OVERVIEW AND SCRUTINY BOARD

15 MARCH 2011

FINAL REPORT OF THE ENVIRONMENT SCRUTINY PANEL - ENERGY EFFICIENCT AND STREET LIGHTING

PURPOSE OF THE REPORT

1. To present the Environment Scrutiny Panel's findings, conclusions and recommendations following its investigation of the topic of energy efficienct street lighting in Middlesbrough.

BACKGROUND

2. The panel investigated this issue as a short topic over the course of two meetings held on 24 January and 18 February 2011. A final meeting was held on 8 March 2011 to consider a draft final report. A Scrutiny Support Officer from Legal and Democratic Services co-ordinated and arranged the submission of written and oral evidence and arranged witnesses for the review. Meetings administration, including preparation of agenda and minutes, was undertaken by a Governance Officer from Legal and Democratic Services.

3. A record of discussions at panel meetings, including agenda, minutes and reports, is available from the Council's Committee Management System (COMMIS), which can be accessed via the Council's website at www.middlesbrough.gov.uk.

4. This report has been compiled on the basis of information submitted to the scrutiny panel by officer from the Council's Transport and Design Service.

5. The membership of the scrutiny panel was as follows:

   Councillors Kerr (Chair); Carter (Vice-Chair), Clark, Davison, C Hobson, Hubbard, Lancaster, McPartland and McTigue.

THE SCRUTINY PANEL'S FINDINGS

6. There are 24,000 streetlights and 123 traffic signal units in Middlesbrough, plus numerous illuminated signs and bollards. The annual cost of the electricity needed to power them is around £1m.

7. Given the requirement for large public sector organisations to comply with the national Carbon Reduction Commitment (CRC) Energy Efficiency Scheme[1] - and also the financial benefits of reducing energy usage - the scrutiny panel sought to examine what action the Council is taking to maximise energy efficiency in respect of Midlesbrough's street lighting.

8. The panel's findings are set out below and relate to:

- The different types of streetlights and their energy efficiency.
- Energy reduction measures and areas of efficiencies
- Street Lighting Energy Reduction Plan
- Five year renewal programme
- Smaller areas of energy usage
- The use of passive lighting
- Performance standards and additional information
- Work undertaken by other local authorities

Types of street lights and their energy efficiency

9. Information was submitted on the various types of streetlights that are in use in Middlesbrough. These are:

a) Low pressure sodium lamps or 'SOX' - These are the older style lighting columns, which produce an orange light. In energy terms they are efficient (35 watt) but the light produced is not as effective as more modern types.
b) High pressure sodium lamps or 'SON' - These cost more than SON lights, are higher powered (70 watt) but produce a whiter light.
c) CPO - These are more efficient and also produce better colours and definition.
d) LED - These are expensive initially but require very little maintenance, possibly of the order of every 20 years. A trial of this type of lighting has taken place at Okehampton Drive in Marton.

10. Around 90% of Middlesbrough's street lights are of the SON type, with a breakdown being submitted to the scrutiny panel as follows:

Construction					
	SOX	**SON**	**CPO**	**LED**	**Induction**
Steel	500	20,859	500	100	30
Concrete	1500	500			
Aluminium				11	
TOTAL	2000	21,359	500	111	30

1. [1] This is a mandatory scheme to improve energy efficiency and cut carbon dioxide (CO_2) emissions in large public and private sector organisations - which are responsible for around 10% of the UK's CO_2 emissions.

Energy reduction measures and areas of efficiency

11. The scrutiny panel heard that over the course of the past three years, extensive trials have taken place in the street lighting industry in respect of energy efficiency and reduction. Information from these trials suggests that the following is the most practical approach to energy and maintenance cost reduction:

    - Dynamic monitoring
    - Increased use of LEDs
    - Replacement of outdated SOX and SON lighting with CPO-type fittings

12. It was explained that dynamic monitoring is the use of an IT system to monitor and dim lighting on all of the main routes through Middlesbrough, including the A66. This could achieve energy reductions of 30-40%. Such a system would also be able to report faults and cut down on the need for physical inspections, as well as administration.

13. The panel heard that the Okehampton DrIve LED trial (where SOX lighting was replaced with LED) had shown a reduction in energy costs of 55%. Further energy reductions will be achieved across Middlesbrough as, in addition to the above, asset management software is being developed to enable more accurate (half hourly) billing from energy providers.

14. Details were also submitted of areas which have been identified as those which are likely to provide the greatest efficiencies in terms of energy usage. The bulk of Middlesbrough's lighting is in urban areas. A planned system of renewals/replacement has meant that the Council has been able to save up to 35% on energy costs, although maintenance costs for the newer lamps are slightly higher than for the older, standard lighting.

15. Research has shown that people generally prefer white light to the more traditional orange or off white. Therefore the increased use of LED lighting on footpaths and cycleways not only promotes and increases their usage in the evenings but has been shown to reduce energy usage by up to 65%. LED lighting also provides an opportunity to make long-term savings on maintenance costs.

