Decarbonising Greater Manchester's Existing Buildings

A report to the Greater Manchester Combined Authority

September 2019

GREATER MANCHESTER

DOING THINGS DIFFERENTLY FOR THE ENVIRONMENT

Contents

Executive summary

The importance of buildings in meeting Greater Manchester's environmental ambitions

In its 5 Year Environment Plan, Greater Manchester set an ambition to be carbon neutral by 2038. Reducing the amount of energy used in Greater Manchester's existing buildings will be key to achieving this aim, especially given 95% of Greater Manchester's existing buildings are still likely to be in use by 2050.

This report builds on the priorities and actions on buildings in the 5 Year Environment Plan. It sets out where Greater Manchester is now and where it needs to get to in terms of the energy demand of its existing domestic, commercial and public buildings. Based on that, it provides a set of recommendations for taking action.

The opportunity and the need to take action

Investing in reducing the energy used in Greater Manchester's buildings offers a significant opportunity that would bring with it multiple benefits, not just for the city-region's environmental ambitions.

For Greater Manchester's residents, homes that are warmer, more comfortable and have good ventilation are healthier homes, improving people's physical and mental health. They are also cheaper to heat, meaning Greater Manchester residents and businesses would spend less on their fuel bills and be more resilient to future energy price rises.

For Greater Manchester's economy, a healthier population means increased productivity and less public spending on healthcare. Businesses that use their energy more efficiently are more productive and also provide better environments to work in – they can also be more attractive to potential employees and better at retaining staff. Investment in improvements in Greater Manchester's building stock also presents an opportunity for growth in jobs and skills in the construction and associated sectors in the city-region.

For Greater Manchester's environment, tackling energy demand in existing domestic, commercial and public buildings is crucial to meeting its ambitions for carbon neutrality. Modelling shows that without action to increase the extent and depth of current activity in this area, Greater Manchester will not be able to meet its aims. The step-change this modelling shows is required informs the approach proposed and recommendations made in the rest of this report so that Greater Manchester can realise its ambitions.

Reducing energy demand in homes

In Greater Manchester's homes, continued effort is needed to ramp up actions to help reduce the energy demand of those residents in or at risk of falling into fuel poverty, continuing to maximise the use of national funding streams (particularly Energy Company Obligation – ECO – funding) by using local flexibilities, whilst making the case for greater local influence so that this funding better aligns with Greater Manchester's ambitions. This funding does not currently provide for the extent and depth of improvements needed in homes to meet Greater Manchester's environmental and wider ambitions (Recommendation 1).

At the same time, Greater Manchester needs to scale up deeper retrofit of homes across the city-region. This presents significant opportunities to realise the benefits set out above – for improving people's health and increasing wealth. To realise the scale of reduction in CO_2 emissions from reducing buildings' demand for energy, Greater Manchester need tens of thousands of deeper retrofits every year. Modelling informing Greater Manchester's 5 Year Environment Plan is based on 61,000 retrofits a year which, on average, reduce heat loss per house by 57%. At present, deeper retrofit projects achieving this scale of reduction are pilots of 10s or at most 100-200 homes, or are not retrofitting to the depth needed.

There are barriers that prevent scaling up what has been achieved in these projects and which would need to be overcome to realise domestic retrofit to the extent and depth required. These barriers include:

- The need to adopt a whole-property (or whole-house) approach to retrofit, understanding what level of reduction in demand (in particular for heating) and CO_2 emissions can be achieved across Greater Manchester's different types of properties (Recommendation 2). At the same time, a whole-house approach needs to be embedded to make sure that retrofit measures are always carried out as part of an overall plan for that property to avoid piecemeal change or unintended consequences.
- The need to develop attractive financial offers for homeowners and financial models for investors (in the public and private sectors) to overcome the high up-front capital costs of deeper retrofit (Recommendation 3). Patient finance, such as green mortgages, equity loans and other forms of loan funding (e.g. revolving loan fund), needs to be available at scale to overcome this barrier.
- The need to develop both the capability (upskilling) and capacity of the supply chain required to deliver deeper retrofit. The supply chain for retrofit will not develop without first seeing, real, evidenced demand emerge, meaning that the supply chain and the stimulation of demand needs to take place in tandem. In particular, the issue of a shortage of a sufficiently large skilled workforce to deliver on this scale needs to be tackled across providers, learning and skills support agencies and trade bodies (Recommendation 4).
- The need to develop delivery models that build awareness of whole-house deeper retrofit, target those people most likely to be early adopters of it, build trust in delivery and the supply chain and coordinate a smooth customer journey through the process (Recommendation 5).

Tackling these challenges in a way that then enables the retrofit of domestic properties at the required scale and depth will require innovative approaches to delivery in partnership between the public, private and third sector.

Reducing energy demand in commercial buildings

The energy demand from commercial buildings in Greater Manchester also needs to see a significant reduction, with modelling informing Greater Manchester's 5 Year Environment Plan based on a 30% decrease in commercial space heating demand by 2040.

There are similar barriers to reducing energy demand in Greater Manchester's commercial buildings. At present, the incentives for and ability of commercial property owners to retrofit their buildings to achieve these level of reductions are mixed. The valuing of energy efficiency in commercial buildings therefore needs to be built up in the market through better measurement and reporting, which would drive improvements. This includes:

- Building measurement and reporting into new developments using the planning system (Recommendation 6).
- Setting out a pathway for embedding measurement and reporting for commercial building heat demand, starting with voluntary reporting whilst looking at ways to encourage (e.g. via nudge) or mandate this in the future (Recommendation 7).

Reducing energy demand in public buildings

At the same time, Greater Manchester's public sector needs to lead by example in reducing the energy demand of its buildings. The Greater Manchester Combined Authority (GMCA) and local authorities have already made commitments around the energy efficiency of their buildings as part of the 5 Year Environment Plan. This should be adopted by other public sector organisations in Greater Manchester (e.g. health sector, universities) and measurement and reporting standardised to help drive up standards (Recommendation 8). Other organisations beyond the GMCA and local authorities should set ambitions and targets for energy efficiency as a result and deliver improvements against these (Recommendation 9).

How to take this forward

Tackling forward this challenge and implementing the recommendations in this report must be a joint effort between the public, private and third sectors. These organisations can each bring different areas of expertise to help take forward these recommendations. In addition, national government has some of the most powerful levers to tackling the issues set out here – this report provides a means of engaging government on Greater Manchester's needs and priorities.

Given that and the ambition of the 5 Year Environment Plan to adopt a mission-oriented approach to its implementation, it is recommended that a Retrofit Challenge Group be established in Greater Manchester as part of the Green City Region Partnership, providing a more formal means of bringing these organisations together to take forward the recommendations in this report and drive the change needed in Greater Manchester's buildings (Recommendation 10). This reflects the complex nature of the challenges faced and the need for coordinated action across sectors.

List of recommendations

No.	Detail
1	Partners across Greater Manchester should develop proposals for and push for changes to current the current ECO framework when it ends in 2022 to better align it with the city-region's ambitions.
2	Partners across Greater Manchester should carry out further research to identify appropriate space heating demand targets for Greater Manchester property types, informed by the emissions reductions in the SCATTER model. This work would provide a set of indicative targets required from the retrofit of homes to meet Greater Manchester's ambitions and that can be feasibly delivered at Greater Manchester's property types.
3	The GMCA, key partners and investors should work together to develop commercially attractive business models for investment in retrofit of social and private housing. At the same time, GMCA, working with key partners and government (to consider this as part of national policy and green finance initiatives), should develop options for the potential use of council tax as a "nudge" to increase energy efficiency.
4	The GMCA, learning and skills support agencies, providers, innovation hubs and existing trade bodies should come together to understand the future needs and opportunities presented by whole-house deep retrofit and develop packages of work to tackle the issues this identifies.
5	Partners across Greater Manchester should collaborate to develop a delivery model to build up local markets for whole-house deeper retrofit. This should build on and learn from the findings of recent work in this area, including government funded pilots like People Powered Retrofit and RetrofitWorks, as well as previous programmes like Green Deal Communities.
6	The GMCA and local authorities should explore the potential for introducing requirements for new developments to report on operational energy performance, and as part of that, on space heating demand.
7	Working with key partners, GMCA should develop and implement a pathway to lead to an increase in the measurement, reporting and improvement of energy efficiency in commercial buildings, and as part of that, on space heating demand.
8	The GMCA, local authorities and the public sector across Greater Manchester should ensure standardised measurement and annual reporting (as part of reporting against the 5 Year Environment Plan) on the energy efficiency of their buildings, including their Display Energy Certificate ratings and a measure of space heating demand.
9	The GMCA and local authorities should work to deliver agreed targets for the energy efficiency of their buildings, including their Display Energy Certificate ratings and developing a measure and targets for space heating demand, and encourage other public sector organisations to do likewise.
10	The GMCA should put in place a Greater Manchester Low Carbon Buildings Challenge Group, which, through establishing specific task and finish groups, would

	provide cross-sector approach to tackling the systemic challenges associated with retrofit across all building types.

1. Introduction and scope of this report

1.1 Introduction

Greater Manchester's buildings provide the homes in which people live and the places in which people work, spend their spare time and access public services. The city-region's buildings are essential to health and prosperity. Greater Manchester needs safe, good quality housing to live healthy, prosperous lives; it needs good quality workplaces to attract, retain and grow businesses; and it needs good quality public buildings in which people can access public services (e.g. education, health) and spend their spare time (e.g. accessing leisure and culture).

Having buildings that use less energy – are warm, safe, healthy, comfortable and cheaper to heat and produce lower CO_2 emissions – is a key part of this. A building's energy demand and how it uses its energy is a key factor in a building's comfort and the cost for its owner or occupier to power and heat it.

Alongside energy generation, a building's energy demand also has a key impact on a building's environmental footprint, with buildings a significant source of CO_2 emissions generated within Greater Manchester. 33% of Greater Manchester's CO_2 emissions are generated in homes, with a further 32% in business and industrial premises. Reducing CO_2 emissions from its buildings will be therefore be vital to Greater Manchester's wider aims for making its fair contribution to mitigating climate change and in delivering the ambitions set out in its 5 Year Environment Plan.

1.2 Scope

This report focusses on the action needed to decarbonise Greater Manchester's buildings to realise the multiple benefits this can bring. The report's main focus is on reducing their *demand* for energy through improvements to a building's fabric. The *supply* of energy to buildings is also crucial to decarbonising them. The priorities and actions required to decarbonise the sources of power (renewable energy generation) and heat (low carbon heating) to buildings is set out in Greater Manchester's Smart Energy Plan[1]. These are not duplicated in this report – however, it is recognised in this report that, at the level of a particular building or group of buildings, putting in place measures to a building's fabric that reduce demand alongside energy generation/storage is likely to deliver multiple benefits, for both the homeowner/occupier and in reducing CO_2 emissions.

In terms of the priorities related to reducing energy demand, the following points set out the scope of this report:

- Ways of reducing energy demand – the report's main focus is on how efficient buildings are at being heated and kept warm, whilst maintaining good levels of ventilation. This is due to the fact that this is the most significant challenge in reducing CO_2 emissions from buildings. Other activities, which result in energy demand in buildings are less significant and are not covered within this report. These include:
    - Active cooling – these technologies (e.g. air conditioning) are generally not installed at domestic properties. In commercial properties, active cooling is estimated to only account for an eighth of the energy consumption that

[1] Greater Manchester Smart Energy Action Plan

heating does[2] (0.75 TWh/year for cooling versus 5.8 TWh/year for heating). However, the demand for cooling is likely to increase in future years given the predicted impacts of climate change on Greater Manchester. Cooling will therefore need to be taken into account in the design and carrying out of retrofitting of buildings, particularly in ventilation, glazing and shading.

- Hot water – the efficiency of hot water systems is largely reliant on the efficiency of the appliance and system installed, with new appliances required to meet certain efficiency rating standards.
- Appliances and lighting – efficiency continues to be driven up by product design standards, requiring certain efficiency rating standards in new products.
- Industrial energy use – the use of energy for industrial processes is not covered within this report and will instead be looked at through the development of a Greater Manchester Sustainable Consumption and Production Plan, which will include a focus on resource efficiency.

- Age of buildings – the report largely focusses on existing buildings rather than new buildings that will be constructed in the future. In Greater Manchester, there are around 1.2 million existing homes (see Figure 1 for the age of Greater Manchester's domestic properties), of which the vast majority (95%) are likely to still be in use by 2050. The Greater Manchester Spatial Framework sets out the objective to deliver 201,000 new homes by 2037, alongside ambitions for office, industrial and warehousing space. The approach of the GMCA and Local Authorities to decarbonising new buildings and developments through spatial planning policy is set out in the Greater Manchester Spatial Framework[3].

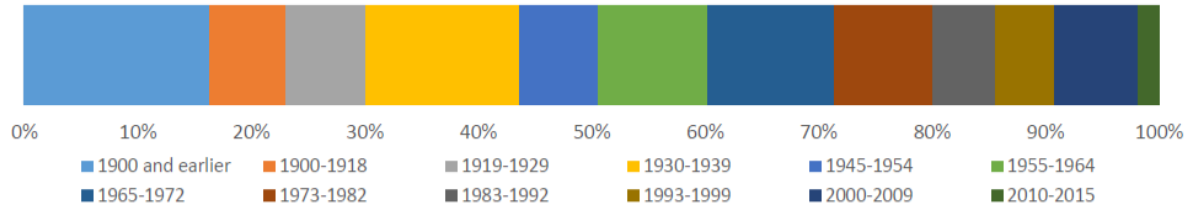

Figure 1: Age distribution of Greater Manchester's domestic properties.

