



**Australian Government**

**Department of the Environment and Water Resources  
Australian Greenhouse Office**

# **Lighting the Way**

## **A Local Government Guide to Energy Efficient Public Lighting on Minor Roads**



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**for the  
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in the  
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## **Executive Summary**

Australia is committed to reducing its growth in greenhouse emissions. Currently initiatives are underway at all levels of government to improve the efficiency of public lighting, including State and local government trials of more efficient public lighting.

Public lighting of minor roads is a major source of greenhouse gas emissions for local government. There are many opportunities to improve the quality of the lighting while reducing both the costs and greenhouse emissions.

This guide provides information to assist local governments in improving the public lighting of minor roads in their communities while reducing their greenhouse emissions, lowering their costs and decreasing their liability and risk. These outcomes can be achieved through use of energy efficient solutions that provide better service in street lighting and comply with Australian Standards (AS/NZS 1158).

It outlines technical and other issues related to energy efficient lighting. It also provides some guidance for councils on techniques to improve their ability to negotiate public lighting issues with distribution businesses. A number of lamp types offer considerable advantages over the standard 80 watt mercury vapour lamps in terms of power consumption, lumen depreciation, light output, maintenance, life span, aesthetics and performance in various temperatures. Many of these lamps are currently being trialled, or have been installed by distribution businesses and local governments. The most significant trials have involved high pressure sodium, T5 triphosphor fluorescent, metal halide and compact fluorescent.

This guide complements other sustainable public lighting studies and initiatives, notably:

- 'Public Lighting in Australia – Energy Efficiency Challenges and Opportunities, 2005' by the same authors of this guide.
- Demonstration and capacity building projects and case studies. See [www.energy-toolbox.vic.gov.au/publiclighting/](http://www.energy-toolbox.vic.gov.au/publiclighting/)

In this guide "public lighting" refers to the lighting provided on roads or streets, as defined in Australian/New Zealand Standard AS/NZS 1158.3.1 The information is, however, generally applicable to most forms of public lighting, such as public area lighting used in carparks and parks and gardens.

This guide was developed in 2006 by Deni Greene Consulting Services, Kevin Poulton and Associates and Genesis Automation for the Australian Greenhouse Office in the Department of the Environment and Water Resources. The suggestions in this guide are informed by energy efficiency trials being undertaken by many councils around Australia.

## **Background**

Public lighting of minor roads is a major source of greenhouse gas emissions for local government in Australia. There are many opportunities to improve the quality of the lighting while reducing both the costs and greenhouse emissions.

Public lighting provides an important service, supplying vehicle drivers and pedestrians with sufficient light to be able to identify hazards and move around safely at night. It also provides a number of other benefits such as amenity and aesthetic rendering of streetscapes. The issue of safety often makes public lighting an issue of great interest to local residents and businesses.

The annual cost of public lighting in Australia is about \$210 million, of which public lighting on minor roads makes up \$100 million. Public lighting of minor roads uses 486 Gigawatt-hours (GWh) of electricity and is responsible for 537,000 tonnes of CO<sub>2</sub> emissions. The 1.36 million public lights on minor roads in Australia annually use about the same amount of energy as 80,000 Australian homes. Local governments, which are being encouraged by the Australian and State Governments to reduce their greenhouse gas emissions, are paying particular attention to public lighting because it is the single largest source, typically accounting for 30 to 50 per cent of their greenhouse gas emissions. (Poulton et al 2006).

Use of electricity for public lighting is currently growing at about 1.5 to 2 per cent a year (Allen Consulting Group, 2004). Over the past 14 years, it has increased by about 45 per cent. Future growth can be reduced (by using more efficient lighting in new installations) and reversed (by replacing existing lighting with more efficient equipment).

## **Important considerations for local government**

Local governments in Australia provide public lighting to meet the needs of their ratepayers and visitors, but the lighting itself is installed and maintained by electricity distribution businesses. Councils are customers of the distribution businesses, paying for the cost of the lighting equipment and for the energy consumed by lighting.

Although the distribution businesses have traditionally taken most of the decisions about public lighting, local governments must ensure that the lighting is responsive to ratepayers' requirements for pedestrian and vehicle safety, amenity, and other services associated with public lighting.

A primary interest of distribution businesses in the area of minor road lighting is to minimise their risk through use of proven technology and to minimise their maintenance requirements through use of reliable equipment. Reducing the energy consumed by public lighting is generally not a major driver for them.

