

**SURREY COUNTY COUNCIL**

**CABINET**

**DATE: 30 JANUARY 2018**

**REPORT OF: MR COLIN KEMP, CABINET MEMBER FOR HIGHWAYS**

**LEAD OFFICER: JASON RUSSELL, DEPUTY DIRECTOR ENVIRONMENT AND INFRASTRUCTURE**

**SUBJECT: CONVERTING STREET LIGHTS TO LED**



**SUMMARY OF ISSUE:**

The Council currently spends £3.5 million each year on energy for street lighting. Recent projections indicate energy costs for street lighting will rise by between 5% and 14% over the next 10 years which could mean the annual cost increasing to nearly £15 million in that time and as high as £55 million per year in 20 years if prices rose by 14% each year.

The streetlights are currently dimmed by 25%-50% power from 2200 to 0530 and approximately 45,000 lights in residential areas are switched off between 0100 and 0500 each night. Extending dimming or part night lighting to further reduce costs have previously been explored are not viable.

By investing approximately £18.5 million over 3 years to convert the council's 89,000 street lights to LED it would reduce their consumption by around 60% saving approximately £2 million per year (at today's prices).

**RECOMMENDATIONS:**

It is recommended that:

1. Cabinet approves in principal the conversion of the Council's street lighting assets to LED and delegates to the Head of Highways and Transport, in consultation with the Cabinet Member for Highways and Transport, the authority to issue a change notice under the Street Lighting PFI contract to enable the development of a detailed proposal.
2. Cabinet take a decision on whether to proceed based on a final detailed business case, including a technical solution and implementation programme, in Autumn 2018.

## **REASONS FOR RECOMMENDATIONS:**

Energy price inflation is increasing at a significant rate (5%-14%) and to ensure lights are operational when needed, there is little opportunity for the Council to control or reduce its energy costs.

LED technology in street lighting has matured significantly in recent years while the costs have reduced. Many Highway Authorities have either embarked on an LED conversion programme or are in the process of planning to commence one within the next 2-3 years.

Converting to LED will reduce energy consumption by 60% delivering £2 million per year energy savings at today's prices as well as reducing carbon impact by 6200 tonnes and avoiding the Carbon Reduction Commitment tax otherwise payable on the avoided consumption.

In addition to converting to LED street lighting and upgrading the Central Management System, Officers will be able to explore additional innovations now being used or being developed for use with street lighting such as:

- Motion sensor controls to turn lights on in residential areas when people or vehicles approach and, off once they have passed
- Providing real-time traffic movement data to help understand and ease congestion
- Environmental sensors to detect and monitor air quality

The potential for these innovations may be in direct relation to street lighting (e.g. motion sensor controls) or in providing a communications network for other areas of the Council (and extending to partners in District and Borough Councils) to connect equipment to improve the services and outcomes they deliver.

Furthermore, these innovations may present grant funding opportunities through central Government departments and the Local Enterprise Partnerships (LEPs) which would reduce the borrowing requirement for the Council.

The PFI contract allows for changes to the specification and service. As explained in paragraphs 18-22, once a change notice is issued the process of identifying an appropriate solution to meet the Council's needs begins which is expected to take 6-8 months to explore and agree before being presented back to Cabinet for approval, hence the reason for the 2 stage Cabinet approval.

## **DETAILS:**

### **Background**

1. In 2010, Surrey County Council entered into a 25 year contract to deliver street lighting through Surrey Lighting Services and their main Contractor Skanska. The contract covers 2 elements:
  - a. Operate and maintain the Council's street lights for 25 years ensuring performance outcomes such as "lights in operation" and "repair timescales" are achieved and that equipment is safely maintained and repaired as required to agreed standards and intervals.

