

REPORT: Executive Board

DATE: 29th March 2012

REPORTING OFFICER: Strategic Director, Policy & Resources

SUBJECT: Street Lighting – Energy Saving Options

PORTFOLIO: Transportation

WARDS: Boroughwide

1.0 PURPOSE OF REPORT

- 1.1 To consider options to reduce revenue costs for the Council's stock of highway electrical equipment that includes street lighting, traffic signals and illuminated traffic signs and bollards. Information is also provided on future lighting provision, the condition of the Council's current lighting stock and the potential future costs of adequately maintaining it.

2.0 RECOMMENDATIONS: That

- (1) Approval be given to the policy to regulate energy consumption by highway electrical equipment, in order to reduce costs and carbon emissions, as set out in Item 4 of this report;**
- (2) Approval be given to turning off street lighting on those high speed roads (over 40 mph speed limits) listed in Appendix A between midnight and 6.00am throughout the year and to any potential impacts of this action being monitored;**
- (3) The potential options to reduce energy consumption as set out in Appendix C be noted and be implemented where appropriate and as resources permit;**
- (4) Other potential actions that may be needed to maintain the Council's street lighting stock and reduce its street lighting energy bill be noted and be brought forward to a future meeting(s) of the Board for consideration.**

3.0 SUPPORTING INFORMATION

- 3.1 The cost to the Council of energy for its highway electrical assets (including street lighting, traffic signals, illuminated signs, etc.) is approximately £1.06m per annum. It currently has a contract with Haven Power (via UPG (Utilities Procurement Group)) to supply energy until April 2013. This contract fixes the unit rate for electricity for the period of the contract. An itemised listing of our equipment is declared to Scottish Power (Distribution Network Operator (DNO)), who issue a Certificate of Estimated Annual Consumption (EAC). This listing includes the following equipment which is in place on the highways of Halton:-

- 19,500 conventional lighting columns plus 400 lighting columns for HHT
- 141 high mast lighting columns
- 1,700 illuminated traffic signs
- 450 illuminated bollards
- 57 traffic signal controlled junctions
- 1 Pelican crossing
- 20 Puffin Crossings
- 5 Toucan crossings
- 18 Zebra crossings
- 11 Variable Message Signs (VMS)
- 67 CCTV cameras
- 12 Speed cameras
- 24 Real Time Passenger Information (RTPI) Signs (at bus stops)

The EAC determines the amount to be paid by the Council each month and this is passed to Haven Power who then invoice us each month. The EAC is updated every month; therefore any equipment removed/added is included within a relatively short period of time.

- 3.2 There is no statutory duty to provide street lighting. However, under S97 of the Highways Act 1980, local highway authorities have the powers, should they chose to use them, to provide lighting and contract with any persons to construct and maintain such lamps, posts and other works as they consider necessary. A highway authority may also alter or remove any works constructed by them. If street lighting is provided under the Highways Act, then it needs to be maintained in a serviceable condition.
- 3.3 The original purpose of street lighting was to prevent crime. It was unrelated to highway safety. The fact that street lighting outside of urban areas is still unusual, is a reflection of this fact. It is recognised that street lighting has a vital role to play in reducing fear and improving community safety after dark. Lighting can reduce crimes involving street robbery, theft from the person and assault, theft of/from and damage to motor vehicles, vandalism and burglary. One of its greatest benefits is to reduce the fear of crime especially for the more vulnerable members of our community. Street lighting also makes our roads and pavements safer.
- 3.4 A number of local authorities and the Highways Agency are now, however, switching off street lamps or reducing lighting levels in order to cut energy bills and carbon emissions. These measures are being applied across a range of road types including motorways, high speed rural roads and residential estate roads. Many of these are being treated as trials to assess the impact of the cuts on road safety, community safety and public acceptability. It is still relatively early days to determine the true impact of these trials. Whilst some cuts appear to have been generally accepted others have generated adverse public reaction, especially where road casualties have been blamed on the removal of lighting. The Risk Analysis section of this report and Appendix B lists a number of examples of where street lighting cuts have taken place and some feedback on the potential consequences of these cuts.
- 3.5 The options for reducing street lighting costs are as follows:
- Adaptive street lighting (reduce lighting levels during periods of low traffic flow)
 - Change switching levels for columns (come on later and go off earlier)

- Switch off street lights for part of the night
- Do not switch on/remove street lighting
- Use of solar panels
- Use of more energy efficient luminaires (lighting units/lanterns) including Light Emitting Diodes (LEDs)
- Removal of decorative lighting
- Removal of high mast lighting

Each of these options is considered in more detail in Appendix C.

- 3.6 St. Helens Council have for a number of years been participating in a European project to research and test methods to reduce street lighting energy consumption. A summary of their experience and findings to date is attached as Appendix D. This briefly sets out the various technologies that have been tested and the potential energy savings from them. It also presents some of the feedback from stakeholders and residents in particular, of the various trials where lighting levels have been reduced or where more efficient types of lighting unit have been installed.
- 3.7 In summary, the St. Helens trials predict potential savings of between 2% (for trimming or making lights come on slightly later and go off slightly earlier) and 40% (for part-night operation where lights are switched off from say midnight to 6.00am). One important conclusion of the studies is that the payback period for the simplest lighting modification is 6 years.

