#UKPHC18

GREATER MANCHESTER LOW CARBON HUB

Greater Manchester's Low Carbon Transition

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GMCA

BOLTON | MANCHESTER | ROCHDALE | STOCKPORT | TRAFFORD
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GM Emissions Strategy: Themes

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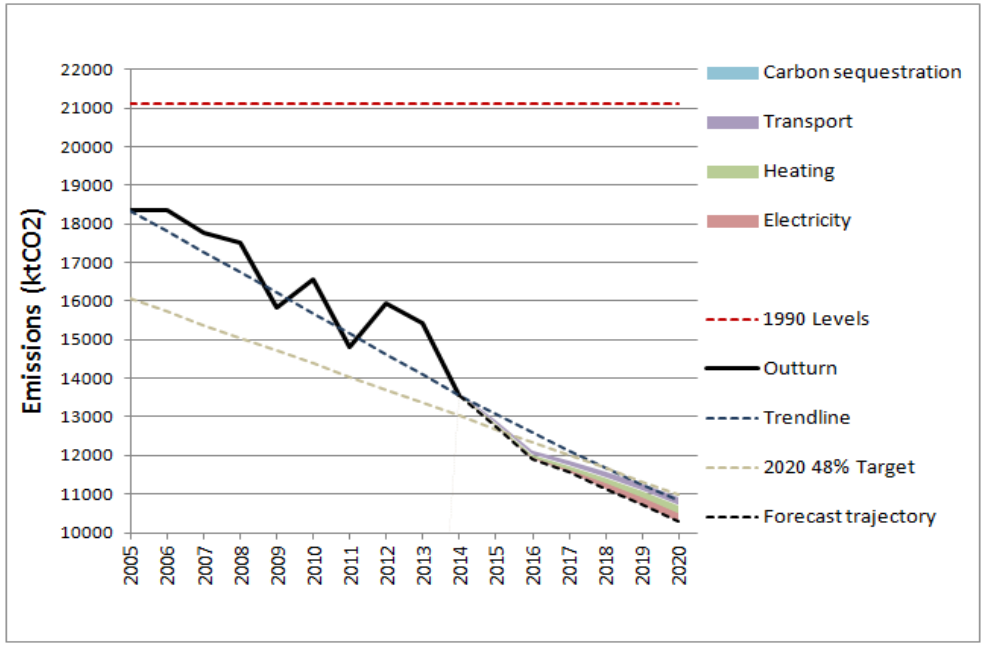
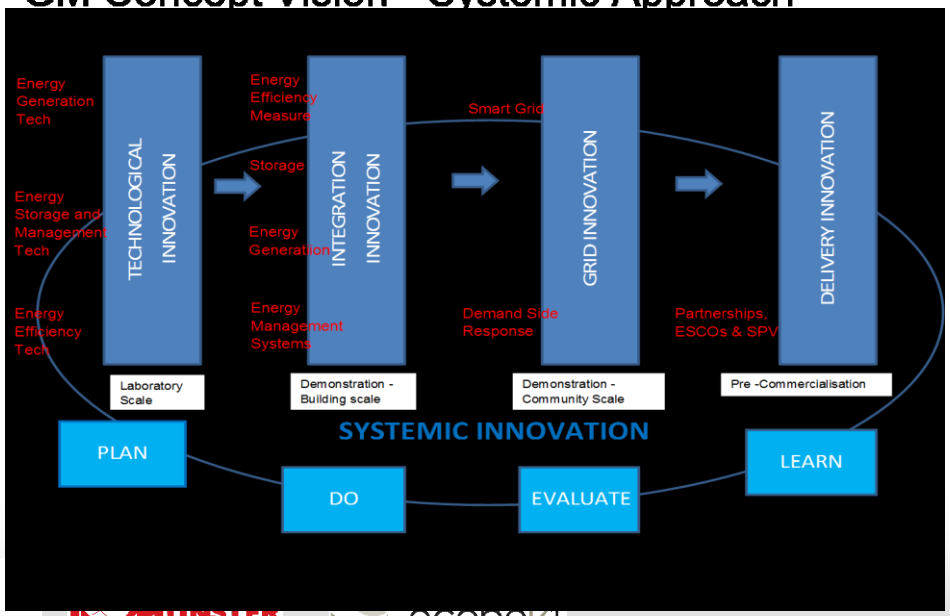
- **Energy**
- **Buildings**
- **Transport**
- **Sustainable Consumption & Production**
- **Natural Capital**
- Skills and Growth
- Climate Resilience

