

## CASE STUDY — DECARBONISATION IN HIGHWAY MAINTENANCE

### Street Lighting Decarbonisation: 58% Carbon Reduction through LED Conversion and Central Management System

*Evidence submission — Local Highways Maintenance Transparency Report 2026/27 (Department for Transport)*

|                           |                                                                                                                                                     |
|---------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Authority</b>          | Milton Keynes City Council (MKCC)                                                                                                                   |
| <b>Programme</b>          | Street lighting LED conversion and central management system (CMS) rollout, delivered through the MKCC Infrastructure Term Services Contract (ITSC) |
| <b>Asset base</b>         | 66,652 lighting, sign and bollard assets, of which 53,909 (80.9%) are now LED; 50,568 assets under CMS control (86.5%)                              |
| <b>Baseline year</b>      | 2020/21 — 14,008,670 kWh / 3,514.9 tonnes CO <sub>2</sub> e                                                                                         |
| <b>Current position</b>   | 2025/26 — 7,669,345 kWh / 1,481.9 tonnes CO <sub>2</sub> e (–45.3% energy, –57.8% carbon)                                                           |
| <b>Cumulative benefit</b> | Approximately 16.5 GWh of electricity and 6,224 tonnes CO <sub>2</sub> e avoided since 2020/21 against a held-flat baseline                         |
| <b>Transparency link</b>  | Innovation and continuous improvement; whole-life cost and preventative asset management; decarbonisation of the highway network                    |

## 1. Background and strategic context

Street lighting is one of the largest sources of operational carbon and energy cost on the local highway network. The Department for Transport's 2026/27 transparency reporting requirements ask local highway authorities to demonstrate how record levels of maintenance investment are delivering long-term outcomes for road users — including how authorities are adopting innovation and whole-life cost thinking rather than short-term reactive replacement.

Since 2020, MKCC has undertaken a systematic conversion of its street lighting stock to LED, combined with a large-scale rollout of central management system (CMS) control, delivered through the council's Infrastructure Term Services Contract (ITSC). The programme is now substantially complete and the results are independently evidenced through monthly unmetered supply reporting produced by Power Data Associates against the national Elexon unmetered supplies framework.

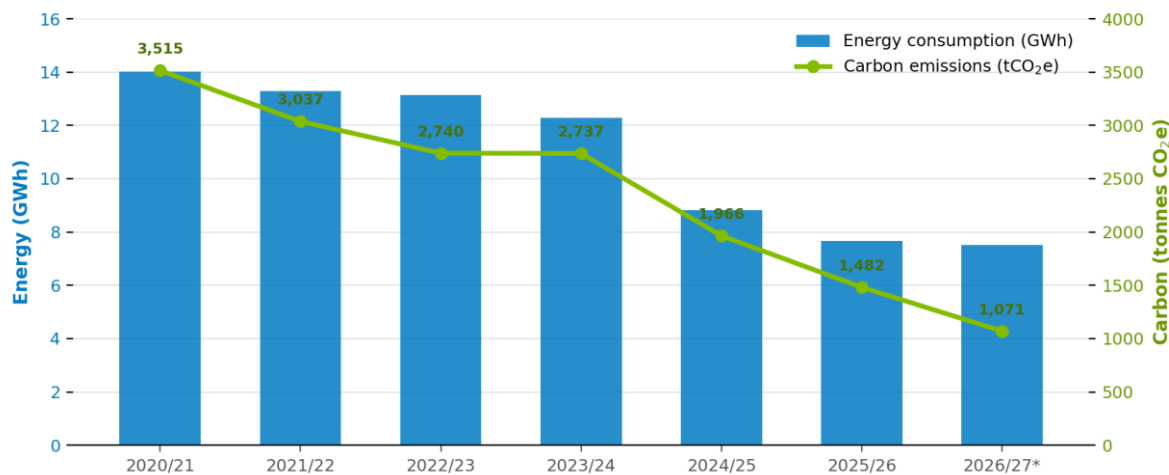
## 2. The innovation

The programme combines two mutually reinforcing interventions rather than a simple lamp-for-lamp replacement:

- LED conversion at scale — 53,909 of 66,652 lighting, sign and bollard assets are now LED (80.9%, marginally ahead of the 79.8% national average across comparable direct-appointment authorities). Critically, 81.4% of the LED stock sits in the sub-40W wattage bands, indicating specification of genuinely low-energy optics rather than like-for-like wattage substitution.
- Central management system control — 50,568 assets (86.5% of controlled assets) are managed via CMS, against a national average of 44%. This is close to double the sector norm and is the principal differentiator of the MKCC approach: it converts a static asset into a dynamically managed one, enabling part-night regimes, adaptive dimming, and precise switching against actual dusk/dawn rather than fixed photocell thresholds.
- Data-led verification — because assets are CMS-controlled and reported half-hourly, consumption is measured rather than inferred from a charge code. This creates an auditable evidence trail directly suitable for DfT evidence sampling, and allows under- and over-reporting assets to be identified and corrected each month.