4.0 PROPOSED POLICY

- 4.1 Due to the increasing energy costs for street lighting, it is recognised that action must be taken to minimise future growth in energy consumption. This requires a complete reassessment of lighting policies, which are currently included in the Highway Maintenance Strategy. It is therefore proposed that a separate **Street Lighting Policy and Strategy be prepared**, which will be submitted to a future meeting of the Executive Board for approval.
- 4.2 However, in order to respond to a more immediate need to cut the cost of energy consumption, it is proposed, in the first instance, that **street lighting be switched off on high speed roads between midnight and 6.00am throughout the year, starting with those sections of road listed in Appendix A.** In the main these roads do not have any residential properties adjacent to them nor do they have any footways. Therefore the potential for crime and disorder issues are limited. It is estimated that this would save approximately £148,000 per year. The accident records of these roads for the three year period 2009 -2011 show that there have been a total of 7 accidents resulting in slight injuries. They occurred between midnight and 04.30 am. Two involved alcohol and two were stolen cars. In summary, all the accidents had factors that would not be affected by the fact of street lighting being present or not. Because of the nature of these accidents it is difficult to predict any potential impacts of removing street lighting. It is therefore proposed that these roads be monitored following any subsequent switch off to determine whether there has been any adverse effect on road safety that can be attributed to a lack of lighting. A report of any subsequent findings can be brought to this Board for its consideration. Consultation on these proposals had commenced prior to the preparation of this report and it may be possible to present a verbal update at the meeting.

- 4.3 It is also proposed that there should be **no net increase in the lighting stock other than for:**
- statutory requirements (e.g. the illumination of certain road signs);
 - road safety reasons, for example, where signs and/or bollards need to be illuminated or where traffic control equipment including traffic signals and Puffin crossings, are to be installed as part of Local Safety Schemes at collision sites; and
 - the adoption of new developments (including industrial and residential).
- 4.4 It is further proposed that **there be a presumption against new lighting schemes or additional highway electrical equipment** (e.g. CCTV) funded either through the Area Forums (such as lighting of footpaths, traffic management/engineering schemes requiring illuminated signs, lighting of car parks or recreational areas) or from the Council's other capital budgets, unless the additional revenue budget is available to fund the on-going lighting/highway electrical equipment and maintenance indefinitely. This proposal could also restrict the installation of new traffic signal equipment, Vehicle Activated signs (VAS), Variable Message signs (VMS), etc.
- 4.5 Obviously, each case would have to be judged on its merits, as each could impact on the safe and efficient movement of pedestrians and vehicles as well as on crime and disorder in the community, but it is evident that difficult choices will now have to be made. Where it is possible to avoid adding to the Council's stock of highway electrical equipment then this must be done.
- 4.6 **All proposed improvement and safety schemes or those currently being constructed are being reviewed** to reduce or remove any additional energy requirements whilst still meeting relevant design standards. **Traffic signs will not be lit unless it is a legal requirement**, highly reflective materials will be used for both direction signs and bollards to obviate the need for lighting. **The provision of vehicle activated signs will be reviewed**, where they are provided they will continue to be solar powered and their maintenance costs closely monitored.
- 4.7 Following structural tests to the lighting columns on the Widnes side of the Silver Jubilee Bridge (SJB) in April 2007, it was necessary to remove a number of columns from A533/A562 Queensway, for safety reasons. Since that time there have been a number of queries as to when this lighting is going to be replaced. The cost of replacing these columns would be in the order of £100,000 but many, if not all, of these replacements could become redundant once construction on the Mersey Gateway starts at the end of 2013. Records indicate that there have been no reported collisions within the area where the columns have been removed during the hours of darkness since the columns were removed. Two lighting columns on the off-slip to Ditton roundabout from the Runcorn direction have recently been demolished during the hours of darkness, but these were on a lit section of road. The speed limit within most of this area is 50 mph. **It is proposed that new lighting columns be installed on this access to the SJB only once the final road layout is constructed and lighting column positions can be accurately determined.** Also the speed limit will be 40 mph or less on the revised layout.