} Cross cutting



GM Concept Vision - Systemic Approach



- Latest Climate Change Plan outlines actions to meet GM's 48% carbon target reduction by 2020 (from 1990)
- 5 Headline goals include reducing carbon, improving air quality, changing behaviours, adapting and developing our economy
- Devolution & Northern Powerhouse provides further opportunities
- ERDF Funds – Place based systemic approach

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Research & Evidence

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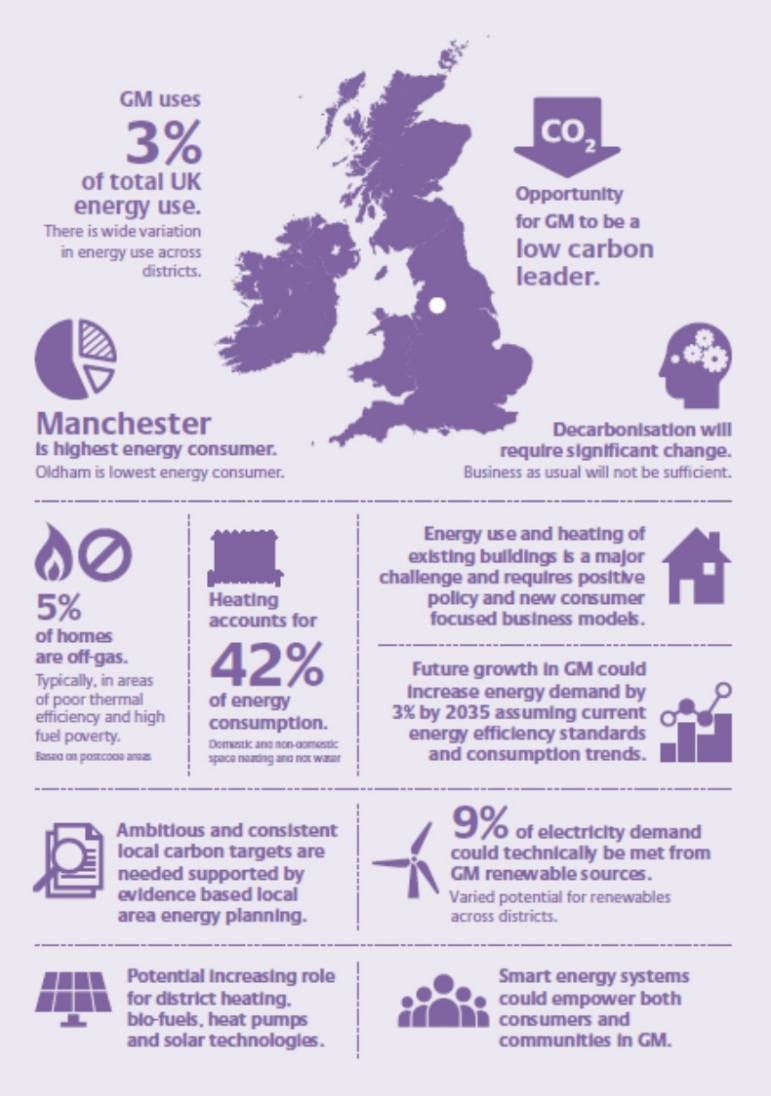

An Evidence Based Approach:

- GM spends over £5 bn/pa on energy (all)
- 1.2m households, 25% are social homes
- Use of electricity and gas in buildings accounts for 37% of total energy demand and 72% of direct CO_2 emissions
- 77% of domestic demand is heating and hot water
- 95% of homes use gas for space and water heating;
- Longer term targets require energy efficiency, low or zero carbon heating, predicated on energy efficient buildings
- GM has 140MW of installed renewable electricity & 29MW of heat capacity.However, technical potential for 9% of our electricity demand and **68%** of our heat demand to come from renewable sources.
- Significant potential for more:
  - **Energy Efficiency through building retrofit**
  - **Heat networks/heat pumps**
  - **Solar technologies (heat and power)**
  - **Biofuel**

SCATTER - Introduction

Setting City Area Targets and Trajectories for Emission Reduction

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- Interventions for consideration by city regions are broken down into four broad categories
  - Energy supply (e.g. use of solar PV panels and biomass for generating renewable energy)
  - Energy demand from buildings (e.g. use of retrofit technologies, switching space heating)
  - Energy demand from transport (e.g. ultralow emission vehicles, reducing domestic travel)
  - Natural capital (e.g. city greening and peatland)

There are 3 key outputs of the model:

1	**A greenhouse gas emissions inventory** that is aligned with the World Resource Institute's *Global Protocol for Community-Scale Greenhouse Gas Emission Inventories ("GPC");*
2	**A range of illustrative emission scenarios** to 2050, based on the adoption or application of a number of emission reducing interventions using existing technologies; and
3	**A report on the emissions target set** that transparently details the nature and extent of any related emissions reduction, aligned with the World Resource Institute's *Mitigation Goal Standard ("MGS").*

SCATTER Analysis

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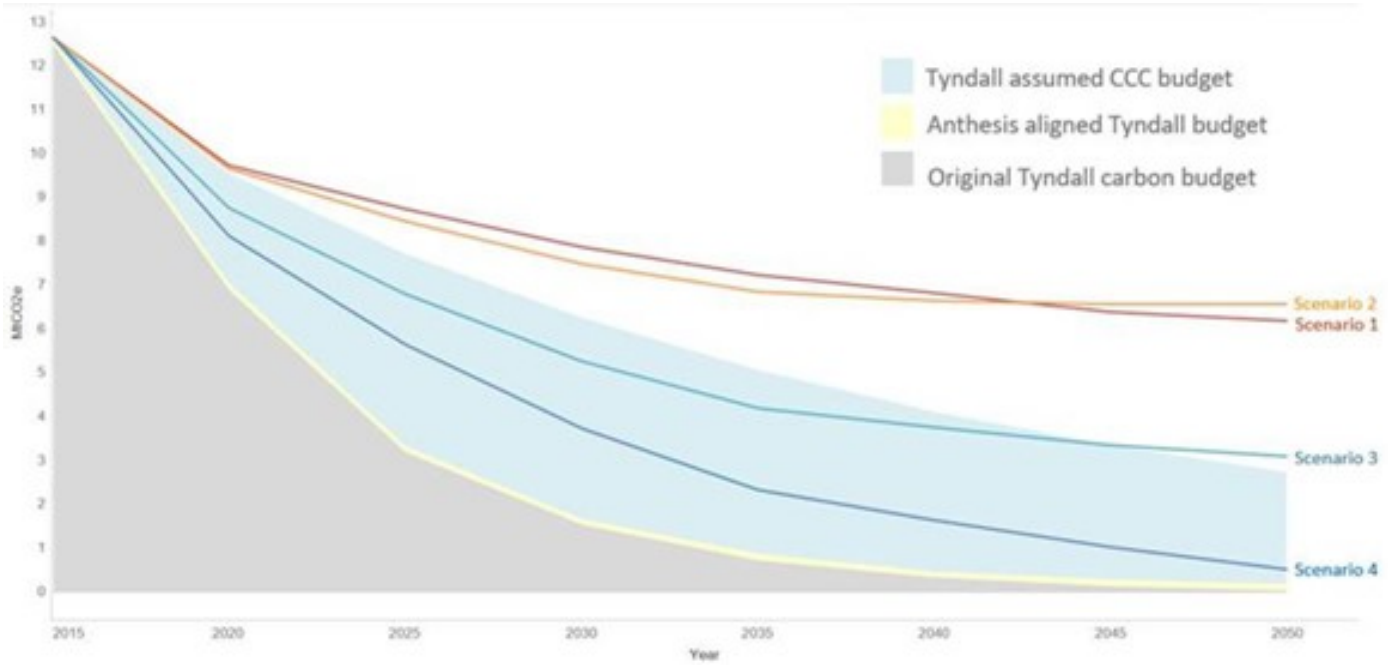

