

AGENDA ITEM 4**RHONDDA CYNON TAF COUNTY BOROUGH COUNCIL****CABINET****27TH AUGUST 2015****SERVICE CHANGE PROPOSALS:- OPTIONS FOR REDUCING STREETLIGHTING ENERGY COSTS BY CONVERTING EXISTING LIGHTING UNITS TO LIGHT EMITTING DIODE (LED) UNITS.****REPORT OF THE GROUP DIRECTOR, CORPORATE AND FRONTLINE SERVICES;****AUTHOR: Roger Waters, Service Director - Highways & Streetcare (01443 494702)****1. PURPOSE OF THE REPORT**

- 1.1 The report provides service change options for reducing revenue costs for street lighting by converting existing lighting units to more efficient light emitting diode (LED) energy saving units.

2. RECOMMENDATIONS

It is recommended that Cabinet: -

- 2.1 Considers the options set out in the report and agrees the implementation of the package of energy saving measures identified in options 1 & 3, delivering net annual savings of £170k (full year).
- 2.2 In light of the ongoing potential to reduce energy and carbon costs by investing in further packages of LED replacement lighting, Cabinet instructs that a further report be brought forward during 2015/16 setting out options for potentially further investment during 2016/17.

3. BACKGROUND

- 3.1 The Council currently provides approximately 28,600 streetlights which can be summarised as follows:

Location	No of Lights
Non residential areas – car parks, by-passes, industrial estates, cycle ways and footpaths	1,166
Residential areas – villages, towns, housing estates	24,535
Sensitive areas – town centres, roundabouts, junctions	2,937
Total	28,638

- 3.2 The current portfolio of street lights is a mix of LED, dimmed and non dimmed lighting units some of which are operated on part night basis i.e. turned off between midnight and 5am. The breakdown of the portfolio is summarised in the table below:

Location	Dimmed	Non dimmed	LED	Total
Non Residential				
Part night	405	493	0	898
Not part night	88	180	0	268
Sensitive areas	182	535	0	717
	675	1,208	0	1,883
Residential				
Part night	4,191	7,802	139	12,132
Not part night	3,995	8,237	171	12,403
Sensitive areas	847	1,373	0	2,220
	9,033	17,412	310	26,755
	9,708	18,620	310	28,638

- 3.3 The 'sensitive areas' highlighted above have been determined by a combination of highway layout (conflict areas), traffic movement data, accident collision data and site specific knowledge. A risk assessment was completed during the part night implementation and sensitive areas remain fully lit.
- 3.4 The main revenue cost of street lighting is energy and the associated carbon tax. Carbon tax is predicted to rise considerably in future years.
- 3.5 The amount of energy consumed by a street light is determined by the circuit wattage of the light and the burning hours i.e. the number of hours each day the light is on. Dimmed lights consume approximately half the circuit wattage of non dimmed lights. Currently lights are dimmed between 22.00 and 6.00.
- 3.6 The type and size of light used is determined by its location. Typically residential streets utilise 35 – 150 watt lights, non residential lights utilise 150 – 250 watt lights.

- 3.7 As part of Service Changes agreed by Cabinet in May 2014 (14th May 2014), part night lighting across the County Borough was implemented and is successfully delivering energy savings of £310K per annum.
- 3.8 The 2015/16 Street Lighting Net Revenue budget is £2.35m, comprised of the following elements:

Budget	Total £'000
Maintenance	888
Energy	1,233
Electrical & Structural Testing	75
Capital Financing	156
	2,352

4. LEGISLATIVE FRAMEWORK

- 4.1 There is no statutory basis to the provision of street lighting, albeit once provided the council has a duty to maintain the infrastructure in a safe condition
- 4.2 The following legislation governs the Councils provision of street lighting:
- The Highways Act empowers local authorities to light roads but does not place a duty to do so;
 - The Council has a duty of care to road users and has an obligation to light obstructions on the highway;
 - The Council has a statutory duty under the Highways Act to ensure the safety of the highway and this includes any lighting equipment placed on the highway;
 - The Electricity at Work Regulations impose a duty on owners and operators of electrical equipment to ensure its safety.

5. REVIEW OF SERVICE PROVISION - OPTIONS AND ISSUES

5.1 The following options have been considered:

Options	Investment Cost £'000	Energy and Maintenance Savings £'000	Payback Period Years
1 Replace Urbis ZX1 luminaires with LEDs Convert 1,090 Urbis ZX1 residential lights with LEDs using retrofit gear trays.	99	52	1.9
2 Replace 692 non residential and 808 residential 135 watt and 150 watt luminaires with LEDs Replace existing equipment in 1,500 lighting units with LEDs	683	117	5.8
3 Replace 1,346 sensitive area lights Replace 1,346 lights in non residential and residential sensitive areas excluding existing dimmed lights	543	118	4.6
4 Replace 2,225 sensitive area lights Replace 2,225 lights in non residential and residential sensitive areas including dimmed lights	855	163	5.3

Note: Option 1 is a standalone option which can be implemented with or without any other option.

