
STREET LIGHTING ENERGY EFFICIENCY PROJECT (SLEEP)

Report by Chief Officer – Roads

EXECUTIVE COMMITTEE

21 November 2017

1 PURPOSE AND SUMMARY

- 1.1 This report provides the Executive Committee with an update on the delivery of the “spend to save” Street Lighting Energy Efficiency Project, (SLEEP).**
- 1.2 The initial project aimed to deliver the conversion of 13,500 traditional street lights to LED, between April 2014 and March 2020 using a total Capital funding allocation of £5.0m.
- 1.3 Between 2014 and 2015 the Council reviewed its current Capital Spend profile for this project in order to accelerate the programme for the installation of replacement lanterns. This acceleration in programme profile reduced the length of the project to 4 years bringing the project completion in March 2018, two years earlier than anticipated.
- 1.4 In 2015/16 a Project Business Case for SLEEP Phase 2 proposed replacing the remaining street lighting lanterns, illuminated signs and bollards with an LED alternative. An additional investment of £1.2m was allocated for Phase 2 of the project with the date for completion aligning with Phase 1 in March 2018.

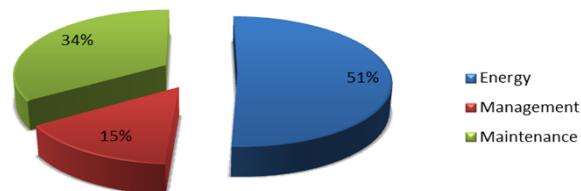
2 RECOMMENDATIONS

- 2.1 **I recommend that the Executive Committee:**
 - (a) Notes the extension to the original Street Lighting Energy Efficiency Project and the accelerated progress that has been made in the delivery of the overall project.**
 - (b) Notes that ongoing investment in the Capital Financial Plan will be required to upgrade identified lighting columns of limited remaining life.**

- (c) Notes the estimated savings of £1.274m in the overall cost of the project and approves the re-allocation of these savings to:**
- replace the street lighting asset where the current column placement does not allow new LED fittings to provide an adequate coverage of light during the hours of darkness to the value of £730,000 to be delivered in 2018/19. Virement approval for a timing movement of the budget to 2018/19.**
 - convert ongoing developments which, due to the time of their approval, will result in traditional sodium lanterns being adopted by the Council to the value of £135,000 which will be delivered as a phased approach in line with the permitted developments. Virement approval for a timing movement is sought to 2018/19.**
 - approve the virement of the identified savings of £409,000 to the Council's Emergency and Unplanned Capital fund in 2017/18.**

3 BACKGROUND

- 3.1 Although there is no statutory requirement for local authorities in the United Kingdom to provide public lighting, the Roads (Scotland) Act 1984, Section 35 [6], empowers a local roads authority to provide lighting for roads, or proposed roads, which are, or will be, maintainable by them and which in their opinion ought to be lit.
- 3.2 The Council provides this service through the Street Lighting Section, which is part of Asset Management within Assets and Infrastructure.
- 3.3 The Street Lighting Section comprises:
- Client/Design - determine the strategy/policy for lighting provision, and deals with the client and design activities, including asset management.
 - Operational Team – an operational electrical workforce that undertakes maintenance and new installation work.
- 3.4 The Street Lighting Section currently manages 19,226 street lights, 1,391 illuminated road signs and 30 traffic light arrangements.
The Section also looks after public space CCTV arrangements for the Council, some floodlighting that illuminates public buildings and some connections for community festive lights.
- 3.5 Traditionally street lights have used low and high pressure sodium lamps with a typical lamp life of 4 years. Fluorescent and LED technology has recently developed that is highly efficient, long lasting and environmentally friendly while also providing a better lighting provision, with an expected lamp life of 80,000 – 100,000 burning hours or 20 – 25 years.
- 3.6 The main elements of Revenue Funding within Street Lighting in 2012/13 are shown below:
- Payment of Energy Costs
 - Planned and Reactive Maintenance Works
 - Staff Management costs to maintain asset management and fault reporting



The chart above illustrates that the significant cost of street lighting is in the electricity required to power the units.

