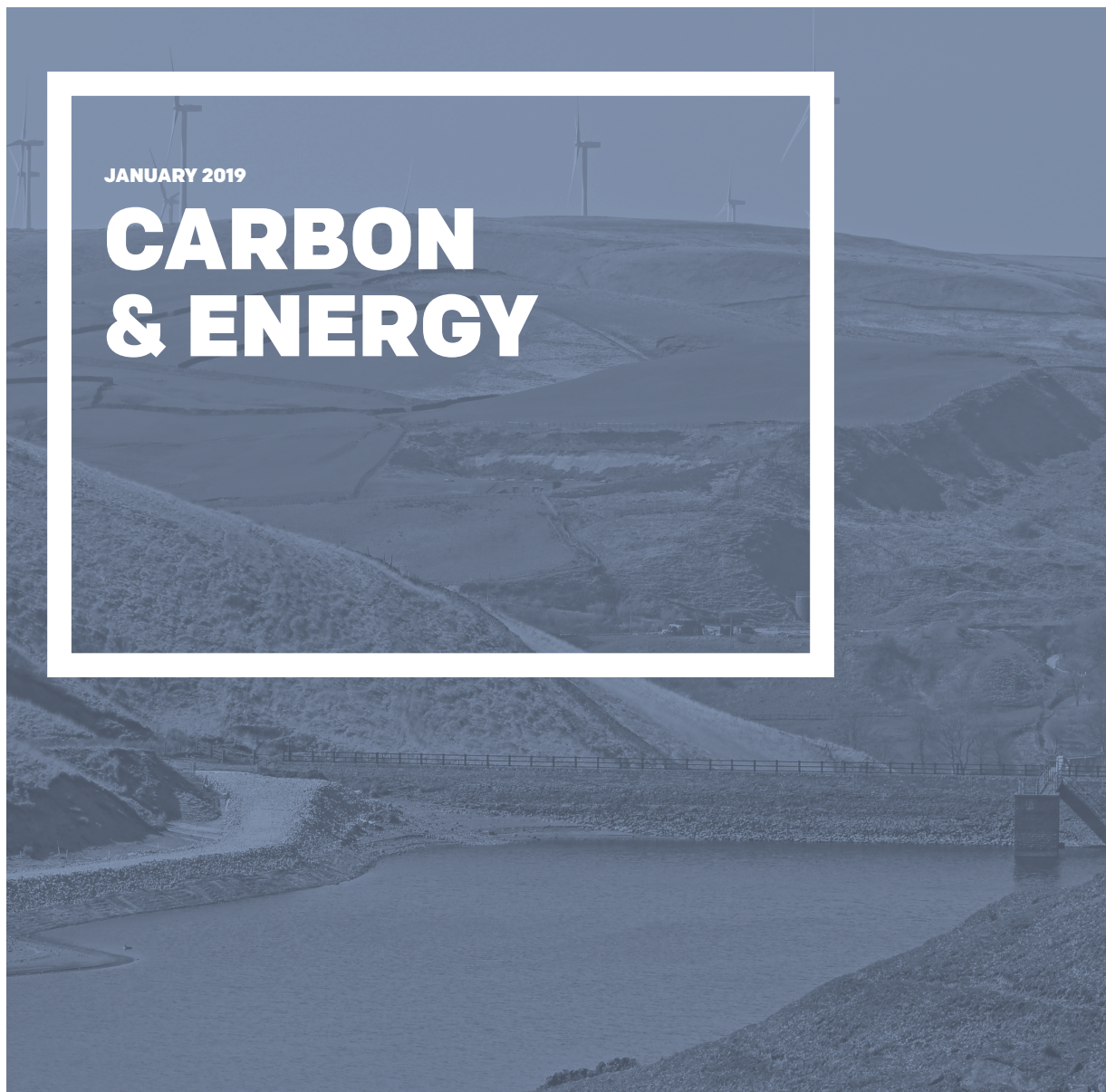


JANUARY 2019

# CARBON & ENERGY



Carbon and Energy	
1. Introduction	2
2. Policy context and evidence	3
3. Summary of consultation	13
4. Summary of IA	14
5. GMSF Strategy, Policies and Allocations	15

