

From: David Brazier, Cabinet Member for Environment and Transport  
John Burr, Director of Highways, Transportation and Waste

To: Environment & Transport Cabinet Committee – 5 December 2014

Subject: 14/00132 Safe and Sensible Street Lighting - LED Conversion

Key decision: The cost of the physical works means that this will be a key decision, which will be the subject of a separate report to this Committee at the appropriate time.

Classification: Unrestricted

Past Pathway of Paper: PAG and Corporate Board Away-day

Future Pathway of Paper: To the Cabinet Member for Environment and Transport for decision.

Electoral Division: All

**Summary:** This report provides an update on the steps already taken and works currently underway to reduce energy costs and carbon emissions associated with the County Council's street lights. It also sets out details of further works that could be undertaken to achieve significant additional reductions.

**Recommendation:** That the Cabinet Committee note the report and endorse action being taken for conversion of the County Council's stock of street lights to LED.

## 1. Introduction

1.1 Kent County Council is one of the largest lighting authorities in the UK and has around 118,000 street lights and some 25,000 lit signs and bollards. The annual cost of illuminating these is around £5.8m, a cost that keeps rising. The average increase for energy prices this year has been around 11%. The carbon produced from generating the energy to illuminate these is around 24,000 tonnes which accounts for over half the carbon footprint across the entire KCC estate.

1.2 The County Council's Carbon Management Action Plan (2013) sets a new carbon reduction target of at least 2.6% per annum up to 2015 across its estate (based on a 2010/11 baseline). Nationally, the Climate Change Act (2008) has introduced a revised UK target of 80% reduction in carbon dioxide emissions by 2050 (based on 1990 emissions levels). The Act aims to enable the UK to become a low-carbon economy and gives Ministers powers to introduce the measures necessary to achieve a range of greenhouse gas reduction targets and mitigate the risk of climate change. Since April 2014 all street lighting is being captured by the Carbon Reduction Commitment Energy Efficiency Scheme (CRC) which in effect is a further tax. This is currently £16 per tonne of carbon produced.

## **2. Financial Implications**

The scheme has an estimated value of £40m. An interest free loan of £22m has been secured, this leaves a funding gap of £18m that the County Council would need to forward fund and underwrite. However, the scheme on its own merit will generate sufficient savings to pay for itself over a maximum of 8 years.

## **3. Policy Framework**

The proposal is transformational and fulfils the principle of achieving value for money.

## **4. The Report**

### **What have we done so far?**

#### Lamp Replacement/Trimming/Dimming

4.1 We have already upgraded inefficient mercury lamps and failing lamps with energy efficient units. We have also introduced as standard for new equipment photocells that switch on later and turn off earlier, thus reducing the burning hours. In addition we have replaced some lanterns, where affordable, in order to dim the wattage at pre-determined times to reduce energy consumption. These measures have saved £130k per annum.

#### Trial Switch-off of Surplus Lights

4.2 In the past, street lighting went far beyond the required needs; around 1,200 street lights were identified as not necessary. If these schemes were being designed today these lights would not be installed as they are far in excess of the normal lighting standards and have a disproportionate maintenance cost due to their locations. This resulted in the development of a number of sites for trial switch off.

4.3 Site-specific risk assessments and safety audit of each site were carried out. We also liaised extensively with Kent Police and consulted Joint Transportation Boards to make sure that we only switched off lights that were not needed. The works were completed in summer of 2014 and will deliver an annual saving of around £100k. We are monitoring crime levels and road safety during the twelve months trial period, and sites being adversely affected will be switched back on. The scheme will be reviewed at the end of the trial period to determine whether further action needs to be taken.

#### Part-night Lighting

4.4 This involved converting 60,000 of our 118,000 street lights, mainly in residential and rural areas and consisted of installing a light sensor in each column which has a built in timer. This means that the column turn on automatically at dusk, turn off at midnight, turn back on at a 5.30am and stay on until first light. During the summer these times change to 1am to 6.30am respectively. This is very much like a householder switching off the lights when going to bed.

4.5 Lights on main roads, town centres, roads with a history of or potential for crime, roads with road safety measures in place and roads that have potential road safety concerns were excluded from the programme and remain lit all night. The hours of switch-off and exclusion criteria were the subject of a public consultation exercise. Details were publicised through press releases and interviews, adverts in local papers and radio as well as a poster campaign. Leaflets explaining the proposals were placed at libraries and district council offices. Parish/Town Councils were contacted in writing and invited to participate in the consultation. Of those who responded 75% agreed with the proposal.

