing legacy decorative lights, often located in parks/residential subdivisions and floodlights, including pedestrian crossings, with LED luminaires in the coming years.

1.4.1 Potential financial impact as public lighting transitions to LED luminaires

As the transition from legacy luminaires to LED luminaires progresses, there will be changes to the cost of public lighting services. The size of the change for each council depends on:

- The mix of luminaires currently in their area;
- Changes to this mix over the 2024-29 period;
- The average age of existing luminaires; and
- Decisions the council has made in relation to up-front payments.

The indicative financial impacts for councils are outlined in **Figure 1.2**. When the impacts of reduced energy consumption and available incentive schemes are considered, we expect the transition to LED lighting will reduce the overall cost of public lighting for councils.

[3] Legacy luminaires are traditional lighting technologies including compact fluorescent, sodium and metal halide.
[4] Smart controls enable individual monitoring and control of a luminaire and allows functions such as on/off dimming, autonomous operation, smart scheduling and fault notification.

Figure 1.2 Potential financial impacts for councils of transition to LED luminaires[5]

Cost or revenue source	Impact on overall cost of public lighting	Reason
Residual capital charges	▲	The large volume of legacy luminaires being replaced before the end of their useful life will potentially increase councils' residual capital payments or keep them at a higher than normal level until the rollout of LED luminaires is completed.
Pre-2009 capital charges	▼	As pre-2009 legacy luminaires are replaced, councils' total pre-2009 capital charges will come down. These charges also decline each regulatory period, due to depreciation of the pre-2009 asset base.
Post-2009 capital charges	▲	As pre-2009 legacy luminaires are replaced with LED luminaires, councils' post-2009 capital charges will increase to start recovering capital costs of the new assets.
Maintenance costs	▼	LED luminaires are a more reliable than legacy luminaires, last longer, have a lower failure rate and require less maintenance. Councils' average maintenance charges will come down a result.
Electricity consumption	▼	LED luminaires are on average 60% more energy efficient than legacy luminaires, resulting in lower consumption and comparatively lower energy consumption costs.
Rebates and Energy Savings Scheme	▼	LED replacement qualifies councils for various incentive schemes such as Energy Savings Certificates (**ESC**) as part of the NSW Energy Savings Scheme

1.5 Customer engagement

To develop our 2024-29 proposal on public lighting services, we reviewed our current services and prices. As part of this process, we engaged with our public lighting customers to get their feedback on the services we offer and our pricing.

We have engaged with councils across our network area and the Southern Sydney Regional Organisation of Councils (**SSROC**) which represents 29 of the 33 councils in relation to the public lighting improvement program. We held 2 dedicated public lighting forums in December 2021 and May 2022 and also discussed the issues raised in these forums with our Reset Customer Panel (**RCP**) in May 2022. In November 2022 we shared a copy of the public lighting model with SSROC and held subsequent sessions to discuss the underlying calculations for 2024-29 public lighting prices. SSROC expressed its appreciation at being involved in the pre-lodgement process and provided in-principle support to our proposed changes.

In our engagement on public lighting services, we have heard that councils want a faster transition to LED luminaires. This includes the introduction of smart controllers – devices that can be fitted to individual LED luminaires – that would enable public lighting to be controlled and monitored remotely and providing other smart city solutions[6] and services. Councils also want the process of having public lighting minor capital works approved and delivered to be easier, faster and cheaper for them.

[5] Where the option is available, a council may decide to pay certain capital costs up-front and in doing so, minimise the increase in ongoing annual capital charges.
[6] Smart city solutions refer to sensors and other smart devices connected to the public lighting network and can be used by councils to monitor and perform other functions in public spaces.

In relation to public lighting pricing, they generally want greater transparency and simplicity. They support changes to simplify prices provided they do not significantly reduce cost-reflectivity and are clearly explained. **Figure 1.3** provides an overview of the feedback we have heard and how we are responding.

Figure 1.3 What we are hearing on our public lighting services, and what we are considering in response

	What we have heard …	We are proposing to …	For our customers, this would mean…
Pricing	**Our pricing, including any changes in pricing, should be transparent** **Price rationalisation is supported provided that bill impacts are negligible** **Moving to simpler (weighted average) pricing is supported, provided that the prices for the most commonly used products are cost-reflective**	• Rationalise existing public lighting charges where feasible • Continue our consultations with councils and their representatives (SSROC) on our proposed pricing approach	A simpler, more transparent list of public lighting prices so they can find pricing information relevant to them more quickly and easily Greater understanding of, and confidence, in the methodology used to calculate our prices
	Customers would like to have flexibility in paying their pre-2009 capital charges	• Provide an option for councils to accelerate payment of remaining pre-2009 capital values during the 2024-29 period so they are fully paid off by the end of 2028-29	Flexibility to manage public lighting expenditure to suit their funding profiles over time
Transition to LED and smart city solutions	**The transition to LED public lighting and introduction of smart controllers to facilitate smart city applications should be accelerated**	• Accelerate the rollout of LED replacements on major roads by 30 June 2026 • Install smart controllers as part of the rollout of LED streetlights on minor roads (when councils choose this option) • Start the rollout of LED decorative lighting and floodlights in 2024-29 period • Extend our smart control rollout to residential and decorative luminaires	More reliable, energy efficient and affordable public lighting Ability to build on installed sensors to enable broader smart city solutions (e.g. air quality monitoring, traffic counting)
	The AER's annual price setting process delays the adoption of new technologies and pricing	• Consult with councils when sourcing new lighting technologies/ products • Seek approval for a pricing approach which allows new public lighting technology to be adopted sooner, without needing to wait for annual price reviews	Ability to adopt new and more efficient technology sooner, resulting in more timely cost savings and lower carbon emissions
Minor public lighting projects	**For public lighting minor capital works (MCW) projects, the approval process should be simpler, the time required to install light poles should be shorter, and the pricing should be more transparent.**	• Review the end-to-end process for customer requests for public lighting MCW (up to 10 lights) to commence in FY23.	A cheaper, faster, and overall improved experience for customers requesting public lighting minor capital works

2. Regulatory requirements

Chapter 6 of the NER governs pricing for distribution services and the responsibilities of the AER and Ausgrid. These requirements are also applicable to public lighting services.