# 1 Introduction

- 1.1 To help explain the Greater Manchester Spatial Framework (GMSF), a series of Topic Papers has been prepared to set out the reasons for the policies in the draft GMSF.
- 1.2 Each Topic Paper summarises and cross-references:
  - The relevant evidence and explains how this has informed the draft GMSF;
  - The 2016 consultation comments that are relevant to the topic.
  - The recommendations of the Integrated Assessment, that seeks to ensure the GMSF is sustainable and promotes equality.
- 1.3 The Topic Papers explain how the draft GMSF policies and allocations have been derived based on the evidence, consultation comments and Integrated Assessment.
- 1.4 The Greater Manchester Combined Authority has chosen to prepare Topic Papers to be transparent in how the GMSF has been prepared and to provide a more understandable summary of the background technical information.
- 1.5 This Topic Paper is about carbon and energy issues for Greater Manchester. This includes carbon emissions, decentralised energy, building standards / efficiency, energy use and renewable energy.

## What is the GMSF?

- 1.6 The GMSF is a joint plan of all ten local authorities in Greater Manchester, providing a spatial interpretation of the Greater Manchester Strategy which will set out how Greater Manchester should develop over the next two decades up to the year 2037. It will:
  - Identify the amount of new development that will come forward across the 10 districts, in terms of housing, offices, and industry and warehousing, and the main areas in which this will be focused.
  - Ensure we have an appropriate supply of land to meet this need.
  - Protect the important environmental assets across the conurbation.
  - Allocate sites for employment and housing outside of the urban area.
  - Support the delivery of key infrastructure, such as transport and utilities.
  - Define a new Green Belt boundary for Greater Manchester.

## 2 Policy context and evidence

### UK Climate Change Act 2008

- 2.1** The UK Climate Change Act 2008<sup>(1)</sup> has enshrined a commitment for the government to achieve at least an 80 percent reduction in greenhouse gas emissions by 2050 from 1990 levels and to limit global temperature rise to as little as possible above 2°C. Government also set five yearly carbon budgets to act as stepping stones to achieve this target which summarise the legal limits of greenhouse gas emissions:

Budget	Carbon budget level	Reduction below 1990 levels
1st carbon budget (2008 to 2012)	3,018 MtCO <sub>2</sub> e	25%
2nd carbon budget (2013 to 2017)	2,782 MtCO <sub>2</sub> e	31%
3rd carbon budget (2018 to 2022)	2,544 MtCO <sub>2</sub> e	37% by 2020
4th carbon budget (2023 to 2027)	1,950 MtCO <sub>2</sub> e	51% by 2025
5th carbon budget (2028 to 2032)	1,725 MtCO <sub>2</sub> e	57% by 2030

**Table 2.1 Carbon Budget Limits (Source: Committee on Climate Change)**

- 2.2** The committee on climate change<sup>(2)</sup> report that . The first carbon budget (2008 to 2012) was met and the UK is currently on track to outperform on the second (2013 to 2017) and third (2018 to 2022). However, it is not on track to meet the fourth (2023 to 2027). To meet future carbon budgets and the 80% target for 2050, the UK will need to reduce emissions by at least 3% a year, from now on. This will require the government to apply more challenging measures and the Committee has made clear that this will require stronger new build standards for energy efficiency and low carbon heat.

### Planning Act 2008

- 2.3** Section 182 of the Planning Act 2008<sup>(3)</sup> puts a legal duty on local authorities to include policies on climate change mitigation and adaptation in Development Plan documents. It required a change to the Planning and Compulsory Purchase Act (2004) through the insertion of the following paragraph (subsection 1A):

1 Climate Change Act 2008 [Online]. London: The Stationery Office. Available from <http://www.legislation.gov.uk/ukpga/2008/27/contents>

2 <https://www.theccc.org.uk/tackling-climate-change/reducing-carbon-emissions/carbon-budgets-and-targets/>

3 Planning Act 2008 [Online]. London: The Stationery Office. Available from <http://www.legislation.gov.uk/ukpga/2008/29/section/182/enacted>

