

Public Service Plaza

Decarbonisation Feasibility Study

February 2026



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Executive Summary



Executive summary

This report presents the findings of the energy and Net Zero feasibility assessment conducted at Public Services Plaza, Havant Borough Council.

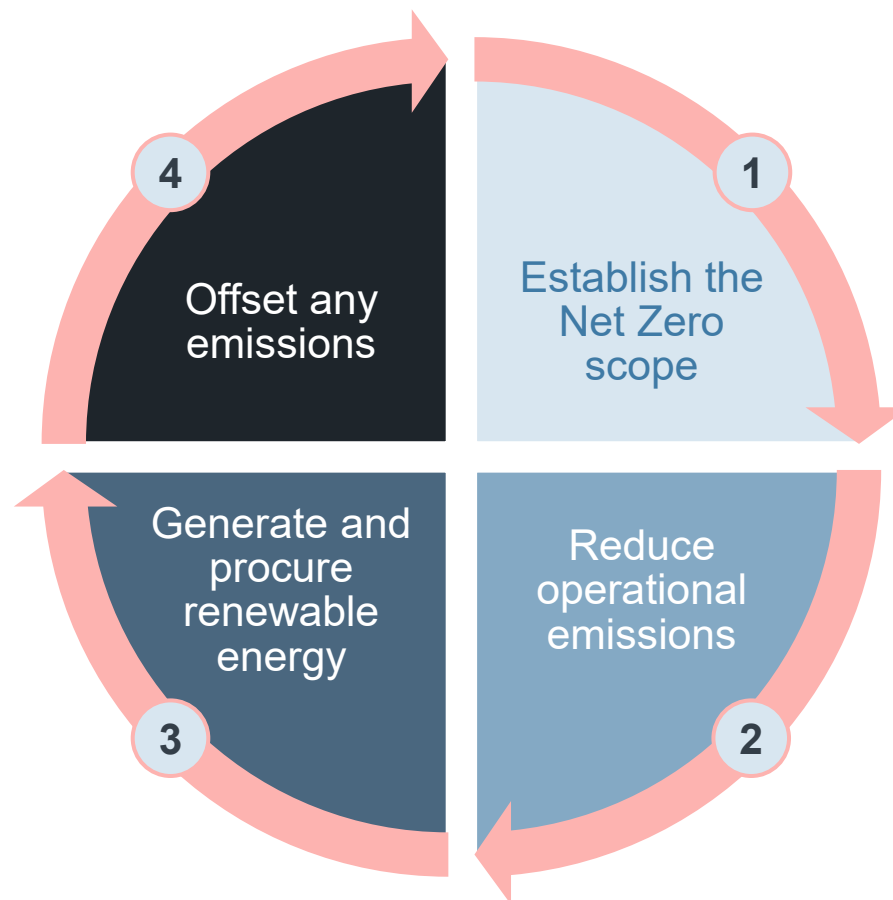
Baseline: Calendar year 2024

- ❖ Energy consumption: 733,644kWh
- ❖ Energy costs: £91,903
- ❖ Carbon emissions: 176.1 tCO₂e
- ❖ The energy baseline includes electricity imports and natural gas.

Key findings:

- ❖ Replace gas boilers for air source heat pumps (ASHPs) to wean off fossil fuels.
- ❖ Install solar Photovoltaic (PV) to generate clean energy on site
- ❖ Upgrade lighting to LED.
- ❖ Optimise Air Handling Units (AHUs) ventilation controls.

Net Zero Pathway



Executive summary



Summary of recommendations

Note:

1. The solar PV recommendation does not result in any energy savings, as the generation of renewable energy on site does not affect the overall energy consumption of the site.
2. Payback accounts for maintenance costs.

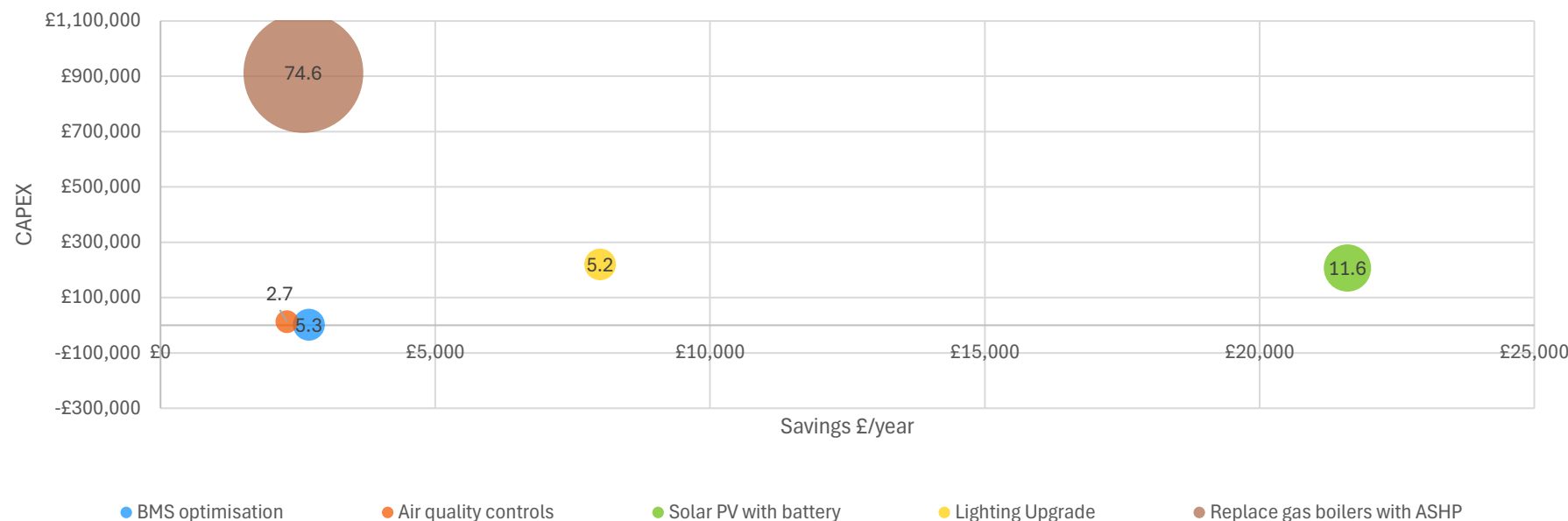
Net zero assessment interventions summary

#	Recommendation	Implementation year	Savings			Capital cost	Maintenance costs	Payback period	Cost to Carbon Savings Ratio	RAG rating on payback duration
			kWh	tCO ₂ e	£					
1	BMS optimisation	2026	25,900	5.3	£2,700	£2,000	£0	0.7	£400	Quick win
2	Air quality controls	2026	13,900	2.7	£2,300	£13,000	£0	5.7	£5,000	Medium term
3	Solar PV with battery	2027	0	11.6	£21,600	£210,000	£1,000	9.6	£18,000	Long term
4	Lighting Upgrade	2027	37,900	5.2	£8,000	£220,000	£0	Over 15 years	£42,000	Long term
5	Replace gas boilers with ASHP	2030	294,900	74.6	£2,600	£910,000	£0	Over 15 years	£12,000	Long term
Total			372,600	99.4	£37,200	£1,355,000	£1,000	Over 15 years		
Total - short and medium term			39,800	8.0	£5,000	£15,000	£0	3.0		
Total - long term and carbon focused measures			332,800	79.8	£10,600	£1,130,000	£1,000	Over 15 years		

The cost to carbon savings ratio (£/tCO₂e) compares upfront capital investment against annual carbon savings. This is also referred to as carbon abatement cost. Measures with low carbon abatement costs are the most cost effective in reducing carbon emissions, while higher-cost measures may still be required to achieve Net Zero.

Bubble chart of recommendations

The bubble chart below shows how the identified measures compare in terms of capital investment and energy savings. The annual carbon savings per measure is reflected by the bubble size (also given by the value within or near each bubble). Therefore, a larger bubble represents a larger annual reduction in carbon emissions.



Disclaimer: Energy auditing methodology suggests assessment of life-cycle costs where possible, but this is complex to calculate and involves assessment of taxation and asset depreciation by a Qualified Accountant. However, it has been assumed that Havant Borough Council's financial investment criteria are based on simple payback time and so this has been used here. Some measures may qualify for capital allowance; however, it is recommended to take advice from an accountant to assess the individual cases. All calculations are based on average utility prices from Havant Borough Council, and payback times will reduce if prices rise in the future.

Caution: It is emphasised that these savings figures have been built up from the estimated impact of individual, discrete projects, and implementing projects in parallel may reduce the overall savings figure achievable, due to the aggregated impact of the measures. WSP recommends that [Client] checks the data, calculations and assumptions for each energy saving measure before making any investment decisions. All costs presented are estimates to allow the relative benefits of each opportunity to be assessed. Further detailed design and costing of options should be carried out by Havant Borough Council to verify payback times.

Introduction



Havant Borough Council's Net Zero Strategy



Havant Borough Council have committed to reducing its operational greenhouse gas emissions by 68% by 2030 (baseline year 2021/22), through their Climate Change Strategy and Action Plan. It also acts as an interim target to support HBC's aim of having zero carbon associated with its own operations by 2035 and across the Borough by 2045.

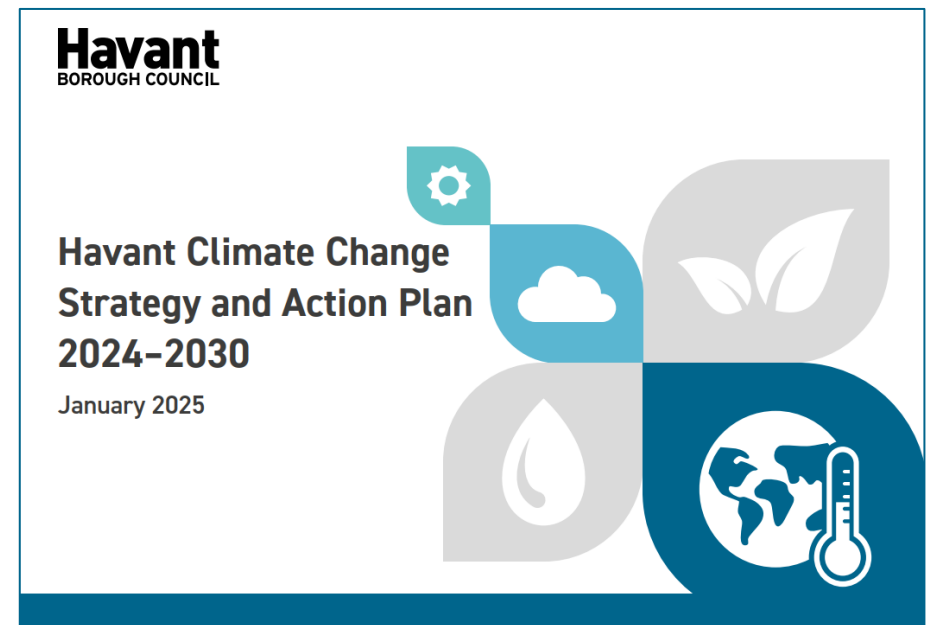
HBC reports emissions in line with the Greenhouse Gas Protocol, covering Scopes 1, 2 and 3. Due to data limitations, Scope 3 reporting is currently limited to Transmission & Distribution (T&D) losses and emissions from outsourced services and leased properties, with coverage expected to expand over time.

These commitments are set out in the Climate Change Strategy & Action Plan 2024–2030 which establishes the council's emissions baseline and a framework for ongoing monitoring, transparency, and targeted decarbonisation.

HBC have used 2021/22 as the baseline year to calculate their emissions reduction target. HBC have also set an acceptable residual emissions level for 2030 as 25 tCO₂e.