5.0 FUTURE LIGHTING PROVISION

- 5.1 There are 19,500 columns within in the Borough, 40% of which are over 30 years old and hence past their design life. These will need replacing in the next few years. The lanterns also need replacing on approximately 40% of columns in order to bring the lighting up to current standards. The cost of these works is estimated to be in the region of £8.0m; the current budget for this sort of (structural) maintenance is currently £200k per annum. As well as this identified need, the rest of the stock is continuing to age towards the end of its design life and will need to be replaced in the coming years.
- 5.2 There is currently a revenue budget of £1.54m available for the maintenance and energy requirements of all the equipment listed in paragraph 3.1. However, £1.06m of this is required for energy costs alone. It follows that little, if any, funding remains for structural maintenance of lighting columns. This, in turn, means that it will be difficult to sustain the existing number of columns on the network with current levels of funding.
- 5.3 Paragraph 7.0 of Appendix C also sets out the issues surrounding the high mast columns on the Runcorn Expressway system. These are nearing the end of their design life and it will cost approximately £1.4m to replace them with conventional lighting. Currently, there is only £130k available per annum for this work, funded through the Local Transport Plan. It could, therefore, take up to 15 years to replace the high masts which would take them beyond their design life and this assumes that the current level of funding remains available.
- 5.4 There is an unavoidable incremental growth in the street lighting stock through the adoption of streets in new residential areas and the construction of new roads e.g. the Upton Rocks distributor road and the Widnes Waterfront Boulevard. New additional lighting units have also been funded through the Area Forum. Annually, these initiatives increase the inventory by approximately 250 units per year at a cost of approximately £12,500, but with no increased budget to cover the additional costs. Due to the downturn in the housing market the number of new units is lower at present, but is beginning to show signs of increasing again. The current total stock of highway electrical equipment is now in the order of 23,000 units.
- 5.5 In order to achieve further savings and ensure the Council's lighting stock is structurally sound and fit for purpose, it will be necessary to continue to invest in the asset. This will enable more efficient technologies to be introduced (recognising however that there will be long pay-back periods) and allow for columns that are past their design life to be replaced. It is anticipated that the subject of the Council's longer term liabilities for lighting assets will be the subject of a future report to the Board.
- 5.6 Many local authorities are now looking to cut their energy bills and carbon emissions by reducing or removing street lighting even in residential areas. Consideration may, therefore, need to be given in the future to the removal of lighting from secondary independent footpaths (i.e. where there is a suitable alternative route and it is not the main access route to properties) and gated routes to the rear of residential properties (i.e. rear entries and passageways). This could be carried out when the existing lighting columns and lanterns reach the end of their life and it is not viable to replace them. It would need to be done on an area basis to provide a consistent approach and

it would also overcome a current maintenance issue, where it is difficult to gain access to carry out maintenance to some columns due to the locked gates.

- 5.7 Where there are suitable alternative lit routes, then consideration may also need to be given to no longer installing lighting on independent footpaths, unless they are a primary route to a school or major employment areas. This would be particularly applicable to independent cycleways and bridleways, which are provided primarily for recreational purposes.
- 5.8 A presumption against any future growth in street lighting provision would be difficult to endorse due to the need to provide it on new residential roads and high profile regeneration schemes. Also there could be a need to install new lighting both for road safety and community safety reasons. A reduction in street lighting standards, such as turning off every other light, would leave the Council exposed to liability claims, because street lighting is provided to national industry standards, and hence cannot be recommended. It has also been noted that the removal of street lighting could have serious impacts on the Council's priorities for road safety and community safety.
- 5.9 Any proposal to remove street lighting from residential areas would be more cost effective if carried out in complete areas (estates or distinct parts of an estate) as opposed to individual streets or alternate columns. This would also avoid patches of light and shadow/darkness as well as liability claims due to the area not being lit to the current design standards (or the standards at the time of installation). To be most cost effective, the oldest lighting units would be decommissioned first. It would cost around £700 to remove each column and this would need to be phased in over a period of years.
- 5.10 Clearly, it is possible that any of the above measures could prove to be unpopular and all could have road safety and community safety implications. There is concern that removing street lighting, or even switching it off between specified periods, has the potential for reversing the very encouraging downward trend in road casualties. It follows, therefore, that any measures that are imposed to save energy costs would have to be very closely monitored to determine their impact on road casualties in particular. A number of the Council's key priorities could also be adversely affected especially in terms of promoting social inclusion and accessibility.

6.0 FINANCIAL IMPLICATIONS

- 6.1 The proposal to switch off street lighting on high speed roads as listed in Appendix B would save an estimated £148,000 per year. However, for this saving to be realised it will be necessary to spend approximately £20,000 to procure the equipment and have the electrical work done to the relevant lighting columns that would accommodate a switch off between midnight and 6.00am. It is proposed that this sum is funded from the "Invest to Save Budget".

7.0 IMPLICATIONS FOR THE COUNCIL'S PRIORITIES.

7.1 Children & Young People in Halton

Reductions in street lighting, especially on residential estates, could impact on: child pedestrian casualties; the desire to walk to school during the dark mornings and nights; young drivers and the incidence of anti social behaviour.

7.2 Employment, Learning & Skills in Halton

There are no direct implications on the Council's 'Employment, Learning & Skills in Halton' priority.

7.3 A Healthy Halton

Reduced street lighting could discourage walking and cycling and the use of public transport, which have implications for the health of those affected.

7.4 A Safer Halton

Street lighting can contribute to road safety and a reduction in accidents. It can also help reduce crime and anti-social behaviour which affects how safe people feel during the hours of darkness.

7.5 Halton's Urban Renewal

Street lighting is often part of Urban Renewal schemes and does have a positive impact on improving the environment.