Source: Greater Manchester Spatial Energy Plan[4]

- Type and use of buildings – this report recognises the differences between domestic and non-domestic properties. Within the latter category, the report looks at commercial and public buildings separately.

[2] Spatial Energy Plan (2016) – extrapolating figures for cooling demand across the north west to a Greater Manchester level (using a per capita measure).
[3] Greater Manchester Spatial Framework
[4] Greater Manchester Spatial Energy Plan

1.3 Structure of this report

The subsequent sections of this report are structured as follows:

- Section 2 – why Greater Manchester needs to take action now to reduce energy demand in its existing buildings.
- Sections 3, 4 and 5 – these take domestic, commercial and public buildings in turn, with each looking at:
    - Where Greater Manchester needs to get to
    - Where Greater Manchester is now and what this means for what needs to be done now and over the next 5 years.
- Section 6 – how the recommendations set out in this report should be taken forward by the GMCA and key stakeholders.

2. Why does Greater Manchester need to take action?

2.1 The multiple benefits of taking action

Taking action to reduce energy demand in Greater Manchester's existing buildings can have multiple benefits across numerous areas, for:

- People – for residents' health, education, jobs, income and productivity.
- Economy – improved productivity and the potential for the creation of new jobs and new skills as well as reduced pressures on public finances.
- Environment – making a significant contribution to reducing CO_2 emissions.

These are set out in further detail below.

2.2 Benefits for Greater Manchester's residents

Reducing energy demand through making improvements to a building's fabric offers substantial health benefits. Homes that are cold and have poor ventilation and internal air quality exacerbate existing conditions (such as respiratory illnesses or mental health conditions), particularly in the young and elderly. For example, research has shown that:

- Excess winter deaths are three times higher in the coldest quarter of homes compared to the warmest quarter[5]. The 2016/17 winter saw 34,300 excess winter deaths across the UK, of which around 30% were estimated to be attributable to living in a cold home[6].
- Children living in inadequately heated households are twice as likely to suffer from conditions such as asthma and bronchitis as those living in warm homes[4].
- Those living with a bedroom below 15ºC are 50% more likely to suffer from mental conditions such as depression and anxiety than those with a well-heated bedroom.

Alongside health benefits, reducing energy demand can also have economic benefits for individuals and households associated with lower fuel bills (which can potentially be used to contribute to funding building fabric improvements) and greater resilience to future rises in energy prices.

This is of particular importance in Greater Manchester, where it is estimated that 157,000 households (c.13% of all households) are classified as being in fuel poverty – in that they cannot afford to adequately heat their home[7]. Across Greater Manchester's 10 districts, all except Stockport have fuel poverty rates above the national average (see Figure 2). In Manchester, nearly 1 in 5 residents (17.9%) live in fuel poverty. Fuel poverty rates across all 10 districts have increased over the last 3 years. Spatial analysis of fuel poverty across Greater Manchester (see Spatial Energy Plan) in 2016 showed that areas of central Manchester and Fallowfield had the highest density of fuel poverty – areas which also have greater amounts of older housing in poor condition.

[5] Friends of the Earth – Cold Homes Health Report
[6] E3G Cold Homes and Excess Winter Deaths Press Release
[7] UK Government Fuel Poverty Statistics

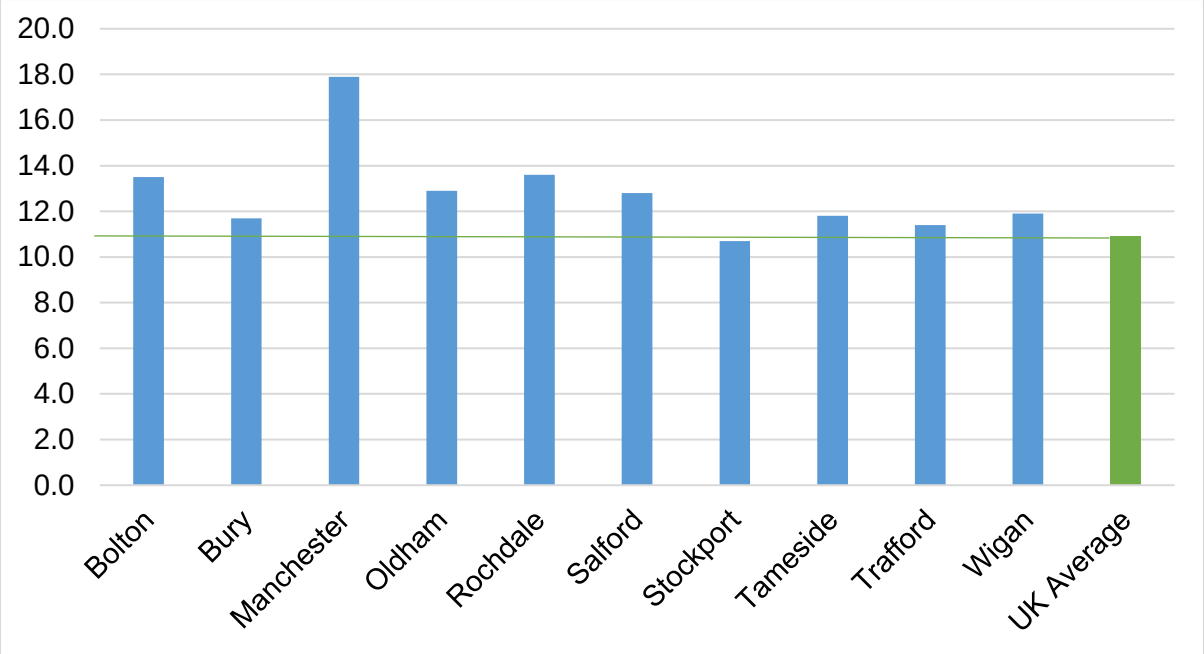

Figure 2 – Proportion (%) of Greater Manchester households in fuel poverty by district

Source: Fuel Poverty Sub Regional Statistics[8]

As well as the link between energy demand and energy bills, the proportion of household income spent on energy can have knock-on impacts – including on nutrition (e.g. how well a household can afford to eat) and household relationships (e.g. due to the stresses of managing a household's bills and expenses). Research has shown that energy efficiency improvements can also help improve the equality of opportunities from lower income groups – for example, an energy efficiency programme in New Zealand led to a 21% fall in children's absence from school over winter months and fewer GP visits[9].

2.3 Benefits for Greater Manchester's economy

Investing in reducing energy demand and making buildings more energy efficient can also have significant wider economic benefits. Research in 2014[10] indicated that energy efficiency programmes can have a benefit to cost ratio of 2.27 to 1, representing a potential "high value" infrastructure programme that would also target low income households. A major infrastructure programme, as modelled in this research, would lead to an increase in net employment of around 70,000 new jobs across the UK by 2030. Improvements beyond those underpinning this model are required to achieve Greater Manchester's ambitions (see section 2.4.2). This will require greater expenditure, potentially reducing that cost-benefit ratio unless further benefits can be quantified. However, this investment would also generate more jobs, with the potential to create 55,000 jobs in Greater Manchester alone.

[8] https://www.gov.uk/government/collections/fuel-poverty-sub-regional-statistics
[9] https://www.asthmafoundation.org.nz/research/improving-health-and-energy-efficiency-through-community-based-housing-interventions
[10] https://www.housingnet.co.uk/pdf/Building-the-Future-Final-report_October-2014_ISSUED.pdf

There are also potential benefits to the wider economy, in terms of reducing the economic losses associated with poor energy efficiency through missed work, missed time at school and lower productivity. Increased energy efficiency can increase social mobility, for example as a result of positive impacts on school attendance and educational attainment, which would have a knock on effect on job and employment prospects of lower income households. In commercial buildings, businesses that lower their energy costs will, by association, be more competitive, productive and profitable. There is also evidence that businesses that are more sustainable are more attractive to potential employees[11] and potentially healthier and therefore more productive workplaces[12]. Emerging markets for more energy efficient commercial buildings also present an opportunity for commercial landlords.

Improving energy efficiency can also have positive impacts for public spending. The cost of cold homes to the NHS has been estimated to be between £600m-£2.5bn (depending on the method used[13]), or up 1.7% of total NHS spending (as of 2016/17 figures). Investing £1 in keeping homes warm is estimated to save the NHS £0.42 in direct health costs[14]. There is therefore the potential to make significant savings in public health costs if energy efficiency of homes can be improved. This could also extend to other public services, including income support and debt advice, if energy costs decrease. Improving energy efficiency across the public estate offers potential bill savings that could be redirected into public services.

2.4 Benefits for Greater Manchester's environment

2.4.1 Buildings' energy use and CO_2 emissions

Greater Manchester's buildings use significant amounts of energy. The types of energy and sectors in which it is used are set out in Figure 3.

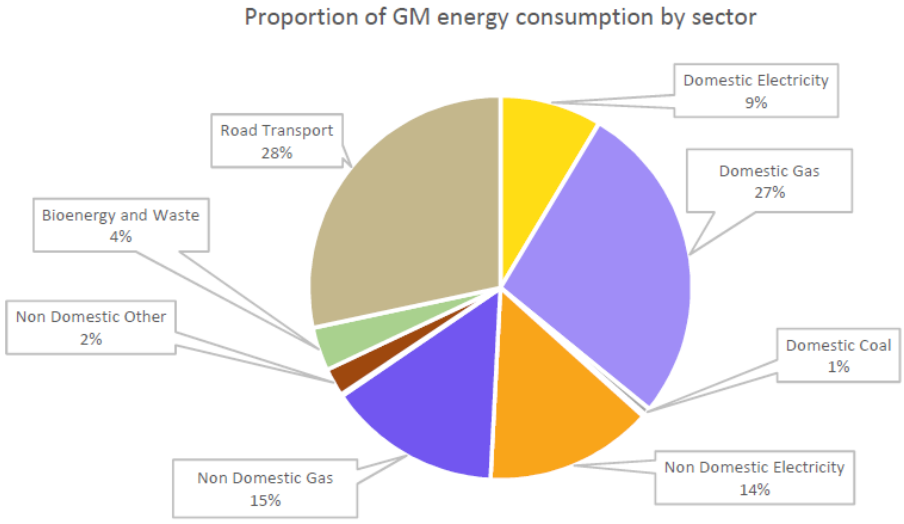

Figure 3 – Proportion of energy consumption by sector in Greater Manchester

Source: Greater Manchester Spatial Energy Plan

[11] fastcompany.com – most millennials would take a pay cut to work at a sustainable company
[12] ukgbc.org.uk – health wellbeing productivity offices next chapter green building
[13] bre.co.uk – Cost of poor housing briefing paper pdf
[14] sthc.co.uk – CMO Report2009 pdf

This shows that 58% of the energy used in Greater Manchester's domestic and non-domestic buildings is gas, with electricity providing 32%, and 10% coming from other sources (including coal, bioenergy and energy from waste). Across Greater Manchester's homes, 73% of energy used is gas for heating (with 95% of Greater Manchester postcodes connected to the gas grid), with a further 24% of energy use being electricity. Coal is used in relatively small proportions (3%) but is higher in certain parts of the city region (most notably in Wigan, where coal accounts for 8% of energy use in homes).

In non-domestic buildings, energy use varies depending on the activities carried out – overall, gas and electricity make up about half each of energy use in non-domestic buildings. Unless action is taken, the predicted growth in Greater Manchester's population, the planned number of new homes and amount of new commercial floorspace will lead to a 3% increase in energy demand by 2035, arising from heating and electricity use in these new buildings.

The energy used in Greater Manchester's buildings translates to them being a significant contributor to the city-region's CO_2 emissions (see Figure 4).

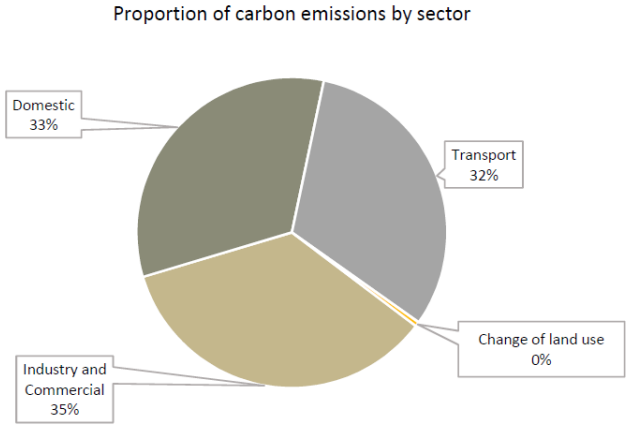

Figure 4 – Proportion of carbon emissions by sector in Greater Manchester

Source: Greater Manchester Spatial Energy Plan

2.4.2 The scale of reductions in CO_2 emissions required

2.4.2.1 The use of models to inform CO_2 reduction pathways

Taking action to reduce buildings' energy consumption is therefore vital in achieving Greater Manchester's wider aims for its contribution to global efforts to mitigate climate change. The vision for how the city-region will do this is set out in the 5 Year Environment Plan for Greater Manchester[15] and is supported by a set of aims, including the following for reducing the city-region's CO_2 emissions:

> *"For our city-region to be carbon neutral by 2038 and meet carbon budgets that comply with international commitments."*

This aim is based on research[16] by the Tyndall Centre for Climate Research, which calculated a carbon budget for Greater Manchester that is compatible with the Paris Agreement. During the development of the 5 Year Environment Plan, the GMCA

[15] 5 year environment plan for Greater Manchester pdf
[16] research.manchester.ac.uk -Tyndall quantifying Paris for Manchester report pdf

commissioned research using two tools to understand potential CO_2 emission reduction pathways for Greater Manchester to meet this aim. These are as follows:

- Setting City Area Targets and Trajectories for Emissions Reductions (SCATTER)[17] – this is a model that provides different emission reduction pathways depending on local decisions taken across over 40 different interventions (including on the energy demand of buildings), which can each be implemented to 4 different extents. This allows the tool to be adapted to reflect local circumstances and provides a modelled pathway based on decisions across these interventions.
- Energy System Modelling Environment (ESME) – this model considers the whole UK energy system and models the most cost effective way of Greater Manchester both becoming carbon neutral by 2040 and attempting to minimise emissions prior to then. The model is driven by the target put into it, and will output the most cost-effective way to achieve that.