HBC are also developing a Decarbonisation Roadmap that will set out the sequenced steps, costs, carbon savings and practical measures required to decarbonise its operations and the wider Borough - providing a clear, evidence-based pathway to meet its 2030, 2035 and 2045 Net Zero targets.

To translate these strategic commitments into practical, evidence-based action, HBC is now undertaking a programme of decarbonisation feasibility studies to understand how individual sites can contribute effectively to the council's wider Net Zero pathway.



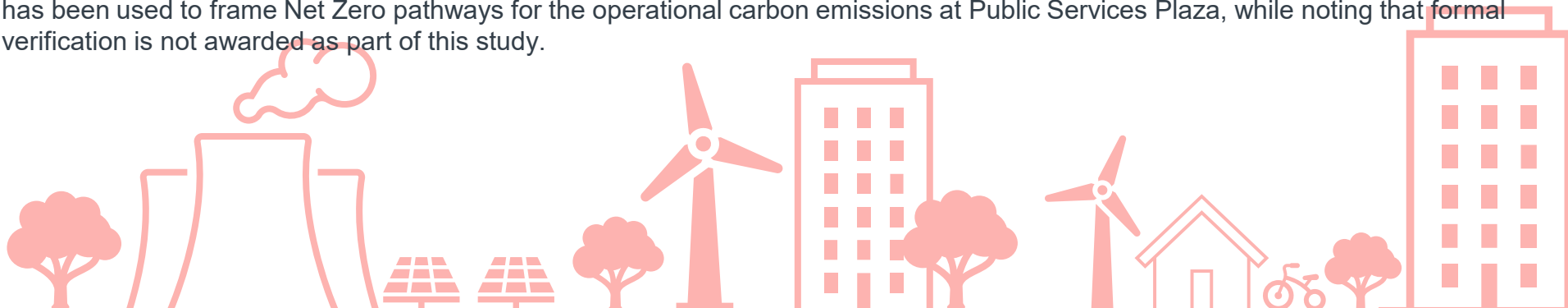
Decarbonisation Feasibility Study Project Aims and Scope

To underpin the Council's Net Zero pathway, this feasibility study delivers the site-specific technical insight necessary to inform prioritisation and investment decisions within HBC's wider decarbonisation programme. The aim is to provide HBC with a robust understanding of Public Services Plaza's current performance, including its energy consumption, carbon emissions, and alignment with Net Zero benchmarks. The report identifies practical decarbonisation and efficiency measures that would enable Public Services Plaza to contribute meaningfully to the Council's Net Zero goals. Overall, the findings will support the Council in tracking progress, planning investment, and taking coordinated action across its estate.

This report presents the findings of the energy and Net Zero feasibility assessment conducted at Public Services Plaza. The report provides the following:

- Analysis of energy consumption at Public Services Plaza, including an overview of the site and its energy users,
- Recommendations to reduce Public Services Plaza's energy consumption and operational carbon emissions,
- Guidance on how Public Services Plaza can achieve Net Zero operational carbon emissions, tailored to Havant Borough Council's targets and wider decarbonisation ambitions.

The energy and Net Zero feasibility assessment follows the methodology detailed in BS EN 16247 (2012) – Energy Audits. Please refer to Appendix A for WSP's Methodology and Limitations. The Net Zero elements of this study follow best practice, using UK Green Building Council (UKGBC) guidance, The Carbon Trust, and the *UK Net Zero Carbon Buildings Standard* (UKNZCBS, Sept 2024).. The Standard has been used to frame Net Zero pathways for the operational carbon emissions at Public Services Plaza, while noting that formal verification is not awarded as part of this study.



Site Context



Site overview

Site:	Public Services Plaza
Address:	Civic Centre Rd, Havant PO9 2AX
Floor area (Net):	5,403 m ²
Survey date:	17/12/2025

The Public Services Plaza building is a local government office in Havant. It was constructed in 1977 and comprises three main building blocks A, B and C. Blocks A and B span across 3 storeys, namely ground, first and second level. Block C was added at a later stage and is a two-storey building with ground floor and first floor levels only. The building underwent an extensive refurbishment during 2009-2011 period where double glazed windows with solar film were fitted. The construction is metal frame with concrete slabs while insulation levels are thought to align with contemporary standards at the time of development.

The building is owned and operated by Havant Borough Council. Limited section of the building are leased out to non-governmental entities whereas a small part of the ground floor is currently vacant.



Further to electricity, natural gas is used on site, for space heating, hot water generation and in catering facilities. Typical occupancy hours of the building are weekdays 7:00-19:00. In the future it is considered to have a team from Hampshire County Council in 24/7, located on the 2nd floor. Overall, good energy management practices were observed during the site survey.

In terms of **lighting**, circulation areas and corridors have been upgraded to LED type fittings. Yet open plan offices and meeting rooms remain on twin T5 35W fluorescent lighting (accounting for circa 85% of building lights). Corridors have **PIR** controls whereas open plan office lighting is switched on via manual switches but thereafter controlled via PIRs. There is central lighting control system installed, and fittings are Dali addressable. Lights operation is further optimised via the use of daylight sensors, enabling the peripheral lighting to dim down as low as 10% and further inward lights dim down to 30%, subject to natural light levels. Meeting rooms lights are controlled via manual switches.

Space heating relies on gas condensing boilers, located in two rooftop plant rooms, one for blocks A and B and one for block C. Perimeter heating radiators are installed across block A and B. Conversely in block C, the Atrium has underfloor heating and lobby areas are equipped with radiators whereas partitioned offices and meeting rooms are heated via the use of heat pumps.

Hot water across all blocks is generated via dedicated systems (one per block) that combine water gas heaters and solar thermal boosters. Solar thermal hot water generation takes priority during summer period, as expected, and is supplemented by the gas water heaters if required.

Mechanical **cooling** exists predominantly in Block C, via the ASHP fitted AHUs (AHU A,B and C) . Also, **AC units** are installed at the printer room and the three server rooms in block B.

Ventilation of meeting rooms and cellular offices across block A and B is achieved by means of 8x roof top **AHUs**. These AHUs have heating coils connecting to the gas boilers, heat recovery between supply and extract streams and Variable Speed Drive (VSD) controlled supply and extract fans, although fan speeds tend to be fixed. Instead, open plan offices rely on natural ventilation via opening windows (also for cooling during summer period).

The aforementioned building services are controlled with the help of a central building management system (**BMS**). The BMS incorporates optimisation strategies such optimal start of heating services as well as weather compensation for adjusting boilers' flow temperature with outdoor conditions. Moreover, it features energy submeters for lighting and power consumption across the floors as well as water and gas consumption meters.

Site overview

Water consumption is closely monitored via the BMS. In addition, taps are fitted with flow restrictors. Welfare facilities used to have automated taps but due to breakdown issues and maintenance costs have reverted to manual taps. Despite this, public access toilets remain on automated taps.

The building benefits from extensive waste management processes, ensuring recycling takes place including plastic, paper, glass and organic waste with dedicated collection bins. Waste collection is carried out by 3rd party contractor (Norse Southeast).



Example of roof top AHU.



Example of T5 lights across open plan office areas



Hot water solar thermal collectors



Bins for separate waste recycling streams.

Energy management matrix



WSP has assessed the energy management approach of the site against the matrix shown below (highlighted cells show the current status). This has been derived based on discussions with site managers and observations made during the energy survey. The higher the level, the better a site is performing in terms of the respective energy management category.

Level	Energy Policy	Organising	Training	Performance Measurement	Communication	Investment
4 (excellent)	Energy policy, Action Plan and regular review have active commitment of top management	Fully integrated into management structure with clear accountability for energy consumption	Appropriate and comprehensive staff training tailored to identified needs, with evaluation	Comprehensive performance measurement against targets with effective management reporting	Extensive communication of energy issues within and outside of organisation	Resources routinely committed to energy efficiency in support of business objectives
	Formal policy but no active commitment from top management	Clear line management accountability for consumption and responsibility for improvement	Energy training targeted at major users following training needs analysis	Weekly performance measurement for each process, unit, or building	Regular staff briefings, performance reporting and energy promotion	Same appraisal criteria used as for other cost reduction projects
	Un-adopted Policy	Some delegation of responsibility but line management and responsibility unclear	Ad-Hoc internal training for selected people as required	Monthly monitoring by fuel type	Some use of company communication mechanisms to promote energy efficiency	Low or medium cost measures considered if short payback period
	An unwritten set of guidelines	Informal, mostly focused on energy supply	Technical staff occasionally attend specialist courses	Invoice checking only	Ad-Hoc informal contacts used to promote energy efficiency	Only low or no cost measures taken
	No explicit energy Policy	No delegation of responsibility for managing energy	No energy related staff training provided	No measurement of energy costs or consumptions	No communication or promotion of energy issues	No investment in improving energy efficiency
0 (poor)						

Energy Analysis



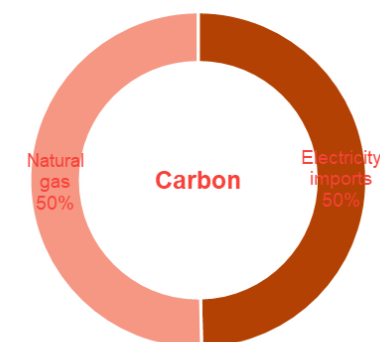
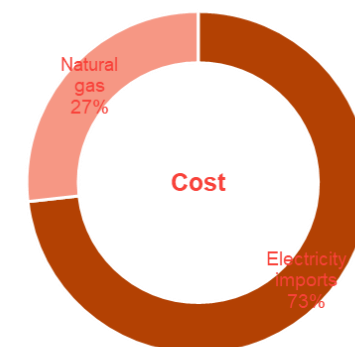
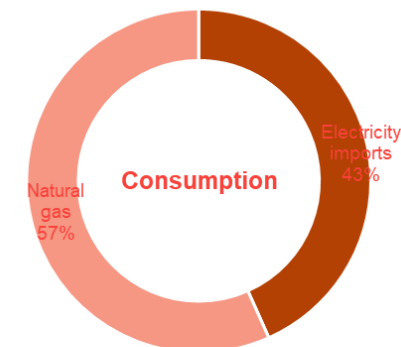
Energy baseline

Public Services Plaza has provided energy consumption and cost data for the calendar year 2024 period, and the analysis in the following pages is based on this data. Annual consumption for the site is shown in the table below, which represents energy usage from the 1st of January 2024 to the 31st of December 2024. Unit costs and carbon factors are detailed in the below as well. Unit costs are sourced from the utility data, site energy dashboards and the provided utility bills. The carbon factor is sourced from DESNZ Greenhouse Gas Conversion Factors 2024*.

Fuel type	Consumption		Costs		Emissions	
	kWh	%	£	%	tCO ₂ e	%
Electricity imports	317,875	43.3%	£67,302	73.2%	87.5	49.7%
Renewable energy 1	0	0.0%	-	-	-	-
Renewable energy 2	0	0.0%	-	-	-	-
Total electricity	317,875	43.3%	£67,302	73.2%	87.5	49.7%
Natural gas	415,769	56.7%	£24,601	26.8%	88.6	50.3%
LPG	0	0.0%	£0	0.0%	0.0	0.0%
Biogas	0	0.0%	£0	0.0%	0.0	0.0%
Total	733,644	100.0%	£91,903	100.0%	176.1	100.0%

Energy tariffs	£/kWh
Electricity imports day rate	£0.217
Electricity imports night rate	£0.184
Natural gas	£0.06

Carbon factors	kgCO ₂ e/kWh
Electricity imports	0.275
Natural gas	0.213



*https://assets.publishing.service.gov.uk/media/6722567487df31a87d8c497e/ghg-conversion-factors-2024-full_set_for_advanced_users_v1_1.xlsx

Energy benchmarks and targets



To assess the site's performance, the energy intensity was compared to benchmarks and targets for similar buildings. The site's energy intensity as captured on its display energy certificate (DEC) has been included to the bar chart. It should be noted however, that it reflects historic measured energy use based on a different baseline year to this decarbonisation feasibility study.

