bcia
the building controls industry association

Comfort, Efficiency, and Health:

The Untapped Potential of Building Energy Management Systems

White paper

October, 2025

Authors

This report has been prepared by Talan on behalf of and in collaboration with the Building Controls Industry Association and its members.

About the BCIA

The Building Controls Industry Association (BCIA) is a trade association which represents organisations in the building controls and building energy management systems (BEMS) industry. The BCIA has over 200 members and represents over 75% of the UK building controls and BEMS industry – a sector which is worth over £850 million per year.

The BCIA is committed to expanding and upskilling the building controls workforce and is at the forefront of skills development in the building controls sector. We have launched a higher Level 4 technical apprenticeship (BEMS Controls Engineer) and are proactively supporting T-Level placements in building services engineering and digital disciplines.

The BCIA aims to promote better understanding, application, and use of building controls within the UK, recognising their part in delivering high levels of energy efficiency and lower costs for end users. BCIA members typically operate within the non-domestic sector, including education, healthcare, industrial, retail, commercial, agricultural and pharmaceutical buildings.

About Talan

Talan is an expert provider of professional and digital transformation services designed to accelerate the transition to a more sustainable future. Talan specialises in complex and highly regulated energy and environmental sectors at the forefront of a changing world, offering a comprehensive range of services for organisations in both the public and private sectors. Our experience in the transition to low-carbon heat stretches over many years. Talan is working with the Government, energy companies, manufacturers and trade associations as well as wider heating industry stakeholders to prepare the heating market for a low-carbon transition. This includes assisting our clients with navigating the complex regulatory and policy landscape, providing insightful and informative research, economic analysis and stakeholder engagement.

Foreword

The alarming rise in average global temperatures is creating unprecedented challenges for the built environment, especially around occupant comfort, indoor air quality and energy efficiency. These pressures are compounded by the UK's ambitious 2050 net zero target, alongside increasingly tight building and sustainability standards.

While the decarbonisation of the UK's building stock requires a collaborative effort from all of us across the built environment, Building Energy Management Systems (BEMS) have a critical role to play in the creation of smarter, more sustainable buildings. Through the integration and optimisation of HVAC, lighting, energy metering and other systems, BEMS empower building owners and facility managers with the crucial insights and control required to reduce energy consumption, minimise waste and enhance occupant wellbeing.

Despite the clear benefits of BEMS, awareness and adoption remain limited across many sectors, particularly educational institutions, commercial buildings and office spaces. Driving increased understanding and implementation is vital – not only to help facility managers and building owners meet regulatory requirements but also to unlock the untapped potential of building controls in improving operational performance and lowering carbon emissions.

This white paper reveals the strategic value of BEMS in supporting the UK's sustainability and decarbonisation goals. Through a combination of Real Estate Assessment (REA) and performance modelling, the paper quantifies the economic, environmental and social impact of Class A and Class C BEMS before underscoring the crucial role of building automation in the creation of healthier and more energy-efficient spaces – now and for future generations.

Stacey Lucas, BCIA President

Prelude

Building Energy Management Systems (BEMS) play a key role in accelerating the decarbonisation of non-domestic buildings, supporting the transition to net zero while delivering healthier, more efficient, and more comfortable spaces. Since 80% of the buildings that will be in use by 2050 already exist, decarbonising non-domestic buildings remains a significant and often costly challenge. In addition, long-term sickness is on the rise and economic growth is stagnant. This paper demonstrates how BEMS can contribute to resolving these issues across offices, schools, and hospitals in the UK. In summary advanced BEMS can deliver:

- High carbon savings: Upgrading BEMS to advanced controls in offices, hospitals, education, can drive an average emissions reduction of 7.4% annually for UK commercial and public sector buildings emissions between 2026 and 2035.
- Economic growth: Improved comfort in offices can generate £5.29 billion in annual GVA, increasing to £12.75 billion in 2050 from installing ISO 52120 Class A BEMS. Reduced sick days from improved air quality in offices and schools can save over £1 billion annually for the UK economy.
- Cost effectiveness: BEMS payback within 4-9 years across the modelled archetypes and drive ongoing savings. Class A are the most cost-effective at abating carbon (saving £224 per tonne of abated CO_2e) when compared to Class B BEMS, hydronic air source heat pumps, building fabric, and solar PV in an office.
- Improved health outcomes: By improving air quality in schools, Class A BEMS could prevent 2 million sick days every year and enable 552,000 more pupils to succeed in their national exams.