Options 2, 3 and 4 consider changes to some of the same lights and therefore only one of these can be implemented.

Details of the cost reduction calculations are included at Appendices – A-D

5.2 In respect of implementation Issues; any decisions taken in respect of any potential implementation of LED lighting units must consider the following:

- A tender process will have to be undertaken for the purchase of the new equipment.
- Investment costs have been calculated using market prices. The tender process could result in a different, and potentially, lower unit costs.
- Installation of the new equipment will be included as part of the Council's streetlighting maintenance contract.
- LED use in street lighting is relatively new technology.
- The full energy savings will not be achieved until the implementation process has been completed.
- It has been assumed that energy costs will continue to rise at 2%.
- Carbon tax avoidance savings have been included at present levels of taxation with no allowance for any future escalation of carbon taxes.

The following table detail the four options for change:

Options for Change

Option		Estimated Savings £'000	Service Implications – Impact of Service Users (Public)	Impact on Other Council Services	Risks
1	Replace Urbis ZX1 luminaires with LEDs	52	<p>Requires £99k of investment</p> <p>1,090 lights will be converted using retrofit gear trays</p> <p>All lights are in residential areas</p> <p>LED luminaires produce a white light and have previously been used in RCT on Highways. Feedback from highway users has been generally positive</p> <p>Improved optics in LED lights make better use of the light available. They increase visibility, reduce light spillage and light pollution. Reduction in light spillage is not always well received in residential streets.</p> <p>514 of the lights are currently operating part night hours</p> <p>LEDs can operate on a part night basis There will be no additional maintenance savings on the part night conversions The proposed investment and savings are included in appendix A</p>	An increase in street lighting queries may have an impact to Customer Care and the Street Lighting Team	LED technology is relatively new to street lighting; the long term durability of the equipment is unknown. However, new LEDs are guaranteed for 10 years.

2	Replace 1,500 135 watt and 150 watt luminaries with LEDs	117	<p>Requires £683k of investment</p> <p>692 lights are in non residential areas 808 lights are in residential areas</p> <p>LED luminaries produce a white light and have previously been used in RCT on highways. Feedback from highway users has been generally positive</p> <p>The lights along traffic routes will benefit from improved reliability. Where access for maintenance has historically caused issues with traffic management</p> <p>Improved optics in LED lights make better use of the light available. They increase visibility, reduce light spillage and light pollution. Reduction in light spillage is not always well received in residential streets.</p> <p>298 of the 692 non residential lights are currently operating part night hours</p> <p>242 of the 808 residential lights are currently operating part night hours</p> <p>LEDs can operate on a part night basis</p> <p>The part night equipment recently installed will have to be converted</p>	<p>An increase in street lighting queries may have an impact to Customer Care and the Street Lighting Team</p>	<p>The tendering process</p> <p>Implementation timescales</p> <p>LED technology is relatively new to street lighting; the long term durability of the equipment is unknown. However, new LEDs are guaranteed for 10 years.</p>
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			There will be no additional maintenance savings on the part night conversions The proposed investment and savings are included in appendix B		
3	Replace 1,346 sensitive area luminaries	118	<p>Requires £543k of investment 362 lights are in non residential areas 984 lights are in residential areas. All sensitive lights have been risk assessed as high risk and are fully lit. LED luminaries produce a white light and have previously been used in RCT on highways. Feedback from highway users has been generally positive</p> <p>The lights along traffic routes will benefit from improved reliability. Where access for maintenance has historically caused issues with traffic management</p> <p>Improved optics in LED lights make better use of the light available. They increase visibility, reduce light spillage and light pollution. Reduction in light spillage is not always well received in residential streets.</p> <p>The 1,346 lights are fully lit and are not dimmed. No energy savings are currently received.</p> <p>The proposed investment and savings are included in appendix C</p>	An increase in street lighting queries may have an impact to Customer Care and the Street Lighting Team	<p>The tendering process</p> <p>Implementation timescales</p> <p>LED technology is relatively new to street lighting; the long term durability of the equipment is unknown. However, new LEDs are guaranteed for 10 years.</p>