Councils can choose to own and maintain streetlights in their area, but no council in Australia is currently doing so. The main impediments, other than initial cost of installing or buying the infrastructure, are the need for specialised knowledge and skills and the potential burden of on-going maintenance.

Public lighting creates a number of important issues for local government, including costs, liability risk and environmental impacts.

### ***Environmental impacts***

The main environmental impacts of public lighting are:

- greenhouse gas emissions, typically 30 to 50 per cent of local government emissions
- other impacts of energy generation, e.g. air and water pollution
- depletion of finite energy reserves
- stray light (e.g. unwanted light in private space)
- light pollution of sky, reducing visibility of night sky
- waste disposal.

All these impacts can be markedly reduced by the use of more efficient and better designed public lighting, as described later in this guide.

### ***Lighting costs***

Public lighting imposes significant costs on local governments. The largest cost is usually the operating, maintenance and (lamp) replacement (OMR) cost. Where public lighting is contestable, such as Victoria, councils pay an OMR charge usually to the network owner and purchase the energy used by the lighting through a retailer.

The method of calculating the OMR costs varies from state to state and differs for each type of lamp. In Victoria, for example, the OMR charge for a luminaire using an 80 watt mercury-vapour lamp is currently around \$30 per year. It costs about \$30 to \$40 in electricity charges per luminaire. Total costs therefore are from \$60 to \$70 per year per luminaire.

### ***Legal liability***

Legal liability can also be a consideration in relation to the adequacy of illumination. The Western Australia Coroner issued a finding in connection with a fatality on a local street that provides an indication of local government's responsibility with respect to public lighting of minor roads:

*I recommend that all local government bodies ensure that new roads constructed are adequately illuminated and that the illumination is at least in excess of the Australian/New Zealand Standards and that in the case of existing roads regular reviews are conducted to ensure that all relevant standards are met and effective maintenance programs are in place (Office of the State Coroner, 2004, pages 36-37).*

Although this finding does not constitute a legal requirement, it does imply that local governments might be considered liable for damages if inadequate lighting results in accidents or crime.

## Public lighting requirements

### ***Australian/New Zealand Standard***

Although not legally binding, the Australian/New Zealand Standard 1158 (commonly abbreviated as AS/NZS 1158) is generally considered to provide the *de facto* requirements for public lighting in Australia. Some aspects of public lighting, such as public lighting policy and maintenance requirements are addressed in Public Lighting Codes in New South Wales and Victoria.

The AS/NZS 1158 series, the applicable Australian and New Zealand set of Standards for public road lighting, divides public street lighting into two main categories, which it defines as follows:

- **Vehicular Traffic AS/NZS 1158.1.1** Category V (major road) lighting is applicable to roads on which the visual requirements of motorists are dominant, e.g. traffic routes. A major road is an arterial or main road that carries moderate to high volume of traffic.

AS/NZS 1158.1.1 identifies five sub-categories of Category V roads, depending on the nature of the road and its operating characteristics, that is, the type and amount of traffic they carry.

- **Pedestrian Area AS/NZS 1158.3.1** Category P (minor road and public space) lighting is applicable to roads on which the visual requirements of pedestrians are dominant, e.g. local roads, and to local area traffic management devices installed on such roads. Minor roads are collector and local roads that carry low volumes of traffic. This category also includes lighting that is applicable to outdoor public areas, other than roads, where the visual requirements of pedestrians are dominant, e.g. outdoor shopping precincts.

*NOTE: Category P lighting on roads is provided for pedestrians, not motorists, with the exception of lighting of local area traffic management devices, which is intended to reveal sufficient details of the device to allow approaching users to navigate through appropriately.*

Councils are generally not required to provide streetlighting, but most choose to do so on many streets and roads to address safety and amenity concerns and the demands of ratepayers.

This guide focuses on lighting for minor roads because of the significant opportunities available for reducing greenhouse gas emissions while improving the level of service and lowering costs and risks. It does not cover issues related to lighting for major roads.

Some of the key topics covered by AS/NZS 1158.3.1 include:

- determination of appropriate lighting levels for roads and public spaces
- factors to consider in designing public lighting for minor roads and public spaces
- technical parameters related to attainment of the lighting levels in the Standard and to minimising the adverse effects of the lighting
- maintenance of lighting levels

- procedures for documenting compliance with the Standard
- methods for designing lighting schemes for different types of roads and public spaces.