8.0 RISK ANALYSIS

- 8.1 Street lighting is not a statutory function and there is no legal requirement for roads to be lit. However, it is recognised that street lighting contributes strongly to road safety, community safety and the prevention of crime. Street lighting fits with the Council's strategic priorities. Since 1998 the Council is required by statute to exercise all of its functions with a view to preventing crime and disorder. It should be noted that the introduction of street lighting was originally to assist pedestrians as a result of crime and disorder issues. It continues to be accepted as a major contributor to the prevention of crime and disorder or its perception. Whilst the Council may not be challenged under the Highways Act about removing lighting, there may well be challenges under section 17 of the Crime and Disorder Act 1998, as happened in Essex when the Police intervened with the proposal to turn off lights.
- 8.2 Studies undertaken by the Transport Research Laboratory (TRL) have concluded that switching off lights between midnight and 5am is not recommended on traffic routes because 'when traffic flow is at its lowest, vehicle speeds will be at their highest, so the accidents will be more severe'. In the dark, drivers' reactions tend to be slower and stopping distances longer. The same study indicates that if part-night lighting is considered, this should be based on 'a full evaluation of the accident statistics'. A recent study (2009) from Newcastle University stated that there is evidence that street lamps save the lives of a 'significant number' (45% on average) of pedestrians, cyclists and motorists each year.
- 8.3 However, there is evidence available to suggest that switching off lighting may not be detrimental in all cases. For example, in 2009 following an 18 month trial in two residential areas, Essex County Council concluded that where lights were switched off between midnight and 5.00am, crime had fallen and there had been no police-reported traffic accidents. Notwithstanding this, it could be argued that this limited period is too short to determine the true impacts of the cuts, especially in terms of road casualties, and that the trials did not consider high speed roads. It is felt that more detailed evidence is needed before the potential impacts of any cuts on all road types can be predicted with more certainty.

- 8.4 A recent statement by the Institute of Lighting Professionals (ILP) states that local authorities are required to advise their energy supplier of their load profile (i.e. when they are using electricity) and their energy tariff is based upon this. Where lighting is on all night, the overall tariff is low, as the lighting uses energy at periods of low demand which offsets consumption at peak hours, such as 4.00pm to 8.00pm. By changing their load profile and removing consumption during the low demand periods, an authority's average energy tariff will increase considerably and could negate any savings. The ILP alleges that this unrecognised effect is not being considered by many authorities and that these changes will cost to implement. The ILP is in favour of utilising technology to allow variable lighting levels instead of cutting lighting altogether. By monitoring traffic flows, light levels can be raised to provide appropriate lighting levels at peak times, while during quieter periods, they can be lowered. This would be in accordance with lighting standards and provide a safe environment. These sorts of technology are referred to in Appendices C and D and whilst the theory cannot be disputed, there are costs attached to their implementation.
- 8.5 The ILP has praised Highway Agency (HA) plans to dim lights along major 'A' roads. The HA plans were recently confirmed to the Commons by transport minister Norman Baker in a written answer to a Parliamentary question. Mr Baker wrote: 'The Highways Agency has plans to reduce the level of lighting on 'A' roads when traffic levels are significantly below road capacity. It is right that lighting authorities consider, in the interests of cost-saving and the environment, whether lighting can be sensibly dimmed or turned off, consistent with proper safety assessments.'
- 8.6 It is a risk that if a decision is taken to switch off lights for part of the night as is proposed in paragraph 4.2 above, then the electricity supplier could, in time, adjust the rate per unit that it charges this authority. This would mean that any saving could indeed be negated. However, the current supplier has not given any indication of this at this stage. In response to the ILP's concerns, a Buckinghamshire CC spokeswoman has stated that a three-year trial into cutting street lighting, launched by the authority back in 2007, has saved money and cut carbon emissions. A statement from the council said: 'On average, using the number of lights turned off and the costs saved, each lamp turned off is saving around £57 per year.' It also stated that accidents were actually reduced by 26% during periods of darkness at the trial sites. North Somerset Council has also defended its streetlight reduction scheme. It said: 'Switching off lights at night saves us money. More than £300,000 will be saved annually following the completion of part-night street lighting. And the cost of electricity is very likely to rise in the coming years. Even if our price went up by 1p a unit, with the amount we use this could see our bill going up more than £50,000 a year'.
- 8.7 Providing lighting to reduced standards could increase the Council's exposure to liability claims. It is proposed that every road in the borough where lighting is switched off be monitored to assess the impact, especially on traffic accidents. If required, it would always be possible to revert back to having lighting on all through the night but this would obviously mean that the anticipated budget savings on the revenue budget would not be achieved.
- 8.8 It is important that any risk is put into context with the significant reduction that is taking place in the grants the Council receives from central Government. The Council has to identify £15m of savings from its 2012/13 revenue budget, together with a

further £25m in the following two years. Initiatives such as the one proposed in this report are seen as “least worst” options, rather than the ideal. However, it is important that the Council uses the momentum that this set of circumstances provides to review its overall long-term approach to lighting.

9.0 EQUALITY & DIVERSITY ISSUES.

- 9.1 Any reduction or failure to provide street lighting could unfairly disadvantage pedestrians and certain population groups who would not feel safe on the public highway during the hours of darkness.

10.0 REASONS FOR DECISION

- 10.1 In order to achieve budget savings it has been necessary to turn off street lights on high speed roads between midnight and 6.00 am.

11.0 ALTERNATIVE OPTIONS CONSIDERED AND REJECTED

- 11.1 A total switch off was considered, but was rejected in order to reduce the impact.

12.0 IMPLEMENTATION DATE

- 12.1 1 April 2012 subject to all equipment being installed.

13.0 LIST OF BACKGROUND PAPERS UNDER SECTION 100D OF THE LOCAL GOVERNMENT ACT 1972

- 13.1 There are several background papers under section 100D of the Local Government Act 1972, which include reports to Environment and Urban Renewal PPB.

