

Public Lighting Supporting Information



Part of the Energy Queensland Group

Contents

1. Introduction	1
2. Public Lighting Asset Bases	1
2.1 Historical Context	1
2.2 Assets included in the PLAB	2
2.3 Capex.....	2
2.4 Lifecycle of public lights.....	2
3. Operating expenditure.....	3
3.1 Energex opex.....	3
3.2 Ergon Energy opex.....	3
3.3 Overhead	4
4. LED Transition.....	4
4.1 Customer involvement.....	5
4.2 LED opex	5
4.3 LED tariffs	6
4.4 LED volumes.....	6
5. Tariff Outcomes.....	7
6. Key customer issues	8

1. Introduction

In its Draft Decision, the AER encouraged Energex and Ergon Energy to provide stakeholders with increase transparency regarding Public Lighting. This document supports our Revised Regulatory Proposal by providing additional insight into our approach to Public Lighting, its regulation, and the enabling of a transition to LEDs. It should be read in conjunction with the Energy Queensland Public Lighting Strategy (October 2018), The Energy Queensland Asset Management Plan – Public Lighting (October 2018) and each of the Energex and Ergon Energy Alternative Control Services 2020-25(January 2019) documents that supported our Regulatory Proposal.

2. Public Lighting Asset Bases

The Public Lighting Opening Asset Base (PLAB) for Energex and Ergon Energy are as follows:

Table 1: Opening PLAB as at 1 July 2020 (\$m, nominal)

\$M, nominal	Energex	Ergon Energy
LED	2.4	0.55
Conventional	113.3	99.8
Total	115.70	85.46

With an expected 331,467 active public lights at the start of the 2020-25 Regulatory Control Period, the written down average value of each public light on the Energex network is \$469. For Ergon Energy the average written down value is \$574 (148,978 active public lights). The different average values reflect the underlying assets, their age, and original cost.

2.1 Historical Context

The AER approved the establishment of separate asset bases for public lighting for Ergon Energy and Energex in 2010. Until that time, public lights formed part of the general asset bases and were regulated as Standard Control Services (SCS). The AER approved the valuation of the public lighting assets in 2010, and this value was removed from the SCS asset base.

The AER's Roll Forward Model has been used since 2010 to adjust the PLAB for additional capex, indexation, and depreciation. The original Energex PLAB of \$94.1 million (2009-10, nominal) had an average remaining life of 11.2 years. During the 2010-15 and 2015-20 regulatory control periods net capital additions have averaged over \$10 million per year (nominal), while depreciation charges averaged below \$8 million per year. The net addition of approximately \$3 million in capex and

indexation annually have resulted in the value of the Energex PLAB increasing to its current level. The situation was similar for Ergon Energy.

2.2 Assets included in the PLAB

The allocation of assets to the PLAB of Ergon and Energex is controlled by the categorisation of capital expenditures on individual work orders issued to installation crews. Through this process both Energex and Ergon Energy ensure that only luminaires, lamps and dedicated street lighting poles and connection equipment are included in the PLAB.

2.3 Capex

We have maintained our expectation for capital expenditure as provided in our Regulatory Proposal. The main drivers of our capex are the ongoing replacement of luminaires and introduction of new lights. Our replacement capex program is accelerated by the introduction of LEDs as we phase our Mercury vapour luminaires.

2.4 Lifecycle of public lights

Both Energex and Ergon Energy model public lighting luminaires using a 20-year expected life. This means that we anticipate that 5% of luminaire will require replacement each year. In addition, approximately one-in-five luminaires require maintenance each year. As well as luminaires,

- Poles and brackets are assumed to have a 40-year life.
- Lamps are assumed to have a three-year life.

An asset that last longer than its expected asset life does so to the benefit of customers. As assets are fully depreciated, we do not earn any revenue (i.e. return on capital and depreciation allowance) on these assets. The revenue determined from the building block model is based on remaining value of the PLAB but is recovered from all active assets (including fully depreciated assets). This results in a benefit to the customers in the form of a lower price per unit of asset.