Within Category P (minor roads), AS/NZS 1158.3.1 (2005) identifies a number of sub-categories (P1, P2, P3, P4, P5 etc) for use in different types of lighting situations and to take account of local conditions. In determining what level is appropriate for a particular area, local government should take account of factors such as the risk of crime, bicycle riders, pedestrians etc. Further detail on selection is provided in the Standard.

### ***Lighting codes and load tables***

State and Territory electricity regulators manage the interface between distribution businesses and their customers – including the formal agreements, minimum performance standards and policies involved in these arrangements. In some states, published lighting codes and/or load table can have an influence on the type and cost of lighting schemes. When specifying lamp types, for example, extra steps are likely to be involved if selecting a type that is not already listed in the load table. Lighting policies may also have a bearing on public lighting decisions.

Arrangements vary among the states:

- Regulators in Victoria and New South Wales have already adopted formal public lighting policies and a Public Lighting Code and have published load tables. (New South Wales documents are also used in the ACT.)
- South Australia has a published load table but no public lighting code.
- Other states and territories have neither a public lighting code nor a published load table.

Public lighting codes specify such things as:

- minimum maintenance standards and associated service level guarantees
- minimum requirements for inventories, management plans, performance reporting and billing
- requirements for determining what standard lighting types to offer (including consultation requirements).

The NSW Public Lighting Code says ‘minimising life cycle cost’ should be considered when making decisions about public lighting. The Victorian code says distributors must use ‘best endeavours’ to develop and implement plans for the operation, maintenance, refurbishment, replacement, repair and disposal of their public lighting assets in a way that minimises costs to public lighting customers. These statements appear to recognise the importance of using energy efficient lighting.

Load tables specify the costs associated with specific lamp types. Lamp types that are not on the load table cannot be easily used, so an essential element of introducing new lamp types is to get them listed on the load table. In some cases, this may be a difficult or protracted process.

## Improving energy efficiency

### *Complying with the Lighting Standard*

**Choosing appropriate lighting levels.** The performance of Category P lighting is assessed in terms of the lighting (illuminance) levels and the uniformity of lighting over an area.

Many councils nominally specify P4 lighting levels for minor roads, but may not actually comply with the requirements for this sub-category, particularly on older installations. Many of the 1.18 million minor road luminaires are installed on every second pole (spacing between 80 to 120 metres). To comply with the P4 lighting levels in the standard, either luminaires would need to be installed on every pole (spacing 40 to 60 m) or a lamp with about twice the lumen output would need to be installed on every second pole (assuming satisfactory light distribution could be achieved). Further, some street lighting decisions are made in an *ad hoc* manner, such as adding a luminaire to respond to resident or business complaints. Such decisions rarely take account of the lighting level required in AS/NZS 1158.3.1.

**Energy efficiency in public lighting.** Energy efficiency in public lighting is gauged by a comparison against a standard. The standard minor road lamp used in Victoria is the 80W mercury vapour.

Table 1 below compares the 80W mercury vapour lamp to the main energy efficient alternatives.

**Table 1. Comparison of public lighting alternatives**

Lamp type	80 Watt Mercury Vapour (base lamp)	42 Watt Amalgam Compact Fluorescent	50 Watt High Pressure Sodium "Twin Arc"	T5 Triphosphor Fluorescent 14W
Power consumption, Watts	80	42	55	14 each, mounted 2 together (total 28W)
Power consumption, Watts (inc ballast & control gear)	96	46	65	30
Light output when new, lumens	3,800	3,200	3,600	1,350, total with two = 2,700
Lumen depreciation, end of life, percent	35%	15%	20%	15%
Light output at end of life, lumens	2,500	2,700	2,900	2,300
Colour rendition index	85	85	65	85
Published life, hours (50% failure rate)	20,000	10,000	40,000	20,000*
Notes on temperature performance	MV lamps perform well in all temperature conditions experienced in Victoria.	Amalgam CFL lamps perform well in all temperature conditions experienced in Victoria.	HPS lamps perform well in all temperature conditions experienced in Victoria.	Previously held that light output decreases with cold temperatures – a 20% decrease @ 0°C. Confirmation of new amalgam lamp allows good performance in all temperature conditions experienced in Victoria.

\* T5 can be fitted with long life 48,000-hour tubes at additional cost

Source: Local Government Toolbox

Although aware that they are not in compliance with AS/NZS 1158.3.1, and that this might expose them to liability risks, local governments have not recognised any feasible alternative to this situation. It has generally been thought that the only available options were non-compliance or prohibitive expenditures to upgrade street lights by installing one luminaire on every pole.

