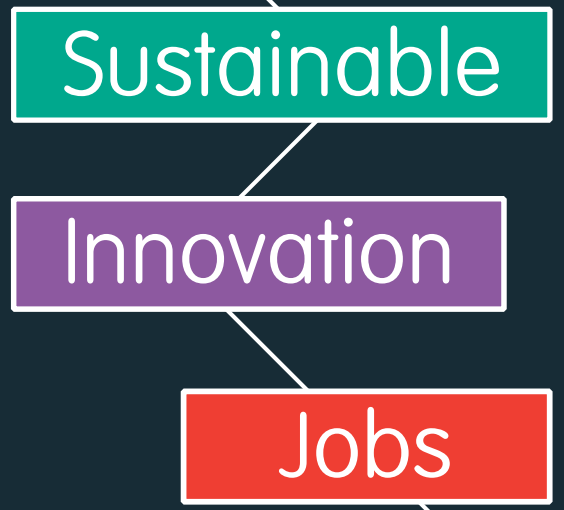
Paper 05 – Annex 1

Local Area Energy Planning - Greater Manchester



"a clean, intelligent, energy system that works for people, communities and businesses"

Richard Halsey
Programme Manager
Smart Systems and Heat Programme

Delivered by CATAPULT Energy Systems

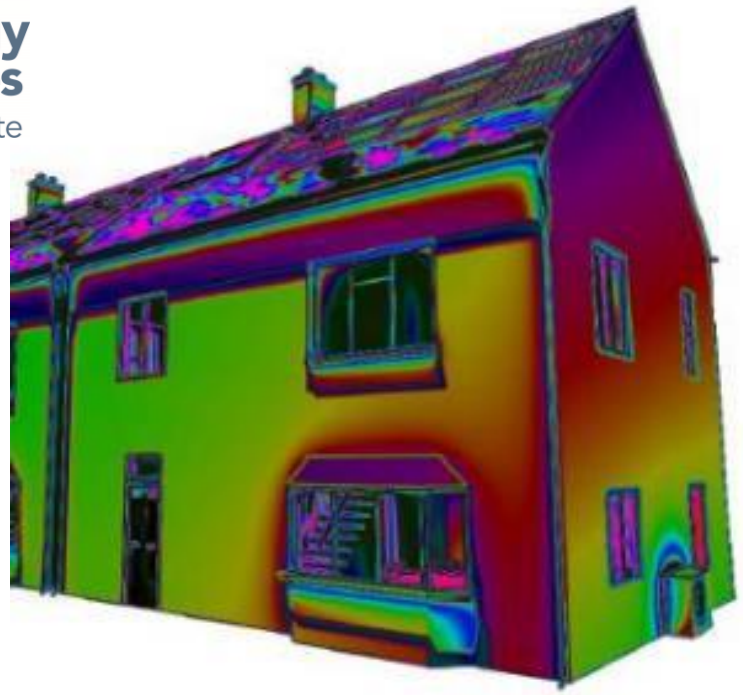
Content

- Context and challenge of energy planning in GM
- Catapult approach for GM as part of SSH
- Scope of Study
- Key findings
- What next

ETI's Smart Systems and Heat Programme

Delivered by CATAPULT Energy Systems

energy technologies institute



"Creating future-proof and economic local heating solutions for the UK"

- Connecting together – the understanding of consumer needs and behaviour with the development and integration of technologies and new business models into…
- Delivering enhanced knowledge amongst industry and public sector
- Resulting in industry and investor confidence to implement from 2020 which enables a UK heat transition

The Energy Systems Catapult will deliver Phase One of the SSH programme as a supplier to the ETI following the transition of the SSH programme team to the Catapult. From 2017 the Catapult will be responsible for delivery of Phase Two of the programme independently of the ETI.