2.1 Classification of services

Public lighting is one of a number of services that have been classified by the AER as alternative control services under NER clause 6.2.2. Prices for public lighting services are separately determined from those for network services, which have been classified as standard control services.[7] Further, the AER has determined that the control mechanism that is to apply to Ausgrid's standard control services is a cap on the prices of individual services.[8]

Ausgrid's response to the AER's proposed Classification of Services is set out in **Attachment 10.2 – Submission to the AER's Framework and Approach preliminary position paper**. In summary, Ausgrid accepts the AER's proposed classification of public lighting services as alternative control services.

Ausgrid has proposed prices and pricing parameters that comply with the AER's proposed pricing control mechanism.

2.2 Regulatory modelling

Our 2019-24 determination used the following modelling approach for public lighting prices:

- Assets constructed prior to 1 July 2009, using an asset roll forward model;
- Prices for services provided after that date were derived using an annuity model; and
- Operation and maintenance costs.[9]

Ausgrid proposes to retain the form of modelling for this proposal. Model inputs will be updated to reflect changes that have taken place in the intervening period.

For the 2024-29 period, the AER has requested that the three NSW network businesses use a standardised model to calculate the installation costs included in their proposed post-2009 capital charges. We note that not all of the functionality of the model applies to how we price our public lighting services. Therefore, we only use it to the extent required to build-up capital and operating costs (**opex**) in a similar way to the 2019-24 determination.

This attachment complies with Ausgrid's obligations concerning the submission of a regulatory proposal in relation to alternative control services. These obligations are set out in NER clause 6.8.2(c), specifically: *a demonstration of the application of the control mechanism set out in the Framework and Approach paper accompanied by the necessary supporting information)*.

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7 AER, *Framework and approach: Ausgrid, Endeavour Energy and Essential Energy (New South Wales) for the Regulatory control period commencing 1 July 2024*, July 2022, pg. 6.

8 AER, *Framework and approach: Ausgrid, Endeavour Energy and Essential Energy (New South Wales) for the Regulatory control period commencing 1 July 2024*, July 2022, pg. 39.

9 AER, *Final decision - Ausgrid distribution determination 2019 to 2024 Attachment 15 Alternative control services*, April 2019.

3. Operating expenditure

We forecast $52.2 million in opex (real $, FY24) in the 2024-29 period. Forecast opex has been determined using a cost build up method of all scheduled and unscheduled maintenance[10] associated with the various lamp technologies.

3.1 Our public lighting opex forecast

The primary driver of our forecast opex relates to our continued rollout of LED luminaires. Their improved reliability compared to older lighting technologies means they require less scheduled and unscheduled maintenance, thus making them cheaper to operate. These savings will be passed on to our customers in the form of lower maintenance charges.

Ausgrid recovers its opex by charging customers for maintenance associated with the type of lamps installed. Pricing is based on a build-up of all expected scheduled and unscheduled maintenance activities and the cost of materials and labour associated with these tasks.

Figure 3.1 summarises our forecast opex for the 2024-29 period. This takes into consideration our proposed LED rollout programs that are forecast to take place throughout the period which have the effect of reducing overall expenditure. It also accounts for our updated cost allocation methodology (**CAM**) which allocates a lower proportion of indirect costs to public lighting. This reduces opex by $2.5 million per year.

Figure 3.1 Forecast public lighting opex 2024-29 (real $m, FY24)

	FY25	FY26	FY27	FY28	FY29	Total
Connections	3.8	3.8	3.8	3.8	3.8	19.0
Smart controller	0.2	0.3	0.4	0.4	0.4	1.7
Legacy luminaire	1.8	0.9	0.4	0.3	0.3	3.7
LED luminaire	5.1	5.4	5.7	5.7	5.8	27.8
Total maintenance	**10.9**	**10.4**	**10.3**	**10.3**	**10.3**	**52.2**

3.2 Maintenance forecast

We incur operating costs when maintaining our public lighting assets. Maintenance for public lighting assets includes both scheduled and unscheduled maintenance. In the sections below, we outline our approach to forecasting these costs.

3.2.1 General assumptions

Our financial modelling of both scheduled and unscheduled public lighting maintenance costs includes general assumptions about inflation, labour price escalation, and other maintenance cost inputs such as the use of elevated work platforms (**EWPs**). These assumptions are outlined in **Figure 3.2** below, with more detail provided in Appendix 1.

[10] Operating expenditure relates to costs incurred for scheduled (planned) and unscheduled maintenance of public lighting. The terms “opex” and “maintenance” are used interchangeably in the document.

Figure 3.2 General assumptions for scheduled and unscheduled maintenance

Assumption	Unit	Proposal
CPI in FY24	% p.a.	8%
CPI from FY25 to FY29	% p.a.	2.87%
Labour real price escalation	% p.a.	0%
Base labour rate	$/hour, FY24	$64.63
Labour rate – overtime (1.75 times base labour rate)	$/hour, FY24	$113.11
EWP rate	$/hour, FY24	$38.22
Proportion of work in overtime hours	% p.a.	7%
Proportion of work in standard hours	% p.a.	93%
Labour oncosts	% p.a.	52.23%
Corporate Overheads	% p.a.	4.0%
Overhead cost allocation (direct + indirect)	% p.a.	9.8%

3.2.2 Scheduled maintenance

Our scheduled maintenance makes up $11.5 million in FY24 prices (or 22%) of our total public lighting opex forecast in the 2024-29 period. Scheduled maintenance activities priced for 2024-29 include:

- Night patrols, which are expected to cease once smart controllers are fully functional; and
- Planned inspections performed in 6-year cycles. This includes:
    - Cleaning the visor;
    - Adjusting out of position brackets or luminaires;
    - Inspecting electrical wiring; and
    - Validating asset information.

The period of planned inspections is reviewed regularly to determine the most cost-efficient cycle. During the current regulatory control period, Ausgrid has increased the scheduled maintenance cycle to 48 months for lamps and 60 months for LED luminaires. This has been possible due to the introduction of LED streetlights and more reliable lamp technologies.

From the 2024-29 period Ausgrid will move to a 72-month inspection cycle for all luminaires, because we will no longer perform bulk replacement tasks regardless of technology used. The maintenance cycle period has been determined based on the high reliability of LED luminaires and relatively small penetration of non-LED luminaires in place at the beginning of 2024-29 period.