- b. During the first 5 years, replace 70,000 street lighting columns and install new lanterns on them and, refurbish a further 19,000 street lighting columns and install new lanterns. Each lantern was fitted with components as part of a Central Management System (CMS).
2. The CMS allows the Council to control the on and off times of the lights as well as dim the lights when desired. The CMS also enables lights to report faults reducing the time lights take to be repaired. A particular feature of the CMS is the ability to remotely set and change the profile of each light individually to respond to differing needs – this not only makes the process of change more simple but also removes the significant time and cost that would be associated with visiting each streetlight to implement such a change. An example of this was the recent decision to change the timing of Part Night Lighting (with the start time moving from midnight to 0100) where the differences were uploaded in to the CMS and changes took effect the next night.
3. At the time of awarding the contract (2009), LED in street lighting was in its infancy with the prices of lanterns significantly higher than the conventional discharge lamps (fluorescent and high pressure sodium) and the consumption reduction much less. As a result the implementation of the CMS was determined to be the most effective option to minimise future costs at the time by allowing variations to lighting profiles as described above.
4. Through the replacement of the lights during the first 5 years of the contract, the energy consumption has already reduced from 31 million Kwh per year in 2010 down to 23.8 million Kwh in 2016.

### **Current Position**

5. Despite that reduction, the current price of energy for street lighting means the Council is paying approximately £3.5 million per year for energy with a further £160,000 to cover the CRC tax each year
6. The unit price of energy is made up of 2 elements with 45% attributable to the cost of the energy itself and 55% to cover the cost of maintaining and operating the underground cable networks. Whilst the price of the energy consumed itself has remained relatively static, these network charges have increased significantly in recent years leading to a higher overall rate of energy price inflation when compared to the overall headline inflation rates such as RPI, CPI etc.
7. A further complexity to the calculation of the energy unit rate is that the price varies depending on the time of consumption. For example, the price from 2100-0700 each night is substantially lower than the price when lights are on between 1600 and 1900 from October to March. As a result, interventions such as dimming and part night lighting which often occur during the “off peak” periods means that although the consumption reduction is a like for like reduction (50% reduction in power = 50% reduction in consumption) it has a disproportionately lower impact on the actual costs (50% reduction in power might have a 30-40% reduction in costs or less).
8. In June 2017, the Council’s energy provider (Kent Laser) issued a 10 year forecast. This outlined a projected range of increases of between 5% and 14% over that period. The impact of these projected increases is that the

cost of energy in 10 years' time is likely to be an annual figure of between £6.5 million and £14.8 million. If the trend continues, energy costs for street lighting in 20 years' time could be as high as £55 million per year.

9. The Council has already taken steps to reduce its energy consumption over the past 8 years including:
  - a. Installing the CMS and as each light was replaced, it was immediately dimmed from 2300-0530 each night with roads in residential areas dimmed by 50% and traffic routes by 25%
  - b. In Oct 2014, dimming was extended to start at 2200 each night
  - c. From Dec 16 to July 17 part night lighting was introduced to 45,000 lights in residential areas with the majority being switched off midnight to 0500 with the remainder being switched off between 0030 and 0300 or switched on before 0500 to provide lighting in locations where trains and buses start/finish after midnight and/or before 0500. In November 2017, a decision was taken to revise the part night lighting profile to 0100 to 0500.
  
10. The Council has therefore exhausted the options available to it with the existing infrastructure to reduce energy consumption and minimise the impact of future price rises.

### Proposal

11. As described above, LED technology has matured significantly over the past 10 years with the replacement cost reducing significantly whilst performance of the lights themselves had risen. To give an example, to replace a 55w fluorescent lamp (mostly used in Surrey's residential roads), a 21w LED would be used to deliver the same level of lighting.
  
12. It is widely acknowledged within the industry that whilst there are still likely to be some improvements in LED performance in future years in the short to medium term at least this is unlikely to be transformative – even a 10% improvement in performance in the above example would only give a 2w reduction.
  
13. Because of this many Highway Authorities are now either completing, implementing or in the process of developing an LED conversion strategy. The low pressure sodium lamps (that give an orange glow) which the Council replaced earlier in the decade are now being discontinued by the manufacturers with any already produced stocks only likely to be available until the end of 2019 with prices rising during that period as they become scarcer.
  