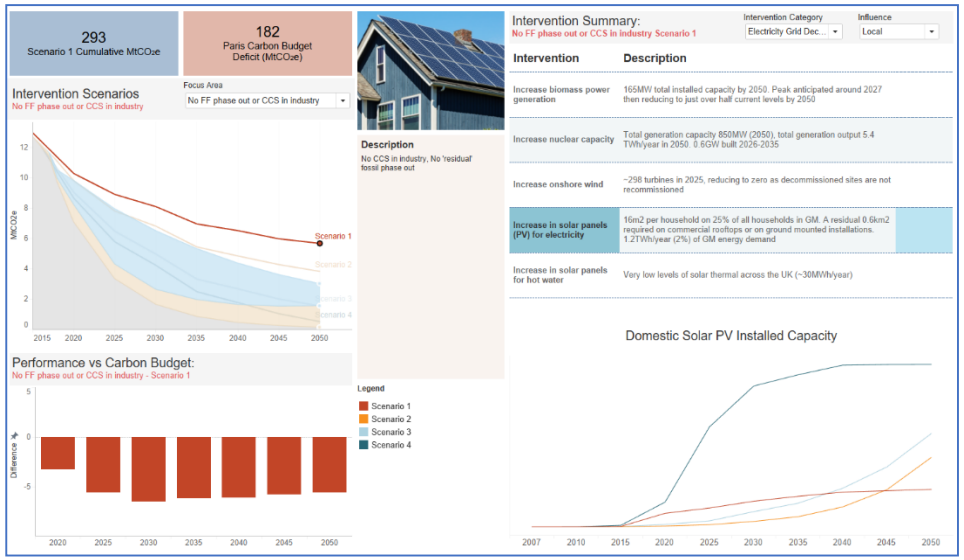

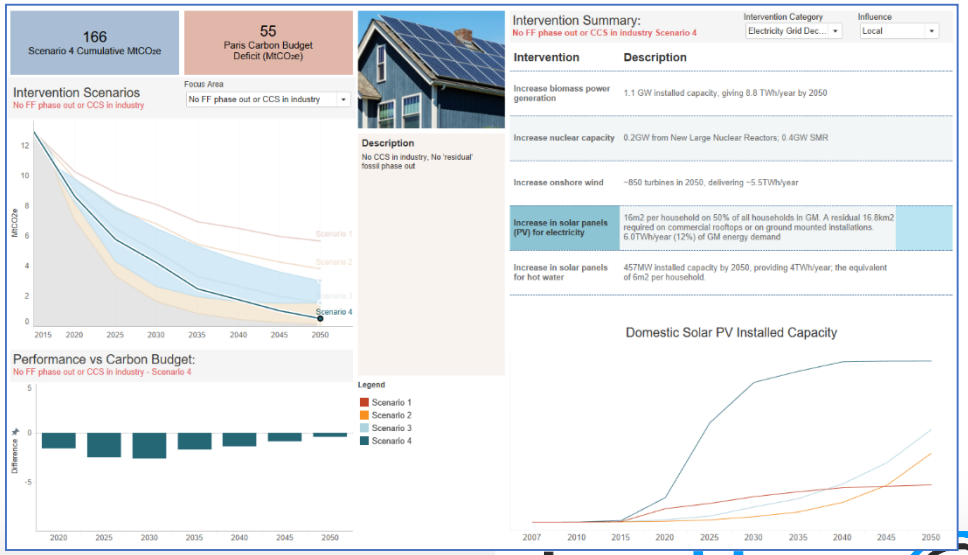

- Renewables (Solar Photovoltaics, Heat Pumps)
- Biomass power generation
- Shift from fossil fuels to battery or fuel cells for transport
- Shifting domestic transport behaviour
- Energy efficiency of domestic properties
- Improved efficiency of commercial heating and cooling
- Waste reduction, reuse and recycling