16. The panel notes that not all lighting changes produce any savings. For example, SOX units, which are mainly concrete column mounted, use low power 35 watt lamps. Nationally, there have been safety issues identified with use of this type of column. When these columns are renewed for safety reasons, it is difficult to replace them with a more energy efficient light source. Also, maintenance costs are high for SOX lanterns as, due to their age, replacement parts are increasing in cost as they become more difficult to obtain.

17. The Council has, however, imported a new lantern type which has been trialled over the last three years, which has shown it to be reliable in terms of performance. In addition to a slight reduction in energy usage, maintenance costs will be reduced as the lamps will last around 20 years compared to four years for the current version.

Street Lighting Energy Reduction Plan and Five Year Renewal Programme

18. A Street Lighting Energy Reduction Plan has been produced. This outlines the various energy reduction methods that will be implemented, together with approximate energy savings and associated costs. The Plan is attached at **Appendix 1** of this report.

19. In addition to the energy reduction plan, a draft FiveYear Renewal Programme has been produced for street lighting. This is based on the need to eradicate the use of concrete lighting columns, which are over 40 years old. Changing the lantern type at the same time will also provide the opportunity to realise energy savings of up to 35%. The draft programme, which is based on anticipated future funding, was submitted to the scrutiny panel and will prioritise areas with concrete lighting columns.

20. The programme is based on replacing a surveyed mix of SOX and SON lanterns with the CPO type, utilising the current budget of £300,000 per year. It is anticipated that this will produce energy savings of approximately 55kilowatts per year, equating to a financial saving of around £23,000 per year. In terms of overall expenditure on energy for street lighting this represents quiet a small, incremental saving - though if this level of replacement work alone was continued over the next 25 years, savings of over £500,000 would be achieved, (based on current energy prices).

Smaller areas of energy usage

21. Information was also submitted to the scrutiny panel on smaller areas of energy usage - such as traffic signals, signs and bollards - and action being taken in these areas.

22. In particular, gradual changes are being made to traffic signal systems to produce energy savings of 60-70%. In terms of signs and bollards, the panel heard that there is a legal requirement to illuminate these in urban areas. As the Department for Transport is currently reviewing the relevant regulations, Middlesbrough Council has written to recommend removing this requirement, as it is considered that the modern reflective materials used on road signs are adequate.

Motion-sensitive (or ‘passive’) lighting

23. The scrutiny panel was interested to explore the possible use of motion sensitive, or ‘passive’, lighting. It was explained that passive detection uses heat from objects to trigger a switch internally. This is then used to control other electrical equipment with the addition of a built in timer and lighting level detector. Although this is a tried and tested approach and can be used in many applications internally and externally, it does have drawbacks.

24. For example, passive switches are expensive for the long-range type and require extra switching apparatus for high wattage loading. They are also very prone to vandalism as they have a thin lens to allow infra red waves to enter the unit in order to trigger the heat sensitive detector. Although they are perfect for high mounting, this restricts their detection field considerably. A good quality detector can be triggered from up to 17 metres away if mounted in ideal circumstances.

25. Most external lighting types cannot be switched on to full power immediately and require a warm up period. The light will then often use considerably more energy in this time period than under normal operating use. As this type of light also has to cool down before it can be switched back on again, it impractical to use these types of light sources for passive lighting systems. Examples of these types of lights are SON, SOX, fluorescent and some older mercury vapour lamps.

26. Halogen and LED are examples of the types of lamps that can be switched on and off irregularly - for instance the passive-switched halogens used for domestic security lighting. While it can be said this is a good use of this type of arrangement, its draw back is that halogen lamps do not last long due to their being switched on and off constantly. LED lanterns, although new on the lighting market, are an ideal type of lamp to be switched on and off without too much bearing on life expectancy. The disadvantage of these, however, is that they are so low powered that the energy saving from passive switching would be far outweighed by the extra costs of installation of a passive control system and ongoing costs of maintenance.

27. Passively controlled lighting systems are ideal in small areas where vandalism and maintenance are not issues. Officers from Middlesbrough Council's Transport and Design Service advised the scrutiny panel that these systems are generally not suitable for street lighting use due to the disadvantages outlined above. Although there are many possible configurations possible with this type of lighting system, the draw backs remain the same - the costs of installation and maintenance make this approach impractical for larger areas.

Work undertaken by other local authorities

28. The scrutiny panel was informed that Leicester County Council has recently announced (February 2011) that it is to switch off or dim almost 2,000 street lights as part of ambitious plans to save cash and cut carbon dioxide emissions.

29. By April 2011, 1,960 lamps alongside main roads in a number of areas will be turned off or dimmed. The move is the latest stage of Leicestershire County Council's plan to cut £700,000 from its £3million street lighting power bill and reduce carbon emissions by 3,000 tonnes each year.

30. Since the project was launched in 2010, 800 lights have been switched off on sections of 30 main roads and over 3,000 lamps in 25 villages are turned off between midnight and 5.30am in 25 villages. A further 29 villages will be included from spring 2011.

