

# STAFF REPORT

**TO:** Chairman and Members, Engineering Services Committee  
**FROM:** Steve Elkington, Asset Engineer Roads  
**REFERENCE:** R868  
**DATE:** 30 May 2008  
**SUBJECT:** **STREET LIGHTING**

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## 1 PURPOSE

To inform the Committee of Council's current range of street lights, inventory upgrading, white lighting and the new Philips CosmoPolis luminaire, waste light and power consumption.

## 2 BACKGROUND

Council owns 3142 street lights of varying types and wattages. Below is a summary of the numbers and percentages of each lantern type.

|                              | High Pressure Sodium (HPS) | Mercury Vapour (MV) | Florescent | Incandescent | Not Known |
|------------------------------|----------------------------|---------------------|------------|--------------|-----------|
| Number (Of various Wattages) | 1958                       | 576                 | 142        | 12           | 454       |
| % of Total of 3142 lights    | 62%                        | 18%                 | 5%         | 0.5%         | 14.5%     |

Sixty two percent of all lanterns are high pressure sodium (HPS), with 18% being Mercury Vapour and the balance a mixture of florescent, and incandescent. The predominant Wattage is 70Watts representing roughly between 50-60 percent of all lantern types.

There are also a number of lights that Council has no information regarding and which there is a programme in place to capture this data. In recent years Council has taken back ownership of its database and with this now in Confirm, it will be managed from in house with update information being provided by its roading consultant and contractor.

Much of the district street lighting has historically been provided by bolting outreach arms and lanterns to the existing poles supplying over head power to homes and businesses.

The ownership of these lanterns and outreach arms is shared between Network Tasman and Council. Where new dedicated street lights are installed these are owned by Council, example of these are in subdivisions or where lighting upgrades have been completed similar to that being presently undertaken on Salisbury Road.

Council has a five year maintenance contract with Powertech for maintaining its streetlights.

### 3 COMMENT

#### 3.1 Mercury Vapour – Very Old Technology

Mercury Vapour lanterns (MV) account for 18 percent of the lamps used throughout the District. The MV lamps are one of the least efficient lamps available and provide less than 60 percent of their initial light output at the end of their rated life of just 2 years or (8000hrs).

**An annual power saving of \$8 125 could be made if all MV lamps were replaced with HPS lanterns. Light output would also be increased in the order 50% to 80%.**

The capital cost of replacing all old lanterns running MV lamps with newer lanterns running HPS or Metal Halide is estimated at more than **\$202,000** based on a cost of \$350 per lantern. It should be noted however this cost will be incurred regardless of a change in lamp type as almost all lanterns running MV lamps are getting to the point that they are no longer maintainable and require replacement. Over the past 4 years Council has undertaken selected upgrades to streets removing the MV lamps and replacing them with HPS lamps. It is intended that this practice of gradual upgrade be continued to make use of the remaining life of assets with the eventual goal of removing all MV lamps on the network over the next five years. The cost of this upgrade is being funded from Council's Subsidised Traffic Services and Minor Safety Budgets.

#### 3.2 White Light

Councils around NZ are enforcing "white light policies" for city centres, tourist areas, and crash black spots, as white light reveals the natural colours of surfaces, and provides a more accurate sense of the size and shape of objects.

There is much research to support the case for white light for public safety. For drivers, good colour performance greatly enhances peripheral vision and incident reaction times. For pedestrians, good colour rendition greatly enhances people identification and the perceptions and reality of public safety.

Historically this has meant metal halide technology that gives half the lamp life and one third less system efficiency compared to high pressure sodium.

The suppliers of the new Philips CosmoPolis lantern that gives the white light state that it matches the efficiency and lamp life of high pressure sodium.

#### 3.3 High Pressure Sodium VERSUS Cosmopolis – Whole of life costs

The whole of life cycle cost of the CosmoPolis has been compared against high pressure sodium in the table below. The table ignores inflation.

| Lantern                      | Purchase Price | Power Consumption Kw/h | Hours per year | Power Cost per year | Power cost 25yr life | Power + purchase |
|------------------------------|----------------|------------------------|----------------|---------------------|----------------------|------------------|
| 70w HPS – Magnetic control   | \$350          | 0.088                  | 4000           | \$56.61             | \$1415.41            | \$1765.41        |
| 70w HPS – Electronic control | \$400          | 0.076                  | 4000           | \$48.890            | \$1222.40            | \$1622.40        |
| 60w CosmoPolis               | \$700          | 0.066                  | 4000           | \$42.46             | \$1061.56            | \$1761.56        |

The table shows that there is similar whole of life cycle costs between the 70w HPS magnetic control and the 60w CosmoPolis is very similar differing by approximately \$4. The 70w HPS with electronic control gear is a clear winner on pure economic terms.

**It is important to note the CosmoPolis fitting is only available in a 60w form which is suitable for residential streets with roading hierarchy of access or collector status only.**

Council is shortly to enter into discussion with Modus Lighting, currently the only importer of Philips CosmoPolis light fittings, to undertake a trial using this fitting. Modus lighting has secured funding from the Government to encourage roading controlling authorities to trial this new technology. The residential street trialled will need to be selected carefully to ensure a good standard of lighting already exists.

### **3.4 Waste Light**

The poor optical control of traditional New Zealand streetlight luminaires creates very significant neighbourhood nuisance problems for residents. Uncontrolled light on to front yards and into bedrooms is not only wasteful but irritates residents and gives Councils a messy and costly job fitting unsightly anti-glare shields. Precision optics conserve energy by putting light only where it is required.

Skyglow is an environmental pollutant specifically addressed by the MfE NZ Urban Design Protocol. Skyglow is caused by poor optical control that wastes a significant proportion of the light upwards into the sky, creating "light haze" and rendering the stars invisible.

The New Zealand Standard has recently been amended to reduce the ratio of upward waste light to three percent of total output. There is a significant difference in the visual amenity of lanterns with zero percent upward waste light however, if a policy of zero percent upward waste light was to be considered for areas sensitive to Skyglow such as hill suburbs and areas with coastal views, then in some circumstances up to a quarter more lanterns will be required to achieve the same illumination levels.

### **3.5 Network Tasman Estimated Power Consumption**

Energy use is estimated by Network Tasman. The estimate is based upon the number of lanterns and the wattage of the lamps connected to the network. This data is forwarded to the electricity retailer (presently Meridian) who then bills the Council for the estimated amount of energy consumed. Some years ago Local Government New Zealand representing most road controlling authorities, negotiated a special rate with Meridian for providing street lighting power. Street lights are not connected to a meter so there is no account taken for the power used by differing control gear but the charge for the control gear consumption is hidden amongst the fixed charge portion of the bill. Modern electronic control gear can use as little as six watts when running hot compared with 18 watts for the old style magnetic control. If, for example, all fittings in the district were converted to electronic control gear a potential annual saving based on this difference of 12 watts could be in the order of \$24,000. However to realise this level of saving would require a significant capital investment. Further investigation is planned to ascertain what the cost of installing latest technology control gear is to meter electricity consumption.

To encourage energy efficiency a new deal needs to be struck with the power supplier under renewed terms that charges on total system wattage. This would encourage Council to upgrade fittings that include electronic control gear.

The Electricity Commission, Local Government New Zealand and Land Transport New Zealand are all working on this issue as it is a very real impediment to encouraging investment in the latest street lighting technologies using electronic control gear.

#### **4 RECOMMENDATION**

**THAT the Engineering Services Committee receives this report.**

Steve Elkington  
**Asset Engineer Roads**