

# **ACCELERATING NET ZERO RETROFIT OF COMMERCIAL BUILDINGS IN GREATER MANCHESTER**

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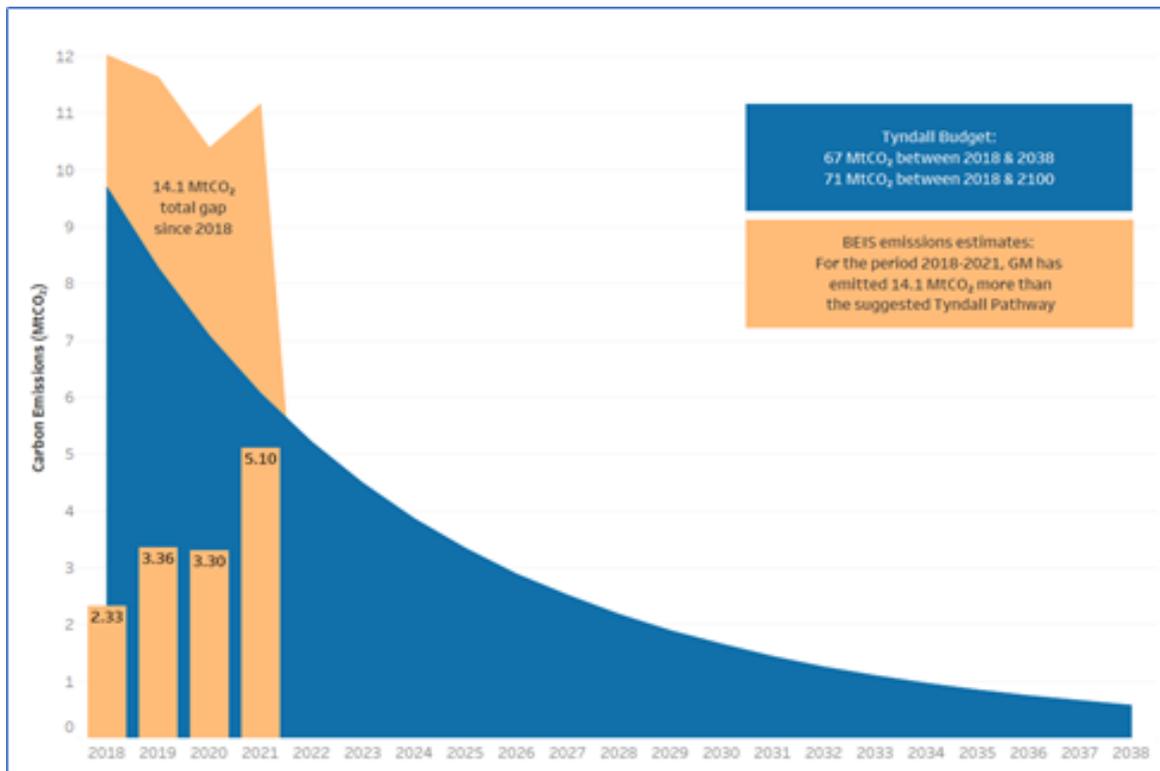
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## 1.0 EXECUTIVE SUMMARY

We are not on track to achieve the climate change targets that have been set at a local, regional, national, and global level. Urgent action is needed in all sectors to help ensure we keep global warming to below 2°C above pre-industrial levels, in line with the Paris Agreement.

In Greater Manchester we have a science-based target of being carbon neutral by 2038, whilst staying with a carbon budget of 67MtCO<sub>2</sub> between 2018 and 2038.

Work completed by the Tyndall Centre for Climate Change Research has identified that emissions from 2018-2020 significantly exceeded the targeted budget, to the extent that if emissions continue at the current rate, the entire 67MtCO<sub>2</sub> budget will be exhausted this decade - see Figure 1 below.



**Figure 1 - Greater Manchester Carbon Budget**

Manchester’s Climate Change Partnership (MCCP), working with Bruntwood, Manchester Climate Change Agency, Greater Manchester Combined Authority (GMCA) and industry experts from a range of relevant sectors, created a City Challenge Task & Finish Group to focus on accelerating retrofit action in the commercial building sector to help reduce the city-region’s direct emissions.

## 1.1 Why Focus on Retrofit of Commercial Buildings

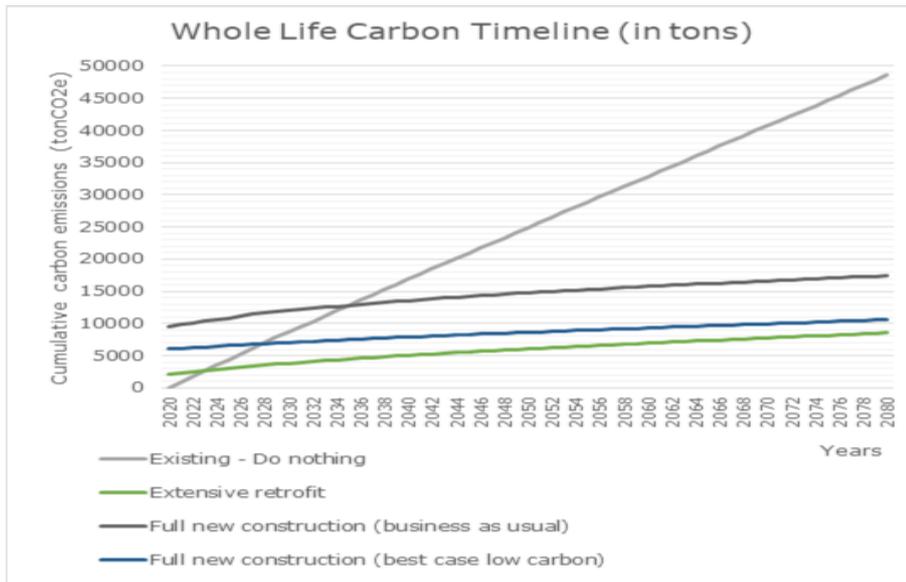
The UK Green Building Council (UKGBC) estimates that 80% of buildings that exist today will still be here in 2050. The majority of these buildings, including commercial buildings, were constructed to much lower energy efficiency standards than required to hit carbon reduction targets and therefore need to be retrofitted to improve performance.

The emissions modelling done for the 2022 Update of the Manchester Climate Change Framework showed that energy consumption in commercial buildings is responsible for 12% of the city's emissions. Action to reduce emissions from this sector, therefore, would make a significant contribution to the overall target.

It is important to note that we cannot achieve this reduction in emissions by demolishing existing commercial buildings and constructing new ones. This would be a high carbon strategy due to the high embodied carbon associated with new build, with embodied carbon meaning the carbon associated with the manufacture, transportation of construction materials and the process of construction.

Figure 2 below brings this to life by showing the whole-life-carbon (WLC) impact of retrofit versus new build. The analysis was completed for one of the case studies included in this report (see Appendix B), whereby four scenarios were modelled for a retrofit project at Pall Mall, Manchester.

The 'Do Nothing' scenario where the building is left unimproved, unsurprisingly, has the highest emissions of all options, while the lowest whole-life-carbon option is the extensive retrofit scenario, even when compared with new build construction to exemplar standards of low carbon performance.



**Figure 2 - Whole Life Carbon Timeline of Scenarios, Pall Mall, Manchester**

## 1.2 Size Matters

It's important to note that the commercial building sector includes a range of different sizes building, and that these different sizes have very different scales of carbon impact.

According to the [UK Government<sup>1</sup>](#), while only 7% of non-domestic buildings are over 1,000m<sup>2</sup>, they account for approximately 50% of the floor space and total energy used in non-domestic buildings.

Utilising the EPC database for offices in Manchester, it's estimated that only 4% of buildings are over 10,000m<sup>2</sup> but they account for 63% of the emissions from this sector. If buildings over 5,000m<sup>2</sup> are included, this means that 9% of the buildings are responsible 63% of the emissions.

Floor Area	Number of Buildings	Proportion of Buildings	Estimated Emissions (tCO2)	Proportion of Emissions
Greater than 10,000m <sup>2</sup>	78	4%	66,032	44%
5,000m <sup>2</sup> - 10,000m <sup>2</sup>	89	5%	28,930	19%
2,500m <sup>2</sup> - 5,000m <sup>2</sup>	140	7%	23,338	16%
1,000m <sup>2</sup> - 2,500m <sup>2</sup>	269	14%	16,003	11%
Less than 1,000m <sup>2</sup>	1358	70%	15,724	10%

**Table 1: Emissions by Floor Area for Offices in Manchester**

<sup>1</sup> <https://assets.publishing.service.gov.uk/media/605210218fa8f55d37fca70b/performance-based-policy-framework-ci-buildings--strategy-paper.pdf>

### 1.3 The Task & Finish Group

A task and finish group of public and private sector industry experts including landlords, developers, consultants, agents, contractors, and policy makers was established in November 2022 to examine the barriers currently limiting commercial retrofit and to develop recommendations for how these can be overcome to accelerate the decarbonisation of this vital part of our built environment.

Members of the Group brought expertise from across the commercial building sector including, asset owners, property agents and consultants, contractors, developers, designers, planners and policy makers.

- ARUP
- Bruntwood (Chair)
- Buro Happold
- Caddick Construction
- Deloitte
- EcoSpheric
- EY
- GMCA
- Green Economy
- Hilson Moran
- JLL
- M&G
- Manchester City Council
- Manchester Climate Change Agency
- Muse
- Peel
- Turner & Townsend
- UKGBC

The Group identified four key components of the challenge and organised itself into four sub-groups to tackle each in detail. Each sub-group had a lead organisation, with Bruntwood providing oversight across the sub-groups as chair of the Task Group, with support from Manchester Climate Change Agency.

1. Finance & Viability - The Commercial Case, led by GMCA
2. Policy - Drivers to Encourage Action, led by Turner & Townsend
3. Technology & Skills - Delivering Solutions, led by Arup
4. Monitoring & Verification - Ensuring Successful Delivery, led by Buro Happold

### 1.4 Summary of Key Barriers

The key barriers and challenges identified by the sub-groups that are limiting commercial retrofit are:

**Finance & viability:**

- The burden for investment in retrofit sits with the landlord or asset owner, whereas the benefit of retrofit typically goes to the tenant (e.g. reduced energy bill).

- An uplift in asset values is not yet fully compensating for the investment in retrofit. Greater Manchester is lagging behind the London in terms of brown discounts and green premiums affecting market values and incentivising retrofit action. This is worsened by current market conditions which according to CBRE<sup>2</sup> UK saw commercial property capital values decrease by 13.3% as a whole in 2022.
- It can be challenging to finance retrofit projects as in isolation such works don't necessarily create direct revenue streams. This has been made more challenging by recent interest rate increases, which have significantly increased the cost of borrowing.
- Recent inflationary pressures on construction materials and labour costs exacerbate all other issues. Recent research by JLL shows that construction costs are up 30% on pre-Covid levels.

#### Policy:

- Current Minimum Energy Efficiency Standards (MEES) for operational energy efficiency in commercial buildings are too low to accelerate retrofit at the pace required – currently minimum standard for MEES is EPC E, which is a very inefficient building.
- Looks unlikely that government will implement proposals to strengthen MEES Regulations whereby EPC C would be required by 2027 and EPC B by 2030.
- Current planning policy and supplementary planning documents do not mandate high enough performance standards.
- Planning rarely impacts existing buildings and is therefore a fairly ineffective level to implement minimum operational efficiency standards.
- There are conflicts within planning policy and supplementary planning documents which can disincentive building retrofit, e.g. 'sound' targets are often exceeded by low carbon heating.
- The duration of Local Plans, sometimes lasting for 15 years, makes them inflexible to changing requirements, standards, and market trends, including retrofit.
- Conflicts on listed buildings where energy efficiency measures may interfere/alter historic features within the building.

#### Technology & skills:

- While technical solutions exist to improve operational efficiency of most buildings they are often costly and disruptive.
- There is a heavy reliance on fossil fuels for heating, heat pump technology has developed significantly in recent years, however are significantly more expensive and present several technical challenges.
- The retrofit supply chain is underdeveloped, with a lack of clear policy/market signals and limited access to growth capital acting as constraints to its development.

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<sup>2</sup> CBRE Monthly Index

- Retrofit projects often require specialist materials, smaller orders and non-traditional construction phase scheduling which require specialist skills, knowledge and capacity to deliver.
- Optimal solutions for retrofit are not widely understood and clients often perceive that a new build will offer more value/better returns than a retrofitted building.

**Monitoring & verification:**

- Lack of effective metering in many existing buildings.
- Inconsistent approach to energy data management and analysis.
- Current mainstream certification schemes (EPC and BREEAM) don't measure the actual performance of a building once occupied and can be shown to be an ineffective measure of building energy efficiency.
- The variety of voluntary standards available (e.g. BREEAM, NABERS) creates uncertainty and inertia in the market, slowing the uptake of retrofit action.
- There is a knowledge gap in building owners and tenants on the installation and interpretation of energy metering, which is disincentivising retrofit action.
- A lack of mandates or incentives to publish building performance data means the market cannot develop in a way that would incentivise energy efficiency and increase retrofit projects (i.e. driving green premiums).

**1.5 Summary of Key Recommendations**

**Recommendation 1: Set a Clear Decarbonisation Pathway**

The following table sets out a pathway of increasing operational energy efficiency standards, linked to building size, which would help to ensure the commercial building sector reduces its carbon emissions at an appropriate rate to support Greater Manchester to stay within its carbon budget.

This pathway is in line with 'Paris Proof' targets proposed by multiple expert bodies including the UK Green Building Council.

Building Size	2027	2030	2035	2038
Greater than 10,000m <sup>2</sup>	EPC C NABERS	EPC B NABERS 5*	EPC A NABERS 5.5*	EPC A NABERS 6*
5,000m <sup>2</sup> - 10,000m <sup>2</sup>	EPC C NABERS	EPC B NABERS 4.5*	EPC A NABERS 5*	EPC A NABERS 5.5*
2,500m <sup>2</sup> - 5,000m <sup>2</sup>	EPC D	EPC C NABERS	EPC B NABERS 5*	EPC A NABERS 5*

1,000m <sup>2</sup> - 2,500m <sup>2</sup>	EPC D	EPC C	EPC B	EPC A
Less than 1,000m <sup>2</sup>	EPC E	EPC D	EPC C	EPC B

**Table 2: Proposed Decarbonisation Pathway / Minimum Energy Efficiency Standards**

It is unclear if there is a regulatory lever to enforce this pathway for all existing buildings, therefore the implementation of these standards may have to be encouraged through influencing measures, from policy makers and the industry itself, rather than through statutory powers. Note that stricter standards are proposed for buildings that are subject to planning applications – see Recommendation 3.

It is also recommended to lobby the government to ensure the adoption of proposed changes to the MEES Regulations so EPC C rating is required by 2027 and EPC B by 2030 and to promote the use of performance based certification such as NABERS.

**Recommendation 2: Establish a Best Practice Cohort**

Create a coalition of asset owners (actively targeting those with properties over 10,000m<sup>2</sup>) and industry specialists to work collaboratively to accelerate action across Greater Manchester. The Cohort would:

- Openly share their own best practice and lessons learned in reducing operational and embodied carbon through retrofit.
- Set up a scheme whereby commercial buildings share data (similar to existing schemes in Copenhagen and Washington DC). This could also include a league table to support improvement through competition.
- Promote the recommended Decarbonisation Pathway and disseminate wider best practice (e.g. guidance from UKGBC or buildings outside Greater Manchester) to other asset owners in and outside the cohort.
- Support engagement with, and capacity building in, the local supply chain.
- Reach out to building tenants to drive energy efficiency (e.g. through Bee Net Zero), promoting and further developing the CBRE Commercial Occupier Retrofit Guide<sup>3</sup>.
- Support the adoption of green leases
- Feedback to local planning departments to support the development and application of consistent, clear requirements.
- Promote the Decarbonisation Pathway identified in Recommendation 1 for existing commercial buildings to improve their energy efficiency performance over time, in line with best practice.

<sup>3</sup> [www.greatermanchester-ca.gov.uk/media/8719/gmca\\_occupierguidance\\_cbre\\_noversioncontrolsheet.pdf](http://www.greatermanchester-ca.gov.uk/media/8719/gmca_occupierguidance_cbre_noversioncontrolsheet.pdf)

### **Recommendation 3: Update Local Planning Powers in Each District**

Use local planning powers (e.g. spatial frameworks, Local Plans, supplementary planning documents) to improve the energy performance of commercial buildings that go through planning across Greater Manchester. For example:

- Explore how the powers associated with devolved government could be used to implement local standards for building energy efficiency that go beyond national planning policy.
- Include in Local Plans that for planning applications submitted for deep retrofit of existing building over 2,500m<sup>2</sup>:
  - Require mandatory completion of whole life carbon assessment.
  - Using NABERS Design for Performance, require design to achieve a minimum 4.5\* rating, improving to 5.5\* rating by 2030. Requirement to complete NABERS Base Build in use assessment for a minimum of 6 years once occupied.
- Include in Local Plans that for new build planning applications for commercial offices over 1,000m<sup>2</sup>:
  - Where there is an existing building, require mandatory completion of whole life carbon assessment including a deep retrofit scenario.
  - Using NABERS Design for Performance, require design to achieve a minimum 5\* rating, improving to 6\* rating by 2030. Requirement to complete NABERS Base Build in use assessment for a minimum of 6 years once occupied.

