

EAST AYRSHIRE COUNCIL

CABINET 19 MAY 2010

STREET LIGHTING – ENERGY EFFICIENCY PROPOSALS

Report by the Depute Chief Executive/Executive Director of Neighbourhood Services

1. PURPOSE OF REPORT

- 1.1 The purpose of the report is to advise the Cabinet on advances in street lighting technology and seek approval for the adoption of white, energy efficient lamps and the corresponding permissible reduction in lighting class on new and existing residential and minor roads as technology permits.

2. BACKGROUND

- 2.1 On 27 November 2007 Cabinet approved the Carbon Management Programme Strategy and Implementation Plan which was developed to reduce
- the environmental impact of the Council's energy consumption,
 - the environmental impact of the Council's vehicle fleet,
 - the environmental impact of the Council's of landfill by reducing and recycling the council's waste,
 - the environmental impact of Street Lighting.
- 2.2 The Climate Change (Scotland) Act 2009 received Royal Assent on August 4, 2009 and comes into effect on 1 January 2011. Part 1 of the Act, creates the statutory framework for greenhouse gas emissions reductions in Scotland by setting an interim 42 per cent reduction target for 2020, with the power for this to be varied based on expert advice, and an 80 per cent reduction target for 2050.
- 2.3 Although East Ayrshire Council currently uses 100% 'green energy' for street lighting, which is carbon neutral, this is currently a finite resource and the Council should investigate other methods of reducing the potential impact of street lighting on the Council's carbon footprint. Reduction in carbon footprint will have a corresponding reduction in energy used.

3 ENERGY EFFICIENT WHITE LIGHT

- 3.1 Trials have been carried out using a white light, low energy, Cosmopolis lantern designed to the S3 lighting standard in Wylie Crescent, Cumnock and the Kirksyle area of Kilmarnock. The white colour has proved popular with residents. Energy per lantern reduced by about 20% compared to High Pressure Sodium lighting but as is normal in all new lighting installations, regardless of the lamp type used, to comply with the new standards on lighting levels, approximately 20% extra lighting columns have to be installed. The net effect has been broadly energy neutral but with much better colour rendering.
- 3.2 Although the measured lighting levels in these installations were similar to those using the traditional yellow Low Pressure Sodium or off white High Pressure Sodium lamps the new installations appear much brighter. European design standard EN13201 Road

Lighting recognises this effect and permits the lighting design standard to be dropped by one lighting class, from S3 to S4, when white light with a Ra greater or equal to 60 is used. The Ra of a lamp is its colour rendering capacity i.e. how well you can see colours, with a Ra of 100 being akin to natural daylight and a domestic fluorescent light being between 60 and 80.

- 3.3** A S4 lighting standard allows a reduction in minimum maintained lighting levels of about 33% when using white light. However, to achieve an acceptable lighting uniformity figure it is seldom possible to reduce the number of lighting columns by that amount. A total energy saving of 20% is more realistic compared to a similar S3 installation.
- 3.4** Trials have also been carried out in South Gargieston Drive, and Largs Avenue, Kilmarnock retrofitting 45W Cosmopolis lighting to existing street lighting installations to achieve an S4 standard. After some initial teething problems at turning areas and some footpaths, these have proved successful. Some residents initially complained about front gardens and private footpaths no longer being lit by the street lights but the public roads and footpaths were lit to an acceptable standard and complaints quickly fell once the problems at turning areas were resolved.
- 3.5** Due to lighting uniformity requirements the technology cannot be retrofitted to older installations which have wide lighting column spacing.

4 COSTS

- 4.1** A Cosmopolis white low energy lamp costs more than current lamps but the cost is expected to fall significantly over the next 3 to 5 years with Philips licensing the technology to other manufacturers. The cost of a 45w Cosmopolis lamp is about £28 compared to £14 for a Yellow Low Pressure Sodium lamp (SOX) and £4 for a High pressure Sodium (SON) lamp. The cost a SOX lamp has risen over 15% in the last 12 months and is expected to increase further while the cost of a Cosmopolis lamp is expected to fall.
- 4.2** Table 1 below compares the cost using various lamp types in a new street lighting installation over the 3 year life of the lamp, for a 300m length of road. It identifies that savings can be made utilizing new lamp technology in locations where the lighting standard can be reduced from S3 to S4.

Table 1

Lamp type	Lighting Class	Electricity cost/annum	Cost of lamp	Expected lamp life (See note 1)	Total cost of energy+lamp over 3 years (See note 2)	Typical cost to light 300m of road over 3 years (See note 3)	Annual Carbon tonnage 300m of road (non green energy)
High Pressure Sodium (SON) 70W	S3	£26.45	£4:00	12000hrs (3 years)	£83.35	£833.50	2010
Cosmopolis (CPO) 60W	S3	£20.76	£30:00	12000hrs (3 years)	£92.28	£922.28	1577
Cosmopolis (CPO) 60W	S4	£20.76	£30:00	12000hrs (3 years)	£92.28	£738.24	1262
Cosmopolis (CPO) 45W	S4	£16.37	£28:00	12000hrs (3 years)	£77.11	£693.99	1119

Notes

- (1) Lamp life of Cosmopolis lamp is similar to High Pressure Sodium at 12,000 hours (3 years), but light output falls slightly more towards the end of its life (20% versus 10-15%).
- (2) Electricity charges are based on present day prices but are expected to rise significantly over the next three years. No allowance is made for this in the calculations in table 1.