The CIBSE benchmarks¹ for naturally ventilated open plan offices (block A&B) and for standard air-conditioned offices (block C) have been used to assess the current energy performance of the site. These give the typical energy consumption per square meter of treated floor area per year and are derived from actual operational buildings.

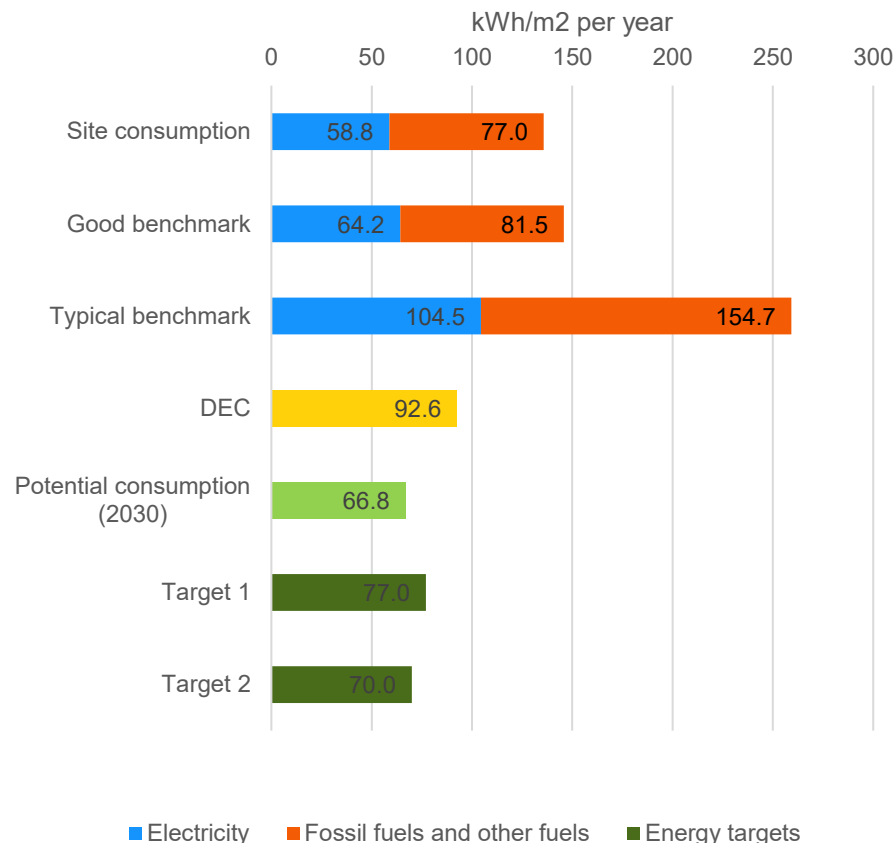
As per the graph to the right, the site is currently performing better than the good benchmarks both for electricity as well as for fossil fuels (natural gas in this case).

Overall, the energy intensity of the site (135.8 kWh/m²), indicates that energy is efficiently used. However, it should be noted that CIBSE benchmarks are dated (from 2012), and modern buildings would be expected to achieve considerably lower levels of overall energy use intensity.

The site's potential consumption, based on the baseline energy consumption and the identified energy saving opportunities, was compared to 2035 UKNZCBS² and UKGBC³ energy targets for existing offices.

This comparisons shows that Public Services Plaza has the potential to exceed both these the targets. Hence, implementing the identified recommendations will put the site into a solid trajectory for becoming an operationally Net Zero carbon building.

Energy Use Intensity



Target 1: UKNZCBS, existing offices, stepped retrofit, 2035.
Target 2: UKGBC, existing offices, stepped retrofit, 2035.

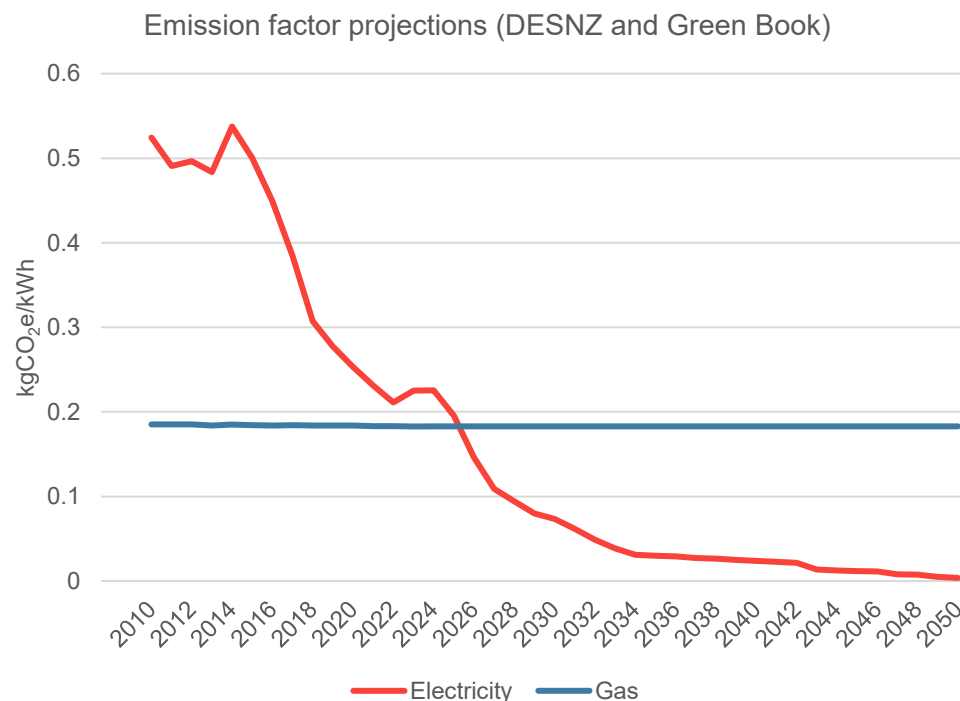
Energy carbon emission projections



Carbon factor projections have been developed using the Green Book published by HM Treasury (November 2023 update), following the methodology detailed by DESNZ on energy carbon projections.

To model carbon factor projections, DESNZ carbon factors up to 2025 have been used alongside the Green Book projections*.

Carbon factor projections are used in the Net Zero assessment to calculate emissions for interim and final targets.



As can be observed on the graph, the electricity carbon factor is decreasing, and is set to continue decreasing until it reaches near zero emissions. However, the gas carbon factor will remain stable as natural gas is a fossil fuel and is not generated by renewables. Therefore, the removal of gas and electrification of operational processes will allow for Net Zero to be achieved.

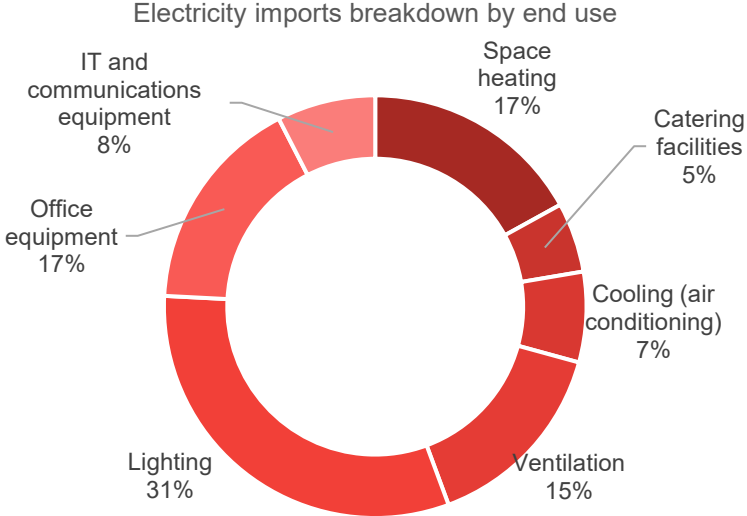
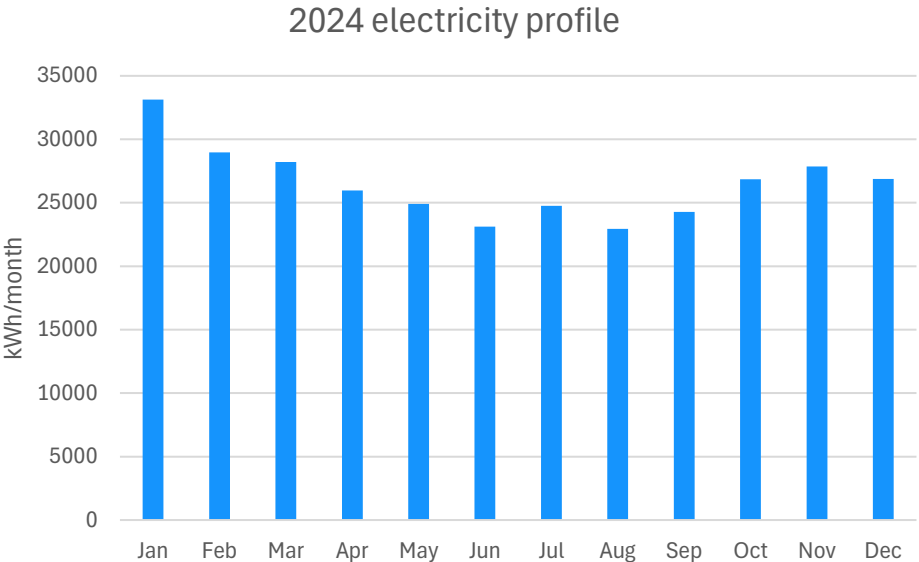
It is expected that the electricity generation in the UK will decarbonise by 2050. The UK's energy mix has changed substantially in recent years, becoming noticeably more reliant on clean energy sources and much less reliant on polluting and carbon emitting fuels such as coal.

* <https://www.gov.uk/government/publications/valuation-of-energy-use-and-greenhouse-gas-emissions-for-appraisal>

Energy analysis - Electricity

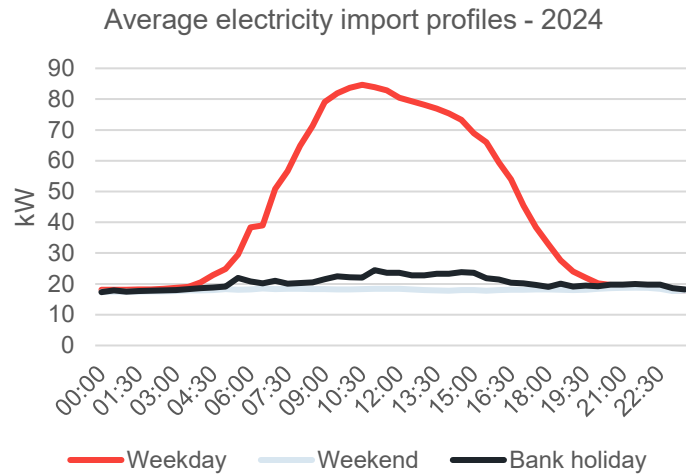


The chart below demonstrates the monthly electricity demand for Public Services Plaza, across the 2024 calendar year. It can be observed that colder months (Nov-Apr) tend to have higher consumption. This can be attributed to the fact that block C main heating fuel is electricity and also on lower natural lights levels leading to longer lighting running hours. Conversely, the spike in electricity demand during July is consistent with the higher need for cooling across summer months.