Conversely, assets that require replacement ahead of their expected life add to the cost of public lighting for all customers associated with the asset base. The remaining value of a light that is replaced ahead of its expected life is recovered from all customers, rather than directly from the applicable customer.

The use of a PLAB can be seen to smooth the cost of public lighting for customers. It reduces the complexity by not assigning charges linked to the performance of individual assets.

The regulatory model reduces the potential volatility of charges for public lighting assets further by using 5-year regulatory control periods. Where the actual life of an asset differs from its expected life

within the same regulatory control period there is no impact on the tariffs. Conceptually, this has the effect of placing a range around the expected life of assets.

3. Operating expenditure

The Revised Regulatory Proposals use the actual opex costs incurred in 2018-19 as a basis for forecasting opex for each year in the regulatory control period. As reported in the Regulatory Information Notice, the 2018-19 public lighting opex for Energex was \$15.98 million. The 2018-19 public lighting opex for Ergon Energy was \$9.55 million including \$1.17 million that was previously incorrectly allocated to standard control services.

3.1 Energex opex

Luminaire maintenance was \$9.45 million of the total \$15.98 million opex during 2018-19. A total of 68,411 luminaires required maintenance, or 21% of the total portfolio. To calculate a unit rate for each year in the regulatory control period, we applied the real labour cost escalation and productivity improvement to the labour portion of the annual luminaire maintenance, while holding constant the material cost. The implied unit rate for luminaire maintenance declined from \$138.27 in 2020/21 to \$130.92 in 2024/25.

We then applied this unit rate to a decreasing quantity of luminaires, on the basis that LEDs will require less active maintenance as detailed in section 4.2 below.

We considered that the quantity of pole maintenance activity would remain unchanged and applied the material costs portion to each year. We adjusted the labour portion of annual pole maintenance costs for the real labour cost escalation rate and expected productivity improvements.

Table 2: Energex opex (\$ per year, real)

\$M, Real \$2020	2021	2022	2023	2024	2025
Opex - LED	412,180	814,696	1,538,776	2,431,200	3,503,501
Opex - Conventional	15,622,691	14,836,844	13,483,225	11,957,585	10,230,193
Total	16,034,871	15,651,540	15,022,001	14,388,785	13,733,694

3.2 Ergon Energy opex

Luminaire maintenance was \$5.36 million of the total \$9.55 million opex during 2018/19. A total of 27,899 luminaires required maintenance, or 19.5% of the total portfolio. To calculate a unit rate for each year in the regulatory control period, we applied the real labour cost escalation and productivity improvement to the labour portion of the annual luminaire maintenance, while holding constant the

material cost. The implied unit rate for luminaire maintenance declined from \$192.45 in 2020/21 to \$187.94 in 2024/25.

We then applied this unit rate to a decreasing quantity of luminaires, on the basis that LEDs will require less active maintenance as detailed in section 4.2 below.

We considered that the quantity of pole maintenance activity would remain unchanged and applied the material costs portion to each year. We adjusted the labour portion of annual pole maintenance costs for the real labour cost escalation rate and expected productivity improvements.

Table 3: Ergon Energy opex (\$ per year, real)

\$M, Real \$2020	2021	2022	2023	2024	2025
Opex - LED	213,056	621,288	1,192,486	1,911,072	2,786,997
Opex - Conventional	9,361,678	8,577,439	7,573,806	6,414,165	5,084,165
Total	9,574,734	9,198,728	8,766,292	8,325,237	7,871,162

3.3 Overhead

We adopt the AER's Draft Decision overhead rate of 31.9% for Energex. We adopt the AER's Draft Decision overhead rate of 35% for Ergon Energy. The overheads applicable to public lighting are provided in Table 4.

Table 4: Overheads (\$ per year, real)

\$M, Real \$2020	2021	2022	2023	2024	2025
Energex	5,115,124	4,992,841	4,792,018	4,590,022	4,381,048
Ergon Energy	3,351,157	3,219,555	3,068,202	2,913,833	2,754,907
Total	8,466,281	8,212,396	7,860,221	7,503,855	7,135,955

4. LED Transition

Our Revised Regulatory Proposals include our plan, developed with customers, to accelerate the replacement of existing lights with LEDs, as this technology is known to lower customer energy costs. By 2025 we anticipate 47% LED penetration across both the Energex and Ergon Energy networks.

