IPF

RESEARCH

APRIL 2024

Costing Energy Efficiency Improvements in Existing Commercial Property

SUMMARY REPORT

COMMISSIONED BY THE IPF RESEARCH PROGRAMME

Costing Energy Efficiency Improvements in Existing Commercial Property

This research was funded and commissioned through the IPF Research Programme 2022-2025.

This Programme supports the IPF's wider goals of enhancing the understanding and efficiency of property as an investment. The initiative provides the UK property investment market with the ability to deliver substantial, objective and high-quality analysis on a structured basis. It encourages the whole industry to engage with other financial markets, the wider business community and government on a range of complementary issues.

The Programme is funded by a cross-section of businesses, representing key market participants. The IPF gratefully acknowledges the support of these contributing organisations:

Costing Energy Efficiency Improvements in Existing Commercial Property

Report

IPF Research Programme 2022-2025

April 2024

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Disclaimer

EXECUTIVE SUMMARY

Purpose of the research

The energy efficiency of commercial buildings remains an important topic in the decarbonisation of the UK buildings. Regulations are driving energy performance requirements higher, while ESG reporting and disclosure is shining a spotlight on asset performance.

This Investment Property Forum (IPF) research will help asset managers to identify the options that are available to improve the energy efficiency of different commercial asset types, what these will cost, and how they will improve the asset Energy Performance Certificate (EPC) rating and bring it in line with the net zero carbon pathways as set in the Carbon Risk Real Estate Monitor (CRREM) tool for energy and carbon intensity.

The research provides the costs and savings from energy efficiency improvements across seven building typologies in retail, industrial, offices and residential sectors. A range of discrete and combined packages of improvement measures were assessed for their impact on EPC ratings, energy use, carbon emissions and cost.

The full report can be reviewed here while the corresponding dataset can be accessed here.

Key messages

- Existing buildings need to become more efficient to achieve Net Zero Carbon and decarbonisation targets.
- Achieving an EPC B may require investment of between £200/m² and £800/m². These costs could be reduced by incorporating these works into planned asset investments.
- Changes to the EPC methodology will impact a building's current rating, even if no changes are made to the building.
- As the carbon emissions factor for electricity will continue to fall, the EPC rating methodology will continue to favour heat electrification and, by 2030, some buildings may find that it is impossible to achieve an EPC B without removing gas.
- Energy efficiency improvements must be built into the next refurbishment cycle, or undertaken as energy efficiency improvement works, particularly for those buildings that will not meet the MEES requirements or will face increased stranding risk in terms of the CRREM pathway.
- Energy efficiency improvement costs may be prohibitive if done as upgrades in isolation rather than as part of a planned refurbishment.
- To meet CRREM energy pathways, asset managers will typically need to adopt active energy management and tenant engagement in addition to investment in asset upgrades.

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The improvements have been analysed against the strengthening Minimum Energy Efficiency Standards (MEES) regulations and longer-term decarbonisation pathways as set in the CRREM tool for energy and carbon intensity.

The minimum energy efficiency standards (MEES) for leased property came into force in April 2018 and strengthened considerably with the expectation that all rental properties achieve an EPC of C in the period 2025-27 and EPC B by 2030. In addition, changes to the EPC modelling method resulting from the adoption of a new Part L of Building Regulations in June 2022 means that electrification of heat is strongly incentivised.

Property values are increasingly exposed to climate risk and therefore climate risk is investment risk. To help investors and property owners to assess and manage these climate change related risks, the Carbon Risk Real Estate Monitor initiative has been developed. CRREM provides Paris-aligned decarbonisation and energy reduction pathways per country and per building type that are used to derive indicators for risk management, reporting and disclosure

'Stranded assets are properties that will be exposed to the risk of early economic obsolescence due to climate change because they will not meet future regulatory efficiency standards or market expectations.' (CRREM, 2019)

The importance of energy efficiency for commercial landlords

For commercial landlords, the implementation of regulations imposing MEES for privately leased buildings is a powerful stimulus to act on improving energy efficiency. However, it is not the only one and there are many regulatory and market factors that make energy efficiency an important issue for commercial property.