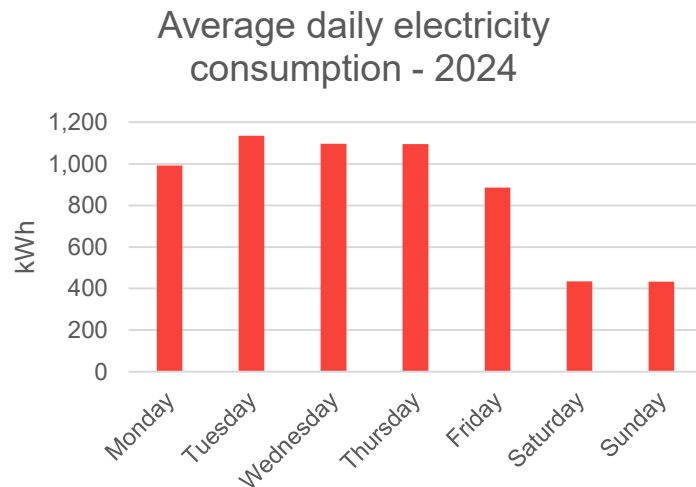


The electricity breakdown graph, uses metered data and estimations of the energy consumption of the various items of plant, equipment and systems, calculated using the power rating, hours of use and utilisation diversities. As such, the figures should be taken as an indication only. Despite this, the chart can be used to focus efforts on those areas with the largest energy consumption, and the best potential for making energy savings.

Energy analysis – Electricity half-hourly profiles



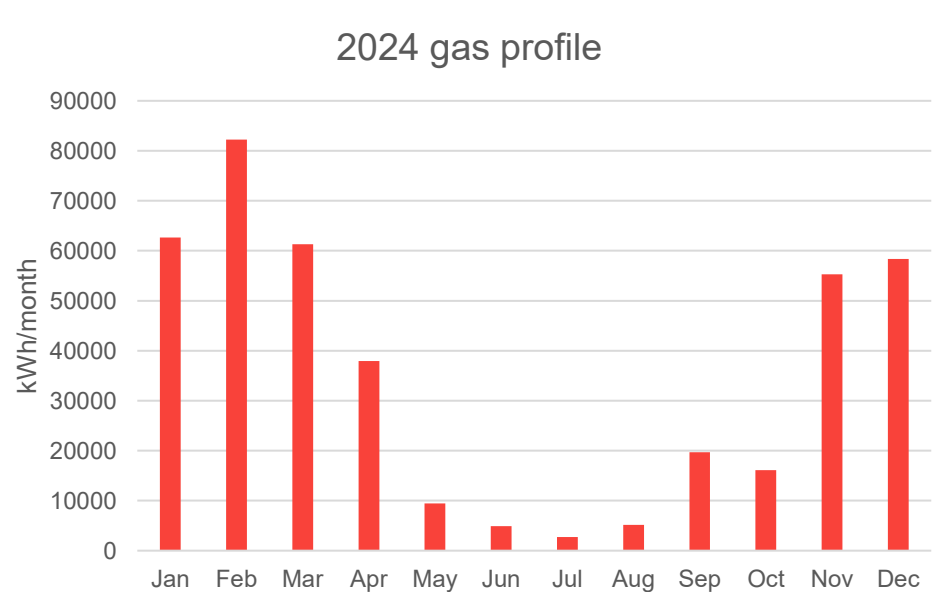
- Comparing the energy analysis of the site on weekdays and weekends, there is a clear drop in consumption on weekends, with the consumption remaining near the baseline both night and day.
- Consumption on bank holidays is also reduced, almost matching that during weekends, suggesting that the site is unoccupied and building services are effectively stopped from running.
- The baseload is of around 20 kW, which is much lower than the peak load of 85 kW during the day, indicating overall good energy management as most equipment, notably Heating, Ventilation and Air Conditioning (HVAC) and lighting, are turned off.
- The profiles align well with what was observed and communicated during the Net Zero feasibility assessment. Consumption starts to increase around 5AM, in line with the pre-heat limit found on the BMS, of up to 6 hours before occupancy start (9am). Consumption increases further, near its peak, at 10:30am, when by most of HVAC equipment and lighting will have turned on as employees arrive at the office. Soon after 4pm, consumption drops considerably and returns near baseload levels by 7pm.
- Comparing the average consumption on different days of the week, Monday to Thursday are consistent with about 1,000 kWh per day, Friday demand drops to circa 880kWh and during weekends when the site is unoccupied, consumption becomes about 400kWh.



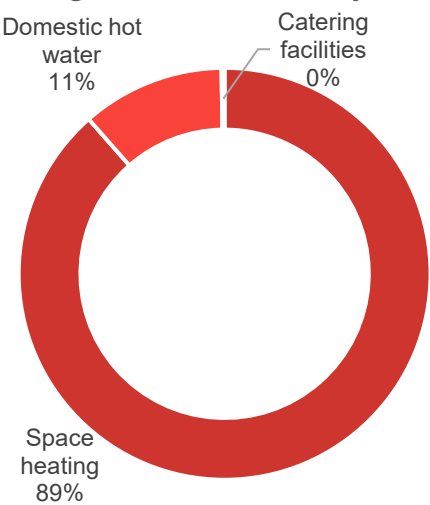
Energy analysis – Natural gas



The chart below captures the monthly natural gas demand for Public Services Plaza, across the 2024 calendar year. Natural gas consumption is dominated by space heating and therefore the monthly profile aligns with high gas demand during colder months of the year. Gas is also used for hot water generation, and to a much lesser extent in catering, which explains the gas demand during warmer months (May-Aug).



Natural gas breakdown by end use



The natural gas breakdown graph is based on submetering data as provided by Public Service Plaza. Therefore, it is deemed reasonably accurate and can be used as a guide for focusing efforts on those areas with the largest energy consumption, and the best potential for making savings.

Heating degree day analysis

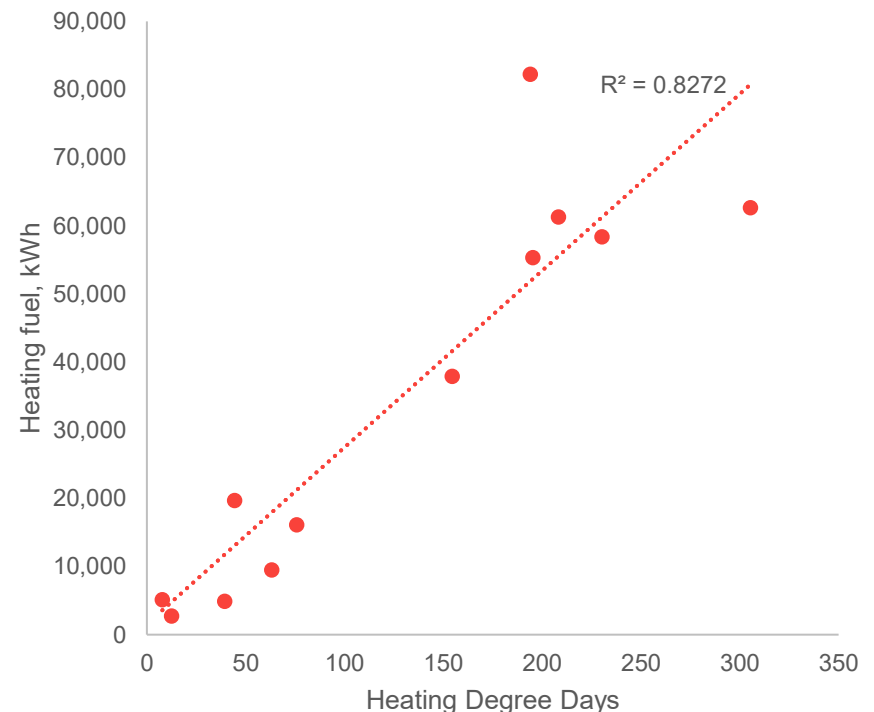
Energy consumption can be compared against external temperatures to assess the impact of temperature on energy consumption.

This metric is the degree day. The heating degree day provides the heating requirement of a building, representing a fall in the external average of one degree below a specified base temperature for one day.

The base temperature is the minimum external temperature at which there is no requirement for additional heating. The figures on the right shows the total site gas usage for those months when heating is generally required, compared with heating degree days. A base temperature of 15.5°C has been selected – this should be the external temperature at which heating needs to be provided to the building.

Within the degree days analysis, R^2 should be as close as possible to 1 to represent a perfect correlation.

In this case, $R^2=0.8272$, indicating average correlation between gas consumption and heating degree days. This suggests that there may be space heating controls improvement potential.



Net Zero Pathway



Net Zero Pathway – Operational emissions



This report focuses on operational emissions and does not consider construction emissions (for new assets, retrofit projects or reportable works), or whole life emissions (for the installation of new equipment). The Net Zero Pathway for operational emissions covered is shown below.



1. Establish the Net Zero scope

- Establish the operational emission baseline, and report emissions,
- Establish Net Zero and interim targets.



2. Reduce operational emissions

- Identify energy and carbon saving opportunities,
- Implement any feasible opportunities, focusing on fossil fuel removal,
- Consider any emissions associated with the implementation of the opportunities, for example:
 - Emissions from any construction work required,
 - Refrigerant global warming potential (GWP) for heat pumps.



3. Generate and procure renewable energy

- Generate renewable energy on site wherever possible,
- Procure renewable electricity for remaining electricity demand.



4. Offset any remaining emissions

- Offset remaining emissions using a recognised offsetting framework,
- Disclose the offset emissions.

The above steps should be followed for all assets, and for all energy consumers, including tenanted areas where HBC has some level of operational control, or ownership of any energy consumers. This includes building fabric upgrades, plant upgrades, or lighting upgrades.

1. Establish the Net Zero Scope



Operational Emissions Boundary for This Assessment



This assessment focuses on operational greenhouse gas emissions associated with energy use at Public Services Plaza, consistent with HBC's established reporting approach and the Greenhouse Gas Protocol. The operational boundary includes Scopes 1, 2 and relevant Scope 3 sources, with the following considerations:

Included in Scope 1 & 2

- Scope 1: Direct fuel combustion, for example, associated with on-site heating systems.
Note: Emissions from the authority's fleet and fuel use are excluded from this study.
- Scope 2: Purchased electricity consumed at Public Services Plaza.

Included in Scope 3 (Operational-level sources relevant to the building)

- Transmission & distribution (T&D) losses
- Well-to-Tank emissions (WTT)

Excluded Scope 3 Sources

The following Scope 3 categories sit outside the boundary of this feasibility assessment as they fall beyond the operational control of the site-level energy Net Zero feasibility assessment:

- Outsourced operations associated with the building (e.g., energy use for leased areas where applicable)
- Staff commuting
- Staff business travel
- Staff working from home
- Water consumption (see note below)
- Material use
- Waste
- Wider outsourcing activities unrelated to on-site energy use

Water Consumption Note

Water consumption is reviewed qualitatively at a high level to identify efficiency opportunities. Associated emissions are not included in the overall net-zero emissions total for this report.

Net Zero Baseline



The Public Services Plaza energy baseline for 2004 is summarised below, including carbon emissions, energy rates, energy intensity and carbon intensity.

Energy consumption	kWh/year	£/year	tCO ₂ e/year
Electricity imports	317,875	£67,302	87.5
Renewable electricity 1	0	-	-
Renewable electricity 2	0	-	-
Total electricity	317,875	£67,302	87.5
Natural gas	415,769	£24,601	88.6
LPG	0	£0	0.0
Biogas	0	£0	0.0
Total energy consumption	733,644	£91,903	176.1

The site's baseline energy consumption is almost 734MWh, with electricity accounting for circa 43% and natural gas the remaining 57%. Consequently overall energy carbon emissions baseline is 176.1tCO₂ with almost a 50/50 split between electricity and natural gas contribution.

As mentioned previously, natural gas is mainly used for space heating and hot water generation and therefore forms part of site's Scope 1 emissions.

