

Slough Borough Council

Report To:	Cabinet
Date:	18 th November 2024
Subject:	Adaptive Street Lighting Policy 2024
Lead Member:	Councillor Gurcharan Manku, Lead Member for the Environment, Environmental Services and Open Spaces. Councillor Paul Kelly, Lead Member for Housing, Highways, Planning and Transport
Chief Officer:	Pat Hayes, Executive Director Housing, Regeneration and Environment
Contact Officer:	Jason Newman, Group Manager, Carbon and Sustainability
Ward(s):	All
Key Decision:	YES
Exempt:	NO
Decision Subject to Call In:	NO
Appendices:	Appendix 1. Maps of adaptive street lighting trials Appendix 2: Technical Briefing on Streetlighting trials Appendix 3: Adaptive Street Lighting Policy 2024 Appendix 4. Equalities Impact Assessment

1. Summary and Recommendations

- 1.1.1. The report outlines the approach taken over three streetlighting trials, to test different lighting profiles across our streetlight network this has led to development of an Adaptive Street Lighting Policy.
- 1.1.2. Cabinet is recommended to adopt the Adaptive Street Lighting Policy and implement a boroughwide adaptive streetlight regime.

1.2. Recommendations

- 1.2.1.1. Cabinet is recommended to:
 - I. Approve the implementation of a boroughwide adaptive streetlighting regime (Option 2: lighting profile 1).
 - II. Adopt a boroughwide Adaptive Street Lighting Policy and delegate authority to the Director of Environment and Infrastructure in consultation with Lead Members of Environment and Highways to develop an action plan to ensure a robust future proofed street lighting network is maintained within Slough.

1.3. **Commissioner Review**

Commissioners have no comments to add to this report.

2. **Report**

2.1. **Street lighting consumption**

- 2.1.1. Slough has a successful track record of decarbonisation across its buildings, assets and operations which has seen the Council reduce more than 30% of its operational carbon emissions over the past 10 years.¹ The Adaptive Street Lighting Policy presents an opportunity for the Council to save carbon, energy, and money and to continue to provide essential street lighting services to its residents. Streetlighting within the context of consumption refers to all illuminated highways lighting, inclusive of streetlights, bollards, traffic lights and other illuminated highway signs.
- 2.1.2. As part of a joint project with Reading and Wokingham Borough Councils, between 2016-2018, 78% of streetlights were replaced with LEDs and connected to a central management system to remotely control and manage the lighting inventory i.e., the Mayflower Smart Cities Platform. A lighting profile of 70% was setup as the default across the Borough. As a result of the LED replacement programme the energy consumption across the street lighting network was reduced by over 40% between 2016/17 and 2020/21.
- 2.1.3. Since 2021/22 energy consumption has increased across the network, and the Council's inventory of street lighting has increased by more over 10%, through the adoption of highway developments and the former SSE network on the Slough Trading Estate. However, no further assessment of the street lighting network efficiency and cost-effectiveness has been conducted until we initiated our lighting trials over winter 2023, winter 2024 and summer 2024. Table 1 shows the street lighting consumption over the past 8 years.

Table 1. Street lighting consumption (kWh) – All illuminated Highway infrastructure

Year	Units	Total	Change % year/year
2016-17	kWh	4,141,016	LED replacement
2017-18	kWh	2,915,843	-29.6%
2018-19	kWh	2,655,354	-8.9%
2019-20	kWh	2,579,745	-2.88%
2020-21	kWh	2,573,357	-0.25%
2021-22	kWh	2,691,641	+4.60%
2022-23	kWh	2,834,550	+5.31%
2023-24	kWh	2,817,534	-0.60% (Trials)

¹ Carbon Management Plan 2020 - 2030

2.2. Street Lighting Costs

2.2.1. In 2020/21, the revenue expenditure on street lighting network energy costs and metering was just under £350k. The sharp rises in wholesale energy costs in early 2022 along with increase in energy consumption and metering has resulted in streetlighting energy costs peaking at £965k in 2022/23. This has placed more than **£600k per annum additional revenue pressure** on our energy budgets.

2.2.2. Our existing street lighting energy contracts expire on 31st March 2025. They are fixed price with a unit cost of around (34p/kWh) The unit rate is the total cost (£) of energy divided by the total consumption (kWh). It is very unlikely unit prices will revert to previous levels around (14p/kWh), thus the cost of street lighting will continue to remain high. Table 2 outlines energy costs for our streetlighting network over the past 5 years.