Landlords should take all suitable opportunities, therefore, to improve the energy efficiency of their estates while working with their occupiers to achieve energy savings wherever possible.

Both regulated & unregulated energy loads should be addressed. EPC certificates and MEES regulations are a driver to encourage action on reducing the regulated energy consumption of a building. The way an asset is used and managed impacts the unregulated energy consumption, for example tenant small power, and therefore the total energy consumption. Asset owners need to work together with tenants to identify and act on opportunities to drive down the energy use intensity and to align with CRREM pathways.

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Improvement measures

The improvement measures analysed included the following:

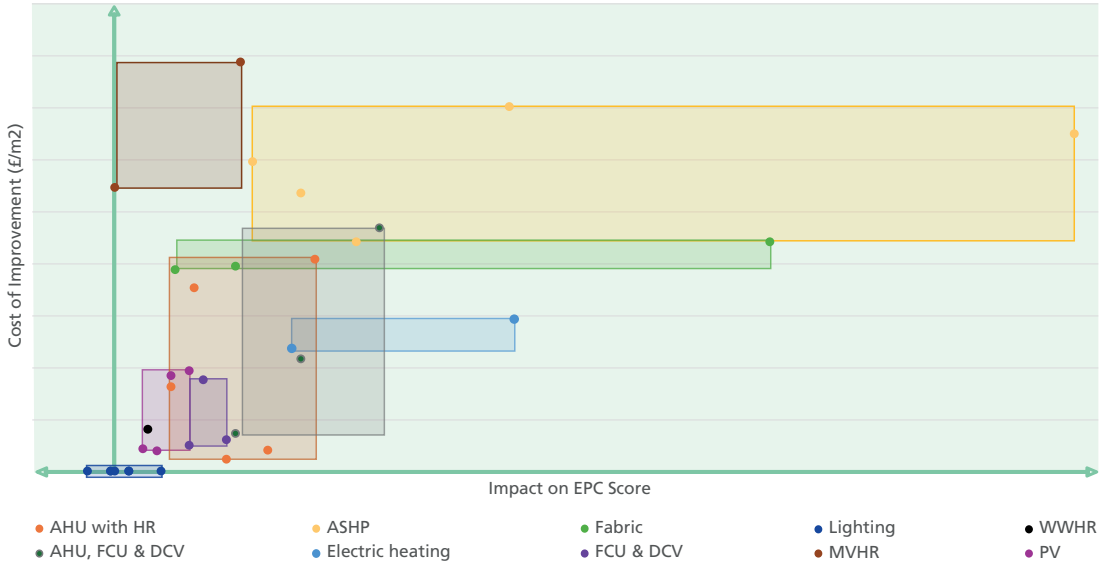
- Lighting
- Ventilation (Air handling units (AHU), fan coil units (FCU), demand-controlled ventilation (DCV), and mechanical ventilation with heat recovery (MVHR))
- Air Source Heat Pumps (ASHP)
- Direct Electric heating
- Photovoltaics (PV)
- Wastewater heat recovery (WWHR)
- Fabric

These were modelled as applicable by building typology and the full results, by typology and improvement measure, can be found in the main report and the supporting dataset.

Figure 1 illustrates the range in impacts on the EPC against the cost of the improvement measures if they were undertaken in a refurbishment scenario (i.e. the marginal extra over cost uplift of each energy efficiency improvement against the business-as-usual alternative.).

In a refurbishment scenario, the lighting improvements present no cost uplift, as energy efficient replacements would be assumed part of a standard refurbishment. At the same time, lighting improvements do not deliver a significant improvement in EPC rating, and in some cases result in a decrease.

Figure 1 Cost of improvement options and impact on EPC ratings



ASHPs typically deliver the most significant change in EPC score and are typically the most expensive improvement measure for most of the typologies. Ventilation improvement options (AHU with HR; AHU, FCU and DCV) deliver a moderate positive impact on the EPC score and can range from relatively low to medium cost across the typologies.