- 3.7 In 2013/14, the make-up of the street lighting provision in the Borders was 77% traditional lighting units, (i.e. high and low pressure sodium), 22.7% 'white light' and only 0.3% of the network was LED technology.

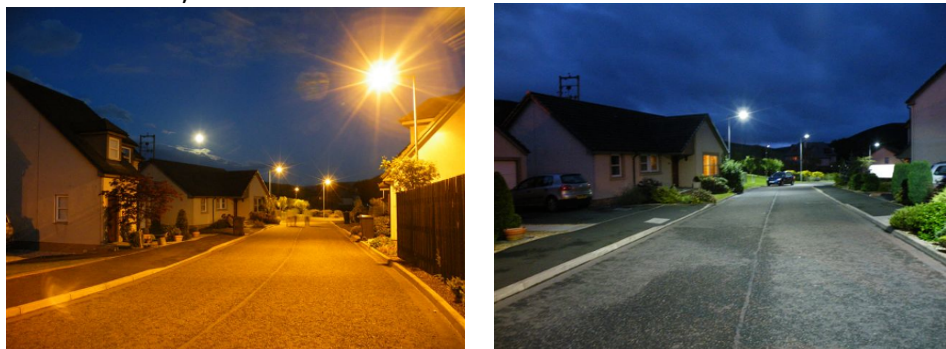
- 3.8 There was increasing pressure on local authorities to reduce the spiralling energy costs associated with their street lighting asset while also tackling environmental pressures such as light pollution and CO2 emissions which, it was estimated, street lighting contributed more than a million tonnes of CO2 emissions annually across the UK.

A “spend to save” project was therefore initiated by the Council that invested in low energy street lighting fittings which would derive significant savings.

4 The Street Lighting Energy Efficiency Project (SLEEP)

- 4.1 Within the street lighting industry there have been great developments in technology that provides increased luminaire life and reduced power consumption. This makes the technology highly efficient, long lasting and environmentally friendly while still maintaining the lighting provision.

A comparison of traditional and new LED technology, initially trialled in Clovenfords, is shown below.



- 4.2 The initial financial model derived to deliver the project showed the benefits of reduced energy, carbon tax and routine maintenance activity against the cost of the investment, showing that the initial capital investment would be paid back within 8 years.

- Energy Savings based on an average of 7% inflation per year.
- Cost avoidance of future Carbon Tax which was assumed would increase from the current £12/tonne CO2 to £70/tonne CO2 by 2030.
- Savings in maintenance based on the predicted life of 80,000 hours for LED light sources.
- An initial investment in 4 x £1.0m, 1 x £0.5m and 1 x £0.5m tranches.

- 4.3 The initial project aimed to deliver the conversion of 13,500 traditional street lights to LED, between April 2014 and March 2020.

4.4 The financial elements that contributed to the original business case were:

(a) **Design and Installation Cost**

Given the current condition of the street lighting asset and the need to reduce costs, it was proposed to fit new luminaires and control gear into the current column network limiting the investment per column to around £300/unit as opposed to £1,500 for a complete replacement.

This approach was practical as adaptors were available that allow new luminaires to be fitted to existing lighting columns. A pragmatic approach would have to be taken regarding the fitting of new equipment to columns of limited remaining life, hence the ongoing investment programme in the Capital Financial Plan will continue to gradually upgrade identified columns across the network.

It was also expected that with greater implementation and the continuing advancement of LED technology, that unit costs would reduce.

(b) **Equivalent Lighting Levels**

One important caveat is that current column placement needs to allow the new LED fittings to provide an adequate coverage of light during the hours of darkness.

Upon investigation it has been proven that this is not always the case and new column positions are required, in instances such as these an LED luminaire would not be fitted.