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Subcategory		Intervention description	Revised thresholds (Local)			
Demand			1	2	3	4
Direct local influence possible	Transport	Passenger transport: Reducing distance travelled by individuals	In 2050, individuals travel the same distance as today. Significant shift to public transport	5% reduction in travel demand below baseline levels by 2030	15% reduction in passenger Km by 2035	25% reduction in passenger Km by 2035
		Passenger transport: Shift to zero emission transport	By 2050 100% zero emission vehicles; all passenger trains and busses electrified	By 2040, 100% zero emissions vehicles and buses and complete railway electrification	By 100% 2035, zero emissions vehicles and buses and complete railway electrification	By 2035, 100% zero emissions vehicles and buses, complete railway electrification by 2025
		Passenger transport: Choice of fuel cell or battery powered zero emission vehicles	80% of zero emission cars use batteries, 20% use fuel cell by 2050	85% of zero emission cars use batteries, 15% fuel cell by 2050,	95% of zero emission cars use batteries, 5% fuel cell by 2050	100% of zero emission cars use batteries by 2050
		Freight: Shift to rail and water and low emission HGVs	Road haulage makes up 73% of distance, using conventional engines. Rail all diesel	Some shift from road to rail and water, and more efficient engines	Greater modal shift to rail and water; more efficient HGVs; more efficient logistics	Road modal share falls to 50%; greater hybridisation. Rail freight is all electric
	Households	Average temperature of homes	Average room temp is 18°C (equivalent to 0.5 degree increase from current av. temp)	Average room temp decreases to 17°C	Average room temp decreases to 16°C	Average room temp decreases to 16°C
		Home insulation	17% (0.19m) homes insulated, average thermal leakiness falls by 20%	Over 20% (0.23m) homes insulated, average thermal leakiness falls by 39%	45% (0.5m) homes insulated, average thermal leakiness falls by 57%	60% (0.7m) homes insulated, average thermal leakiness decreases by 75%
		Shift to electrification of home heating	The proportion of domestic heat supplied using electricity is 0-10%, as today	The proportion of domestic heating systems using electricity is 20%	The proportion of domestic heating systems supplied using electricity is 30-60%	The proportion of domestic heating systems supplied using electricity is 80-100%
		Home heating that isn't electric	The dominant non-electric heat source is biomass CHP	The dominant non-electric heat source is gas or gas CHP (biogas if available)	The dominant non-electric heat source is waste heat from power stations	A mixture of gas/biogas; biomass; and heat from power stations
		Home lighting & appliances	Energy demand for domestic lights and appliances increases by 20% (relative to 2016)	Energy demand for domestic lights and appliances is stable	Energy demand for domestic lights and appliances decreases by 40%	Energy demand for domestic lights and appliances decreases by 60%
		Electrification of home cooking	Energy used for domestic cooking remains at 63% electricity and 37% gas	Energy used for domestic cooking is entirely electric	Energy used for domestic cooking is entirely electric	Energy used for domestic cooking is entirely electric

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Introduction to EnergyPath Networks

A modelling approach for strategic, spatial planning of the future energy system for a local area. How would you decarbonise building energy demands at the lowest cost to society?

- What would you need to do? Where in your local area? When would it need to happen?
- What investments would be required in buildings, networks and energy production across heat, electricity and gas?
- What is the sensitivity to uncertain factors, e.g. how would the electricity price in 2050 change the lowest cost plan; what plan is low risk and cost effective across most of the uncertainty?
- The approach considers spatial factors – the relationships between buildings and the networks that serve them
- Uses an optimisation technique that tests all options and finds the lowest cost route to cutting carbon emissions. The outputs provide evidence to aid consensus building – stakeholders and local communities.