Table 2. Street lighting energy costs

Year	Consumption (kWh)	Energy Costs (£)	p/kWh (unit cost)
2019-20	2,579,745	357,283	13.8
2020-21	2,573,357	344,908	13.4
2021-22	2,691,641	379,981	14.2
2022-23	2,834,550	965,870	34.1
2023-24	2,817,534	960,659	34.1

2.3. Adaptive Streetlighting

2.3.1. The ability to vary lighting intensity over different operating times creates an opportunity to reduce the carbon emissions associated with energy consumption and to improve the local amenities. Adaptive lighting will assist in **reducing light pollution levels**. Additionally reducing consumption will assist in reducing energy costs. Observations, during our street lighting trials, suggest that in practice even a 30% reduction in energy to LED street lighting would not be obviously noticeable to most people if introduced gradually over the evening/night period.

2.3.2. High level projections by Power Data Associates (PDA), our meter operators who monitor and report on our lighting inventory and consumption, indicate that a **dawn to dusk lighting profile of 60%** across all controlled street lighting inventory could lead to over £100k per annum savings based on current unit rates for electricity (34p/kWh). A staggered lighting level profile could increase savings further, if lights were set to 30% after midnight to 5am, which could lead to an additional £80k savings per annum. The Carbon saving would also be significant, with a reduction of more **than 100 tonnes of CO₂** in scope 2 and 3 emissions.

2.3.3. During our trials, we have gathered more accurate information about potential energy savings that could be achieved through the adoption of different lighting profiles. This has also allowed us to be able to consider the potential impacts of adapting the street lighting in the borough to fit different scenarios and concerns (e.g., crime, fear of crime, equalities impact). Thus, the data recorded during these trials can be used to inform the Council's future decision

to adapt the street lighting levels across the entire borough, and to suit different areas and activities, at different times throughout the night.

2.4. Street Lighting Network

- 2.4.1. Slough Borough Council's Street Lighting Network as of October 2024 has 17,264 assets of which of which 11,671 streetlights are controlled by two types of drivers: nodes and sub-masters. The nodes are small cylindrical units on top of most of the street light lamps, and the sub-masters are larger cylindrical units that can control up to 500 nodes and communicate directly with our Mayflower Central Management System (CMS).
- 2.4.2. Since the start of this project in November 2022, we've identified, managed, and resolved numerous faults and issues related to the condition of the lighting network and its management. Initially, the Council did not have an in-house lighting engineer and no trained officers on the Mayflower CMS, but over the past 2 years we have regained some expertise and control over our network. Thus, we are no longer dependent on experts from Enerveo (CMS operators) to program and update the Street Lighting Network. However, although we are in a stronger position, there is still much to do to optimise our lighting network to the Council's current and future needs and these are covered as actions within the Adaptive Street Lighting Policy.

2.5. Adaptive lighting trials

- 2.5.1. To support the development of the Adaptive Street Lighting Policy and gather vital data about the network, its capabilities, and its limitations, we carried out three adaptive street lighting trials since February 2023.
- 2.5.2. The trial areas were picked based on the recommendations of the British Standards BS 5489 and BS 13201, as well as national best practice set out in the Institute of Lighting Professionals' Professional Lighting Guide PLG08 "Guidance on the Application of Adaptive Lighting within the Public Realm".
- 2.5.3. The chosen trial zones are largely residential and are located away from other external sources of light. They were also picked to have similar lighting unit profiles, and heights to each other, and to include enough nodes to make any changes in lighting levels visible to residents and road users. During trial 2 we added two 'A' roads to assess the lighting impact.
- 2.5.4. For the first trial, in February 2023, we engaged with the Thames Valley Police (TVP) and made a public announcement, without communicating the specific adaptive lighting scenarios proposed and their change schedule. We provided an email address where the residents could give feedback as the weeks progressed. Concerns were raised by some residents prior to the trial that reducing lighting would lead to an increase in crime and impact on public safety. However, no complaints were received with respect to the changing lighting levels during the trial. During the second and third trials we chose to only inform our main stakeholders: TVP and councillors. The trial area zones are shown in **Appendix 1**.
- 2.5.5. There were multiple lighting profiles tested during these trials, to test network capabilities, visual impacts, and suitability for the designated area in the borough. The lighting energy levels varied from 70% down to 20%, at different times throughout the night and over many months.