ETI members

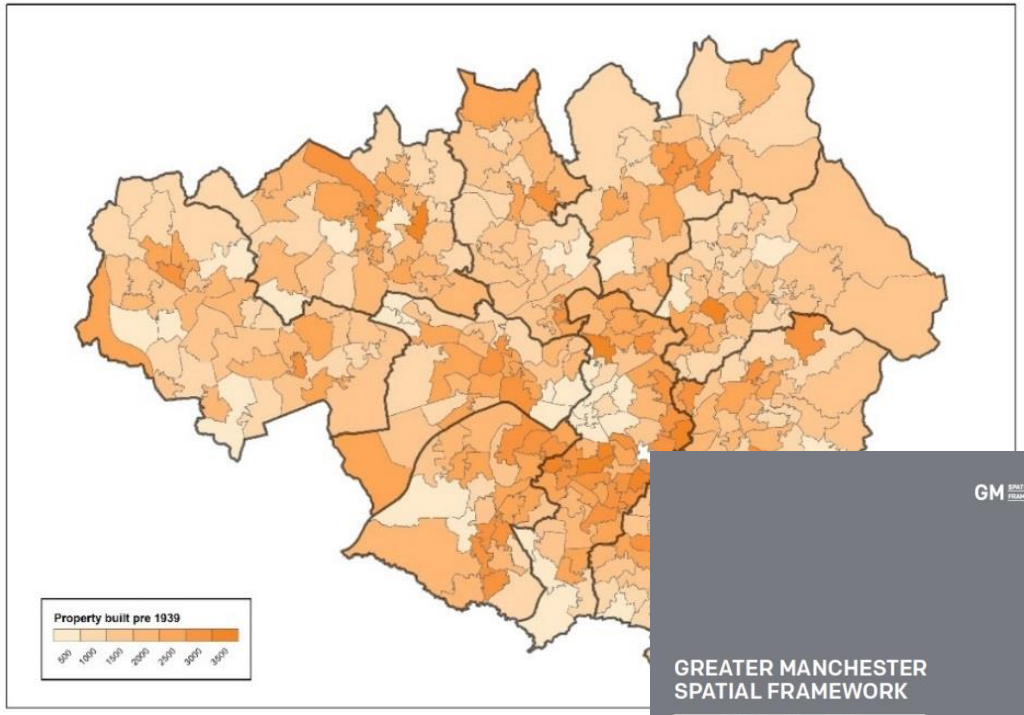
bp · CATERPILLAR · EDF ENERGY · Rolls-Royce · Shell · Department for Business, Energy & Industrial Strategy · EPSRC Pioneering research and skills · Innovate UK Technology Strategy Board

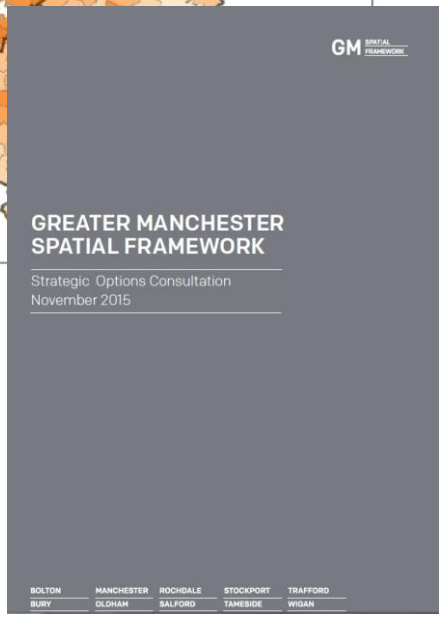
ETI programme associate

HITACHI Inspire the Next

Challenge of a energy planning for GM

- Large area covering over 1m homes
- Large and complex electricity network
- Emerging GM spatial planning framework
- Energy planning key to achieving ambition
- Evidence needed to establish policy direction
- Evidence to select a local area for a detailed study as part of SSH programme