- 2.4 *‘Development plan documents must (taken as a whole) include policies designed to secure that the development and use of land in the local planning authority’s area contribute to the mitigation of, and adaptation to, climate change’.*

## Planning and Energy Act 2008

- 2.5 The Planning and Energy Act 2008<sup>(4)</sup> enables local planning authorities to set requirements for energy use and energy efficiency in local plans. This includes requirements for a proportion of energy used in developments to come from renewable sources, to be low carbon, or to comply with energy efficiency standards that exceed the requirements of existing building regulations.
- 2.6 In early 2015, the Housing Standards Review reported and Government announced the withdrawal of the Code for Sustainable Homes. As a result, a number of changes to existing Building Regulations were introduced, along with new technical optional standards on Access, Water and Space.
- 2.7 In a Written Ministerial Statement in March 2015, Government advised that local planning authorities should not set any additional local technical standards relating to the construction, internal layout or performance of new dwellings. The exception was energy performance, where the WMS said that LAs would continue to be able to require energy performance standards higher than Building Regulations up to the equivalent of Code for Sustainable Homes Level 4 *‘until commencement of amendments to the Planning and Energy Act 2008’*. No changes were announced in relation to requiring a proportion of energy used by development to be from renewable or low carbon sources (Part 1 subsection 1a/b).

## Paris Agreement on Climate Change 2015

- 2.8 The United Nations Framework Convention for Climate Change (UNFCCC) Paris Agreement on climate change commits the global community to take action to *“hold the increase in global average temperature to well below 2°C above pre-industrial levels and pursue efforts to limit the temperature increase to 1.5°C”*. In December 2015, 195 countries adopted the first ever universal, legally binding climate deal. Less than a year later, the landmark Agreement has entered into force and has been ratified by the UK as a sign of the continued commitment to climate action across the world<sup>(5)</sup>.

4 Planning and Energy Act 2008 [Online]. London: The Stationery Office. Available from <http://www.legislation.gov.uk/ukpga/2008/21/contents>

5 <https://www.gov.uk/government/news/uk-ratifies-the-paris-agreement>

## Industrial Strategy White Paper 2017

**2.9** The government sets out grand challenges at the forefront of industries in the future as part of the Industrial Strategy White paper.<sup>(6)</sup> Achieving ‘Clean Growth’ is one of the challenges and to maximise the advantages for UK industry from global shift to clean growth the strategy proposes:

- To develop smart systems to cheap and clean energy across power, heating and transport
- To transform construction techniques to dramatically improve efficiency
- To make our energy intensive industries competitive in the clean economy
- To put the UK at the forefront of the global move to high efficiency agriculture
- To make the UK the global standard setter for finance that supports clean growth
- Support key areas of innovation, investing £725m over 4 years

## Greater Manchester Local Industrial Strategy Pilot

**2.10** Greater Manchester is one of three pilot areas to develop a ‘local’ industrial strategy for adoption by April 2019. The pilots have a broad aim to ‘boost productivity, earning power and competitiveness’ by identifying ‘priorities to improve skills, increase innovation and enhance infrastructure and business growth’.

**2.11** The White Paper sets out that local industrial strategies will:

- Be developed locally and agreed with the government. Places in England with a Mayoral Combined Authority will have a single strategy led by the mayor and supported by Local Enterprise Partnerships;
- be long-term, based on clear evidence, and aligned to the national Industrial Strategy;
- Identify local strengths and challenges, future opportunities and the action needed to boost productivity, earning power and competitiveness. This might include addressing skills issues, improving infrastructure, harnessing the potential of world-class science and innovation, supporting new high-value businesses, or identifying leading sectors to inform the development of deals;
- Guide the use of local funding streams and any spending from national schemes;

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6 HM Government (2017) Industrial Strategy, *Building a Britain fit for the future*.



- Establish new ways of working between national and local leaders in both the public and private sectors. Universities, colleges and other local institutions are also identified as key; and
- Form the basis for Government to “*continue to support locally-driven partnerships, proposals and reforms, with the aim of ensuring that economic powers are exercised at the most appropriate level and that decision-making is effective and clear*”.