(c) **Routine / Cyclic Maintenance Costs**

This operation is required to maintain the current asset through the replacement of faulty materials. The cost of this should reduce, as the new fittings with longer service life are fitted.

(d) **Routine /Cyclic Structural and Electrical Inspection Costs**

This operation is required to ensure electrical and structural safety, and will be required for both the current and the new lighting, so is therefore financially neutral.

(e) **Administration of Fault Reporting Costs**

There is a cost in administering and managing fault reports from CRM, SBC website, phone calls, elected members, etc. It is envisaged that street lighting outages will reduce with the roll out of the new technology, so some savings will accrue in this area.

(f) **Asset Management Planning (AMP) Process Costs**

In a similar vein the cost of the AMP process should be reduced with the increased life of the new technology, so some minor savings will accrue in this area.

(g) **Energy Costs including Inflation Indices**

This is an area where a significant saving was anticipated. Street Lighting energy payments are not metered but are based on lamp/luminaire wattage ratings and an average number of burning hours. This equated to energy costs of £615,000 in 2012/13.

The use of alternative technology luminaires with a lower energy

rating than existing fittings would obviously reduce energy costs considerably.

Rises in the cost of raw energy over the years have been transferred to the customer through increases in rates above the general rate of inflation. It is expected that this trend will continue, and therefore measures that reduce the overall consumption will mitigate these rises.

An annual rise of around 7% over 20 years was initially modelled. This was considered a conservative approach.

(h) **Carbon Taxation and Possible Future Rises**

Carbon Tax is a tax that the Government apply to energy users to encourage energy conservation. When the project commenced the rate per carbon tonne produced was £16.

The Government intend to inflate this level of tax in the next ten years, according to the "Carbon Price Floor Report December 2010" by HM Treasury. This shows that it is likely that the Carbon Tax per tonne of CO₂ will rise from the current rate to £70/tonne by 2030. This was included in the financial model.

The proposed investment would enable the Council to reduce the financial impact of these tax increases in future years.

- 4.5 The outline Project Business Case projected savings of around £20m from reduced energy, carbon tax and routine maintenance activity costs against the cost of the investment projected over the expected 20 year life of an LED luminaire. These initial estimated savings intimated that the initial Capital investment for the project would be paid back between years 8 and 9.

5 STREET LIGHTING ENERGY EFFICIENCY PROJECT – PHASE 2

- 5.1 Following on from the initial phase of SLEEP a further Project Business Case for SLEEP 2 proposed replacing the remaining street light luminaires, illuminated signs and bollards with an LED alternative.
- 5.2 This further programme of work, together with additional capital investment in lighting columns, would ensure that Scottish Borders Council road lighting would be almost 100% LED.
- 5.3 The implementation of the Phase 2 investment, totalling £1.2m over two years, would allow Phase 1 & 2 to expand into one project meaning the elimination of having to revisit areas that had already been included in the programme.
- 5.4 The date for the completion of the amalgamated project remained at March 2018.
- 5.5 The Project Business Case for Phase 2 projected savings of £3.8m from reduced energy, carbon tax and routine maintenance activity costs against the cost of the investment projected over the expected 20 year life of an LED luminaire. These estimated savings intimated that the initial Capital investment for the project is paid back between years 9 and 10.

