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Ausgrid's public lighting services

Ausgrid

Content

1   INTRODUCTION TO PUBLIC LIGHTING

Public lighting is an essential service that promotes safety of communities and roadway users. Ausgrid is the largest operator of public lights in Australia and provides this service across its entire network area.

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 ensures both public lighting services and network services are efficiently delivered.

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 (the Rules)

- How the proposed prices for public lighting services are built up from Ausgrid's costs.

Public lighting is an essential service that promotes safety of communities and roadway users. Ausgrid is the largest operator of public lights in Australia and provides this service across its entire network area.

1.2   Snapshot of Ausgrid's public lighting business

Ausgrid provides public lighting services to over 90 customers including Councils, community groups and government associations. There are over 250,000 public lights in Ausgrid's network area, which are typically installed on major and minor roadways. A conventional public light is usually made up of the following five components:

- *Lamp:* This is the device which produces the illumination. It is mounted inside the luminaire. A range of technologies are used in lamps.

- *Luminaire:* Provides the housing for the lamp. The luminaire protects the lamp and reflects and diffuses the light. This directs the light to the desired area of coverage, whilst ensuring stray light does not; for example dazzle motorists. Modern luminaires usually contain a photoelectric (PE) cell that automatically switches the light on at night time.

- *Bracket:* This supports the luminaire from a pole.

- *Pole:* This elevates the entire assembly above the ground. There are dedicated street lighting poles, but the majority of street lights are mounted on distribution poles.

- *Connection:* This is point where the electrical circuit of the public light is joined to the wider electrical network.

Lighting technology has evolved significantly over the past twenty years. HID lamps are being replaced with Light Emitting Diode (LED) luminaires and smart controls are being discussed. LED technology provides significant reductions in energy consumption and minimise the life cycle costs ultimately borne by public lighting customers.

1.3 Objectives of public lighting

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. These objectives have been developed to provide an efficient and cost effective service to our customers while aiming to comply with the NSW Public Lighting Code[1] (the Code).

There are three key objectives:

1. *Minimise total life cycle cost for Ausgrid and its 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 network reforms

   - Rationalising Ausgrid's lighting population

   - Offering cost effective, energy efficient, lighting technologies.

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) for public lighting which details the illumination and other technical requirements for various roadway scenarios. Ausgrid will be working towards meeting the targets of the Code throughout the 2014-19 regulatory control period. The Code is currently under review and will not be complete by the time Ausgrid regulatory submission is due. Ausgrid reserves the right to review public lighting charges if there are major changes to the underlying requirements.

3. *Cost reflective prices*

   Cost reflectivity at the highest level 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 Ausgrid's public lighting management plan

Ausgrid's Public Lighting Management Plan has been prepared in accordance with the Code. This plan documents the objectives and strategies developed for the management of Ausgrid's public lighting assets. Ausgrid has forecast capital and operating expenditures that will enable the public lighting business to deliver many of the levels of service that are defined in the Code.

During the 2019-24 regulatory control period, Ausgrid intends to meet the requirements of the Code, principally through the following actions:

- Routine maintenance of street lighting assets through bulk lamp replacement (BLR) every 48 months for HID lamps and 60 months for LED, throughout the network area

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[1] NSW Department of Industry, Resources & Energy, *NSW Public Lighting Code*, 1 January 2006, V2.

- Spot maintenance as necessary, in response to reported faults, targeting the performance levels set out in the Code

- Deployment of energy efficient lights (with the agreement of public lighting customers) to replace less reliable and high energy consuming luminaires

- Night patrols on main traffic routes as an alternative means to identify faults.

2   REGULATORY REQUIREMENTS

Chapter 6 of the Rules governs how the pricing for network services is set and the responsibilities of the AER and the DNSP (i.e. Ausgrid). These requirements are 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 clause 6.2.2 of the Rules. Prices for public lighting services are separately determined from those for network services, which have been classified as standard control services[2]. 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[3].

Ausgrid's response to the AER's proposed Classification of Services is set out in Attachment 11.01 (Ausgrid's classification proposal). In summary, Ausgrid accepts the AER's proposed classification of public lighting services as alternative control services.

The AER has proposed the following control mechanism for alternative control services, to cap the prices of individual services[4]:

$$\bar{p}_i^t \geq p_i^t \qquad\qquad i = 1, \ldots, n \text{ and } t = 1,2,\ldots,5$$

$$\bar{p}_t^i \geq \bar{p}_{t-1}^i \times (1+CPI_t) \times (1-X_t^i) + A_t^i$$

where:

$\bar{p}_t^i$ is the cap on the price of service *i* in year *t*.

p_t^i is the price of service *i* in year *t*. The initial value is to be decided in the distribution determination.