### **Recommendation 4: Explore Potential for Local Fiscal Instruments to Incentivise Retrofit**

Examine the business case for utilising available local fiscal powers (e.g. business rates, business improvement districts or innovation districts) to incentivise the retrofit of commercial buildings. For example:

- Identify the options available and quantify the costs and benefits (both financial and carbon and the benefit-recipient) of rewarding energy efficient commercial properties, and the scale of impact such measures could achieve on our carbon targets.
- Understand how market forces (e.g. from NABERS), as stimulated by new local policy instruments, would enhance, or stifle this business case.
- Consider how business improvement districts, innovation districts or a new 'retrofit innovation zone' could be used to trial concept testing of fiscal instruments and testing of new retrofit technologies.
- Explore how a league table of energy performance could support such local powers.

### **Recommendation 5: Develop Novel Investment Mechanisms**

Explore opportunities to attract new investment into commercial retrofit in novel ways. For example:

- Work with the Green Finance Institute on new product development to mirror emerging products for the domestic market.
- Work with the UK Green Investment Bank on novel ways to bundle and scale activity.
- Work with partners through the Innovate UK Net Zero Pathfinder Places programme on capturing financial, environmental, and social returns from retrofit projects to support future investment.

### **Recommendation 6: Supply Chain Development**

Build on existing assessments of local skills capacity and future needs, to target support appropriately. For example:

- Develop existing domestic ‘retrofit coordinator’ course to include commercial office building elements to fill an identified gap in the supply chain, vital to complex projects which are common in large-scale commercial office building retrofit.
- Develop financial business support products that provide growth capital to enable the local retrofit sector to scale up capacity and activity, helping retain economic benefits within the city region.
- Connecting asset owners with retrofit project pipelines to local suppliers, e.g. through Green Economy<sup>4</sup>.
- Ensure the supply chain are an integral part of the Best Practice Cohort as per Recommendation 2.
- Create a best practice library/service to support property owners and occupiers reduce energy consumption and decarbonisation, which connects and promotes delivery supply chain with owners and occupiers.

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<sup>4</sup> <https://gi.greenecology.co.uk>

## 2.0 INTRODUCTION, BACKGROUND & CONTEXT

### 2.1 Local Policy Context

The Manchester Climate Change Partnership (MCCP) and Agency (MCCA) are responsible for ensuring that Manchester sets and maintains climate change targets, informed by science and in line with the Paris Agreement. These are set out in Manchester's Climate Change Framework (2020-25) and its 2022 Update<sup>5</sup>.

The Framework states that: *'Manchester will play its full part in limiting the impacts of climate change and create a healthy, green, socially just city where everyone can thrive. Its vision is for a green city with walkable neighbourhoods, clean air, good jobs in successful businesses, warm homes and affordable energy, safe cycling routes and a public transport system that works for everyone.'*

The Framework used a science-based targets approach to set a zero-carbon date of 2038 and a carbon budget of 15m tCO<sub>2</sub> for the period 2018-2100 for the city.

This is in line with the Greater Manchester science-based approach, its 2038 target date for carbon neutrality and its carbon budget of 67m tCO<sub>2</sub> for the whole city region, all of which is outlined in the city region's 5-Year Environment Plan<sup>6</sup>.

### 2.2 Commercial Buildings

According to government statistics<sup>7</sup>, in the UK, there are presently 1.62 million registered commercial buildings comprising approximately 180 million square metres of commercial space. In Manchester, the commercial building sector includes almost 2,000 buildings of varying sizes. In Greater Manchester, the figure rises to around XXX.

In 2022, Manchester updated its [Climate Change Framework](#) to identify specific targets for the decarbonisation of buildings and transport that would enable the city to achieve a 50% cut in its direct energy-related emissions, an important milestone along the decarbonisation pathway.

To establish the reduction target for commercial buildings, the 2022 Update analysed current emissions to establish a baseline. For commercial buildings, this showed that:

- 12% of Manchester's total direct CO<sub>2</sub> emissions are from commercial buildings.
- 52% of commercial building emissions are from lighting and appliances.

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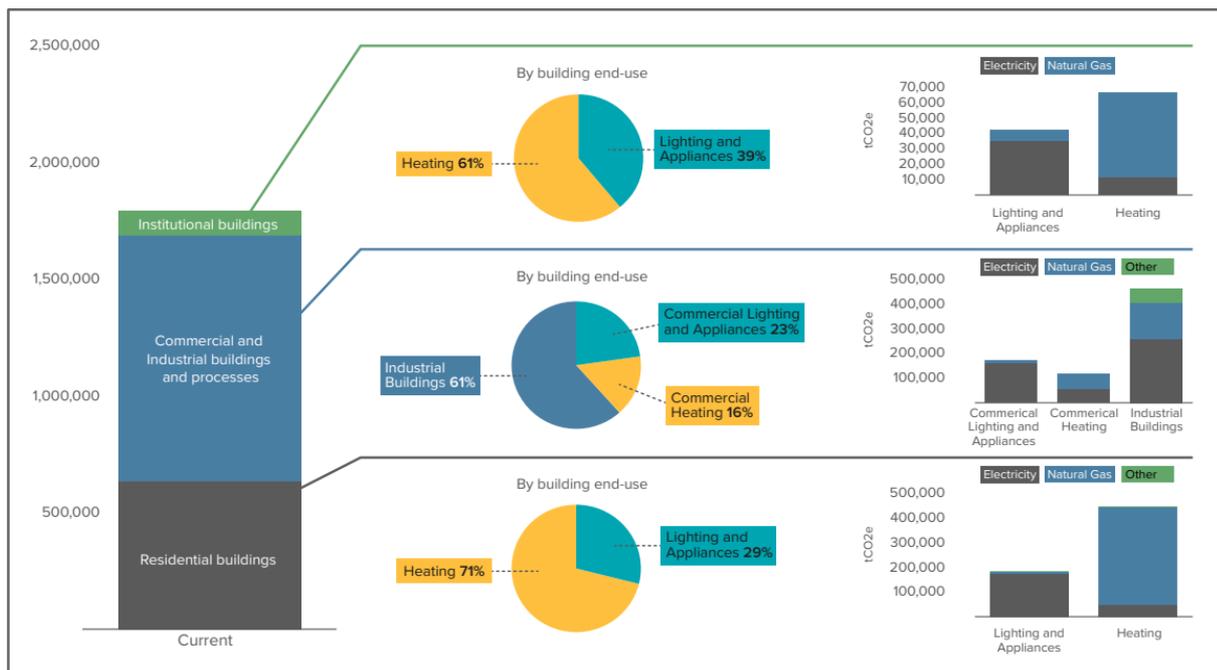
<sup>5</sup> [www.manchesterclimate.com/content/2022-update](http://www.manchesterclimate.com/content/2022-update)

<sup>6</sup> [www.greatermanchester-ca.gov.uk/what-we-do/environment/five-year-environment-plan/](http://www.greatermanchester-ca.gov.uk/what-we-do/environment/five-year-environment-plan/)

<sup>7</sup> [www.gov.uk/government/statistics/non-domestic-rating-stock-of-properties-including-business-floorspace-2023](http://www.gov.uk/government/statistics/non-domestic-rating-stock-of-properties-including-business-floorspace-2023)

- 48% of commercial building emissions are from space heating and hot water.
- 67% of heating is powered by gas and 32% by electricity.

Figure 3, taken from the 2022 Update, illustrates how direct emissions are generated from different sections of the built environment in Manchester, including commercial buildings. It highlights how energy is used for heating or for lighting and appliances, and whether the source of energy is gas or electricity.



**Figure 3 - Emissions breakdown for the Built Environment (from [Manchester Climate Change Framework \(2020-25\) - 2022 Update](#))**

From this baseline position, to support the city to halve its emissions, it was identified that commercial buildings would need to deliver a 61% reduction in overall energy demand.

### 2.3 Commercial Retrofit Task Force

MCCP identified retrofit as a key aspect of achieving the 61% reduction in emissions from commercial buildings and engaged with Partnership members and strategic partners, including Greater Manchester Combined Authority (GMCA), to consider how low carbon commercial retrofit can be accelerated.

A task and finish group of public and private sector industry experts including landlords, developers, consultants, agents, contractors, and policy makers was established in November 2022 to examine

the barriers currently limiting commercial retrofit and to develop recommendations for how these can be overcome to accelerate the decarbonisation of this vital part of our built environment.

The group was chaired by Bruntwood, supported by Manchester Climate Change Agency, and its work forms part of the Greater Manchester Retrofit Taskforce. Group members are listed in Appendix A.

The intention of the group is to help increase the number of commercial retrofit projects taking place in Manchester and the Greater Manchester city region, thus increasing the number of highly energy efficient commercial buildings available and supporting a shift in the market that makes low carbon credentials more attractive to occupiers, tenants and investors. Such a shift would stimulate demand for retrofit skills, products, and technologies, enabling growth in the local supply chain, and creating new economic opportunities for local people. It would help to cement Manchester and Greater Manchester's positions as climate leaders and an attractive target for low carbon investments.

The group identified four key areas and organised into four sub-groups to explore the barriers and opportunities posed by each, and to propose recommendations for inclusion in this report. The sub-groups were:

1. Finance & Viability - The Commercial Case, led by GMCA
2. Policy - Drivers to Encourage Action, led by Turner & Townsend
3. Technology & Skills - Delivering Solutions, led by Arup
4. Monitoring & Verification - Ensuring Successful Delivery, led by Buro Happold

The sub-groups worked individually for several months, drawing in best practice and research from around the UK and internationally, and convened on multiple occasions to discuss and challenge emerging findings and to agree the recommendations and contents of this report.

A similar group was established by MCCC at the same time to examine how Manchester's Local Plan could help to increase delivery of low carbon new buildings, considering both operational and embodied energy in all sectors. These two cohorts collaborated throughout delivery to ensure their recommendations were consistent and supportive of each other.

## 2.4 Retrofit - An Optimal Solution

According to the UK Green Building Council (UKGBC), 80% of buildings that exist today will still be here in 2050, the target date for the UK to reach net zero, and twelve years later than the date set by Manchester and Greater Manchester.

Most of these buildings were constructed to lower energy efficiency standards than would be required today, and so their performance needs to be improved to support the transition to carbon neutrality. However there are multiple barriers and challenges preventing retrofit at the scale required to hit net zero targets.

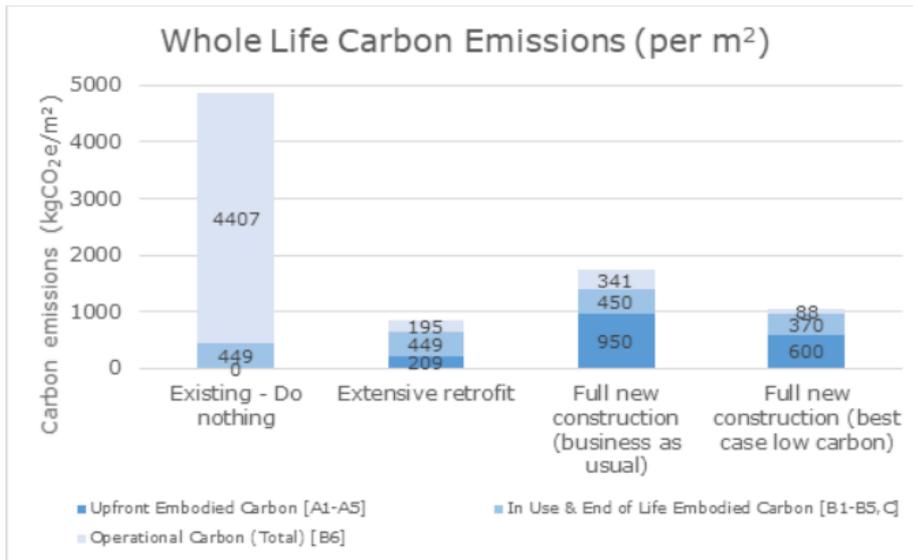
It's important to recognise the solution is not to build new buildings to replace existing stock due to the high levels of embodied carbon associated with new build construction. Embodied carbon refers to the greenhouse gas emissions arising from the extraction, manufacture, transport, installation, maintenance, and disposal of building materials. The industry has only recently started to focus on embodied carbon, consequently, whole life carbon (WLC) assessments are starting to become common practice, which look at both embodied and operational carbon emissions throughout the life of a building.

Existing buildings represent a significant volume of embodied carbon already emitted, therefore when retrofit is compared against new build, the WLC of retrofit is often found to be lower than new build. This can be seen in the case of Pall Mall, Manchester, where Bruntwood have completed a WLC comparison of a number of four different scenarios (see detailed Case Study in Appendix B) assuming a 60 year life:

1. **Do Nothing:** Building has original single glazed windows, minimal wall/roof insulation, gas fired heating, separate cooling, inefficient lighting and mechanical ventilation system with no heat recovery.
2. **Extensive Retrofit:** Comprehensive strip out and installation of new high performance glazing, high efficiency air source heat pumps providing heating and cooling with heat recovery, high efficiency.
3. **New Build - Business as Usual:** Demolition of existing building and construction of new building of same floor area, built to current Building Regulations Part L, with air source heat pumps providing heating and cooling and utilising typical construction materials.
4. **New Build - Exemplar Low Carbon:** Demolition of existing building and construction of new building of same floor area, designed to exemplar standards and constructed utilising low carbon materials.

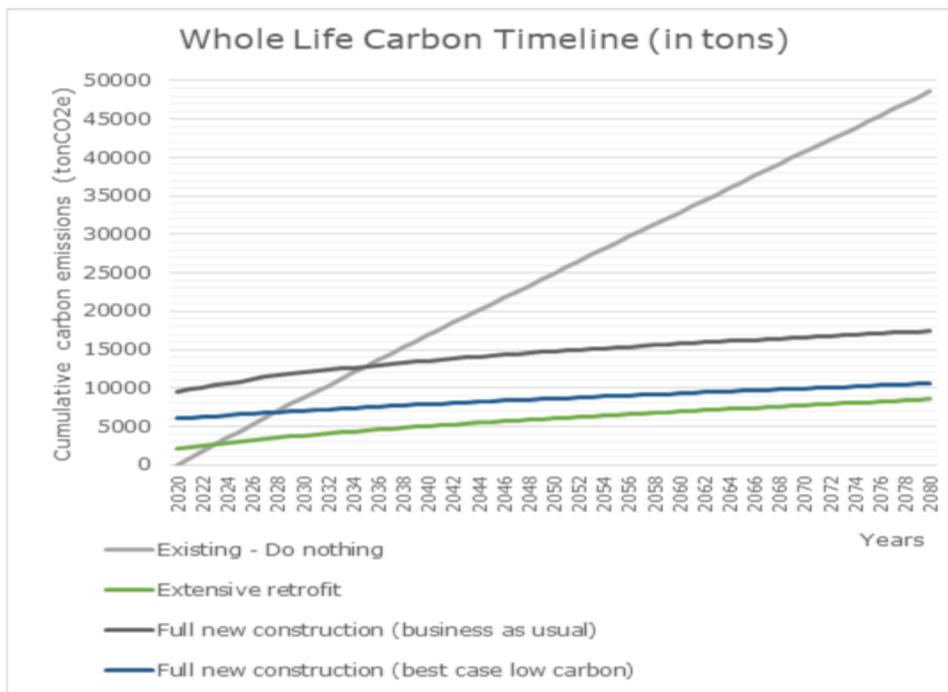
Figure 4 examines the WLC emissions of the four options on a per square metre basis. It separates out operational and embodied carbon, further breaking embodied carbon into upfront and in use / end of life carbon, and groups emissions by the construction stages identified in BS EN 15978:2011 (e.g., A1 - A5) which sets out the calculation method for assessing the environmental performance of a building.

This assessment illustrates how significant the operational energy use is in the 'Do Nothing' scenario for the existing, inefficient building, which has gas-fired heating systems and having low levels of insulation in their building fabric, which is typical of many commercial buildings.



**Figure 4 - Whole Life Carbon Emissions per square metre for Four Scenarios, Pall Mall, Manchester**

Figure 5 shows the WLC assessment of the four options over the building lifetime. Again, the ‘Do Nothing’ scenario stands out as the worst performing, highest carbon option by far when compared to the retrofit and new build options.



**Figure 5 - Whole Life Carbon over Building Lifetime of Four Scenarios, Pall Mall, Manchester**

The best performing option is Extensive Retrofit; even though it has higher operational carbon emissions than the 'New Build - Exemplar Low Carbon' option, the higher embodied carbon associated with construction of this option means that its overall emissions are higher than the retrofit option.