As part of this transition, Energex and Ergon Energy will accelerate the roll out by using LEDs for new connections and replacement assets. Our approach is to target LED replacements by geographic areas, potentially accelerating the retirement of some of the existing asset street lighting fleet where it is economically efficient to do so. Transitioning whole geographic areas to LEDs will allow the modification of operational practices and resourcing that are expected to reduce overall opex. As well as the direct reductions in cost, Energex and Ergon Energy have anticipated some value in reducing their exposure to the Mercury Vapour lights, which represent a business risk and

are becoming harder to source as a result of the United Nations Minamata Convention to limit anthropogenic emissions and releases of mercury and mercury compounds.

Our objective is to replace 75% of all existing mercury vapour lamps and luminaires with LEDs by 2025. We also expect 20-25% of life-expired/failed conventional lights to be replaced with LEDs in 2021, with this number increasing to 30-40% by 2025.

4.1 Customer involvement

We anticipate working with customers to sensibly manage the transition to LEDs. Through the tariff structure (see below) customers have an incentive to invest in LED public lights. For example, a customer paying an NPL1 conventional tariff can invest in an LED luminaire, with the new asset transitioning to the NPL4 LED tariff. Alternatively, a customer paying a NPL2 conventional tariff can invest in an LED luminaire, with the new asset transitioning to the NPL2 LED tariff.

In both cases, the customer will benefit from lower energy costs.

Energex and Ergon Energy will not charge exit fees when customers transition luminaires to LEDs. However, any remaining asset value will continue to form part of the conventional lighting PLAB. Energex and Ergon Energy anticipate working with customers to ensure that the vast majority of luminaires replaced with LEDs during the 2020-25 period will be fully depreciated by 2025.

4.2 LED opex

Maintenance is largely a labour expense, and therefore the cost of a maintenance event is assumed to be the same for both conventional and LEDs. To capture the anticipated cost savings and reductions in business risk to Energex and Ergon Energy, we have assumed that only one percent of LEDs will require maintenance in 2021, rising to one in twenty in 2025. This compares to one-in-five for conventional lights. The resulting opex charge for LEDs is less than half that of conventional lights in 2021. By 2025, the opex charge per LED is approximately 75% that of a conventional light.

Table 5: opex charge per luminaire (\$ per year, nominal)

\$M, nominal	2021	2022	2023	2024	2025
Energex - LED	27.50	28.94	30.35	31.72	32.98
Energex - Conventional	65.07	64.21	63.38	62.57	61.65
Ergon Energy – LED	40.22	42.57	44.92	47.26	49.46
Ergon Energy - Conventional	88.18	87.69	87.23	86.78	86.16

4.3 LED tariffs

Tariffs for LEDs pick up these opex costs. The NPL1 LED tariff includes this opex charge, plus 90% of the return of and return on capital charges of the LED asset base. This reflects that Energex and Ergon Energy are responsible for supply all equipment used in NPL1 lighting.

The NPL2 LED tariff includes the opex cost and 10% of the return of and return on capital charge of the LED asset base. Assets supporting this tariff category are originally funded by customers, but Energex and Ergon Energy are responsible for their replacement (as required).

The NPL4 tariff has been established for customers wishing to fund the upgrading of conventional NPL1 luminaires to LED. This tariff is made up of the opex charge plus 70% of the NPL1 capital charges. The capital portion of this tariff reflects the portion of the PLAB that is attributable to the pole (which Energex and Ergon Energy provide). The responsibility for asset replacement for this tariff category will also remain with Energex and Ergon Energy.

4.4 LED volumes

Energex and Ergon Energy anticipate a resource-constrained industry, which will naturally limit the speed at which we and our customers can transition to LEDs. As such, we have continued to assume the simple growth rate for LEDs as in our Regulatory Proposals.