Planned inspections are determined so that service availability and lighting levels are maintained and where applicable comply with the levels specified in *AS1158 - Lighting for public roads and spaces* or as agreed by the relevant council or road operator. This minimises unscheduled maintenance costs associated with repairing failed lights and maintaining illumination levels.

Key assumptions underlying our scheduled maintenance opex are shown in **Figure 3.3**. Certain costs, such as traffic control and night patrol inspections, only apply to lights installed on major roads. Prices shown are prior to an overhead percentage being applied.

Figure 3.3 Scheduled maintenance assumptions – Luminaires & Smart controllers

	Cycle time (years)	Unit	Proposal $FY24
Servicing of Minor roads Luminaire – Scheduled	6	$/unit	$43.20
Servicing of Major roads /Floodlight Luminaire – Scheduled	6	$/unit	$50.76
Servicing of Decorative Luminaire – Scheduled	6	$/unit	$51.84
Servicing Smart controller	1 (annual)	$/unit	$5.00
Nighttime Traffic Route Luminaire (TRL) Patrol	1 (annual)	$/unit (major road only)	$1.84

The relationship between cycle times, unit rates and revenue requirements are detailed below:

Annual revenue requirement = unit rate multiplied by luminaire count divided by cycle time

3.2.3 Unscheduled maintenance

Unscheduled maintenance comprises tasks which are performed in response to a reported fault or maintenance issue outside of the scheduled maintenance.

The most common unscheduled maintenance tasks identified for the 2024-29 period are:

- Replacements of a failed component (luminaire, PE cell and smart controllers); and
- Cable failure (overhead or underground).

During each fault attendance, an inspection is performed to check if any additional work needs to be performed. The following items are checked during the inspection:

- Lenses – check if they are opaque or substantially discoloured, cracked, improperly secured, damaged or missing;
- LEDs – check that chips are functional;
- Luminaire – check for moisture within the luminaire, inspect for damaged or corroded supports, luminaires, brackets or connections;
- Improperly aligned luminaire or brackets;
- Any other circumstances or defects, which may affect the ongoing performance of the luminaire; and
- Damage to luminaire supply, including fuse.

As public lighting across the Ausgrid network transitions to LED luminaires, the resolution of faults from unscheduled maintenance will change. Faults relating to the luminaires will no longer result in repairs but instead replacement of the whole luminaire. Recovery of this cost is via capital charges, depending on whether it is an LED covered by the warranty period.

Unscheduled maintenance (spot maintenance) of lamps and other components will be required regardless of whether Ausgrid has a bulk maintenance regime is in place or not. Though an effective bulk replacement regime will reduce the number of failures which occur between replacement cycles, unscheduled maintenance is still required to fix failures that occur between bulk replacement periods. The most common unscheduled maintenance task is the replacement PE cell and cable failure.

We note that activities relating to ‘luminaire repair’ do not apply to LEDs. However, these activities are priced in the 2024-29 period for legacy lights.

Our financial modelling calculates the cost of labour, vehicles, equipment and materials that will be required to maintain all components as they fail. Component failure is based failure rates provided by component manufacturers and validated through Ausgrid’s fault data analysis.

The assumptions we have applied when forecasting our unscheduled maintenance costs are outlined in **Figure 3.4** below.

Figure 3.4 Unscheduled maintenance assumptions

	Unit	Proposal
Number of workers in standard crew	No. of people	2
Additional workers on traffic route	No. of people	1
Time required for average spot lamp replacement	No. of hours	0.76
Time for PE Cell replacement	No. of hours	0.76
Time for other spot maintenance tasks	No. of hours	0.76
Annual average failure rate for PE cells	% p.a.	1.98%
Annual average failure rates for other components	% p.a.	3.26%

Ausgrid uses on average two staff for minor roads (category P), often residential roads, and three staff when work is required to be performed on a major road (category V) with high traffic.

The 'Time required for an average spot lamp replacement' is 45.6 minutes (0.76 x 60mins). A clear distinction needs to be made between the time to complete an unscheduled maintenance task and a scheduled maintenance task. Unlike bulk lamp replacements, these repairs are not located on adjoining poles and are not all the same in nature. Consequently, each repair involves:

- Travel to the site;
- Set-up of work site and tools, etc;
- Identify fault;
- Make repair;
- Test repair; and
- Clear work site and pack away tools.

The relationship between the annual revenue requirements and the unscheduled maintenance assumptions are as follows:

> *Annual spot labour revenue requirement = Labour rate x hours required for repair x number of staff x annualised failure rate.*

3.3 Connections forecast

The connection charges are the recovery of costs associated with underground connections only. Ausgrid does not include any charges for overhead connected streetlights. This charge is to cover the costs associated with the repair and reinstatement of underground street lighting faults as well as the periodic inspection for electrical integrity.

When an underground connection of a public light fails, due to water ingress, corrosion or other reasons, Ausgrid must dig up the connection to repair it. This is a time consuming and labour intensive as faults are difficult to find and complicated to repair. Repair invariably requires other skilled staff like testing technicians, cable jointers and substation technicians. It is common for these types of tasks to require traffic control given the long period of time required to undertake the repair. While only a small number of underground connections fail per year, the cost of repair is relatively high.

We have maintained the same rates in real terms from our 2019-24 Final Decision, which we consider to be conservative given expected real labour cost increases. The calculation for the revenue requirements of connection repairs are as follows:

Annual Connection revenue requirement = Flat rate (as per connection type) x number of connections.

3.4 Material Price Inputs

Material prices for the majority of equipment used on public lighting are sourced by competitive tender. Where equipment is no longer purchased or used but is still required for price modelling, the last known price is used or the 2019-24 Final Determination price is adopted.

The relationship between the material price inputs and revenue requirements is as follows:

Annual spot material revenue requirement = Material price x annualised failure rate per lamp type x population of particular component

Material prices increase by CPI only over the 2024-29 period. No other escalation is used.

3.5 Operational Expenditure in the 2019-24 period

Figure 3.5 summarises Ausgrid's operational expenditure and revenue for financial years 2019/20 to 2022/23.