$\bar{p}_{t-1}^i$ the cap on the price of service i in year t–1..

t is the regulatory year*.*

ΔCPI_t is the annual percentage change in the ABS consumer price index (CPI) All Groups, Weighted Average of Eight Capital Cities[5] from the December quarter in year t–2 to the December quarter in year t–1, calculated using the following method:

> The ABS CPI All Groups, Weighted Average of Eight Capital Cities for the December quarter in regulatory year t–1
>
> divided by
>
> The ABS CPI All Groups, Weighted Average of Eight Capital Cities for the December quarter in regulatory year t–2
>
> minus one.
>
> For example, for 2020–21, year t–2 is the December quarter 2018 and year t–1 is the December quarter 2019.

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[2] AER, *Framework and approach: Ausgrid, Endeavour Energy and Essential Energy for the Regulatory Control Period commencing 1 July 2019,* July 2017, p. 56.
[3] Ibid., pp. 60-62.
[4] Ibid., p. 60.
[5] If the ABS does not, or ceases to, publish the index, then CPI will mean an index which the AER considers is the best available alternative index.

X_t^i is the *X*-factor for service *i* in year *t*. The X factors are to be decided in the distribution determination and will be based on the approach the distributor undertakes to develop its initial prices.

A_t^i is an adjustment factor. Likely to include, but not limited to adjustments for residual charges when customers choose to replace assets before the end of their economic life.

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

2.2   Forecast expenditures

Clause 6.2.6 of the Rules establishes that a determination for alternative control services may utilise elements of Part C for a Building Block Determination for standard control services.

This proposal for public lighting as an alternative control service will not be subject to all of the provisions that apply to a building block proposal. Nevertheless, the AER is expected to subject the associated expenditures to a similar review process. Accordingly, this proposal has been designed to meet the following Rules requirements for supporting information that apply to a building block determination.

S6.1.1 Information and matters relating to capital expenditure

(2)   *the method used for developing the capital expenditure forecast;*

…

(4)   *the key assumptions that underlie the capital expenditure forecast;*

…

(6)   *capital expenditure for each of the past regulatory years of the previous and current regulatory control period, and the expected capital expenditure for each of the last two regulatory years of the current regulatory control period, categorised in the same way as for the capital expenditure forecast and separately identifying for each such regulatory year:*

(7)   *an explanation of any significant variations in the forecast capital expenditure from historical capital expenditure;*

S6.1.2 Information and matters relating to operating expenditure

(1)   *a forecast of the required operating expenditure that complies with the requirements of clause 6.5.6 and identifies the forecast operating expenditure by reference to well accepted categories such as:*

      (i)   *particular programs; or*

      (ii)   *types of operating expenditure (eg. maintenance, payroll, materials etc), and identifies in respect of each such category:*

      (iii)   *to what extent that forecast expenditure is on costs that are fixed and to what extent it is on costs that are variable; and*

      (iv)   *the categories of distribution services to which that forecast expenditure relates;*

(2)   *the method used for developing the operating expenditure forecast;*

(3)   *the forecasts of key variables relied upon to derive the operating expenditure forecast and the method used for developing those forecasts of key variables;*

(4) the method used for determining the cost associated with planned maintenance programs designed to improve the performance of the relevant distribution system for the purposes of any service target performance incentive scheme that is to apply to the Distribution Network Service Provider in respect of the relevant regulatory control period;

(5) the key assumptions that underlie the operating expenditure forecast;

(6) a certification of the reasonableness of the key assumptions by the directors of the Distribution Network Service Provider;

(7) operating expenditure for each of the past regulatory years of the previous and current regulatory control period, and the expected operating expenditure for each of the last two regulatory years of the current regulatory control period, categorised in the same way as for the operating expenditure forecast;

(8) an explanation of any significant variations in the forecast operating expenditure from historical operating expenditure.

S6.1.3 Additional information and matters

(7) the Distribution Network Service Provider's calculation of the regulatory asset base for the relevant distribution system for each regulatory year of the relevant regulatory control period using the roll forward model referred to in clause 6.5.1, together with:

(i) details of all amounts, values and other inputs used by the Distribution Network Service Provider for that purpose;

(ii) a demonstration that any such amounts, values and other inputs comply with the relevant requirements of Part C of Chapter 6; and

(iii) an explanation of the calculation of the regulatory asset base for each regulatory year of the relevant regulatory control period and of the amounts, values and inputs referred to in subparagraph (i);

2.3 Regulatory modelling

In the 2010 determination, the regulatory modelling of public lighting revenue did not use the building block approach set out in Part C of the Rules and the AER's PTRM, used for standard control services. Rather, the modelling approach for public lighting prices separately treated:

- 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

- Operation and maintenance costs[6].