6 STREET LIGHTING ENERGY EFFICIENCY PROJECT – PHASE 1 & 2

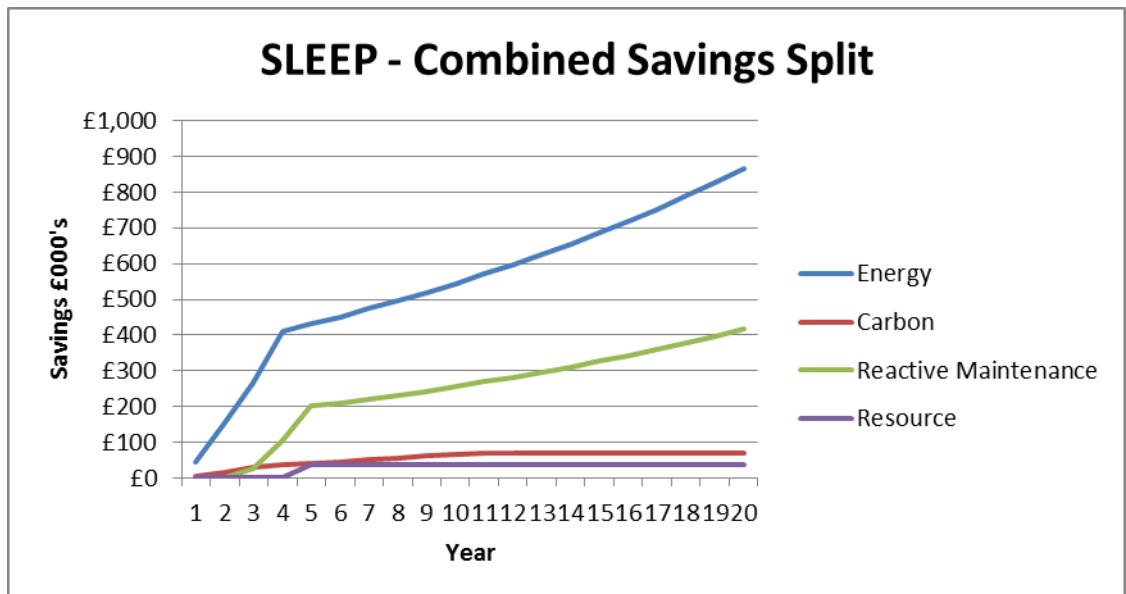
6.1 The savings profiles previously reported in the outline business cases for Phases 1 and 2 were on an indicative estimate basis. The financial models have now been re-evaluated using actual costs derived from years 1-3 of Phase 1 and year 1 of Phase 2. The two profiles for the project have then been amalgamated and the total combined figures are shown in Section 6.2.

6.2 Combined figures (x£000k) from the amalgamated profiles:

	Energy	Carbon	Maintenance	Resource	Total
Baseline Costs	£25,229	£2,088	£5,455	£738	£33,510
Reduced Costs	£14,354	£985	£581	£142	£16,062
Savings	£10,874	£985	£4,873	£596	£17,447

The combined budget profile detailing individual figures within the amalgamated profiles is shown in Appendix A.

6.3 The individual savings profiles shows that the larger percentage of savings for the project will be realised through the reduction in energy consumption and associated costs followed by savings in maintenance, carbon and resource.



6.4 The new combined profile show the benefits of reduced energy, carbon tax and routine maintenance activity costs against the cost of the investment projected over the expected 20 year life of an LED luminaire. The initial capital investment totalling £6.2m for the project is paid back between years 10 & 11.

6.5 The number and % of LED luminaires that have been fitted to date in the eight main towns are shown below.

Town	No of Lights	No of LED's fitted	% of LED's fitted
Eyemouth	985	846	86%
Galashiels	2818	2246	80%
Hawick	2975	1939	65%
Jedburgh	809	691	85%
Kelso	1708	1463	86%
Melrose	590	418	71%
Peebles	1819	74	4%
Selkirk	1210	1013	84%
Total	12914	8690	67%

* No of lights includes Signs and Bollards.

- 6.6 Complexities relating to the procurement of the last 4,200 LED luminaires to complete Phase 1 & 2 of the project; the subsequent ongoing delivery programme; and the limited time remaining until the end of the financial year, may affect the ability to complete the project by 2018. Currently it is anticipated that up to 2500 luminaires may need to be fitted in 2018/19 and officers will continue to monitor the situation and provide updates as necessary.

