

SUSTAINABLE LED LIGHTING HITS THE STREETS OF BAW BAW SHIRE

Raj Manihar

Environmental Coordinator, Baw Baw Shire Council, Warragul Victoria 3820, Australia

Abstract

The Baw Baw Shire Council Street Lighting Energy Efficient Changeover Program is a community energy efficiency project on a giant scale that involved changing over 2,638 old and inefficient street lights to modern energy efficient LEDs. The total cost of the upgrade was \$1.2 Million with \$489,546 in grant funding received from the Australian Government.

Each light changed represents a 77% reduction in electricity costs. These are savings that have started to flow through to the council, ratepayers and broader community – a total of \$5.06 million in energy and maintenance savings over the 20-year life of the new lights. The project has resulted in a reduction of energy use by over 830,000 kWh a year which will result in a reduction of greenhouse gas emissions by over 20,000 tonnes over the next 20 years.

In addition to offering lower costs, lower energy consumption and lower greenhouse gas emissions, the new lights provide better lighting outcomes for the community, including a greater uniformity of light across and along Baw Baw's streets; better colour rendering and visibility; less depreciation of the light output over time; and lower glare. Moreover, the flow-on benefits from the community promotion and education component of the project has been far and wide, particularly in terms of increased awareness of residential and commercial energy savings..

Key Words – LED, Energy Efficiency, Public Lighting, Street Lighting Community Energy Efficiency Program, Greenhouse Gas reduction, Clean Energy Finance Corporation.

Project Objectives

The project aimed to replace large numbers of inefficient street lights with more efficient lights with the following objectives in mind:

- Maximisation of energy savings within project budget;
- Maximisation of greenhouse gas reduction;
- Reduction in Council and ratepayers electricity costs; and
- Sharing the learning and promoting energy efficiency with the community

The project was also guided by the following requirements, each of which were met:

- A proper procurement process was implemented as per the requirements of

the Local Government Act and through partnership with the Municipal Association of Victoria's (MAV) Street Lighting bulk procurement project.

- Safe and efficient work practices were undertaken.
- The project considered above-standard lighting in areas of crime and public safety concern.
- Community information was disseminated including information on the benefits of the project to community organisations in saving energy and reducing greenhouse emissions.
- Engagement of local industry (in particular the Distribution Network Service Provider Ausnet Services, lighting manufacturers and local installers).

Project Outcomes and Outputs

The following outcomes of the project were met.

1. Installation of the most energy efficient lights approved:
 - a. 2,638 x 80 Watt Mercury Vapour (MV) lights were replaced by 18 Watt LEDsⁱ.
2. Financial and environmental savings:
 - a. Over 1,000 tonnes of greenhouse emissions saved per year.
 - b. 20,530 tonnes of greenhouse emissions will be saved during the life of the new assets over 20 years.
 - c. \$5.06 million in energy and maintenance savings over 20 years.
3. Community education and promotional project:
 - a. A raft of promotional activities were undertaken including distribution of fact sheets, regular updates about progress and outcomes of the project in local papers, and a launch that showcased the collaborative energy efficiency project between local and Federal Governments and the Clean Energy Finance Corporation² (CEFC).
 - b. Local communication channels include the Baw Baw Sustainability Network, Gippsland Climate Change Network (GCCN), Warragul Police and Council's Environmental Voice Group and Council webpage.

Project Energy Efficiency Activities

The project involved replacing 2,638 inefficient and polluting MV lamps in Category P (residential) streets throughout the Shire of Baw Baw.

LED Technology

When Council originally developed the funding application for Community Energy Efficiency Program¹ (CEEP) the only energy efficient technology approved by the owner of the assets (Ausnet Services) was compact fluorescent lights. The original project plan was based on installing 2x14W

“T5” lights. These were the only approved energy efficient replacement options for 80-Watt MV streetlights and provided a clear improvement to MV lamps in terms of lumens per watt and light colour. However while these would have been an efficient and suitable alternative, Council's preference was to install more modern LEDs. In June 2014 Local Network Distributor approved an LED street light for use on their network.

The capital cost of the LED was higher than the “T5”, but the overall cost savings and environmental benefits are superior. So the decision was made – in conjunction with the Department of Industry– to purchase and install LEDs.

LED technology has developed rapidly over the last five years. From a position where the upfront costs were prohibitively expensive, costs have now reduced dramatically with the size and reliability of savings significantly improved. In their landmark 2012 report, *Lighting the way: Perspectives on the global lighting market*, McKinsey & Co predicted that the price of LEDs would reduce by around 14% per year between 2010 and 2015.

Indeed over the last four years costs have fallen even faster than expected and by 2020, LED streetlights are expected to reach cost parity with legacy technologies, making their benefits to costs immediately positive. Furthermore, with many countries rapidly urbanising and in need of improved street lighting infrastructure, this has created an enormous market opportunity. Between 2015 and 2025, LED street lighting investment is projected to cumulatively reach \$57.8 billion³ of global investment pipelines which has already resulted in improved technology and cost reductions.

The key reasons for the decrease in prices are technology advancement and increased competition. Firstly, LED lighting is considerably more efficient than traditional

lighting technology, which means that consumers can significantly reduce energy use. This is expected to continue with key international bodiesⁱⁱ stating that while it can be difficult to predict the speed at which the technology will develop, LEDs are predicted to increase in efficiency over the coming decade.

Prices are also falling through market forces. All large lighting manufacturers are spending significant money and resources on research and development and marketing of their LEDs. As competition increases, prices are decreasing.