Figure 3.5 Operational expenditure FY20 – FY23 ($m, nominal)

	FY20	FY21	FY22	FY23 (Forecast)
Revenue (Maintenance Charges Only)	14.5	14.2	13.9	13.6
Actual Spend	18.8	14.7	11.6	12.1
Difference (revenue – Actual)	**-4.3**	**-0.5**	**2.3**	**1.5**

Recovery of maintenance costs is based on average assumptions for failure rates, whereas actual maintenance expenditure is driven by the actual number of maintenance faults attended to in any given period and the nature of work performed. As shown in **Figure 3.5**, this may lead to revenue being higher or lower than actual cost in each year, however over time we expect the differences to be minimal.

Maintenance charges are also trending down across FY20-FY23. This is due to the transition to LED luminaries during this period which have a lower annual charge than legacy luminaires. This trend is expected to continue until the accelerated rollout of LED programs are completed.

4. Capital expenditure

We forecast $64.1 million in capital expenditure (**capex**) over the 2024-29 period (**Figure 4.1**). A major driver of this expenditure in the first two years is the major road accelerated LED luminaire replacement program, as outlined below. In is anticipated that the minor road LED replacement program will be largely completed in the current regulatory period. New public lighting and pole replacement capex are forecast to remain in line with historical spend, while reactive capex is forecast to decrease as the accelerated minor and major LED replacement programs reach completion.

Additional information on public lighting asset movements and capex is detailed in **Figures 6.1 and 6.2** in the Appendix.

Figure 4.1 Forecast public lighting capex 2024-29 (real $m, FY24)

	FY25	FY26	FY27	FY28	FY29	Total
Major road LED replacement	15.7	14.5	1.6	1.2	0.3	33.4
New public lighting	1.6	1.6	1.6	1.7	1.7	8.2
Pole replacement	1.0	1.0	1.0	0.9	0.9	4.8
Reactive replacement	1.6	1.8	1.8	1.3	1.3	7.7
Allocated capex	3.0	2.5	2.0	1.4	1.1	9.9
Total public lighting	**22.9**	**21.3**	**8.0**	**6.5**	**5.3**	**64.1**

An important factor in the price build-up for capital expenditure on luminaires is whether the light is installed on a major (Cat V) road or a minor (Cat P) road. Certain costs, such as traffic control, are assumed to only apply to lights on major roads, due to high traffic, and is a key driver of the difference in costs between capex programs.

Ausgrid will continue replacement of luminaires on minor roads in FY23 and FY24 by upgrading CFL (Compact Fluorescent Lamp) luminaires to LED. The CFL replacement started in July 2022 and is expected to finish in FY24. Ausgrid's program to replace luminaires containing Mercury Vapour lamps is in the final stage with only 2% luminaires to be replace. These are mostly in locations requiring outages or special access and will be replaced by end of FY23.

4.1 Public lighting capex programs

Major road LED replacement

Ausgrid has developed a scheduled replacement program for all luminaires on major roads. This proposal has been supported by 95% of councils in Ausgrid's network and is forecast to commence in February 2023. The program includes replacement of more than 60,000 luminaries on major roads that will be co-deployed with smart controls and also incorporate provision for each light to accept future smart city sensors. The approach being taken will be one of the most advanced lighting deployments of its type in the world. It will take total LED deployments to more than 90% of all Ausgrid lighting by FY26.

As with all public lighting capital programs, if assets are replaced before the end of their economic life customers are expected to pay the “residual” capital value as well as a new charge reflective of the installed asset. Residual values of assets installed pre-July 2009 are calculated in **Attachment 9.1.a – Public lighting - Pre 2009 fixed charge model FY24-29** and the residual value of assets installed post July 2009 is calculated as the present value of the future annuity payments up to the asset life.

Ausgrid will install glare shields upon request by councils as part of replacement programs. Glare shields will not be part of Ausgrid’s standard pricing, and the material cost will be invoiced directly to councils.

New public lighting

This category includes projects initiated by councils to install new luminaires in locations where there was no light previously. A relatively small expenditure has been forecast for new public lighting assets. Typically, the construction of new public lighting is contestable, however Ausgrid’s Minor Capital policy allows for customers to request for additional lights on existing poles. Expenditure of this nature would be captured under this program.

Pole replacement

This program is the proactive replacement of condemned steel street lighting columns. Condemned columns are identified during scheduled pole inspections using a detailed condition assessment process. Poles which have been identified to be replaced are added to the program worklist by the responsible officer within Network Operations. The poles are then replaced either by Ausgrid staff or external delivery partners.

Reactive replacement

Ausgrid is continually replacing streetlights that fail due to age and other reasons. The Reactive Public Lighting program covers luminaires and other street lighting components that are replaced which have not been targeted in a specific proactive replacement program such as the minor and major roads replacement programs. The forecast expenditure through the 2024-29 period is relatively low due to the number of proactive replacements undertaken during the 2019-24 period as part of the transition to LED lighting

Allocated capex

This is capex allocated to public lighting through the cost allocation methodology for non-network capex, including fleet, ICT and property.

5. Public lighting prices

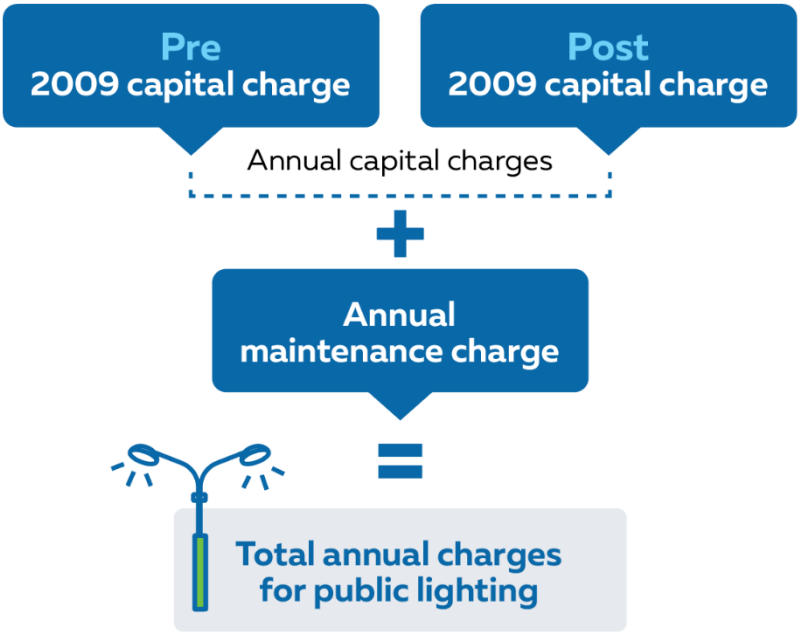
Public lighting prices are split into maintenance and capital charges. The AER determines the maximum prices we can charge for public lighting services for the first year of the 5 year regulatory period, and how we may change this price over the remaining 4 years.