Whilst it is important to recognise that other factors will come into play when making decisions about the future of existing buildings, including site utilisation, floor to ceiling height, and flexibility, this case study, and the emerging application of WLC assessments shows that the optimum solution in terms of carbon may well be retrofit.

## 2.5 Drivers of Retrofit

### 2.5.1 Effectiveness of Current Regulatory Landscape

The industry recognises that existing policies are insufficient to drive the change required to achieve net zero in the commercial property sector.

While there may be plans to amend national policy, including strengthening the MEES Regulations and introducing performance-based buildings certification (assessing actual energy consumption), it seems unlikely that anything will be implemented quickly enough to create the step change needed to help Manchester and Greater Manchester meet their climate change targets.

The most relevant areas of policy worth highlighting are:

- **Planning:** Unless a significant change to a building is being carried out, existing buildings rarely need to engage with local planning departments, so this local policy lever has limited ability to increase retrofit activity in the commercial buildings sector and cannot deliver the step change needed to retrofit our commercial buildings at pace and scale. Where a significant change to a building is planned, however, it is important that Local Plans use this opportunity and mandate high standards of energy efficiency as part of the permissions process.
- **Energy Performance Certificates (EPCs) & Minimum Energy Efficiency Standards (MEES):** Barring a couple of exceptions, it is a legal requirement for all buildings to have an EPC at the point of sale or letting. For commercial properties this is therefore an effective policy lever as it captures the majority of buildings. To support energy reduction, the UK government introduced the MEES Regulations which have slowly tightened over time and currently require landlords of commercial properties to have an EPC rating of E or above for all leases (new and existing, except where certain exemptions apply), however an EPC E rating is an very inefficient building and therefore is not sufficient to achieve net zero targets. In 2021, the Government issued a consultation on future updates to the MEES

Regulations, which proposed raising minimum standards for the commercial rental sector to require an EPC rating of C by 2027 and EPC B by 2030. If adopted, such standards would help to accelerate retrofit activity in this sector, however with recent roll backs by the government roll backs on net zero it is not expected to be implemented in 2027 and 2030 as recommended in the 2021 government recommendation report.

- **Building Regulations:** Lots of commercial refurbishment activity is covered by the Building Regulations. In terms of how these drive energy efficiency see 'Part L, Conservation of fuel and power', with Volume 2 covering commercial property. There is a requirement to make 'consequential improvements' if there is an extension or installation/increased capacity of new fixed building services (other than renewable energy generators). Consequential improvements include upgrading HVAC or lighting, installation of metering, improving thermal fabric and on-site energy generation. While this is a good requirement given building services are typically replaced every 20-25 years, the improvements are insufficient to deliver the scale of energy reductions required.

## 2.5.2 Comparative Analysis of Existing Certification Schemes

Certification schemes can play a critical role in driving change and are a critical element of policies, enabling standards to be set and measured. There are several different certification schemes relevant to building energy efficiency, the key ones of relevance to this report are:

- Energy Performance Certificates (EPCs)
- Display Energy Certificates (DECs)
- Building Research Establishment Environmental Assessment Methodology (BREEAM)
- National Australian Built Environment Rating System (NABERS)

EPCs are the de facto certification scheme and a legal requirement for all property sale and rental agreements (with some minor exceptions) via the MEES regulations, covered earlier in this section.

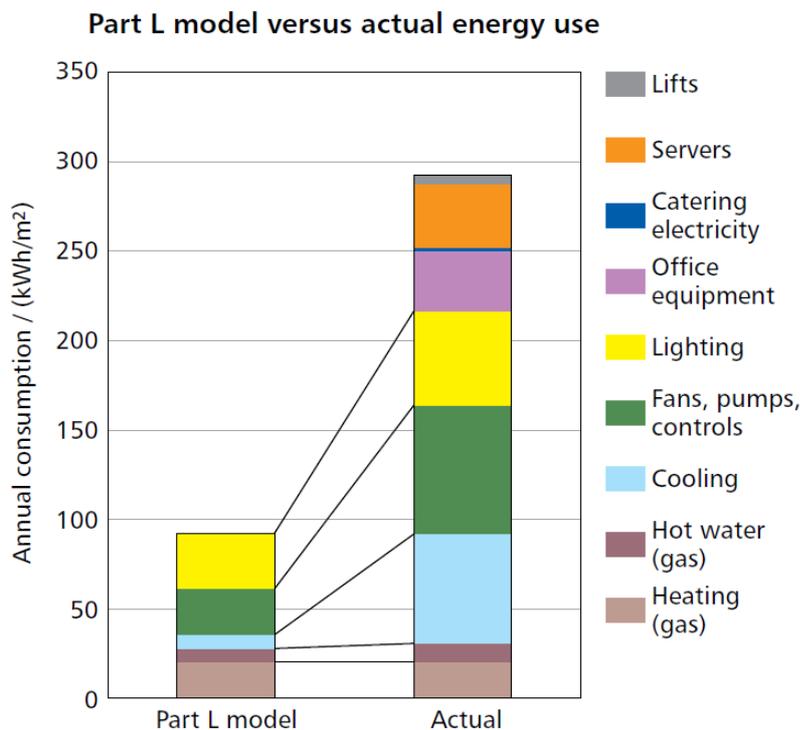
While the theory of EPCs is good, in practice there are a couple of fundamental issues:

1. They only assess regulated loads (HVAC, hot water, and lighting) while unregulated loads (plug in equipment, servers and lifts) are omitted. As highlighted by the UKGBC<sup>8</sup> and in Figure 6, unregulated can be a significant proportion of whole building energy and in the case of leased office space, something which the landlord has little control over.
2. There is no measurement of actual energy consumption of the regulated loads, so this is often found to be significantly underestimated. This is commonly referred to as the 'Performance Gap' which is well documented in the property industry.

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<sup>8</sup> [www.ukgbc.org/wp-content/uploads/2020/01/Energy-performance-targets-for-offices-technical-report.pdf](http://www.ukgbc.org/wp-content/uploads/2020/01/Energy-performance-targets-for-offices-technical-report.pdf)

These issues mean that the actual energy consumption of a building is often higher than the EPC rating would imply. CIBSE research<sup>9</sup> estimates that new buildings typically consume between 50% and 150% more energy than originally expected. It's fair to assume this same inaccuracy can be extended to existing buildings. This is highlighted in Figure 6 which compares the estimated energy consumption from the Part L model (EPC model) with the actual energy consumption in use. Note Figure 8 compares energy consumption utilising energy use intensity (EUI) which is the total annual energy consumption divided by the floor area, which is an important metric for comparing energy consumption in different buildings.

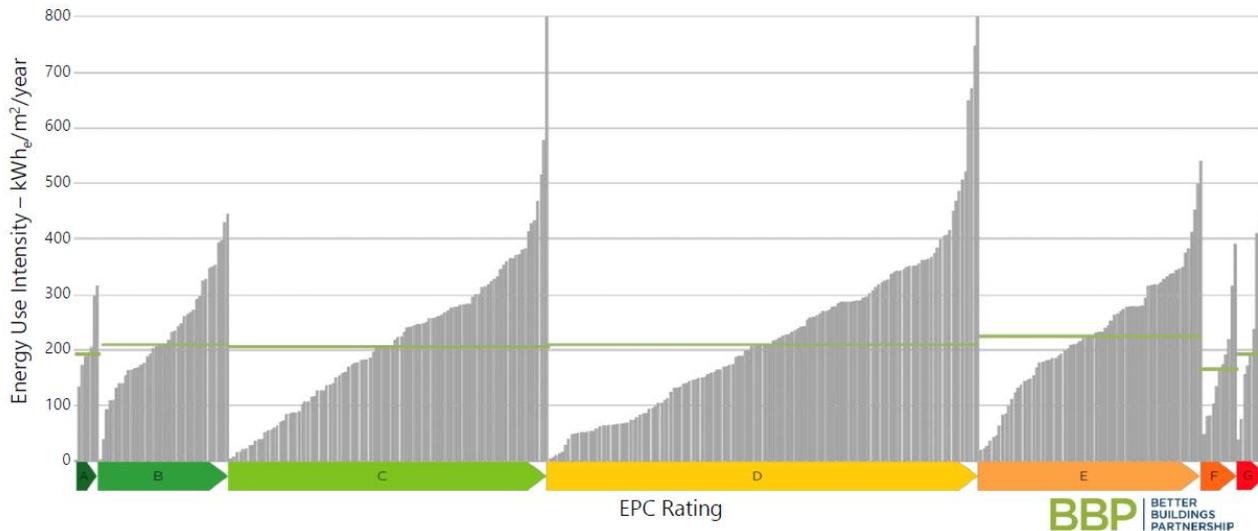


**Figure 6 - EPC Model vs Actual Energy Consumption (taken from CIBSE<sup>10</sup>)**

The Better Building Partnerships (BBP) collect actual energy consumption data for commercial buildings and has mapped EUI against EPC rating. This data is shown in Figure 7, with the EUI of individual buildings shown in the grey vertical bars, grouped by EPC band. The data clearly shows that there is little correlation between a building's EPC rating and its EUI, with a mix of low and high energy use intensity in each EPC band.

<sup>9</sup>CIBSE TM54 Evaluating operational energy performance of buildings at the design stage

<sup>10</sup> CIBSE TM54 Evaluating operational energy performance of buildings at the design stage

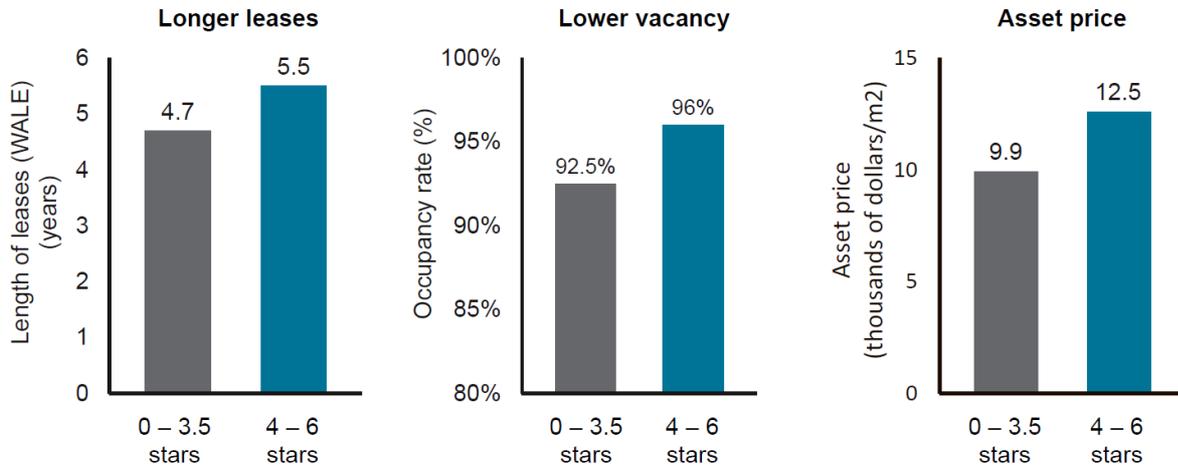


**Figure 7: BBP Data Comparing EPC Rating and Energy Use Intensity**

DECs do measure actual energy consumption and are mandatory for public buildings; however, they have not become mainstream in the commercial property sector and so their impact is limited in driving the uptake of retrofit.

BREEAM looks at a broad range of different sustainability related aspects such as transport, wellbeing, resilience, water, and energy; while energy carries the highest proportion of the overall score, as with EPCs it only looks at theoretical energy efficiency and therefore does not address the Performance Gap highlighted above and therefore subject to inaccuracies of estimated vs actual energy consumption.

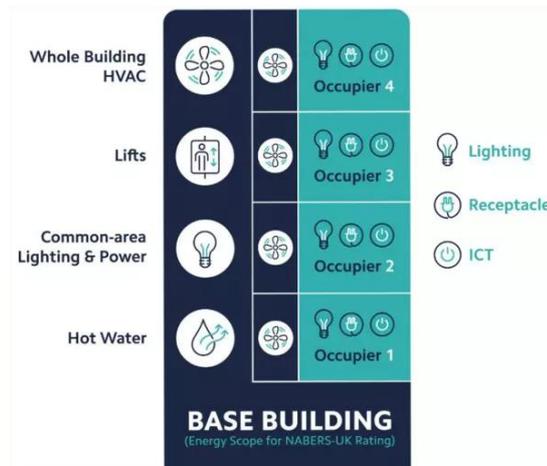
In 2005 a new certification scheme was launched in Australia called NABERS (National Australian Built Environment Rating System). It has had a transformational impact on the Australian commercial property market. It was initially a mandatory requirement for government leases, however subsequently more widely adopted, with mandatory disclosure introduced in 2011. In a nine year period there has been a 35% reduction in the average EUI. There has also been a number of other benefits resulting from better NABERS ratings - see Figure 8.



**Figure 8: Market Demand for Buildings with Better NABERS Ratings (source BBP)**

The success of NABERS is underpinned by a number of key principles:

1. **Actual Energy Measured:** While it is possible to get a predicted rating, once in operation NABERS rating is based on actual measured energy consumption from meters.
2. **Simple Rating System:** By using a 1 to 6 star scale rating, investors, owners and occupiers can easily understand how a building is operated over a year. Star ratings as follow:
  - 1 Star = Poor
  - 2 Stars = Below Average
  - 3 Stars = Average
  - 4 Stars = Good
  - 5 Stars = Excellent
  - 6 Stars = Market Leading
3. **Technically Robust:** The certification is very technically robust and includes adjustments for operational hours and equipment density so buildings are not penalised for these factors.
4. **Responsibility aligns with Party in Control:** Acknowledging landlord and tenant are in control/responsible of different energy demands, NABERS has three different rating options (also see Figure 9):
  - **Base Building:** Buildings can be rated based on their central services like heating and cooling systems, lifts and lobby lighting.
  - **Tenancy:** Enables energy used by the tenant to be rated, typically for lighting and power, plus special tenancy requirements or local a/c.
  - **Whole Building:** Provides assessment of energy used by office tenancies and by Base Building services to lettable and common spaces.



**Figure 9 – NABERS Rating Options: Base Building / Tenant / Whole Building**

Recognising the success in Australia, in November 2020 NABERS UK was launched for use in the UK, with the hope that it has a similar impact here, although at present there are fairly low adoption rates and the BRE recently announced they are withdrawing as administrator, although NABERS are working on finding a new administrator.

## 2.6 UKGBC Commercial Retrofit Programme

Recently, a growing consensus has emerged in the UK around the concept of net zero carbon buildings. A key moment was the publication of the Net Zero Carbon Buildings Framework in 2019 by a UK Green Building Council (UKGBC) industry task group, and a growing body of resources which are helping the built environment sector better understand the key requirements for net zero carbon new buildings, such as performance targets developed by LETI and RIBA.

In May 2022 the UKGBC launched its [Delivering Net Zero: Key Considerations for Commercial Retrofits](#) and are currently in the process of developing this further with a live project called ‘Closing the gap towards net zero carbon commercial retrofit’ which should launch early 2024.

Members from the MCCP Commercial Retrofit Project have been part of the live project and endorse the work being completed which focuses on two main aspects:

1. Methodology for retrofit
2. Evidence for retrofit measures based on case studies

### 2.6.1 Methodology for Retrofit

## 2.6.2 Evidence for Retrofit Measures based on Case Studies

## 3.0 KEY FINDINGS & RECOMMENDATIONS

### 3.1 Summary of Key Barriers

The key barriers and challenges identified by the sub-groups that are limiting commercial retrofit are:

#### **Finance & viability:**

- The burden for investment in retrofit sits with the landlord or asset owner, whereas the benefit of retrofit typically goes to the tenant (e.g. reduced energy bill).
- An uplift in asset values is not yet fully compensating for the investment in retrofit. Greater Manchester is lagging behind the London in terms of brown discounts and green premiums affecting market values and incentivising retrofit action. This is worsened by current market conditions which according to CBRE<sup>11</sup> UK saw commercial property capital values decrease by 13.3% as a whole in 2022.
- It can be challenging to finance retrofit projects as in isolation such works don't necessarily create direct revenue streams. This has been made more challenging by recent interest rate increases, which have significantly increased the cost of borrowing.
- Recent inflationary pressures on construction materials and labour costs exacerbate all other issues. Recent research by JLL shows that construction costs are up 30% on pre-Covid levels.

#### **Policy:**

- Current Minimum Energy Efficiency Standards (MEES) for operational energy efficiency in commercial buildings are too low to accelerate retrofit at the pace required – currently minimum standard for MEES is EPC E, which is a very inefficient building.
- Looks unlikely that government will implement proposals to strengthen MEES Regulations whereby EPC C would be required by 2027 and EPC B by 2030.
- Current planning policy and supplementary planning documents do not mandate high enough performance standards.
- Planning rarely impacts existing buildings and is therefore a fairly ineffective level to implement minimum operational efficiency standards.
- There are conflicts within planning policy and supplementary planning documents which can disincentive building retrofit, e.g. 'sound' targets are often exceeded by low carbon heating.
- The duration of Local Plans, sometimes lasting for 15 years, makes them inflexible to changing requirements, standards, and market trends, including retrofit.

