Street Lighting Energy and Carbon Reductions: Part Night Lighting

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1. Summary

Shropshire Council has approved a Carbon Management Plan (CMP) which has set a baseline target of reducing carbon emissions by 35% by 2014. Street lighting is required to reduce carbon emissions by 1400 tonnes per annum.

There have been a series of trials of different methods to reduce energy usage of street lighting in Shropshire. Part Night lighting is the one method that is both affordable and can deliver the required reductions; switching the lights off between mid-night and 5:30 to 6:00 am.

The reduction in energy cost is approximately £162,500 per annum (using the present day energy rates); but this will need to be set against the future significant increases in energy rates. The cost of converting the street lights (£412,500 over four years) will be in the main funded by not cleaning them and the energy saved.

Shropshire Council has already undertaken a number of energy and carbon reduction initiatives including the dimming and trimming of street lights, several small LED street lighting trials and the replacement of low efficiency lamps. All of which can be continued along side a part night lighting project to maximise our future savings.

The most critical task in the roll out of the part night initiative will be the risk assessment process which will be used for each site to determine any exceptions. Exceptions will exclude street lights from conversion to part night lighting and indicate where dimming of the lighting levels will be more appropriate. This will be led by the street lighting team following consultation with Members, other authorities who have done this already and the Performance Management and Commissioning Group, the multi agency partnership including all the emergency services, PCT and Shropshire Council.

2. Recommendations

Cabinet is recommended to approve the carrying out of a risk assessment of all of Shropshire Council’s street lights to determine which of the options below will be applied to each area;
Part night lighting, that is to switch on at dusk, off at mid-night, on at 5:30 to 6:00 am, off at dawn
Dimming of street lights, that is reducing the lighting level between mid-night and 5:30 to 6:00 am.

3. Risk Assessment and Opportunities Appraisal

**Risk Management** The Key risks for Part Night lighting are the operational risks which are:

<table>
<thead>
<tr>
<th>Operational Risk</th>
<th>Impact of Risk</th>
<th>Mitigation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Road safety</td>
<td>There is the possibility the lack of lighting could potentially result in an increased number of claims against Shropshire Council.</td>
<td>Carry out safety audit and detailed risk assessment. The risk must be assessed and the risk must continue to be monitored once the policy is implemented to ensure that any unexpected outcomes which increase the exposure are acted on.</td>
</tr>
<tr>
<td>Fear of crime and anti social behaviour</td>
<td>Increased criminal activity</td>
<td>Careful consideration of each individual area taking into account safety audit recommendations. Full communication (not consultation) with Parish/Town Councils, residents, stakeholders and the emergency services. This will be monitored through the Performance Management and Commissioning Group.</td>
</tr>
<tr>
<td>Dangers from unlit equipment</td>
<td>Danger from unlit lighting columns and associated street furniture on the side of the road. Possible claims against the Council.</td>
<td>Take into account safety audit recommendations. Street lighting units near to traffic islands or busy roundabouts and junctions should remain operational</td>
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</tbody>
</table>

**Human Rights / Equalities Appraisal** EINA completed and all low risk.

**Community / Consultations Appraisal** Limited to Members, and the Emergency Services, through the Performance Management and Commissioning Group to develop the risk assessment process.
4. Financial Implications

**Savings** from reduced energy usage is approximately £162,500 per annum when fully implemented (over a four year period); but these are likely to be offset by significantly increased energy prices. The saving is based on 12,500 street lights and any increase in the exception areas will reduce this saving.

**Capital Cost** is £412,500 for the investment over 4 years. This will be financed in part by stopping our interim clean and inspection of the street lights (saving £55,000 per annum). However, it should be noted of the implications by temporarily stopping our interim lamp cleaning and column inspections over the next 4 years could expose us to more liability in the future.

The remaining funding would be self financing and achieved by recycling the ongoing energy savings back into the Part Night Lighting initiative.

The investment is for the new photo electric cell that switches the lanterns on and off.

There are another 2 options which have been considered;
- Option 2 to fully implement over only 1 year
- Option 3 to have a hybrid of running at the 4 year cycle for the first year with a review at the end of the year to determine whether accelerating the programme, completing installation in full in the second year, is appropriate.

The comparison of the capital costs and savings are included in Appendix A.

Option 2 has been discounted as it requires £525,000 capital in year 1 (2012 / 2013) and does not allow for any iterative learning. As Options 1 and 3 have the same first year there is no difference in the capital until year 2 (2013 / 2014) therefore the review will inform the approach for year 2.

**Revenue resources needed**, these are not included in the above costs. Once we have established a process we will undertake initial office based surveys using GIS to identify street lights which should be excluded from the Part Night Lighting scheme against agreed set criteria. This will require a street lighting engineer and an administrative assistant full time for 12 months, costing £50,000. The funding for this additional staff resource will be provided from the Local Transport Plan (LTP) Highways Consultant fees split £25,000 for 2011 – 2012 and £25,000 for 2012 – 2013.

