

EMS Consultant Report

Streetlight Upgrade to High Efficiency LED Technology

PURPOSE

To seek approval from Council for the bulk upgrade of Councils streetlighting fleet from aged low efficiency technology to modern high efficiency Light Emitting Diode (LED) technology.

BACKGROUND

Councils existing fleet of 571 streetlighting luminaires are of high-pressure sodium (HPS) technology. This is an aged technology with high energy use, requires high maintenance to provide an acceptable level of service and provides a relatively poor quality of light with poor colour rendition.

In recent years light emitting diode (LED) technology has been proven to be a preferred technology for streetlighting luminaires. LED technology is low energy use with improved reliability and lower maintenance costs and provides improved lighting quality with good colour rendition.

Reduced energy use and lower maintenance costs result in savings that can fund the bulk replacement of the in-service aged technology luminaires with modern LED technology.

REPORT

Essential Energy provides Council with streetlighting services connected to and supported by the Essential Energy distribution network. The charges for the service being a monopoly are regulated by the Australian Energy Regulator (AER).

Consultants EMS have validated the proposed charging of the replacement works and ongoing maintenance charges and savings have been confirmed.

As streetlighting is a monopoly service Council can not engage another service provider for this work resulting in a negotiated service from Essential Energy being the only option under current legislation.

Essential Energy have conducted an initial evaluation of the existing lighting installations and lighting levels and developed a proposed replacement for each luminaire with a schedule of rates for each luminaire type. Any variance in costs that a more detailed review may determine is expected to be small and can be accommodated within a small contingency allowance.

In general lighting levels would increase in most areas. The bulk of residential luminaires will have higher lighting levels providing an improved service and safety to the community.

The bulk replacement project will result in the following benefits:

- An approximate 60% reduction in energy consumption saving \$44,000 per annum
- An increase in the annual streetlight luminaire charges for the next 10 years of \$8,500 while funding Essential Energy's capital followed by an ongoing annual reduction in luminaire charges of \$29,000 for the balance of the luminaires life
- An improved standard of reliability from annual failure rates currently over 10% to less than 2%
- Improved lighting standards and improved colour rendition
- More robust luminaire diffusers less prone to external damage

The proposed bulk replacement programme aligns with the following policy objectives of Council:

- Reduction in energy consumption and resultant greenhouse gas emissions
- Reduction in ongoing operating costs
- General improvement in amenity for the community through an improved quality of lighting and its reliability

FINANCIAL RESOURCE IMPLICATIONS

The project has been assessed against the status quo of continuing with the existing in-service luminaires and results in a positive Net Present Value as detailed in the table below:

Upgrade Costs	\$	
Cost Payable to EE	\$1,510	Residual value of existing lights
Contingency	\$5,000	
Estimated ESC Credits	(\$45,015)	Estimate refundable from NSW Gov
Net Capital Credit	(\$38,505)	
Change in Annual Costs	\$	
Streetlight Charges	\$8,564	Reduction for first 10 years then (\$29,243) reduction after 10 years
Energy Costs (Saving)	(\$44,052)	Energy and Network charge savings
Total Annual Savings cost years 1 to 10	(\$35,488)	After 10 years annual saving increases to (\$73,295)
Net Present Value	\$	
NPV 15 Years @ 5%	\$507,346	Compared to existing in-service luminaires of old technologies
NPV 15 Years @ 3%	\$590,995	

LEGAL IMPLICATIONS

Nil.

RISK IMPLICATIONS

The incremental risks over the existing in-service luminaires are summarised in the table below:

Risk Description	Description	Mitigation
Premature Failure	The LED luminaires may have a shorter life than expected	<ul style="list-style-type: none"> • Essential Energy capital is at risk • Extensive EE trials • 3-year luminaire and installation warranty to replace • 10-year luminaire only warranty
Glare Complaints	Improved lighting may result in some glare complaints from residents	<ul style="list-style-type: none"> • Glare shields are available • Desk top lighting design review prior to installation

STAKEHOLDER CONSULTATION

Siding Springs Observatory

The Observatory has been consulted and provided with data sheets for the proposed luminaires. Due to the proximity to the Observatory the highway lights typically with a colour temperature of 4000 Kelvin will be procured at minimal additional cost to provide a lower colour temperature of 3000 Kelvin the same as the residential luminaires. This is the same approach as taken by Gilgandra Shire Council.

Smart Lighting

Smart lighting uses a controller in the luminaire that communicates via a local communication device to a master controller which would be managed by Essential Energy. The main benefits of smart lighting are automatic reporting of failed lights and dimming during periods of low traffic volume to reduce energy consumption.

Essential Energy have undertaken a market exercise to source smart controllers for LED lights. This exercise has been protracted and a firm decision is yet to be made. A positive business case for the use of smart controllers has not yet been confirmed and in the case of Warrumbungle Shire Council has limited potential to provide any material savings as only 169 luminaires are the higher wattage highway lights and of these over half are of the lowest highway wattage size at only 80W LED. For residential luminaires of typically 17W and 33W the business case for smart controllers is most unlikely to be positive as any dimming would achieve minimal savings.

OPTIONS

Council has three options to consider:

Option 1 - Do nothing and replace at failure - The business case is such that the replacement is self-funding as detailed in the Financial Implications section. Failure to take a bulk replacement approach would result in a piecemeal approach at failure by Essential Energy which would have negative amenity impacts due to variable lighting standards and the potential savings in maintenance and energy would only be realised over many years.

Option 2 - Bulk Replacement funded by Council – This exposes Council to the risk of premature failure where Essential Energy will replace failed luminaires and charge a higher tariff to recover capital. Council's capital is at risk rather than Essential Energy's. For this option the NPV over 15 years with a discount rate of 3% is \$576,000 compared to Option 3 – Essential Energy Funded with an NPV over the same period of \$591,000.

Option 3 - Bulk Replacement funded by Essential Energy – This is the preferred option. It does not expose Council to the risk of premature failure of luminaires and has a higher NPV than Option 2 at \$591,000 over 15 years with a discount rate of 3%.

CONCLUSION:

It is recommended that Council approve the bulk replacement of Councils 751 streetlights to LED technology with funding by Essential Energy. The only cost payable to Essential Energy is \$6,500 for residual capital and project contingency. With estimated NSW Government credits for energy savings of \$45,000 the net upfront gain to Council is \$38,500 plus ongoing annual savings in energy and maintenance of \$35,500.