Energy and carbon intensity	Energy intensity (kWh/m ²)	Carbon intensity - baseline year (kgCO ₂ e/m ²)
Electricity imports	58.8	16.2
Renewable electricity 1	0.0	0.0
Renewable electricity 2	0.0	0.0
Total electricity	58.8	16.2
Natural gas	77.0	16.4
LPG	0.0	0.0
Biogas	0.0	0.0
Total energy consumption	135.8	32.6

2. Reduce Operational Emissions



Reduce operational emissions



This section of the report provides opportunities for decarbonisation and reduction in operational energy emissions. It covers the key actions needed to progress towards Net Zero operational carbon at Public Services Plaza. The following opportunities were identified, and further detail for each opportunity can be found in Sections 2.1 and 2.2:

Net zero assessment interventions summary

										Quick win
										Medium term
										Long term
#	Recommendation	Implementation year	Savings			Capital cost	Maintenance costs	Payback period	Cost to Carbon Savings Ratio	RAG rating on payback duration
			kWh	tCO ₂ e	£					
1	BMS optimisation	2026	25,900	5.3	£2,700	£2,000	£0	0.7	£400	
2	Air quality controls	2026	13,900	2.7	£2,300	£13,000	£0	5.7	£5,000	
3	Solar PV with battery	2027	0	11.6	£21,600	£210,000	£1,000	9.6	£18,000	
4	Lighting Upgrade	2027	37,900	5.2	£8,000	£220,000	£0	Over 15 years	£42,000	
5	Replace gas boilers with ASHP	2030	294,900	74.6	£2,600	£910,000	£0	Over 15 years	£12,000	
Total			372,600	99.4	£37,200	£1,355,000	£1,000	Over 15 years		
Total - short and medium term			39,800	8.0	£5,000	£15,000	£0	3.0		
Total - long term and carbon focused measures			332,800	79.8	£10,600	£1,130,000	£1,000	Over 15 years		

For the purpose of this Net Zero feasibility assessment, recommended implementation years have been assigned to each recommendation, based on the ease of implementation, and allowing for planning permissions and feasibility studies to be conducted where necessary. Recommendations are detailed further in the following sections of the report. The solar PV recommendation savings are applied to electricity imports and do not affect the total electricity consumption or intensity.

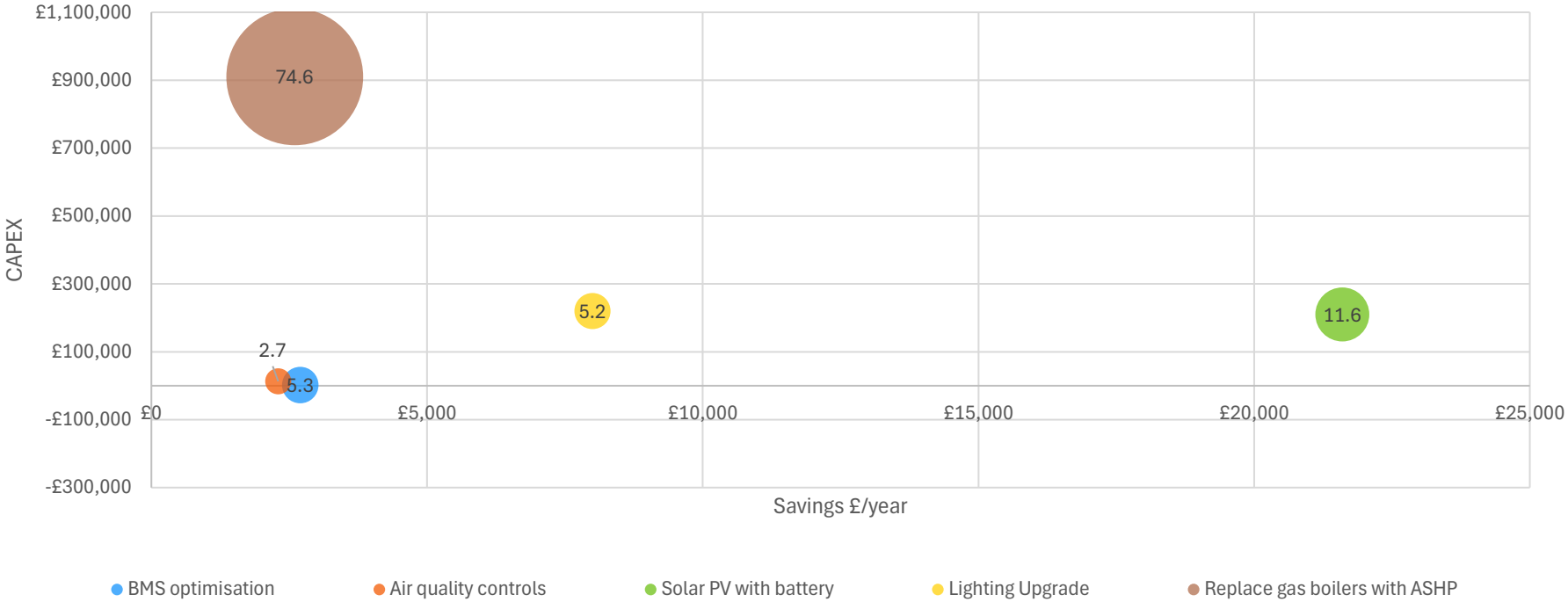
The lighting upgrade recommendation has a very long payback due to optimised lighting controls. As T5 lamps become obsolete, this is expected to lead to rising replacement cost and therefore LED lighting would become more cost effective.

Replacement of boilers with heat pumps although with very long payback, it is key for site's degasification and for reaching Net Zero.

Cost to carbon savings ratio



The bubble chart below shows how the identified measures compare in terms of capital investment and energy savings. The annual carbon savings per measure is reflected by the bubble size (also given by the value within or near each bubble). Therefore, a larger bubble represents a larger annual reduction in carbon emissions.



Options appraisal – action plan



The timeline below sets out a potential action plan where measures have been prioritised considering carbon impact, capital intensity, payback and feasibility. Early actions typically focus on low-cost and operational measures while later actions typically focus on more strategic, longer-term investments which are likely to be required to achieve Net Zero.

2026 - 2027	2027 - 2030	2030 onwards
BMS optimisation: Implement over the next 6 months. Check system health and adjust temperature settings to optimise energy use. Low disruption is anticipated to site's operation. Air Quality Controls: Implement over the next 6 months. Will require hardware installation and BMS integration. Low to medium disruption, as AHUs would need to be stopped for the retrofit.	Lighting upgrade: implement over the next 6-12 months. Medium disruption but could be planned around venue's activities. Solar PV: implement within 2-3 years. Subject to roof condition and feasibility study. Low disruption to site's operation is expected.	Replace gas boilers with ASHP. Seek to implement at end of boilers' economic lifetime. Significant disruption and space requirements. High capital cost, enabling measure for achieving Net Zero.

Energy Saving Recommendations – LCCA



Life Cycle Cost Analysis (LCCA) is a method used to assess the lifetime costs and benefits of a measure. LCCA considers the costs and savings of a measure, the time over which this measure is considered, hence its predicted lifespan, and the discount rate applied to future costs and savings, equating these to present day value.

LCCA was conducted for each measure implemented, considering the capital investment required, the energy costs or savings over the lifetime and the maintenance costs or savings over the lifetime.

The discount rate has been taken as 3%.

For the LCCA, the capital cost has been adjusted from the values shown in the original energy saving recommendation, which are for the baseline year, to account for the indicated implementation year. The electricity and gas costs are based on the actual tariffs paid for by Havant Borough Council for Public Services Plaza for the baseline year and have been adjusted over time using the Green Book electricity and gas projections. The maintenance costs are based on the assumed cost to maintain the measure implemented (e.g. maintenance costs for a heat pump), compared to maintenance costs prior to the implementation (e.g. maintenance costs for the previous heating and/or cooling systems). These are adjusted year-on-year using the discount rate, and the costs are for the measure lifespan.

Energy Saving Recommendations – LCCA



The results of the LCCA are presented in the table below. Negative figures indicate cost savings. Maintenance costs or savings represent costs or savings compared to existing systems (if applicable).

Overall, the capital cost for all measures combined is of £1,235,000, with energy cost savings of circa £590,000 and maintenance costs increase of about £19,000.

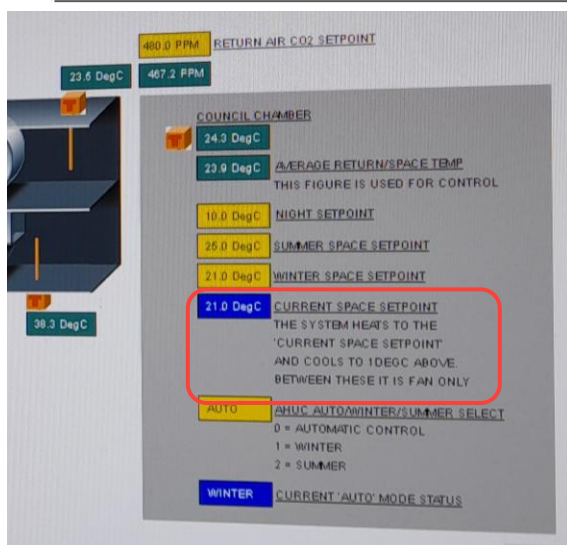
Recommendation	Implementation year	Recommendation lifespan	Capital cost (£)	Energy costs or savings (£)	Maintenance costs or savings (£)	Total costs or savings (£)	Total energy savings (kWh)
BMS optimisation	2026	25	£2,000	£-46,430	£0	£-44,430	647,582
Air quality controls	2026	15	£13,000	£-23,343	£0	£-10,343	208,616
Solar PV with battery	2027	25	£200,000	£-330,293	£18,632	£-110,465	0
Lighting Upgrade	2027	15	£210,000	£-79,090	£0	£134,502	568,978
Replace gas boilers with ASHP	2030	25	£810,000	£-110,819	£0	£699,481	7,371,903
Total	-	-	£1,235,000	£-589,975	£18,632	£668,745	8,797,078

2.1. Operational Energy



BMS Optimisation

Implementation in 2026	Annual Savings				Cost (£)	Payback (years)
HVAC	£	tCO ₂ e	kWh			
			Elec	Gas		
Controls improvement	2,700	5.3	7,500	18,400	2,000	0.7



BMS snapshot indicating narrow temperature deadband.

Issue:

A BMS is in use for managing the operation of all major HVAC plant on site. By interrogating the current BMS settings, it was found that the temperature deadband on AHU C (block C) is very narrow at 1°C. This can cause the simultaneous operation of heating and cooling systems (effectively fighting each other). Additionally, the ventilation target is set low at 480ppm CO₂ which would result in higher than necessary ventilation rates.

Similarly, the control interface for block A&B boilers, shows that the ambient temperature threshold above which space heating is disabled is set at 19°C. This could lead to higher space heating loads during warmer months when ambient temperatures drop below this level.

Solution:

It is recommended to review BMS settings and adjust so as to optimise energy use on site. As a rule of thumb about 8% savings are expected per degree reduction of heating setpoint and circa 6% savings per degree increase of cooling setpoint.

Best practice dictates that the temperature deadband between heating and cooling setpoints should be 4°C. In addition, the space heating hold-off temperature should be lowered to 16-17°C to ensure space heating is not enabled during summer period. It is also recommended to explore reducing AHU supply air temperatures in areas with reheater batteries. This enables temperature zoning and lowers the energy demand for tempering the supply air bulk volume.

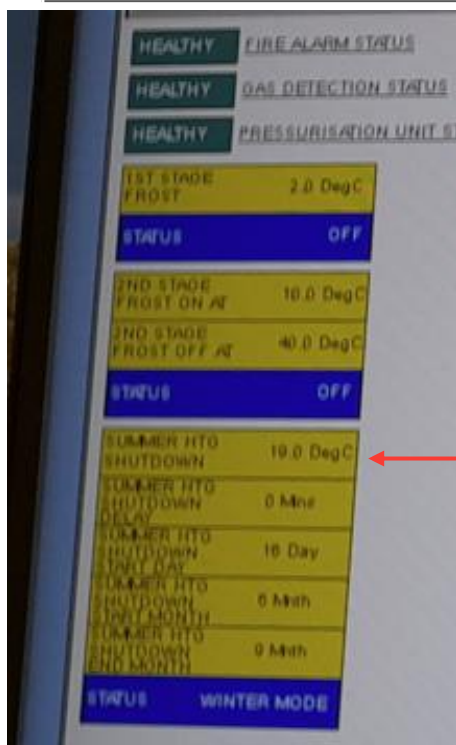
Further to this, air quality threshold is suggested to be set at 800-1000ppm, in line with CIBSE guidance. This will reduce ventilation rates and therefore minimise energy demand for running fans as well as for tempering the supply air.