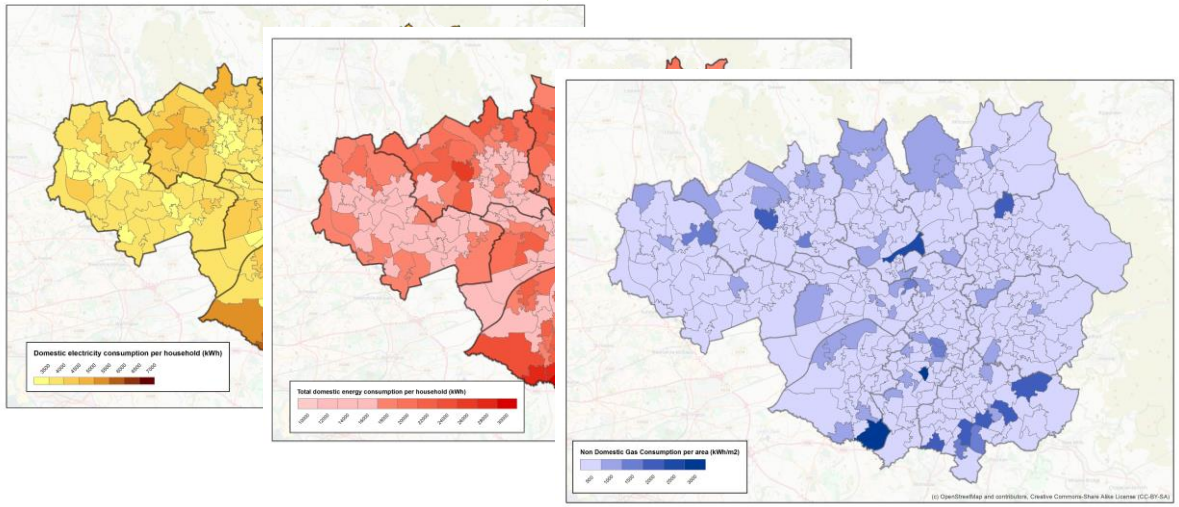


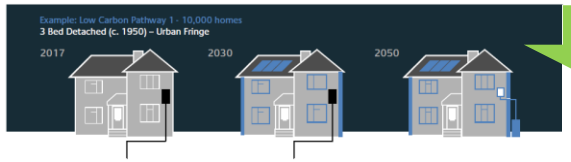


Catapult and GM approach

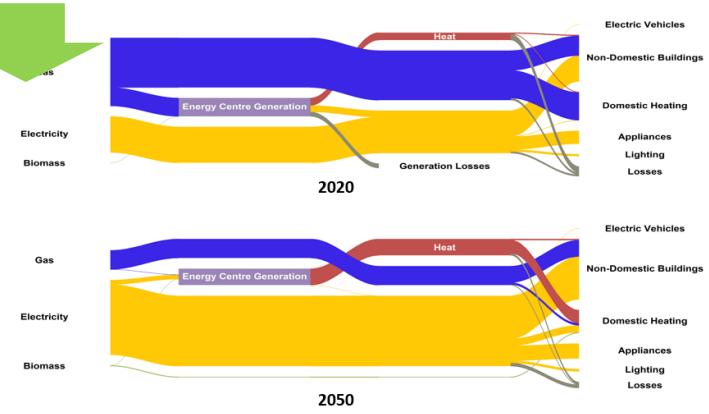
- Collaborative approach
  - Consolidate data and evidence for GM
  - Hook into emerging GM spatial planning framework
  - Inform selection of a detailed study area
  - Aligned with SSH Programme objectives
- 2no distinct stages of work:

- High level study and data gathering
- Detailed study for single authority using EnergyPath Networks



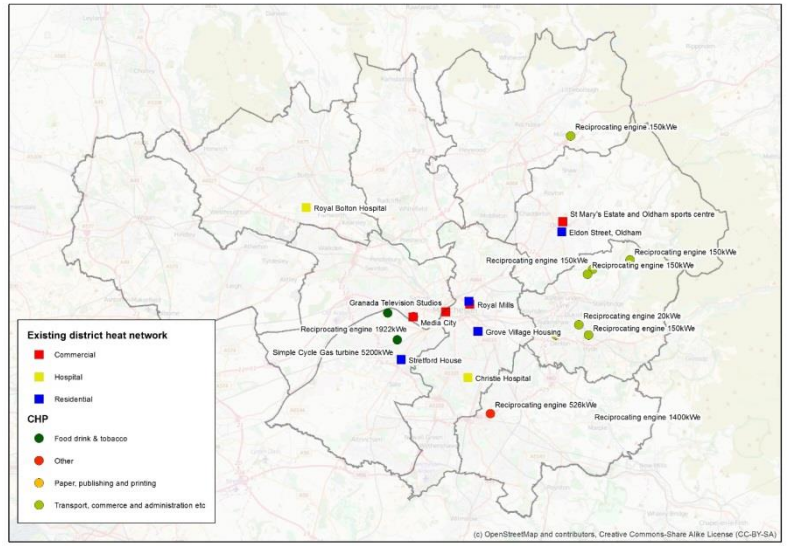


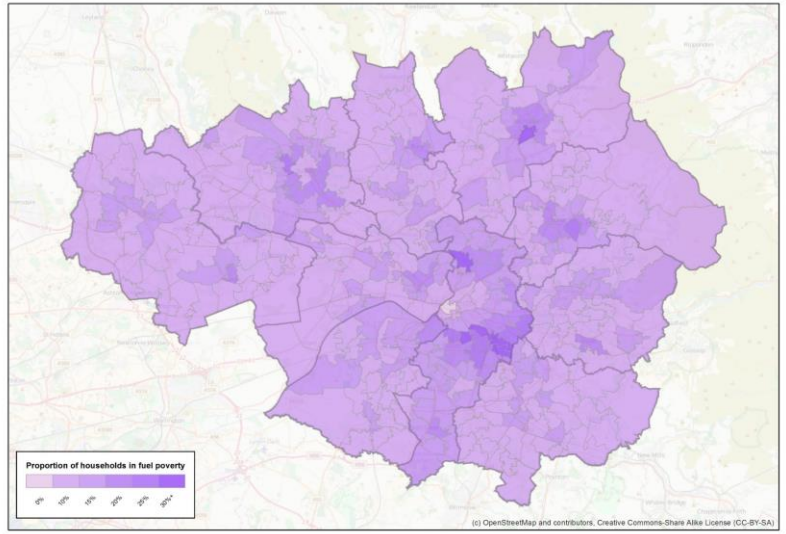
EnergyPath



Study Scope and Outputs

- Scope
  - Consolidate and analyse data and studies
  - Assess existing and future energy demand
  - Assess technical potential for low carbon tech
  - Spatial mapping of data – evidence for GM policy
  - Assess potential future energy scenarios
- Limitations - High level study only
  - No dynamic multi-vector modelling
  - No cost optimisation.
  - Technical potential doesn't mean desirable or cost effective
- Outputs
  - Single study and GIS data set for GMCA
  - Policy evidence for GM Spatial Framework
  - Analysis to inform selection of more detailed study area
- Outcome
  - Hook into GMSF – consolidated and additional evidence
  - Foundation for future energy planning in GM
  - Select local authority for detailed study