14. It should be noted that such a decision is not being suggested lightly given the recent replacement of the Council's streetlights however as described above, the technology was not available at the time of the contract award and if the Council had not acted when it did, not only would it continued to have seen 50% higher consumption than now (as described in paragraph 6) but also a higher number of significant column and lantern failures resulting in an increasing cost and risk to the travelling public. Furthermore, approximately 50% of the cost of the PFI contract is funded through PFI grants provided by the Department for Transport which is no longer available to apply for. The

Council will continue to receive all planned PFI credits and will retain 100% of the savings generated by the conversion.

## Options

### Option 1

Do nothing – aside from the increasing cost of energy, this is arguably a low risk option.

The street lights have recently been replaced in the past 8 years and operate well, contractor performance is strong with low levels of complaints about faults not being repaired etc and so we have another 15 or so years ahead with one less operational area for the Council to be worried about.

An LED conversion programme was considered in late 2014 but due to the limited cost benefit and uncertainty in price inflation, it was decided not to proceed at that time.

However as described, the cost of energy has risen steadily but at an increased rate and with little if any options available to further reduce consumption particularly in the peak winter, early evening period it is highly likely that the Council will have to consider stopping spend in other equally important areas across the Council to be able to keep the lights on.

### Option 2

Retrofit LED gear trays in to all existing lanterns and upgrade/replace the CMS. This has the benefit of being the cheapest option (current estimate is £16m) and minimises waste by recycling existing lanterns. However there is a risk around the future warranties of the lanterns and a particular risk around water ingress in the retrofitted Arc lantern and the fact you cannot replicate the optics of a designed lantern over a retrofitted LED - again a greater issue in the Arc lanterns. As described below (option 4) this needs further analysis to evaluate the viability.

Any potential compromise in future warranty of equipment may result in liability surcharges or the Council accepting liabilities which go against the principal of the PFI contract approach and terms.

### Option 3

Instead of retrofitting each light to accommodate LED functionality, we would instead replace each unit with an LED lantern. This is of course a more expensive solution (estimated to be £23 million) and although would not deliver any additional savings over the retrofit solution will still be offset by the significant savings resulting from converting to LED.

As described there would be no material benefits in terms of additional energy reductions and so savings when compared to other options however the individual products would be warranted as “off the shelf” designs.

### Option 4

In moving this work forward, the Council needs to consider a balance between maintaining the existing excellent performance in street lighting it experiences with reducing its costs wherever possible.

The work undertaken so far gives strong confidence that the 66,000 Libra lanterns mostly installed in residential roads can be successfully retrofitted. As described above, there is further work to be carried out in assessing the viability of retrofitting the Arc lanterns – both to ensure the optical

performance of the existing lights can be maintained and that retrofitting will not compromise the lanterns waterproof ratings which would otherwise increase the risk of lantern failure in the future. A hybrid solution of this nature is expected to cost in the region of £18.5 million and it is on this basis that current discussions are being taken forward.

#### Recommended Option

Option 2 is the optimum solution providing the greatest net saving over the life of the replaced equipment however as described, the suitability of a retrofit for the Arc lanterns needs to be more fully investigated.

The fall-back position would be to select a hybrid solution of retrofits and full replacements with the best solution for each column being installed. This will be explored as part of the change notice and, if retrofitting all lanterns is viable this will be taken forward.

15. In all cases the CMS will need to be upgraded to work with LED. The cost of upgrading has been included in the above values.