## Clean Growth Strategy 2017

**2.12** In October 2017, Government published the Clean Growth Strategy (CGS)<sup>(7)</sup>, which described policies and proposals intended to allow the UK to meet its fourth and fifth Carbon Budgets (a 57% greenhouse gas emissions reduction on 1990 level). The CGS sets out three possible pathways to decarbonise the UK's economy by 2050:

1. Electric: including full deployment of electric vehicles (EVs), electric space heating, and industry moves to ‘clean fuels’.
2. Hydrogen: including heating homes and buildings, fuelling many vehicles and the power industry
3. Emissions removal; including construction of sustainable biomass power stations with carbon capture and storage technology

**2.13** All the analysed scenarios included an assumption that heat networks would supply 17% of UK domestic heat demand and at least 17% of UK non-industrial business and public sector heat demand, indicating the importance of these solutions within a future low carbon energy system.

## National Infrastructure Assessment 2018

**2.14** In providing advice on the UK's long term infrastructure needs the National Infrastructure Commission <sup>(8)</sup> recommended the following in relation to low cost low carbon:

- At least 50% renewable electricity generation by 2030
- Buildings which require less energy to heat and progress to zero carbon heat, through developing the evidence base on the different options, identifying areas for potential future cost reduction and progressing towards trialling low carbon hydrogen supply and manufacture at scale, including carbon capture and storage.
- Pilots to test hydrogen and heat pumps as low carbon heating options

7 HM Government (2017) Clean Growth Strategy

8 National Infrastructure Commission (2018) National Infrastructure Assessment. Available from [https://www.nic.org.uk/wp-content/uploads/CCS001\\_CCS0618917350-001\\_NIC-NIA\\_Accessible.pdf](https://www.nic.org.uk/wp-content/uploads/CCS001_CCS0618917350-001_NIC-NIA_Accessible.pdf):

## National Planning Policy Framework 2018

- 2.15** Paragraph 8 outlines overarching objectives to achieving. Subsection C makes clear that as part of the environmental objective that the land use planning system should support the transition to a low carbon future in a changing climate.
- 2.16** Chapter 9 of the NPPF has a focus on the promotion of sustainable transport. In relation to carbon Paragraph 103 is clear that significant development should be focused on locations which are or can be made sustainable, through limiting the need to travel and offering a genuine choice of transport modes. Additional support is also given for planning policies to provide for walking and cycling infrastructure (Para 104d) and to set standards for parking for ultra low emission vehicles (Para 105e).
- 2.17** Paragraph 118 recognises that some undeveloped land can have a critical function of carbon storage and planning policies/decisions need to be mindful of this.
- 2.18** Paragraph 148 (Chapter 14) is clear that the planning system should support the transition to a low carbon future in a changing climate, taking full account of flood risk and coastal change. It should help to: shape places in ways that contribute to radical reductions in greenhouse gas emissions, minimise vulnerability and improve resilience; encourage the reuse of existing resources, including the conversion of existing buildings; and support renewable and low carbon energy and associated infrastructure.
- 2.19** Paragraph 150 (b) further states that new development should be planned in a way that can help to reduce greenhouse gas emissions, such as through its location, orientation and design. Any local requirements for the sustainability of buildings should reflect the Government's policy for national technical standards. In response to representations on the NPPF consultation Government further clarified<sup>(9)</sup> that *'local authority respondents stated the view that the text in the revised Framework restricted their ability to require energy efficiency standards above Building Regulations. To clarify, the Framework does not prevent local authorities from using their existing powers under the Planning and Energy Act 2008 or other legislation where applicable to set higher ambition. In particular, local authorities are not restricted in their ability to require energy efficiency standards above Building Regulations. The Government remains committed to delivering the clean growth mission to halve the energy usage of new buildings by 2030'*.
- 2.20** Paragraph 151 advises that to help increase the use and supply of renewable and low carbon energy and heat, plans should:
- a. provide a positive strategy for energy from these sources, that maximises the potential for suitable development, while ensuring that adverse impacts are addressed satisfactorily (including cumulative landscape and visual impacts);

9 [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/728498/180724\\_NPPF\\_Gov\\_response.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/728498/180724_NPPF_Gov_response.pdf)



- b. consider identifying suitable areas for renewable and low carbon energy sources, and supporting infrastructure, where this would help secure their development; and
- c. identify opportunities for development to draw its energy supply from decentralised, renewable or low carbon energy supply systems and for co-locating potential heat customers and suppliers.