4	Replace 2,225 sensitive area luminaries	163	<p>Requires £855k of investment</p> <p>516 lights are in non residential areas 1,709 lights are in residential areas.</p> <p>All sensitive lights have been risk assessed as high risk and are fully lit.</p> <p>LED luminaries produce a white light and have previously been used in RCT on highways. Feedback from highway users has been generally positive</p> <p>The lights along traffic routes will benefit from improved reliability. Where access for maintenance has historically caused issues with traffic management</p> <p>Improved optics in LED lights make better use of the light available. They increase visibility, reduce light spillage and light pollution. Reduction in light spillage is not always well received in residential streets.</p> <p>The 2,225 lights are fully lit, 879 are dimmed. No energy savings are currently received from 1,346 lights.</p> <p>The proposed investment and savings are included in appendix D</p>	An increase in street lighting queries may have an impact to Customer Care and the Street Lighting Team	<p>The tendering process</p> <p>Implementation timescales</p> <p>LED technology is relatively new to street lighting; the long term durability of the equipment is unknown. However, new LEDs are guaranteed for 10 years.</p>
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6. PREFERRED OPTION

6.1 Following a review of savings opportunities and risks associated with implementation, the preferred options recommended to Cabinet for the street lighting replacement LEDs are as follows:

Investment package combining options 1 & 3		Estimated Cost £'000	Estimated Saving £'000	Payback Period Years
1 and 3	<ul style="list-style-type: none"> Replace 1090 Urbis ZX1 luminaries and 1,346 non residential and residential sensitive areas luminaries. 	642	170	3.8

6.2 The preferred option is recommended on the basis that 1 & 3:

- Offer the most cost effective investment package of options available providing the shortest payback time;
- Maximise the energy saving in this phase of investment by targeting lights (in option 3) which are powered from dusk till dawn and do not benefit from having been dimmed in the last round of savings initiatives.
- The package can be implemented during 2015/16, yielding full year gross savings of £170k per year in 2016/17.
- This package represents a 14% reduction in the energy budget from 2015/16 to 2016/17 and would reduce the amount of future maintenance required.
- The majority of the lights in these options are in sensitive areas, the reduction in maintenance would lead to less traffic management requirements and greater safety for the operatives. The quality of the light will also aid visibility in high risk areas.
- This package is affordable within available funding parameters.
- The option would reduce annual carbon emissions by 159.4 Tonnes, saving £2,869 in carbon tax at the current rate of £18 per Tonne.

- 6.3 The total cost of options 1 and 3 is £642k, which could be funded by a £42k one off contribution by the Service Area and the balance £600k, funded through release of available Earmarked Reserves (set aside to cover street lighting investment and energy efficiency). By using one off funding to support the investment in this way, the full annual saving of £170k can be delivered from 2016/17.

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Appendix A – Option 1 - Urbis ZX1 Replacement

Category			LED	Savings Per Unit £		Total Savings £			Investment Cost £	
			No of units	Energy	Carbon	Energy	Carbon	Total	Cell Per Unit	Total Cost
Non Residential	Sensitive	Dimmed & Non Dimmed	-	-	-	-	-	-	-	-
	Non Sensitive	Dimmed	-	-	-	-	-	-	-	-
		Non Dimmed	-	-	-	-	-	-	-	-
Total Non Residential			-			-	-	-		-
Residential	Non Sensitive	Dimmed	-	-	-	-	-	-	-	-
		Non Dimmed	1,090	36.36	0.75	39,632	818	40,450	91.05	99,245
Total Residential			1,090			39,632	818	40,450		99,245
Grand Total			1,090			39,632	818	40,450		99,245
Maintenance Savings								10,328	10 Year Life	9,924
Cost avoidance - Energy inflation estimate at RPI (June 2015) of 0% plus 2%								868		
Total saving including cost avoidance								51,646	Net Annual Saving Years 1 - 10	41,721
									Net Annual Saving Years 11 onwards	51,646

Notes

1. The savings and investment costs per unit are weighted averages for all lamp types/wattages
2. For illustrative purposes, investment payback periods have been calculated based on the estimated life of each component being 10 years
3. Carbon reduction budget held in Corporately in Misc Finance
4. Maintenance savings are based on units being replaced as part of this proposal with a 12 year life
5. Cost avoidance figures are based on and annualised estimated increase in energy costs for the next 10 years

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Appendix B – Option 2 - 135 SOX and 150 SON