### **Contract Change Process**

16. The PFI contract has a specific schedule defining the process for implementing change and covers small, medium and high value changes during the life of the contract. The process for each being more or less complex depending on the extent of the change.
17. The conversion of the street lights would constitute a High value change and as described, the first step of that would be to issue a change notice to the Service Provider. The Change Notice will outline the reason for change, what change is being requested (i.e. new equipment specification) and any changes in the existing contract that might result from the change – for example changes to performance standards or maintenance frequencies.
18. Once issued, the Service Provider would then carry out an exercise to develop a solution to meet those revised requirements which would include seeking and selecting a manufacturer, developing a programme to ensure the conversion is carried out within the agreed timescales with the least disruption as possible. This will result in changes to the various documents covering the PFI contract. Collectively, the development of a new specification, scrutinising and agreeing the technical solution coupled with the subsequent contract amendments will inevitably take some time. A period of approximately 6 months has been provisioned for this activity based on the experience of other Local Authorities developing similar changes under street lighting PFI contracts.
19. As a result of initiating this change, the Council will bear the advisory costs borne by the Service Provider and their lenders who will need to assess the proposed changes satisfy themselves that appropriate controls have been considered and implemented to maintain the existing excellent levels of service for the remainder of the contract period. These primarily include legal and technical advisors for the Service Provider and the banks who initially funded the contract. It is estimated that these costs will be in the region of £350,000 and will be incurred in 2018/19.

20. Once Officers have agreed a solution and determined value for money, a more detailed business case will be presented to Cabinet in autumn 2019 for approval to implement the change and convert the street lights to LED.

#### **CONSULTATION:**

21. Although the equipment will be changed, there are no plans to change anything that would have a direct impact on residents or road users. As a result no public consultation has been undertaken.
22. Once the change process has been completed and a solution agreed by Officers, Cabinet will be asked to review and approve it before work is formally commissioned.

#### **RISK MANAGEMENT AND IMPLICATIONS:**

23. There is potential for a risk that residents see equipment being upgraded or replaced that has only been installed in the past 4-8 years and question the value of doing so when savings are trying to be made across the Council. Ahead of the work being a completed a communications plan will be developed to ensure residents are aware of why the work is being carried out and the savings that will be made as a result alongside clearly stating the impact of not replacing the lights with LED.
24. Replacing 89,000 lights is a significant construction project. There may be localised disruption as lights are changed and this could include lane closures to safely carry out the work. However the work involved does not require any excavation or major road works – in most cases the replacement can be fully carried out in 15-30 minutes to each lantern. As part of its maintenance regime, Skanska already carry out visits of a similar nature to each column at least once every 6 years which would include similar traffic management and impacts where appropriate to ensure the safety of the travelling public and the operatives carrying out the work. Early and ongoing engagement with the Council's Streetworks team will ensure the programme is managed effectively minimising any disruption.
25. Although the energy price projections indicate a rise of between 5% and 14% over the next 10 years, Officers have used the lower of these to develop its business case to ensure generated savings will exceed the cost of carrying out the work. Finance Officers have calculated that even if energy prices only rose by 1.7%, the savings generated by converting to LED over their 20 year minimum life would still cover the cost of replacing them. Prices rose by just over 11% in October 17 when prices changes were last due to be changed.

#### **Financial and Value for Money Implications**

##### **Costs, Savings and Funding Options**

26. As described, the current model developed is on the basis of retrofitting 66,000 Libra lanterns with LED gear trays and the remaining lights will be fully replaced with LED lanterns. As part of the conversion, the CMS will also be upgraded to be compatible with LED.
27. The costs of retrofitting and replacing the lanterns and the CMS is currently estimated to be £18.5 million over 3 years from April 2019. The business

case has been prepared on the basis of using Public Works Loan Board (PWLB) borrowing and is estimated to add a further £6.5 million in interest costs over the 20 year minimum life of the replaced lights.