Packages of measures are required to achieve significant improvements in EPC ratings. For most buildings, a combination package of three improvement measures - lighting, ventilation and heat pumps will meet the requirement of an EPC 'B'. In the Retail Unit, Logistics Warehouse and Student Accommodation typologies, the heat pump or direct electric heating package alone will also meet EPC B. This is dependent on the age and condition of the existing building.

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The following table shows an example improvement package that would achieve EPC B for each typology, the associated capital costs, the internal rate of return, and indicates whether it follows the CRREM carbon intensity pathway. There are other improvement options that would also meet EPC B and the full dataset can be explored in the dashboard and the research report which can be downloaded from the IPF website (www.ipf.org.uk).

It is important to remember that typologies have been used to run this analysis and they are representative of core commercial sector assets, rather than case studies. The costs are indicative for the typologies and improvements modelled. This analysis is a snapshot in time. Care should be taken when applying the analysis to a specific building.

Table 1 Building typologies

Typology	Description	Starting EPC rating band	Example improvement package that would achieve EPC B or better	Energy upgrade scenario[1]		Refurbishment scenario[2]		CRREM Carbon intensity pathway
				Capital cost (£/m2)	IRR	Capital cost (£/m2)	IRR	
Office 1 (air conditioned)	12-storey (+ basement) office building, deep plan with an area of approximately 20,500m2. Services including lighting, heating, ventilation, and air conditioning. Built in early 2000s.	91 - **D**	LED lighting and new controls, a new air handling unit and fan coils and an ASHP (Package 1)	£437	Negative	£121	0.04%	On pathway to 2050
Office 2 (older air conditioned)	5-storey office building, narrow plan with an area of approximately 2,000m2. Services including lighting, heating, ventilation (extract only in toilets) and air conditioning. Built in the 1970s.	257 - **G**	LED lighting and new controls, a new air handling unit and fan coils and an ASHP (Package 1)	£596	Negative	£222	2%	On pathway to 2050
Retail unit in shopping centre	1-storey unit in a retail shopping centre with an area of approximately 300m2. Services including lighting, heating, ventilation and air conditioning. Built in the early 1990s	96 – **D**	LED lighting and new controls, a new air handling unit and fan coils and an ASHP (Package 1)	£820	Negative	£131	10%	On pathway to 2050

[1] Where a building owner upgrades but without a set forward investment plan. The absolute replacement costs have been modelled, without any reference to age, condition or performance of the existing assembly.

[2] Where a building owner will be making these interventions as part of a planned programme of asset improvements / replacement. The cost assessment is the marginal extra over cost uplift of each energy efficiency improvement against the business-as-usual alternative that can be assumed to have formed part of a PPM plan (i.e. a like for like or 'minimum compliance' solution).

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Typology	Description	Starting EPC rating band	Example improvement package that would achieve EPC B or better	Energy upgrade scenario[1]		Refurbishment scenario[2]		CRREM Carbon intensity pathway
				Capital cost (£/m2)	IRR	Capital cost (£/m2)	IRR	
Retail warehouse	1-storey, double height with mezzanine retail warehouse, deep plan with an area of approximately 1,500m2. Services including lighting, heating, ventilation (extract only). Built in 1995.	134 – **F**	LED lighting, a new air handling unit for Office & WCs, direct electric radiant panels for heating and direct electric for hot water, adding insulation to the walls and roof and installing new windows and doors (package 1)	£835	0%	£169	Negative	On pathway to 2039
Logistics	1-storey, double height logistics building, deep plan with an area of approximately 20,500m2. Services including lighting, heating, ventilation (extract only) and air conditioning to office space. Built in 2005.	72 – **C**	LED lighting, a new air handling unit with heat recovery, direct electric radiant panels for heating and direct electric for hot water.	£215	0%	£117	8%	Not on pathway
Build-to-rent residential	15-storey residential block,175 flats, amenity areas on the ground floor. Approximately 10,000m2. Natural ventilation, with extract fans in kitchens and bathrooms. Heating provided by communal gas boiler. Built 5-6 years ago	61 – **D**	LED lighting, a community ASHP, heating controls, insulation to LTHW pipework, new windows and doors and good practice thermal bridging	£473	Negative	£313	0%	On pathway to 2050
Student accommodation	7-storey student accommodation block, shallow plan. 150 units (ensuite bedrooms and studios) approximately 4,500m2. Natural ventilation, with extract fans in kitchens and bathrooms. Heating provided by communal gas boiler. Built 20 years ago	98 – **D**	LED lighting and controls, communal ASHPs, new mechanical ventilation with heat recovery to service bedrooms, heating controls, insulation to LTHW pipework and metering	£556	Negative	£296	Negative	On pathway to 2048