Category			LED	Savings Per Unit £		Total Savings £			Investment Cost £	
			No of units	Energy	Carbon	Energy	Carbon	Total	Cell Per Unit	Total Cost
Non Residential	Sensitive	Dimmed	105	38.63	1.63	4,056	171	4,227	455	47,775
		Non Dimmed	258	66.58	1.63	17,178	421	17,598	455	117,390
	Non Sensitive	Dimmed	77	38.63	1.63	2,975	126	3,100	455	35,035
		Non Dimmed	252	66.58	1.63	16,778	411	17,189	455	114,660
Total Non Residential			692			40,986	1,128	42,114		314,860
Residential	Non Sensitive	Dimmed	-	-	-	-	-	-	-	-
		Non Dimmed	808	66.58	1.63	53,797	1,317	55,114	455	367,640
Total Residential			808			53,797	1,317	55,114		367,640
Grand Total			1,500			94,783	2,445	97,228		682,500
Maintenance Savings								17,213	10 Year Life	68,250
Cost avoidance - Energy inflation estimate at RPI (June 2015) of 0% plus 2%								2,076		
Total saving including cost avoidance								116,517	Net Annual Saving Years 1 - 10	48,267
									Net Annual Saving Years 11 onwards	116,517

Notes

1. The savings and investment costs per unit are weighted averages for all lamp types/wattages
2. For illustrative purposes, investment payback periods have been calculated based on the estimated life of each component being 10 years
3. Carbon reduction budget held in Corporately in Misc Finance
4. Maintenance savings are based on units being replaced as part of this proposal with a 12 year life
5. Cost avoidance figures are based on and annualised estimated increase in energy costs for the next 10 years

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Appendix C – Option 3 - Sensitive Areas Excluding Dimmed Lights

Category			LED	Savings Per Unit £		Total Savings £			Investment Cost £	
			No of units	Energy	Carbon	Energy	Carbon	Total	Cell Per Unit	Total Cost
Non Residential	Sensitive	Dimmed	-	-	-	-	-	-	-	-
		Non Dimmed	362	75.72	1.66	27,411	601	28,012	436	157,832
	Non Sensitive	Dimmed	-	-	-	-	-	-	-	-
		Non Dimmed	-	-	-	-	-	-	-	-
Total Non Residential			362			27,411	601	28,012		157,832
Residential	Non Sensitive	Dimmed	-	-	-	-	-	-	-	-
		Non Dimmed	984	63.84	1.48	62,819	1,456	64,275	391	384,744
Total Residential			984			62,819	1,456	64,275		384,744
Grand Total			1,346			90,229	2,057	92,286		542,576
Maintenance Savings								24,134	10 Year Life	54,258
Cost avoidance - Energy inflation estimate at RPI (June 2015) of 0% plus 2%								1,976		
Total saving including cost avoidance								118,396	Net Annual Saving Years 1 - 10	64,139
									Net Annual Saving Years 11 onwards	118,396

Notes

1. The savings and investment costs per unit are weighted averages for all lamp types/wattages
2. For illustrative purposes, investment payback periods have been calculated based on the estimated life of each component being 10 years
3. Carbon reduction budget held in Corporately in Misc Finance
4. Maintenance savings are based on units being replaced as part of this proposal with a 12 year life
5. Cost avoidance figures are based on and annualised estimated increase in energy costs for the next 10 years

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Appendix D – Option 4 - Sensitive Areas Including Dimmed Lights

Category			LED	Savings Per Unit £		Total Savings £			Investment Cost £	
			No of units	Energy	Carbon	Energy	Carbon	Total	Cell Per Unit	Total Cost
Non Residential	Sensitive	Dimmed	154	34.16	1.44	5,261	222	5,485	405	62,370
		Non Dimmed	362	75.72	1.66	27,411	601	28,012	435	157,470
	Non Sensitive	Dimmed	-	-	-	-	-	-	-	-
		Non Dimmed	-	-	-	-	-	-	-	-
Total Non Residential			516			32,671	823	33,494		219,840
Residential	Non Sensitive	Dimmed	725	29.50	1.23	21,388	892	22,279	372	250,850
		Non Dimmed	984	63.84	1.48	62,819	1,456	64,275	372	384,744
Total Residential			1,709			84,206	2,348	86,554		635,594
Grand Total			2,225			116,877	3,171	120,048		855,434
Maintenance Savings								39,894	10 Year Life	85,543
Cost avoidance - Energy inflation estimate at RPI (June 2015) of 0% plus 2%								2,560		
Total saving including cost avoidance								162,502	Net Annual Saving Years 1 - 10	76,958
									Net Annual Saving Years 11 onwards	162,502

Notes

1. The savings and investment costs per unit are weighted averages for all lamp types/wattages
2. For illustrative purposes, investment payback periods have been calculated based on the estimated life of each component being 10 years
3. Carbon reduction budget held in Corporately in Misc Finance
4. Maintenance savings are based on units being replaced as part of this proposal with a 12 year life
5. Cost avoidance figures are based on and annualised estimated increase in energy costs for the next 10 years