Modest savings of 5% against the heating baseline (both electricity and gas) as well as 10% savings against electricity baseline for ventilation, have been considered.

BMS Optimisation



Implementation in 2026	Annual Savings				Cost (£)	Payback (years)
HVAC	£	tCO ₂ e	kWh			
			Elec	Gas		
Controls improvement	2,700	5.3	7,500	18,400	2,000	0.7



Next Steps and Additional Support Required:

- Review current HVAC controls settings, especially office areas heating setpoints, AHU supply air setpoints. of site space heating.
- Liaise with BMS engineers to implement the recommendations and source quotations.
- Investigate options to use an AI-driven software for site HVAC controls. Such systems optimise flow rates, setpoints, and schedules based on weather predictions and data analysis and offer savings of up to 30% for offices. Quotations should be obtained to determine the viability of such solutions.
- Investment cost is indicative and accounts for BMS engineer labour to implement setpoints review and adjustments.

BMS snapshot indicating 19°C as space heating hold-off threshold.

Air Quality Controls

Implementation in 2026	Annual Savings				Cost (£)	Payback (years)
Ventilation	£	tCO ₂ e	kWh			
			Elec	Gas		
Controls Improvement	2,300	1.7	9,500	4,400	13,000	5.7

Issue:

As previously mentioned, ventilation requirements in meeting rooms and cellular offices across blocks A and B, are met by dedicated AHUs (8x units in total), located on the building roof top. It has been observed that although these AHUs are equipped with VSDs both on the supply as well as the extract fans, these are generally operated at fixed speeds. This means that the volume of air supplied and extracted remains constant, regardless of actual indoor air quality which could result in higher than required ventilation rates. This in turn leads to energy waste as higher volume of air than necessary undergoes treatment.

Solution:

It is recommended to install air quality sensors to all AHUs to enable extract air CO₂ levels monitoring. The supply and extract fan speeds could then be modulated according to occupancy levels for maintaining a 800-1000ppm CO₂ target. It should be noted that even a 10% reduction in fan speed can return up to 27% savings in fans' power consumption.

In this case it has been estimated that 20% reduction in ventilation electrical demand can be achieved and 1% saving on space heating gas baseline from this measure.

The investment cost presented above, accounts for the provision and installation of CO₂ sensors and motorised recirculation dampers to enable air recirculation between AHUs' supply and extract streams.

Next Steps and Additional Support Required:

- Liaise with AHU supplier/maintenance contractor to confirm recirculation dampers installation is feasible.
- Source quotations for hardware and installation work costs.
- Ensure compatibility with existing BMS and integrate controls.
- Downtime of AHUs would be required, care should be taken to plan works so as to minimise disruption to site's operation.



Example of motorised damper.

Lighting Upgrade

Implementation in 2027	Annual Savings				Cost (£)	Payback (years)
Lighting	£	tCO ₂ e	kWh			
			Elec	Gas		
Long term capital investment (with payback over 3 years)	8,000	5.2	37,900	-	220,000	Over 15

Issue:

The site has undergone a partial lighting upgrade with LED lighting having been installed in corridors and circulation areas and controlled with PIRs. However, open plan offices and meeting rooms remain on Dali addressable Twin T5 35W fluorescent lighting (accounting for circa 85% of building lights). Open plan office areas lighting is manually switched on and thereafter controlled by PIRs. Additionally, a central control system exists which enables lights dimming depending on natural lighting levels. Meeting rooms' lighting is controlled by manual switches.

Solution:

Although existing open plan office lighting is efficiently controlled, fluorescent technology has been surpassed by LEDs which in general can be over 40% more efficient. Even though this may seem an unattractive investment at present, rise in fluorescent lamps replacement costs or outright ban, means that LED upgrade will soon be necessary.

The investment cost presented above, accounts for the provision and installation of LED fittings to replace all existing fluorescent fittings (1047 units). Energy savings are based on current fittings wattage (~52kW) and typical operating hours (3024 per year), with a reduction factor of 48% (to account for load and dimming diversities).

Next Steps and Additional Support Required:

- Invite reputable contractor to carry out a lighting survey and quote for the hardware and installation costs.
- Ensure solution is compatible with existing central controller.
- Map areas according to operating hours and dimming levels so as to carry out a staggered replacement prioritising areas with lower payback first.



Existing linear fluorescent fittings in open plan offices (top) and meeting rooms (bottom).



Replace gas boilers with heat pumps

Implementation in 2030	Annual Savings				Cost (£)	Payback (years)
HVAC	£	tCO ₂ e	kWh			
			Elec	Gas		
Long term capital investment (with payback over 3 years)	2,600	72.1	-97,100	392,000	910,000	Over 15

Issue:

The site currently uses gas boilers for space heating and hot water generation. Although common practice, gas boilers are less energy efficient when compared to electrified solutions. Typically, a gas boiler efficiency will lie in the range of 85% and for existing boilers being manufactured between 1999 to 2011 this may have dropped further. On the contrary air source heat pumps can achieve efficiencies between 300-400% depending on ambient conditions.. At the same time, as the electricity grid continues to decarbonise, natural gas emissions end up being considerably higher compared to the respective emissions from electricity demand.

Solution:

It is recommended to start replacing the site's gas boilers with air source heat pumps. Although payback is very long, it is a measure that will heavily reduce site's emissions and enable the council to meet its net zero trajectory targets. A gradual replacement of space heating boilers could be rolled out, aligning with asset's lifecycle management.

The upgrade costs shown above, account for the replacement of circa 760kW of gas boilers with air source heat pump systems. It is suggested to monitor gas consumption at hourly or half hourly intervals to optimise replacement heat pumps sizing and thus reduce CAPEX requirement.

Next Steps and Additional Support Required:

- Liaise with competent heat pump suppliers to source quotations and for identifying space requirements.
- Contact DNO to establish available capacity, should an increase in agreed supplied capacity is required to accommodate additional electrical load.
- Ensure compatibility with existing BMS, integrate controls and submetering.
- Opt for units that use readily available and with low GWP refrigerants.



Existing gas boilers in blocks A&B plant room.



Example of ASHPs array.

2.2. On-site Renewable Electricity Generation



On-site renewable electricity generation



Generating renewable electricity on-site will reduce Public Services Plaza electricity import consumption and costs and will reduce its reliance on the electricity grid.

Any on-site generated renewable electricity consumed by Public Services Plaza has zero operational emissions, and any exported electricity shall be metered and reported to provide carbon emission benefits. Renewable electricity generated on-site shall be included in Public Services Plaza baseline energy consumption and energy use intensity.

Installing solar Photovoltaic (PV) arrays would allow the building to generate some of its own electricity. Other solutions such as wind and hydroelectric are not feasible at this site.

How does solar PV work

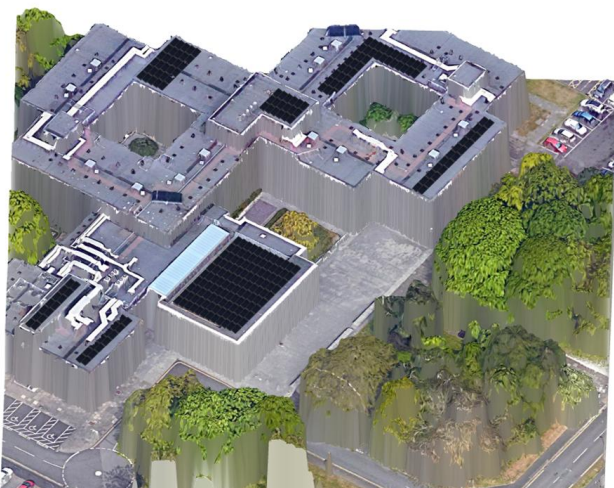
- Solar PV systems use cells to convert solar radiation into electricity. The PV cell consists of one or two layers of a semi conducting material, which is usually silicon. When solar radiation hits the cell, it creates an electric field across the layers causing electricity to flow. This solar radiation is still present on cloudy days but is less intense. The greater the intensity of the light, the greater flow of electricity, which means sunny days provide a greater opportunity for generating electricity on site.
- On days where the electricity generation from the solar PV system exceeds the building's demand, any excess generation can be exported to the electricity grid for a financial benefit to HBC.



Solar PV (roof mounted with battery storage)



Suggested implementation in 2027	Annual Savings					Cost (£)	Payback (years)
Energy Generation	£	tCO ₂ e	kWh				
			Elec imports	Renewable Elec	Export		
Long term capital investment (with payback over 3 years)	£21,600	11.6	98,200	-98,200	7,100	£210,000	9.6



Indicative roof areas for solar PV installations.

Issue:

Presently, apart from solar thermal for hot water, Public Services Plaza does not benefit from any other renewable energy generation systems. Power generated locally can be used to partly offset grid imports and assist in reducing energy cost impacts arising from volatile electricity price. Existing building roof tops, could be used for deploying solar PV arrays and generate electricity.

Solution:

The picture to the left shows the roof spaces on all blocks of Public Services Plaza, where a solar PV system is suggested to be installed. The size of the system has been calculated based on the analysis of respective half-hourly electricity consumption data, along with optimisation considerations, such as a battery deployment, for maximum displacement of grid imports whilst maintaining an attractive payback. With these criteria, an estimated combined system of 107kWp system should be able to produce circa 105,300 kWh per year. With the addition of a 200kWh battery, circa 98,200 kWh would be consumed on site, offsetting grid imported electricity.

Next Steps and Additional Support Required:

- Gather proposal from solar PV suppliers/contractors.
- Asses the optimum size and location of the PV array. This should be considered in conjunction to the replacement of gas boilers with heat pumps, as it will impact the site's electricity demand. Potential exists to to expand solar PV to site's surrounding car parking areas.
- Carry out a full structural survey to assess if the roofs can withstand the additional loads.
- Liaise with DNO to identify any connection capacity constraints (G99 application).
- Review any government/local incentives that are available. (Higher cost savings may be possible with Smart Export Guarantee scheme.)

2.3. Energy and Carbon Projections



Reduce operational emissions



Implementing all the recommendations detailed previously would lead to energy savings of 50.8%, from 135.8 kWh/m² to 66.8 kWh/m².

The carbon intensity would drop by 86.2% in 2030, 94.3% in 2035, and 99.2% in 2050. This drop is largely attributed to the decarbonisation of the electricity grid, as it is assumed that the site would be free of fossil fuels by 2030, following the replacement of gas boilers.

At present, Public Services Plaza would have to offset 176.1 tCO₂e to reach Net Zero. By 2030, assuming all opportunities are implemented, 24.4 tCO₂e would remain to offset. By 2040 and 2050, remaining emissions become 10.1 and 1.4 tCO₂e respectively, provided the grid decarbonisation trajectory is realised.

Offsets would still be required to reach Net Zero, even if electricity is purchased from a renewable or green tariff.

The graphs in the following slides show the following:

- Impact of the recommendations on the site's energy intensity upon implementation,
- Impact of the recommendations on the site's carbon emissions in 2035,
- Projected building operational carbon emissions from 2024 to 2050.

As can be observed from the graphs, the bulk of the energy and emissions reduction is from the replacement of gas boilers with air source heat pumps, as well as the installation of a solar PV system with battery storage.