96% Carbon Reduction by 2035

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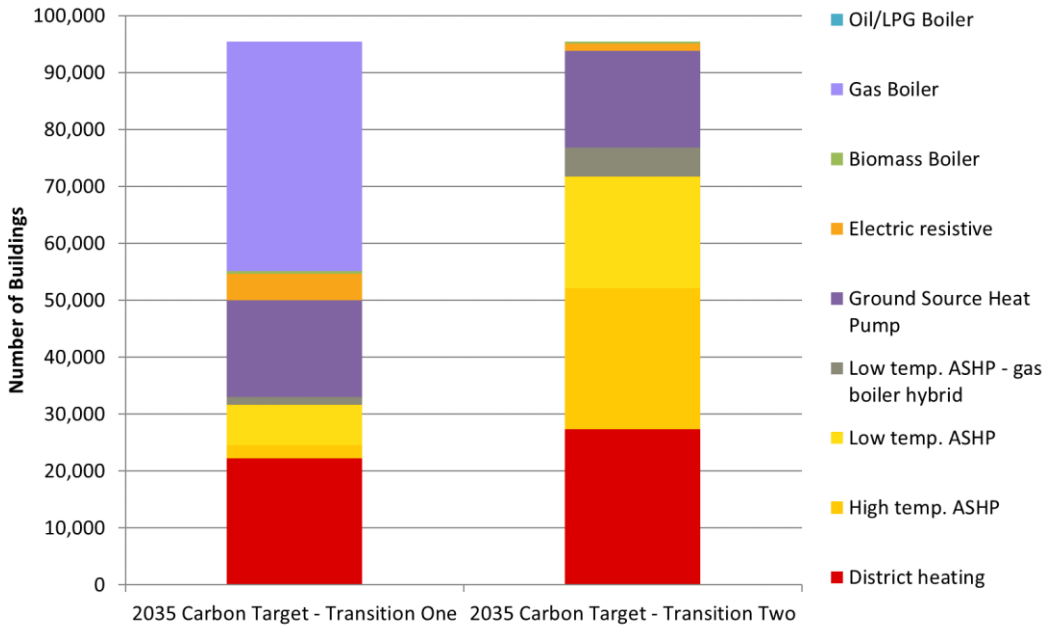
- suggests an earlier carbon target does not change the final heating system distribution in Bury.
- requires this change to happen earlier, with more happening in transition 1.
- suggests that working towards a 2035 carbon target increases the total cost of Bury's energy system by about 30% compared to no local carbon target
- the 2050 target cost 15% more than no local target.

Modelled Domestic Heating Systems in Bury to achieve an earlier carbon target



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Heating Systems across Bury

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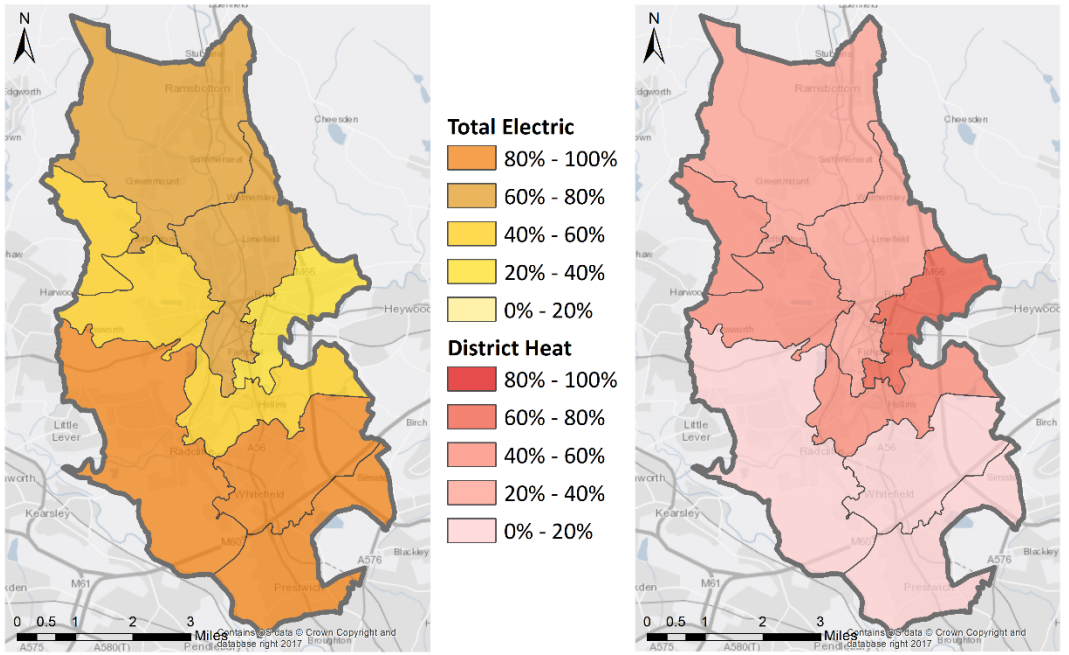
- We can map our modelled types of heating system across Bury.
- areas on these maps represents the areas served by different HV substations.
- results can be broken down further by detailed building type in different areas.
- can also produce results on buildings, network infrastructure, energy centre technologies and heat and electricity storage.
- Results include detailed cost breakdowns of all included