Ausgrid retained this form of modelling in its 2014-19 proposal and 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.

2.4 Regulatory proposal

This chapter complies with Ausgrid's obligations concerning the submission of a regulatory proposal in relation to alternative control services. These obligations are set out in Rules clause 6.8.2, specifically:

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[6] AER, *Final decision - EnergyAustralia distribution determination 2009–10 to 2013–14 Alternative control (public lighting) services*, 13 April 2010.

- A demonstration of the application of the control mechanism set out in the Framework and Approach paper accompanied by the necessary supporting information (clause 6.8.2 (c)(3)).

2.5 Proposal

This proposal for public lighting service prices constitutes initial proposal for the regulatory control period from 1 July 2019 to 30 June 2024. It is accompanied by attachments noted in this document and:

- Full pricing models for the regulatory control period (Attachments 8.08, 8.09 and 8.10)

- Proposed public lighting prices (see Attachment 8.12 (Public Lighting Price List)).

3   THE CURRENT PUBLIC LIGHTING ENVIRONMENT

Ausgrid's public lighting network has undertaken significant changes this regulatory period. This section highlights key issues that will be detailed in this submission.

3.1   Technical aspects of the current public lighting environment

Since the 2015 decision, Ausgrid has continued to upgrade its street lighting network by providing more energy efficient technology where it was proven to be cost effective. This reduces operational expenditure and the total life cycle costs associated with public lighting, which flows through to savings for public lighting customers.

Some key points that will be highlighted in this submission are summarised below:

3.1.1   Bulk lamp replacement cycle times

Scheduled maintenance includes bulk lamp replacement (BLR), pole inspection and routine tasks performed in conjunction with BLR such as cleaning of the visor.

The AER recommended a four year BLR in its 2015 draft determination. At that stage Ausgrid's inventory of street lights was not suitable to comply with this recommendation. Ausgrid has now transitioned to a four year BLR for traditional lighting types and six year BLR for LED luminaires. Ausgrid still has a number of luminaires that would not meet the technical parameters required for a four year BLR however these luminaires will be targeted and replaced before July 2020. The luminaires that need to be replaced are:

- High wattage Mercury Vapour luminaires (250W & 400W)

- Twin 20 florescent luminaires.

Another significant event that will impact the supply of mercury lamps is the Minamata Convention on Mercury. Ausgrid has forecast to replace all mercury luminaires with LED by end 2020 so that a reduced supply of mercury lamps will have no impact.

For further information on Ausgrid's capital programs refer to Attachment 8.11 (Public Lighting Investment Plan).

3.1.2   Containment of unscheduled maintenance

Unscheduled maintenance (spot maintenance) occurs outside of the BLR. Spot maintenance is required when lamps or any other component fail prematurely. If the fault requires the replacement of a capital component, i.e. luminaire, bracket or support, then this would be considered a capital expenditure.

With the introduction and installation of approximately 40,000 LED luminaires as well as introducing a blend of internal and contract labour to perform unscheduled maintenance, Ausgrid has reduced its operating expenditure to the efficient levels set by the regulator in the 2015 determination.

3.1.3   Roll out of LED

Ausgrid has introduced LED as its default luminaire type for all road lighting applications. As at April 2018 39,309 LED street lights have been installed. A further 100,000 residential and at least 20,000 major road street lights are to be replaced with LED by end 2020.

Consultation has begun with our customers on residential road LED replacements and will begin late 2018 for major road roll outs.

3.1.4 Standardisation of luminaire range

Ausgrid has historically provided a variety of different light types including a range of lights designed for non-standard or aesthetic purposes. As a result, Ausgrid has supplied and maintained a diverse population of light types. This diversity complicates maintenance processes, stores inventories and the already complex billing arrangements for public lighting.

Ausgrid will continue to maintain these legacy non-standard lights until they require replacement. At this time Ausgrid will consult with the customer to decide:

- Whether existing Ausgrid stocks of spare fittings exist, enabling the luminaire to be replaced, or

- Where no stocks of the decorative fitting are held, whether a luminaire from Ausgrid's standard range of fittings would be provided.

If the customer wishes to install a new decorative fitting, Ausgrid will decommission the existing fitting and the customer will become responsible for the provision and maintenance of the new decorative fitting as part of a privately metered installation.