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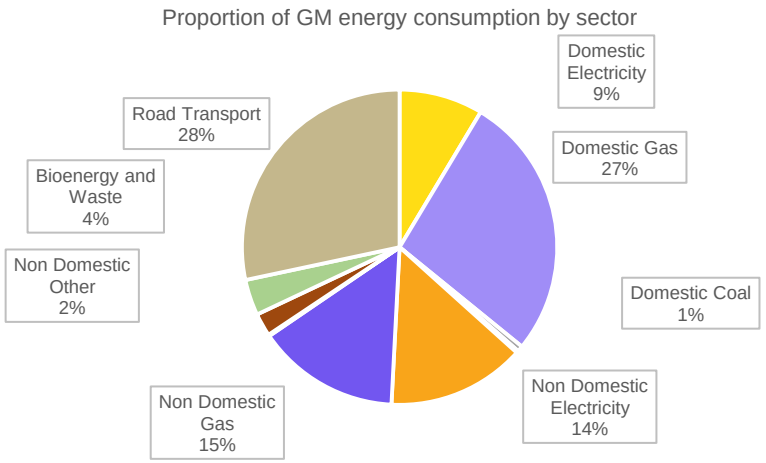
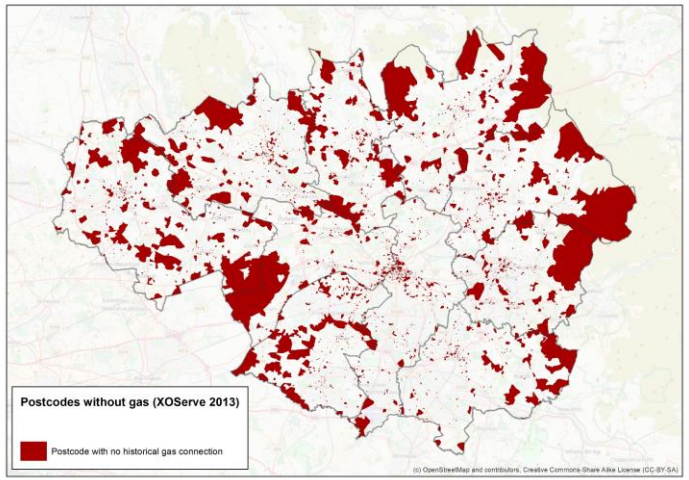
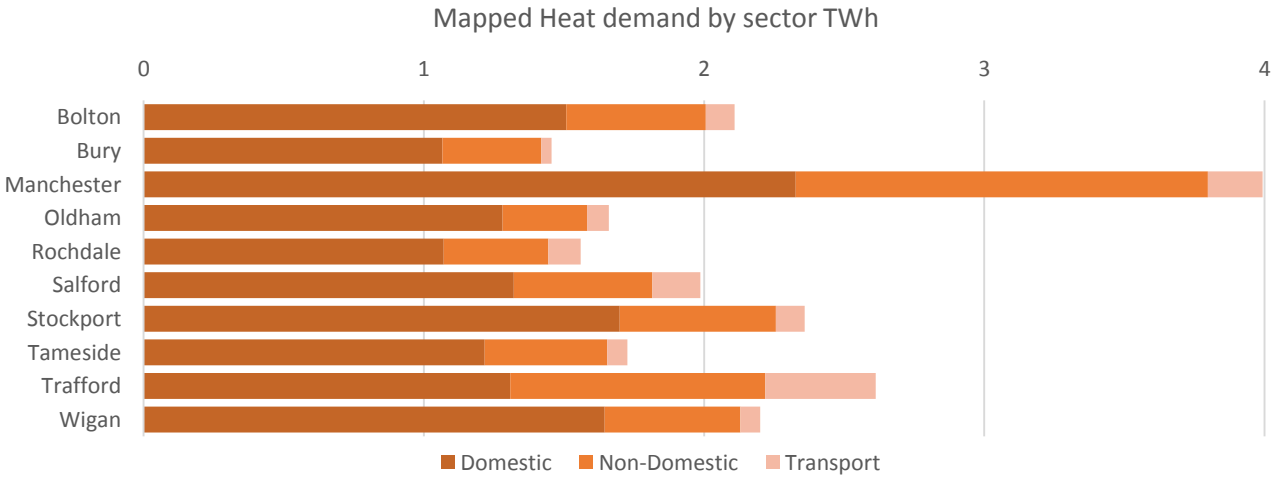
Key findings – current energy system and future demand

- **Wide variation** in energy use across GM districts
- **Homes** in GM account for **37%** of total energy demand
- **77%** of domestic demand is **heating and hot water**
- **5%** of postcodes in GM **'off-gas'**
- Significant reliance on coal and oil in some areas such as Wigan.
- **GM growth** could increase energy and CO_2 by **3%** under business-as-usual
- Some districts such as Trafford, Stockport and Tameside have proportionally higher levels of inefficient housing