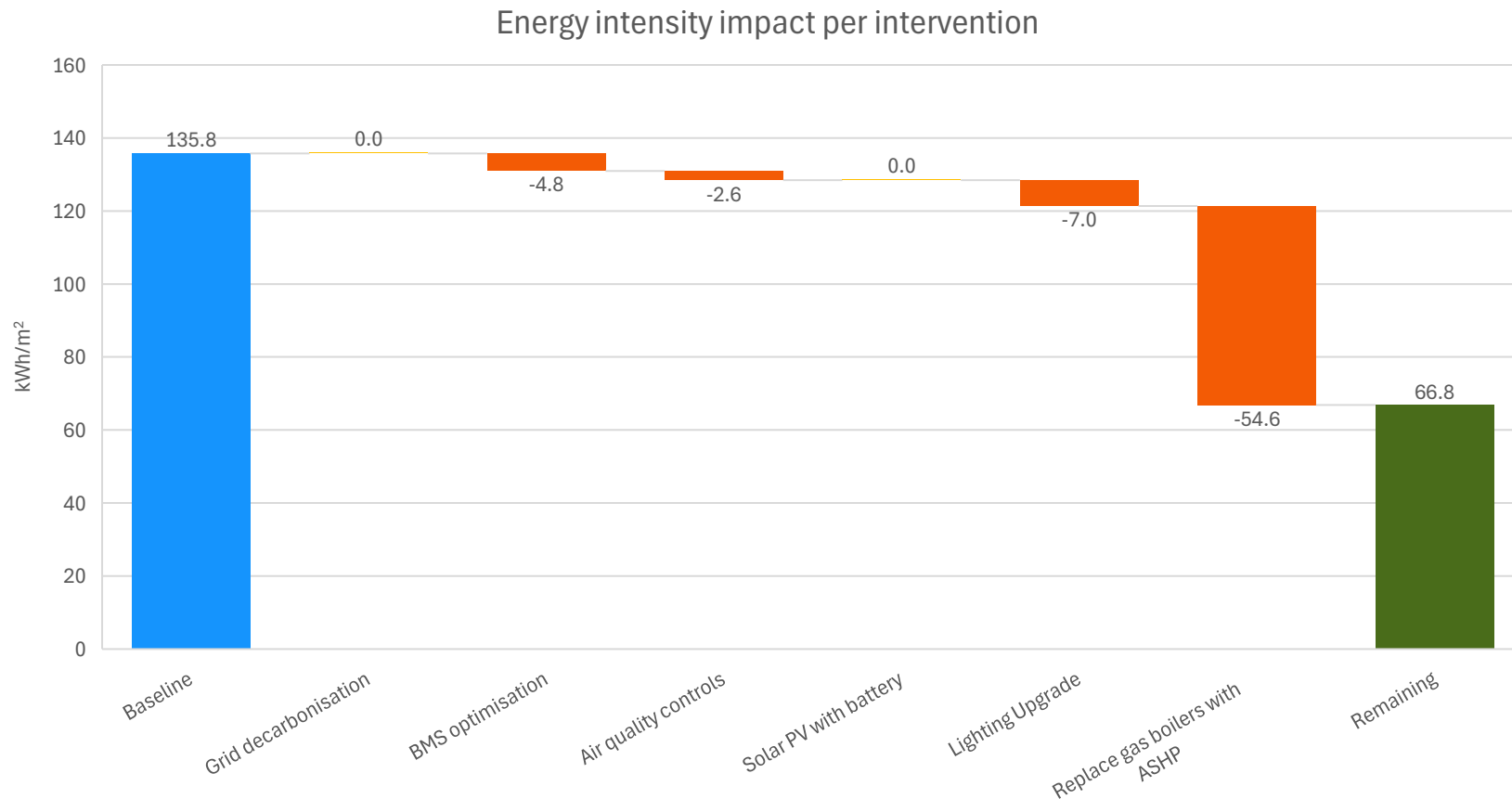
The grid decarbonisation will also have a large impact on emissions reduction. If fossil fuel remains in the building, the impact will be lessened greatly, and the site's carbon intensity will remain high.

Energy intensity impact per recommendation

The waterfall graph below shows the baseline energy intensity of the site and the impact of each energy saving measure. (Blue= baseline, orange= decrease from measures, green= remaining post measures implementation)

It should be noted that the Solar PV system with battery storage does not have an effect on energy intensity since it does not reduce the site's energy demand.

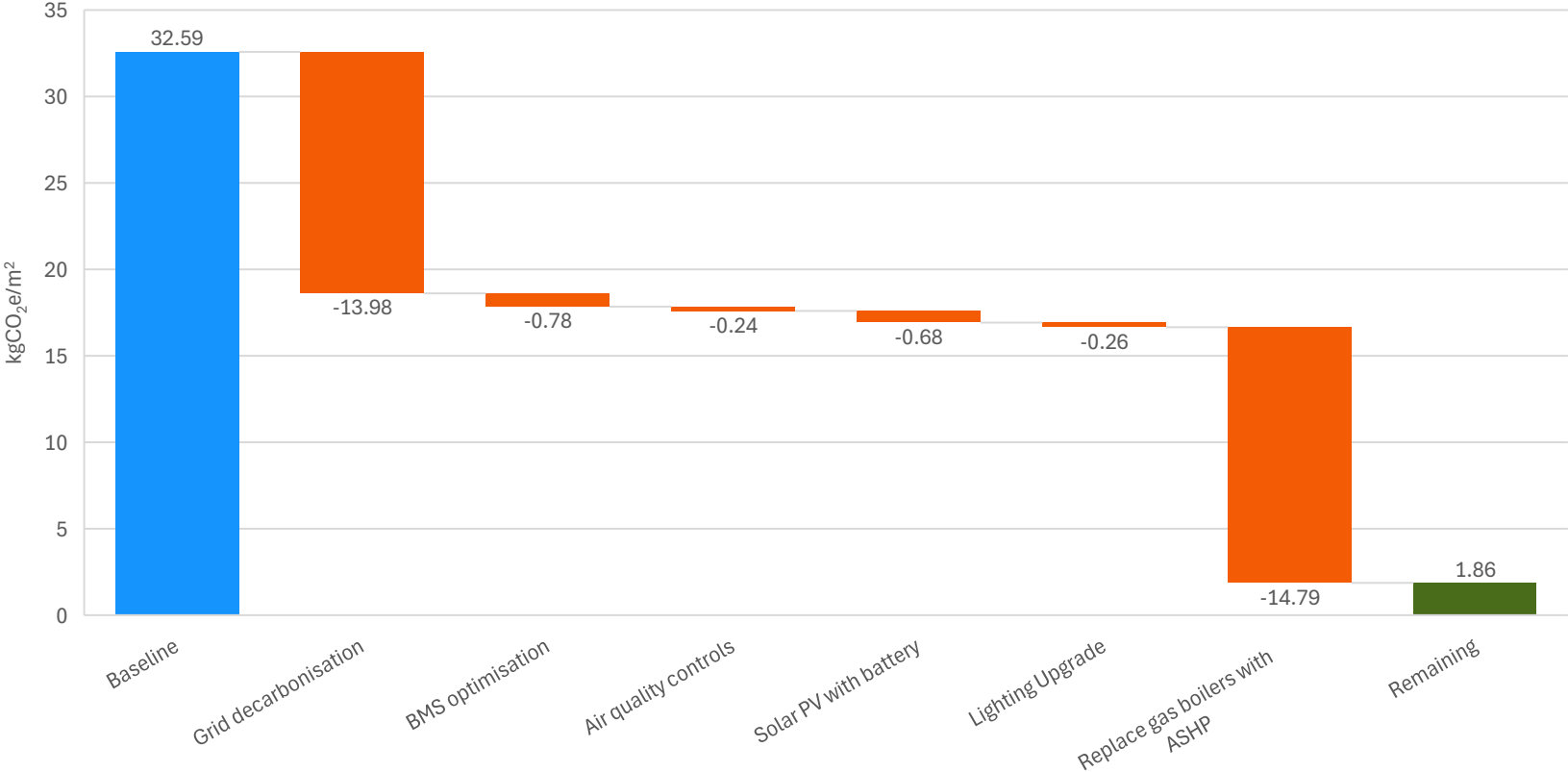
Replacing gas boilers with ASHP has the biggest impact to energy intensity, followed by the lighting upgrade measure.



Carbon intensity impact per recommendation – 2035

The projected carbon intensity impact of each recommendation for 2035, is shown in the graph below. Again, the gas boilers replacement with heat pumps carries the highest impact but now followed by solar PV system with battery storage.

It should be noted that grid decarbonisation impact is significant but not adequate to achieve HBC's Net Zero aspirational target of 68% emissions reduction by 2035. (Blue= baseline, orange= decrease from measures, green= remaining post measures implementation)

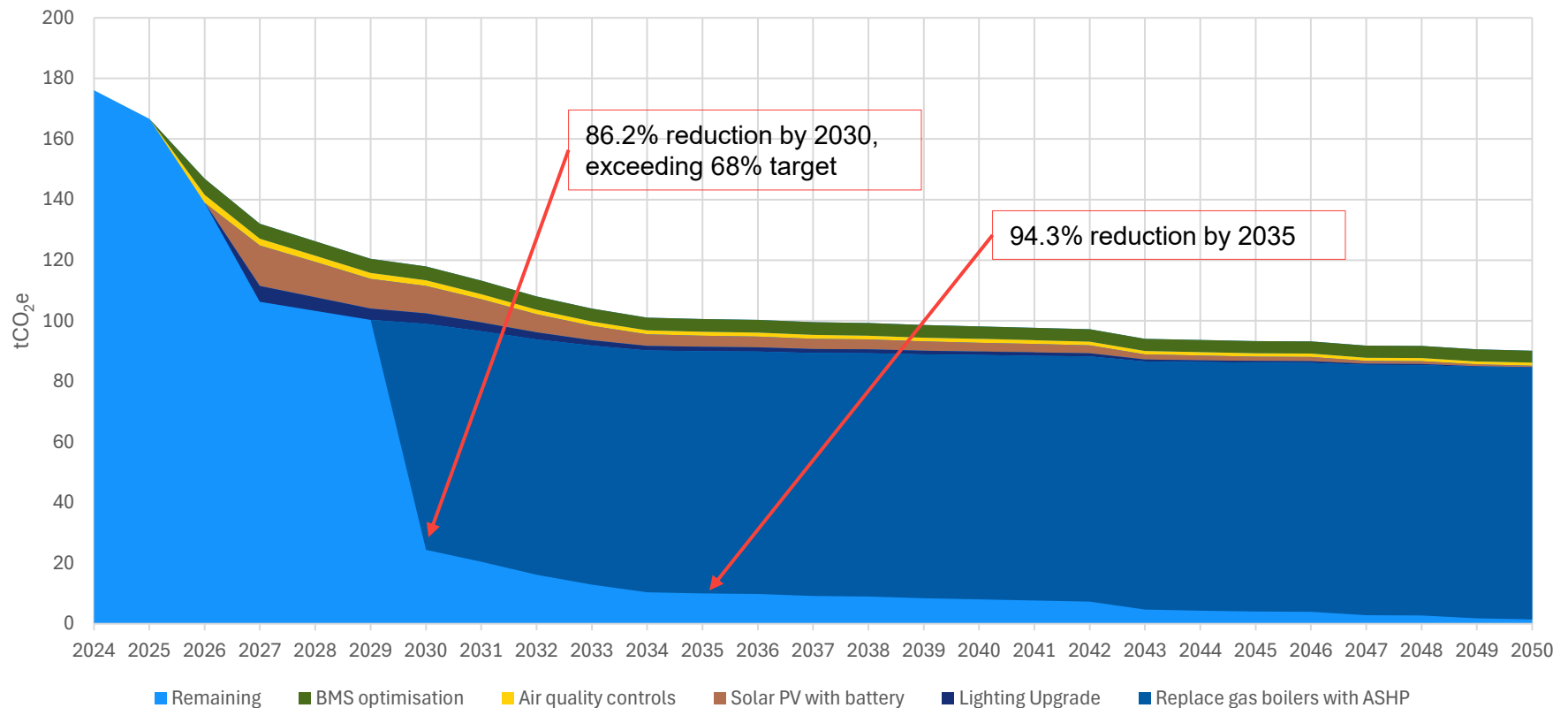


Projected site operational carbon emissions

The projected building operational carbon emissions and impacts of each recommendation is shown below.