The graph below (see Figure 5) sets out potential carbon reduction pathways for Greater Manchester from the SCATTER model, upon which the actions in the 5 Year Environment Plan is based, against the budget recommended by the Tyndall Centre's research.

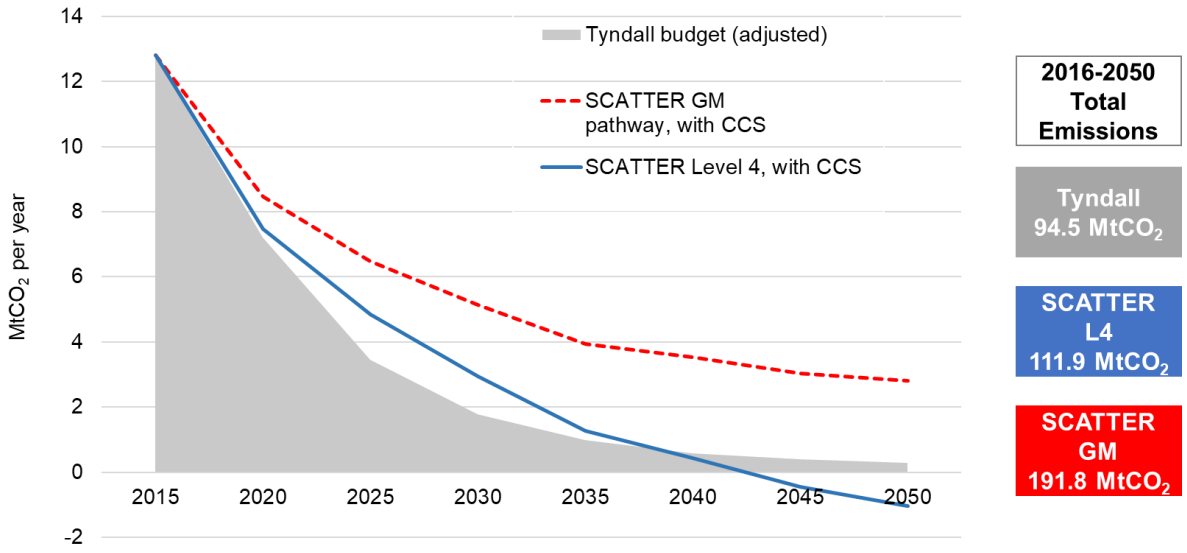

Figure 5 – Potential Carbon Reduction Pathways for Greater Manchester

Source: Anthesis

This sets out two scenarios:

- A "SCATTER Level 4" pathway – in which each of the 40+ interventions in the model are pulled to the maximum extent. Under this model, carbon neutrality is possible to achieve but even under this highly ambitious and transformative scenario, emissions of nearly 20% above the Tyndall Centre's recommended budget[18] are produced in Greater Manchester by 2050.
- A "SCATTER GM" pathway – in which each of the 40+ interventions in the model are set according to an estimate of what is currently planned and what might be

[17] anthesisgroup.com – scatter carbon footprint reduction tool
[18] Extrapolated to cover 2015-2050 from 2018-2050 in the Tyndall Centre's original report

achievable in the future in Greater Manchester. Under this model, emissions of over double the Tyndall's recommended budget are produced by 2050 despite it still requiring significant transformative change.

2.4.2.2 Using these models to inform the action needed

Underpinning these trajectories, the models show us the scale of change required and an indication of the actions required to achieve these levels of reductions.

The models highlight the importance of the role of the energy used in buildings in achieving emissions reductions. In SCATTER, emissions from both domestic and non-domestic buildings (from both the energy they are supplied with and the amount of energy they are used) each reduce by around 50% by 2025 (on a 2015 baseline) (see Figure 6).

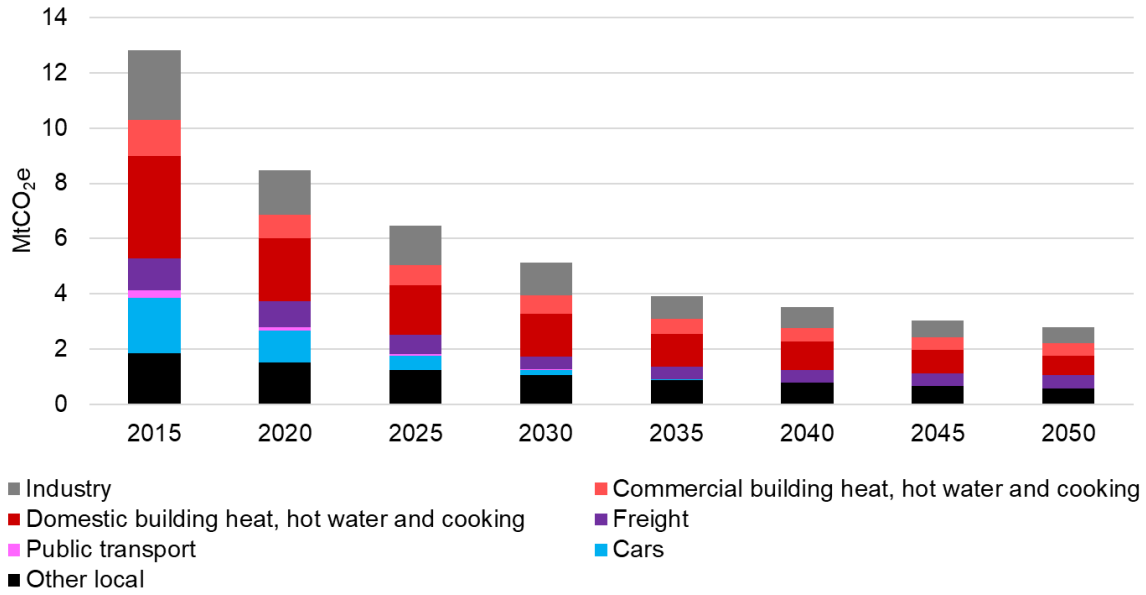

Figure 6 – Sectors where emission reductions come from ("SCATTER GM" pathway)
Source: Anthesis

In the ESME model, less significant reductions in emissions from buildings are made up to 2030, at which point emissions are reduced dramatically, driven predominantly by the uptake of low carbon heating systems alongside less significant decreases in energy demand than in SCATTER (see Figure 7).

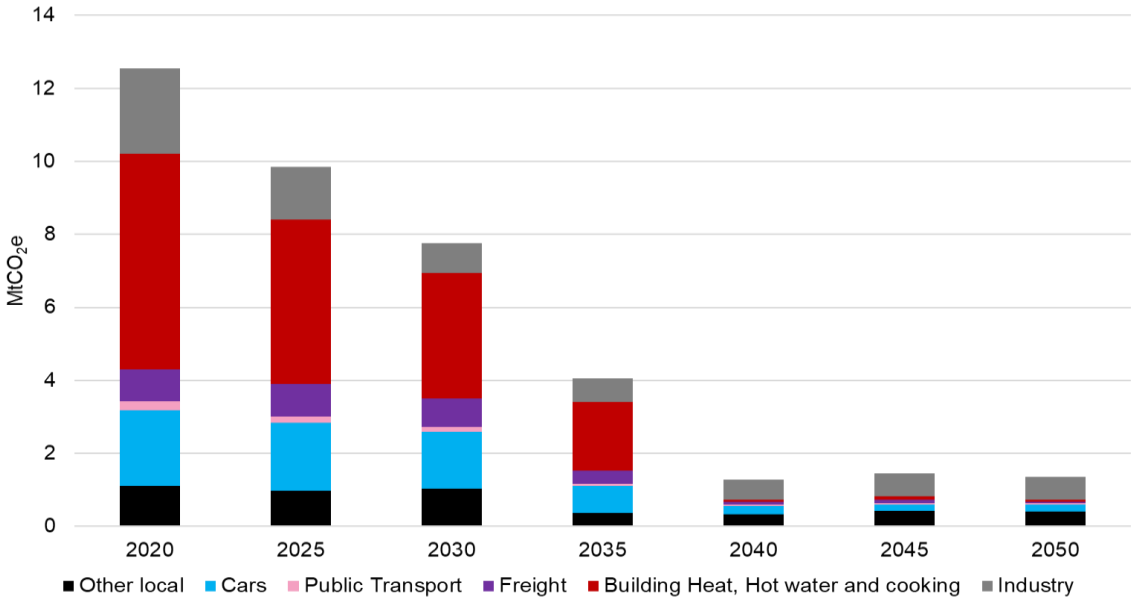

Figure 7 – Sectors where emission reductions come from (ESME pathway)

Source: Energy Systems Catapult

Despite differences in the timing and extent of reductions in emissions from buildings, the models are in agreement in the types of actions that are needed in order to realise reductions in emissions. The reductions set out in the SCATTER and ESME models are both based on reducing the demand for energy in buildings through the installation of measures to a building's fabric to improve thermal performance. Further detail on this is set out below.

a. <u>For domestic properties:</u>

In SCATTER, the model makes assumptions about the level of different insulation measures retrofitted at homes across Greater Manchester by 2040. The table below shows the assumed levels of penetration into Greater Manchester's homes by 2040 of these measures. This translates into 61,000 homes per year requiring some sort of retrofit (but averaging a 57% decrease in "thermal leakiness" – a measure of heat loss – per house) being carried out in the SCATTER GM pathway.

Retrofit Measure	**SCATTER L4 Assumption i.e. assumed technical capacity for these measures (% of households by 2040)**	**SCATTER GM Assumption (% of households by 2040)**
Solid wall insulation	28%	24%
Cavity wall insulation	32%	28%
Floor insulation	42%	36%
Superglazing (i.e triple glazing)	83%	72%
Lofts	78%	68%
Draughtproofing	88%	76%

In the ESME model, less ambitious interventions are made in terms of extent (about 60% fewer properties per year than SCATTER) and depth of the measures put in place. In the ESME model, emissions reductions are instead driven to a greater extent by the decarbonisation of energy supply, through the electrification of home heating. This is due to the model implementing the most cost-effective measures at a national or whole system level. The measures chosen by the model is a package that, where appropriate includes, wall insulation, loft insulation, floor edge insulation, draught stripping, single room heat recovery and heating controls. It does not include floor insulation, window replacement and door replacement, which the model does not choose to use due to their cost. This package is expected to deliver on average a 20-30% energy saving.

The models therefore highlight the potential choice to be made between both the number of homes at which improvements are made and the level of the measures to be implemented. However, they both indicate the need for a step change in the extent and level of current uptake of measures.

b. <u>For commercial and public buildings:</u>

The models are more similar in their assumptions about energy demand in commercial and public buildings. Again, the reductions in SCATTER are more significant than in ESME, as set out below.

Timeframe	**Reduction in heating and cooling demand – SCATTER GM**	**Reduction in heating and cooling demand – ESME**
By 2025	10%	5%
By 2030	13%	8%
By 2035	17%	10%
By 2040	22%	13%

Both ESME and SCATTER model reductions that will be extremely challenging to achieve, requiring unprecedented transformational change and financial investment. Turning these scenarios into reality requires immediate, radical actions over the next 5 years and beyond.

For all building types, the SCATTER GM model highlights the need to act quickly to reduce energy demand in buildings. If there was to be no change in how Greater Manchester's heat was supplied (e.g. a shift to electrified heating and/or heat networks or hydrogen ingress into the gas grid) or in its demand over the next 5 years, all other sources of CO_2 emissions (including from private vehicles, buses, industry and freight) would have needed to reduce to zero by 2025 in order for us to reduce emissions in line with the SCATTER GM model.

The models result in different futures for Greater Manchester. ESME would see us more reliant on decarbonisation of the national gird rather than local renewable generation. As set out above, the ESME model also places less reliance on local efforts to reduce demand. It models this approach as the most cost-effective way to reduce emissions, but does not account for the wider benefits to Greater Manchester of greater local renewable energy generation and local reductions in demand. Acting locally to reduce energy demand also provides a low/no regrets way of reducing CO_2 emissions, particularly if efforts to decarbonise the supply of energy (e.g. through local electricity generation or decarbonising

heat) fail to deliver on the scale required. Taking this local approach at a city-region scale is supported by the direction of policy in this area at an EU[19] and UK scale.