- (3) Calculations based on 10 lighting columns per 300m for S3 lighting standard, 8 columns per 300m for S4 lighting standard lit with a 60W Cosmopolis and 9 columns per 300m for S4 lighting standard lit with a 45W Cosmopolis. Lighting uniformity can be an issue with 45W Cosmopolis at certain locations, limiting where it can be used. Savings may be greater or less dependant on number of junctions being lit.
- (4) Carbon tonnage figures based on Carbon Trust figure of 0.544ton/KWh

4.3 Carbon Reduction Commitment (CRC) charges are not currently levied in Scotland for street lighting as energy usage is calculated in a different way from the rest of the UK but are expected to be applied soon. The estimated annual cost of CRC charges when applied to street lighting in East Ayrshire would be approximately £50K per annum

4.4 Cosmopolis lamps are currently available in a limited number of power ratings which at present are only suitable for residential and minor distributor roads. The lamp cannot be retrofitted to existing lanterns as it requires different control gear and optic. The cost of a replacement Cosmopolis lantern is approximately £250 compared to £110 for an equivalent High Pressure Sodium Lamp, but again this cost is expected to reduce over future years .

4.5 The annual electricity cost for street lighting is approximately £660K per annum and there are approximately 19,300 streetlights in East Ayrshire. About 5% of lanterns are replaced annually. Using Cosmopolis 45w white low energy lanterns for the replacement programme would provide a relative saving of £10k based on present electricity costs. Although initially it would take ten years to recover the additional investment cost the return period would reduce as electricity costs increase and the new lamp and lantern costs reduce as outlined in 4.1 and 4.4

5 FUTURE TECHNOLOGIES

5.1 Many of the major lantern manufacturers are developing LED lanterns with claim burning hours in excess of 50,000 hours (12 years). The lanterns are expensive at present (£300-£800 each) and there are currently reliability issues with the electronic drivers. At present it is not currently cost effective to use these lanterns on a 'spend to save' basis.

5.2 The cost of LED lighting is slowly dropping and the technology improving but at present LED lighting is only suitable for smaller road widths of 5.5m and below. The technology is available with a White Light Ra ≥ 60 making it suitable for S4 installations.

5.3 The Street Lighting Section is currently trialling LED technology in South Hamilton Place and Dundonald Place, Kilmarnock and it is proposed to introduce this technology as the Council's preferred lamp type once they satisfy the Council's technical and financial requirements.

6. LEGAL IMPLICATIONS

6.1 Section 44 of the Climate Change (Scotland) Act 2009 places duties on public bodies relating to climate change. The duties on the face of the Act require that a public body must, in exercising its functions, act:

- in the way best calculated to contribute to delivery of the Act's emissions reduction targets;
- in the way best calculated to deliver any statutory adaptation programme; and
- in a way that it considers most sustainable.

The duties come into force on the 1 January 2011 and apply to all 'public bodies', defined as a Scottish public authority within the meaning of section 3(1)(a) of the Freedom of Information (Scotland) Act 2002 (as amended).

7. PERSONNEL IMPLICATIONS

7.1 None

8. FINANCIAL IMPLICATIONS

8.1 The cost of new street lighting installations will be contained within Roads and Transportation's Capital allocation for Street Lighting Improvements.

8.2 Any savings in the cost of energy in the short term are liable to be in the form of a reduction in the rate of increase in cost, rather than a fall in the actual total cost of the energy for street lighting. This is due to the cost of electricity continuing to increase and an increase in the lighting inventory as a result of new residential developments.

9. COMMUNITY PLAN / POLICY IMPLICATIONS

9.1 Improving street lighting and reducing energy consumption with a corresponding reduction in carbon emissions contributes to Improving Community Safety theme of the Community Plan. These proposals support the Council's sustainable development strategy.

10. RISK MANAGEMENT IMPLICATIONS

10.1 Not embracing new technology to reduce energy consumption exposes the Council to financial risk due to the predicted increase in future energy prices and risk in not achieving carbon reduction targets.

11. RECOMMENDATIONS

11.1 It is recommended that the Cabinet,

- (i) Approves white light, energy efficient, lamps ($Ra \geq 60$) as East Ayrshire Council's preferred lamp for all existing and new residential and minor roads as the technology allows.
- (ii) Approves adoption of an EN13201 S4 standard for street lighting designs for all existing and new residential and minor roads being lit with white light ($Ra \geq 60$), where technically possible.
- (iii) Approves corresponding reductions in lighting levels on other classes of roads when appropriate technology permits.
- (iv) Approves the use of other energy saving light technologies, such as LEDs, as and when technology permits and they prove cost effective.

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JB/LP
13 May 2010

BACKGROUND PAPERS

1. Cabinet Report 27 November 2007- Carbon management programme strategy and implementation plan.

2. Climate Change (Scotland) Act 2009

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