The results demonstrate the value of BEMS as a strategic enabler of the UK's net zero, healthy buildings, and economic goals. However, advanced BEMS are often value engineered out of retrofit programmes owing to cost constraints, and experience limited policy support in the retrofit sector. There are a series of policy interventions which can support advanced BEMS installation:

- Update the National Calculation Methodology to account for the energy savings of BEMS up to a Class A level.
- Update EPCs to recommend controls which align with Class B and Class A control systems.
- Update policy to incentivise operational energy and carbon to address the performance gap.
- Confirm the 2030 EPC B target for non-domestic private rented sector minimum energy efficiency standards (MEES), extending to the non-rented sector over time.
- Reinstate a financial support scheme for the non-domestic sector.
- Consult on a statutory maximum indoor air temperature for non-domestic buildings.
- Implement stricter commissioning, servicing and maintenance requirements under the Building Regulations to ensure the correct and continual performance of BEMS.

Executive Summary

Whilst significant progress has been made in decarbonising the UK's power sector, greenhouse gas emissions associated with buildings remain a persistent challenge. In particular, non-domestic buildings decarbonisation urgently needs to be ramped up if the UK is to meet its Carbon Budgets and legally binding net zero target.

The Climate Change Committee (CCC) states the UK is off track to achieve its carbon emissions targets within the built environment[1], with little supporting policy development for non-domestic buildings[2]. Building energy management systems (BEMS) have been recognised as a key technology for achieving net zero. The CCC's Seventh Carbon Budget states that energy management and building instrumentation and control measures can contribute to 60% of the energy efficiency related emissions reductions needed in public and commercial buildings by 2040[3]. Appliances will increasingly require smart functionality to respond to energy system flexibility requirements. National Energy System Operator (NESO) and Department for Energy Security and Net Zero (DESNZ) scenarios project 10-12 GW of consumer-led flexibility capacity by 2030[4]. Smart technologies, like BEMS, which are capable of flexibility and demand-side response will be key to enabling this transition. The UK also faces growing challenges around air quality, overheating, and workplace health and sickness, with poor air quality considered by the government to be "the largest environmental risk to public health in the UK"[5]. These issues also directly affect productivity and educational attainment. Technologies which drive improvements in indoor air quality, such as BEMS, can help address these challenges.