Local governments do, in fact, have the opportunity to bring their lighting of existing roads into compliance with AS/NZS 1158.3.1 without doubling the number of lights. The Standard provides the option of using the P5 sub-category for local roads. It identifies the circumstances for using P5:

*Discretionary use of subcategory P5.*

*Generally, subcategory P5 shall only be applied to the replacement of existing luminaires installed on existing electricity distribution poles or for the initial application of a lighting scheme where the cost to reconfigure these poles limits or precludes compliance with category P4.*

*It is recognised however that for some authorities, category P4 could be deemed as being excessive in terms of providing adequate level of service and meeting with community expectations. In this case subcategory P5 may be used (Standards Australia 2005, page 11).*

The lighting levels and uniformity requirements specified by the Standard for P5 lighting can be met on most roads and streets using energy efficient lamps and appropriate luminaires on every second pole (spacing between 80 to 120 metres). (This may not be the case for very wide streets.) Councils can specify that they will meet P5, and negotiate with distribution businesses to ensure that the necessary changes are made to comply with the requirements of AS/NZS 1158. By meeting the levels specified in the Standard, councils will reduce their liability at the same time as they reduce greenhouse gas emissions and lower their costs.

The potential for local governments to use P5 lighting levels on existing local roads is very important, because it offers a solution to the difficulty that has been faced by many councils - they have been aware that they face risks because their lighting does not comply with the Standard, but they have been unable to allocate sufficient funds to upgrade the lighting to meet the P4 level.

It is critical to note, however, that the level of lighting provided should meet the needs of residents and businesses in the area to be lit. Public consultation is therefore essential to obtain local views and to explain the options available. It is important to discuss the issue of uniformity of lighting (and to demonstrate it where possible) so that the community recognises that lighting level is not the only factor involved in good lighting.

Re-defining the level sought, and then making the changes necessary to meet the P5 level will be far less expensive than it would be to meet P4. The changes will almost certainly require the use of lamps that are more efficient than those currently in use, which will provide the added benefits of dramatically improving the lighting service provided, lowering costs and reducing greenhouse emissions. Such changes would also reduce a council's liability because it would be in conformance with the Standard.

As the excerpt from AS/NZS 1158.3.1 quoted above indicates, use of P5 is generally for use only in the replacement of existing luminaires. In some circumstances, as described in the excerpt, P5 may be used for new lighting. New developments do, however, offer the opportunity, through careful planning, for installing lighting that meets P4 requirements at much lower cost than that involved in upgrading lighting in existing areas.

**Changes in lamp/lighting type.** AS/NZS 1158.3.1 does not specify use of any particular type of lamps. Although sample calculations are based on use of mercury vapour lamps – the type most commonly used at present – nothing in the Standard gives preference to one type of lamp over another. The Standard defines a good public lighting scheme as ‘one that is reliable, energy efficient and cost effective.’

The Standard does indicate that if high pressure sodium (HPS) and low pressure sodium (LPS) lamps are proposed for use, penalties need to be applied in calculating light output:

*....if used in subcategories P4, P4R and P5, the lamp lumens for high pressure sodium (HPS) lamps shall be derated to 0.75 of their quoted value and those for low pressure sodium (LPS) lamps shall be derated to 0.5 of their quoted value.*

*NOTE: This requirement is included to compensate for the decreased sensitivity of the eye to yellow light at the inherently low light levels of categories P4, P4R and P5. The low brightness of the scene will be further exacerbated by the low reflectance of any surrounding foliage to yellow light. These factors emphasize the desirability, in these situations, of using white light, for which the multiplier is 1.0 (Standards Australia, 2005a, page 16).*

There are a number of lamp types that offer considerable efficiency and lighting quality advantages over mercury vapour (MV) lamps. Use of these lamp types can assist local governments in complying with the requirements of AS/NZS 1158.

The 80W MV lamp has become the *de facto* standard lamp for minor roads over the last 20 years, because it is perceived to provide a high reliability and a service life of four years.

There are, however, problems with MV lamp use, including:

- MV (80W) lamps typically have an efficacy of less than 40 lumens per watt (compared with up to 100 lumens per watt for high efficiency fluorescent), and this decreases as the lamps age. As the energy required to operate the lamps remains the same even when the output declines with age, MV lamps are particularly inefficient as they get older.
- MV lamps deteriorate steadily and provide less than 60 per cent of their initial light output at end of their rated life. (Although all HID and many fluorescent lamps deteriorate over time, the extent of the deterioration of MV lamps is much greater than that of alternatives.) They do not fail like an incandescent globe, but rather fade over time and so can continue providing very low levels of light for many thousands of hours beyond their useful life.