5. Background

Shropshire Council has over 18,500 street lights which the energy cost this year is predicted at £830,000 (previous year £750,000). It is likely that as the economy recovers, the cost of energy will again rise well above the rate of inflation.

To meet the objective of reducing the carbon emissions of the street lighting energy there have been several options trialled. These are outlined in Appendix B. The Part Night lighting is the only option which is both affordable and substantially reduces the energy usage and carbon emissions of the street lighting.
Current Position

To try Part night lighting, three pilot schemes were identified in partnership with the three Town/Parish Councils in advance of an overall approach across the County. The pilot areas selected were Church Stretton, Ellesmere and Cleobury Mortimer.

The Part night trials were subject to the necessary safety audits and consultation with the Emergency Services, Parish Council’s, residents and other effected parties. After investment of £10,000 by the authority over the past 6 months, trials will start from August 2011 following extensive consultation with the councils and through them the local community.

Proposal for Shropshire wide carbon emissions and energy reductions.

The full proposal for this initiative is included in Appendix C and is summarised below.

- To move as many as possible of Shropshire Council’s street lights to Part Night lighting. This is likely to be 12,500 street lights.
- Exception areas where lighting remains lit following a site risk assessment will include roundabouts and approaches, junctions and sections of highway considered to be at risk, town centres and high security areas. These will all have the lighting level reduced by dimming.
- We will consider only Shropshire Council street lights initially. However, we will offer to Shropshire’s other larger lighting Authority’s the option to piggy back on our large scale procurement.
- To start the initiative on the 1 April 2012 with the target of completion by 2016.
- Base line information for crime and safety to be set and monitored through Performance Management and Commissioning Group, the multi agency partnership including all the emergency services, PCT and Shropshire Council.
- Consultation will be limited to the Emergency Services through the PMCG (Performance Management and Commissioning Group) prior to implementation.
- We will undertake full communication and sharing of information with the remaining stakeholders during the development of the risk assessment process.

7. Conclusions

Shropshire Council’s street lighting is required to contribute to the carbon reduction target reducing carbon emissions by 35% by 2014, potentially making annual savings in energy and 1400 tonnes of CO\textsubscript{2}. 
There have been a series of trials undertaken to reduce energy usage of street lighting; but the only one that is both affordable and can deliver the reduction is Part Night lighting, switching the lights off between mid-night and approximately 5:30 to 6:00 am. We now propose to roll out Part Night lighting across Shropshire with full communication, but reduced consultation, from 1 April 2012.

The reduction in energy consumption for street lights following full implementation of this initiative will be £162,500 per annum and is needed to offset future significantly increased energy prices. The capital cost will be £412,500, for the most economic option, with a payback period of 4 years.

Aligned to this initiative will be a specific communication plan to ensure that all stakeholders are fully aware of the reasons for and the programme for the Part Night initiative.

List of Background Papers (This MUST be completed for all reports, but does not include items containing exempt or confidential information)

None

Cabinet Member (Portfolio Holder)
Cllr Simon Jones

Local Member
Not applicable

Appendices

Appendix A  Comparison of the cost and savings for each of three options
Appendix B  Carbon and energy reduction options trialled
Appendix C Full Proposal for Shropshire wide Part night lighting
Appendix A  Comparison of the cost and savings for each of three options.

### Part-night lighting 1, 2 or 4 year installation comparison

<table>
<thead>
<tr>
<th>Years</th>
<th>No. of Columns</th>
<th>Capital Cost to install</th>
<th>% of Annual Saving</th>
<th>Total Saving</th>
<th>Net Savings over 5 years</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>3125</td>
<td>£103,125</td>
<td>13</td>
<td>£20,313</td>
<td></td>
</tr>
<tr>
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<tr>
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<tr>
<td>5</td>
<td>0</td>
<td>£0</td>
<td>100</td>
<td>£162,500</td>
<td></td>
</tr>
</tbody>
</table>

**Option 1 (4 year install)**

|          | 12500          | £412,500                | £487,500          | £75,000      |

**Year 1-4 - 3125 installs @ £33, same time as bulk lamp change**

### Option 2 (1 year install)

|          | 12500          | £525,000                | £731,250          | £206,250     |

*Year 1 - 3125 installs @ £33, 9375 installs at £45 (separate from bulk lamp change.)*

### Option 3 (Hybrid)

|          | 12500          | £487,500                | £605,313          | £117,813     |

*Year 2 - 6250 installs @ £33, 6250 installs at £45.
Appendix B Carbon and energy reduction options trialled

Removal of Street Lights
- 100% saving for maintenance, energy consumption and carbon usage
- Significant capital outlay required of between £350 - £500 per column (depending on the electrical connection) to remove safely. Leaving them in place is not an option.
- We have removed a minimal number of street lights due to the cost; we should however consider this during any replacement programme

Dimming / Variable lighting
- There is now the option to dim (to approximately 50% of light level) the streets lights after midnight rather than switch off.
- This is only applicable to the more powerful lanterns (those on major roads) and therefore only to a small percentage of our street lights.
- We should be dimming all the appropriate street lights as part of our replacement programme.