Table 6: Forecast total LED installations

	2021	2022	2023	2024	2025
Energex - Major LED	5,884	11,021	19,785	29,818	41,165
Energex - Minor LED	13,889	26,111	47,098	71,286	98,962
Ergon Energy - Major LED	2,068	5,690	10,335	15,732	21,896
Ergon Energy - Minor LED	5,083	14,012	25,500	38,864	54,180
Total	26,924	56,834	102,718	155,700	216,203

5. Tariff Outcomes

Our Revised Regulatory Proposal results in tariffs that will result in a reduction in rates at the start of the 2020-25 Regulatory Control Period. Annual increases are then limited to inflation.

Table 7: Energex tariff outcomes

\$/day, nominal	2020	2021	% Change	LED incentive
NPL1 - Major Conventional	0.866	0.844	-2.5%	
NPL1 - Minor Conventional	0.398	0.388	-2.5%	
NPL2 - Major Conventional	0.301	0.293	-2.7%	
NPL2 - Minor Conventional	0.146	0.142	-2.7%	
NPL1 - Major LED	0.866	0.424	-51.0%	49.8%
NPL1 - Minor LED	0.398	0.257	-35.4%	33.8%
NPL2 - Major LED	0.301	0.197	-34.6%	32.8%
NPL2 - Minor LED	0.146	0.131	-10.3%	7.7%
NPL4 - Major LED		0.336		60.2%
NPL4 - Minor LED		0.207		46.6%

The LED incentive is the difference between the relevant conventional and LED tariffs expressed as a percentage reduction of the conventional tariff. For NPL4, the NPL1 conventional tariffs are referenced.

Table 8: Ergon Energy tariff outcomes

\$/day, nominal	2020	2021	% Change	LED incentive
NPL1 - Major Conventional	1.31	0.936	-28.5%	
NPL1 - Minor Conventional	0.78	0.558	-28.5%	
NPL2 - Major Conventional	0.529	0.378	-28.5%	
NPL2 - Minor Conventional	0.346	0.248	-28.3%	
NPL1 - Major LED	1.31	0.399	-69.5%	57.4%
NPL1 - Minor LED	0.78	0.253	-67.6%	54.7%
NPL2 - Major LED	0.529	0.292	-44.8%	22.8%
NPL2 - Minor LED	0.346	0.194	-43.9%	21.8%
NPL4 - Major LED		0.337		64.0%
NPL4 - Minor LED		0.216		61.3%

The LED incentive is the difference between the relevant conventional and LED tariffs expressed as a percentage reduction of the conventional tariff. For NPL4, the NPL1 conventional tariffs are referenced.

Customers will benefit from Energex and Ergon Energy's LED rollout, as the LED tariffs are lower than the conventional equivalents. Customers also have an incentive to invest in LEDs. For new installations, this will expose them to the lowest public lighting tariff (NPL2 LED). Customers also

have the incentive to fund the replacement of existing NPL1 conventional lights with LEDs, as this will result in the NPL4 tariff being applied.

6. Key customer issues

The AER published a series of questions raised by the City of Gold Coast on behalf of public lighting customers. We address each issue here.