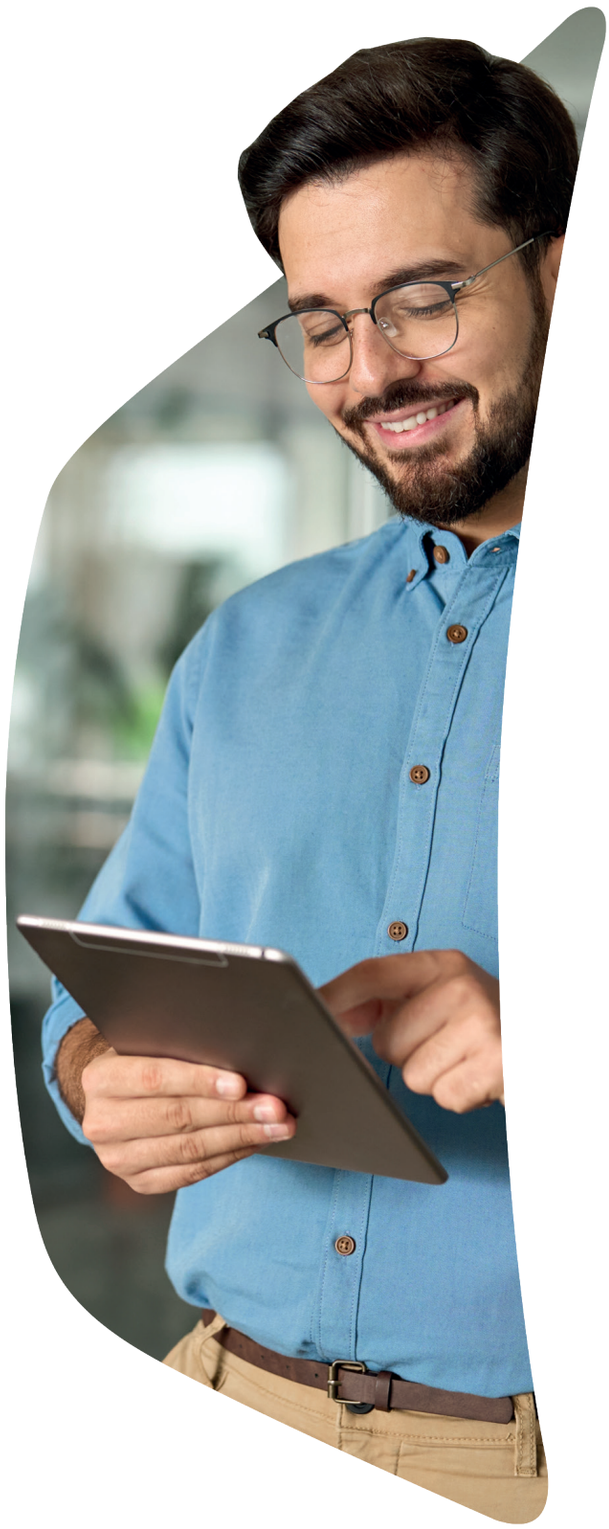
Building controls refer to a category of automated technologies and devices used to manage and regulate various aspects of a building's environment, such as heating, ventilation, air conditioning (HVAC) and lighting. By helping to integrate systems and optimise energy use in real time, they can ensure cost-effective operations by adapting to occupancy needs and environmental conditions. BEMS are computerised control systems used in buildings for the monitoring and control of the main HVAC services, and the management of lighting. The systems include functionality to monitor energy usage via multiple connected meters and are configured to optimise energy performance. As a well-established technology, BEMS present an opportunity to simultaneously address the challenges associated with decarbonisation, energy efficiency, and poor indoor air quality. They are a key enabler of the low-carbon and smart transition for the UK's building stock and contribute to healthier, more comfortable, working environments.

This report provides an updated evidence base of the benefits of upgrading from a standard BEMS (Class C) to the more recently developed and highly advanced BEMS (Class A) in offices, schools, and hospitals. BEMS are classified by the ISO 52120 standard through four efficiency classes which are defined below. The Building Regulations Part L Buildings other than Dwellings uses this classification to recommend compliant BEMS measures.

- **Class A** – Highly Advanced. Advanced BAC and Technical Building Management (TBM) systems. Integrated controls system across multiple building services and HVAC. Occupancy and demand-based controls.
- **Class B** – Advanced. Systems have advanced automation and some Technical Building Management functions.
- **Class C** – Standard. Traditional BACS with basic automation control.
- **Class D** – Not efficient. No automation or control.

The analysis draws on adjusted in-use performance data from the Building Controls Industry Association (BCIA) member case studies and up-to-date secondary data from the literature. Economic modelling was developed to understand the impact advanced BEMS can have on building energy use, carbon emissions, and costs. It compares BEMS with other low-carbon technologies and highlights the impact of improved ventilation on health and productivity outcomes. The BCIA believes the findings will be useful for informing strategic decisions on buildings decarbonisation and energy efficiency, and building occupant comfort and health by policymakers, developers, building owners and tenants.