**2.21** When determining planning applications, Paragraph 153 references that local planning authorities should expect new development to:

- a. comply with any development plan policies on local requirements for decentralised energy supply unless it can be demonstrated by the applicant, having regard to the type of development involved and its design, that this is not feasible or viable; and
- b. take account of landform, layout, building orientation, massing and landscaping to minimise energy consumption.

## **National Planning Practice Guidance**

### **Climate Change Planning Practice Guidance**

**2.22** National Planning Practice Guidance outlines that addressing climate change is one of the core land use planning principles which the National Planning Policy Framework expects to underpin both plan-making and decision-taking. These include the requirements for local authorities to adopt proactive strategies to mitigate and adapt to climate change in line with the provisions and objectives of the Climate Change Act 2008, and co-operate to deliver strategic priorities which include climate change (Paragraph: 001 Reference ID: 6-001-20140306).

**2.23** Paragraph 003 (Reference ID: 6-003-20140612) provides the following examples of mitigation/adaptation approaches to Local Plans:

#### **2.24 Mitigation:**

- Reducing the need to travel and providing for sustainable transport
- Providing opportunities for renewable and low carbon energy technologies
- Providing opportunities for decentralised energy and heating
- Promoting low carbon design approaches to reduce energy consumption in buildings

## 2.25 *Adaption:*

- Considering future climate risks when allocating development sites
- Considering the impact of and promoting design responses to flood risk and coastal change for the lifetime of the development
- Considering availability of water and water infrastructure for the lifetime of the development and design responses to promote water efficiency and protect water quality
- Promoting adaption approaches in design policies

**2.26** Paragraph 004 (Reference ID: 6-004-20140612) recommends that Local Plans should set an integrated approach to adaptation and mitigation where possible.

## **Renewable and Low Carbon Energy Planning Practice Guidance**

**2.27** National Planning Practice Guidance recognises that the planning system has an important role in the delivery of renewable and low carbon infrastructure. Paragraph 001 (Reference ID: 5-001-20140306) highlights that *‘increasing the amount of energy from renewable and low carbon technologies will help to make sure the UK has a secure energy supply, reduce greenhouse gas emissions to slow down climate change and stimulate investment in new jobs and businesses’*.

**2.28** Paragraph 009 (Reference ID: 5-009-20140306) gives full consideration to how planning can help identify opportunities for decentralised energy either through the location of development or the generation and recovery of waste heat.

## **Greater Manchester Strategy**

**2.29** The Greater Manchester Strategy<sup>(10)</sup> sets out a series of priorities around the twin themes of growth and reform. These focus on creating the conditions for growth, increasing productivity across GM and helping our citizens to become independent and self-reliant. The city region aspires to close and then eliminate its budget deficit to become a net contributor to the national economy.

**2.30** Priority 7 within the Greater Manchester Strategy (A Green City for All) specifies that one of the outcomes will be *‘reduced carbon emissions and air pollution, increased resilience, more sustainable consumption and production, and an outstanding natural environment’*. This includes a target of *‘reducing CO2 emissions to 11mt by 2020 (down from 13.6mt in 2014)’*. The strategy acknowledges that there is a need to *‘radically rethink how we supply, manage and consume energy’* and *‘urgent innovation in our*

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10 GMCA (2017) Our People Our Place, The Greater Manchester Strategy

*buildings, transport and energy infrastructure is required*'. It also committed to working with partners to define a robust low carbon pathway to 2050 to accelerate the point at which Greater Manchester can become carbon neutral.