Modelled final distribution of domestic heating systems in Bury to achieve decarbonisation



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Key Local Authority Roles

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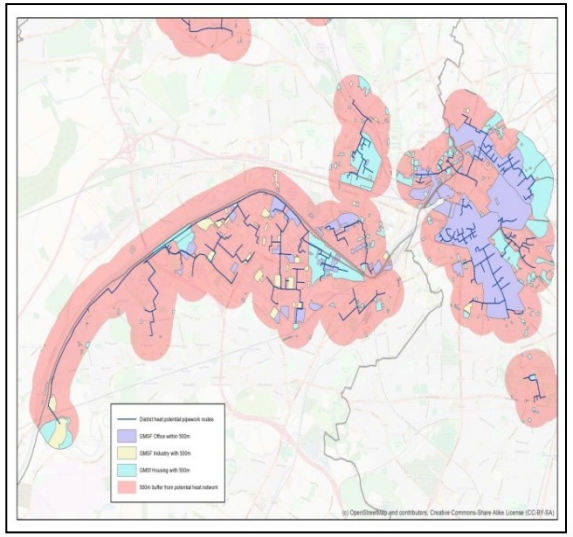
- **Improving energy efficiency and resilience in buildings** – insulation measures, focus on addressing fuel poverty.
- **Low Carbon Energy/Heating** – making district heating systems and heat pumps commercially viable. Stimulate PV and biomass.
- **Transport** - implementing sustainable travel programmes and promoting low-carbon vehicles.
- **Waste -** waste prevention and sustainable waste management, circular economy.
- **Low-carbon policies/plans -** All local authority areas should develop a low-carbon plan that includes a high level of ambition for emissions reductions.
- **Own estate -** Reducing emissions from local authorities' own estate to demonstrate leadership. Support Community Energy.
- **Business Support –** to reduce resource use, support sector growth and skills development.



Existing Projects

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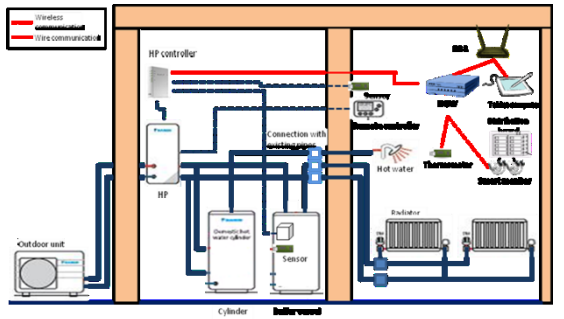
- **Smart Systems and Heat (SSH)** – one of 3 national pilots with the Energy Systems Catapult to deliver advanced energy master-planning
- **Domestic Efficiency** – Local Energy Advice Programme (LEAP), £1.8m Warm Homes Fund Programme, Award Winning £9m Green Deal domestic energy efficiency programme & a £10m ECO Fuel Poverty Programme
- **Public Buildings Efficiency/Management** – Triangulum and CityVerve IoT (MCC), £20m investment opportunity identified with Salix
- **NEDO** project – a £20+ million partnership with the Japanese Government Agency: 550 Air source heat pumps in social homes with smart monitoring and engagement tools to pilot Demand Side Response
- **Heat Networks** - £2.7m ELENA funding for project development capacity on heat networks and LED street-lighting. £10m funding for first two networks agreed.
- **Transport -** Electric Vehicle recharging Infrastructure, £23m Velocity Cycling Network, Extension of Metrolink
- **Business support -** £3m Green Growth programme.