Advanced BEMS are a cornerstone technology for simultaneously addressing occupant comfort, energy efficiency, and carbon improvements.



The report has the following key messages and findings:

- BEMS have a unique capability to integrate and optimise a series of functions, such as demand response, facilities management, equipment maintenance, consumption prediction and energy storage, which means comfort, energy efficiency, carbon savings and building smartness can be maximised within buildings. This can give building managers real-time and remote access to cloud-based analytics, reporting and services, which is subject to automated optimisation, and allows them to continually improve the building's energy efficiency and occupant comfort. Due to its integration with HVAC and lighting systems, and associated technologies, BEMS can optimise the performance of entire buildings rather than just individual systems.
- Class A BEMS therefore have a diverse impact across building services, helping building owners comply with multiple legislative requirements on ventilation (Part F), energy efficiency, and carbon reduction (Part L) under the Building Regulations.

Through improved ventilation management, Class A BEMS shape productive working and learning environments for schoolchildren and working people, driving economic growth and educational attainment.

- **Driving national productivity, supporting UK economic growth**. Operational productivity improvements are secured through employees working in more comfortable environments and can yield an additional £5.29 billion in annual GVA in 2025, increasing to £12.75 billion in 2050. This is a greater contribution to UK output than the gambling and betting industry.
- **Enhancing career prospects for students by increasing educational attainment.** The analysis suggests that over half a million (552,000) more pupils, could have passed their national exams in 2024 if Class A BEMS were deployed in all classrooms.

BEMS present value for money in achieving energy and carbon reduction policy objectives.

- **Addresses the UK's growing sick leave problem, by reducing time off work.** Through reducing 2 million workforce sick days per year in office-based industries, £322 million in productivity losses can be saved. Additionally, £565 - £709 million can be added to the UK economy through reducing parental work absences.
- **Class A BEMS have higher carbon abatement potential and are more cost-effective for decarbonising a standard office building than building fabric, air source heat pumps, and solar PV.** The Marginal Abatement Cost (MAC) analysis demonstrates that the installation of Class A BEMS can drive cost effective emission reductions over ten years.

Over ten years an 1000m^2 office can save a total of 105 tonnes of CO_2e and save £224 per tonne of CO_2e abated. Typically, Class A BEMS in this setting will achieve a payback within four years, demonstrating their value for money in achieving decarbonisation objectives.

- **Advanced BEMS can deliver emissions reductions needed to decarbonise the office, education and hospital sectors.** Upgrading to Class B and Class A in these sectors is projected to result in emissions savings of 15 million tonnes of CO_2 equivalent from 2026 to 2035. This equates to an annual reduction of 7.4% in emissions from all UK commercial and public sector buildings. In total, this is equivalent to 5% of emissions generated by England and Wales in 2023.
- **Advanced BEMS can support the carbon reduction targets of Minimum Energy Efficiency Standards and contribute to energy bill saving under the Performance-Based Policy Framework.** Installing Class B controls in all privately rented offices, educational buildings, and hospitals can exceed the expected emissions reductions of 4.1 MtCO_2e over Carbon Budget 5 through MEES, rising even higher if Class A were installed. For offices with a floor space of 1,000m2 and above, installing Class B can contribute 91% to the annual energy bill reduction expected from the Performance Based Policy Framework over Carbon Budget 5, or exceed the target of saving £116m in energy costs by 2030 if Class A were installed.

Over the next 10 years, large offices benefit the most from short payback times and high energy bill savings from installing Class A BEMS

- **Payback times and cost savings vary by archetype.** For example, an office with a floor area of 1,000 m² can achieve savings of £23,485 over ten years, with a payback period of four years when upgrading from a Class C to a Class A BEMS. In contrast, schools and hospitals typically have longer payback periods of around nine years, with lower ten-year savings of £3,504 and £7,293 respectively. This is largely due to their larger average floor areas, which lead to higher capital installation costs.
- **Despite their energy savings, Class A BEMS are underutilised in non-domestic buildings and their full social value from carbon savings is not accounted for. With financial support, this can be capitalised upon.** Given the higher upfront cost of BEMS in these sectors, financial support installing BEMS in the non-domestic sector can improve their cost effectiveness, driving greater energy bill savings and achievement of achieving carbon emissions targets in the non-domestic sector.

