



Queensland Energy Efficient Street Lighting Trial

Project overview

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The Queensland Energy Efficient Street Lighting Trial is a joint initiative between the Queensland Government, local councils, electricity distribution companies and the Australian Government.

This project is expected to lead to:

- identification of the most energy efficient street lights for various environments across a large part of Queensland
- successful lamp types being made available by electricity distribution companies for deployment within councils
- potential greenhouse gas reductions, as well as potential financial savings from resulting operation, maintenance and replacement costs (which includes reduced energy use by councils)
- enhanced partnerships between key public lighting stakeholders (councils, Queensland Government, electricity distribution companies) as well as the Australian Government.

Project partners

This partnership brings together the key stakeholders in the public lighting field. All partners are contributing financially to the trial.

The financially contributing partners to the trials are:

- Queensland Government - Department of Mines and Energy
- ENERGEX
- Ergon Energy
- Brisbane City Council
- Gold Coast City Council
- Ipswich City Council
- Sunshine Coast Regional Council (formerly Maroochy Shire Council)
- Moreton Bay Regional Council (Caboolture District) (formerly Caboolture Shire Council)
- Australian Government - Department of the Environment, Water, Heritage and the Arts

Data collection

The energy efficient street lighting trials will collect data on energy efficient streetlight options using a purpose-built Public Lighting Performance Data Collection Unit (the 'collection unit') - to collect data on the performance of various lamp technologies under a range of environmental and network conditions.

Trial design

The trial will be conducted over a three-year period, and will involve an estimated 300 street lights across 13 locations throughout South-East Queensland and two locations in regional Queensland.

The lights being trialled include:

- compact fluorescent
- T5 linear fluorescent.

As well as the following two emerging lamp technologies:

- metal halide
- white LED.

The lamps will be clustered in groups (or pods) with varying numbers of lamps per pod (eg 12, 13 or 20), located in sites with different environmental conditions around the distribution network e.g. coastal, hinterland, industrial, hot, cool, tropical, locations with high lightning activity. This will ensure that the results from the trial sites will be applicable to the extremes of conditions of the majority of the South East and regional Queensland.

It should be noted that the trial is to test the performance of the lamp technology and the trial will not be an endorsement of any particular lamp brand or the luminaire.

Use of the collection units

The purpose of the collection units is to measure, log and deliver data relating to a number of defined parameters, including:

- ambient site temperature
- ambient site relative humidity
- illuminance from luminaire at the cover/diffuser/bowl of the luminaire
- pole vibration (frequency/amplitude)
- mains voltage supply
- voltage surges (frequency - from lighting strikes or transmission line clashes)
- current supply to luminaire.

The collection units will be able to identify lamp failure, and potential causes of lamp failure, as well as the light output performance of the lamps throughout their life.

A database has been built to capture the information downloaded from the collection units and will store the data for the length of the trial. During the trial independent advice will be sought to analyse the data and provide a final report examining operating costs (eg lamp life is a contributing factor), energy efficiency and greenhouse gas emissions of the technologies, as well as other technical and logistical issues.

Deliverables

- The trial will deliver a report that will analyse lamp performance and provide recommendations on the most appropriate lamps for particular environmental conditions. The report will also outline the expected greenhouse gas savings and operational and maintenance costs of using the trialled lamp types.

Project context

Australia has approximately 2 million streetlights. Annually, public lighting costs \$210 million, uses 1035 Gigawatt hours (GWh) of electricity and is responsible for 1.15 million tonnes of carbon dioxide emissions (equates to 0.2 per cent of Australia's total greenhouse gas emissions). If more efficient street lighting is widely introduced after the trial, this will have the potential to reduce Australia's total greenhouse gas emissions.

Local Governments have a clear incentive both for economic and environmental reasons to seek more energy efficient options for public lighting. Electricity costs for public lighting on minor roads are estimated to represent between 30-50 per cent of a Local Government's total electricity bill. Greenhouse gas emissions derived from energy use in public lighting make up between 20-50 per cent of total council emissions.

Various lighting technologies have been trialled across Australia, proving that energy reductions and greenhouse gas savings are possible through replacement of existing lights. This trial is unique to other trials because it has the ability to gather, store and download information such as power usage, light output, and temperature for each of the lighting technologies. This information is gathered via the purpose-built Public Lighting Performance Data Collection Unit.

By way of background, in 2006, a Technical Working Group was formed to conduct a technical review of possible technologies that could be assessed under the energy efficient street lighting trial. The members of the Group had technical expertise, and comprised the following:

- The Department of Mines and Energy.
- The Brisbane City Council.
- Gold Coast City Council.
- Maroochydore Shire Council.
- ENERGEX.
- An independent lighting consultant.

Ergon Energy joined the process in early 2007.

In order to effectively identify and compare the strengths and weaknesses of lamp technologies suitable for trial, the Group used the following criteria for lamp selection:

- White light appearance.
- Colour Rendering Index (CRI).
- Lamp efficacy.
- Operational Maintenance and Replacement (OMR) cost.
- Capital cost.
- Lumen depreciation.
- Rated lamp life.

It was agreed that the trial would include technologies capable of being implemented today (market ready), and newer technologies representing leading edge technology.

After conducting a tender evaluation process the lights being trialled include market ready technologies:

- Compact fluorescent.
- T5 linear fluorescent.

As well the following leading edge lamp technologies:

- Metal halide.
- White LED.

Xenon was considered. However, it was decided not to be deployed for the trial due to a range of considerations such as cost and logistics. For example, there is no xenon lamp equivalent as a suitable replacement for a 50 watt mercury vapour lamp.