Most lamps in streetlights are not replaced until a member of the public reports to a council or distribution authority that they have burned out, Because the MV appears

to be still operating, even though the light output is inadequate, people may not report the need for replacement of the lamps, and light levels may remain unsatisfactory for a considerable length of time.

- An 80W MV lamp costing \$4 consumes about \$133 worth of electricity over its 4-year life and results in production of 1.7 tonnes of CO<sub>2</sub>. NOTE: *Calculation based on load of 96 watts operating for 4,341 hours per year and electricity costs of 8 cents per kWh. The actual cost will depend on individual state cost regime. The CO<sub>2</sub> emissions are based on 1 kg CO<sub>2</sub> per kWh.*

There is a large range of alternative lamp types for minor roads, these include:

- High intensity discharge (HID) light sources
  - HPS (35, 50 and 70W)
  - metal halide (35 and 70/75W)
  - low pressure sodium (18, 35W) NOTE LPS lamps are generally considered unsuitable for the lighting of minor roads or streets. As noted earlier in this report, low pressure sodium lamps must be de-rated by 50 per cent when used on minor roads.
- Fluorescent light sources
  - compact fluorescent (26, 36, 42 and 57W)
  - T5 (2x14 and 2x24W)

The improved light output of these lamp types would assist local governments in complying with the lighting levels specified in AS/NZS 1158.3.1. Most of these lamp types have a better maintenance factor than MV lamps, meaning that as they age, their light output is not reduced as much as with MV lamps.

If used with appropriate fittings, they would also create better distribution of light, further helping to comply with the requirements for lighting uniformity in AS/NZS 1158. Simply installing these lamps in existing fittings (which is possible for the HID sources but not fluorescents) would improve energy efficiency but not uniformity of light.

Table 2 shows the characteristics of these lamp types.

**Table 2. Lamp characteristics**

Lamp (wattage)	Significance	Fluorescent (4-215)	CFL (5-80)	MV (40-1250)	MH (32-2000)	HPS (35-1000)	LPS (18-180)
<b>System efficacy (lumens/watt)</b>	higher efficacy reduces electricity use	50-100	50-80	25-50	40-100	40-140	120-175
<b>Average rated life (hours)</b>	higher life reduces maintenance costs	7,500-24,000	10,000-20,000	24,000+	6,000-20,000	16,000-24,000	12,000-18,000
<b>Colour Rendering Index(0-100)</b>	higher CRI improves safety and aesthetics	62-92	82-86	22-52	65-85	21-80	0
<b>Life cycle cost</b>	overall cost	low	moderate	moderate	moderate	low	low
<b>Lantern size</b>	aesthetic	extended	compact	compact	compact	compact	extended
<b>Restrike time (time to get any light)</b>	availability of light after power failure or lamp extinguishing	instant	instant	3-10 min	10-20 min	1 min	instant
<b>Start to full brightness</b>		0-5 sec	0-1 min	2-5 min	2-5 min	4-6 min	10-15 min

CFL – compact fluorescent; MV – mercury vapour; MH – metal halide; HPS – high pressure sodium; LPS – low pressure sodium

Many of these lamps are currently being trialled, or have been installed in large numbers by distribution businesses and local governments. The most significant trials have involved 50W HPS (2,600 installed on minor roads in Coffs Harbour), T5 (3,000 installed in New South Wales and Victoria), 75W metal halide (Swan Council WA) and compact fluorescent (large number installed in the ACT).

**Efficient ballasts for high intensity discharge lamps.** Energy efficiency can also be improved by use of electronic ballasts for HID lamps. These ballasts have the potential to:

- reduce circuit power by 15 to 20% (Circuit power is, the energy used by the entire system - the lamp, ballast and photo-electric cell)
- extend lamp life (reducing maintenance costs and lamp disposal)
- eliminate the problem of lamps cycling on and off

Electronic ballasts have only been in use for a relatively short time, compared to the conventional ferro-magnetic ballasts. It is therefore not yet known whether their length of life and reliability will match or exceed those of conventional ballasts.