7 IMPLICATIONS

7.1 Financial

- (a) The original individual Project Business Cases for Phases 1 & 2 estimated savings of £20m and £3.8m respectively over the expected 20 year life of an LED luminaire. The re-evaluated financial models using actual costs derived from years 1-3 of Phase 1 and year 1 of Phase 2 show a combined project saving of £17.5m.
- (b) As a result of the 40-45% reduction to purchase and install a new luminaire there will be a significant saving in the overall cost of the project. Currently the estimated savings are in the region of £1.274m of the total £6.2m investment.
- (c) Section 4.4(a) highlights that ongoing investment in the Capital Financial Plan will be required to upgrade identified lighting columns of limited remaining life. It is difficult to be precise on the number of columns currently within this category as the condition of the column asset will continue to deteriorate over time. An allocation of £250,000 per annum during the next 10 years would allow approximately 1800 columns to be replaced.

- (d) Section 4.4(b) confirms that there are locations where current column placement does not allow new LED fittings to provide an adequate coverage of light during the hours of darkness. In these cases a LED luminaire has not been fitted and continued Capital investment will be required to fully replace these sections of the asset after individually designed projects have been prepared. It is anticipated that this situation applies to a total of 455 existing lanterns based on a complete replacement cost of £1,600/unit. This therefore requires a total capital investment of £730,000.
- (e) The savings generated by the replacement of the sections referred to in 7.1(d) and based on the 20 year life of a LED luminaire, are estimated at £442,000. These savings falls short of the Capital investment of £730,000 required to undertake the works.
- (f) It has been identified that there are a number of ongoing developments which, due to the time of their approval, will result in traditional sodium lanterns being adopted by the Council. It is estimated that this would add approximately 500 traditional lanterns to the Council's existing asset and will require an estimated £135,000 to convert to LED luminaires.
- (g) The savings generated by the conversion of the sodium lanterns referred to in 7.1(f) and based on the 20 year life of a LED luminaire, are estimated at £479,000. These total savings produce actual savings of £344,000 with the Capital investment of £135,000 being paid back between years 7 and 8.

7.2 Risk and Mitigations

- (a) Should ongoing Capital investment not be provided, identified lighting columns of limited remaining life will not be able to be replaced and will continue to deteriorate until in a dangerous state. The annual provision within the Lighting Asset Management Plan Capital Block will provide the necessary funding for these replacements.
- (b) Should Capital investment not be available, 455 existing traditional sodium lanterns, located on columns of current spacing that does not allow new LED luminaires to provide an adequate coverage of light during the hours of darkness, will not be able to be replaced. The re-allocation of £730,000 of the £1.274m estimated savings identified in 7.1(b) will resolve this issue.
- (c) Should Capital investment not be available, the Council will adopt approximately 500 traditional sodium lanterns within ongoing developments which, due to the time of their approval, will not have LED luminaires fitted. The re-allocation of £135,000 of the £1.274m estimated savings identified in 7.1(b) will resolve this issue.

7.3 Equalities

The Council is committed to providing a sustainable environment for all residents in the Scottish Borders. An Equalities Impact Assessment has been carried out on this proposal and it is anticipated that there are no adverse equality implications.

7.4 **Acting Sustainably**

The project being undertaken is centred round providing street lighting in a more sustainable way through reduced maintenance activity.

7.5 **Carbon Management**

The project has many carbon management benefits as illustrated within the report.

7.6 **Rural Proofing**

This report does not relate to a new or amended policy or strategy and as a result rural proofing is not an applicable consideration.

7.7 **Changes to Scheme of Administration or Scheme of Delegation**

There are no changes to be made to either the Scheme of Administration or the Scheme of Delegation as a result of the proposals in your report.

8 CONSULTATION

8.1 The Chief Financial Officer, the Monitoring Officer, the Chief Legal Officer, the Chief Officer Audit and Risk, the Chief Officer HR and the Clerk to the Council have been consulted and any comments have been incorporated into the final report.

8.2 The Executive Director and Corporate Communications have also been consulted and any comments received have been incorporated into the final report.