2.6. Field observations and findings

- 2.6.1. Once the trial areas and scenario were set, different locations were visited within each trial zone to subjectively observe the lighting and measure the light intensity (lux) from the exact same spot throughout the change in the different lighting profiles. The surveys were carried to ascertain that the scheduled switches happened throughout the night.
- 2.6.2. During these surveys an officer drove around the entirety of each trial zone and record any faulty lights; switched off or knocked over. In the subsequent nights, it was obvious, from driving around the borough multiple times, that numerous lights were not lit and needed replacing or repairing, not just within the trial zones.
- 2.6.3. During and after the first trial, it was clear that work was required to bring the network to the standard needed for achieving our goal of a borough-wide adaptive street lighting policy and implementation of an energy efficient lighting regime. There were several risks identified as a result, such as numerous faulty lights and sub-master controlling them, lack of full control of the system and dependence on our consultants for even the simplest tasks, and generally a disconnect with the status of the network, since there had not been a designated internal person looking after its running and maintenance since 2019.
- 2.6.4. There were also several positives. We achieved a better understanding of our network, and how it should work, we now know what certain lighting levels look like, and we gathered valuable data that can help implement changes to achieve the desired energy levels; whilst ensuring adequate lighting, protecting amenities, and reducing light pollution.
- 2.6.5. During the trials, the overall perceived visibility within the trial zones and throughout the changing in lighting levels regimes, was considered acceptable. Whilst driving or on foot, there was no situation where the lack of light was a hindrance or impeded carrying out the simplest of tasks. People's faces, street signs and vehicle registration numbers were visible, and it felt safe to be out and about even after midnight.
- 2.6.6. A field trial on 29 November 2023 was setup to demonstrate to Cabinet Members and local ward councillors how the adaptive street lighting would be implemented, and for them to observe the different street lighting levels across different trialled scenarios. The feedback was positive, and the impacts were marginal even at very lowest lighting settings (at 20%) this created confidence that adapting our streetlights levels to different conditions in the borough would not place residents at risk and would protect the amenities.
- 2.6.7. The second and third trial proved successful in that the switches planned happened as desired, repairs/replacement of the submasters have been completed, and internal officers obtained access and knowledge of the CMS to control the street lighting network and no complaints have been received regarding lighting levels in these trial areas. **Appendix 2** contains a technical briefing on all three trials.
- 2.6.8. The overall achievements of the trials carried out are:
 - Gaining understanding of the functionality and limitations of the street lighting network;
 - Identifying repairs and replacements needed for faulty network elements;

- Gaining in house control and knowledge of the network and the CMS function;
- Understanding what different levels of lighting looks like and how they can be perceived in different areas of the borough;
- Gathering data that allows us to estimated the energy, carbon and cost savings that the Council could achieve by implementing a borough wide adaptive street lighting policy;

2.6.9. Current research indicates that there are no proven adverse health or safety issues associated with the use of LED street lighting. Equally there is no evidence that reducing energy to street lighting, resulting in minimal visual difference invites crime and our local crime data for the period of the trial supports this. The Adaptive Street Light Policy is attached in **Appendix 3**.

2.6.10. There are several processes, specifications, codes, and procedures that do require updating, renewal or creating as part of this new Adaptive Street Lighting Policy. These are outlined within the policy and a draft high level action plan is also included. It is recommends Cabinet delegates authority to the Director of Environment and Infrastructure in consultation with Lead Members of Environment and Highways to develop an action plan to ensure a robust future proofed street lighting network is maintained within Slough. It is proposed the policy is reviewed every six years.

2.6.11. The following lighting regime options have been considered.

Table 3. Adaptive Lighting Regime Profiles

Scenario	Residential Areas			'A' Roads
	Dusk to 10pm	10pm to Midnight	Midnight to Dawn	Dusk to Dawn
Option 1 - Do nothing	70%	70%	70%	70%
Option 2 - Lighting profile 1	50%	40%	30%	60%
Option 3 - Lighting profile 2	40%	30%	20%	50%

2.7. Adaptive Lighting Regime Options

2.7.1. We have considered 3 adaptive lighting regime options:

- **Option 1** – Do nothing, maintain, and operate the existing street lighting network at the default lighting setting of 70%. This option does not present the most energy efficient use of our streetlighting network. This option does not present best value. The cost of energy is controlled by market energy prices and the best contract price that we can procure at the time of renewal. This option does allow us to implement trials for testing different lighting profiles but their impact on consumption and costs are considered low. **This option is not recommended.**
- **Option 2** – Implement Lighting Profile 1 across all residential areas and local 'A' roads. **This option is recommended** as it ensures an energy efficient lighting network and allows us to alter the lights in residential areas at 'specific times of night' and set a dusk to dawn lighting profile for our 'A' roads, to a level that have been assessed to be safe and ensures the

amenity is also protected from excessive lighting. This option will generate a reduction in energy consumption, carbon emissions and costs.