3.2 Commercial aspects of the current public lighting environment

This proposal outlines the efficient costs of providing the standard public lighting services. These services are underpinned by our existing capital costs plus new capital and operating expenditure. Ausgrid's capital and operating forecasts include the ongoing maintenance of our lights and investment in programs to replace old lights with new technology. The tables below detail Ausgrid's capital and operational expenditure and the revenue received.

Table 1.   Public Lighting Capital and Operational expenditure ($m, nominal)

Expenditure	2014/15	2015/16	2016/17	2017/18 (YTD - FEB)
Operating expenditure	24.99	23.70	17.74	7.59
Capital expenditure	16.46	12.97	9.25	6.79
Total	**41.45**	**36.67**	**26.99**	**14.38**

Table 2.   Public lighting revenue ($m, nominal)

Revenue	2014/15	2015/16	2016/17	2017/18 (YTD - FEB)
Operating expenditure	15.31	15.82	15.96	10.78
Capital returns	25.60	26.16	25.37	16.32
Total	**40.91**	**41.98**	**41.33**	**27.10**

3.2.1 Capital expenditure

Capital expenditure has three main drivers:

1. New Installations

New installations are those where no public lighting previously existed. These arise from customer requests for additional lighting and are typically due to roadway augmentations or new housing developments. New installations represent the smallest amount of capital expenditure to Ausgrid as this work is typically deemed contestable and the capital cost component is customer funded.

2. Reactive replacements

Where an asset is no longer serviceable or where replacement parts can no longer be sourced, the asset will be replaced with the standard Ausgrid luminaire for the particular class of road or purpose. Reactive replacements are usually driven by customer and resident requests or fault reports.

3. Proactive replacements

Proactive (planned) replacements are driven by the need to replace all of a particular type of technology on our network. Typically this is to introduce more cost efficient technology that reduces operational cost for both Ausgrid and the customer. Customers may request an accelerated replacement of a particular technology however, they would be required to pay all residual costs associated with the technology being replaced and Ausgrid would need to consider the resources that may be required to undertake this request.

3.2.2   Operating expenditure

Operating expenditure is recovered on a year to year basis through public lighting maintenance charges intended to cover the cost of scheduled and unscheduled maintenance activities.

Table 3 summarises Ausgrid's operating expenditure and the number of luminaires that have undergone both scheduled and unscheduled maintenance during 2014/15 to 2017/18.

Table 3.   Operating expenditure 2014/15 – 2017/18 ($m, nominal)

	2014/15	2015/16	2016/17	2017/18 (YTD - FEB)
Revenue (Maintenance Charges Only)	15.3	15.8	16.0	10.7
Actual Spend	25.0	23.7	17.7	7.6
Difference (revenue – Actual)	**-9.7**	**-7.9**	**-1.7**	**3.1**

Ausgrid exceeded the regulatory allowance for the maintenance of public lighting assets for 2014/15 through 2016/17. However changes in our operating model appear to be reducing the loss. This can be attributed to the blended delivery of spot repairs and the introduction and roll out approximately 40,000 LED street lights. Further detail on Ausgrid's operational expenditure and strategies can be found in Attachment 8.11 (Public Lighting Investment Plan).

3.2.3   Forecast Expenditure

Forecast capital expenditure has been estimated by using historical new and replacement installations as well as the proactive capital replacement programs. Forecast operating expenditure has been determined using a cost build up method of all scheduled and unscheduled maintenance associated with the various lamp technologies

Further information regarding both capital and operating expenditure can be found in Attachment 8.11 (Public Lighting Investment Plan).

Table 4 summarises the forecast capital and operating expenditure for the 2019-24 regulatory control period.

Table 4.   Forecast expenditure on public lighting services ($m, real FY19)

Expenditure element	2019/20	2020/21	2021/22	2022/23	2023/24
Capital expenditure	28.19	8.63	8.67	8.71	8.75
Operating expenditure	16.14	14.57	13.33	13.26	13.30
Total	**44.33**	**23.20**	**22.00**	**22.01**	**22.05**

It should be noted that:

- The capital expenditure proposal is mainly based on assumptions concerning the rollout of energy efficient luminaires using new technologies. This is subject to acceptance by public lighting customers and represents an increase in activity in 2017/18 to 2019/20, followed by a progressive reduction from 2021/22 onwards.
- The operating expenditure forecast represents a continuation of the actual costs that Ausgrid currently incurs.

Forecast revenue based on the estimated mix of assets at each year of the period is tabled below.