Delivering the programme through the ITSC allowed conversion to be integrated into planned maintenance cycles rather than run as a standalone capital scheme, reducing mobilisation cost, traffic management duplication and network disruption.

### 3. Results: energy and carbon 2020/21 to date



\* 2026/27 projected from April–July 2026 actuals, seasonally weighted on the 2025/26 monthly profile. Source: Power Data Associates monthly unmetered supply report, July 2026.

| Year                  | Energy (kWh) | Change vs base | Carbon (tCO <sub>2</sub> e) | Change vs base |
|-----------------------|--------------|----------------|-----------------------------|----------------|
| <b>2020/21 (base)</b> | 14,008,670   | —              | 3,514.9                     | —              |
| <b>2021/22</b>        | 13,276,178   | –5.2%          | 3,037.1                     | –13.6%         |
| <b>2022/23</b>        | 13,126,224   | –6.3%          | 2,739.6                     | –22.1%         |
| <b>2023/24</b>        | 12,289,892   | –12.3%         | 2,736.8                     | –22.1%         |
| <b>2024/25</b>        | 8,812,233    | –37.1%         | 1,965.5                     | –44.1%         |
| <b>2025/26</b>        | 7,669,345    | –45.3%         | 1,481.9                     | –57.8%         |
| <b>2026/27 YTD*</b>   | 1,744,046    | –49.0%         | 248.1                       | –71.1%         |

\* 2026/27 figures are April–July 2026 actuals, compared against the equivalent period in 2020/21. Emission factors: 0.251 kg CO<sub>2</sub>e/kWh (2020/21) falling to 0.142 kg CO<sub>2</sub>e/kWh (2026/27), Scope 2 + 3, per the Greenhouse Gas Protocol methodology applied in the source report.

Energy consumption has fallen by 45.3% and carbon emissions by 57.8% between the 2020/21 baseline and 2025/26. The step change between 2023/24 and 2024/25 — a 28.3% single-year fall in consumption — corresponds to the main phase of LED conversion and CMS commissioning. Performance has continued to improve into 2026/27, with April–July consumption 49.0% below the equivalent 2020/21 period.

### 4. Attribution: separating council action from grid decarbonisation

Reported carbon reductions for electricity-consuming assets reflect two independent effects: the authority's own reduction in consumption, and the falling carbon intensity of national grid electricity, which is outside the authority's control. To provide a defensible evidence position, MKCC has separated the two.

Holding the emission factor constant at the 2020/21 value of 0.251 kg CO<sub>2</sub>e/kWh, the 2025/26 consumption of 7,669,345 kWh would have produced 1,925.0 tonnes CO<sub>2</sub>e. Against the 3,514.9 tonne baseline, this gives:

- 1,589.9 tonnes CO<sub>2</sub>e (78% of the total reduction) attributable directly to MKCC's LED conversion and CMS programme.
- 443.1 tonnes CO<sub>2</sub>e (22% of the total reduction) attributable to grid decarbonisation.

The great majority of the improvement is therefore the direct result of council action. On a cumulative basis, measured against the 2020/21 baseline held flat, the programme has avoided approximately 16.5 GWh of electricity consumption and 6,224 tonnes CO<sub>2</sub>e to date.

### 5. How this evidences the transparency report requirements

- Innovation and continuous improvement — CMS penetration at 86.5% against a 44% national average places MKCC materially ahead of the sector, with dynamic, data-led control of the lighting asset rather than static replacement.

- Whole-life cost and preventative asset management — LED luminaires substantially extend replacement intervals and reduce reactive lamp-change visits, shifting the lighting service from reactive to planned intervention; delivery through the ITSC integrated conversion into existing maintenance cycles.
- Decarbonisation — a 57.8% reduction in reported street lighting carbon since 2020/21, of which 78% is directly attributable to council action, supporting MKCC's wider net zero commitments.
- Evidence quality and verifiability — figures are drawn from independently produced monthly half-hourly unmetered supply reporting, giving DfT an auditable and directly sampleable evidence base rather than modelled estimates.

## 6. Next steps

The remaining 12,743 non-LED lighting assets — principally high pressure sodium (2,795), fluorescent (7,366) and incandescent (1,628) units — represent the residual conversion opportunity and will be prioritised through the ITSC forward programme. Beyond lighting, the inventory shows 748 incandescent traffic signal vehicle aspects and 114 incandescent school crossing aspects still in service, indicating a further decarbonisation opportunity across signals and crossing assets. Continued CMS optimisation, including extension of adaptive dimming regimes, offers additional consumption reduction from the converted stock without further capital replacement.

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*Prepared by MKCC Highways Service — August 2026. Source data: Power Data Associates monthly unmetered supply energy and carbon report for Milton Keynes, data to end of July 2026 (MPAN 1100039923020, sub-meters MILTON1 and milton2). Supporting evidence is held by the Highways Service and available to DfT on request.*