## Greater Manchester Carbon Commitments

- 2.31** The Greater Manchester Combined Authority (GMCA) has adopted its own aspirational target of a 48% reduction in carbon emissions by 2020 compared to 1990 levels with a goal to cut emission levels to below eighty to ninety-five percent, or two metric tons per capita, by 2050<sup>(11)</sup>.
- 2.32** Greater Manchester districts have also independently signed up to the UK100 Cities '100% Clean by 2050' commitment<sup>(12)</sup>. In addition Greater Manchester has signed the Integrated Covenant of Mayors memorandum of understanding (MOU). This commits each signatory to limit emissions to below 80 to 95 percent below 1990 levels, or below two metric tons per capita, by 2050 – the level of emission reduction believed necessary to limit global warming to less than 2°C by the end of this century. The current energy consumption is equivalent to 5.0 metric tonnes per capita. Although not legally binding, these commitments present clear and lasting commitment to reduce emissions in the decades to come.

## Mayoral Green Summit

- 2.33** To support existing ambition, the Mayor's manifesto included a commitment to hold a Green Summit within the first year of taking office *"to declare a new, accelerated ambition for Greater Manchester on the green economy and carbon-neutrality"* and *"in the meantime, ask experts and city stakeholders to lead a public debate on what that new goal should be."*
- 2.34** Following his election, Mayor Andy Burnham wanted to emphasise Greater Manchester's leadership on this agenda by setting a new ambition for clean air, access to quality green-space and an accelerated ambition for Greater Manchester to become 'carbon neutral' before 2050. To help realise this, he called for a landmark Green Summit, which was held on 21 March 2018. As part of this, the Summit set out to consider how Greater Manchester can accelerate its activities to reduce carbon emissions to tackle climate change and in doing so, to position the city region as a global leader for smart energy innovation. The event brought together environmental experts, interest groups, partner agencies, academics and local people together to accelerate Greater Manchester's green ambitions.
- 2.35** A number of key announcements from the Summit were made relevant to this topic paper:

11 GMCA (October 2016), *Climate Change and Low Emissions Strategies Whole Place Implementation Plan for Greater Manchester (2016 – 2020)*

12 <https://www.uk100.org/>

- Bringing forward the date by which we make Greater Manchester carbon neutral by at least a decade.
- Greater Manchester is one of the few cities in the world that is using a science-based approach to evaluating carbon targets and trajectories<sup>(13)</sup>.
- Greater Manchester has been designated by Defra as the UK's urban pioneer city, which means we will be given the opportunity to find new ways to manage and invest in our natural environment.
- Exploring the creation of a Greater Manchester energy company able to invest in energy generation, storage and control technologies to generate revenue from 'grid balancing'.
- Electricity North West will lead a workstream to find out how Greater Manchester can generate more energy locally from smart, renewable sources.;UK Green Buildings Council will lead a workstream to assess how our current building stock can be retrofit at an affordable cost, potentially generating new jobs for the region.
- The Greater Manchester Spatial Framework including a date by which all new homes built across Greater Manchester will need to be net zero carbon;Doubling the number of electric vehicle charging points.
- Moving to an emissions-free bus fleet.;Investing up to £50m per year for three years to transform cycling and walking in the city-region.

## Springboard to a Green City Region (2018)

**2.36** Following on from the Green Summit, the GMCA published the Springboard report<sup>(14)</sup> to set out an environmental vision for Greater Manchester to be a 'carbon neutral, climate resilient city region with a thriving natural environment and circular, zero waste economy where:

- *All citizens will have access to green space in every community, more trees in urban areas, active travel networks, environmental education and to healthy and locally produced food*
- *Our infrastructure will be smart and fit for the future. We will have an integrated, clean and affordable public transport system, resource efficient buildings, greater local community renewable energy, cleaner air, water and greenspace for all.*
- *Citizens and businesses will actively participate in decision-making and will be encouraged to adopt sustainable living and businesses practices, focusing on local solutions to deliver a prosperous economy.*

**2.37** For buildings it reaffirmed the commitment that the GMSF would include a date by which all new homes and buildings will be net zero carbon and 80-100% of households and commercial buildings must be electrically heated by 2050 (mainly by heat pumps and

13 Tyndall (2018), Quantifying the Implications of the Paris Agreement for Greater Manchester

14 GMCA (2018) *Greater Manchester's Springboard to a Green City Region*

low carbon heat networks). In relation to energy it outlined that to achieve the carbon neutrality targets set within the SCATTER research there will requirement to significantly decarbonise electricity and gas .