5.1 Pricing structures

As shown in **Figure 5.1**, we currently have three types of annual public lighting charge:

- Two capital charges – these recover the costs we incur to fund and install the customer's public lighting infrastructure and depend on when the infrastructure was installed and are calculated using different approaches.
- One maintenance change – which recovers the costs of maintaining the customer's public lighting assets (regardless of when they were installed).

Figure 5.1 Our public lighting charges



For the 2024-29 period, we propose to maintain these three charges, and the approaches used to calculate them. This will maintain consistency in how public lighting charges are calculated across regulatory periods. However, as indicated in Section 1.5, we are considering some pricing changes related to each of these charges in response to what we have heard through our engagement with councils to date.

5.2 Ausgrid's pricing models

Ausgrid's public lighting proposal aims to recover the efficient costs of providing the standard public lighting services. These services are underpinned by the existing capital costs plus new capital and operating expenditure. As set out in Sections 4 and 5, our capital and operating expenditure forecasts include the ongoing maintenance of our lights and investment in programs to replace old lights with new technology.

5.2.1 Pre-2009 capital charge

In 2009, the AER made a change to the way our public lighting capital charges are calculated, based on when the assets were installed. For assets installed before 1 July 2009, the charge is calculated based on a return *on* capital invested (to recover our ongoing financing costs) and return *of* capital invested (or depreciation, to recover the cost of the asset over its useful lifespan).

The AER determined the value of our public lighting asset base as at 30 June 2009, by customer and by asset category. The value of this asset base is updated each year, reducing in value to account for depreciation (based on the average age of assets within each category). The value is also adjusted each year to remove the residual capital value of assets replaced or removed in the previous year.

By 1 July 2024, the value of the pre-2009 asset base will have reduced from $111.3 million in 2009 to an estimated $9.7 million. This is because the capital value of pre-2009 public lighting assets will be almost fully recovered. For example, all luminaires will be fully depreciated, and assets in other categories will be mostly depreciated.

However, poles will not be fully depreciated until 2044. This means some councils will continue to pay a small annual pre-2009 capital charge for another 22 years.

During our customer engagement, some councils indicated they would like flexibility in their pre-2009 asset charges and more transparency. In response to this feedback, we consulted with councils about the option to accelerate payment of remaining pre-2009 capital values during the 2024-29 period so all assets are paid off by 30 June 2029. Councils would pay the same amount in net present value terms whether they bring payments forward or continue to pay until 2044. However, bringing payment forward would simplify their future public lighting bills, and may provide other benefits. We expect that whether this option makes sense for a council will depend on its individual financial circumstances and preferences.

We engaged with councils individually, outlining the potential financial implications of this option for them. We received responses from 14 councils, with 11 in favour of bringing payments for the pre-2009 asset base forward so they are fully paid off by the end of 2028-29. As a result, we have only applied accelerated depreciation to the 11 councils that responded positively.

5.2.2 Post-2009 capital charge

Ausgrid proposes to retain the methodology for capital annuity pricing used for the 2019-24 determination. Assets installed post July 2009 are priced using a cost build up model which then calculates an annuity based on the expected life of the asset. This means it is calculated so that our one-off installation costs and our ongoing financing costs are recovered over the expected asset life.

Pricing model inputs

We calculate the installation cost component for all post-2009 public lighting assets in the categories shown in **Figure 5.2** using the inputs shown in **Figure 5.3**.