- **Option 3** – Implement Lighting Profile 2 across all residential areas and local ‘A’ roads. This option allows us to further lower energy to our lights. We have observed lighting at this level through the trials, and it is still considered sufficient lighting within the residential amenity at the time of night when the lowest energy levels are set, but it will be noticeable to the public who are out and about late at night/during the early hours. We have tested this lighting regime without complaint. We have observed lighting levels down to 40% on two local ‘A’ roads but consider further assessments are required. This profile will lead to significant energy consumption and cost reduction, as well as carbon savings. It is proposed to assess this lighting profile across other wards and roads at this level before we recommend implementing this profile under the approved policy. It may also require a technical evaluation of lighting levels for our main ‘A’ roads to ensure they comply with British Standards. **This option is not currently recommended.**

2.8. Reasons for recommendations

- 2.8.1. The energy and costs savings we are currently forecast to achieve across the three trial zones through the implementation of lighting profile 1 equates to just under **80,000 kWh/annum** (2.8% saving across our entire network), a reduction of 18 tonnes of CO₂ and nearly **£30k** in energy costs for 2024/25. Please see Table 4.

Table 4. Street lighting Trial Zones (Lighting Profile 1)

Year	Consumption (kWh)	Consumption Saving (kWh)	Energy Costs (£)	Energy Cost Savings (£)	Trial Zones
2022-23	2,834,550		£965,870		1
2023-24	2,817,534	17,016	£960,659	£5,211	2
2024-25	2,738,418	79,116	£930,850	£29,809	1, 2 and 3

- 2.8.2. It is estimated that should Cabinet approve the borough-wide implementation of adaptive street lighting profile 1 this could potentially lead to additional in-year consumption savings of **60,000 kWh**, 13 tonnes of CO₂ and **£21k** in energy costs. See Table 5.

Table 5. Lighting Profile 1 (Boroughwide Adoption) 2024/25

Year	Consumption (kWh)	Consumption Saving (kWh)	Forecast Energy Costs (£)	Energy Cost Savings (£)	Trials Zones + Lighting Profile 1
2023-24	2,817,534	17,016	£960,659	£5,211	2
2024-25	2,738,418	79,116	£930,850	£29,809	1, 2 and 3
2024-25	2,678,348	60,069	£909,584	£21,266	Boroughwide

- 2.8.3. Following Cabinet approval of the Adaptive Street Lighting Policy it is proposed that the roll-out, testing and commissioning of lighting profile 1 will take at 3 months to complete for all residential areas and roads across Slough,

excluding exempt areas that will be identified within the Adaptive Street Lighting Policy, following further consultation with stakeholders.

Forecasting Energy Costs 25/26

- 2.8.4. The cost of wholesale energy has reduced more than 50% over the past 12 months. The current forecasts for our streetlighting energy contract renewals in 2025/26 is 26p/kWh. We're currently paying 34p/kWh on our fixed price contract.
- 2.8.5. Table 6 shows the forecast energy costs for each option based on a contract renewal unit price of 26p/kWh and for do nothing, lighting profile 1 and lighting profile 2. If we do nothing the savings are forecast at £219k, if we implement lighting profile 1 this adds £112k of additional savings in 25/26, if we implementing lighting profile 2 this adds £175k of additional savings in 25/26.

Table 6. Forecast Energy Costs 25/26 (based on 26p/kWh unit rate)

Year	Consumption (kWh)	Forecast Energy Costs	Energy Cost - Contract Renewal saving	Energy Consumption Cost Savings	Total Forecast Savings	Options
Current Energy Contract Price 34.1p/kWh						
2024-25	2,738,418	£930,850	N/A			Do nothing
Energy Contract Renewal 26p/kWh						
2025-26	2,738,418	£711,989	£218,861	£0	£218,861	Do nothing
2025-26	2,304,027	£599,047	£218,861	£112,941	£331,803	Lighting Profile 1 Boroughwide
2025-26	2,061,765	£536,059	£218,861	£175,930	£394,791	Lighting Profile 2 Boroughwide

- 2.8.6. We are currently forecasting more than £330,000 of energy cost savings in 2025/26 through the boroughwide roll out of lighting profile 1 and the renewal of the UMS Streetlighting contract. In addition, we will achieve a reduction of more than 430,000 kWh equivalent to nearly 100 tonnes of CO₂. This is based on the:
- full adoption of the Adaptive Street Lighting Policy,
 - completed roll out of Lighting Profile 1 across the network,
 - improved maintenance and repairing of faults, and
 - a reduced unit cost of energy currently forecast at 26p/kWh