Approved by

David Girdler
Chief Officer - Roads

Signature

Author(s)

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Background Papers: Street Lighting Efficiency Project – Administration Budget Working Group – 8 January 2013; Street Lighting Energy Efficiency Programme Phase 2 – Administration Working Group – 18 November 2015.

Previous Minute Reference: N/A

Note – You can get this document on tape, in Braille, large print and various computer formats by contacting the address below. Jaqueline Whitelaw can also give information on other language translations as well as providing additional copies.

Contact us at Jacqueline Whitelaw, PLACE, Business Support, Scottish Borders Council, Council Headquarters, Newtown St Boswells, Melrose, TD6 0SA, Tel 0300 100 1800, email JWhitelaw@scotborders.gov.uk.

Combined Budget Profile

Year	Energy			Carbon			Reactive Maintenance			Resource			Investment	
	Baseline Cost £000's	Reduced Cost £000's	Saving £000's	Baseline Cost £000's	Reduced Cost £000's	Saving £000's	Baseline Cost £000's	Reduced Cost £000's	Saving £000's	Baseline Cost £000's	Reduced Cost £000's	Saving £000's	Original £000's	Revised £000's
0 (13/14)	725	-	-	67	-	-	165	-	-	35	-	-	23	23
1 (14/15)	763	720	43	67	61	6	165	165	0	35	35	0	1058	1058
2 (15/16)	801	646	155	67	50	17	173	173	0	35	35	0	1450	1450
3 (16/17)	841	575	266	67	37	30	182	156	25	36	36	0	1040	1040
4 (17/18)	883	472	411	67	30	37	191	87	104	36	36	0	2616	1359
5 (18/19)	927	496	431	74	33	41	201	-	201	36	-	36	-	-
6 (19/20)	974	522	451	82	36	46	211	-	211	36	-	36	-	-
7 (20/21)	1,022	549	473	90	40	50	221	-	221	36	-	36	-	-
8 (21/22)	1,074	578	495	100	44	56	232	-	232	36	-	36	-	-
9 (22/23)	1,127	608	520	110	49	61	243	-	243	37	-	37	-	-
10 (23/24)	1,184	640	544	121	54	67	256	-	256	37	-	37	-	-
11 (24/25)	1,243	673	570	123	55	68	269	-	269	37	-	37	-	-
12 (25/26)	1,305	708	597	124	55	69	282	-	282	37	-	37	-	-
13 (26/27)	1,370	745	625	124	55	69	296	-	296	37	-	37	-	-
14 (27/28)	1,439	784	655	124	55	69	311	-	311	38	-	38	-	-
15 (28/29)	1,511	825	686	124	55	69	327	-	327	38	-	38	-	-
16 (29/30)	1,586	868	719	124	55	69	343	-	343	38	-	38	-	-
17 (30/31)	1,666	913	753	125	55	70	360	-	360	38	-	38	-	-
18 (31/32)	1,749	960	789	125	55	70	378	-	378	38	-	38	-	-
19 (32/33)	1,836	1,010	826	125	55	70	397	-	397	38	-	38	-	-
20 (33/34)	1,928	1,063	865	125	56	69	417	-	417	39	-	39	-	-
Totals £000's	£25,229	£14,354	£10,874	£2,088	£985	£1,103	£5,455	£581	£4,873	£738	£142	£596	£6,187	£4,930
Total Baseline Costs £000's	£33,510													
Total Reduced Costs £000's	£16,062													
Total Savings £000's	£17,447													

The budget profile has been modelled on the following assumptions:

- Energy
 - Baseline cost has a projected 5% increase in energy per year
 - A 0.2% increase in kWh for new development adoption
- Carbon
 - Reduced cost has a projected 10% increase in carbon per year between years 5 and 10 and then is frozen
- Maintenance
 - An average cost of £50 per fault applied (includes all materials, plant and labour costs)
 - A baseline of 3,300 faults per year
 - An increase in material cost of 5% over the 20 year period
- Resource
 - Reduced cost based on streamlining of design and operational staffing levels