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<sup>11</sup> CBRE Monthly Index

- Conflicts on listed buildings where energy efficiency measures may interfere/alter historic features within the building.

#### Technology & skills:

- While technical solutions exist to improve operational efficiency of most buildings they are often costly and disruptive.
- There is a heavy reliance on fossil fuels for heating, heat pump technology has developed significantly in recent years, however are significantly more expensive and present several technical challenges.
- The retrofit supply chain is underdeveloped, with a lack of clear policy/market signals and limited access to growth capital acting as constraints to its development.
- Retrofit projects often require specialist materials, smaller orders and non-traditional construction phase scheduling which require specialist skills, knowledge and capacity to deliver.
- Optimal solutions for retrofit are not widely understood and clients often perceive that a new build will offer more value/better returns than a retrofitted building.

#### Monitoring & verification:

- Lack of effective metering in many existing buildings.
- Inconsistent approach to energy data management and analysis.
- Current mainstream certification schemes (EPC and BREEAM) don't measure the actual performance of a building once occupied and can be shown to be an ineffective measure of building energy efficiency.
- The variety of voluntary standards available (e.g. BREEAM, NABERS) creates uncertainty and inertia in the market, slowing the uptake of retrofit action.
- There is a knowledge gap in building owners and tenants on the installation and interpretation of energy metering, which is disincentivising retrofit action.
- A lack of mandates or incentives to publish building performance data means the market cannot develop in a way that would incentivise energy efficiency and increase retrofit projects (i.e. driving green premiums).

### 3.2 Size Matters

According to a [Government publication from June 2021<sup>12</sup>](#), commercial offices in the UK account for circa 11% of energy consumption from non-domestic buildings; however, while only 7% of non-domestic buildings are above 1,000m<sup>2</sup>, they account for approximately 50% of the total floor area and used an estimated 53% of the total energy used in non-domestic buildings.

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<sup>12</sup> BEIS Introducing a Performance-Based Policy Framework in large Commercial and Industrial Buildings in England and Wales 2021

Further analysis, using data from the EPC Register for ‘B1 Offices and Workshop businesses’ in Manchester shows that the city’s larger commercial buildings, over 5,000 square metres, make up less than 10% of the stock but are responsible for nearly two-thirds of the emissions from this whole sector (63%). Table 3 shows this data in more detail, grouping buildings into five size categories according to floor area.

Floor Area	Number of Buildings	Proportion of Buildings	Estimated Emissions (tCO2)	Proportion of Emissions
Greater than 10,000m <sup>2</sup>	78	4%	66,032	44%
5,000m <sup>2</sup> - 10,000m <sup>2</sup>	89	5%	28,930	19%
2,500m <sup>2</sup> - 5,000m <sup>2</sup>	140	7%	23,338	16%
1,000m <sup>2</sup> - 2,500m <sup>2</sup>	269	14%	16,003	11%
Less than 1,000m <sup>2</sup>	1358	70%	15,724	10%

**Table 3: Emissions by Floor Area for Offices in Manchester**

Table 4 then shows the data for Greater Manchester...

Floor Area	Number of Buildings	Proportion of Buildings	Estimated Emissions (tCO2)	Proportion of Emissions
Greater than 10,000m <sup>2</sup>				
5,000m <sup>2</sup> - 10,000m <sup>2</sup>				
2,500m <sup>2</sup> - 5,000m <sup>2</sup>				
1,000m <sup>2</sup> - 2,500m <sup>2</sup>				
Less than 1,000m <sup>2</sup>				

**Table 4: Emissions by Floor Area for Offices in Greater Manchester**

In terms of targeting energy efficiency improvements, or implementing minimum energy efficiency standards for commercial buildings it is clear that action by a small number of large buildings will deliver a greater impact than if the same actions are taken by a large number of small buildings. In addition, large buildings are more likely to be in an ownership structure that should be better prepared for the implementation of such activity/higher standards.

### 3.3 Summary of Key Recommendations

#### Recommendation 1: Set a Clear Decarbonisation Pathway

The following table sets out a pathway of increasing operational energy efficiency standards, linked to building size, which would help to ensure the commercial building sector reduces its carbon emissions at an appropriate rate to support Greater Manchester to stay within its carbon budget.

This pathway is in line with 'Paris Proof' targets proposed by multiple expert bodies including the UK Green Building Council.

Building Size	2027	2030	2035	2038
Greater than 10,000m <sup>2</sup>	EPC C NABERS	EPC B NABERS 5*	EPC A NABERS 5.5*	EPC A NABERS 6*
5,000m <sup>2</sup> - 10,000m <sup>2</sup>	EPC C NABERS	EPC B NABERS 4.5*	EPC A NABERS 5*	EPC A NABERS 5.5*
2,500m <sup>2</sup> - 5,000m <sup>2</sup>	EPC D	EPC C NABERS	EPC B NABERS 5*	EPC A NABERS 5*
1,000m <sup>2</sup> - 2,500m <sup>2</sup>	EPC D	EPC C	EPC B	EPC A
Less than 1,000m <sup>2</sup>	EPC E	EPC D	EPC C	EPC B

**Table 2: Proposed Decarbonisation Pathway / Minimum Energy Efficiency Standards**

It is unclear if there is a regulatory lever to enforce this pathway for all existing buildings, therefore the implementation of these standards may have to be encouraged through influencing measures, from policy makers and the industry itself, rather than through statutory powers. Note that stricter standards are proposed for buildings that are subject to planning applications – see Recommendation 3.

It is also recommended to lobby the government to ensure the adoption of proposed changes to the MEES Regulations so EPC C rating is required by 2027 and EPC B by 2030 and to promote the use of performance based certification such as NABERS.

#### Recommendation 2: Establish a Best Practice Cohort

Create a coalition of asset owners (actively targeting those with properties over 10,000m<sup>2</sup>) and industry specialists to work collaboratively to accelerate action across Greater Manchester. The Cohort would:

- Openly share their own best practice and lessons learned in reducing operational and embodied carbon through retrofit.
- Set up a scheme whereby commercial buildings share data (similar to existing schemes in Copenhagen and Washington DC). This could also include a league table to support improvement through competition.
- Promote the recommended Decarbonisation Pathway and disseminate wider best practice (e.g. guidance from UKGBC or buildings outside Greater Manchester) to other asset owners in and outside the cohort.
- Support engagement with, and capacity building in, the local supply chain.
- Reach out to building tenants to drive energy efficiency (e.g. through Bee Net Zero), promoting and further developing the CBRE Commercial Occupier Retrofit Guide<sup>13</sup>.
- Support the adoption of green leases
- Feedback to local planning departments to support the development and application of consistent, clear requirements.
- Promote the Decarbonisation Pathway identified in Recommendation 1 for existing commercial buildings to improve their energy efficiency performance over time, in line with best practice.

### **Recommendation 3: Update Local Planning Powers in Each District**

Use local planning powers (e.g. spatial frameworks, Local Plans, supplementary planning documents) to improve the energy performance of commercial buildings that go through planning across Greater Manchester. For example:

- Explore how the powers associated with devolved government could be used to implement local standards for building energy efficiency that go beyond national planning policy.
- Include in Local Plans that for planning applications submitted for deep retrofit of existing building over 2,500m<sup>2</sup>:
  - Require mandatory completion of whole life carbon assessment.
  - Using NABERS Design for Performance, require design to achieve a minimum 4.5\* rating, improving to 5.5\* rating by 2030. Requirement to complete NABERS Base Build in use assessment for a minimum of 6 years once occupied.
- Include in Local Plans that for new build planning applications for commercial offices over 1,000m<sup>2</sup>:
  - Where there is an existing building, require mandatory completion of whole life carbon assessment including a deep retrofit scenario.
  - Using NABERS Design for Performance, require design to achieve a minimum 5\* rating, improving to 6\* rating by 2030. Requirement to complete NABERS Base Build in use assessment for a minimum of 6 years once occupied.

<sup>13</sup> [www.greatermanchester-ca.gov.uk/media/8719/gmca\\_occupierguidance\\_cbre\\_noversioncontrolsheet.pdf](http://www.greatermanchester-ca.gov.uk/media/8719/gmca_occupierguidance_cbre_noversioncontrolsheet.pdf)

#### **Recommendation 4: Explore Potential for Local Fiscal Instruments to Incentivise Retrofit**

Examine the business case for utilising available local fiscal powers (e.g. business rates, business improvement districts or innovation districts) to incentive the retrofit of commercial buildings. For example:

- Identify the options available and quantify the costs and benefits (both financial and carbon and the benefit-recipient) of rewarding energy efficient commercial properties, and the scale of impact such measures could achieve on our carbon targets.
- Understand how market forces (e.g. from NABERS), as stimulated by new local policy instruments, would enhance, or stifle this business case.
- Consider how business improvement districts, innovation districts or a new 'retrofit innovation zone' could be used to trial concept testing of fiscal instruments and testing of new retrofit technologies.
- Explore how a league table of energy performance could support such local powers.

#### **Recommendation 5: Develop Novel Investment Mechanisms**

Explore opportunities to attract new investment into commercial retrofit in novel ways. For example:

- Work with the Green Finance Institute on new product development to mirror emerging products for the domestic market.
- Work with the UK Green Investment Bank on novel ways to bundle and scale activity.
- Work with partners through the Innovate UK Net Zero Pathfinder Places programme on capturing financial, environmental, and social returns from retrofit projects to support future investment.

#### **Recommendation 6: Supply Chain Development**

Build on existing assessments of local skills capacity and future needs, to target support appropriately. For example:

- Develop existing domestic 'retrofit coordinator' course to include commercial office building elements to fill an identified gap in the supply chain, vital to complex projects which are common in large-scale commercial office building retrofit.
- Develop financial business support products that provide growth capital to enable the local retrofit sector to scale up capacity and activity, helping retain economic benefits within the city region.

- Connecting asset owners with retrofit project pipelines to local suppliers, e.g. through Green Economy<sup>14</sup>.
- Ensure the supply chain are an integral part of the Best Practice Cohort as per Recommendation 2.
- Create a best practice library/service to support property owners and occupiers reduce energy consumption and decarbonisation, which connects and promotes delivery supply chain with owners and occupiers.

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<sup>14</sup> <https://gi.greeneconomy.co.uk>

## APPENDIX A: PROJECT SUB-GROUPS

As part of the work of this Commercial Retrofit Project, group members were split into four sub-groups, which were chosen as discrete areas with specific challenges and barriers. The sub-groups and their members were:

### **Finance & Viability - The Commercial Case**

Members: Laura Blakey - Sub Group Lead (GMCA), Rob Edwards (GMCA), Richard Wharton (JLL), Laura Jockers (M&G) and David Lord (Manchester City Council)

### **Policy - Drivers to Encourage Action**

David Kemp - Sub Group Lead (Turner & Townsend), Paige Johnson (formerly Turner & Townsend, now Anthesis), Richard Cohen (Manchester City Council), Sarah Darch (formerly EY, now Homes England), Ellen Sanderson-Clark (Deloitte) and Todd Holden (GMCA)

### **Technology & Skills - Delivering Solutions**

Rick Lee - Sub Group Lead (ARUP), Craig Havenhand (ARUP), Tom Waterson (ARUP), Ben Edwards (Caddick Construction), Kit Knowles (EcoSpheric), Katherine Burden (Green Economy), Emma Payne (Muse) and Joseph Crolla (GMCA)

### **Monitoring & Verification - Ensuring Successful Delivery**

Ben Jones - Sub Group Lead (Buro Happold), Andy Hart (Hilson Moran), Lizzie Norman (Buro Happold), Jo Holden (formerly Peel) and Etienne Humphries (Bruntwood)

Sub-groups were asked to identify barriers, as well as opportunities and recommendations, which are outlined in the next section and have fed into the main body of the report.

## Finance & Viability - The Commercial Case

### Context

Up and down the country there are some significant finance and viability challenges facing commercial retrofit. Within the industry we are seeing some value in more energy efficient buildings, often referred to as 'green premium vs brown discount'.

Retrofit to achieve high energy efficiency often requires 'deep retrofit' which may involve significant interventions such as replacement/comprehensive upgrade of building facades and HVAC systems. These interventions are extremely disruptive and may require a completely vacant building. As such in the current market when viewed through the lens of commercial viability, the costs associated with retrofitting a building to achieve a highly efficient building are viewed as cost prohibitive, certainly without any financial support to do so and the current financial conditions in property exacerbate the issues.

### Barriers

#### Lack of Policy

The lack of policy driving more energy efficient commercial buildings has an impact on the financial viability that will drive green premium / brown discount. Until we see some sort of policy, for example the proposed changes to MEES, then it's highly unlikely that we will see a shift in the pace of commercial retrofit driven by financial incentive.

#### Insufficient Brown Discount / Green Premium

In the current GM market the uplift in values are not yet fully compensating for the investment required for energy efficiency measures required to meet GM energy targets. Generally the view is that premium markets (e.g. London, Manchester city centre etc) landlords are starting to see the investment in retrofit come through in increased values, however other areas are lagging behind in this respect. Evidence to support this is as follows:

- Knight Frank has found an 8% to 18% price premium for green-rated offices compared to those without any sustainability certification, with a 13% premium on rents and 10.5% on sales prices on BREEAM outstanding and excellent rated buildings in central London.
- Nareit shows in the US REIT market that green certified buildings can translate into a 31% increase in sales values, 23% higher occupancy rates and an 8% increase in rental incomes. However there is insufficient data within the commercial retrofit market.

There is however insufficient evidence yet of the scale of brown discounts / green premiums and the impact of location on these parameters. Initial views from the market in GM are that whilst demand for 'green' buildings is increasing, this is not necessarily matched with a willingness to pay more. Furthermore, the impact of brown discounts, where landlords start to see a depreciation in values due to the energy efficiency of their buildings has not yet materialised and is unlikely to do so at scale until effective policy is in place.

### **Landlord Investment - Tenant Energy Saving**

In a tenant occupied commercial building it's often the landlord that makes the financial investment in energy efficiency measures, with the tenant benefitting through lower operational energy costs. Typically the landlord would hope to receive an increased rental income for a more energy efficient building, however this rental premium does not as yet cover the investment required.

### **Current Economic Pressures**

Over the last 12-24 months external financial market pressures have had a further negative impact on the financial viability of retrofit projects, namely:

- **Reduction in Asset Values:** In 2022 according to CBRE<sup>15</sup> UK saw a 13.3% reduction in commercial property capital values.
- **Increased Cost of Borrowing:** Over the past 18 months interest rates have increased by circa 5%, which have significantly increased the cost of borrowing.
- **Inflationary Pressures:** Recent inflationary pressures on construction materials and labour costs exacerbate all other issues. Recent research by JLL shows that construction costs are up 30% on pre-Covid levels.

These conditions make it even more difficult for energy efficiency commercial retrofit to provide the financial returns required.

### **Which Interventions to Choose?**

When it comes to commercial retrofit there are a wide number of possible interventions, however many developers are unclear as to what the optimal solution to commercial retrofit is. There are many options to reduce the carbon impact of a building, generally combining high efficiency windows, wall and roof insulation, removal of fossil fuels for heating, efficient HVAC systems, LED lighting and on-site energy generation are viewed as the most beneficial measures available, however landlords/developers need to take into account the impact to the cost/benefit analysis,

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<sup>15</sup> CBRE Monthly Index

level of disruption to the existing occupiers, potential statutory consents and whether electricity infrastructure upgrades would be required to implement the options.

All of the above can leave landlords/developers uncertain on which potential measures to choose and inevitability leading confusion over picking the most impactful measures to select.

### **General Funding Constraints**

As retrofit programmes in isolation do not currently capture any revenue streams they can be challenging to finance unless the developer's wider banking facilities fit within the established parameters (pre-lets / LTV% etc). The market needs to evolve to remove this barrier, either through innovative new banking products or retrofit-related revenue opportunities such as green leases becoming more mainstream. Even where a suitable product can be leveraged in, these generally rank behind an existing lending product and amortise in line with the elongated payback period of the retrofit, achieving reasonable pricing levels continues to prove challenging.

The low interest rate environment of recent years was a perfect opportunity to deliver retrofit at scale, however, the current higher level of interest rates is unlikely to materially fall in the short term and as such, will likely be prohibitive to already marginal programmes. Institutions that look to take a long term payback view (such as pension funds) would typically need to see a portfolio of retrofit to deliver the scale of funding requirement that would be appealing to them.

### **Opportunities**

#### **Shifting Green Premium / Brown Discount**

We are starting to see evidence of a shift in the market in recent years with regards to green premium / brown discount. This shift is being driven by a number of factors:

- Investor/lending pressure
- Expected future policy
- Occupier demand
- Employee expectation

Knight Frank has found an 8% to 18% price premium for green-rated offices compared to those without any sustainability certification, with a 13% premium on rents and 10.5% on sales prices on BREEAM outstanding and excellent rated buildings in central London.