28. The Council will incur the Service Provider's costs to agree and implement the contract change which is estimated to be in the region of £350,000 in 2018/19.
29. Once completed the converted lanterns will use 60% less power generating approximately £2 million savings in energy costs (at today's prices) which will be used to fund the cost of conversion and debt servicing.
30. As described, converting to LED will make the Council's street lighting use 60% less power. This equates to around 6,200 tonnes of CO2 each year. Under the Government's Energy Efficiency Scheme (formerly the Carbon Reduction Commitment scheme), the Council is obliged to pay a tax equivalent to £15.60 per tonne of CO2 produced. By converting to LED, the Council will save a further £98,000 each year.
31. The Council is currently exploring alternative options to PWLB borrowing for this project and these include:
  - a. Salix Energy Efficiency Loans – Salix is funded and governed by the Department for Business, Energy and Industrial Strategy in Central Government and provide interest free loans over 5 years to public sector organisations for different projects including LED conversion and have supported a number of Highway Authorities in implementing their LED conversion. Due to the requirement to repay the loan within the first 5 years, Salix funding is often combined with other funding sources to reduce the overall cost of the project.
  - b. The Green Loan provided by the Green Investment Bank (GIB). The GIB was initially set up by central Government to provide funding to a variety of energy related infrastructure projects such as Solar, On and Offshore Wind, Fuel from Waste and, energy efficiency including street lighting. In 2015, the Government sold the GIB into private ownership. Again the GIB have provided funding to support a number of LED conversion programmes in recent years.
  - c. Grant funding for innovation through the Local Enterprise Partnerships and Central Government departments. Recent discussions with representatives from the Coast to Capital LEP and SCC Officers in the Strategy and Commissioning Team indicate there may be suitable grant funding streams to support innovative solutions to tackle challenges such as energy reduction. Any successful bid would reduce the direct cost to the Council and in turn reduce borrowing costs.
32. Officers have had initial, productive conversations with both organisations and these will continue to be developed over the coming months as the wider change process moves forward.

## Value for Money

33. Under the terms of the PFI contract, the Council cannot conduct a separate tender and so require the existing Service Provider to develop a solution based on the Council's revised requirements and specification.
34. To ensure the contract and the LED conversion continues to provide the Council with value for money, the Service provider will conduct an open book tender with Officers from both Highways and Procurement involved in the process. This will allow Officers to scrutinise the product selection as well as prices to achieve that objective.

### **Section 151 Officer Commentary**

35. The County Council is facing a very serious financial situation, whereby there are still substantial actions to be identified and delivered to achieve a balanced budget in the current year and a sustainable budget plan for future years. Street lighting energy represents a significant cost to the council, with the risk of significant price increases in future years. Converting street lights to LED would allow the council to reduce those energy costs while maintaining services to residents.
36. Cabinet are not being asked to agree the implementation of LED lighting at this time. Instead Cabinet are asked to consider supporting the principal of converting to LED lighting, which would allow officers to undertake further work with the council's service provider. In doing so the council will incur costs estimated at £350,000 in 2018/19, which will be met from existing budgets. A more detailed business case, including a full financial analysis showing investment, payback and annual savings, will be presented to Cabinet later in the year for consideration before proceeding with the project

### **Legal Implications – Monitoring Officer**

37. Under Section 3(1) Local Government Act 1999 the Council is under a general duty to "make arrangements to secure continuous improvement in the way in which its functions are exercised, having regard to a combination of economy, efficiency and effectiveness". In addition to achieving monetary savings, energy efficiency and carbon reduction are an integral part of Government policy and the LED conversion programme will go some way in supporting this.
38. The Council is able to modify existing contracts in certain circumstances set out in Regulation 72 of the Public Contracts Regulations 2015. The modifications proposed in this report fall within these circumstances and as such are permissible without a new procurement procedure.
39. Cabinet will note that the recommendations sought in this report do not bind the Council into entering into the contract modification. Cabinet will want to satisfy itself that the proposed investigatory works and associated costs represent appropriate use of the Council's financial resources and will enable it to achieve its general duty to secure best value in the delivery of its functions.