Baw Baw is also one of the 68 councils in Victoria that have joined together to reap the benefits of bulk procurement of LEDs across local government boundaries which has seen increased competition and large reduction in capital costs as more than 232,000 lights are in the process of being changed over to energy efficient alternatives.

Finally, LED is also considerably better from an on-going maintenance perspective.

Implementation

The project implementation involved the replacement of old inefficient 80 W MV lamps with the efficient 18 W LED Lamps

1. Find this



An old inefficient 80W MV

2. Replace with this



The efficient 18W LED alternative

Target Audience and Stakeholders

Before the project, Council mapped out key stakeholders and audiences, including internal project partners and stakeholders (involved in the delivery of the project). The following key stakeholders were engaged throughout the project:

- Local Network Distributor
- MAV Procurement
- Gerard Lighting (manufacturers)
- Accredited Installer
- Council staff
- Department of Industry

External community groups were also identified, including:

- Residents of Baw Baw and Council's Environment Voice Group
- The Baw Baw Sustainability Network
- Gippsland Climate Change Network and Warragul Police.
- Local commercial and industrial businesses
- Police and community safety representatives

Council maintains close engagement with local environmental groups about a range of Council and Community environmental initiatives. This project was a great opportunity to build on these close relationships and build the capacity of the broader community.

Outcomes and Benefits

The project outcomes are:

Outcome	Observed
Energy reduction KWh/year	847,304
GHG tonne/year	1,144
GHG over life of assets tonne	20,530
Savings over life of assets	\$5.0 M

Energy reduction, GHG emissions and financial savings were higher than expected because Council ended up installing LED lights which are more energy efficient than

the originally planned “2 x 14W T5” compact fluorescent lights. This resulted in greater energy reduction, greater GHG savings and greater financial savings.

Baw Baw – along with other Victorian councils – has been investing options for a street lighting “bulk change” for nearly a decade and it has only been in the last few years that these projects have become mainstream. While Baw Baw is one of the first councils in the Gippsland region to complete this project, general processes have become more streamlined given the increased number of projects throughout the state and the fact that the asset owners Local Network Distributor has now been fully engaged and were familiar with how these projects are implemented. Nevertheless, there were still components that were complex mainly due to the project involving a large number of diverse stakeholders; the fact that Council did not own the assets they were seeking to change; multiple funding streams; and the relative size of the project for a regional council.

Key Challenges and Learnings

While the project was managed and implemented smoothly, there were some issues and learnings for Baw Baw Shire Council that can be shared with other councils and also assist Council into the future.

The biggest challenge was dealing with inaccurate and inconsistent data from Local Network Distributor. As mentioned previously the data (which forms the basis of electricity and maintenance costs to Council) proved to be inaccurate. It has been challenging to undertake a final audit and reconciliation of all lights because the information provided to Council by Local Network Distributor was different to what was found “on the ground”.

Similarly, it was also difficult to identify “decorative” or non-standard lights and lights that were “cost-shared” with Vic

Roads. Council now has a greater understanding of the lighting assets it pays for. However, in the future when undertaking a changeover of the remaining lights (higher wattage lights), more extensive audits will be carried out to identify types and locations of lightsⁱⁱⁱ. Council will also try to engage with Vic Roads before undertaking any project on the cost-shared lights to seek a contribution.

Overall the project will significantly impact on the efficiency of broader public lighting. Council also owns many outdoor lighting assets in parks, car parks and sports facilities. These assets can readily be replaced and upgraded in a similar manner to the standard street lights. The street light project can thus be readily used as a case study for many other energy efficiency projects.

Conclusion

The Baw Baw Shire Council Street Lighting Energy Efficient Changeover Program has resulted in the successful implementation of 2,638 modern and energy efficient LEDs. This has been one of the most successful projects Baw Baw has undertaken. More importantly, Council and ratepayers are starting to witness the massive cost and energy savings that flows through with lights that require 77% less electricity and cost less to maintain. The flow-on benefits from the community promotion and education component the project has been far and wide, particularly in terms of increased awareness of residential and commercial energy savings and links to other Council programs and networks.

Baw Baw has built on and improved partnerships and relationships internally and with the broader community – residents, local business and the electricity provider. The benefits of this project will flow into the future for the entire Baw Baw community.

References

1. Australian Government – Community Energy Efficiency Program Funding application Round -1.
2. CEFC Clean Energy Finance Corporation also provided the loan for the project.
3. *Global LED and Smart Street Lighting: Market Forecast (2015 - 2025)* summary, Northeast Group. For example, the US Department of Energy.
4. Note that High-Intensity Discharge (HID) sources such as MV have readily replaceable lamps while the luminaires can last 20 years or longer. For LEDs, typically the entire luminaire is replaced (at 10 to 20 years).
5. *Towards More Sustainable Street Lighting Practice Note*, Institute of Public Works Engineering Australasia (IPWEA), July 2014.

Author Biography and Photograph



Raj Manihar has degree in Science/ Engineering, a Master's degree in Biochemical Engineering and Diploma of Environmental Management.

Raj has been working with Baw Baw Shire Council since December 2000 and is responsible for the implementation of environmental management plans including water conservation, energy efficiency, renewable energy, waste minimization and community education and behavior change programs.

Raj was selected to participate in the 2010 Overseas Study Tour program supported by the Municipal Engraving Foundation Victoria.

Contract Address:

Baw Baw Shire Council,
P. O. Box 304

Warragul Victoria 3820

Phone: 03 56242501

E-mail:

raj.manihar@bawbawshire.vic.gov.au