Nareit shows in the US REIT market that green certified buildings can translate into a 31% increase in sales values, 23% higher occupancy rates and an 8% increase in rental incomes.

If this shift continues then hopefully market forces drive further retrofit activity, however it likely needs some stimulation, particularly outside the premium market areas such as Manchester city centre.

### **Explore Potential for Local Fiscal Instruments to Incentivise Retrofit**

Through the devolved government within GM, there is an opportunity to implement local fiscal powers through the devolved government which would financially incentivise landlords/developers to make commercial buildings more energy efficient.

This might be through business rates and/or business improvement districts and/or other mechanisms depending on what levers are available to the devolved government.

### **Develop Novel Investment Mechanisms**

Considerable work on domestic retrofit funding has already been completed by the Green Finance Institute, UK Green Investment Bank and Innovate UK Net Zero Pathfinder Places on novel investment models. Given there are similar challenges in commercial retrofit, this existing work could be repositioned to explore opportunities to attract new investment into commercial retrofit in novel ways.

### **New Funding Mechanisms**

There is an opportunity to develop new funding mechanisms (potentially via the UK Infrastructure Bank) which support retrofit projects through access to financial incentives / local planning policy changes to incentivise these early adopters to share this knowledge. Furthermore, Local Authorities with property portfolios could utilise their access to Public Works Loan Board funding to fund the retrofit of their own stock to assist with this knowledge gathering exercise.

### **Knowledge Sharing**

As some developers at the forefront of the net zero agenda deliver more retrofit programmes, there is an opportunity to share insights with others which could then provide exponential returns to the wider development community. This can support case studies which provide a pathway for developers to follow and answer some of the pertinent questions set out above.

### **Green Leases**

With green issues seemingly higher on the agenda for consideration by potential lessees, the option of introducing Green Rental Agreements and/or green lease clauses which seek to address some of the issues identified earlier, is an opportunity. These agreements are in their relative infancy and would require some trial and error and as with the optimal solution point, the sharing of knowledge in this space would be key to progressing. Often the concept is better for lessees than the contract and it will require either a few trailblazing lessees to take a risk or further incentives to be issued in support of these terms.

### **Investor Pressure**

Increased importance is being placed on property owners by investors and funders with regards to ESG metrics, with ESG KPIs now fairly commonplace within commercial property related finance, which might be KPIs on such things as carbon use intensity reductions, EPC rating improvements, number of EV charges etc. KPIs are then linked to financial incentives within the finance arranges for example reduced interest rates for loans.

Furthermore, requirements of the Task Force on Climate Related Financial Disclosures (TCFD) requires companies to provide information to investors about steps being taken to mitigate the risks of climate change and governance transparency. It will become mandatory for companies to report on these disclosures by 2025 in the UK, although some companies will have to report earlier.

### **Supply Chain Growth Capital**

Consideration also needs to be given to developing the supply-chain across the region, access to skills is high on the agenda but these businesses will also need growth capital to invest in gearing up operations ahead of a growth in commercial retrofit.

## Recommendations

Theme	Barriers	Recommendations (short term)	Recommendations (long term)
New funding mechanisms	General funding constraints / landlord funding – tenant saving	<ul style="list-style-type: none"> <li>Explore the role of UK Green Investment Bank, Green Finance Institute and others can play in the funding of retrofit</li> <li>Explore how landlord recovers cost of investment where tenant benefits</li> </ul>	<ul style="list-style-type: none"> <li>Support the creation of new financial products for commercial retrofit similar to those being developed for domestic retrofit</li> <li>Consider supporting reduced interest rates for low carbon schemes from public sector funds</li> <li>Single pot settlement</li> </ul>
New fiscal instruments	Insufficient brown discount / green premium	<ul style="list-style-type: none"> <li>Explore available fiscal powers (e.g. business rates or new tax) to incentivise energy efficient buildings</li> <li>Explore how innovation districts and/or business improvement districts could support potential trial of fiscal instruments</li> </ul>	<ul style="list-style-type: none"> <li>Use local tax regime to drive positive change, offering incentives to energy efficient buildings / businesses</li> <li>Financial incentives for early adopters</li> <li>Use innovation districts and/or business improvement districts as trial for fiscal instruments</li> </ul>
Sharing best practice	Lack of knowledge	<ul style="list-style-type: none"> <li>Establish a best practice forum to share best practice and lessons learned</li> <li>Promote and further develop CBRE Commercial Occupier Retrofit Guide<sup>16</sup></li> <li>Establish true green premium / brown discount across Greater Manchester and compare with other parts of UK</li> <li>Promote the use of green leases</li> </ul>	<ul style="list-style-type: none"> <li>Develop standard green lease for commercial tenants</li> </ul>

<sup>16</sup> [www.greatermanchester-ca.gov.uk/media/8719/gmca\\_occupierguidance\\_cbre\\_noversioncontrolsheets.pdf](http://www.greatermanchester-ca.gov.uk/media/8719/gmca_occupierguidance_cbre_noversioncontrolsheets.pdf)

## Policy - Drivers to Encourage Action

### Context

Policy initiatives are widely recognised as having the potential to influence a positive change on the rate of commercial building retrofit that we see across the Manchester City Region.

When considering policy, the initial response is one of punitive or target driven initiatives such as supplementary planning documents that require actions from those looking to undertake construction projects or set particular standard that must be achieved for a construction project or activity to take place e.g., Minimum Energy Efficiency Standards to be met for the letting of commercial buildings.

Policy drivers do not always need to take the form of 'sticks' to achieve changes in behaviour or action. Initiatives that encourage competition, create desirability around an issue and foster collaborative working can also drive positive retrofit related outcomes.

### Barriers

The barriers to commercial retrofit that relate to local, regional and national policy initiatives are myriad. These are not necessarily intentional challenges and in some cases are linked to the legislative framework surrounding the planning system.

The system which is designed to ensure suitable development takes place can, in itself, present barriers to facilitating and encouraging commercial building retrofit. The challenges referred to below are present in, but not unique, to the Greater Manchester (GM) city region.

#### **Lack of Policy Driving Minimum Standards/Retrofit of Existing Buildings**

Much of the policy that drives building efficiency standards is connected to planning, however existing buildings rarely go through planning unless they are connected to a deep retrofit project at which point it's likely that essential measures such as upgrading fabric to NZC standards and replacing gas boilers with heat pumps will be included; but what policy is in place to force the hand of existing building owners to implement the measures

EPCs are a statutory requirement impacting commercial buildings and as part of the MEES Regulations from April 2023 it will be unlawful to continue to let a commercial property with an F or G EPC rating unless a specific exemption applies.

In 2021, the Government issued a consultation on future updates to the MEES regime, which recommended improving standards for commercial properties so that an EPC C would be required by 2027 and EPC B by 2030. In September 2023 Prime Minister Rishi Sunak announced the government scrapped proposed MEES requirements impacting the residential sector, however it is unclear if there will be changes to the commercial sector affecting the proposed changes in 2027 and 2030, however it is expected that the 2021 proposals will be delayed.

### Local Plan Considerations

While we need a lever outside of planning to drive minimum standards in existing buildings, the Local Plan is still an important element of policy governing commercial retrofit as it sets the tone for minimum efficiency standards for commercial buildings. The following are considered as barriers in respect of the Local Plan:

- **Longevity:** It takes a considerable amount of time to develop a Local Plan and they typically remain valid for a period of 15 years. While this provides certainty to the development community and building owners regarding what is expected of them in relation to developing new buildings or works to existing buildings that fall under planning, it does prevent regular reviews of the Plan and the accommodation of amendments in response to changing social, economic or environmental circumstances. Supplementary Planning Documents (SPD) can be developed, reactively, to address emerging issues however the need for an initial policy 'hook' within the Local Plan remains for SPD to be an effective tool.
- **Policy Setting/Implementation Ambiguity:** It is unclear as to the specific powers that local/regional government bodies have at their disposal to support commercial retrofit activity. Often there are examples where new build projects must achieve higher energy efficiency or carbon emission targets than those laid out in the Building Regulations and the national planning policy framework. This equally could apply in the GM context with strategic, Greater Manchester Combined Authority (GMCA) level planning policy alongside district Local Authority policies.
- **Which Certification Scheme:** Where a planning authority has the ability to require higher levels of building performance in return for planning approval, often this what should that level look like? In many cases an improved EPC rating and/or BREEAM is required, however as outlined elsewhere in this report neither EPC or BREEAM look at actual energy consumption and therefore would NABERS be more appropriate as it is arguably a simpler and more effective accreditation if the overall aim is energy reduction and decarbonisation as it places a particular emphasis on energy efficiency. Choice is good, but it also drives inertia if the market is unsure which one to explore and clients uncertain as to which to require.
- **Policy Conflict:** There are examples of where policies brought in by local planning authorities conflict with others that are related to retrofit or sustainable construction. An example of

this is related to noise levels associated with air source heat pumps (ASHPs), which are the primary technology available for decarbonisation of heat in commercial buildings. It is a requirement to meet stringent noise related targets if an installation is not classed as permitted development and requires planning approval. For commercial buildings in quieter or residential areas, this is a major barrier for roll out of ASHPs and is counterintuitive because the existing technology, gas boiler systems, may not meet these stringent targets themselves (gas boiler flues are noisy), however as this technology is unlikely to require planning permission, it is not a consideration for the planning authority.

### **Other Relevant Statutory / Regulatory Requirements**

There are several initiatives linked to existing buildings that might be applicable to commercial building owners and occupiers including; Energy Saving Opportunities Scheme (ESOS); Streamlined Energy and Carbon Reporting (SECR); Corporate Sustainability Reporting Directive (CSRD); and, Taskforce on Climate-related Financial Disclosures (TCFD). Some or all of these may be relevant to commercial buildings in GM and will in some instances drive commercial retrofit, however alone then will not drive the improvements required for GM to be carbon neutral by 2038.

### **Listed / Historic Buildings**

Greater Manchester has a rich history and is fortunate to have a number of amazing historic buildings, lots of these buildings are listed and it is important to preserve these buildings, which is often through having them 'listed'. Listed buildings often present another layer of complexity when it comes to retrofit, however it's also essential to improve energy efficiency in these buildings or they risk becoming stranded assets.

### **Opportunities**

Although there are a number of challenges to supporting commercial retrofit activity across the GM city region, there are equally several actions that could help overcome them. These actions can be taken by the GMCA and stakeholder local authorities, commercial building owners and businesses themselves, or collectively in collaboration with each other.

### **The Power of the Devolved Government**

Strong indicators are that there will not be national policy in place to support GM's ambition of being carbon neutral by 2038. So in the absence of national policy, what is the power of the devolved government in Greater Manchester in relation to improving the efficiency of existing buildings?

While there are some issues with EPCs, the proposed changes to MEES Regulations whereby a minimum of EPC C by 2027 and EPC B by 2030 was seen as a significant step in the right direction. Assuming this is not put into national policy, does the devolved government have the power to implement something similar at a local level? How much power does GM have in setting more stringent targets for projects that go through planning?

Once confirmed clear communication from GMCA as to the powers that it and its local authority stakeholders have in relation to setting more challenging targets will make explicit to building owners in GM that as a city region, GMCA and its authorities understand what they can or cannot do in this space. Articulating these powers also acts as a statement of intent which may reduce the strength of any argument opposing a requirement to deliver augmented energy efficiency performance targets.

### **Planning Policy Update**

As shown in the Pall Mall Case Study (see Appendix B), retrofit is considerably lower carbon when compared with new build - even best in class low carbon new build, therefore there is an opportunity to favour retrofit over new build as part of planning applications where the planning application includes the demolition of an existing building.

It's essential that retrofit projects that go through the planning process achieve an enhanced energy efficiency standards and other initiatives, which would encompass:

- An improved EPC rating
- Obtaining a performance based certification e.g. NABERS
- Participation in collaboration initiatives

Key target areas of GM experiencing demand for new commercial development could be listed as 'innovation' or 'regeneration' districts within planning policy frameworks so as to intertwine commercial retrofit with new commercial development. There are limited examples of this in GM, with the most comparable being the Oxford Road Corridor regeneration initiative.

The consistent use of planning policy powers across all GM districts would support implementation of minimum operational energy standards for all buildings.

### **Business Improvement Districts / Innovation Districts / 'Retrofit Innovation Zones'**

There are a number of areas across GM that have been identified as a Business Improvement District (BID), which are business-led partnerships that deliver additional services to local businesses. They directly involve local businesses working with local authorities to improve the local

trading environment. A BID sees business within a defined geographical area paying a levy on all business rate payers in that area which is used to develop projects, agreed by the BID that will benefit local businesses. Historically, BID have been used to improve the physical environment of an area e.g. with hard and soft landscaping or additional street cleansing, although there is no limit on what projects or services can be provided through a BID.

In recent years there has been an emergence of Innovation Districts where are urban geographies of innovation where academic institutions, business and other private actors develop integrated strategies and solutions to develop thriving innovation ecosystems—areas that attract entrepreneurs, start-ups, and business incubators.

GMCA and local authority stakeholders could encourage the creation of commercial retrofit focused BID or Innovation District to create a 'Retrofit Innovation Zone' in key locations through identification of and support given to local business champions that could drive interest amongst other commercial building owners and businesses. The Retrofit Innovation Zone could be a good opportunity to trials financial mechanisms to support commercial building retrofit and which engenders a 'safety in numbers' mentality amongst building owners. A Retrofit Innovation Zone would enable retrofit to take place at a lower cost and without unduly distorting the commercial rental market within its boundary.

## Recommendations

Theme	Barriers	Recommendations (short term)	Recommendations (long term)
Planning policy review	Lack of policy driving minimum operational efficiency standards	<ul style="list-style-type: none"> <li>Explore how the powers associated with devolved government can be used to implement local standards for building energy efficiency that go beyond national planning policy.</li> <li>Update local planning powers to promote retrofit and improve energy efficiency, to include: <ul style="list-style-type: none"> <li>Mandatory whole life carbon assessment for buildings over a certain size</li> <li>Promote the use of NABERS Design for Performance and in use certification for a period post completion</li> </ul> </li> <li>Undertake a review and assessment of current planning policies and supplementary planning documents to identify any and all areas of conflict</li> <li>As condition of planning approvals, require building developer to engage with knowledge sharing proposal</li> <li>When the time comes to refresh the GMCA Places For Everyone Joint Development Plan, the principles of building re-use, embodied carbon, energy demand and other considerations that promote existing building retrofit should be embedded within</li> <li>SPD alignment: Review existing and agree (or develop new) a suite of GM wide SPD which require or support commercial retrofit during new build or refurbishment projects</li> </ul>	
Devolved government powers	Lack of policy driving minimum operational efficiency standards	<ul style="list-style-type: none"> <li>Ascertain powers of the devolved government to implement local policy to improve the minimum operational efficiency standards</li> </ul>	<ul style="list-style-type: none"> <li>Implement local policy/policies to improve performance of commercial buildings in GM</li> </ul>
Retrofit Innovation Zone	Business Improvement Districts / Innovation Districts /	<ul style="list-style-type: none"> <li>Retrofit Innovation Zone – concept testing: Through engagement and outreach, identify areas across GM or cluster of commercial building owners / occupiers with a common interest in retrofit that may be suitable for a retrofit innovation zone – possibly an existing BID or Innovation District</li> </ul>	<ul style="list-style-type: none"> <li>Retrofit Innovation Zone – proof of concept: Encourage and support development of a retrofit focused ‘Retrofit Innovation Zone’ trialling financial mechanisms to incentivise commercial building owners and occupiers to reduce energy consumption</li> </ul>
Proposed MEEES changes	Lack of policy driving minimum operational	<ul style="list-style-type: none"> <li>Lobby government to implement proposed MEEES Regulations changes that would see minimum EPC C by 2027 and EPC B by 2030</li> </ul>	<ul style="list-style-type: none"> <li>Continue to push for higher standards utilising the most effective certification scheme(s) available</li> </ul>

	efficiency standards		
Energy performance standard	Ambiguity over preferred energy performance standard	<ul style="list-style-type: none"> <li>• Research and agree a preferred energy performance standard(s) that, where relevant, new, retrofitted and existing commercial buildings must achieve</li> <li>• Agree GM specific energy performance standard to be used together with grade required and agree how this is applied to existing commercial buildings and for commercial building projects that must secure planning permission</li> </ul>	<ul style="list-style-type: none"> <li>• Continually review and update preferred scheme and grade required, with a view that grades improve over time</li> </ul>
Knowledge sharing	Lack of knowledge	<ul style="list-style-type: none"> <li>• Information dissemination campaign: Develop and disseminate to commercial building owners and occupiers, via a dedicated communications campaign, information on the relevant legal obligations / regulations relating to carbon reporting and reduction as well as benefits of retrofit to them and options / solutions open to them.</li> <li>• Award initiative: Create a high profile, GM commercial building owner and occupier focused award initiative (for both new build and refurbishment projects) to showcase excellence in building design and retrofit.</li> </ul>	<ul style="list-style-type: none"> <li>• Commercial building focused advice service: Initiate and host a dedicated commercial building owner / occupier facing advice service that is able to provide impartial information on national and regional legislation, planning policy changes and wider benefits to be realised from retrofitting and occupying commercial buildings with better environmental performance.</li> <li>• Best practice club: Support creation and delivery of a collaborative best practice club that enables commercial building owners and occupiers to share experiences and ideas and which allows direct engagement with GM policy and decision makers to help address challenges to retrofit.</li> </ul>
Listed/historic buildings	Conflict with preserving historic buildings and energy efficiency	<ul style="list-style-type: none"> <li>• Engage with Historic England and local Conservation Officers to discuss conflicts with preserving historic buildings and energy efficiency to agree how to move forwards</li> </ul>	<ul style="list-style-type: none"> <li>• Develop recommendation report on principles to be applied to historic buildings when considering energy efficiency/decarbonisations</li> </ul>

## Technology & Skills - Delivering Solutions

### Context

There are significant technical challenges facing commercial retrofit, however the good news is that most of the solutions already exist, so if we can overcome these issues there is the opportunity to significantly reduce emissions from commercial buildings.