APPENDIX A

High Speed Roads (Speed limits in excess of 40 mph) where it is proposed to switch off street lighting between midnight and 6.00am

A56 Daresbury Bypass

From M56 Junction 11 to 40 mph limit near Keckwick Lane

A533 Bridgewater Expressway

From 40 mph limit near Astmoor Road junction to Bridgewater Interchange

A533 Central Expressway

From Bridgewater Interchange to Lodge Lane Interchange

A533 Southern Expressway

From Lodge Lane Interchange to Murdishaw Roundabout

A557 Watkinson Way

From M62 Junction to 40 mph limit north of Fiddlers Ferry Road

A557 Weston Point Expressway

From North of M56 Junction 12 Clifton

A558 Daresbury Expressway

From Lodge Lane Interchange to Innovation Way Roundabout

A562 Dans Road

From Borough Boundary to Warrington Road Roundabout (excluding roundabout)

A562 Fiddlers Ferry Road

From Warrington Road Roundabout to Tanhouse Lane Roundabout (excluding roundabouts)

A562 Speke Road

From Borough Boundary to 40 mph limit north of SJB

A5126 Weston Link

From Lodge Lane Interchange to Weston Point Expressway

Slip roads will also be switched off unless subject to a speed limit of 40 mph or less

APPENDIX B

Examples of highway authorities that have already implemented or are considering implementing reductions in street lighting levels and preliminary feedback on these schemes

- Essex CC – conducted trials in the residential areas of Uttlesford and Maldon over 18 months switching off lights between midnight and 5.00am. Proposals to extend scheme, but petitions against extending it to residential areas have been submitted (January 2012)
- Powys CC - turned off 64% of its lights completely in 2008, although some were quickly switched back on following ‘a substantial amount of discontent with the current policy’.
- Buckinghamshire CC has recently completed a three year energy saving trial at 46 locations across the county and has concluded public consultation on 37 of these sites. The results of this exercise are now being evaluated (see further reference in para. 8.6 of the main report. A pensioner was recently killed resulting in calls from the coroner for the CC to review its policy.
- A413 at Gerrards Cross 1 April 2009 – cyclist fatality, part of the driver’s defence was that the street lighting being off contributed to the accident. The cyclist was wearing high visibility clothing and had lights on his bike.
- Leicestershire CC - After carrying out a risk assessment, it will be switching off some lights completely in rural areas or in other locations where there are no houses fronting onto the roads. Only a small number of lights (about 2 - 3% of all the lights in the County) are expected to be affected. Once switched off, the lights will be kept in place for about 3 years whilst monitoring is carried out to ensure there are no adverse impacts as a result of the changes (in monitoring stage)
- Pembrokeshire CC - carrying out trials since 2008 for midnight to 5.00am with dimming and complete switch off. An update on this trial is on the following website: <http://mgenglish.pembrokeshire.gov.uk/mgAi.aspx?ID=15583>
- The Highways Agency now have stretches of its motorway network without lighting between midnight and 5.00am e.g. on the M6 (in North West from junctions 21a to 23; 26 to 27; 27 to 29 and 31 to 31a), a section of the M4 near Bristol, a part of the M5 near Exeter.
- In the North West, the Highways Agency permanently switched off street lighting at three locations from Tuesday, 29 March 2011 to reduce carbon emissions and light pollution:
 - M58 between Skelmersdale Jct 4 to Orrell Jct 6 (approximately 3.8 miles);
 - M65 between Dunkenhalgh Park Jct 7 to Burnley Jct 10 (approximately 5.5 miles);
 - M66 between Walmersley Jct 1 to Simister Roundabout Jct 4 (approximately 6.6 miles).

The stretches of motorway have a good safety record and following careful

assessment, analysis shows that the lights can be switched off without increasing risks to road user safety.

- Ealing Council is actually upgrading and installing street lighting to reduce anti-social behaviour
- Northamptonshire CC – in Thorplands (East Northamptonshire) there has been a reported increase in knifepoint robberies at shops where the lighting has been turned off
- Gloucestershire dimmed 10,000 lamps and switched a further 7,000 to part-night operation in 2009. Police say there has been a fall in criminal activity at night.
- Cardiff City Council decided not to proceed with an early-hour switch-off, after there was a fatal accident during a trial on a traffic route.
- Clevedon – petition recently submitted to get lights switched back on following the death of a soldier in December 2011 in which it is alleged that the lack of lighting was a contributory factor - lights switched off by North Somerset Council between midnight and 5.00am to save money.
- Nottinghamshire – 1,000 street lights turned off in Bingham between midnight and 5.30 am, plans to expand to 90,000 lights over next four years
- Hertfordshire – The decision was made to convert the majority of the county's street lights to part-night operation. This means some streetlights will only be switched on from dusk to around midnight and, during the winter, in the morning rush hour. While up to 80 per cent of the county's street lights will switch to part-night lighting, areas where there is significant pedestrian activity after midnight and busier road junctions will remain lit throughout the night. The changes will be implemented over 18 months and began in June-July 2011.
- Westminster Council – Dimming during non-peak periods, rather than switching off. Four years to install dimming equipment throughout the area
- Kirklees (Huddersfield & Dewsbury) Council – switching street lights off between midnight and 5.00 am; exact numbers not yet determined