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Conclusion

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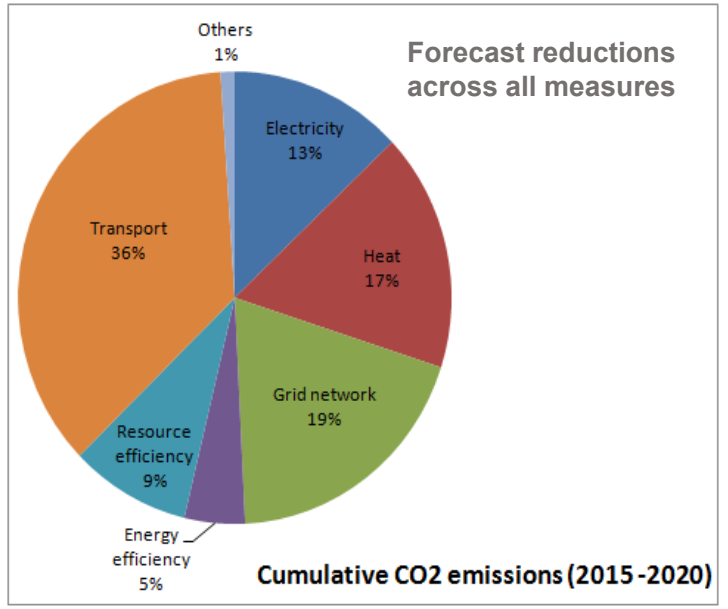
Strong role for Authorities in incentivising low carbon transition:

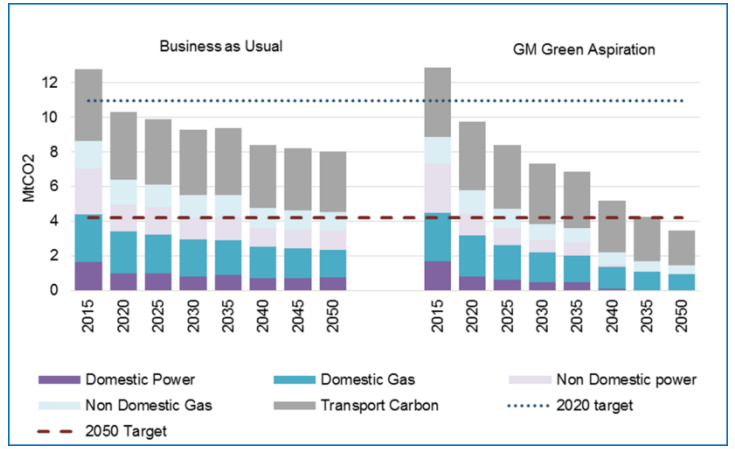
- Local intelligence
- Effective strategy and policy
- Investor/Key partner
- Demonstrator/Partnership facilitator
- Trusted brand/Conduit to communities

Further work Required:

- `Business as Usual' not enough for 2050 – Energy Transition Region
- Significantly scale up our energy efficiency activities and smart energy infrastructure – GM Energy Innovation Company
- Maximise the value of existing partnerships, strategic approaches and joined up thinking – GM Smart Energy Plan
- Incentivise low carbon investment by others though stronger local policies – Greater Manchester Spatial Framework
- Create investment frameworks which provide capacity for viable project development – GM Environment Fund

*exploring following Green Summit





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