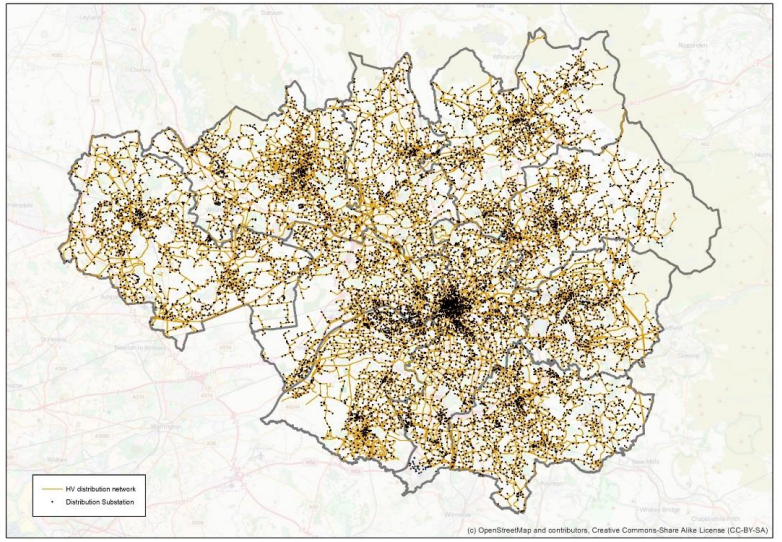


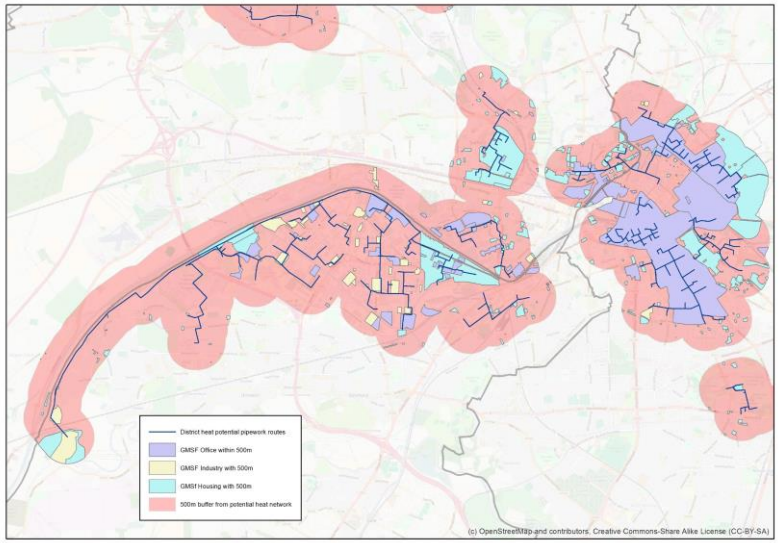




Key findings – Networks

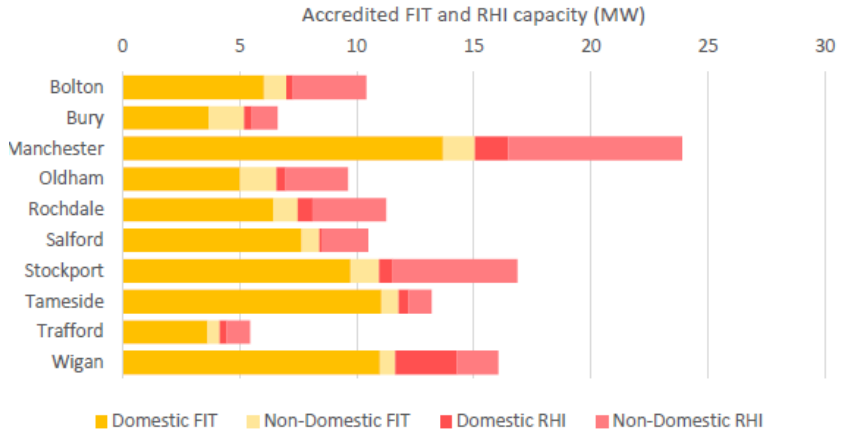
- Electricity
  - GM electricity network generally robust.
  - Number of areas with limited capacity to accommodate new demand
  - Increasing renewable generation, electrification of heat/transport create significant challenges.
  - Smart systems and storage provide opportunity but credible view of heat electrification needed
- Gas
  - Principal fuel for heating and hot water in GM - Some areas less extensive than others
  - Need to move homes off gas OR decarbonise gas network
  - Repurposing for hydrogen or biofuels could be a game changer but significant uncertainty
- District Heating
  - District Heating currently supplies around 2,000 homes in GM
  - 2 main sites at Mediacity and St Mary's Oldham
  - 182,000 homes in the UK currently connected to District Heating.
  - Networks identified in GM urban areas that could connect 6,000 homes >160,000 homes within 500m of potential heat network. HNDU funding supporting feasibility