Trimming street lighting.
- By having more precise photo electric cells (light meters) and therefore reducing the safety margin we can turn the lights on 10 minutes later and similarly turning off earlier in the morning around 92 burning hours can be saved per year. All new installations should include trimming as standard.

Electronic Conversion
- Savings are already being made by converting 35 watt low power lamps (orange lights) to electronic switchgear and by using more efficacious photo-electric cells, which reduce switch-on times and use less energy. These initiatives will give a 5 year payback, with savings of 10% of the total annual energy bill.
- The programme for all applicable street lights will be completed by April 2014.

LED
- Several authorities are installing LED lanterns throughout as part of either PFI’s or with significant Capital investment. These cost approximately £400 per column.
- The average saving in energy and maintenance is £ 17 per column per annum for 6000 of our low power lights.
- This route is considered as too expensive, the capital needed would be nearly £2.4 million, with a payback period averaging at 16 years, considerably more than Part Night lighting. However, as the price of LED lanterns drops over the next few years this may become a viable option in the near future; but would not in any way be compromised by any of the initiatives above.

Part night lighting (‘on at dusk, off at mid-night, on at 5:30 to 6:00 am and off at dawn’)
- Average energy savings of up to 50% can be achieved per unit for part night operation.
- To allow this we have to change the photo electric cells on the lanterns (approximately 12,500). Therefore this is a relatively cheap way to reduce
energy consumption and carbon emissions but has the disadvantage of the street lights being totally off.
Appendix C Full Proposal for Shropshire wide Part night lighting

1. To move as many as possible of Shropshire Council’s street lights to Part Night lighting. This is likely to be 12,500 street lights.

2. Exception areas where lighting remains lit following a site risk assessment will include roundabouts and approaches, junctions and sections of highway considered to be at risk, town centres, CCTV areas, railway stations and banks. These will all have the lighting level reduced (dimming) rather than switched off.

3. To Part night light all appropriate street lights such that they are switched:
   - on at dusk,
   - off at mid-night, (middle of the night),
   - on at 5:30 to 6:00 am (5.5 to 6.0 hours from middle of the night),
   - off at dawn.

4. For clarity it is the middle of the night (usually midnight in GMT) as the photo electric cells use the point exactly in the middle of the previous day’s switch on and off times.

5. To minimise the capital cost we would propose to do this over four years (Option 1) as part of the ongoing bulk change of lamps programme. We currently replace all lamps every four years and whilst the operative is up doing this they can change the photo electric cell. This would cost £33 for each street light.

6. If we did it separately (Option 2) we would have to pay for an additional visit to the street light of £12 for most street lights; although this will increase the net saving over 5 years by £130,000 it would require capital of £525,000 in 2012 / 2013.

7. To review the initiative at the end of the first year (Option 3) to see if an accelerated programme would be appropriate. The issues considered in the review will be customer feedback, financial savings, capital availability, and operational delivery.

8. To revisit the financial assessment following receipt of the tenders for the new contract for street lighting in late summer 2011. We will need to consider the new rates for the new contract and assess the savings again and consider whether a stand alone tender is needed for these capital works.

9. We will consider only Shropshire Council street lights initially. However, we will offer to Shropshire’s other larger lighting Authority’s the option to piggy back on our large scale procurement.

10. Consultation will be limited to the Emergency services through the Performance Management and Commissioning Group (PMCG).

11. To start the initiative on the 1 April 2012. This will ensure that the communications plan is complete and minimise the customer enquiries as we will then be in the shorter lit periods.

12. To reduce our response and have a more “standard reply” approach managed through the Customer Service Centre (CSC) and a dedicated web page. The web site would have a GIS layer with all streetlights identified, numbered and coloured (green - full night, amber - part night, red -repairs instructed).

13. To identify the street lights converted by using a conspicuous green photo electric cell.

14. Base line information for crime and safety to be set and monitored through Performance Management and Commissioning Group.

15. To ensure that there is full communication and involvement of the stakeholders of this sensitive initiative at four levels;
o Member briefings, a general workshop for members, including through the Area Committees and LJC's, and then local communication for the works. This could then include the Town and Parish Councils in the communications.

o Communication plan for stakeholders other than members; a leaflet, web page, street signs, media campaign, parish magazine articles to raise the awareness of the need, effect and programme of the Part Night lighting initiative. The two messages being that the initiative is driven by the need for carbon reduction and control of the risk of soaring energy prices.

o Response to increased customer enquiries; reduce our response and have a more "standard reply" approach managed through the Customer Service Centre and a dedicated web page.

o Signs on the areas which were due for the part night lighting 4 weeks prior to the switch off.

16. To test the concept with the Risk and Insurance team and review the claims history after six months.

17. Once we have established a process we will undertake initial office based surveys using GIS to identify street lights which should be excluded from the Part Night Lighting scheme against agreed set criteria. This will need a street lighting engineer and an administrative assistant full time for 12 months, costing £50,000.

18. There will also be the need to agree the response process with the Customer Service Centre and train their team members