The findings therefore suggest Class A BEMS drive significant carbon, energy, and cost savings, supporting buildings decarbonisation and the reduction of high energy bills for those in the non-domestic sector. Additionally, through improved ventilation, Class A BEMS can unlock economic growth and provide improved learning outcomes for schoolchildren.

The BCIA's Policy Asks

- **Update the National Calculation Methodology to account for the energy savings of BEMS up to a Class A level**. The National Calculation Methodology (NCM) does not recognise the energy savings of Class B or A BEMS across all building services. Updating the NCM to remedy this can support advanced BEMS to contribute more greatly to energy and carbon compliance requirements.
- **Update EPCs to recommend controls which align with Class B and Class A control systems. Non-domestic EPC recommendations are limited to a Class C level system**. Therefore, the installation of advanced BEMS for improving energy efficiency is not incentivised. Adjusting EPCs to recommend more advanced systems can support building owners and landlords to meet EPC requirements.
- **Update policy to incentivise operational energy and carbon reduction to address the performance gap.** There are no policies incentivising and measuring operational energy efficiency improvements. EPCs do not measure in-use performance and so in practice many buildings perform worse from an energy efficiency and carbon emission perspective than anticipated at the design phase. Introducing the NABERS-style Performance-based Policy Framework which was consulted on in 2021 is a first step to address this.
- **Confirm the 2030 EPC B target for non-domestic private rented sector minimum energy efficiency standards (MEES), extending to the non-rented sector over time**. Introducing higher MEES requirements will drive investment in energy efficiency installations and support Government's ambition to reduce business energy costs and reduce non-domestic buildings emissions.
- **Reinstate a financial support scheme for the non-domestic sector.** There is no financial support scheme for decarbonising the sector past 2028, despite the CCC recommending greater policy support for the non-domestic sector. A mix of regulatory drivers and financial incentives for the installation of energy efficiency measures have proven successful in driving energy efficiency uptake in the past. A financial support scheme can support landlords to comply with MEES cost-effectively, particularly for cash strapped SMEs.
- **Consult on a statutory maximum indoor air temperature for non-domestic buildings.** The UK is experiencing more frequent and intense heatwaves, which are expected to worsen with climate change. Workers, students and other users of non-domestic buildings will increasingly be subject to higher temperatures, negatively impacting occupant productivity and health, particularly for the most vulnerable. There is no legislative requirement stipulating a maximum acceptable level of indoor air temperature in non-domestic buildings. Without intervention, occupants are likely to face uncomfortable levels of heat.
- **Implement stricter commissioning, servicing and maintenance requirements under the Building Regulations to ensure the correct and continual performance of BEMS.** BEMS systems can fail to achieve their designed energy performance owing to poor commissioning, post-installation validation, service and maintenance. The quality of checks and balancing to ensure proper commissioning and continued performance should therefore be improved through Part L of the Building Regulations. As such proper documentation of commissioning validation as well as regular servicing and maintenance checks can address this issue.

[1]Climate Change Committee, 2023, Progress in reducing emissions. UK Progress Report for Parliament
[2]Climate Change Committee, 2025, Progress in reducing emissions: 2025 report to Parliament
[3]Climate Change Committee, 2025, The Seventh Carbon Budget
[4]UK Government, 2024, Clean Power by 2030 Action Plan: A new era of clean electricity
[5]House of Commons, 2025, Air quality: policies, proposals and concerns. Available here

Scan the above code to download the full white paper

the building controls industry association

www.bcia.co.uk