As it did through its 5-Year Environment Plan, Greater Manchester therefore needs to base its ambitions, approach and targets on the type and scale of action required in the SCATTER model to reduce CO_2 in buildings. The subsequent sections taking domestic properties and then non-domestic properties (commercial and public buildings) in turn are informed by this modelling work.

[19] cor.europa.eu – unlocking the potential of local energy communities

3. Domestic properties

3.1 Where does Greater Manchester need to get to?

3.1.1 Priorities for decreasing energy demand in domestic properties

For domestic properties, these challenges and underpinning evidence points to a two-pronged approach to reducing energy demand in Greater Manchester's homes:

1. **Tackling fuel poverty** through supporting the installation of energy efficiency measures to maximise the co-benefits of more energy efficient, warm and healthy homes for people's health, well-being and prosperity and for the wider economy.
2. **Delivering the level of energy demand reduction required across all households to meet Greater Manchester's aims for CO_2 emissions reductions** through upscaling whole-house deeper retrofit of measures (thermal elements, improved air tightness along with the provision of ventilation with heat recovery) to increase energy efficiency to a greater degree (at the property level) and extent (across a wider range of households).

3.1.2 Tackling fuel poverty by reducing energy demand

Given the level and persistence of fuel poverty across households in Greater Manchester and the potential wide range of benefits for people, the economy and environment from tackling it, reducing the number of households in fuel poverty by reducing the energy demand in their homes should remain a key priority. Approaches should focus on prioritising those households that are hardest to engage, taking local approaches to targeting them.

3.1.3 Delivering the level of fabric improvements required across all households to meet Greater Manchester's aims for CO_2 emissions reductions

The results of both the SCATTER and ESME models set out in section 2.4.2 indicate that a step change in reducing the energy demand of homes is required. However, the interventions in both SCATTER and ESME are indicative of the overall scale of change required, rather than being a prescriptive or transferrable set of interventions required to be put in place across Greater Manchester's housing stock. The reductions in the SCATTER model therefore need to be translated to a measurable target of space heating demand and CO_2 emissions required at the level of each individual home.

At present, there are measures for the energy efficiency of homes. The most well-known and widespread of these is the Energy Performance Certificate (EPC). EPCs contain information about a property's energy use and typical energy costs and recommendations about how to reduce energy use and save money. Ratings are required for properties at the point of construction, sale or rent[20]. However, ratings are affected by measures beyond energy demand (e.g. renewable energy generation) and forthcoming changes are planned in the methodology that underpins the ratings. EPC ratings on their own are therefore not particularly useful proxies for energy efficiency; however, the data within them can be

[20] A minimum EPC E-rating will be required for all privately rented properties from 1 April 2020.

disaggregated and used as part of developing a measurable target of space heating demand and CO2 emissions required at the level of each individual home.

Separately to EPCs, independent standards and methodologies – such as the Passivhaus standard[21] – have also been developed and implemented, including in properties in Greater Manchester.

Further work is required to develop an appropriate and practicable measure (a space heating demand target) that can inform homeowners and those carrying out works to reduce energy demand in their homes of what needs to be achieved at the level of the individual home to achieve the emissions reductions required and maximise the wider co-benefits of doing so.

3.1.4 Enabling a "just transition"

In focussing on these two areas, it is crucial that this does not lead to a twin-track approach between those able to pay for deeper retrofit measures and those who are either unable to or whose private landlords are unwilling to pay. The focus instead should be on developing approaches that allow deeper retrofit to be extended to those homeowners or tenants who are in fuel poverty or who cannot afford the scale of deep retrofit required. For example, research[22] – *"Finance Models for Retrofit"* – highlights the potential financial products that could be used for different people and at different scales (e.g. the use of loans from LAs to fuel poor households for energy efficiency improvements, such as the HELP scheme in Manchester[23]).

The overall approach could be through initially focussing on social housing providers and their fuel poor tenants, alongside able-to-pay households, in order to develop models to tackle the current barriers to uptake which exist across all households. Reducing energy demand should be part of wider efforts to improve the quality of housing provided by the private rented sector.

3.2 Where is Greater Manchester now and what action is needed over the next 5 years?

3.2.1 Tackling fuel poverty by reducing energy demand

3.2.1.1 Current fuel poverty national policy

Fuel poverty initiatives in Greater Manchester are mainly provided for and funded by the government's Energy Company Obligation (ECO), which places legal obligations on larger energy suppliers to deliver energy efficiency measures to domestic premises of for low income, fuel poor and vulnerable householders. The current programme (2018-2022) has a value of around £640m per year across Great Britain.

[21] passivhaustrust.org.uk
[22] shapuk.com - finance models for retrofit of all housing tenures pdf
[23] careandrepair-manchester.org.uk – the home energy loan plan

3.2.1.2 Local fuel poverty initiatives

Local authorities in Greater Manchester are maximising the amount of funding and support available to fuel poor households. This includes specific programmes, such as the following:

- Fuel poverty outreach and advice schemes operating in each borough of Greater Manchester[24], providing services to low income and vulnerable households of all tenures. This includes home energy advice visits, income maximisation advice, some simple energy efficiency measures (e.g. draught excluders, LED light bulbs) and referrals for larger energy efficiency measures funded by ECO. Through one of these programmes (the Local Energy Advice Programme – LEAP) operating over 7 Local Authorities, over the 9 months from June 2018 to April 2019, over 1175 households were visited, with total lifetime bill savings of over £1.2 million achieved.
- Funding under the national Warm Homes Fund scheme. The Greater Manchester programme under this national scheme is planned to deliver a total of 500 first time central heating systems by autumn 2019 and plans are in place for a successor scheme to run from 2019 to 2021. This will reduce bills, increase comfort in non-gas fuel poor households, and improve health outcomes for some of the most severe levels of fuel poverty.

3.2.1.3 Locally led research into fuel poverty – the STEP-IN project.

In Greater Manchester, further work has been carried out to understand issues facing residents in fuel poverty – through the STEP-IN project. Led by the University of Manchester, with support from the GMCA and Groundwork, STEP-IN is an EU-Horizon 2020 funded project that has developed an innovative methodology for the analysis and tackling of fuel poverty and energy vulnerability. The project focuses on the impact that energy efficiency improvements can have on the quality of life and overall comfort levels of individuals that struggle with their energy bills. Three Living Labs were set up to implement the methodology developed. The Living Lab locations include Greater Manchester in the UK, Metsovo in Greece and Nyirbátor District in Hungary. Through these Living Labs local experts, stakeholders and energy poor consumers were brought together to undertake action on energy efficiency in a number of ways including energy cafes, advisor visits and use of ICT systems.

In Greater Manchester, the lab principally involves the development, provision and evaluation of energy advice, via specialised energy advisors from Groundwork. The advisors share knowledge and resources relating to keeping warm, reducing energy costs, and accessing financial support. As part of the lab, online Energy Cafes took place so as to provide citizens an opportunity to interact with the advisors. Once concluded in early 2021, this will provide further evidence to support the case for changes to how those in fuel poverty are supported.

[24] Bolton – Care and Repair; Oldham – Warm Homes Oldham; Wigan – AWARM Plus; Bury, Manchester, Rochdale, Salford, Stockport, Tameside, Trafford – Local Energy Advice Programme.

3.2.1.4 Gaps and issues with the ECO framework

Although these schemes are vital to the residents that benefit from them, further investment to increase their scale and ambition would be required for them to make a significant contribution to Greater Manchester's aims for reducing its CO_2 emissions.

These obligations are paid for by energy companies via on-bill levies. Given that energy bills account for around 10% of household expenditure for the poorest households and 3% for the richest[25], this means that poor households make a greater proportionate contribution than richer households. Fuel-poor are also among the least likely to engage in and benefit from schemes like ECO. Analysis by IPPR[26] suggests that elevating all fuel-poor households to government targets of energy efficiency (Energy Performance Certificate Band C) by 2030 will not be achieved until at least 2091 under current rates of installation.

These measures will not deliver what is required in Greater Manchester to meet its wider ambitions, particularly its aims for CO_2 emissions reductions, given that:

- ECO can only support households in fuel poverty, meaning at least 80% of homes in each district are not eligible.
- The measures currently delivered under ECO, coupled with the government's level of ambition (fuel poor homes to be EPC rated C by 2030) mean these arrangements will not be sufficient to deliver the scale of reductions in CO_2 emissions in Greater Manchester to meet its aims.

Recommendation 1: Partners across Greater Manchester should develop proposals for and push for changes to current the current ECO framework when it ends in 2022 to better align it with the city-region's ambitions.

GMCA and local authorities are maximising the use of available ECO funding and local flexibilities in Greater Manchester. The GMCA and key partners should develop proposals for changes to ECO from 2022 and work with government on these, including:

- How funding through general taxation rather than energy bills would benefit Greater Manchester residents.
- How ECO could be transformed from a supplier-led scheme to a local area-based scheme in Greater Manchester, supported by appropriate delivery arrangements.
- How this could support ambitions for a whole-house deeper retrofit approach in Greater Manchester and supporting fuel poor households in this – e.g. through being a component of a blended finance approach to funding retrofit.

3.2.2 Delivering the level of fabric improvements required across all households to meet Greater Manchester's aims for CO_2 emissions reductions

3.2.2.1 Taking a whole-house approach

The evidence provided by the modelling work set out in section 2.4.2 indicates that to achieve the scale of reductions in CO_2 emissions required, a step-change in the extent and depth of the current thermal performance of homes is needed to realise significant reductions in energy demand.

[25] ukerc.ac.uk – funding a low carbon energy system
[26] ippr.org – fuel poverty june18 summary pdf

As referred to in section 3.1.3, further work is required to understand:

a) What level of space heating demand is required across Greater Manchester's different types of domestic properties, based on the SCATTER model.
b) What Greater Manchester's different types of domestic property can feasibly deliver in terms of space heating demand.

Recommendation 2: Partners across Greater Manchester should carry out further research to identify appropriate space heating demand targets for Greater Manchester property types, informed by the emissions reductions in the SCATTER model. This work would provide a set of indicative targets required from the retrofit of homes to meet Greater Manchester's ambitions and that can be feasibly delivered at Greater Manchester's property types.

In order to provide greater clarity on the scale of change in energy efficiency required from existing homes, it is recommended that indicative space heating demand targets (e.g. kWh/m^2/year) be developed for Greater Manchester's domestic properties. This should be based on the reductions set out in the SCATTER model, so that the GMCA and stakeholders can understand how much domestic properties can feasibly contribute to the trajectories for CO_2 emissions reductions in Greater Manchester set out in the model.

This target would need to be developed with the input of stakeholders in Greater Manchester, drawing on existing information within EPCs, data available from Ofgem, existing UK standards, and, potentially, emerging data from smart meters. It would need to be adapted for Greater Manchester and to different archetypes, ages and occupancy levels of properties.

Notwithstanding the issue of understanding what needs to be done at the level of the individual property, the installation rate of insulation measures is estimated to have reduced significantly over the last 5-7 years with significant untapped potential to upgrade existing homes[27]. Although national schemes have changed over that period, progress on improving the energy efficiency of buildings has stalled, and installation rates are now 5% of what they were in 2012[28]. If Greater Manchester is to meet its aims for reducing its CO_2 emissions, this situation needs to change quickly.

The SCATTER and ESME models provide only a theoretical implementation of measures rather than a practicable way of delivering them. An approach of staged implementation of the insulation measures put in place in the models would lead to incremental improvements in energy efficiency at the expense of holistic whole-house solutions. A whole-property or whole-house approach was a key recommendation in the *Each Home Counts*[29] review, commissioned by the government in 2015, and is being developed in standards for domestic retrofit (PAS2035[30] standard). Modelling[31] undertaken by the Centre for Sustainable Energy on behalf of the Committee on Climate Change suggests that policy should be designed to incentivise efficient long-term investments, rather than piecemeal or incremental change carried out without it being part of an overall retrofit plan for that home.

Together, this evidence points to the development and support of deeper retrofit through a holistic, whole-house approach – with measures carried out in one go or in stages as part of a property-level plan and including consideration of renewable energy generation and

[27] gov.uk – estimates of home insulation levels in Great Britain
[28] theccc.org.uk – 2018 progress report to parliament pdf
[29] gov.uk – each home counts December 2016 pdf
[30] standardsdevelopment.bsigroup.com - projects
[31] theccc.org.uk – Final report on fuel poverty Nov 2014 pdf

storage opportunities to reduce emissions. This approach also maximises the multiple co-benefits set out in section 2.1, in particular by improving comfort, ventilation and internal air quality, reducing energy bills significantly and reducing maintenance and refurbishment costs in the longer term.

3.2.2.2 Examples of whole-house deeper retrofit

To date, whole-house approaches to deeper retrofit of domestic properties have been relatively limited – either in scale (i.e. limited to small numbers of homes) or in the diversity of the sources of funding they have attracted (i.e. relying on public rather than bringing in private investment). This is problematic given the scale of change required in Greater Manchester to deliver its aims for reducing CO_2 emissions and to maximise the co-benefits action on this scale will bring to its economy. Funding this level of change is also potentially more sustainable if a broader range of funding sources can be brought in to finance this investment.