31. Indications from Leicester County Council are that before changes are made to any street lights, every potential site is assessed thoroughly and consultation carried out with the emergency services and the Council's accident unit. The vast majority of feedback received by the Council has been positive. The emergency services have agreed to the idea in principle and are being consulted on every scheme.

32. Other local authorities have adopted similar approaches to street lighting and have found that this has not led to increased crime or accidents. These include Gloucestershire (dimming and part-night lighting), Essex (part-night lighting) and Buckinghamshire (switching lights off).

Performance standards and additional information

33. The scrutiny panel also sought information on the following:

- How performance standards on street lighting/energy efficiency are measured and whether there are any national standards.
- Whether performance is measured or compared to other local authorities.

34. In response, the panel was informed that the Council is not aware of any national performance standards regarding energy use. Standards that do exist relate to the appropriate quality of lighting levels for given situations and are complied with by the Council. A service plan has been produced and is governed by the relevant British Standard (BS5489), as set out by central government. These guidelines are based on lighting levels only and do not, as yet, cover energy efficiency.

35. It was confirmed that performance is not currently measured against other authorities, however each authority's lighting engineers regularly share experiences and developments in street lighting technology. The scrutiny panel heard that Middlesbrough has run a number of lighting trials and is generally regarded as being at the forefront of street lighting developments nationally. Over the last two years, approximately 200 representatives of other authorities and businesses have visited the Borough to view the various trials that have been carried out. For example, Birmingham City Council's Lighting Engineer visited the Okehampton LED trial, which resulted in that authority including the same street lighting fitting in its Private Finance Initiative (PFI) contract.

36. In addition, in early 2011, a major international lighting manufacturer brought customers to Middlesbrough to conduct an LED-based training course. This was so that that they could include Middlesbrough's LED trial as part of the training course to assist the lighting industry in making the changes needed to save energy in future.

37. The scrutiny panel also queried the position in respect of repairs to non-functioning streetlights. Members were informed that inspection surveys are carried out by vehicle, while remote footpaths rely upon public reporting in between service inspections. Information was submitted showing a typical month's (September 2010) 'onage' levels measured against target onage. This illustrated operational levels of 99.52% against the target level of 98%.

CONCLUSIONS

38. Having considered the submitted information, the Environment Scrutiny Panel reached the following conclusions:

1. The energy needed to power Middlesbrough's 24,000 street lights, plus traffic signals and illuminated road signs, costs around £1m each year. Middlesbrough Council has recognised street lighting as an area where energy reduction can be used to make financial savings as well as to cut carbon dioxide (CO_2) emissions.

(Cont….)

2. Action has been taken to investigate the most energy-efficient lighting solutions and to replace lighting with more efficient types wherever possible. A Street Lighting Energy Reduction Plan has been devised, which will be implemented in conjunction with a five year lighting renewal programme. Information submitted to the scrutiny panel suggests that this will continue to provide opportunities to reduce energy consumption.
3. The authority has also acted to ensure that energy reduction is balanced against the cost effectiveness of replacement lighting. New lighting schemes will continue to take into account energy reduction as well as future maintenance and repair costs. It is recognised, however, that in some cases, returns on investments will be achieved over the longer term.
4. The Council has recognised that new lighting developments mean new opportunities to improve energy efficiency, as well as lighting effectiveness, and is at the forefront of street lighting developments. The authority has been involved in a number of new lighting trials which have assessed effectiveness as well as opportunities to reduce energy consumption. The scrutiny panel is please to see the progress that the Council is making in this area.
5. The scrutiny panel welcomes proposals to develop schemes to dim street lighting late at night and during the early hours, when traffic levels are light and pedestrian numbers are low. In addition, the panel considers that - as has happened in some other local authority areas - switching off completely some lights should also be considered as a means of reducing energy usage further. This would not only save energy but any financial savings would contribute to maintaining Council services.

RECOMMENDATIONS

39. Following the submitted evidence, and based on the conclusions above, the scrutiny panel's recommendations for consideration by the Overview and Scrutiny board and the Executive are as follows:

1. That the invest to save approach in respect of street lighting is continued as this will realise energy savings over the longer term. This should involve regular reviews of the Street Lighting Energy Reduction Plan and continued development of the Five year Renewal Programme on a rolling basis.
2. That targets are set for street lighting energy reduction so that progress can be measured in future.
3. That, subject to consultation with the public and emergency services and the authority being satisfied in respect of any risk factors involved, the Council undertakes a trial of switching off some areas of street lighting for part of the night.

ACKNOWLEDGEMENTS

40. The Panel is grateful to the following officers, who presented evidence during the course of this investigation:

- D Gittins - Network design Manager, Transport and Design Service, Middlesbrough Council.
- R Warner - Street Lighting Engineer, Transport and Design Service, Middlesbrough Council.

BACKGROUND AND REFERENCE MATERIAL

41. The following sources were consulted or referred to in preparing this report:

- Report to and minutes of the Environment Scrutiny Panel Meeting held on 24 January and 14 February 2011.

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