4.6 The physical works started in December 2013 and were completed in September 2014. These will deliver an annual saving of around £800K.

4.7 The combined effect of Trial Switch-off and Part-night Lighting will generate a saving of around £900k. These measures will also reduce carbon emission by 5,000 tonnes to 24,000 tonnes. However, this year, the cost of energy rose by over 11% and carbon emission is being taxed at £16 per tonne of carbon produced. The combined effect of these equates to £923k, wiping out the savings. Had these measures not been introduced the annual energy and CRC bills would have been in excess of £6.8m.

### **What we are planning to do?**

4.8 Given the budgetary pressures, the CRC tax, potential future penalties for carbon production, and the desire to tackle wasted energy and light pollution we have been exploring what more can be done.

4.9 Majority of our street lights (around 105,000) have Sodium lamps which are very energy hungry, around 11,000 have the more efficient Cosmopolis units and the remainder are equipped with various types of light sources. National street lighting standards were reviewed recently and the new standards published in 2013 focus on sustainable lighting solutions and, through risk assessment, provide opportunities for areas to be lit to lower lighting levels, with better quality light sources.

### **Light Emitting Diodes (LED)**

4.10 Innovations in street lighting technology in recent years mean that the market can now offer products and controls that deliver ultra-efficient street lighting solutions at affordable prices. A key recent development has been the improvement in LED technology resulting in better product reliability and much lower costs. Manufacturers now guarantee their LED products for up to twenty years.

4.11 Whilst Part-night Lighting and Trial Switch-off measures, referred to above, will save around £900k per annum in energy costs and reduce carbon emissions by about 5,000 tonnes each year, the use of LED technology offers by far the largest potential for reducing both energy cost and carbon emissions. Replacing the existing stock of lanterns with LED units can result in a further reduction of 60% in energy use, carbon emission and therefore significant cost reduction. Appendix 1 provides details of pros and cons of LED lighting. Appendix 2 illustrates the illumination levels of both conventional and LED lighting.

4.12 In recent years, the capital cost of LED lanterns has fallen significantly and has now reached a plateau. Any further decreases are likely to be relatively small. The unit cost of LED lanterns is now comparable to that of conventional units. As LED becomes more prevalent, conventional units will become rare and therefore more expensive to buy and maintain.

### Central Management Systems (CMS)

4.13 The control mechanism used to manage illumination levels is known as Central Management System. This involves installing a small radio device on each column, a collection of these; around 1,000, are then linked to a local base station, which in turn is connected to a remote Central Monitoring Unit. This is a highly versatile system that coupled with LEDs enables complete management of street lighting including dimming, switch on/off, fault reporting, etc. The fault reporting element of CMS will offer a significant improvement in customer service, in that it will enable real time reporting of faults reducing the need for members of the public to report them to us. CMS also future-proofs the authority against any future changes in street lighting policy. Appendix 3 shows how CMS operates.

4.14 We have in the past two years established a number of trial sites using both LED and CMS. Early evaluation of these sites has shown favourable results, particularly in relation to costs and energy usage. We are currently focussing on evaluating energy usage reporting, the day-to-day functionality of the software, and the extent to which fault reporting can be fed electronically into our asset management IT system.

### The proposal

4.15 We have developed a proposal for converting the County Council's entire stock of street lights to LED with full CMS control. This will involve replacing all street lighting lanterns with LED lanterns. The lighting columns are not being replaced, this is because majority of these have significant residual life and the remainder will be replaced as they become life-expired. The scheme will cost around £40m and about three years to implement. The scheme will result in reduced energy consumption and carbon emission and far less maintenance requirement. The annual saving from these will be around £5.3m at today's prices. The scheme is now being developed in detail and conversion works could begin in late 2015 or early 2016, pending approval of funding.

### Funding

4.16 We have been exploring a number of funding options, through a mixture of grant funding, KCC investment and borrowing.

### EU

4.17 A number of EU funding streams have been examined; the front runner appears to be South Eastern Local Enterprise Partnership's (SELEP) Structural and Investment Fund, which has £16.5m for carbon reduction initiatives and a further £28.8m for innovation. We intend to make a bid for £10-15m but at this stage, we are

not aware of the level of demand for these funds. Further work is being undertaken to see if there are other EU funding streams available.

4.18 We understand that SELEP will be calling for 'expressions of interest' in early 2015 with decision expected early the following year. These funds are grants and do not need to be repaid, but have to be match-funded by the County Council. To this end, we have been holding discussions with Salix about raising 0% loan capital to use as match funding.