However, several projects have taken or are currently taking place that have been important in demonstrating that levels of space heating demand and CO_2 emissions reductions of the scale needed can be achieved by taking a whole-house approach. In Greater Manchester, several past and current projects[32] have demonstrated that emissions reductions of the scale required can be made through deeper retrofitting of insulation measures. These have been undertaken using different approaches and therefore at different levels of cost. Other projects across the UK, such as Energiesprong in Nottingham have done likewise – this project is being supported European Regional Development Funding to support the retrofit of 150 homes to an "ultra-low carbon" standard.

3.2.2.3 The current barriers to whole-house deeper retrofit

The barriers to whole-house deeper retrofit, both in Greater Manchester and across the UK, are not technical or geographical, rather scale-up is inhibited by issues of:

- Supply – having a supply chain with sufficient skills and capacity (people) and the right products to deliver the scale required.
- Demand – there being sufficient demand amongst owner-occupiers, social landlords and private landlords so that this scale-up can be realised.
- Intermediary support – stimulating demand, linking that demand with the supply chain in more innovative ways (e.g. through a simplified service offer) and, at the same time, developing financial models and bringing to bear financial products to fund the high up-front capital costs currently associated with whole-house deeper retrofit.

These barriers are illustrated in the diagram below (see Figure 8). These align with those set out in the government's call for evidence (and subsequent responses) on *Building a market for energy efficiency*[33]. The section below focusses on those areas where local influence

[32] carbon.coop – community greendeal
superhomes.org.uk
usir.salford.ac.uk
ecospheric.co.uk/zetland
retrofit.innovateuk.org – Retrofit revealed: The retrofit for the future projects data analysis report
procure-plus.com – homes as energy systems
[33] gov.uk – building a market for energy efficiency call for evidence

can have the greatest impact. As government develops policy to respond to these barriers, it will be important for Greater Manchester to influence this, as well as adapting its approach in line with any new policy initiatives.

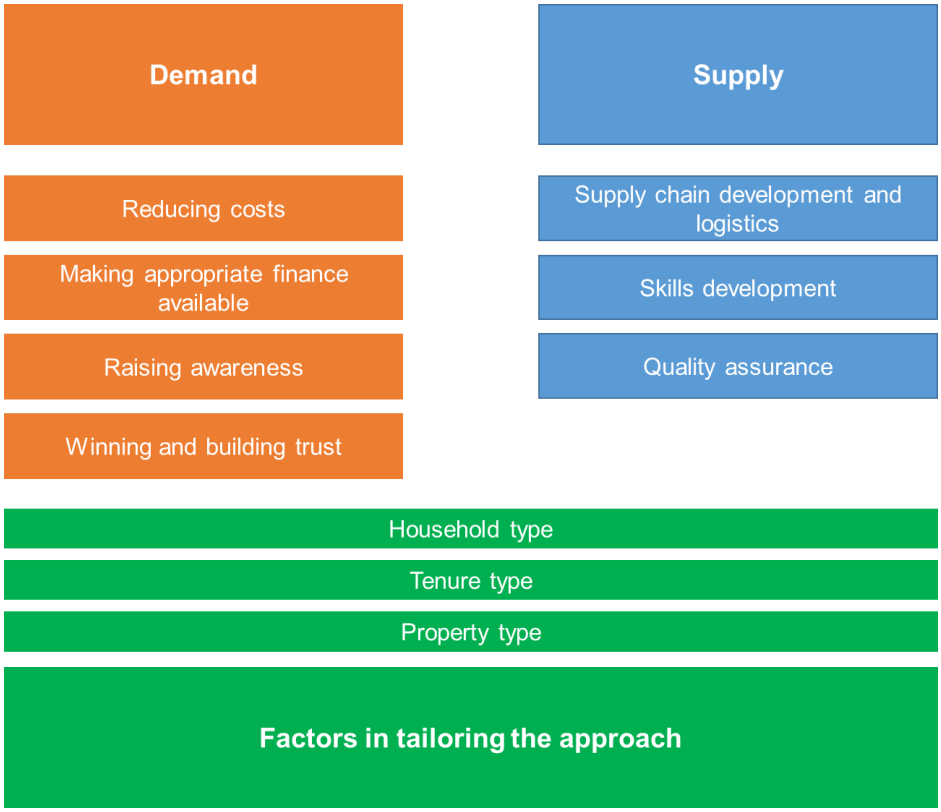

Figure 8 – Implementing a successful model for whole-house deeper retrofit

1. Demand – influencing the decisions and behaviours of home owners

The level of works required at properties to deliver whole-house deeper retrofit are invariably more disruptive, complex and expensive to install than basic measures. This approach to and depth of retrofit is not generally considered by most homeowners, even during purchase or when planning significant renovation projects. The challenge of this scale of work is not the technical challenge of the measures installed, but about engaging, encouraging and incentivising tenants and homeowners to install these measures. At the same time, financial products are needed to provide ways of overcoming the high up-front capital costs of works of this scale – estimates generally place the minimum cost at this level of retrofit at around £40,000 per property[34].

To do this requires a focus on the key areas below, which are mutually reinforcing rather than things to be seen in isolation. A recent BEIS-funded project[35] – *"People Powered Retrofit"* – piloted the creation of a local market for owner occupier retrofit at a neighbourhood scale including service design and delivery, local infrastructural development and supply chain development and quality assurance[36]. The £10.4m Homes as Energy

[34] carbon.coop – powering down together community green deal
[35] carbon.coop – new report advocates bottom up approach to retrofit
[36] carbon.coop – people powered retrofit householder centred approach energy efficiency systems

Systems[37] (HaES) project, part-funded through ERDF, will also help tackle this issue by proving the benefits of energy efficient homes with small scale electricity generation and storage aggregated into virtual network.

a. Reducing costs

Given the current high costs of the measures, focus needs to be placed on minimising costs. This can be tackled in two main ways:

- At the property level – taking a whole house approach from the outset, rather than renovations of particular parts of the home (e.g. a bathroom or kitchen renovation) without due consideration of the whole home. This would allow homeowners to take better-informed decisions as well as facilitating the installation of wider measures at reduced cost due to wider enabling activity already being underway. The installation of micro-generation and storage and low carbon heating at the same time as extensive retrofit measures may also help improve cost-effectiveness, by allowing the homeowner to benefit from the Smart Export Guarantee and Renewable Heat Incentive respectively. The aggregating of flexible assets and stored energy at a group of properties could be sold to Distribution System Operator local flexibility markets or balancing markets to further increase revenue to participating homeowners and intermediaries. These issues are covered in more detail in Greater Manchester's Smart Energy Plan.
- Across groups of properties – delivering at scale (across groups of property archetypes), developing packages of related measures, delivering economies of scale (e.g. through bulk purchasing) and upgrading tranches of properties together rather than on an individual basis. To enable this to be achieved, partnerships may be required between the public and private sector to bring together cohorts of properties to be retrofitted as part of a programme.

b. Making appropriate finance available

Even after reducing the overall costs, significant up-front capital will be required in order to fund whole-house deeper retrofit. Payback for these measures, in terms of energy bill savings, is likely to be over the long term. Therefore, appropriate finance is required to fund this. An approach that combines investment from the homeowner with public funding and private finance is most likely to be able to deliver these measures at scale.

- Homeowner investment – given the scale of up-front capital costs, homeowners are only likely to invest in these measures if they have set aside significant funds for a renovation project or are able to release equity in their properties to fund the improvements (e.g. the HEEPS scheme in Scotland[38]) or access low interest loans (e.g. the Home Energy Loan Plan scheme in Manchester[39]).
- Investment in energy generation and storage – investment in renewable energy generation, storage and low carbon heating at the same time as carrying out fabric improvements can bring co-benefits (e.g. reduced energy use which in turn is able to be met to a greater extent by renewable energy generated on-site; a better insulated building fabric which in turn makes the operation of a heat pump more efficient; carrying out works to a building's fabric and heating system at the same time). The

[37] https://www.procure-plus.com/case-studies/homes-as-energy-systems/
[38] http://www.energysavingtrust.org.uk/scotland/grants-loans/heeps/heeps-equity-loan-scheme
[39] https://www.careandrepair-manchester.org.uk/manchester-services/hrst/the-home-energy-loan-plan/

Homes as Energy Systems[40] Project and Heat as a Service model[41] are both looking at tackling retrofit alongside issues of energy generation and storage and low carbon heating.

- Public funding – there is currently no sufficiently targeted large scale public funding programme for energy efficiency measures of this scale and ambition in England. The Committee on Climate Change's 2018 report on progress for reducing emissions identifies the absence of concrete national policies to deliver and fund the scale of retrofit needed.
- Private finance – attracting sources of long-term, low cost private finance is key but at present poses a significant challenge due to a number of factors including:
    - The perception of domestic retrofit as complex and risky – which current projects are seeking to overcome (e.g. RetrofitWorks[42]).
    - The need to have confidence in stable returns before entering the market.
    - The need to overcome barriers through de-risking investment – e.g. by developing a track record in delivery, by attracting subsidies and revenue streams, by providing security (assets, income streams, subsidy) or by underwriting some of the risk.

While there is evidence of interest from institutional investors in retrofit, as yet there is no proven model against which to assign a credit rating and not enough critical mass of activity.

Mechanisms that can clawback the high upfront capital investment, through the recovery of uplifts in rents, value and tax revenue, are those most likely to succeed. This points to equity loans and green mortgages, alongside developing proposals for a revolving loan fund, being the most viable options to be explored further in Greater Manchester, whilst tailoring models to different parts of the market and scale[43] and working within government's policy development in this area[44].

Government is also considering the potential use of price signals – which could include fiscal measures linked to EPC ratings – to help drive uptake. There is an opportunity consider how local taxation might be used as part of this approach.

Recommendation 3: The GMCA, key partners and investors should work together to develop commercially attractive business models for investment in retrofit of social and private housing. At the same time, GMCA, working with key partners and government (to consider this as part of national policy and green finance initiatives), should develop options for the potential use of council tax as a "nudge" to increase energy efficiency.

The significant up-front capital costs associated with whole-house deeper retrofit, the long-term nature of payback (in terms of energy bill reductions or realising value/rental uplift) and the current lack of proven financial models for providing returns on other benefits (e.g. of improved health) are barriers that need to be overcome in the development of business models that are attractive to investors. Investment will therefore need to come from patient capital, potentially including:

- Equity loans – whether the GMCA or local authorities (or others) would develop an offer to take an equity share in some domestic properties and use that stake to lend money to the property owner for investment in whole-house deeper retrofit. An initiative such as

[40] https://www.procure-plus.com/case-studies/homes-as-energy-systems/
[41] https://es.catapult.org.uk/news/ssh2-introduction-to-heat-as-a-service/
[42] http://retrofitworks.co.uk/
[43] https://shapuk.files.wordpress.com/2018/07/finance-models-for-retrofit-of-all-housing-tenures.pdf
[44] https://www.gov.uk/government/consultations/building-a-market-for-energy-efficiency-call-for-evidence

this is already available to homeowners in parts of Scotland, run by the Scottish Government[45].
- Other forms of loans – whether there the GMCA or local authorities (or others) would establish a programme of loan funding (e.g. a revolving loan fund) to fund whole-house deeper retrofit at a large scale but for multiple recipients (homeowners).
- Green mortgages – whether there are mechanisms that can be implemented locally, alongside the national level actions of lenders and national government, to increase the availability and uptake of green mortgages in Greater Manchester.

As a component of this approach, GMCA and local authorities should, in collaboration with government and key partners, develop an understanding of the potential use of council tax as a means of "nudging" homeowners to make energy efficiency improvements. Implementation of such an approach could strengthen the economic case for homeowners by increasing the potential payoff and decreasing payback times. In developing these proposals, the cost imposed would need to not be excessive but sufficient enough to provide a "nudge," whilst at the same time not impacting detrimentally on fuel poor households. Changes should also be set in a way that are cost-neutral for local authorities and Greater Manchester council taxpayers as a whole – with the level of discount for more energy efficient properties matching the surcharge against less energy efficient properties. Any proposals should be developed in collaboration with government, who have control over a wider range of fiscal measures available to achieve this (e.g. Stamp Duty).

c. Increasing awareness of the opportunities of whole-house deeper retrofit

Awareness amongst homeowners of the opportunities provided by whole-house deeper retrofit needs to be increased. At present, it is not generally part of people's decision making – this needs to change so that it becomes a natural part of the decision making process at key stages of the homeowner journey, particularly when homeowners are planning significant investment in renovating their home or in purchasing a new property.

Any efforts to increase awareness need to be supported by an understanding of decision-making, including the different contexts for decisions and the different sources of advice drawn upon and trusted (e.g. estate agents, mortgage providers, building firms, DIY chains).

Awareness could be strengthened by using price signals to reduce the purchase or running costs of more energy efficient properties, and/or vice versa for less energy efficient properties. This would provide a "nudge" to property owners to make improvements to their property. At present, there are no national or local benefits or disbenefits for owning, selling or leasing homes of different energy efficiency.

d. Winning and building trust

Trust amongst homeowners will need to be built in extensive retrofit measures. There are a variety of potential methods and approaches available to do this. Current projects, including HaES and RetrofitWorks will contribute to this area. Priorities include:

- Agreeing expectations and delivering in line with them – delivering projects as agreed with the homeowner and in line with the expectations set with them prior to the work being carried out. This could be formalised through contracting and guarantees,

[45] energysavingtrust.org.uk – heeps equity loan scheme

particularly guarantees around the energy performance of the building after the works have been carried out.