3. Implications of the Recommendation

3.1. Financial implications

- 3.1.1. In March, Cabinet approved the Gas & Electricity Risk Management Strategy to appoint a new contractor. That report identified initial savings based on the 23-24 forecast of £300k.
- 3.1.2. The 24/25 general fund energy budget includes an MTFs saving proposal of **£0.275m** across the estate and **£0.175m** for street lighting resulting in a total general fund budget saving of **£0.450m to £2.585m**

3.1.3. The following table sets out the impact on the 24/25 Budget through the 23/24 forecast and additional MTF5 requirement

	2023/24 Budget	Forecast Costs	Variance
	£m	£m	£m
23-24 Forecast	3.035	2.885	0.150
Further Savings		0.300	0.300
24-25 Budget		2.585	0.450

3.1.4. The proposed budget saving is based on a combination of ‘supply side’ i.e., purchasing cheaper energy and ‘demand side’ i.e., reducing consumption, transferring assets, disconnecting meters, and adopting a new adaptive street lighting policy. ‘Supply side’ savings will offer significant mitigation. In March, the ‘supply side’ forecast general fund energy costs are **£2.676m** based on adopting the stop-loss cap strategy. We are on track to exceed this target.

3.1.5. There is potential for further savings in energy costs if all ‘demand side’ measure and ‘supply side’ savings can be secured. There is potential for additional ‘supply side’ savings if wholesale market prices remain stable and significantly below the cap (stop/loss trigger) price. The adaptive street lighting policy is forecast to achieve **£50k** of additional in year saving if lighting profile 1 is approved.

3.1.6. The forecast energy costs would therefore be **£2.626m**. Any shortfall on MTF5 delivery will need to be offset by alternative proposals. And this could be achieved through transferring of assets, thus reducing consumption and energy spend and through the buying of our flexible contract energy below our stop-cap prices.

3.2 Legal and Statutory implications

3.2.1 Section 97 of the Highways Act 1980 provides the Council with the power to provide lighting for the purposes of any highway or proposed highway. The Council has a discretion as to whether and how it exercises that power. The Council has a duty of care to road users and has to exercise its power in a way that meets this duty and is reasonable. This includes ensuring compliance with the Council’s equality duties and considering whether particular groups are more likely to be impacted by any changes. In addition, the Council has duties under the Crime and Disorder Act 1998 and lighting is a key feature in prevention of crime and prevention of fear of crime.

3.2.2 The Council has considered its equality impact assessment and guidance on street lighting in making the recommendation.

3.3 Risk management implications

3.3.1 These are considered within the Adaptive Street Lighting Policy. There are risks associated with energy pricing, CMS portal, node and substation communication failure, faulty lights, energy saving forecasts and repairs and maintenance and the number of exempt areas. The forecasts have assumed a 25% contingency failure in savings to offset these risks.

3.4 ***Environmental implications***

3.4.1 The implementation of this policy will help minimise the adverse effect on the environment whilst still enhancing the night-time ambience. It will also lead to a reduction of carbon emissions.

3.5 ***Equality and Human Rights implications***

3.5.1 An Equalities Impact Assessment is attached to this report.

3.5.2 The implementation of this policy would not result in a significant potential impact for any of the protected characteristic groups. However, all potential impacts are subject to mitigation measures and monitoring, should the situation deem it necessary. In addition, opportunities for delivering positive impacts are in place via the proactive approach to identifying need.

3.5.3 As a result of this EqlA, the following actions will be taken:

- Implement the exceptions within the policy as advised by our stakeholder consultees.
- Monitor the impact on community safety for all protected characteristic groups, both perceived and actual, through on-going dialogue with the Police, Ward Councillors and the local community and by responding to complaints from the public.
- Monitor the impact on road traffic collisions for all protected characteristic groups.
- Implement appropriate actions as a result of on-going monitoring finding.

3.6 ***Procurement implications***

3.6.1 There are no procurement implications related to the borough wide roll out of a Adaptive Street Lighting Policy.

3.7 ***Workforce implications***

3.7.1 There are minimal workforce implications because of this report. It will only require several days to setup different areas of the borough to achieve the proposed lighting levels and some night work to confirm that the switch happened. Once the CMS is setup there is no further work needed, but regularly check for fault reports, network status and other issues on the Mayflower system will continue to be a requirement.

3.8 ***Property implications***

3.8.1 There are no property implications related to this report.

4. **Background Papers**

4.1. None