OPTIONS FOR REDUCING STREET LIGHTING COSTS**1.0 ADAPTIVE STREET LIGHTING**

- 1.1 Adaptive street lighting varies the lighting levels and, in turn, energy demand to suit the pedestrian and vehicular traffic levels at the time. It is applied predominately in the early hours of the morning when pedestrian and vehicular traffic levels are at their lowest. Adaptive lighting has been installed on various sites and on over 500 columns throughout the Borough since January 2010. It is achieved by retrofitting smart electronic components into existing lanterns, or when installing new lanterns with the appropriate components. The saving in energy consumption varies dependant upon the amount the light is dimmed and the number of hours it is dimmed during the night. Typically, the light levels have been dimmed by 30%, between the hours of midnight and 6.00am. However, it needs to be noted that dimming light levels by 30% only gives an energy saving of around 17% due to the energy requirements of the control gear. Dimming from midnight until 6.00am through the year equates to 1895 dimmed hours and 2252 non-dimmed hours per column. These reduced energy consumptions and hence savings are currently agreed and accepted by the electricity suppliers. The time at which the lighting is dimmed is also the low demand period for the power stations but they need to be kept running and any significant reduction in demand may possibly impact on their operations. Our current electricity contracts are based on a constant demand through the hours of darkness. Whilst it is hoped not to be the case, it is possible that suppliers may try to compensate for night-time reductions by charging higher rates during the periods of higher demand. It therefore follows that any current and expected savings may be reduced in the future.
- 1.2 Where possible all new lighting installations, whether in residential developments, regeneration sites or on existing roads, are fitted with equipment suitable for adaptive lighting. This technology is well established on units typically used in residential areas (wattages up to 150W), and this year has seen the introduction of suitable technology for adaptive lighting on the equipment used more commonly on the expressways and main roads (higher wattages of 250W and 400W).
- 1.3 Some of the existing lantern equipment in Halton is suitable for adaptive lighting (around 4000 columns) provided the appropriate lighting standards (class) can be met when in the dimmed state. The cost of this modification will typically be around £40 per column which saves around £5 per annum in reduced energy costs, giving a payback period of 8 years. Other equipment could be upgraded with electronic dimmable ballasts to permit adaptive lighting, but the payback periods are longer and may not be achieved within the life of the equipment.

2.0 CHANGE SWITCHING LEVELS FOR COLUMNS

- 2.1 The idea of changing the switching levels so that lights come on later and go off earlier is sometimes referred to as trimming. The lanterns are controlled by photoelectric cells, which are set to switch on and off at pre-determined light levels. These light levels can be reduced so that lights come on slightly later and go off slightly earlier and hence reduce energy consumption. Prior to 2001 all photoelectric cells fitted were designed to switch on at a light level of 70Lux and turn off at 105Lux which equates to 4211 burning hours per annum. All photoelectric cells fitted since

2001 until May 2008 had been set to switch on at 70Lux and off at 35Lux which equates to 4147 burning hours per annum. Since May 2008, all photoelectric cells have been set to switch on at 55Lux and off at 28Lux which equates to 4127 burning hours per annum. (N.B. a Lux is the unit of illuminance and is a measure of the intensity of light that hits or passes through a surface). The current cells, therefore, save around 4 burning hours per year compared with the oldest cells. This saves between 70p and £4.00 per annum in energy dependant on the power consumption of the lamp.

2.2 There are around 4500 of the oldest photocells, 500 of which are on the higher wattage lanterns (150W +). To replace these with new cells would cost around £30 per column or £20 if replaced at the same time as routine maintenance is carried out. Therefore, to change the cells on the 500 higher wattage columns would cost between £15k and £20k. However, this would only save £1500 per annum and it would take at least 10 years to break even on any investment based on current electricity costs. The units have a design life of at least 25 years. The electricity companies currently accept the reduced energy consumption and therefore the energy cost saving can be realised.

3.0 SWITCHING OFF LIGHTS FOR PART OF THE NIGHT

3.1 Switching off street lighting on selected roads or in selected areas, between say midnight and 06.00am can be implemented via two methods. The first is to install time clocks in HBC electricity supply feeder pillars (the Electricity Company's supply comes into the pillar from the electricity distribution network, the outgoing supply to a number of separate columns is via private cables owned by HBC). The second is where the supply to the columns is direct from Electricity Company's cables and which will require the installation of both intelligent control gear and new cells in every column to enable them to be switched off.

3.2 The energy cost savings can be realised, because they would be declared on the Energy Return as units switched off between the selected times. For columns supplied directly by the electricity company, the initial cost would be around £30 per column, but the saving would be around 2000 burning hours per year per column meaning the maximum payback period would be 2 years. The cost for feeder pillars will vary dependent upon the number of units fed from the supply point, but should have a similar or better payback period.

3.3 This proposal could have an impact on road safety, crime and disorder and the ability of people to feel safe to go out at night. It is perhaps worth noting that street lighting was originally provided for the benefit of pedestrians and not vehicles. Paragraph 4.2 of the main report is recommending part night operation on Halton's high speed roads. The Highways Agency has carried out the trial implementation of part night lighting on carefully selected sections of the motorway network (see Appendix B), where there are lower traffic volumes and accident rates between midnight and 5.00am, albeit with the backup that lighting can be remotely turned back on from control centres in the event of an incident. Here, signs are displayed to warn road users that the lights are intentionally turned off, and road casualties are being monitored. Initial indications are that casualties have not increased on these selected locations, but this is on a limited observation period at this stage. Appendix B also refers to experiences elsewhere when lights have been switched off for specific periods.