- Showing the benefits and sharing best practice – communicating the benefits in a clear and meaningful way. This could be accompanied by highlighting and publicising individual success stories (e.g. through retrofit show homes) and aggregating individual, property-level benefits into a set of case studies (e.g. through retrofit show streets). Experience of projects has shown that working with social enterprises and Community Energy groups, who can act as trusted and respected intermediaries for awareness raising and delivery, is important in winning trust for this scale of retrofit.

This points to a broader focus than just traditional marketing campaigns, using community-based social marketing strategies to engage communities themselves in the marketing and delivery of programmes through, for example, community champions, tenant and resident groups and co-operatives.

Accreditation of suppliers and fitters, using robust and effective quality assurance frameworks informed by the PAS2035 standard, would also be a useful tool in this area. This could be formalised within the sector through the development of a local framework of trusted local suppliers, in order to increase confidence and trust in extensive retrofit measures (e.g. the RetrofitWorks project).

More broadly, communications will need to promote the wider case for whole house deeper retrofit, promoting it and its benefits broadly and over the long term, as part of the efforts across Greater Manchester to meet ambitions for reducing CO_2 emissions.

2. Supply – Ensuring the supply chain has the necessary skills and capacity to deliver measures at the necessary scale and quality

At the same time as stimulating and supporting a pipeline of demand, success is equally dependent on ensuring that the supply chain can support demand, building the sector in a sustainable way. Even where homeowners are aware of the opportunity of whole house deeper retrofit for their home, they will likely find it difficult to access advice and suppliers to carry out the work. The supply chain for retrofit will not develop without first seeing, real, evidenced demand emerge.

A systemic, coordinated and planned approach to enabling SME supply chain networks to grow, expand and develop within Greater Manchester is therefore required, which in turn:

- Creates enough certainty and confidence to support and sustain investment in capacity by bringing a sustained and consistent demand over the medium to long term.
- Diversifies and expands existing capacity, enabling the existing contractor base to exploit the high skill, high value, income streams within retrofit services.
- Ensures there is access to high quality products to deliver the standard required.
- Identifies and develops new products and services.

This points to an approach in which clients, who create demand, and suppliers are closely engaged on an ongoing basis, which will require coordination and planning between stakeholders rather than an approach which just leaves the market to develop.

Given the upskilling that whole-house deeper retrofit requires, upskilling and building capacity within the supply chain will be key. Greater Manchester's workforce requires support to do this by building upon the significant construction and the repair, maintenance

and improvement (RMI) sectors already in place in Greater Manchester, and also in those in site management and coordination roles. There are several themes to this upskilling and capacity building, including a focus on the following:

- Type of skills – these will be required across the whole process of delivering retrofit – from surveying and assessment of properties, to design installation, customer care and ongoing maintenance. There is a potential gap in on-site coordination, given the need for different types of work to be carried out at properties at the same time. There is significant potential in training up the existing Refurbishment, Maintenance and Improvement (RMI) sector given its size and scale in Greater Manchester.
- Quality assurance – there have been concerns regarding the quality of retrofit carried out in certain cases, with some high-profile examples evident, particularly around dampness caused by the installation of wall insulation. The implementation of PAS2035 for standards in domestic retrofit is expected to lead to change and reduce the rate of failing installations at homes by providing a means of defining good practice standards for domestic retrofit.
- Engagement with young people and providers – engagement with Sector Skills Councils, colleges and others will be needed so that this area appeals to a wider range of young people and to ensure a coordinated approach to training. More broadly, to meet its ambitions, Greater Manchester's young people need to be engaged and interested in this area before and as they make choices about their career. Apprenticeships with existing providers and contractors provide an opportunity to do this.

Skills amongst local authority planners are also important. Best practice, such as the implementation of an "Existing Dwellings Policy" for energy efficiency in Stockport[46], should be rolled-out and built upon at a Greater Manchester scale.

Recommendation 4: The GMCA, learning and skills support agencies, providers, innovation hubs and existing trade bodies should come together to understand the future needs and opportunities presented by whole-house deep retrofit and develop packages of work to tackle the issues this identifies.

In addition, this needs to focus on:

- The different roles required, for example, retrofit coordinators, site managers and those carrying out the physical works on properties.
- How to increase demand for training – through wider efforts to increase demand for retrofit amongst property owners (as above) and considering how to increase demand amongst individuals and businesses working in the construction and RMI sectors.

3. Factors in tailoring the approach to overcoming these barriers

Approaches to overcome these barriers also needs to take into account the differences between households, in particular in the 3 following areas:

a. Tenure type – whether owner-occupied, social landlord or private landlord.
b. Household type – key characteristics that may make the household more or less likely to install extensive retrofit.

[46] stockport.gov.uk – energy efficiency information requirements

c. Property type – the age and archetype of the property.

This is set out in greater detail below.

a. Tenure type

Each sector of the housing market has different characteristics and will require a different approach to influence the decision making of home owners and tenants, whilst at the same time all contributing together to build up the supply chain (see section 2 below). These differences are due to the different type of incentives to act and the degree to which they impact, which result from the different ways and extent the benefits of retrofit (through uplifted value, reduced energy bills, increased comfort) apply in different tenure arrangements. There are also different national requirements for each sector. These, alongside the particular challenges for each sector, are set out in the table below and expand on the set of challenges in the previous section.

Tenure	**Particular retrofit challenges**	**Relevant national policy**
Social housing – 22% of stock	The need for sufficient capital to be available and for social landlords to demonstrate a sufficient return on investment. Implementing different models to allow housing providers to benefit from bill savings (e.g. rent+bills or debt repayment models). The need to consult tenants on improvements and new service charges Ensuring asset managers and maintenance staff have sufficient awareness and training to ensure retrofit improvements are carried out as part of ongoing maintenance or when properties are vacant How to apportion costs to right to buy apartment occupiers	Decent Homes Standard[47] (currently under review and likely to be strengthened) Ambition for EPC Band C for homes in fuel poverty by 2030
Private rented – 17% of stock	Some benefits (energy bill savings, increased comfort) accrue to the tenants rather than landlord (uplift in value) Appetite to make longer term investment tends to be limited Requirement to engage with both tenants and landlords adds complexity and increases drop out Capacity of Local Authorities to use available enforcement powers effectively Diversity of sector and large number of small landlords to reach and engage with	Private Rented Property minimum standard[48] requires any properties rented out to normally have a minimum energy performance rating of EPC Band E (due to be updated in 2019 to introduce the requirement for landlords to contribute to the cost of upgrades)

[47] gov.uk – A decent home: Definition and guidance for implementation pdf
[48] gov.uk – the private rented property minimum standard landlord guidance documents

		Ambition for EPC Band C for homes in fuel poverty by 2030
Owner occupier – 66% of stock	Not fully aware of the potential opportunities and benefits offered by whole-house deeper retrofit Whole-house deeper retrofit not part of homeowner psyche and lack of price incentives to lead to improvements it on the scale required Lack of access to finance to tackle high up front capital costs The need to make retrofit easy, convenient, understandable and affordable Working with communities to build trust, tailor marketing and increase take-up High standards of customer care to build trust and manage disruption Increasing local visibility of retrofit homes – to play the role of show homes	Ambition for EPC Band C for homes in fuel poverty by 2030

The owner-occupier sector is the most challenging to tackle – in terms of its scale, age profile of owners and access to finance. Social landlords remain best-placed to build on existing good practice and continue to lead the way on decreasing energy demand across their properties, subject to working with others to tackle the barriers above. This could provide a means of developing the approach and supply chain. Good Landlord Schemes could be used to improve the performance of properties in the private rented sector, particularly if financial incentives/funding tools or easier access to retrofit solutions can be facilitated.

b. Household type

Specifying and typifying the people who commission retrofit in the current market provides evidence on householders most likely to do so. In Greater Manchester, the *People Powered Retrofit* project used data from existing retrofit clients to examine those most likely to be early adopters of retrofit, who are as follows:

- Civic minded retirees
- Climate pragmatists
- Climate idealists
- Home improvers

This analysis was accompanied by a GIS mapping exercise, carried using a range of data sources to highlight location of those owner occupier householders most likely to take up services. This approach could be used to target future retrofit service offers in Greater Manchester and be built on and added to by others to create a city-region wide resource (e.g. using Mapping GM). This evidence also further justifies the need for wider communications about the benefits of and need to carry out whole house deeper retrofit.

c. Property type

Knowing what needs to be done to each home will be fundamental and is influenced by form, age and location of homes across Greater Manchester. All districts within Greater Manchester have a wide range of property ages, with Manchester and Salford having the greatest proportion of new builds. Figure 9 shows the energy efficiency (in terms of EPC ratings) of Greater Manchester properties by property age.

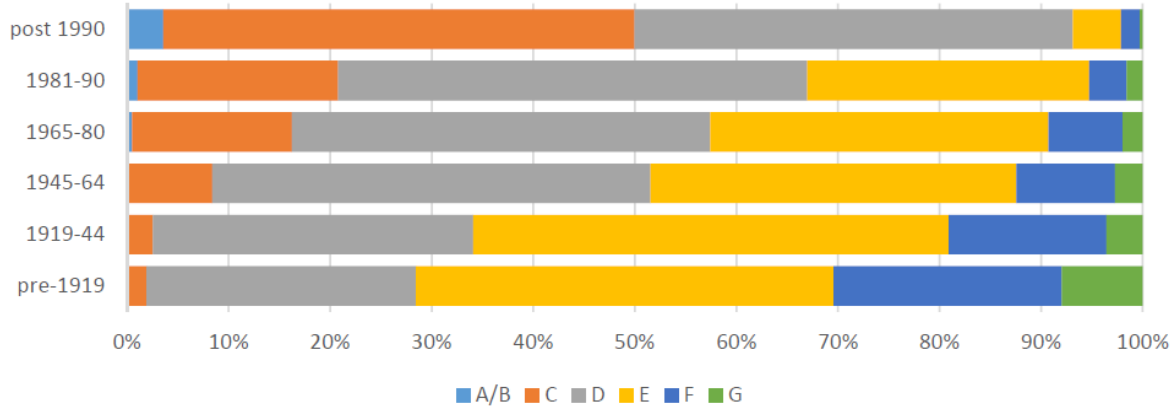

Figure 9 – Energy performance (EPC ratings) of Greater Manchester properties by age

Source: Greater Manchester Spatial Energy Plan

Different types of homes will require different packages of measures to be installed – these would best be developed as part of a "pattern book" of best practices, specifications and details that could be shared across the supply chain and updated over time to support its development. Work is already underway in Greater Manchester to develop a pattern book[49] of packages of measures, informed by modelling of the most common housing archetypes in the city region and measures that can be applied to them to maximise energy efficiency.

3.2.2.4 Tackling the supply and demand side barriers together

At present, there is a lack of coordinated action and support to tackle these barriers together – supporting an increase in awareness and demand among people likely or wanting to retrofit their homes and linking this up with a supply chain of sufficient capacity and capability to deliver whole-house deeper retrofit at the scale needed. A local approach is in line with the direction of government policy in this area, where different local markets and solutions have been tested through 6 pilot projects[50] across England (including in Greater Manchester, led by the Carbon Co-op and URBED[51]).

Recommendation 5: Partners across Greater Manchester should collaborate to develop a delivery model to build up local markets for whole-house deeper retrofit. This should build on and learn from the findings of recent work in this area, including government funded pilots like People Powered Retrofit and RetrofitWorks, as well as previous programmes like Green Deal Communities.

[49] retrofit.support
[50] gov.uk – energy efficiency improvement rates local supply chain demonstration projects: local supply chain demonstration projects summaries
[51] carbon.coop – what does people powered retrofit look like

There are several demand and supply side issues that need to be tackled together in a coordinated way in order to upscale whole-house deeper retrofit. Tackling these also needs to be supported by a delivery model that can increase demand and match that with a supply chain that has the capacity and capability to meet that demand.

Several projects, including the recently BEIS-funded pilots, have identified the need to develop local delivery models that can:

- Target those most likely to retrofit – identify early adopters and the household and neighbourhood types where these people are most likely to live.
- Build awareness in these neighbourhoods – using tools such as open homes and social marketing and community-based groups to put whole-house deep retrofit on people's radars and turn awareness into demand.
- Build up the supply chain – improving the capability of the supply chain, providing a means for referring retrofit clients to suppliers.
- Providing a smooth customer journey – providing support to homeowners throughout the process and works in an end to end service.

The following delivery models should be explored as part of this:

- Local authority-led approach, drawing on learning from group work improvements contracts and schemes such as the Home Energy Efficiency Programmes for Scotland (HEEPS).
- The use of a trusted community or co-operative-led intermediary to facilitate works across a collection of homes, tendering packages of homes and building a supply chain, e.g. People Powered Retrofit.
- The use of an Aggregator/Energy Services Company model, combining delivery of retrofit improvements with the installation and management of flexible load technologies and the sale of local flexibility and other grid services, e.g. HaES, OpenDSR
- The development of Pay As You Save owner occupier retrofit service offers.
- The development of social housing-led retrofit investment vehicles or projects to extend in to owner occupier households, broadening the benefit of provider procurement channels.