According to this projection, carbon emissions by 2030 can potentially drop by 86.2% , surpassing the HBC target for 68% reduction. Similarly, the drop by 2035 would become 94.3%, leaving a small amount of residual emissions to be offset for HBC to achieve its 2035 operations Net Zero target.

Projected carbon emissions



2.4. Operational Water Use



How does operational water use relate to emissions?

Although water use typically represents a smaller proportion of a site's overall carbon footprint compared to energy, it is still an important operational metric. Energy is required to abstract, treat, heat, distribute and ultimately dispose of water, meaning that reductions in water use directly contribute to lower operational carbon emissions. Understanding water consumption also supports resilience, resource efficiency and compliance with emerging sustainability expectations.

The importance of reducing operational water use to reach Net Zero

Although water itself is not a direct carbon emissions source, the processes behind supply and treatment do contribute to emissions. Every cubic metre of water used on site contributes to emissions through energy-intensive pumping and treatment, while hot water use adds further emissions from energy consumption. As a result, improving water efficiency helps to reduce operational carbon and supports progress toward Net Zero, particularly where large volumes of water are used on site.



Operational water use



This section presents the Public Services Plaza water consumption, associated costs and carbon emissions alongside recommendations for operational water use reductions.

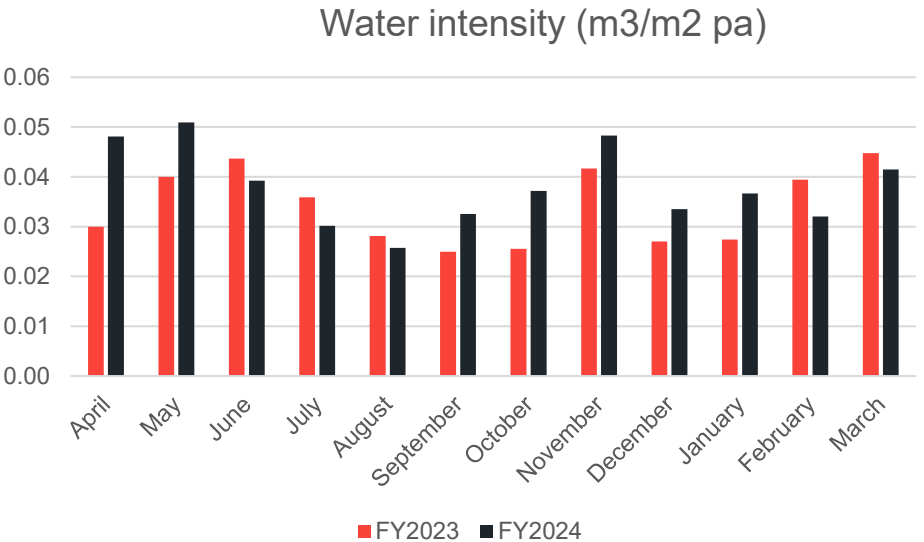
Water use on site is monitored via monthly meter readings as well as submeters on the BMS. Water emissions have been calculated using the standard water supply carbon factor of 0.1913 kgCO₂e/m³ and the water treatment emission factor of 0.17088 kgCO₂e/m³(both for 2025) for all water disposed of via the network supplier’s drains. The table to the right provides an overview of Public Services Plaza annual consumption for financial years 2023 and 2024.

Water Consumption	Annual Usage m ³	Annual Cost* £	Annual CO ₂ e Tonnes
Consumption FY2023	2207	£8,780	0.8
Consumption FY2024	2463	£10,720	0.9

* Includes standing charges

Water consumption intensity has been calculated (see graph to the right) and the annual intensity metric has been compared against local and regional benchmarks (see table below). The Real Estate Environmental Benchmark* (REEB) from Better Buildings Partnership (BBP) for offices in the UK from 2024 was used as the closest match to Public Services Plaza. The comparison shows that the site’s water consumption approaches the typical performance benchmark, suggesting that annual water consumption could be reduced so as to better align with the good performance benchmark.

	Actual Performance		Typical Performance	Good Performance
	2023	2024		
Water consumption (m ³ /m ² pa)	0.41	0.46	0.48	0.30



During the Net Zero feasibility assessment, the current operational water use as captured by the provided water metered data, has been evaluated and is summarised in a Strengths, Weaknesses, Opportunities and Threats (SWOT) analysis below.

Strengths

- Good water consumption monitoring observed both via monthly meter reads as well as BMS water submeters capturing cold water feed to DHW plant and kitchen areas.
- Existing infrastructure includes low-flow devices and automated taps within publicly accessed welfare facilities.

Weaknesses

- Water submetering is currently available on the BMS but monitored by building management team at irregular intervals. Setting up an alarm to flag abnormal daily water consumption can help quickly identify potential water leaks or infrastructure issues, before causing excessive water consumption.

Opportunities

- Welfare facilities in office areas use manual taps due to maintenance issues with automated ones. Explore different vendors with more reliable products to re-instate automated taps.
- Introduce half/full flush manual controls for toilets flushing. Alternatively sensor flush controls could be introduced including cubicles and urinals.

Threats

- Regulatory requirements around water-efficiency and reporting could mean that metering and submetering becomes mandatory
- Operational risks from leaks, particularly where hot water is heavily used
- High water tariffs could mean reducing water consumption becomes a necessity for cost saving

Operational water use opportunities



This section provides opportunities for decarbonisation and reduction in operational water use which will support progress towards Net Zero operational carbon at Public Services Plaza. During the Net Zero feasibility study, the following opportunities were identified:

- **Monthly meter and submeter reads:** Monthly meter reads and submeter reads should be recorded and assessed. This will enable HBC to identify whether the invoices are correct which could lead to cost savings. Also, monitoring can be automated via the BMS and alarm notifications can be introduced for flagging abnormal water use. This can assist in timely identification of leaks or water infrastructure issues.
- **Automated taps:** Upgrade office welfare facilities taps to automated type to minimise water usage and ensure taps are not accidentally left running.
- **Flush controls upgrade:** Sensor flush controls or half/full volume flush buttons could be installed to the toilets allowing for a controlled volume of water used and reducing the likelihood of continual flushing occurring.
- **Water saving behaviours and awareness training:** Carrying out staff/tenant awareness programmes on water consumption can reduce excessive water misuse and reduce bad habits such as leaving a tap running when not required.
- **Rainwater harvesting:** Installing a rainwater harvesting system would allow for collection of rainwater for use on site. This will reduce main water consumption, bringing about cost and carbon savings.

3. Offset Remaining Emissions



What is carbon offsetting?

Carbon offsetting is the process of compensating for carbon dioxide emissions by investing in projects that reduce, avoid or remove an equivalent amount of carbon dioxide elsewhere, such as tree planting, renewable energy and waste gas avoidance.

Why is carbon offsetting important for achieving Net Zero?

Even after reducing emissions as far as possible, through maximising energy efficiency, switching to renewable energy and minimising all operational emissions, some unavoidable emissions will remain. Carbon offsetting provides a method of removing or preventing emissions that are hard to eliminate, enabling organisations to truly reach Net Zero.

Why does offsetting come last?

The ultimate goal of Net Zero is to stop emissions from entering the atmosphere in the first place, not to compensate for them afterwards. Reducing emissions at the source delivers real, permanent decarbonisation, whereas offsetting only balances out emissions that have already occurred. Relying on offsets means greenhouse gases continue to be released into the atmosphere, which is the opposite of what Net Zero aims to achieve. Offsetting should therefore be reserved solely for the small proportion of residual emissions that cannot be eliminated through technology, operational changes, or design improvements.

What does ‘good’ offsetting look like?

All offsets should be high quality to ensure transparency, efficacy and legitimacy. High quality offsets should be:

- Accredited under trusted standards (e.g. ICROA-endorsed¹, ICVCM Core Carbon Principles²),
- Additional (the project only delivers that carbon benefit because the investment made it possible, it would not have occurred otherwise),
- Verified by an independent body,
- Linked to projects with clear climate benefits (e.g. tree planting, carbon capture storage, methane capture).

¹ <https://icroa.org/>

² <https://icvcm.org/core-carbon-principles/>

Appendices



Appendix A: Methodology and limitations

Methodology:

This Assessment of Energy Saving Opportunities has been designed to provide information relating to:

- The current energy consumption, management and site operation;
- Potential savings with regard to occupational behaviour, plant operation, feasibility of plant upgrade and site energy management.
- Identifying the potential for renewable resources to aid with energy efficiency.
- Any relevant information provided by the Client has been reviewed, with action taken to ensure this information is taken into account and/or verified where necessary. All information is then assessed to define the potential for energy savings and/or cost savings, where applicable. Recommendations are made for additional work where this is necessary to fully define the implementation and cost estimates for further detailed assessment that is recommended can be provided under separate cover, where appropriate.

Limitations:

WSP UK Limited has prepared this report solely for the use of the Client and those parties with whom a warranty agreement has been executed, or with whom an assignment has been agreed. Should any third party wish to use or rely upon the contents of the report, written approval must be sought from WSP UK Limited.

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The work undertaken to provide the basis of this report comprised a study of available documented information from a variety of sources (including the Client) and discussions with relevant authorities and other interested parties. The opinions given in this report have been dictated by the finite data on which they are based and are relevant only to the purpose for which the report was commissioned. The information reviewed should not be considered exhaustive and has been accepted in good faith as providing true and representative data pertaining to site conditions. Should additional information become available which may affect the opinions expressed in this report, WSP UK Limited reserves the right to review such information and, if warranted, to modify the opinions accordingly.

It should be noted that any recommendations identified in this report are based on information provided by the Client and as gathered during the site survey. In some cases, access cannot be granted to all areas of the site, in these instances and in the absence of information to the contrary, WSP will use the information provided to complete the report.

Before relying upon this assessment of energy saving options and capital and operating cost estimates, it is recommended that the Client should review these initial results and compare them with other energy and technology costs data and literature that is available. WSP have produced these ball-park estimates of capital and operating costs for the purposes of initial feasibility assessment only using the limited data and assumptions provided by the Client at this time. A full front-end engineering and design (FEED) study would be required to confirm and refine the technology cost estimates and determine the true payback time and NPV.

Appendix B: List of abbreviations



HBC	Havant Borough Council
AHU	Air Handling Unit
ASHP	Air Source Heat Pump
BMS	Building Management System
DHW	Domestic Hot Water
EC fan	Electrotonically Commutated Fan
GHG	Greenhouse Gas
GWP	Global Warming Potential
HVAC	Heating, Ventilation and Air Conditioning
kWp	Kilowatt Peak
kW	Kilowatt
W	Watt
LED	Light-Emitting Diode
PIR	Passive InfraRed (sensor)
PoU	Point-of-Use (water heaters)
Solar PV	Solar PhotoVoltaic

UKGBC	UK Green Building Council
UKNZCBS	UK Net Zero Carbon Buildings Standard
TRV	Thermostatic Radiator Valve
DESNZ	Department for Energy Security and Net Zero
CIBSE	Chartered Institution of Building Services Engineers
LCCA	Life cycle cost analysis
eTRV	Electronic Thermostatic Radiator Valve
VSD	Variable Speed Drive
IR	Infrared
SWOT	Strengths Weaknesses Opportunities and Threats
REEB	Real Estate Environmental Benchmark
BBP	Better Buildings Partnership



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