Figure 5.2 Asset categories for calculating the installation costs

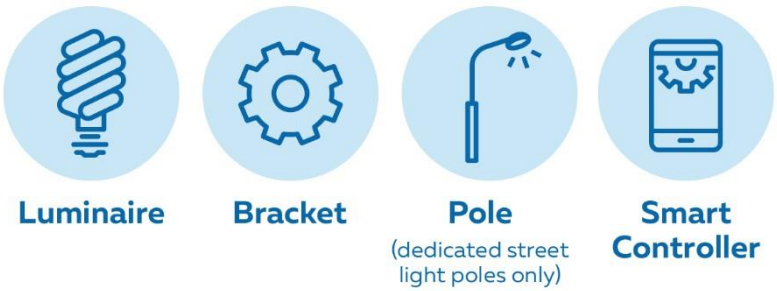
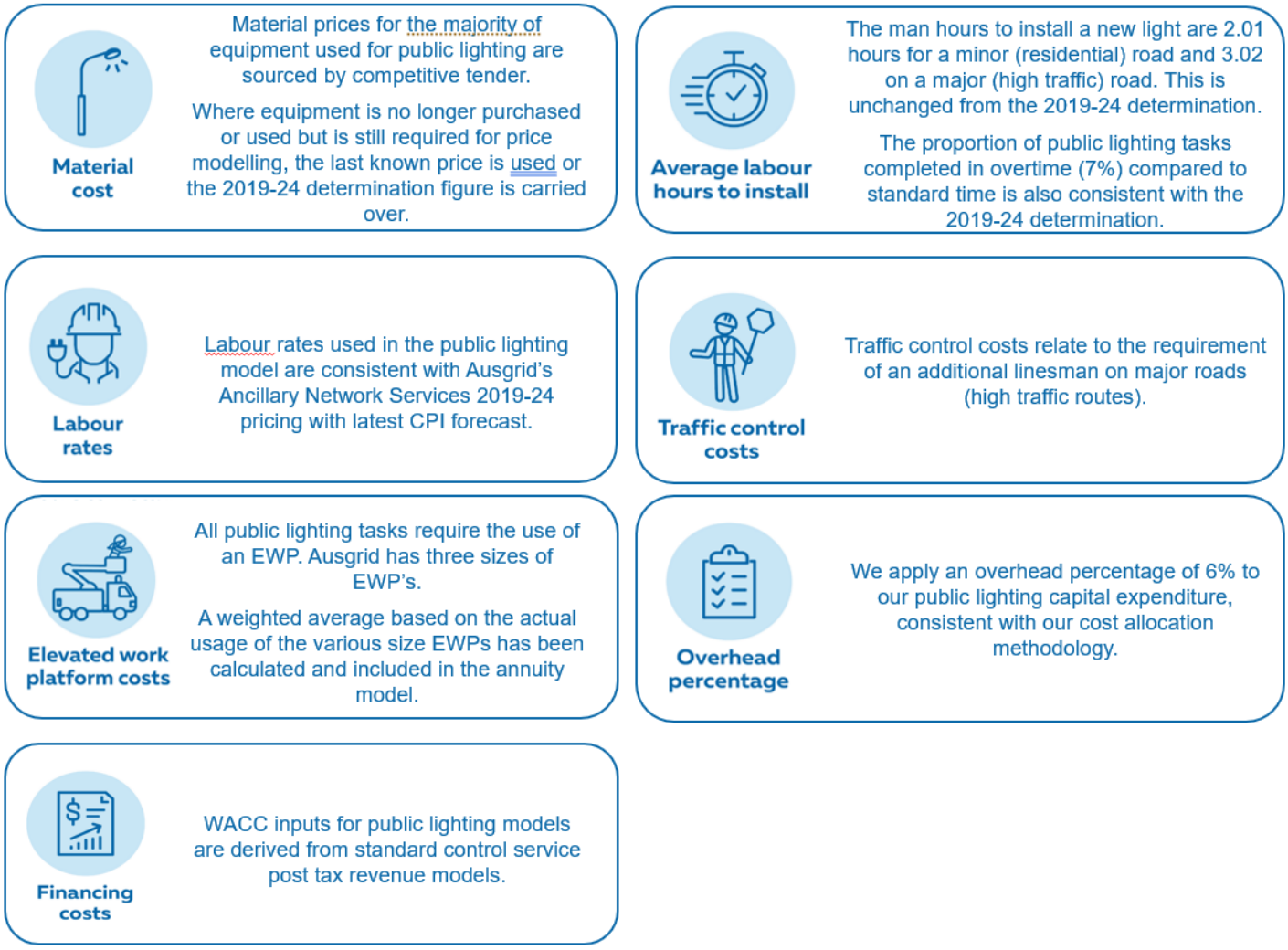


Figure 5.3 Inputs for calculating the installation cost component



Warranty

In negotiations regarding LED prices, all councils agreed to pay an additional 5% of the annuity charge for non-warranty repairs of all new LED luminaires to be covered by Ausgrid. This means that if an LED fails during the first 10 years after installation, Ausgrid covers the cost of replacement. This was subject to extensive consultation with our customers and was mutually agreed. This premium also applies to all smart controllers.

Pole establishment costs

In the annuity pricing model labour is recovered by allocations of labour to the bracket and luminaire. As such when a new support is installed a specific capital expenditure amount needs to be included in the total cost to recover the costs associated with its installation. The specific capital expenditure amounts inputs are averages for the replacement of both in ground mounted and rag bolt assembly steel columns. This figure, informed by contractor tendered rates, has been carried over from the 2019-24 determination in real terms.

Standard asset lives

Figure 5.4 shows the component lives in the annuity model. These are the expected lives of the asset and are the number of years used in the annuity model calculations.

Figure 5.4 Economic lives of public lighting assets

Component	Asset life (years)
Luminaire (traditional)	20
LED luminaire	10
Bracket	35
Support	35
Connection	20

We note that a 10-year life for LEDs is being applied in the pricing, consistent with the 2019-24 determination, despite an expected longer actual life. This was the preference of the local councils and reflects a desire to pay this expense over a shorter timeframe, and the potential for newer or more efficient LED lights to become available to replace existing luminaires in a shorter timeframe using a shorter asset life.

Post-2009 capital price list

We are responding to council feedback that our capital price lists are confusing. In our consultation in May 2022, we raised the possibility of rationalising these lists by introducing some weighted average prices for similar products. Councils indicated they would support this approach, provided that:

- The most commonly used products are properly cost-reflective and not included in a weighted average price;
- Rationalising the costs of luminaires with like luminaires does not drive unintended outcomes (for example no incentives to minimise the luminaire utilised as the costs are the same as larger luminaires); and
- Impacts on prices are marginal.

We took this feedback into account in developing our final price lists for our post-2009 capital prices and are proposing to:

- Rationalise the bracket capital price list;
- Maintain the current luminaire capital price categorisation along with introducing more generic descriptions for some of the LED products;
- Maintain the current support capital price categorisation; and
- Maintain the current smart controller capital price categorisation, as introduced in the 2023 public lighting price list.

Bracket capital price list

We are proposing to rationalise the current legacy bracket capital price list from 26 to six categories of bracket. Prices for legacy brackets are rolled forward based on CPI. In addition, five new prices will be included for new bracket categories included in the LED roll-out. These will be priced based on latest contract prices and will only apply to new or replaced brackets.

Prices have been developed based on the weighted average prices based on each bracket size range, shown in **Figure 5.5**.

Figure 5.5 Proposed bracket capital prices ($ nominal)

Category	FY25	FY26	FY27	FY28	FY29
Legacy Bracket – Minor (Cat P) road – Short	7.97	8.19	8.43	8.67	8.92
Legacy Bracket – Minor (Cat P) road – Medium	14.58	15.00	15.43	15.87	16.33
Legacy Bracket – Minor (Cat P) road – Long	23.02	23.68	24.36	25.06	25.78
Legacy Bracket – Major (Cat V) road – Short	11.82	12.16	12.51	12.87	13.24
Legacy Bracket – Major (Cat V) road – Medium	22.69	23.34	24.01	24.70	25.41
Legacy Bracket – Major (Cat V) road – Long	32.89	33.83	34.80	35.81	36.83
Bracket – Minor road (Cat P) – Short	9.86	10.15	10.44	10.74	11.05
Bracket – Minor road (Cat P) – Medium	15.66	16.11	16.57	17.05	17.54
Bracket – Major road (Cat V) – Short	12.81	13.18	13.56	13.95	14.35
Bracket – Major road (Cat V) – Medium	23.21	23.87	24.56	25.27	25.99
Bracket – Major road (Cat V) – Long	28.92	29.75	30.61	31.49	32.39

Luminaire capital price list

In light of councils' feedback that luminaire prices should be properly cost-reflective, we are not proposing to rationalise luminaire pricing. We note that the price list for luminaires will reduce over the 2024-29 period, as legacy luminaire types are replaced as part of our LED replacement program.