With regards to skills, the construction industry already has a significant skills deficit, according to the GM Retrofit Action Plan<sup>17</sup>, there is a shortfall of approximately 7,000-8,000 construction workers over the next 5 years. This is expected to increase due to changes needed to decarbonise and improve the efficiency of buildings for example an increase in the number of heat pumps installed and need to add wall insulation to existing buildings.

### Barriers

#### Reliance on Fossil Fuels for Heating

Until relatively recently fossil fuels have been the primary source of energy for heating which is often the dominant load in many existing buildings due to historic lower standards of construction i.e. single glazed windows, walls and roofs with little/no insulation.

In recent years we've seen the development of heat pump technology as an alternative solution for heating. As heat pumps are electrically driven and offer an efficiency of circa 300%, given the significant decarbonisation of the grid, they are a key component of our race to net zero. There are however there are a number of challenges relating to heat pumps:

- **Operating Temperatures:** Generally speaking the temperatures delivered by heat pumps are lower than fossil fuels, presenting an issue when it comes to direct replacement as it's possible that other components e.g. pipework and radiators require replacement. There are however high temperature heat pumps on the market, however they are costly.
- **Performance in Low External Temperatures:** Performance output reduces when outside temperatures drop, which means systems are most inefficient when heat is needed the most.
- **Cost:** Capex is significantly more expensive than direct fossil fuel replacement. Depending on operational temperatures and relative gas/electricity prices, heat pumps may also be more expensive to run.

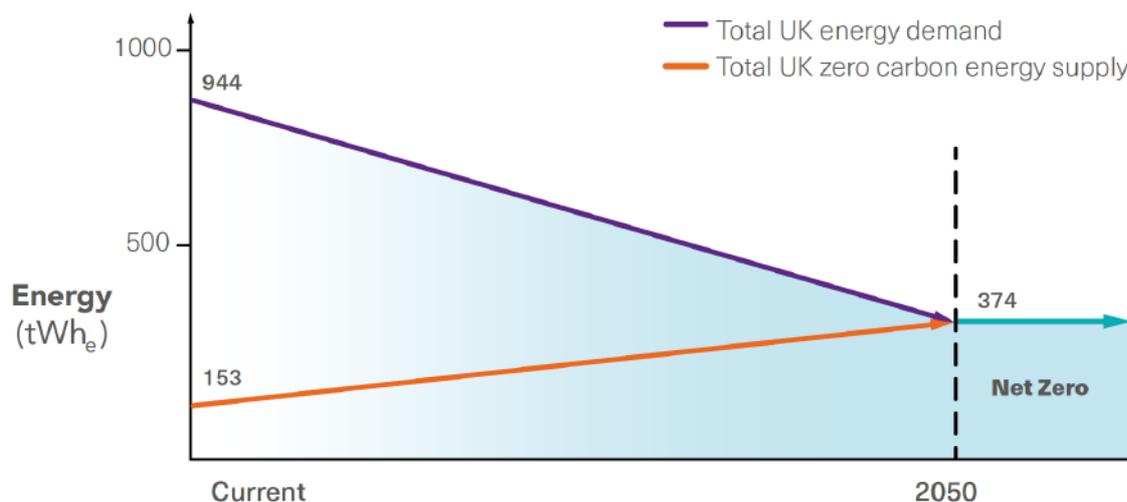
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<sup>17</sup> [www.greatermanchester-ca.gov.uk/media/6018/retrofitgm.pdf](http://www.greatermanchester-ca.gov.uk/media/6018/retrofitgm.pdf)

- **Availability of Space:** Air source heat pumps are the dominant heat pump technology. To function they need outdoor space, which in some buildings, particularly historic buildings with pitched roofs, there is a lack of suitable outdoor space.
- **Fugitive Emissions:** Heat pumps rely on the use of refrigerant gases which if lost to the atmosphere, have the impact of many thousands of times the impact of carbon dioxide. Unfortunately, whilst the best endeavours are made to eliminate any losses and new less damaging refrigerants entering the market, there are inevitable incidents that occur that result in their escape.
- **Planning:** There are potential planning issues associated with the installation of air source heat pumps and ideally this should be addressed as part of permitted development.

### Fabric Improvements are Essential but Challenging

In order to achieve net zero / zero carbon it's essential to not only decarbonise, but also significantly reduce energy demand so that the overall energy demand meets the predicted zero carbon energy supply, which is predicted to be significantly lower than the current energy demand for the UK, see Figure A-1 below.



**Figure A-1: Graph showing UK Energy Demand vs Zero Carbon Energy Supply to achieve Net Zero ([UKGBC Energy Performance Targets For Offices Technical Report, Jan 2020](#))**

To achieve the energy reduction required, upgrading thermal fabric where it is significantly below existing standards will be essential, however there are some barriers which don't make this straightforward:

- **Disruption:** Replacing key building components in particular windows and curtain walling can be extremely disruptive, to the extent that often it is most practical to do this in a vacant building, which may not be feasible due to overlapping tenancies.

- **Costs:** Fabric upgrades are often very expensive and offer little/low rental uplift and long paybacks in respect of energy efficiency.
- **Loss of NIA:** Some solutions in particular wall insulation may result in loss of net internal area (NIA), which obviously building owners/landlords won't want.
- **Technical Coordination:** When specifying fabric upgrades it's important to have a good technical understanding to mitigate issues such as interstitial condensation, thermal bridging, fire engineering and water ingress.

### Skills Shortages

According to the Civil Engineering Contractors Association 75% of contractors have issues recruiting skilled operatives, with 96% of suppliers impacted by labour shortages relating to net zero skills. The Construction Skills Network has identified that 225,000 new construction workers are needed by 2027. The skills are split into two categories: Construction Workers and Design Team:

#### Construction Team:

- There are already significant skill gaps at every level with regards to sustainable construction and little sign this is being resolved with little capacity to train. At this stage it seems unlikely that Greater Manchester will find the 55,000 new construction professionals/workers it needs to deliver the green revolution.
- With an industry wide shortage of skilled tradespeople, there is limited drive to reskill to obtain work and not enough people are moving into the industry with a desire to develop skills in sustainable construction.
- With no shortage of work already for a reputable construction company, there is limited impetus to take on a project they associate as higher risk unless it offers significantly higher returns. This leads to sustainable projects receiving artificially high tenders.
- Lack of knowledge and experience to coordinate low carbon commercial retrofit.

#### Design Team:

- To complete a successful commercial retrofit design, it's essential that the design team has a well-rounded knowledge of lots of different aspects so that the different aspects are coherently coordinated without issues such as heat pump design considerations, smart technology, interstitial condensation, thermal bridging and metering.
- There are significant skills gaps across all the design disciplines. What specialism there is, is often unregulated and largely focused on operational carbon without consideration of embodied.
- A lack of building physics knowledge makes it difficult for designers / specifiers to navigate their way confidently through the unregulated industry greenwash and perpetuates their reluctance to specify new technologies.

- Sustainability is often not considered at an early enough stage, it needs to form part of the project brief and not a bolt on in due course when often key decisions and budgets are already made/approved. Achieving sustainability goals then becomes more challenging and less effective if 'strap on' technologies and product substitutions and then considered. When cost savings are required part way through a project, these substitutions and strap on technologies are often the first to go.

### **Preference for New Build**

The industry has a general preference for new build developments, with retrofit seen as lower in quality and less appealing. Newer buildings are often associated with higher building standards (latest building codes, regulations etc.) and the incorporation of energy-efficient systems, smart technology, advanced materials etc. that enhance comfort, energy performance, and overall functionality of the space. Hence whilst the upfront cost (monetary and carbon) of new build may be higher than with a retrofit, it is often deemed worthwhile for the perceived increased value of new build.

### **Traditional Solutions are Low Risk**

Traditional solutions are tried and tested resulting in known costs, timescales and risk. Sustainable solutions take time to research and specify, the lack of time allowed for means traditional/pre-existing solutions are often chosen, stifling innovation.

Existing supply chains are often unable (or unwilling due to lack of demand) to supply the products required in sustainable retrofit. These 'specialist materials' therefore often need to be imported through smaller suppliers which poses a risk in terms of supply chain stability as well as not attracting the same level of discount.

## **Opportunities**

### **Sharing Best Practice**

From a technical point of view, the solutions to deliver a low carbon commercial retrofit exist, however for one reason or another these solutions are not always adopted, even when they are adopted the success/failure is not documented/shared.

If there is better sharing of best practice then this should increase the number of projects demystify solutions, methods to overcome challenges, address misconceptions and promote good practice.

By giving real world examples of exemplary commercial retrofit it will be possible to demonstrate the benefits of retrofit from an environmental, cultural and social value aspect.

Support greater collaboration across the value chain by creating a community of installers, designers and practitioners that can transfer knowledge, share learnings and best practice from one discipline to another.

### **Innovation / Technological Development**

If we can build momentum in the commercial retrofit sector, this will drive opportunities for technical innovation and availability of data to help focus the industry on delivery of retrofit projects and continuing to improve.

The digital industry is developing at a rapid pace and this provides opportunities in the built environment for increased digitalisation of the process and more sophisticated modelling. This will allow decisions to be made on more in-depth interpretation of data and more efficient project delivery through every stage, including post completion.

Greater Manchester has a strong history of public/private partnerships and specifically in commercial retrofit can we engage with the sector to make them aware of the business support organisations that can help to drive innovations i.e. encourage closer working with the Energy House, Energy Innovation Agency and Catapult to ensure that innovators have access to the support they need to research, demonstrate, commercialise and scale.

### **Skills / Skills to Drive a Greater Manchester Green Revolution**

The increasing momentum of demand via the green revolution gives opportunity for supply chains to expand and adapt to meet increasing demands at regional, national and international level. This investment can then in turn encourage further innovation and efficiency.

Specific opportunities include:

- **Retrofit Coordinator:** Within the domestic sector there is a specific 'Retrofit Coordinator' qualification. Given the crossover between commercial and domestic retrofit, it would seem logical to expand this course/create a new course which covers commercial retrofit.
- **Learning through Case Studies:** With an increasing number of retrofit case studies there is opportunity to share and learn best practice and also things that didn't go so well. The key to maximising the learning opportunities from case studies is sharing and awareness.
- **Digital/Data Skills:** There is opportunity for the industry to develop skills around the fast developing digital and data availability to reduce carbon impact throughout the design process.

- **Industry/Education Collaboration:** There is opportunity for industry and education sectors to collaborate and share knowledge to allow best practice and experience from delivering retrofit projects to be fed into the skilling up of the future generations that will deliver retrofit in the future and will face even tighter environmental targets.
- **Younger Generation Passion:** There is a strong passion for retrofit in the younger generation and tackling the climate crisis head on. These will drive opportunities within the built environment to attract strong talent into the sector to drive change.

## Recommendations

Theme	Barriers	Recommendations (short term)	Recommendations (long term)
Promote incentivise energy efficient retrofit	Challenging technical solutions e.g. heat pumps / fabric improvements	<ul style="list-style-type: none"> <li>Develop incentive strategy (e.g. business rates relief for efficient buildings, tax that penalises poor performing buildings or grant funding), that promotes energy efficient/low carbon solutions such as heat pumps and fabric improvements and leverages green premium / brown discount</li> <li>Share best practice low carbon retrofit within commercial office community so others can learn best practice solutions</li> </ul>	<ul style="list-style-type: none"> <li>Implement incentive strategy, perhaps within small area of Manchester as trial that could be tested first before a bigger roll out across GM</li> <li>Create some sort of best practice library or service to support property owners and occupiers reduce energy consumption and decarbonisation, which perhaps partners with delivery supply chain</li> </ul>
Perception that retrofit projects come at a higher risk than new build projects	Lack of knowledge / knowledge sharing	<ul style="list-style-type: none"> <li>Introduce a myth-busting programme for commercial retrofit across Greater Manchester to demystify solutions, address misconceptions and promote good practice</li> </ul>	<ul style="list-style-type: none"> <li>Build a library of case studies to benefits of retrofit from an environmental, cultural and social value aspect.</li> <li>Support greater collaboration across the value chain by creating a community of installers, designers and practitioners that can transfer knowledge, share learnings and best practice from one discipline to another</li> </ul>
Technological development	Lack of benchmarking within the retrofit industry	<ul style="list-style-type: none"> <li>Promote the use of low carbon technology at the early project stages that will assist in the overall retrofit cycle. This could be surveys, calculation packages etc.</li> <li>Help to strengthen innovation and collaboration by using the public / private estate to test and trial new innovations. Engage with the sector to make them aware of the business support organisations that can help to drive innovations to ensure that innovators have access to the support they need to research, demonstrate, commercialise and scale</li> </ul>	<ul style="list-style-type: none"> <li>Encourage software and hardware vendors to focus on the real needs of the industry. Research into how to attract this kind of product / methodology development: how to make it attractive, profitable and exciting. Ensure the industry's needs are clearly stated, in order for rapid digital progression. Sharing digital features between software packages such as optimisation engines</li> </ul>

Skills	Lack of necessary skills in sustainable retrofit	<ul style="list-style-type: none"> <li>• Work with local and national partners to develop and maintain a centralised case study database for the retrofit community to promote best practice and showcase projects that consider the whole life cycle carbon of a building</li> <li>• Development of innovative procurement assessment techniques for commercial portfolios or specific projects aims to raise the standards by encouraging sustainability-conscious suppliers</li> </ul>	<ul style="list-style-type: none"> <li>• Development of training / education for secondary education and apprenticeships should be prioritised. Development of new curriculum should be discussed with industry to ensure Secondary education and apprenticeships key to upskilling and training</li> </ul>
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## Monitoring & Verification - Ensuring Successful Delivery

### Context

One of the key aspects of ensuring successful retrofit of buildings is to instil a robust process for monitoring and verification of building performance post retrofit.

Currently, demonstration of existing building energy performance is only required when letting a space. In 2015, new laws in the UK set Minimum Energy Efficiency Standards (MEES), stating that private rented property in England and Wales must have an EPC rating of E or above. These came into force on 1 April 2018 for new tenancies, and on 1 April 2020 for existing tenancies. The UK government has proposed to improve this to EPC C by 2027 and EPC B by 2030, however this is yet to be implemented as part of national policy.

Whilst this provides an incentive for landlords to improve the energy efficiency of their buildings above a minimum standard, it is widely accepted that EPC outputs provide a crude metric for the efficiency of a building, often not bearing much similarity to the actual energy consumption of the buildings. Also, the current EPC minimum standard of E and the proposed 2025 standard of C set a minimum standard only, and do not provide a “Paris-proof” demonstrable year-on-year carbon reduction that would align with the UKs legally binding carbon budgets.

In Australia, the NABERS certification scheme for commercial buildings has proved that target setting combined with ongoing monitoring and improvement of buildings can yield year-on-year savings. The scheme also sets out metering and monitoring protocols to ensure accurate data is used. It is these principles which Manchester should look to for its existing commercial stock.