4. Commercial buildings

4.1 Where does Greater Manchester need to get to?

4.1.1 Priorities for increasing energy efficiency in commercial buildings

For commercial buildings, the challenges and underpinning evidence set out in section 2.4.2 points to the following priority in improving their energy efficiency:

1. Reducing the demand for energy, particularly space heating, in Greater Manchester's commercial buildings.

In order to do this, action needs to be taken to:

- Increase measurement and reporting of energy use in commercial buildings.
- As a result of that increased measurement and reporting, reduce energy use.

4.2 Where is Greater Manchester now and what action is needed over the next 5 years?

4.2.1 Measuring and reporting on the operational energy performance

Several requirements exist for the measurement and reporting of energy use in commercial buildings, including:

- The *Streamlined Energy and Carbon Reporting (SECR)*[52] policy, which requires around 12,000 businesses across the UK (including all quoted companies and "large" unquoted companies) to report on their energy use.
- The *Energy Savings Opportunity Scheme (ESOS)*[53] places requirements on businesses to report on energy use, but this is only required of "large" businesses and every 4 years.

However, these requirements are mostly limited to larger companies, meaning that the majority small and medium sized businesses are not legally required to report on their energy use. Although there may be incentives to measure and report (e.g. to target improvement measures or through supply chain requirements), there are also often practical difficulties in doing so, including:

- The ability to measure energy usage – in some buildings, such as commercial office buildings with multiple tenants, metered data is often not available per unit.
- The need to make reporting meaningful – taking raw energy use data and accounting for factors beyond a building's fabric, including operational hours, type of occupiers and age/type of energy/heating systems to provide a measure of its operational energy performance.

This situation generally means that there is a lack of specific data on the operational energy performance of commercial buildings in the UK, including in Greater Manchester. Action is needed at a national level to address this issue – however, planning policy provides a potential local means of tackling it.

---

[52] carbontrust.com - secr-uk business streamlined energy carbon reporting framework
[53] gov.uk – energy savings opportunity scheme

Recommendation 6: The GMCA and local authorities should explore the potential for introducing requirements for new developments to report on operational energy performance, and as part of that, on space heating demand.

In order to begin to mainstream the measurement and reporting of operational energy performance, there is a potential opportunity to introduce requirements for new developments through planning policy. For example the New London Plan draft for consultation proposes requirements for major development to monitor and report on energy performance (e.g. through a DEC) for at least 5 years via an online portal. Given the scale of current and planned commercial development in Greater Manchester, this could provide a means of upscaling the amount of commercial floorspace for which operational energy performance is measured and reported which would begin to build this as an approach that could be adopted for existing buildings.

The data currently available and which provides an indication of the energy efficiency of Greater Manchester's commercial buildings is set out below.

At the building level:

Greater Manchester's commercial buildings vary significantly in type, use and age – from offices in new blocks or older listed buildings, to factories, warehouses, industrial units and retail and leisure space. The sector is significantly more varied than the domestic stock, where more common archetypes of properties exist.

As with domestic properties, EPCs are available for commercial buildings and are generated when they are constructed, sold or leased. However, in addition to the limitations set out in section 3.1.3, there are additional issues with using them as an indicator of energy efficiency in commercial buildings as they are not representative of how they perform during operation. This varies significantly from the theoretical rating in the EPC and is dependent on how the building is used and occupied.

This lack of data is compounded by a variety of wider factors, including:

- Sparse and inconsistent data about the energy performance of these properties.
- The wide variety of construction methods.
- Multiple uses and constant change of use.
- Absence of price signals or legal requirements to measure or report on the energy efficiency of commercial buildings.
- Metering arrangements, particularly in large, multi-tenanted buildings.

At a spatial level:

At a spatial rather than building level, available evidence points to the areas of the city-region that have the highest commercial heat demand. Figure 10 – a map of commercial heat density across Greater Manchester – shows the highest commercial heat demand is aligned with the density of Greater Manchester's city and town centres. Manchester city centre and Trafford Park have the largest area of heat density – most areas have heat density of around 100kWh/m^2, with Manchester city centre's demand over 140kWh/m^2. Areas of the highest demand provide the greatest potential for realising the greatest reductions in CO_2 emissions and realisation of co-benefits for productivity.

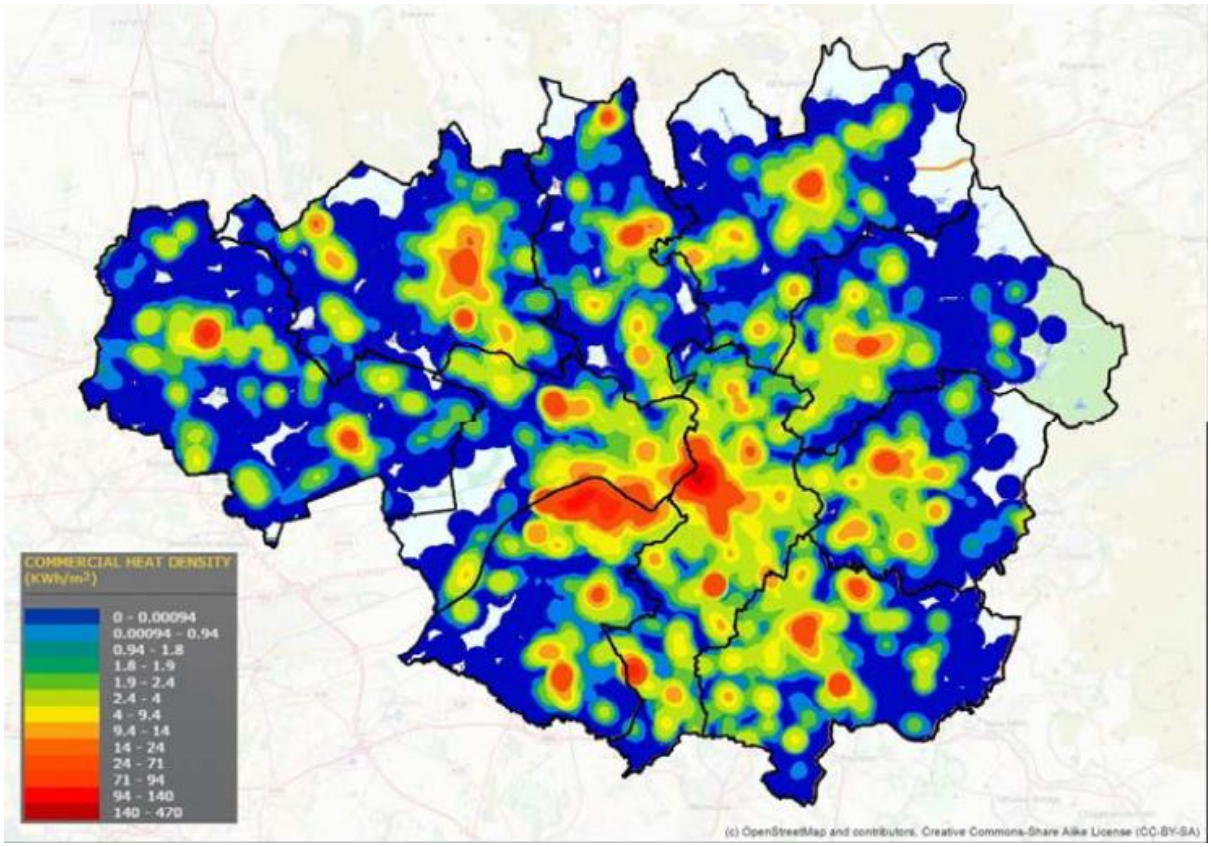

Figure 10 – Spatial heat demand across Greater Manchester

Source: Greater Manchester Spatial Energy Plan

At a sectoral level:

Evidence is also available for the commercial sectors in which heat demand is the highest. Excluding heat used in transport (public buildings), these are as follows:

- Industrial – 25%
- Retail – 25%
- Commercial offices – 12%
- Hotels – 10%

The heat demand under “industrial” above goes beyond that of space heating in buildings and into industrial processes (to be covered in the separate Sustainable Consumption and Production Plan for Greater Manchester). This varies depending on the exact nature of the products and processes involved. Retail, commercial offices and hotels therefore provide the greatest potential for reducing space heating demand in commercial buildings.

4.2.2 Reducing energy use by improving operational energy performance

At present, there is no widespread requirement for businesses to improve the operational energy performance of their premises. Incentives do exist, in the form of cost savings in reduced energy bills if these directly benefit the business (i.e. they pay the energy bills directly or, if they do not, savings are passed on through charges from landlords). However, for tenanted commercial property, there is a significant issue over who pays and who sees

the benefit of that investment (e.g. landlords investing in a tenant's space may not see a return on that investment if there is not a market for more energy efficient property; conversely, tenants investing may not be in the space long enough to see a return on that investment). There is generally an absence of demand for more energy efficient commercial buildings that would incentivise investment from property owners or occupiers.

Nationally, requirements are in place relating to EPCs which, as set out above, have limitations in their interpretation as a proxy for operational energy performance. For businesses that rent their premises from a private landlord and either move premises or enter into a new tenancy at their existing premises, the landlord cannot be able to rent out a property with an EPC rating of F or G. From 1 April 2023, this will apply to all properties, even if businesses have not moved or entered into a new tenancy agreement. This will serve to increase the theoretical efficiency of Greater Manchester's rented commercial premises but will not tackle operational energy performance given the methodology underpinning the production of an EPC.

4.2.3 Setting a pathway for improving operational energy performance

At present, the measurement, reporting and improvement of operational energy performance in commercial buildings in Greater Manchester is not sufficiently valued or incentivised in business' decision making to achieve the required level of reductions in the CO_2 emissions associated with their energy use. A phased approach is needed to change this, recognising that there are limited local levers that can immediately be implemented to change this.

Recommendation 7: Working with key partners, GMCA should develop and implement a pathway to lead to an increase in the measurement, reporting and improvement of energy efficiency in commercial buildings, and as part of that, on space heating demand.

The market for more energy efficiency commercial buildings needs to be developed in Greater Manchester. In the short term, this will need to rely on a voluntary approach but will require "nudge" incentives/disincentives or legislative requirements to deliver the required shift. A proposed pathway for achieving this is set out below.

1. Year 1 – Focussing on a voluntary approach and developing policy proposals

a. Developing a voluntary approach:

GMCA and partners' activity should focus in the following areas:

- Measurement – working with businesses to increase uptake of measures of operational energy performance. This could use existing methodologies – such as DECs.
- Reporting – working with businesses to report this measurement in a standardised way, for example at premises, to customers or clients, through trade bodies (to increase scale) or online (e.g. through an online portal).
- Improvement – working with businesses to encourage commitments to improve operational energy performance. This could be led by Greater Manchester's largest businesses or most significant emitters of CO_2 and its largest commercial landlords. The public sector and large businesses could make commitments to improve the energy efficiency of its buildings – for example, setting a date beyond which they will only occupy buildings that can meet certain standards of operational energy performance.

To have the greatest potential impact, these efforts should focus on:

- Those organisation with the greatest CO_2 emissions that arise from the heating of their buildings. This could build on the approach being taken in Manchester by the Manchester Climate Agency to work with 10 organisations responsible for over 20% of CO_2 emissions in Manchester.
- Those areas of the city region with the highest spatial heat demand, drawing on mapping work which identifies the city centre, Trafford Park, Salford Quays and city-region town centres as the most significant areas of emissions.
- Those sectors responsible for the greatest proportion of CO_2 emissions within Greater Manchester – industrial, retail, commercial offices and hotels. Collaboration within key businesses in these sectors (as has occurred in the hospitality sector on single use plastics) could help drive this at scale.

b. Developing policy proposals

At the same time, the GMCA and key partners should develop policy proposals that would support strengthening this approach and move beyond voluntary initiatives alone. As local levers are limited to those areas below, this work should be in collaboration with government policy development on price signals to "nudge" the behaviour of businesses and the energy efficiency of their premises. This work should focus on:

- Developing options for the potential use of business rates as a "nudge" to increase energy efficiency. This could be implemented according to the same principles set out in Recommendation 3.
- Driving change through costing carbon into public procurement.
- The development of more sophisticated standards against which local businesses could measure their operational efficiency. This would not mean the GMCA developing and setting Greater Manchester-only standards, but potentially involve the promotion or adoption of other standards. As an example, this could include positioning Greater Manchester as a potential early adopter or pilot area for the adaptation of the NABERS[54] standard. This has been developed and implemented in Australia to measure and compare the environmental performance of buildings and tenancies. Alternatively, priority sectors could also be encouraged to develop their own specific standards – e.g. specific measures of the operational efficiency of hotels and retail space.

2. Years 2-3 – Piloting policy proposals, whilst continuing to expand a voluntary approach

Focus will need to switch away from a voluntary approach to piloting the policy proposals set out above. These could be piloted within particular areas of the city region or within particular sectors.

3. Year 4-5: Implementation of policy proposals

Depending on piloting, these proposals could then be rolled out more widely across the city-region.