### 3 Summary of consultation

**3.1** In relation to the Carbon Emission Policy (GM 15) 75 comments were received during the 2016 consultation which were mainly supportive. Some of the representations also suggested that the ambition around carbon reduction did not go far enough (particularly in relation to the Paris Agreement). The following issues summarise the main points that were taken forward for further consideration:

- Cross reference with measures in the evidence base GM Air Quality Action Plan and Low Emissions Strategy.
- The role Green Infrastructure for cooling and its contribution to lower summer energy and cooling demand
- Specific requirements and measurable targets and what this means for development including any offsetting approach
- Viability
- Scope of GMSF and carbon emissions for new development, in particular potential requirements for net zero carbon and on site renewable energy generation
- Further consideration of Criterion 4 (carbon assessments) and 7 (low/renewable energy schemes)
- Travel Planning
- Establishment of new energy centres and decentralised heat infrastructure



## 4 Summary of IA

4.1 The Integrated Assessment<sup>(15)</sup> which supported the previous draft Spatial Framework highlighted the following recommendation in relation to draft policy GM15 (Carbon Emissions):

- *Reference links between reducing carbon emissions and reducing air pollution (from transport).*
- *Reference links between sequestering carbon and resilience to climate change (urban heat island cooling and flood risk management).*
- *Reference encouraging water efficiency for new developments to reduce energy intensive treatment.*
- *Reference the carbon emissions resulting from physical resource use for new development, and the consequent carbon benefits of recycling and efficient use of physical resources.*

4.2 It also noted that Policy GM19 (Design) did not consider energy efficiency and resilience of housing stock is not considered. It recommended that design specifications and layout will affect these issues so should be set out in the policy.

4.3 In relation to the thematic policies on 'Industry and Warehousing' (Policy GM2) and 'Offices' (Policy GM3), the Integrated Assessment advised that there should be reference to *'the potential negative impacts on air quality and health from operational use emissions and employees travelling; similarly the tensions concerning carbon emissions reductions'*. For the thematic policy on 'Housing' (Policy GM5) it was recommended that *'reference to energy efficiency and water efficiency should be included'*.

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15 Arup (2016), *Integrated Assessment of the Greater Manchester Spatial Framework*

## 5 GMSF Strategy, Policies and Allocations

**5.1** This section outlines the policy approach that is needed within the GMSF in relation to carbon and energy. It takes into account current legislation and guidance (Section 2), the findings of key evidence (Section 3), issues raised from the public consultation (Section 4) and the key recommendations from the Integrated Assessment (Section 5).