4.0 USE OF SOLAR PANELS

- 4.1 Use of solar panels is often thought of as an easy way to reduce energy costs. However, there is a high initial cost for purchase and installation and at the present time the technology does not produce enough power to light a streetlight for the whole period of darkness. It would need to be supplemented by a wind turbine, which is likely to be unacceptable in residential areas. There is also a higher risk of the equipment being stolen due to its perceived value. If the equipment is damaged then there is a higher replacement cost. The life of the batteries is also unknown and creates an environmental disposal issue.
- 4.2 At the present time solar panels are being used to power vehicle activated signs with mixed success. The use of solar panels to power lights for road signs is a possibility, but they are only considered viable where the signs must be provided as stand alone units – if the proposed signs are near to an existing electricity supply in a lighting column it is as cheap to take a feed from that column than provide a solar panel and this does not have the disadvantages referred to in 4.1 above. Panels have been installed in several areas and they seem to be working well. The use of solar panels to power sign lanterns was the subject of a previously unsuccessful Spend to Save Capital bid, due to the high capital cost and low pay back. It would cost about £1200 to convert an existing sign but the energy saving would only be £10 pa. It follows that it would take 120 years to pay back the cost of the panel.

5.0 USE OF LIGHT EMITTING DIODES (LEDS)

- 5.1 Another option to save energy is to use Light Emitting Diodes (LED) light units, which use less energy and last longer than conventional lamps. These are currently being used in certain situations where equipment permits e.g. in school crossing patrol warning lights (amber flashing lights), zebra crossing beacons, illuminated bollards and lights for road signs. The use of LEDs within traffic signals is being carried out, but there have been initial reliability problems due to the regular switching (on and off). The electricity companies now recognise the reduced energy consumption associated with LEDs and therefore the energy cost saving can be realised but it is a slow process as each manufacturer needs to have their equipment tested and the energy consumption agreed.
- 5.2 Manufacturers are now producing LED street lighting lanterns, and increasing competition is driving down the cost of these lanterns. Over the last year, most new developments in Halton have been fitted with LED lanterns, and prices are now at a level where their implementation is also being used for HBC own schemes. These have been mainly in residential areas where there is a greater range of lower wattages available, suitable to meet the required lighting standard. The energy saving with LED's is typically between 30% and 60%. This was backed up by trials in St. Helens where the new lighting was received well by the residents. The lamps are guaranteed to last 10 years with an expected life of 25 years, so this would reduce the cost of replacing the lamp every few years.
- 5.3 LED traffic signals heads have been installed at several sites throughout the Borough and initial results indicate an energy saving for the whole junction of between 60 and 70%.
- 5.4 All future new traffic signal installations and refurbishments of existing signals will incorporate extra low voltage (ELV) equipment. This will not only save energy by

using LED signal heads, it will also be safer as there will be less risk of electric shock in the event of a fault/vandalism.

6.0 REMOVAL OF DECORATIVE LIGHTING

6.1 Within the Borough the main decorative lighting installations are the floodlighting of the Silver Jubilee Bridge (SJB) and the Seasonal (Christmas) lighting in the town centres. When these were considered by the Street Lighting Topic Review Group some years ago, its members felt that these should be retained due to the feel good factor that is generated. Due to previous increases in energy costs and reductions in budget for the bridge floodlighting, the lights are now only on during the winter, outside the months of British Summer Time, between the hours of dusk and 2200. The Silver Jubilee Bridge floodlighting is costing about £30,000 per annum.

7.0 REMOVAL OF HIGH MAST LIGHTING ON EXPRESSWAYS

7.1 The Expressway network in Runcorn is predominately lit using high mast columns. These are reaching the end of their design life and are suffering from structural defects and a programme of replacement with modern low-level lighting is underway. It will cost about £1.4m to replace the high masts with conventional lighting. Funding is drawn from the LTP allocations at the level of £130,000 pa. At this current level of investment it will take approximately 15 years to replace all high mast columns with conventional lighting. However, due to the number that have already reached the end of their design life, the work ideally needs to be carried out as quickly as possible and in the short term it may be necessary to remove some masts, leaving no lighting in place.

7.2 The option of removing high mast lighting from the Expressway Network and not replacing it could result in an energy cost saving in the order of £130,000pa. However, while it would be relatively inexpensive to decommission and remove the lighting units at approximately £200 per mast, it would cost about £2,000 to remove each mast. With 141 high masts left, the removal costs would be approximately £280,000.

7.3 Leaving the decommissioned masts in situ for any length of time would retain the liabilities referred to above and structural safety surveys would still be required at a cost of up to £50,000 pa, until they are removed (conventional lighting columns do not require such structural surveys). Once removed, the surveys would not be required but, as it says above, it would still take a number of years to remove all masts if this option were pursued.

7.4 Whilst, in theory, it would be possible to remove all lighting from the whole of the high speed expressway network, it would mean abandoning a large number of new low level installations (approximately 725 columns at a cost of approximately £1.2m have been installed to replace 125 high masts over the last 10 years). These recent high mast replacement schemes have all resulted in improved lighting and a reduction in energy consumption. The scheme on Weston Point Expressway, near Picow Farm Road, resulted in a 50% reduction in energy consumption, which equates to a saving of £17,000 per annum and was part of the budget savings required in 2009/10. The retention of lighting at junctions with local roads would always be recommended for safety reasons. On the approaches to the Silver Jubilee Bridge it would also be necessary to retain/replace about 20 high masts due to the network of bridge structures in place and the difficulties of installing conventional lighting. In March

2009, 10 masts were replaced by 9 new masts on the approach to the bridge. This now leaves 10 masts to replace but these are on hold until the de-linking proposals following the construction of the Mersey Gateway are finalised.