### Barriers

#### Energy Certification

Certification schemes can play a critical role in driving change and are a critical element of policies, enabling standards to be set and measured. There are several different certification schemes relevant to building energy efficiency, the key ones of relevance to this report are:

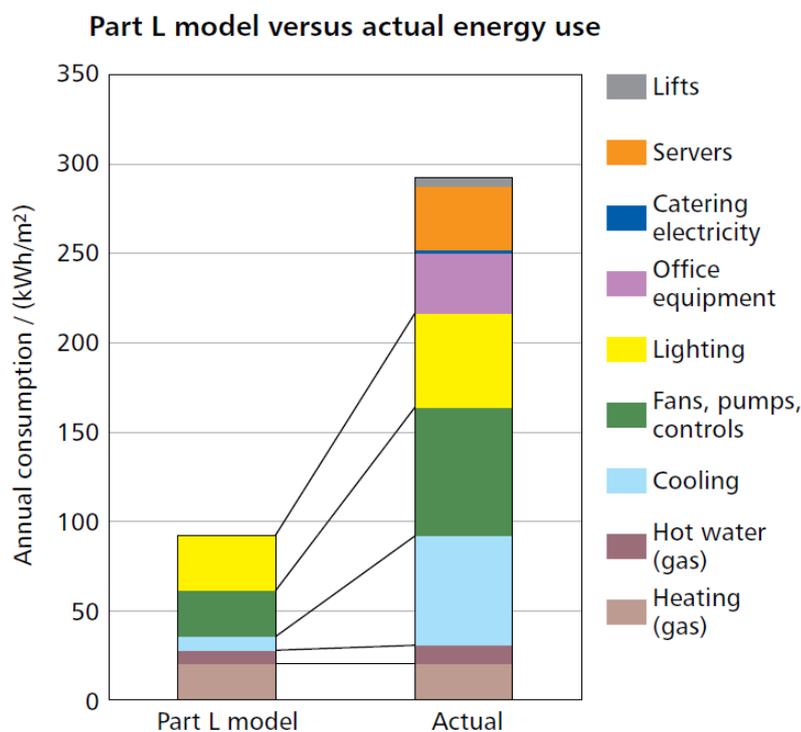
- Energy Performance Certificates (EPCs)
- Display Energy Certificates (DECs)
- Building Research Establishment Environmental Assessment Methodology (BREEAM)
- National Australian Built Environment Rating System (NABERS)

EPCs are the de facto certification scheme and a legal requirement for all property sale and rental agreements (with some minor exceptions) via the MEES regulations, covered earlier in this section.

While the theory of EPCs is good, in practice there are a couple of fundamental issues:

3. They only assess regulated loads (HVAC, hot water, and lighting) while unregulated loads (plug in equipment, servers and lifts) are omitted. As highlighted by the UKGBC<sup>18</sup> and in Figure 6, unregulated can be a significant proportion of whole building energy and in the case of leased office space, something which the landlord has little control over.
4. There is no measurement of actual energy consumption of the regulated loads, so this is often found to be significantly underestimated. This is commonly referred to as the 'Performance Gap' which is well documented in the property industry.

These issues mean that the actual energy consumption of a building is often higher than the EPC rating would imply. CIBSE research<sup>19</sup> estimates that new buildings typically consume between 50% and 150% more energy than originally expected. It's fair to assume this same inaccuracy can be extended to existing buildings. This is highlighted in Figure 6 which compares the estimated energy consumption from the Part L model (EPC model) with the actual energy consumption in use. Note Figure 8 compares energy consumption utilising energy use intensity (EUI) which is the total annual energy consumption divided by the floor area, which is an important metric for comparing energy consumption in different buildings.

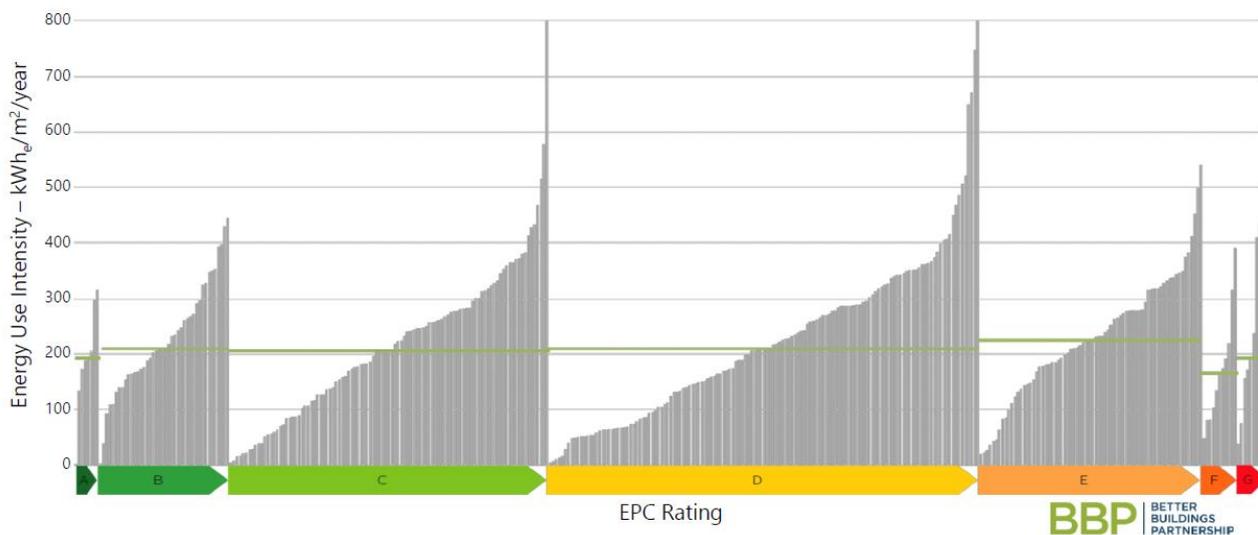


<sup>18</sup> [www.ukgbc.org/wp-content/uploads/2020/01/Energy-performance-targets-for-offices-technical-report.pdf](http://www.ukgbc.org/wp-content/uploads/2020/01/Energy-performance-targets-for-offices-technical-report.pdf)

<sup>19</sup> CIBSE TM54 Evaluating operational energy performance of buildings at the design stage

**Figure 6 - EPC Model vs Actual Energy Consumption (taken from CIBSE<sup>20</sup>)**

The Better Building Partnerships (BBP) collect actual energy consumption data for commercial buildings and has mapped EUI against EPC rating. This data is shown in Figure 7, with the EUI of individual buildings shown in the grey vertical bars, grouped by EPC band. The data clearly shows that there is little correlation between a building's EPC rating and its EUI, with a mix of low and high energy use intensity in each EPC band.



**Figure 7: BBP Data Comparing EPC Rating and Energy Use Intensity**

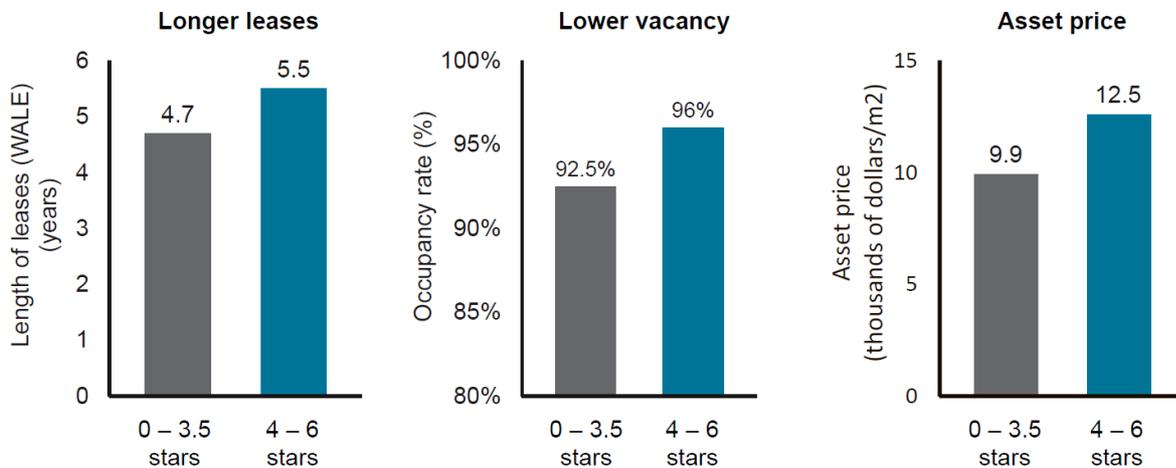
DECs do measure actual energy consumption and are mandatory for public buildings; however, they have not become mainstream in the commercial property sector and so their impact is limited in driving the uptake of retrofit.

BREEAM looks at a broad range of different sustainability related aspects such as transport, wellbeing, resilience, water, and energy; while energy carries the highest proportion of the overall score, as with EPCs it only looks at theoretical energy efficiency and therefore does not address the Performance Gap highlighted above and therefore subject to inaccuracies of estimated vs actual energy consumption.

In 2005 a new certification scheme was launched in Australia called NABERS (National Australian Built Environment Rating System). It has had a transformational impact on the Australian commercial property market. It was initially a mandatory requirement for government leases, however subsequently more widely adopted, with mandatory disclosure introduced in 2011. In a

<sup>20</sup> CIBSE TM54 Evaluating operational energy performance of buildings at the design stage

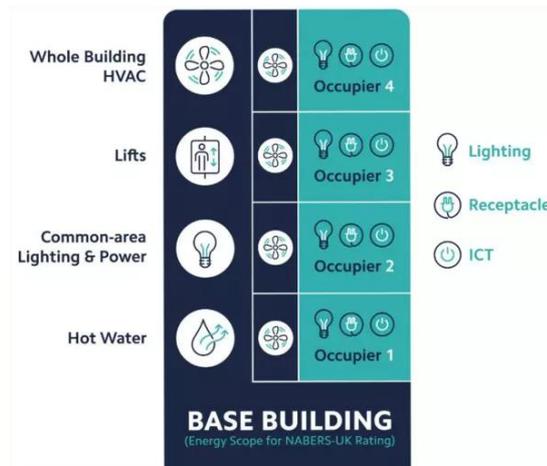
nine year period there has been a 35% reduction in the average EUI. There has also been a number of other benefits resulting from better NABERS ratings - see Figure 8.



**Figure 8: Market Demand for Buildings with Better NABERS Ratings (source BBP)**

The success of NABERS is underpinned by a number of key principles:

5. **Actual Energy Measured:** While it is possible to get a predicted rating, once in operation NABERS rating is based on actual measured energy consumption from meters.
6. **Simple Rating System:** By using a 1 to 6 star scale rating, investors, owners and occupiers can easily understand how a building is operated over a year. Star ratings as follow:
  - 1 Star = Poor
  - 2 Stars = Below Average
  - 3 Stars = Average
  - 4 Stars = Good
  - 5 Stars = Excellent
  - 6 Stars = Market Leading
7. **Technically Robust:** The certification is very technically robust and includes adjustments for operational hours and equipment density so buildings are not penalised for these factors.
8. **Responsibility aligns with Party in Control:** Acknowledging landlord and tenant are in control/responsible of different energy demands, NABERS has three different rating options (also see Figure 9):
  - **Base Building:** Buildings can be rated based on their central services like heating and cooling systems, lifts and lobby lighting.
  - **Tenancy:** Enables energy used by the tenant to be rated, typically for lighting and power, plus special tenancy requirements or local a/c.
  - **Whole Building:** Provides assessment of energy used by office tenancies and by Base Building services to lettable and common spaces.



**Figure 9 – NABERS Rating Options: Base Building / Tenant / Whole Building**

Recognising the success in Australia, in November 2020 NABERS UK was launched for use in the UK, with the hope that it has a similar impact here, although at present there are fairly low adoption rates and the BRE recently announced they are withdrawing as administrator, although NABERS are working on finding a new administrator.

## Metering

The key technical barrier to the visibility of energy consumption within buildings is metering. Historically, sub-metering of energy consumption within buildings is insufficient or entirely absent. Furthermore, meters that are installed are often not calibrated or corrected as required, or the data is not stored or monitored.

In order to obtain a clear picture of energy consumption within a building, metering should allow monitoring of:

- The whole building energy consumption with main meters on incoming utilities.
- Energy consumption of any tenants, separate from energy consumption of landlord areas.
- Energy consumption of discrete items consuming large quantities of energy such as chillers, boilers, heat pumps etc.
- Energy consumption of energy intensive areas such as kitchens or large server rooms.
- Energy generated by renewable sources.

Any further sub-metering of electrical circuits would also provide further visibility as to the energy consumption characteristics of the building.

Data should also be visible on a BMS or energy management system, with historic consumption data stored to allow trends to be analysed across the seasons.

It is important that the accuracy of meters is checked and validated. Meters should be validated by an energy professional, with guidance set out in the following document: [NABERS UK The Rules - Metering and Consumption](#).

### **Data Analysis**

With building owners and energy managers currently adopting a range of different approaches to energy management and analysis, consistency and interpretation of data will be challenging. Factors such as the scope of measurement, format of data and frequency of measurement will change from building to building. Thus careful interpretation of the data will be crucial to ensure an accurate picture of the buildings can be produced.

Transparency of data will be another key challenge. In order to establish momentum with retrofit across the city, a number of landlords will need to offer up their energy consumption for the scheme such that a clear and robust picture of energy performance of the commercial buildings across Manchester can be assessed. This will allow for realistic yet aspirational targets to be set, and for participants to understand where they sit in relation to other similar buildings across the city. However the office market in Manchester is very competitive, thus landlords may be reluctant to give away such data due to their building(s) potentially being exposed as poor performing vs. competing buildings. This should be acknowledged and to mitigate this, incentivising and encouraging landlords to participate will be key, citing the collaborative nature of the project for public good, the operational cost and carbon benefits that could be realised and the resulting positive marketing as incentives. However, the privacy of the data should ultimately be respected should landlords wish to anonymise data or to not participate.

### **Benchmarking & Governance**

It must be understood that the gathering of data, validation, benchmarking and auditing will require significant time and resource. The quality and accuracy of raw data received from landlords cannot be relied upon and an individual with experience in the energy sector would be required to ensure data reliability. An appropriate data platform will also be required which would need a custodian, as well as an independent reviewer/auditor.

The same rigour would need to be applied when setting targets for improvement. Landlords could challenge benchmarks or targets if their building appeared to perform poorly, in which case a clear understanding is required of the methodology undertaken to establish the targets, and how and where they apply to each building. The NABERS UK certification scheme gives a robust and industry accepted framework with which to approach energy benchmarking so it is advised that this is used as a template.

## **Opportunities**

### **MEES**

While there are some issues with EPCs, if the proposed changes to MEES were implemented, it still represents a significant opportunity to reduce energy consumption across Greater Manchester. If the government fails to implement the proposed changes then there might be an opportunity to implement across GM through the powers of the devolved government, which given commercial property owners should be gearing up to the changes, shouldn't cause too much of an issue.

### **Performance Based Certification**

Given the impact NABERS has had in the Australian market, there's a clear opportunity to implement a performance based certification scheme to reduce consumption of commercial buildings.

Ideally this would be incorporated for all buildings, however acknowledging there may be limited powers to implement into local policy, then GM should prioritise incorporating performance based certification (preferably NABERS) as part of planning applications for both new building and retrofit projects that go through planning. This will hopefully drive increased knowledge and skills in the area and hopefully set an expectation within the market for all buildings.

### **Best Practice Cohort**

There are significant opportunities to create a more informed and motivated commercial sector in the city, who are aware of how their building should be performing in the context of their city, and how to reduce their energy and carbon consumption over time. A collaborative space could be facilitated so those participating can share stories and guidance, also serving as a positive and collaborative space for the sector.

### **City Data Challenge**

Taking learning from other forward thinking cities like Copenhagen and Washington DC, GM could look to set up a scheme whereby all commercial buildings share data. The first stage of this would be establishing a best practice cohort, as described above, who are keen to be involved and share data on a voluntary basis. Following this, reporting and benchmarking of energy performance of buildings could potentially be mandated through law. For example, in the US Washington DC (via the District of Columbia Department of Energy and Environment) have brought into law the requirement for all privately owned buildings greater than 25,000sqft to report their energy

performance, with results publicly displayed on a [building performance map](#). Buildings are given a star score based on performance, and this has demonstrated significant improvements in building efficiency across the city.

As an alternative to, or incorporating elements of, a centralised information sharing initiative, peer to peer learning and collaboration amongst commercial building owners, occupiers, GMCA and stakeholders may deliver faster and more effective outcomes than hierarchical and dictatorial planning policy changes.

The retrofit and green building agenda is being driven, in no small part, as a response to increasing consumer demand, be that residents expecting a response to the climate emergency from their local authority, customers of a business wanting to buy products or services that have a lesser impact on the environment or financial institutions wanting to ensure their investments are contributing to rather than hampering their own climate and carbon reduction related objectives. Councils want to support change; commercial occupiers are pushing for buildings with green leases; and, commercial building owners and investors want assurances that investments made are both commercially viable and meet the needs of both customers, councils and their own climate targets.

Sharing information, best practice and practical examples amongst a common community of interest can help all parties to achieve their objectives. For example, Copenhagen's 'Energy Leap' is a partnership among municipality, private building owners, developers, and other relevant organisations to achieve a significant reduction in energy consumption in buildings. Similarly, taking advantage of already established and well-connected networks such as C40 to share knowledge and tools is beneficial for everyone involved.

No business wants to be associated with being less capable than its peers and competitors. This applies equally to commercial building owners and their occupier customers. Be it via a formal, annual awards, the publishing of energy performance ratings and or accreditation of commercial buildings or the invitation to participate in policy development and other such 'influencing' forum and initiatives with GMCA and stakeholder local authorities for owners of better performing buildings, a desire to be seen to be leading the field would support commercial retrofit.