We have also reviewed the descriptions for each LED luminaire price and updated the descriptions to be more flexible so that they apply to equivalent luminaires in terms of functionality and price in the future.

5.2.3 Maintenance charge

The cost of scheduled and unscheduled maintenance services is priced via an annual maintenance charge. The average charge reflects the average time taken for each activity, a labour rate, and materials required. Maintenance charges apply to both pre- and post-2009 capital assets. **Figure 5.6** describes the components of the annual maintenance charge. **Figure 5.7** outlines in inputs we use to calculate these components.

Figure 5.6 Maintenance charge components

Component	Description
Luminaire	Applied to all luminaires recover the costs of scheduled and unscheduled maintenance tasks. These tasks include replacing the lamp (required for legacy luminaires), replacing the PE-cell, fixing cable or fuse supply issues, scheduled servicing of luminaires, night-time traffic route patrol (required for luminaires on major roads)
Connection	Applied to public lighting poles with underground connections to recover the cost of repair work to underground cabling
Smart controller	Applied to LED luminaires with smart controllers only to recover the costs related to system licence fees, data charges and cyber security management

Figure 5.7 Inputs for calculating maintenance charges

Maintenance prices

We currently have 50 maintenance prices for luminaires. Several of them are the same as, or only slightly different to, another price. Councils have indicated that the prices could be rationalised without material impact on their charges. In response to this feedback, we are proposing to rationalise maintenance prices for luminaires by grouping similar luminaires together and calculating one maintenance price for each group. This would reduce the number of maintenance prices from 50 to 6.

In addition, we are introducing four new maintenance prices for our new LED luminaires with smart controllers, which will have lower prices than the equivalent category of luminaire without smart controller. A separate charge to cover the smart controller licence and maintenance fee (introduced in the FY23 annual pricing) will also apply to luminaries with smart controllers. No changes are being proposed for the maintenance 'connections' price categories. Our proposed maintenance prices for the 2024-29 period are set out in

Figure 5.8.

Figure 5.8 Proposed maintenance prices ($ nominal)

Category	FY25	FY26	FY27	FY28	FY29
Luminaire					
Legacy luminaire – minor (Cat P) roads	33.39	34.35	35.33	36.35	37.39
Legacy luminaire – major (Cat V) roads[11]	53.43	54.97	56.55	58.17	59.85
Luminaire – minor (Cat P) roads	23.25	23.92	24.61	25.32	26.04
Luminaire – major (Cat V) roads	31.69	32.60	33.54	34.51	35.50
Luminaire – Decorative	24.94	25.66	26.39	27.15	27.93
Luminaire – Floodlight	31.69	32.60	33.54	34.51	35.50
Luminaire – minor (Cat P) roads – smart controller installed	22.43	23.08	23.74	24.42	25.12
Luminaire – major (Cat V) roads – smart controller installed	17.97	18.49	19.02	19.56	20.13
Luminaire – Floodlight – smart controller installed	22.43	23.08	23.74	24.42	25.12
Luminaire – Decorative – smart controller installed	19.66	20.22	20.80	21.40	22.02
Smart Controller					
Smart Controller – Licence and maintenance fee	5.85	6.02	6.19	6.37	6.55
Connections					
Connection – O/U	101.08	103.98	106.97	110.05	113.21
Connection – UGR1	92.65	95.32	98.06	100.88	103.78
Connection UGR - 2	33.69	34.66	35.65	36.68	37.73

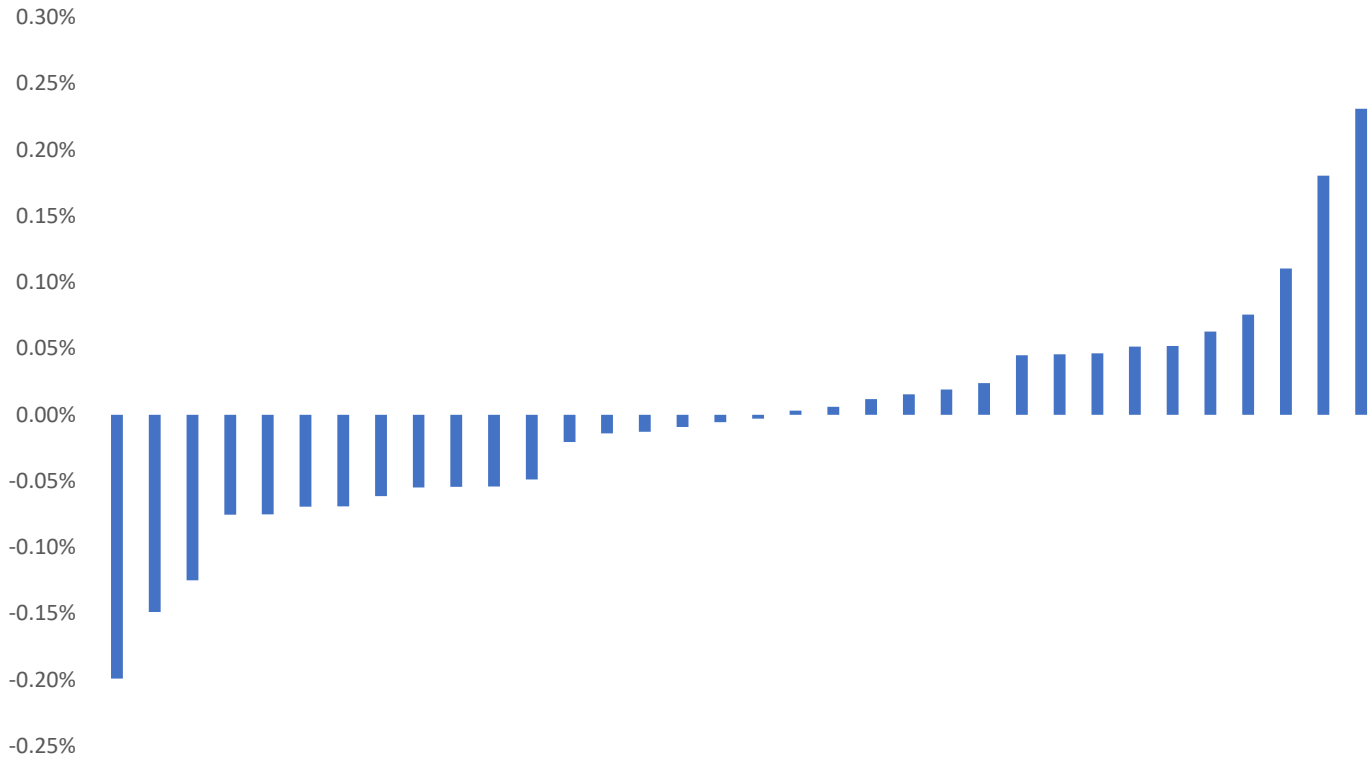
5.2.4 Customer impact of rationalisation of pricing