- 7.5 If the complete removal of street lighting on the expressway network were ever considered, it would be recommended that a trial be carried out first on one section to determine the potential impacts. As Appendix B indicates, a number of trials of switching off street lights are being undertaken by various local authorities across England, generally on non-residential and rural roads and the impacts are being closely monitored. Some rural villages have also had lighting turned off, or made part night, where it has been agreed in consultation with the residents. Following two fatal accidents in Buckinghamshire, where the street lights had been turned off, opinions were expressed that the street lighting not being on had contributed to the deaths. The coroner has requested the local authority to review its policy of turning off street lighting. With this in mind, it is not recommended that lighting on the Expressway be switched off completely (as opposed to between midnight and 6.00am only) until more conclusive evidence of the impacts of removing street lighting on high speed roads is available. It is proposed that the situation be kept under review.

Better Lighting in Sustainable Streets (BLISS)

BLISS is a European project to research and test methods to reduce street lighting energy consumption in different real life situations without detriment to crime, anti-social behaviour and road accidents. St Helens are one of the four project partners.

A key aim of the project is to look at ways of reducing energy consumption and CO₂ emissions. This is being tested by:

- Install more energy efficient lanterns and control gear
- Remote monitoring and controls
- Dimming lights at selected times
- Trimming lights – on later, off earlier
- Passive infra-red movement detection to control lights
- Review design standards – to ensure roads are not over-lit
- Analysing road accident and crime data

Acceptability of these trials has or is being determined through selected public consultations undertaken by Ipsos MORI through focus groups, interview and canvassing.

The project is looking at recent innovations in exterior lighting.

New light sources technology:

White Light, CPO (Cosmo lamps), LED (Light Emitting Diodes), OLED (Organic Light Emitting Diodes – next generation technology), Electro-Luminance

Central Management Systems:

Dynamic Lighting Control, Variable lighting levels, fault logging and pro-active management

Reduction in energy consumed:

Smart Ballast, Energy efficient lamps, trimming/dimming techniques
Re-evaluation of lighting levels and illuminated signage requirements

Control of Street Lighting

	Photocells			Central Management System	Ballasts
	Standard	Part-night	Dimming		
	Trimming and Consumption	Part-night operation (to Off)	Part-night Dimming Operation	Advanced Control Regimes	High Efficiency Ballasts
Savings =	2%	>40%	>20%	40%	13%

A number of trials took place in 2009 including in a public open space where 24 No. 70 watt SON-T lanterns (consuming 90 watts) were replaced with 24 luminaires incorporating 36 LEDs (rated at 52 watts). The new luminaires consume 38 watts less energy i.e. savings of over 40%.

Outcome of the above trial:

- LED lighting gives sharper “white” light
- True colours of objects visible
- Light spillage reduced
- Survey of residents, “friends” of the park, police, indicates high satisfaction with scheme
- Savings 40% of energy

Other trials in residential areas achieved energy savings of 46% and 63%.

The overall conclusions from the 2009 trials were:

- Significant energy and carbon savings can be made (30-63%)
- Concerns from some people with “cut off” from LED lanterns i.e. a more sharply defined cut off between light and darker areas
- 78% of respondents preferred new “white” lighting
- Initial stakeholder research confirmed that improved street lighting contributed to the perception of safety and comfort as well as safe movement of pedestrian and cyclists at night

Dimming lights to 66% of full light between midnight and 6.00 a.m. showed that energy and CO₂ savings of 36% were possible.

However results from a postal survey of another trial to study the impact of dimming by 25% and 50% gave rise to the following comments:

- Those feeling “very unsafe” increased from 10% before to 21% after works
- 58% felt there were not enough street lights compared to 75% before
- 50% felt the neighbourhood was evenly lit after compared to 70% before
- 35% felt there were enough lights to see objects at a distance after the works compared to 56% before
- 58% felt that the front of their house was adequately lit after the works compared to 75% before (the “cut off” effect)

Some of the more significant early outcomes of these trials include:

- No “one size fits all”
- LEDs are not a universal panacea. At present the high capital cost negates energy cost savings. Reliability is unknown but lifetimes could be 30 years
- Payback for simplest lighting modification is 6 years
- Age and stock condition is a key issue in decision making
- Simple retro fit interventions may deliver optimum cost/benefit
- High potential for savings
- 70w SON (pink light) reduced to 50w with modern control could save £450 per lantern over 30 years for minimal investment. Colour of lantern affects community acceptance.
- If “Invest to Save” is applied to all street lighting installations, the energy costs could reduce by 40%

Some of the results and comments from the resident consultation include:

- 6 of 8 had not noticed a difference
- Respondents did not see any benefits for them
- Once told about the dimming, the reduction was deemed irresponsible by the Council
- The environmental argument did not strike a chord with participants
- Reassurance was needed about crime and benefits must be publicised
- “If we are suffering, what’s in it for us”?
- “A thief’s paradise”
- “Who benefits from the money anyway, it never gets passed on”
- “It takes a lot longer for it to brighten up”
- “Kids think they can get away with things when lights are darker”