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EPC methodology and MEES compliance post June 2022

In June 2022, the method for calculating the EPC score and rating changed as part of the change to Building Regulations Part L. Among several changes, the most significant alteration was in the carbon emission factor applied to electricity. The new factor for electricity is around a third of that used previously and is now lower than that for an equivalent amount of gas.

This change in EPC modelling method will result in a change in EPC score for most buildings. Owners of gas-heated buildings could find that, on remodelling the EPC, the rating falls into a non-compliance level. Owners of electrically-heated buildings might find that on remodelling they improve to a level that meets current and potentially future minimum standards without further intervention.

This change means that electrification of heat is strongly incentivised, and compliance strategies historically used by the industry, such as high efficiency lighting systems, are now much less effective in improving EPC ratings and can make the rating considerably worse. For example, the results in this study demonstrate that:

- Replacing gas heating with heat pumps or direct electric can significantly improve the EPC rating of any building.
- The LED lighting and controls package alone do not always improve the EPC, and in some cases make it worse.

As the carbon emissions factor for electricity will continue to fall, the impact on EPC score will continue to favour heat electrification and, by 2030, some buildings may find that it is impossible to achieve an EPC B without electrifying heat.

CRREM 1.5 carbon intensity pathway

For most of the typologies modelled, there is a solution that would follow or better the CRREM 1.5 carbon intensity pathway. The exception to this is the Logistics warehouse where the solutions result in a carbon intensity a little higher than the pathway. The improvements that switch from gas to electric for heating fuel most often deliver the carbon intensity reduction required to meet the targets. The results demonstrate that individual measures alone, with the exception of the ASHP and Direct Electric improvements, will not meet the carbon intensity reductions required to meet the CRREM carbon pathway.

CRREM 1.5 energy intensity pathway

The CRREM energy pathway sets a trajectory for reducing energy intensity (KWh/m2/yr) of a building. In the pathway, the intensity reduces gradually to a plateau around 2035 for most building types. Of the typologies modelled, only improvements modelled for Office 1 would meet the energy intensity targets and remain better than the target for more than five years without further intervention. No packages modelled for the retail and logistic warehouses will meet the CRREM energy intensity targets. It should be noted that measures to address unregulated energy, occupancy and building management activities have not been analysed. There will be opportunities, specific to a building, to reduce energy intensity through working with tenants on behaviour change and energy management.

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Taking action

Energy efficiency improvements must be built into the next refurbishment cycle for existing buildings, or undertaken as energy efficiency improvement works, particularly for those buildings that will not meet the MEES requirements or will face increased stranding risk in terms of the CRREM pathway.

The seven typologies explored in this research demonstrate that cost effective energy efficiency measures exist for a range of building types of different age and condition. When considering energy efficiency upgrades, investors and asset managers should adopt the following recommendations:

- **Long term thinking** - take a long-term approach to decision making for energy efficiency improvements to buildings and portfolios.
- **Align with future building works** - When planning future building works/refurbishment, it is recommended that full consideration is given to current requirements and the direction of travel for policy and that all opportunities to improve the energy performance of the asset are explored. Energy efficiency must be in building refurbishment plans.
- **For MEES compliance, prioritise updating EPCs** - It is important to be aware of the risk of inaccurate EPCs and to prioritise getting updated EPCs for properties that could be at risk and, in relation to new or renewal of tenancies, assess current and future risk.
- **Work with tenants on meeting CRREM pathways** – to drive down both regulated and unregulated energy consumption in the building. For most existing assets, meeting the CRREM pathways (energy and carbon intensity) will require active energy management alongside improvement measures alongside property management interventions.

The following steps are recommended to help asset managers take the right steps to improve building performance:

Read the full report here.

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