### Carbon and Energy

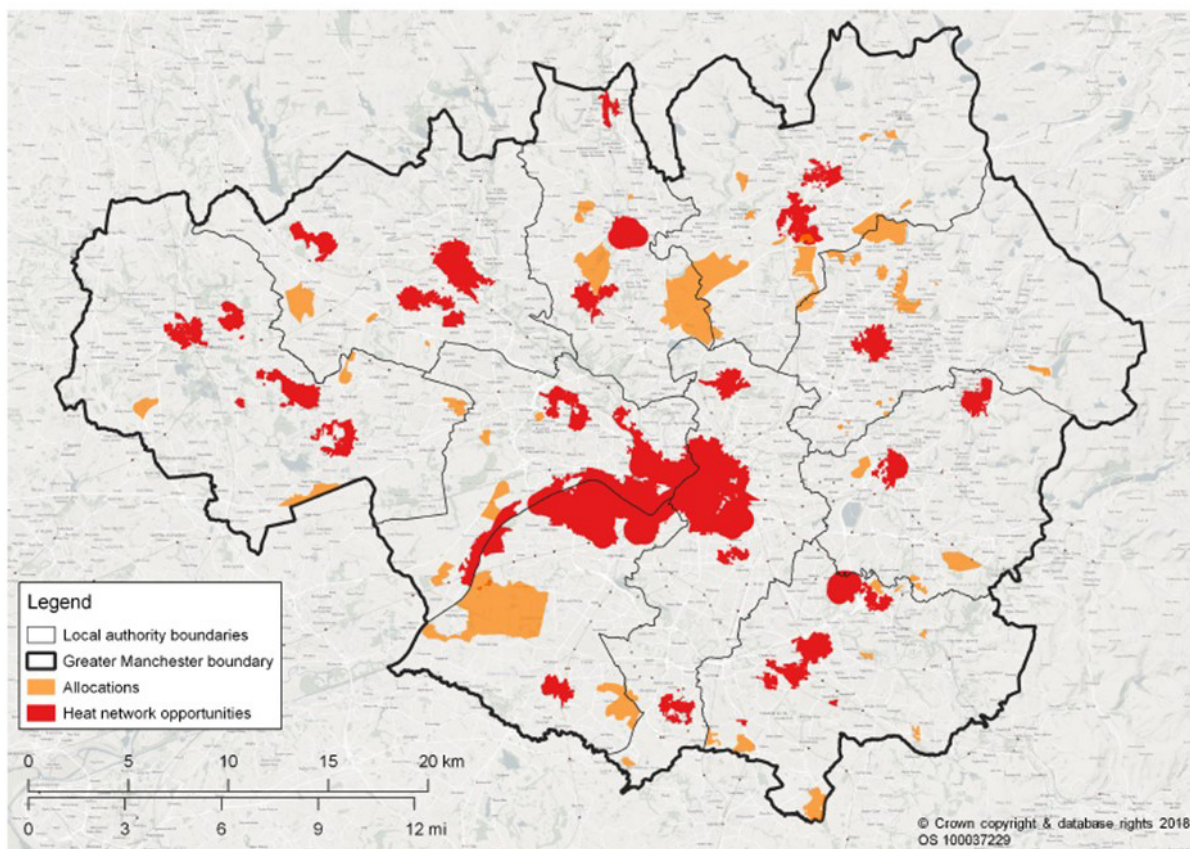
**5.2** The Revised GMSF needs a policy that recognises the ambition of Greater Manchester's carbon emission targets and the range of measures that are necessary to support this trajectory including:

- Securing sustainable growth that reduces reliance on the need to travel and patterns of development that encourage active walking, cycling and low emission vehicle use
- Energy efficiency and renewable energy generation requirements for new development including measurable targets against predicted carbon emissions to stimulate growth in the low carbon goods sector
- Planning for a smart and balanced grid which supports energy assets for generation and storage
- Increasing carbon sequestration through the restoration of natural assets which provide this critical ecosystem service
- Supporting Local Energy Area plans to develop long term cost effective pathways for future carbon emissions and reliance on alternative forms of energy
- Adopting a whole life cycle approach to carbon emissions to consider both the operational and embodied carbon resulting from new development
- Setting a date by which all development will be carbon neutral having regard to the emerging pathway and the role of offsetting
- Embedding the energy hierarchy:
  - Minimise energy demand;
  - Maximise energy efficiency
  - Utilise renewable energy;
  - Utilise low carbon energy;and
  - Utilise other energy sources.

### Energy Networks

**5.3** Decentralised energy infrastructure is a critical component of Greater Manchester's low carbon energy system in the future. The GMSF needs a clear policy to set out priorities for land use planning decisions across the city region to maximise the potential for heat and energy networks (see Map 1 below). In particular

- Utilizing existing evidence to define areas of opportunity for heat and energy networks where there should be a presumption in favour of connection and that new development will need to have regard to:
  - Minimum requirements to connect to existing infrastructure or installation of a site wide network
  - Future proofing within the design to be 'connection ready' and an expectation that any site wide network will be designed to enable future expansion to adjoining buildings.
  - Infrastructure requirements for new development including the connection to existing networks and creation of new energy centres
- Opportunities for reuse of waste heat and secondary heat sources
- Requirements for viability assessments which consider:
  - Identification of existing and proposed heat/energy loads;
  - Identification of heat/energy supply sources;
  - Identification of opportunities to utilise renewable and low carbon energy sources;
  - Identification of opportunities to utilise waste and secondary heat sources;
  - Impacts of proposals and technology choices on local air quality;
  - Design according to best practice; and
  - Adopting appropriate consumer protection standards.



**Map 1 Heat Network Opportunities**