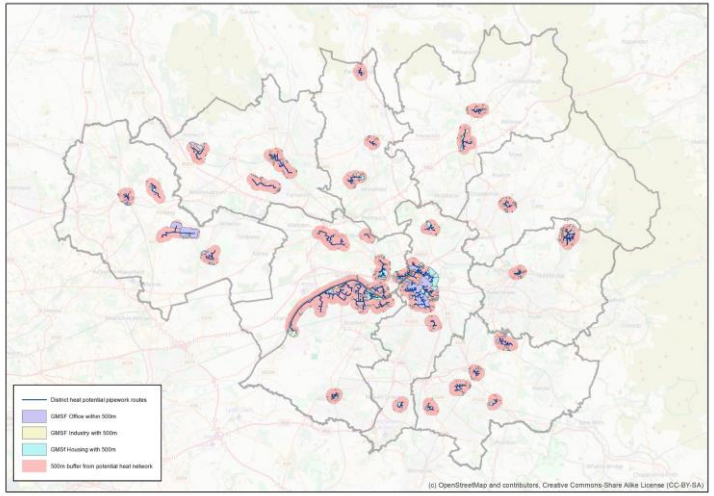


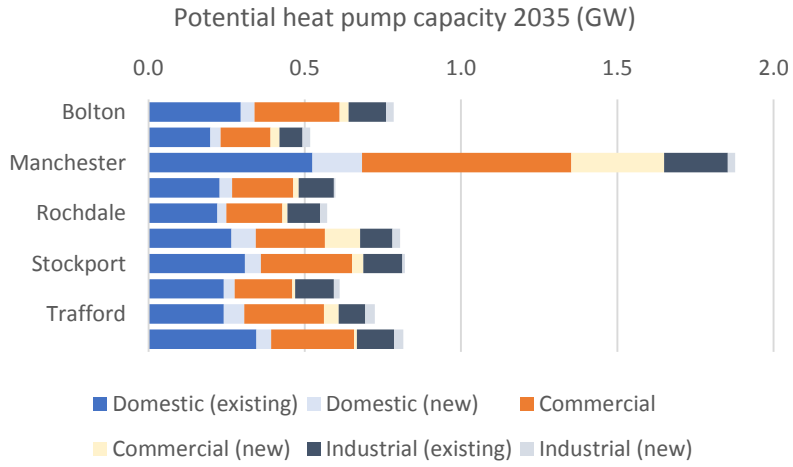


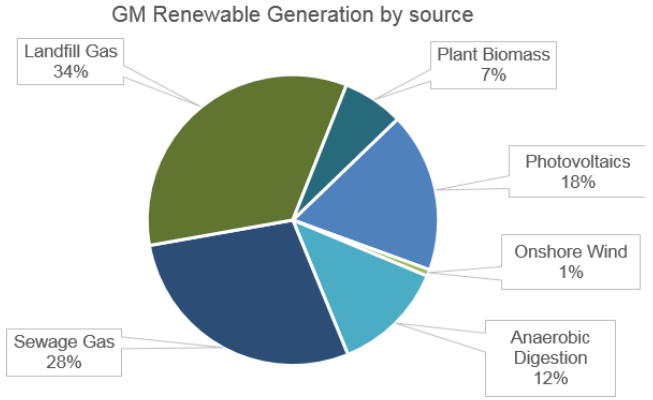
Key findings – GM low carbon potential

- The majority of regional renewable generation is from Landfill, sewage and AD gas (74%).
- Wide variation in installed small scale renewables (<5MW) across districts
- **140MW** of installed renewable electricity capacity.
- **29MW** of installed renewable heat capacity
- Technical potential for c**9%** of elec demand from renewable energy
- Technical potential for c**68%** of heat demand from renewable energy