**Electronic (solid state) photo-switches.** A third potential measure to increase energy efficiency is use of electronic photo-switches. These photo-switches reduce electricity consumption by:

- reducing night burning hours; turning on later, turning off earlier, and eliminating drift (longer burning as the photo-switch ages)
- eliminating electricity consumption when the photo-switch is off during the day

### ***Councils working together to improve street lighting***

The options for improving energy use and greenhouse emissions while reducing cost and the risk associated with failure to comply with AS/NZS 1158.3.1 will require negotiation with distribution businesses. Individual local governments often lack the information, skills and resources to participate effectively in dialogues with distribution businesses about public lighting. It is also inefficient for distribution businesses to work with each local government individually. There would be benefits in the creation of regional groupings of councils to overcome both these difficulties.

Some councils have formed groups or used existing groupings to create greater market pressure to negotiate public lighting issues with individual distribution businesses. South Sydney Regional Organisation of Councils recently received a \$4.2 million grant from the NSW Energy Savings Fund to assist it in working with Energy Australia on more efficient public lighting.

## **Considerations in improving energy efficiency**

### ***Timing***

Key times at which decisions can be made to change luminaire types for public lighting are:

- the changeover of luminaires, individually or in bulk, at the end of their economic life (planned upgrades)
- the changeover to more efficient lamps in bulk before the end of their economic life (accelerated redundancy) and installation of customer owned assets
- new public lighting projects - which provide the opportunity to meet P4 lighting levels, if desired, through careful planning, at a much lower cost than that involved in upgrading lighting in existing areas

### ***Financial return***

Financial return is one of the factors that must be considered in evaluating improvement opportunities. Other significant factors include:

- risk
- quality of service
- the certainty of achieving projected savings
- the estimated longevity of savings

- the resources required to implement the improvements (including the funds and management and workforce resources required).

### ***Risks***

There are risks in any change. Risks can be managed with a full risk assessment, including an assessment of:

- the risks of not changing (e.g. will staying with MV lamps incur a risk of supply as Europe and North America switch from these lamps?);
- the benefits of changing and the costs of not changing.

The replacement of mercury vapour lamps involves various risks and risk management options:

- risk of inadequate lighting levels – risk managed with design and field trials, public consultation, improved sharing of experience of distribution businesses and customers. The very positive results being achieved in many of the current field trials reduce the perceived risk for those considering replacement of mercury vapour lamps.
- risk of increased maintenance requirements – risk managed through detailed design including consulting with distribution businesses, component selection and guarantees, laboratory and field testing, and accelerated testing where appropriate.
- risk of financial factors changing – risk managed by testing a range of scenarios.

Overall risks can be shared and managed through partnerships and agreements. Risks may also be managed through assistance with brokering arrangements and clarification of responsibilities and real risks.

New technologies will have a failure rate, which needs to be determined and managed using manufacturers' data, guarantees, laboratory and field testing and comparisons with performance of similar equipment in applications other than public lighting. Failure rates for proposed equipment need to be compared with failure rates for existing technologies.

Perception of risk plays a large part in judging opportunities. For example, some distribution businesses consider the replacement of minor road MV lighting to be risky, although they have replaced MV lighting on major roads. New technologies are generally considered more risky than older conventional ones, and distribution businesses usually base their costs on the level of perceived risk.

### ***Project financing***

Many cost-effective lighting efficiency improvements require a capital investment. In situations where neither the distribution business nor the local council wish to make this investment, there is the potential to offer this investment opportunity to a third party. Establishing such a finance facility or standard contract would reduce the financing administration costs.

One potential opportunity to expedite the introduction of newer, more efficient lighting equipment is to overcome the *Catch 22* problem of newer equipment costing more

because it is sold in lower volumes; it sells in lower volumes because they cost more. This could be achieved by tendering or negotiating a large purchase of efficient luminaires on behalf of many distribution businesses and/or councils. The delivery of luminaires could be spread over time, to provide the supplier with medium term certainty, and further reduce costs.

## **Lighting trials**

Many councils and other bodies are involved in trialling energy efficient public lighting. Current and recent lighting trials include:

- City of Port Phillip, Victoria
- Hornsby Shire Council, NSW
- City of Swan, WA
- Coffs Harbour City Council, NSW
- SEAV, Victoria - Sustainable Public Lighting Initiative covering 12 capacity building projects and 19 demonstration projects
- Mornington Peninsula Shire, Victoria
- SSROC, NSW
- The Sustainable Energy Development Office (SEDO) Western Australia
- Banyule, various projects including Pierlite Greenstreet
- Banyule / Agility / Genesis Automation. Photo-switch testing.
- Melbourne City Council

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