[54] nabers.gov.au

5. Public buildings

5.1 Where does Greater Manchester need to get to?

5.1.1 Priorities for increasing energy efficiency in commercial buildings

For public buildings, the challenges and underpinning evidence set out in section 2.4.2 points to the following priority in improving their energy efficiency:

1. Reducing the demand for space heating in Greater Manchester's public buildings.

5.2 Where is Greater Manchester now and what action is needed over the next 5 years?

5.2.1 Measuring and reporting on the operational energy performance of public buildings

Like Greater Manchester's commercial buildings, its public buildings also vary. However, they can be more easily segmented into key categories allowing a degree of comparison within these groups. The most significant of these are as follows:

- Schools (maintained schools and academies)
- Further education and higher education institutes
- Emergency services (fire and police)
- Hospitals and health care facilities (NHS)
- Leisure facilities (e.g. sports centres)
- Cultural facilities (e.g. museums and libraries)
- Offices

More information is available regarding the operational energy performance of public buildings than it is for commercial buildings. Public buildings with a total useful floor area over 250m^2 and which are frequently visited by the public are required to obtain and display a Display Energy Certificate (DEC) at the building. DECs provide an energy rating of the building from A (most efficient) to G (lease efficient) and are accompanied by a valid advisory report, containing recommendations for improving the energy performance of the building.

Where the building has a total useful floor area of more than 1000m², the DEC is valid for 12 months and the accompanying advisory report is valid for seven years. Where the building has a total useful floor area of between 250m² and 1000m², the DEC and advisory report are valid for 10 years. DECs therefore provide a more up to date assessment of the energy performance of larger public buildings – those for smaller public buildings are more likely to be out of date (and could be out of date by as much as a decade).

At present, the best available data on DECs is that accessible online through government datasets[55]. This has some limitations in that the data is out of date (currently by 2 years) and DECs are broader measures of a building's energy use, rather than just its energy efficiency.

[55] data.gov.uk – display energy certificate data

Recommendation 8: The GMCA, local authorities and the public sector across Greater Manchester should ensure standardised measurement and annual reporting (as part of reporting against the 5 Year Environment Plan) on the energy efficiency of their buildings, including their Display Energy Certificate ratings and a measure of space heating demand.

The public sector in Greater Manchester (particularly the GMCA, local authorities and the organisations within the Greater Manchester Health and Social Care Partnership) should work together to tackle the following in this area, which will bring the following benefits:

- Increasing capacity – to overcome the issue of a lack of capacity, particularly within Local Authorities, to dedicate to this issue.
- Sharing expertise – different organisations are likely to bring different areas of expertise to tackling this issue.
- Efficiencies of scale – there are likely to be efficiencies in improving energy efficiency across a larger estate.

5.2.2 Improving the efficiency of Greater Manchester's existing public buildings

At present, there is no requirement for the public sector to improve the operational efficiency of the premises they own and/or occupy. Incentives do exist, in the form of cost savings in reduced energy bills if these directly benefit the organisation (i.e. they pay the energy bills directly or, if they do not, savings are passed on through charges from landlords).

Nationally, requirements are in place relating to EPCs which, for non-domestic buildings, are indicators of the theoretical efficiency of a building rather than in use. For public sector organisations that rent premises from a private landlord and either move premises or enter into a new tenancy at their existing premises, the landlord will not be able to rent out a property with an EPC rating of F or G. From 1 April 2023, this will apply to all properties, even if businesses have not moved or entered into a new tenancy agreement. As with commercial buildings, this will serve to increase the theoretical efficiency of Greater Manchester's rented public buildings but will not tackle operational efficiency.

Recommendation 9: The GMCA and local authorities should work to deliver agreed targets for the energy efficiency of their buildings, including their Display Energy Certificate ratings and developing a measure and targets for space heating demand, and encourage other public sector organisations to do likewise.

The Greater Manchester 5 Year Environment Plan sets out a target for average DEC ratings to achieve across GMCA and local authority buildings by 2024, where economically viable. This could be expanded, including a commitment to end leases of buildings that do not meet this target (where economically viable and where leases allow).

As well as wider reporting, Greater Manchester's public sector organisations should also commit to meeting and reporting annually against the government's voluntary targets on carbon emissions reductions (30% by 2020/21 on a 2009/10 baseline[56]) and any subsequent target set after that. Although this encompasses activities beyond the energy used to heat public buildings, this should be a focus for action.

[56] gov.uk – emissions reduction pledge 2020 emissions reporting in public and higher education sectors

6. Bringing it together

6.1 Where does Greater Manchester need to get to?

6.1.1 Mission-oriented approach

The 5 Year Environment Plan for Greater Manchester sets out the scale of the challenge in achieving the CO_2 emissions reductions required to meet its international climate change obligations, of which increasing building energy efficiency is an integral part. In order to deliver its environmental vision and aims the plan sets out and to close the gap between what is needed and where Greater Manchester is now. To do that in points to taking new and different approaches in the following areas:

- Supporting innovation
- Finance and funding
- Building partnerships between the public, private and voluntary, community and social enterprise organisations
- Showing leadership
- Engaging and educating residents, communities and businesses
- Upskilling its workforce

In this report, these themes are key to tackling the challenges associated with decarbonising Greater Manchester's buildings and have been covered in various sections and recommendations.

To bring all these areas together and effectively implement its aims, the 5 Year Environment Plan sets out the desire to establish a mission-oriented approach to tackling Greater Manchester's environmental challenges. This approach involves defining a challenge and then uses this to create an ambitious goal and create a long-term policy landscape, setting out tasks that mobilise various actors to come together in new ways, rather than within traditional sectors or groups. This points to establishing new ways of working within Greater Manchester – across the public, private and voluntary, community and social enterprise sectors – to achieve the aims set out in the 5 Year Plan and in implementing the recommendations in this report.

6.2 Where is Greater Manchester now and what action is needed?

6.2.1 The roles of different organisations within Greater Manchester

No single organisation in Greater Manchester can tackle the priorities and implement the recommendations in this report alone. Doing so requires joint working across different types of organisations and sectors, which should build upon the strength of existing partnerships in Greater Manchester. These have been developed strategically, for example in the lead up to the 2018 and 2019 Green Summits and in the development of the 5 Year Environment Plan, and around particular projects, for example the Homes as Energy Systems ERDF-funded project. Each sector brings different abilities and expertise – these are set out below:

- GMCA and Local Authorities – providing the right policy framework, including setting ambition and direction, providing evidence to inform action and implementing policy where levers are held locally (e.g. local taxation, planning policy); convening key stakeholders and engaging more widely across Greater Manchester.

- Wider public sector – leading by example in areas where organisations (GMCA, Local Authorities, health, national government etc) have direct operation and financial control (e.g. assets, procurement).
- Community, voluntary and campaign sector groups – building greater public understanding and awareness of energy efficiency and low carbon buildings. There is the potential to participate in broad information campaigns and in more innovative community-based social marketing activity and to act as trusted advisors and advocates, signposting opportunities and sources of information.
- Social Enterprises and co-operatives – developing the sector through trading activity that brings wider social and environmental benefits in areas, activities include supply chain training schemes that offer a route in to work for marginalised elements of the workforce or the co-design of new retrofit service delivery models.
- Businesses (within the sector) – offering apprenticeships and training schemes as a route into work for new entrants, carrying out innovative research and development, developing new supply chains and business diversification
- Businesses (all) – raising awareness and offering incentives/schemes for domestic retrofit amongst their employees.

6.2.2 Building on existing partnerships to work together in new ways

GMCA and key partners need to build on this foundation and move to focus on delivery against the priorities set out in the 5 Year Environment Plan and within this report. This should be done in a way that reflects the ambition for a mission-oriented approach and links to other Greater Manchester strategies, particularly the Local Industrial Strategy and Infrastructure Framework.

Recommendation 10: The GMCA should put in place a Greater Manchester Low Carbon Buildings Challenge Group, which, through establishing specific task and finish groups, would provide cross-sector approach to tackling the systemic challenges associated with retrofit across all building types. The GMCA should put in place a Greater Manchester Low Carbon Buildings Challenge Group, which, through establishing specific task and finish groups, would provide cross-sector approach to tackling the systemic challenges associated with retrofit across all building types.

The following section (including Figure 11) sets out a proposed structure for how a Retrofit Challenge Group would work. These areas are discussed in further detail below.

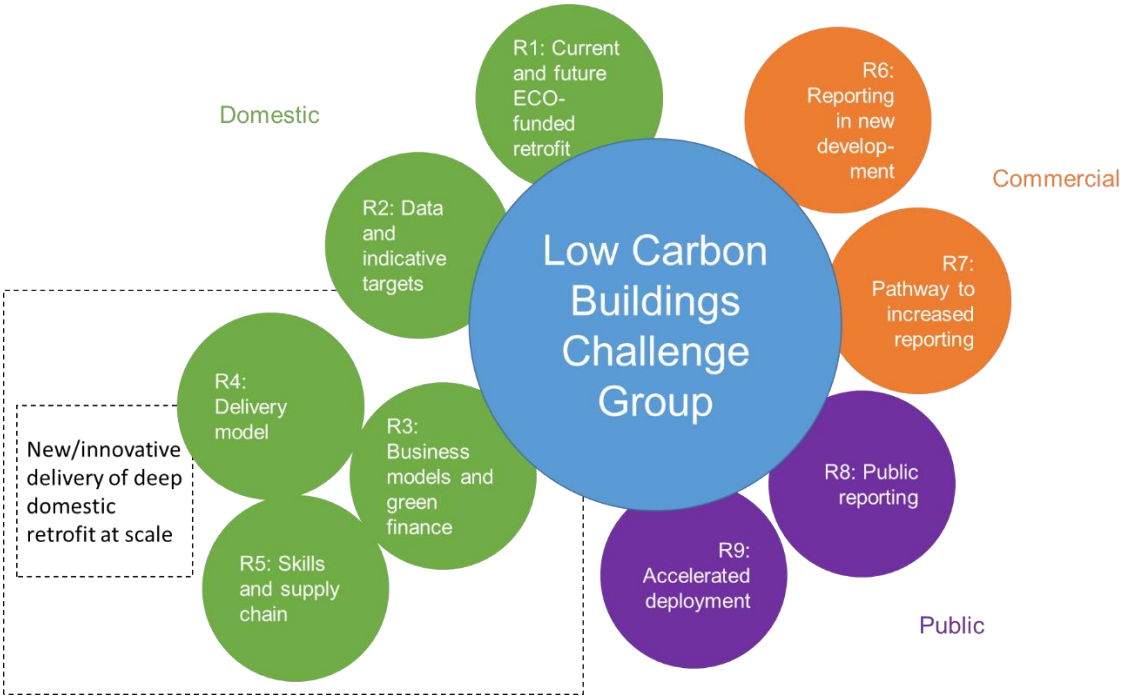

Figure 11 – Potential model for a Greater Manchester Retrofit Challenge Group

The Retrofit Challenge Group should be responsible for driving progress towards the ambitions for buildings set out in this report and the 5 Year Environment Plan. In order to do this across the aims of the 5 Year Environment Plan through a mission-oriented approach, the Greater Manchester Combined Authority put in place new arrangements for how the implementation and delivery of the 5 Year Environment Plan is governed and progressed. This is being implemented in a way that reflects the interdependencies between different areas. For decarbonising buildings, this will include looking at reducing energy demand, decarbonising energy supply and decarbonising travel (through supporting electric vehicle roll-out) at the level of domestic, commercial and public buildings.

In line with the mission-oriented approach set out in the 5-Year Environment Plan, it is recommended that the Retrofit Challenge Group and Task and Finish Groups beneath it are:

- Action-focussed – focussed on implementation and delivery, driving forward the recommendations in this report rather than focussing on or discussing issues or barriers.
- Agile – should not necessarily be long-standing and should be able to change their remit and focus to ensure the most significant issues are prioritised given limited resources.
- Cross-sectoral – approaching issues in a way that allows for them to be tackled bottom-up most effectively rather than on traditional top-down sectoral lines

Given the different issues that need to be tackled in different building types set out in this report, different approaches and actions will be required for each. Even within these building types, different approaches may be required for:

- Domestic properties – social housing, the private rented sector and owner occupiers.
- Commercial properties – offices, retail, tourism/leisure.
- Public buildings – schools, healthcare.

The structure proposed above should allow for actions and experience to be shared across building types depending on relative priorities and cross-over. The list below sets out an initial set of potential areas of cross-over between building types:

- Communications and marketing – raising increasing awareness among key groups (e.g. home owners, SMEs, commercial landlords, public estates managers).
- Standards, measurement and performance – refining the standards that retrofit across building types can feasibly meet in order to meet Greater Manchester's ambitions and measuring and reporting on progress and performance to meeting these.
- Policy, implementation, research – developing local policy initiatives and working with national government where it holds the relevant levers; implementation through training, pilots, campaigns; further developing the evidence base, through commissioning research and bringing this together (e.g. on Mapping GM).
- Finance – developing proposals and models for financing retrofit, including liaising with potential investors on financial products.
- Skills and sector development – engaging with providers and other stakeholders within the education system to promote the sector, whilst also working with the sector and supply chain to identify issues and barriers.

6.2.3 Next steps

Working across organisations in the way set out above offers the potential for stakeholders to come together in new ways to deliver on the ambitions for low carbon buildings set out in this report and the 5 Year Environment Plan for Greater Manchester. The Retrofit Challenge Group should be established as soon as possible to drive action in this area forward. Within that, tackling the key barriers to domestic retrofit and developing innovative public, private and third sector partnerships to do that should be the key priority.