#### Salix

4.19 Salix is a Government organisation, funded by the Department of Energy and Climate Change, which provides interest-free loans to the public sector for energy reduction projects.

4.20 Their governing principle for making loans available is based on the cost of reducing energy consumption; with the main emphasis on projects that pay for themselves from energy saving within five years. We have developed an excellent relationship with Salix and have secured a loan offer of £22m which will be drawn down, in stages, over the conversion period.

4.21 A benefit of Salix, over and above the 0% terms (negative interest when considering inflation), is that Salix have confirmed the loan repayments can be recycled within the County Council to fund new energy saving initiatives. An example of this is converting our lit signs and bollards to LED, which could deliver an annual saving of £200k. This is not confined to LED technology; our property and school estate could benefit in terms of energy efficient boilers, roofing/insulation and lighting.

#### KCC

4.22 As indicated above the level of EU funding is dependent on demand from other organisations and may be significantly less than we apply for. This could leave a gap of £18m in funding for the scheme, which the County Council would have to underwrite and forward fund.

#### Procurement

4.26 The plan is to fully engage with the market to ensure that all options are considered, i.e. the County Council pays for the works; either County Council or the provider manages the long term maintenance. The market may wish to offer an alternative model, for example, it may propose to finance implementation and manage long term maintenance, which is akin to a PFI. This will ensure that the deal that delivers maximum savings at least cost is procured.

4.27 To this end, on 27 October 2014 we published the Prior Information Notice for market engagement in the Official Journal of European Union and on Kent Business Portal to generate expressions of interest. Interested parties have until 24<sup>th</sup> November 2014 to submit their brief. We will then assess their submissions, shortlist suitable companies and invite them to a two day Market Engagement Event on the

1<sup>st</sup> and 3<sup>rd</sup> December 2014. At the time of writing this report twenty two companies had expressed an interest. Information gathered from the Event will inform the formal procurement that will follow.

## **5. Conclusions**

5.1 Energy prices continue to rise and this will be further exacerbated by carbon tax which applies from April 2014. We therefore need to do more to reduce energy consumption and carbon emissions. Converting our stock of street lights to LED with CMS will modernise the asset and will ensure energy efficient and cost-effective street lighting for a generation. It will also future proof the County Council against any changes in street lighting policy. Converting the 25,000 light signs and bollards could follow resulting in even more savings.

## **6. Recommendation**

That the Cabinet Committee note the report and endorse action being taken for conversion of the County Council's stock of street lights to LED.

## **Contact details**

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## Appendix 1

LED and CMS	
Advantages	Disadvantages
<ol style="list-style-type: none"> <li>1. Significant reduction in energy consumption and carbon emission – circa 60%.</li> <li>2. Complies with new national standards for low lighting classes.</li> <li>3. Reduces base load when per unit cost of energy is high, and increasing year by year, so part-mitigates future unfunded price pressures.</li> <li>4. Upgrades network with new modern light sources e.g. keeping pace with technological changes.</li> <li>5. Future proofs network and provides active control of individual lighting units</li> <li>6. Negates requirement for outage detection cycle</li> <li>7. Provides significant maintenance savings through the use of new more reliable equipment and places this onus on the manufacturer/ contractor.</li> <li>8. Includes re-wire and electrical test, a further saving.</li> <li>9. Reduces obtrusive light and sky glow throughout the night so better customer satisfaction and less “wasted” energy.</li> <li>10. Instantaneous light allows lights to be switched on later and switched off earlier so is flexible to changing policy decisions.</li> <li>11. Savings from variable lighting in line with reduction in light levels</li> </ol>	<ol style="list-style-type: none"> <li>1. High capital cost – but payback of less than 8 years.</li> <li>2. Long period of upgrade i.e. up to 4 years - but it is a significant project as 118,000 streetlights are to be converted. KCC has one of the largest street lighting stocks nationally.</li> <li>3. Annual service charge for use of CMS system/support, around £150k – a small cost in comparison to £5.3m of annual savings. It is a flexible solution to future changes in street lighting policy.</li> </ol>

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## Appendix 2

### Photographs below show obtrusive light reduction using LED lanterns



#### Conventional Lanterns (High Pressure Sodium)

- Less directional, the street light is illuminating much of the flank wall
- Fading over lantern lifetime
- Less even lighting coverage of road surface.
- Sky glow.
- Energy inefficient



#### LED Lanterns

- Better cut-off of light
- Less illumination of areas that do not need to be lit.
- Very little fading over lifetime of lantern.
- Better light coverage of road surface.
- Less sky glow.
- Energy efficient
- Warranty

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Schematic of a Central Management System