### **Equalities and Diversity**

40. The outcome of converting street lights to LED will deliver the same levels of lighting as present.
41. In terms of the work to do this, it will replace the “bulk lamp change” programme which sees all lights visited in a 6 year period to change the lamp (aka bulb) with no excavation and each visit to a column probably lasting around 15-30mins (similar to a fault repair visit). In certain locations lanes may be closed or overnight working scheduled but this is again the same as would be carried out for the bulk lamp change programme.
42. As a result of the Equality Impact Assessment Screening, it is determined that no protected groups will be impacted either positively or adversely.

### **Environmental sustainability implications**

43. The conversion to LED will have 2 notable environmental impacts:
  - a. The conversion to LED will reduce annual electricity consumption from 21.3 million Kwh down to 8.3 million Kwh. This saving of 12.7 million Kwh translates to a saving of around 6,200 tonnes of carbon dioxide each year.
  - b. In the event that retro-fitting the 23,000 Arc lanterns is not viable, this will require the lantern to be replaced in full. Inevitably this would result in a considerable amount of redundant lanterns. As described, it is hoped that this can be avoided by retrofitting the lanterns however if this is not possible it will be mitigated in the following ways:
    - i. In the early phases of LED replacements, old Arc lanterns can be reused to repair damaged or faulty lanterns due for replacement at a later stage. This will reduce the need to produce new lanterns for the short term whilst maintaining uniformity.
    - ii. Since the PFI contract commenced in 2010, all waste material generated (including throughout the initial replacement programme) has been 100% recycled and this would also be the case for the above replacements.

### **Public Health implications**

44. There are 2 areas where LED might have an impact on Public Health – firstly concerns over the effect on circadian rhythms and sleep patterns and secondly glare from the lights which could impact on road users. Included are 2 reports on the public health impact of LED.
45. The first produced by the American Medical Association in 2016 (AMA) (<https://www.ama-assn.org/sites/default/files/media-browser/public/about-ama/councils/Council%20Reports/council-on-science-public-health/a16-csaph2.pdf>) considers both these aspects. Their recommendations support the conversion of lighting to LED providing it is suitably directed to minimise

glare. They also highlight the need to consider using LEDs with a colour of temperature of 3000k or less.

46. The second report published by Stockport City Council (<http://democracy.stockport.gov.uk/mgConvert2PDF.aspx?ID=113023> – *this link may need to be copied and pasted into the browser address bar*) considers the same points including referencing the above AMA report. The Author agrees with the findings but makes 2 additional points.
- a. That the cost of limiting the colour temperature of LEDs to 3000k or less is significant when compared to 4000k which at that point was the most common standard across products being manufactured.
  - b. In 4.3 Table 1, the final point highlights the potential for a reduction in road accidents and perceived safety as a result of converting to LED. It should however be noted that this consideration relates to a comparison with low pressure sodium street lights which give an orange glow. Surrey County Council has already converted to whiter lights sources as part of the 2010-2014 replacement programme and so would have already benefitted from these improvements.
47. As part of the change process, Officers will carefully consider these aspects when defining the specification and approving the product selection and conversion costs to ensure value for money.

#### **WHAT HAPPENS NEXT:**

48. Subject to approval by Cabinet:
- Officers will issue a change notice under the Street Lighting PFI contract in early 2018
  - In conjunction with the Service Provider, Officers will then carry out a market test to select an appropriate manufacturer to provide suitable products to meet the Council's requirements to ensure the required levels of lighting in all roads and maintain the excellent operational performance
  - Cabinet will be presented with a report including a more detailed business case to approve before the change agreement is agreed and implemented (expected to be Autumn 18)
  - Subject to that Cabinet approval the replacements will commence in April 2019 and are expected to be completed over 3 years

#### **Contact Officer:**

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#### **Consulted:**

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Kent County Council  
Skanska Infrastructure Services Ltd  
Surrey Lighting Services

**Annexes:**

No Annexes

**Sources/background papers:**

Report of the Council on Science and Public Health (American Medical Association 2016) - Human and Environmental Effects of Light Emitting Diode (LED) Community Lighting

Health impact assessment of introducing LED street lighting in Stockport

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