Table 5.   Forecast Public Lighting revenue ($m, real FY19)

Forecast Revenue ($M)	2019/20	2020/21	2021/22	2022/23	2023/24
Capital – Pre 09 Fixed charge	10.82	9.07	7.64	6.48	5.51
Capital – Post 09 annuity charge	18.76	19.32	19.89	20.46	21.04
Maintenance charges	16.14	14.57	13.33	13.30	13.30
Total	**45.72**	**42.96**	**40.86**	**40.24**	**39.85**

4   PUBLIC LIGHTING PRICES

In order to meaningfully charge customers, we need to convert the expenditure into prices which reflect the service being provided. The starting point is a basis for control which allows us to construct models to calculate the price. The inputs to the models are the key to ensuring all costs are accounted for.

4.1   Regulatory modelling

The goal of the regulatory models is to calculate the overall revenue requirements for the provision of public lighting services. Regulated revenue requirements are made up of a return on capital (financing costs), return of capital (recovery of depreciation expense), taxation liability and operational and maintenance costs.

For public lighting, there are three models being currently used to calculate the revenue requirements and hence public lighting prices. These are:

- *Pre 2009 'Fixed' Capital Charge Model* – this model rolls forward the regulatory asset base (RAB) with allowance for depreciation, indexation and assets that are written off. It calculates the return on and return of capital for each public lighting customer as well as the residual values of components that are replaced before the end of their economic life. There is no additional capital expenditure component

- *Post 2009 'Annuity' Capital Charge Model* – this model derives an annuity charge for each asset, taking into account the capital cost, its expected service life and the Weighted Average Cost of Capital (WACC)

- *Opex cost build up model* - contains a build up of costs associated with scheduled and unscheduled maintenance. Inputs to this model are based on Ausgrid's time and motion study, maintenance requirements analysis and the cost of labour, material and equipment associated with the maintenance of public lighting assets. These maintenance costs apply to both pre and post 2009 installed assets.

These models have been carried over from the 2015 determination with changes to inputs made to reflect the changes that have taken place in the intervening period.

4.2   Prices for public lighting services

Public lighting prices are split into operational (maintenance) and capital charges. The capital charges are further split into the pre and post July 2009 installed assets.

Attachment 8.12 (Public Lighting Price List) lists proposed prices for the 2019-24 regulatory control period.

Throughout the coming regulatory control period Ausgrid proposes that public lighting price increases will be limited to CPI.

4.3   Ausgrid's Pricing Models

Ausgrid's public lighting proposal sets out 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. Our capital and operating expenditure forecasts include the ongoing maintenance of our lights and investment in programs to replace old lights with new technology.

The existing capital costs have been included in the roll-forward of a public lighting asset base, which has been carried forward from the AER's 2015 public lighting determination. As

this only includes assets that were installed prior to 1 July 2009, new capital has not been added. This asset base has been depreciated and adjustments made for equipment that has been written off since 2010. The asset base has decreased from $140 million in 2010 to $38 million as at 1 July 2019. The closing RAB value of each public lighting asset from the 2015-19 model has been rolled into the opening value of the proposed 2019-24 model.

Ausgrid's prices for assets installed after 30 June 2009 include capital costs based on the annuity model from the AER's 2010 determination, which has been updated for the current inputs (see Attachment 8.09 (Public lighting – Post June 2009 Annuity Prices)).

A significant change to the way LED charges are recovered has been made. The annuity calculation for LED street lights is based on a 10 year period rather than 20 years which has historically been used. At the end of the 10 year period charges will cease. In addition Councils opted to pay an additional 5% of the annuity charge for warranty to be covered by Ausgrid. This means that if an LED fails during the 10 year period, Ausgrid covers the cost of replacement. This was the topic of extensive consultation with our customers and was mutually agreed.

Similarly, Ausgrid's operating expenditure forecasts are based on the AER's 2010 determination operating expenditure model updated for the most recent inputs. See Attachment 8.10(Public lighting opex cost build up model). Ausgrid has made two key changes to this model:

1. In previous models there was significant cross subsidy over lighting types. This has been removed to ensure greater cost reflectivity. This has the impact of increasing the charges associated with older HID type luminaires, but reduces the LED charges. As Ausgrid is planning to replace a significant proportion of HID luminaires prior to July 2019, the impact this will ultimately have is a reduction in charges to customers.

2. Ausgrid has adopted manufacturers' failure rates based on a four year bulk lamp replacement. This was necessary due to having no actual data available on the failure rates of lamps aged greater than three years. As the failure rates are not linear this is the best available data.