The most appropriate form of competition for GMCA would need to be identified considering stakeholder views and the policy landscape surrounding commercial retrofit. For example, a 'name and shame' league table of performance would be incongruous if delivered alongside a collaborative, partnership-based knowledge sharing initiative supported by the GMCA.

### **Green Leases**

A key opportunity for landlords could be to accelerate the use of green leases to incentive tenants (and the landlords themselves) to reduce their energy consumption. These are lease agreements which contain a series of additional provisions, which at its simplest could comprise a memorandum of understanding between tenant and landlord to reduce energy consumption, or could go as far as setting energy targets for tenants to adhere to.

## Recommendations

Theme	Barriers	Recommendations (short term)	Recommendations (long term)
Governance	Benchmarking and governance	<ul style="list-style-type: none"> <li>Establish roles and responsibilities for driving the programme and governance roles</li> <li>Establish an energy benchmarking and performance grading system</li> </ul>	<ul style="list-style-type: none"> <li>Embedding energy performance requirements in local planning</li> <li>Establish energy reduction pathway for all commercial stock across the city, with clear guidance as to incentives for overachieving and penalties/guidance for underachieving</li> </ul>
Energy data & analysis	Metering & data analysis	<ul style="list-style-type: none"> <li>Agree best practice approach to metering standards – suggest using NABERS ‘base building’ and ‘tenancy’ approach as preferred standard</li> <li>Promote benefits of effective metering for building owners and occupiers e.g. reduced service charge, ability to implement energy reduction through analysis, incentivises party in control to reduce consumption etc.</li> <li>Trial installation of new metering and data analysis on trial council buildings</li> <li>Establish “quick win” energy savings potential for initial participants</li> <li>Agree best practice reporting metrics and most effective visualisation</li> <li>Review potential for city scale energy data sharing platform and develop proposals for the scheme including benefits and what building owners, in particular, should expect</li> <li>Develop a strategic implementation strategy - key data streams and platforms should be proposed, as well as resource, timescale and cost</li> </ul>	<ul style="list-style-type: none"> <li>Partner with supply chain partners to link consultants and contractors with building owners and occupiers</li> <li>Promote benefits of effective metering and analysis through case studies where it has been adopted for example proposed trial council buildings</li> <li>Establish city scale data sharing platform together with league table of performance</li> <li>Growth in participants and communication of energy band performance of buildings (i.e. via a star system or similar)</li> <li>Gain better understanding of actual energy consumption of commercial building across Manchester and Greater Manchester</li> </ul>

Preferred energy certification scheme	Energy certification	<ul style="list-style-type: none"> <li>• Confirm preferred energy certification scheme(s) and grades to be used for any minimum efficiency standards for planning permissions and existing buildings</li> <li>• Lobby government to implement performance based certification and proposed changes to MEES to improve minimum EPC rating to EPC C by 2027 and EPC B by 2030</li> </ul>	<ul style="list-style-type: none"> <li>• Continually review and update to ensure GM is utilising the most effective certification scheme and that standards ratchet over time</li> </ul>
Best practice cohort	Knowledge sharing	<ul style="list-style-type: none"> <li>• Establish a best practice cohort - including sharing of portfolio best practice metering installations and energy data analysis</li> <li>• Release guidance - retrofit guidance for landlords and tenants including technical and financial guidance</li> <li>• Release guidance –It should also set out key guidance regarding retrofit including practical considerations, financing and funding options and case studies. It could also include advice regards setting up green leases.</li> </ul>	<ul style="list-style-type: none"> <li>• Establish a league table of performance and/or annual awards for those</li> <li>• Share case studies of examples where effective metering and data analysis have resulted in energy reduction</li> <li>• Seek landlord/tenant commitments and establish a task group of scheme curators and willing participants from the sector.</li> </ul>

## APPENDIX B: CASE STUDY - PALL MALL, MANCHESTER (BRUNTWOOD)

### PALL MALL



**Office typology:** Constructed 1964-84

**Location:** Manchester City Centre

**Type of retrofit:** Deep

**Partners:** Client: Bruntwood, Architect: Sheppard Robson, MEP & Sustainability Consultant: Ramboll, Planning Consultant: Deloitte, Main Contractor: Dragonfly

**Design status:** Construction

**Expected completion:** Early 2025

**Project size:** NIA = 85,000sqft

#### PLANNING & OPTIMISATION

#### LIGHT RETROFIT

#### DEEP RETROFIT

#### PROJECT OVERVIEW

##### > Context

Pall Mall is located on King St and sits in the heart of Manchester City Centre. Originally constructed in 1969, it is Grade II listed and was acquired by Bruntwood in October 2021 having sat mostly vacant for four years.

##### > Retrofit Strategy

The property will include 85,000 sq ft of office and hospitality space across three interlinked tower blocks. The building is structured using a reinforced concrete frame with original single-glazed windows and time-expired building services. As part of the redevelopment, the glazing and building are being replaced alongside a complete internal refurbishment.

##### > Planning considerations

Initially, the planning / listed building application to replace glazing was refused, however, off the back of the energy modelling and net zero targets for the building, planning / listed building consent was successfully obtained for replacing existing curtain walling. Due to the listing, the curtain walling needs to replicate the existing layout and the mosaic tiling to the cores must remain untouched. This results in a slightly compromised building fabric performance, however, a significant reduction in energy demand can still be achieved compared with the original building.

#### RETROFIT DRIVERS

##### > Net zero in operation

The key sustainability targets for Pall Mall is that it is net zero in operation with low energy consumption. Bruntwood are aiming for all electricity supplied to the building to be derived from renewable sources, and intelligent building management technology will also be incorporated throughout. Once complete, Pall Mall will be targeting BREEAM 'Very Good' certification and an EPC B rating.

##### > Attract new occupiers

The upgrade is intended to appeal to new occupiers as the building was vacant when we purchased it, meaning it was a great opportunity for us to undertake a deep retrofit and bring it up to modern sustainability standards. Bruntwood's target audience is organisations with strong sustainability credentials, to create a sustainable business 'hub' at Pall Mall.

##### > Risk of becoming a stranded asset

There were concerns that if the building's glazing wasn't replaced quickly then it may become a stranded asset, which is why this was a fundamental requirement for the redevelopment of the building.

##### > Social impact

The site contained an existing area of public realm which was under-utilised and a target for anti-social behaviour, thus the reimagining of this space as a draw to the building and for societal benefit was required.

##### > Improved rental value

The condition of the building on acquisition was very poor and would have only realistically achieved a rental value of circa £12-15 per square foot, however on completion of the scheme we expect in the region of £35-37 per square foot.

### SUSTAINABILITY OUTCOMES

➤ Switch from gas heating to lower carbon heating

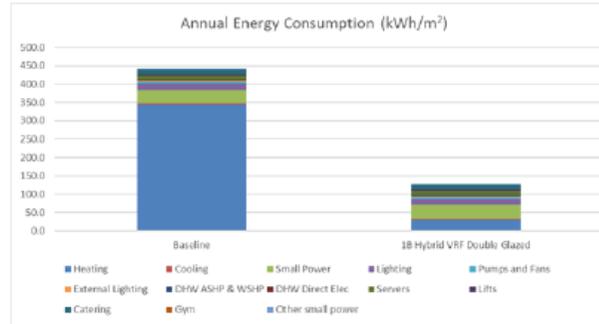
A switch from gas heating to hybrid variable refrigerant flow (VRF), with air source heat pump (ASHP) serving domestic hot water and air handling unit (AHU) coils has dramatically reduced the overall carbon emissions and set the building on a trajectory for zero carbon as the grid emissions reduce. Note that full net zero carbon (NZC) was not possible due to the existing nature of the building and the listed status, as certain elements of the fabric were required to remain.

➤ Improved airtightness and façade replacement

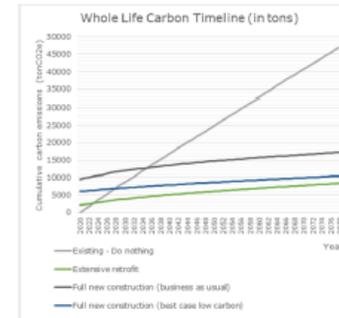
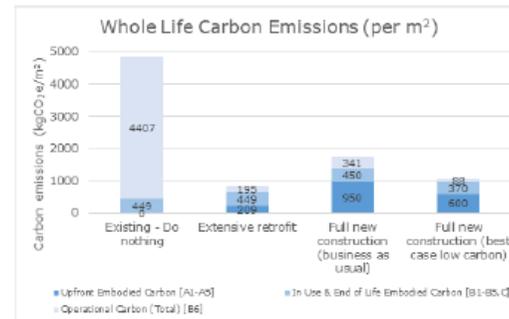
A focus on air tightness and façade replacement, within the constraints of the listed building status provided a significant energy consumption improvement.

➤ Choosing a deep retrofit over new build

Whole life cycle carbon was a fundamental driver for the building. The decision to retain and perform a deep retrofit was determined through detailed assessment, balancing operational and embodied carbon. The adjacent graphs show the outcome from the decision-making process.



Scope	Metric	Stage 3	Stage 3 Excluding Gym, car park and Retail/Café	Stage 3 Excluding Gym, car park, Retail/Café & assumes Tenant Energy of 70kWh/m2 NLA is achieved
Whole building energy	kWh/m²(NLA)/yr	397	173	159
	kWh/m²(GIA)/yr	127	118	108
Base building energy	kWh/m²(NLA)/yr	116	93	89
	kWh/m²(GIA)/yr	75	63	63
Tenant energy	kWh/m²(NLA)/yr	81	81	70
<b>Target Achieved</b>				<b>2020-2025</b>



### KEY LEARNINGS

➤ Significant reductions in operational carbon can be achieved for Grade II listed buildings despite planning constraints

Although it was not possible to achieve 'Paris Proof' targets for operational carbon on this project due to existing building constraints, particularly listed façade, a significant reduction on operational carbon can be achieved.

➤ Retrofitting results in much lower embodied carbon compared to new build

➤ Data on net zero carbon and clear net zero strategy can assist in gaining planning approval

Using operational carbon data and highlighting net zero aspirations can help persuade conservation officers to agree to planning applications e.g. replacing the windows after an initial refusal.

### WIDER IMPACT AREAS



**Resource use:** the fit-out of Pall Mall will breathe new life into the old building, utilising a circular economy approach through its use of recycled and reclaimed furniture and materials, to create Bruntwood's most sustainable serviced and leased office space to date, incorporating details such as timber partitions and reclaimed raised access floors. What's more, through retaining the existing structure, Bruntwood have avoided the need to rebuild which would have resulted in approximately 7,900 tonnes of additional carbon emitted - equivalent to around 16,000 flights from London to New York.



**Climate change adaptation:** the new façade and glazing system has been designed to limit the solar gain to the building and thus limit the energy required to cool it. At the same time, it will allow the building to respond to increasing external temperatures over time.



**Health, Well-being and Social Value:** the provision of the new high quality public realm offers the external space back to the community for societal benefit. Additionally, new gym and café spaces within the building (including external roof terraces) provide wellness facilities to the building users.

## APPENDIX C: USEFUL LINKS

MACE Retrofit [\*Transform & Renew - Making non-domestic buildings fit for a low carbon future\*](#)

PAS 2038:2021 Retrofitting non-domestic buildings: <https://www.bsigroup.com/en-GB/standards/pas-20382021/>

Retrofit Pattern Book: Allows designers and manufacturers to show their best practice details to others <https://retrofit.support/>

[The Merton Rule](#)

<https://www.constructionenquirer.com/2023/12/13/retrofit-first-policy-floated-for-city-of-london-schemes/>

UKGBC

[www.greatermanchester-ca.gov.uk/media/8719/gmca\\_occupierguidance\\_cbre\\_noversioncontrolsheet.pdf](http://www.greatermanchester-ca.gov.uk/media/8719/gmca_occupierguidance_cbre_noversioncontrolsheet.pdf)

Guide for Occupiers

## APPENDIX D: UKGBC Retrofit Guidance

## APPENDIX E: NABERS

# NABERS UK



### What is NABERS UK?

NABERS UK, which launched in 2020 following the success of the Australian scheme, provides a scheme that measures, verifies and discloses the actual energy use of existing offices, helping building owners and the wider market to accurately measure, target and communicate the energy performance of commercial offices.

The scheme is governed and backed by a Steering Group that includes the BBP, BCO, BPF, BRE, BSRIA, CIBSE, IWFM, RIBA, RICS and UKGBC.

### NABERS UK offers two products:

#### NABERS UK Design for Performance

Design for Performance is a process whereby a developer or owner commits to design, build and commission a new office development or major refurbishment to achieve a specific NABERS energy rating.

#### NABERS UK Energy for Offices

Energy for Offices measures the energy efficiency of an operational office building and rates its performance. Offices can be rated in three different ways: Base building, tenancy and whole building.

New developments certified under 'Design for Performance' must use the annual 'Energy for Offices' rating to ensure that the design ambitions are met in practice. Over 100 new developments have been registered in the UK since the scheme's launch, representing a significant proportion of major office developments in the UK, which will all go through the 'Energy for Offices' process once built, let and in operation.

'Energy for Offices' ratings can be applied to any existing office, and buildings do not have to have been through the Design for Performance process in order to be rated. Ratings can be public or private, and in either case are intended to support offices in a process of continuous improvement of their operational energy efficiency.

The assessment process associated with these two products is explained in more detail on the following page, along with details of how to get started with your development or project or existing building/portfolio.

### NABERS UK PROVIDES A RATING FROM ONE TO SIX STARS FOR OFFICES. THIS PROVIDES BUSINESS OWNERS WITH A BENCHMARK FOR PROGRESS.



### Benefits of a NABERS UK Energy for Offices rating

- Compare - Provides a benchmark for a building's energy efficiency, enabling comparison across the industry.
- Validate and communicate - Provides cost-effective, high-trust and independent validation of energy data, ensuring confidence in reporting.
- Track progress - Annual ratings enable owners to understand whether interventions have delivered real performance improvements.
- Understand and improve - Provides an accurate assessment of energy consumption and efficiency so that owners can understand performance and improve buildings.
- Competitive edge - Lower environmental impact, lower running costs and simple communication gives owners a competitive advantage with investors and occupiers.
- Demonstrate good practice - NABERS UK is integrated into several industry standards including the BCO Guide to Specification for Offices.
- Gain recognition - NABERS UK can provide owners with credits under BREEAM and GRESB.

## DESIGN FOR PERFORMANCE

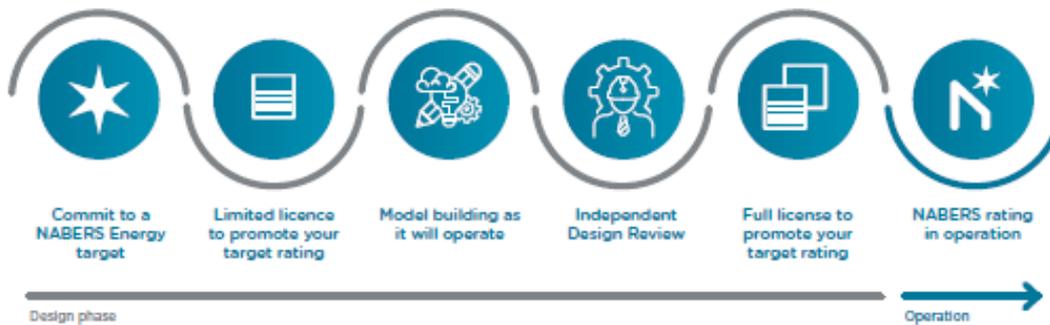
### What is Design for Performance?

The UK has a design-for-compliance culture which has led to the well-known performance gap that exists between original design intent and how a building truly performs in-use.

Design for Performance is a process that overcomes this, where a developer or owner commits to design, build and commission a building to achieve a targeted NABERS UK Energy rating.

If you are a developer or owner, you can register any new office development or major refurbishment by signing a Design for Performance Agreement. Your target NABERS UK Energy rating must be 4 stars or above. The Agreement spans a number of years and remains in effect until the building has received its NABERS UK Energy Rating, after 12 months of operation.

#### THE DESIGN FOR PERFORMANCE PROCESS:



## ENERGY FOR OFFICES

### What is Energy for Offices?

Energy for Offices measures the energy efficiency of an operational office building and rates its performance. The energy rating works by comparing the energy consumption of a building against a set of benchmarks.

The benchmarks have been developed using actual performance data from offices in the UK to set the median and the star rating takes into account both location and occupancy.

Offices can be rated in three ways:

**Base Building:** Buildings can be rated based on their central services like heating and cooling systems, lifts and lobby lighting.

**Tenancy:** Enables energy used by the tenant to be rated, typically for lighting and power, plus special requirements or local a/c.

**Whole Building:** Provides assessment of energy used by office tenancies and by base building services.

#### STEPS TO A RATING