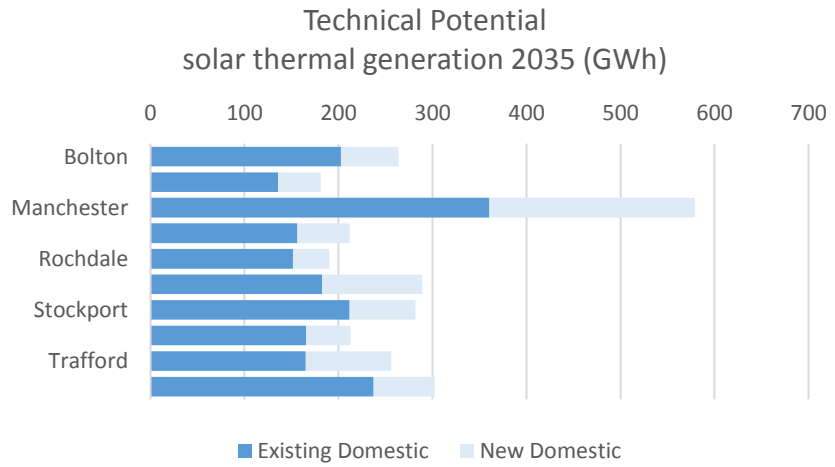


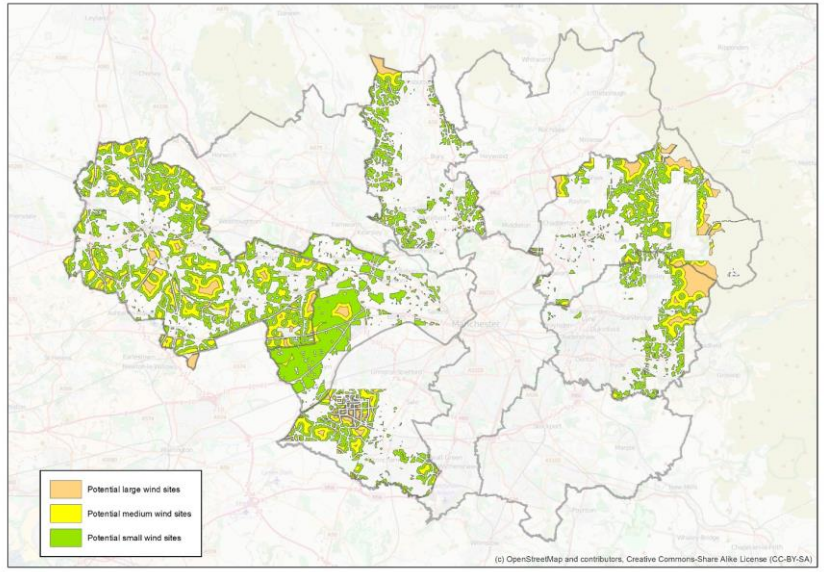




Key findings – GM low carbon potential

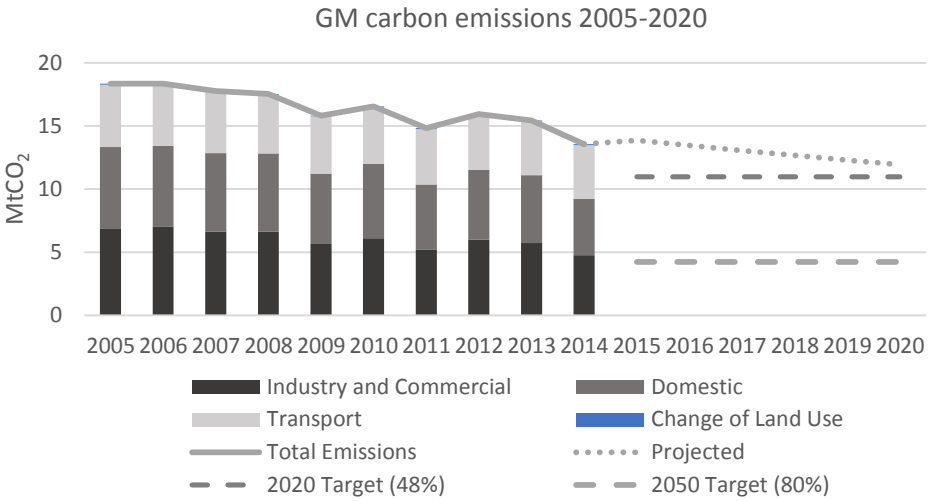
- Significant technical potential in GM for future energy demand met by:
  - **Heat networks**
  - **Solar technologies (heat and power)**
  - **Heat pumps**
  - **Biofuel**
- Other technologies (**wind, hydro, geothermal**) could have role but lesser technical potential in GM.
- Limitations to role of renewable electricity in decarbonisation within GM particularly onshore wind in current policy environment
- Important to recognise **economic barriers** to realising technical potential
- Implementation also affected by **political** and **societal** decisions
- Renewable energy is no silver bullet
- Increasing decentralised generation will create **challenges for networks**
- Number of **potential game changers** including **hydrogen** and **storage** but significant uncertainty