Table 9: Submission responses

Issue	Description	AER Response	Our Response
1	Energex stated it owns and operates 325000 public lights, being the quantity of lights of both NPL1 and NPL2 tariffs, which includes those gifted to Energex by customers.	Those assets gifted to Energex are considered Energex 'owned', allowing Energex to operate and maintain them. While not technically incorrect, we have included mention of the quantity of these assets that have been gifted by customers.	Energex and Ergon Energy manage and maintain public lighting assets as a single portfolio and do not differentiate assets on the basis of their initial funding.
2	Energex stated a target of 47 per cent LED rollout by end of 2020.	Energex has confirmed this error; the target is 47 per cent by the end of 2025.	As per AER response.
3	City Council of Gold Coast (CCGC) does not consider asset costs attributed to Energex's shared assets (poles and wires) should be borne by the customer.	Energex is entitled to recover the costs of these assets. This recovery can be apportioned between standard control services and public lighting services (as alternative control services) in a way that reflects the shared usage. We support CCGC's recommendation that Energex provide more transparency around the cost breakdown of capital expenditure, demonstrating how much - if any - of the poles and wires costs are recovered through public lighting tariffs.	As per AER response. Our practice is for dedicated steel poles to be included in the public lighting asset base. No shared pole and wire assets are assigned to the PLAB.
4	CCGC suggested contestability be introduced for services and maintenance on all public lighting assets to remove Energex's monopoly over lighting services.	While the AER promotes contestability in markets, the powers to introduce contestability lie with the jurisdictional government, i.e. Queensland Government. We note that Energex does allow for customers to own and maintain their own assets on the NPL3 tariff, with Energex only providing the electricity supply.	As per AER response. Both Energex and Ergon Energy also competitively source most public lighting installation and maintenance activity.
5	CCGC is concerned that Energex's monopolistic framework prevents alternative technology and suggested that NPL2 assets are returned to customers to provide opportunities for customers to deliver alternative technology such as solar/battery solutions.	We welcome further discussion between Energex and CCGC regarding this, noting that alternative technologies could be best suited to the NPL3 tariff.	Energex and Ergon Energy continuously evaluate new public lighting technologies in conjunction with customers.
6	CCGC has concerns around the impact of the building block approach, and how the LED rollout will impact the revenue Energex is allowed to recover.	Energex proposed separate models for conventional and LED lighting. This allows for appropriate costs to be recovered from the relevant customers. The conventional lighting asset base will continue to be recovered from conventional lighting customers until the asset base is depleted. At that point, all customers will be using LED lighting, or will be paying a lower charge, net of	Energy Queensland has directly engaged with CCGC and other customers to explain the application of the building block approach. Separate forums for Energex and Ergon Energy customers were also held prior to the release of the Revised Regulatory Proposal.

Issue	Description	AER Response	Our Response
		capital costs (to be addressed in a future regulatory determination). There is no need for Energex to revalue any assets, and the value capitalised at the beginning of the asset will remain. We recommend further discussion between Energex and CCGC to offer further transparency.	
7	CCGC disputed the value assumed by Energex to calculate the opening public lighting asset base.	Energex has used the AER's RFM to calculate the opening public lighting asset base value. Energex has confirmed errors in its capital expenditure and customer contributions and have updated the RFM to reflect the amounts provided in its annual RINs. This is reflected in a new opening asset value.	As per the AER response. Energex and Ergon Energy have been regulated by the AER since 2010. The AER has approved the opening PLAB.
8	Energex's proposal is silent on the total value of the non-network assets and capitalised overhead costs included in capital expenditure, as well as the proportioned amount of each item.	Energex provided models for the capital expenditure for both conventional and LED lighting. These models show all components of the capital expenditure forecasts. Note our Draft Decision on capitalised overheads above.	As per the AER response.
9	Energex's proposal is silent on its expectation of funding responsibility to achieve its target of 47 per cent LED penetration by 2025.	Energex provided details of its LED rollout strategy in its Public Lighting Asset Management Plan. This included removal of mercury vapour lamps and luminaires from use, replacement of failed/life-expired lights, and new lights. This document also mentions approaches to minimising costs. We recommend further discussion between Energex and CCGC to offer greater transparency and recommend Energex addresses this further in its revised proposal, including clarity around who bears responsibility for the LED changeover. We note that LED tariffs are lower than conventional lighting, and that where a customer gifts the asset (or the LED only for NPL4), there should always remain a fiscal incentive due to decreased operating expenditure incurred with LED lighting.	47% LED penetration is a target which will be driven by the savings it affords our customers and our desire to remove from operation Mercury Vapour Lights (MVLs). Customers are under no obligation to switch but have an incentive to do so through the LED tariff structure. Energex and Ergon Energy will roll out LEDs – targeted to deliver operational cost savings and for the removal of MVLs. If the target is not met (or exceeded) more (or less) lights will remain on the conventional tariffs. We have provided additional detail on the LED rollout strategy in section 4 of this document.
10	Energex has not provided information to customers on request regarding the makeup of the public lighting asset base.	Energex has advised that it has since provided an asset register to CCGC.	Energex and Ergon Energy maintain asset registries, which we can (and do) provide to customers. However, the PLAB does not identify individual assets, and is maintained as a total value only.
11	Energex included a tax allowance in building block revenue requirements for all public lighting.	This tax allowance is in line with the building block approach used in our PTRM treatment of the asset base.	As per AER response.
12	Energex's NPL4 LED Minor tariff (customer contributed LED lamp, Energex asset) is higher than NPL1 LED Minor tariff (Energex owned and operated).	See comments in LED Rollout section above regarding NPL4 tariff.	We have corrected this error in our Revised Regulatory Proposal.