In response to customers advising Ausgrid that the impact of any price rationalisation should be minimal, we have modelled the proposed rationalised prices for capital bracket and maintenance charges, based on forecast volumes, to validate that the impact will be minimal.

Figure 5.9 shows the percentage impact of estimated rationalised prices compared to non-rationalised prices on our 33 council public lighting customers. The percentage impact is very low ranging from approximately 0.02% higher (negative impact to customers) to 0.02% lower (positive impact to customers). On this basis, we are confident the impact to customers of rationalisation of bracket and maintenance prices as proposed will be minimal.

[11] A small number of luminaires in the legacy major road and floodlight groupings have multiple lamps, which result in higher maintenance prices.

Figure 5.9 Forecast percentage impact of price rationalisation for customers



6. Appendix

Figure 6.1 General assumptions

General Assumptions	Description of assumption	FY24 Input
CPI (%)	Forecast CPI over the coming regulatory period. CPI figures are used to escalate all materials prices, sub contracted service rates and connection maintenance costs.	2.87%
Labour rate ($/hour)	Hourly labour rate excluding overheads. Consistent with Ausgrid's Ancillary Network Services (ANS) model for a field worker.	$64.63
Labour rate - overtime ($/hour)	Hourly overtime labour rate excluding overheads. Average of 1.75 times the normal rate is assumed based on work performed at 1.5 and 2 times normal rate. Consistent with the overtime rate proposed for ANS.	$113.11
Proportion of work in overtime hours (%)	Proportion of public lighting tasks completed in overtime hours calculated using historical actual data. This percentage is consistent with the 2019-24 determination.	7%
Proportion of work in standard hours (%)	Proportion of public lighting tasks completed in standard hours calculated using historical actual data. This percentage is consistent with the 2019-24 determination.	93%
Labour oncosts (%)	Oncosts associated with the employment of a field worker. They include the following costs of employment: • Annual leave; • Sick leave; • Public holidays; • Superannuation; • Long service leave; and • Payroll tax. The oncost percentage (compounded) applied to the public lighting maintenance model is consistent with oncosts used for ancillary network services.	52.2%
EWP ($/hour)	Elevated work platform cost per hour. All unscheduled maintenance requires the use of an EWP. Weighted average based on the actual usage of each of the 3 EWP sizes used by Ausgrid. 2019-24 approved value has been adjusted by CPI for the 2024-29 model.	$38.22
Average PE cell cost	Weighted average of PE cell costs sourced by Ausgrid through standard procurement methods	$13.05

General Assumptions	Description of assumption	FY24 Input
Average materials cost	Materials other than luminaires, PE cell and smart controllers including the cost of fuses, connectors, cable and other components used to repair streetlights.	$35.73
Corporate Overheads	Corporate overheads represent corporate costs allocated through the cost allocation methodology to public lighting services and represents other indirect costs of running the business. Overhead allocations include many corporate functions including: • Finance/Treasury; • Information technology; • Human resources; • Property; • Fleet; • Regulatory; • Legal; • Strategy; and • Corporate Affairs. The corporate overhead rate has decreased from the 2019-24 determination from 13.7% to 4%, reflecting estimated lower corporate overheads allocated to public lighting due to a change in CAM methodology.	4%
Operational Overheads	Allocated operational overheads associated with providing public lighting services, including planning, oversight, administration and engineering services. The operational overhead rate has decreased from the 2019-24 period (by 13.1% to 9.8%) reflecting estimated lower operational overheads allocated to public lighting due to a change in CAM methodology.	9.8%

Figure 6.2 Current period and forecast public lighting movement in volumes

	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29
Replacement brackets	449	6,938	5,460	897	813	854	854	861	871	873
Replacement luminaires	8,047	17,296	11,934	36,490	20,010	20,295	21,508	4,588	3,409	2,825
Replacement supports	12	9	6	172	88	128	127	127	128	128
New public lighting	258	527	822	390	645	525	525	525	525	525
New smart controllers	-	-	-	-	20,000	25,000	11,500	3,500	500	500
Total	**8,766**	**24,770**	**18,230**	**37,950**	**41,555**	**46,802**	**34,514**	**9,601**	**5,432**	**4,851**

Figure 6.3 Forecast public lighting capex by component 2024-29 (real $m, FY24)

	FY25	FY26	FY27	FY28	FY29	Total
Replacement brackets	0.2	0.2	0.2	0.2	0.2	1.0
Replacement luminaires	12.9	14.1	2.6	2.1	1.3	32.9
Replacement supports	1.1	1.1	1.1	1.1	1.0	5.3
New public lighting	1.6	1.6	1.6	1.7	1.7	8.2
New smart controllers	4.1	1.9	0.6	0.1	0.1	6.7
Allocated capex	3.0	2.5	2.0	1.4	1.1	9.9
Total public lighting capex	**22.9**	**21.3**	**8.0**	**6.5**	**5.3**	**64.1**