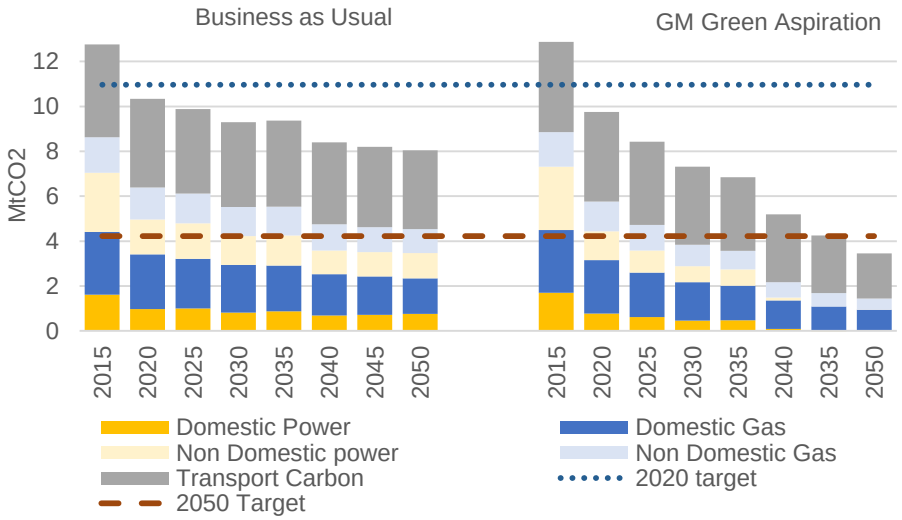




Key findings – GM future energy scenarios

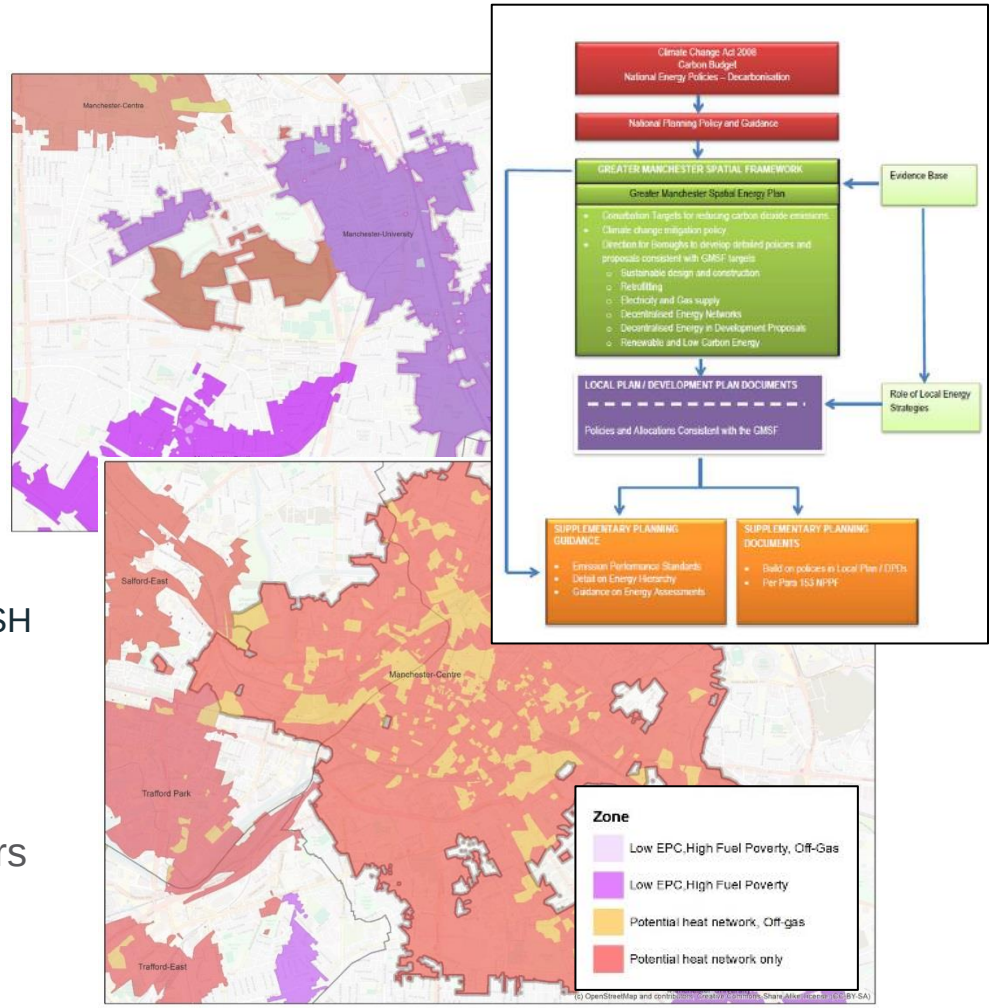
- **Business-as-usual not enough** to hit 2050 80% CO_2 target
- Low carbon future is **achievable** with known technologies
- **Significant uncertainty** in national policy
- **Decarbonisation of power by 2030** is key
  - Significant reductions achieved in recent years
  - Not enough on its own
- Need to **accelerate decarbonisation of heat**
  - **Existing homes and buildings** in GM account for over **56%** of carbon emission by 2035 under BAU
  - **Significant infrastructure challenges** to electrification of heat and heat network growth – no easy solution
  - Credible plan needed for people, communities and businesses
- **Smart energy revolution**
  - Enabler for **consumer focused** low carbon energy system
- Need local understanding of **what, where and when** and **near term priorities**





GM future energy planning policy - recommendations

- GM wide **policy framework needed** supporting decarbonisation
  - Must be adaptive to reflect innovation and future ‘game changers’
  - Recognise need to tackle energy to existing homes and buildings
- Need for an **ambitious local carbon target** to 2050
  - 80% CO2 from GM buildings not enough
- More **detailed local area energy planning**
  - Reflect local opportunities and constraints
  - Consider all energy vectors – electricity, gas and heat
  - Understand potential transition pathways for existing homes
  - Build consensus and unlock investment into infrastructure
- **Identify contenders and near term action**
  - Low regret projects and interventions within local areas of GM
  - large-scale whole system pilots - Real-world examples of future system (SSH Phase 2)
  - Credible long term pathways and roadmap to 2050
- Policy to support **retrofitting and heat networks**
  - Demand reduction and heating system change
- **Consensus building** with GM, Local Authorities and network operators
- **Plan positively** for low carbon infrastructure as part of growth



Thank you and any questions

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