Issue	Description	AER Response	Our Response
13	Energex's LED tariffs do not incentivise funding from customers.	Corrections of errors in the model, AER adjustments to overhead applications, and corrected historical capital expenditure have changed Energex's tariffs. These tariffs now reflect up to 32 per cent of savings compared to conventional lighting.	Our Revised Regulatory Proposal results in public lighting tariffs that provide a clear incentive for customers to fund the replacement of NP1 conventional lights with LEDs.
14	Prices for conventional NPL2 to LED NPL2 is inadequate to support customer funding.	There is no charge or exit fee for customers to transition to LED. Prices are lower than conventional, providing incentive to change, and providing long-term benefits.	Energex and Ergon Energy are responsible for the end-of life replacement of NPL2 assets. The difference between the NPL2 conventional and LED tariffs pass through the expected operating and maintenance costs savings with LEDs.
15	Energex is silent on conversion of LED NPL4 to alternative rate type at end of life.	We consider that NPL4 assets should be treated similarly at end of life as other tariffs, in that they shall remain on the NPL4 tariff. We recommend Energex includes more detailed information regarding the treatment of public lighting tariffs at the end of the asset's life in its revised proposal and supporting documents.	NPL4 assets will continue to be categorised as NPL4 at the end of life, with the net cost of the replacement asset being added to the NPL4 regulated asset base. This is consistent with the inclusion of 10% of capex spend being allocated to the NPL2 public lighting categories. For the 2020-25 period no CAPEX allocation will be made to NPL4, but this will be needed in the following regulatory period.
16	Energex is silent on the process for customer funded assets at end of life.	Where customers contribute assets on the NPL2 (or NPL4) tariff, these assets are gifted to Energex and then maintained by Energex and are therefore retained by Energex. Where Energex replaces the asset at end-of-life, the customer remains on the NPL2 tariff, where they are responsible for only a fraction of the capital expenditure involved. Where customers intend to use the asset past the end-of-life, or upgrade the asset in any way, we recommend the NPL3 tariff be used.	As per AER response.
17	Energex is silent on deployment and costs of advanced technologies and data options.	Energex's base offering of LED lighting includes a 7 pin NEMA socket to facilitate future technology developments. Energex continue to participate in trials of LED advanced technology trials. Energex discussed improvement and innovation in both its public lighting strategy and asset management plan.	As per AER response.
18	Energex did not provide a full draft proposal as was advised, limiting the ability for customers and stakeholders to fully understand the issues related to public lighting.	While the AER recommends active consultation between DNSPs and respective customers and stakeholders, it appears that this has not occurred between Energex and a number of its public lighting customers, including CCGC. The AER recommends both parties work towards a more constructive consultation process. We note that Energex held 7 forums in 2018 dedicated to public lighting in regard to its 2020–25 Regulatory Proposal.	In addition to the forums held prior to the publication of the Regulatory Proposals, Energex and Ergon Energy have also held additional dedicated public lighting forums ahead of the submission of the Revised Regulatory Proposals. We have met with the CCGC and other public lighting customers directly, and ACS (including public lighting) has been included in general customer forums.

Issue	Description	AER Response	Our Response
18(b)	Price increases - public lighting constitutes approximately 60% of most LGA's electricity spend.	The prices in Energex's proposal are decreasing from the 2019–20 year, as are the adjusted prices in our Draft Decision. For subsequent years, prices increase by inflation each year only.	As per AER response. Our Revised Regulatory Proposal proposes a reduction in public lighting tariffs in 2021, with subsequent increases limited to the rate of inflation.