Greater Manchester Smart Energy Projects

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Greater Manchester Emissions Strategy

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

Implementation Plan outlines actions to meet carbon target to 2020
- `Business as Usual’ not enough for 2050
- Significantly scale up our energy efficiency and generation activities with smart energy infrastructure
Research & Evidence

An Evidence Based Approach:

- GM spends over £5 bn/pa on energy (all)
- Use of electricity and gas in buildings accounts for 72% of direct CO₂ emissions
- Longer term targets require energy efficiency, low or zero carbon heating
- 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.
Evidence: Low Carbon Generation

- **140MW** of installed renewable electricity capacity.
- **29MW** of installed renewable heat capacity
- The majority of GM renewable generation is from Landfill, sewage and AD gas (74%).
- Wide variation in installed small scale renewables (<5MW) across districts
- Limitations to role of onshore wind in GM in current policy/planning environment
GM Energy Potential

- Significant technical potential in GM for future energy demand met by:
  - Heat networks
  - Solar technologies (heat and power)
  - Heat pumps
  - Biofuel

- Other technologies (hydro, geothermal) could have role but lesser technical potential in GM.

- Important to recognise economic barriers to realising technical potential

- Increasing decentralised generation may create challenges for networks

- Number of potential game changers including hydrogen and storage
Existing Projects

• **Smart Systems and Heat (SSH)** – national pilot with the Energy Systems Catapult to deliver advanced energy master-planning and a potential £30 million demonstrator

• **NEDO** project – a £20+ million partnership with the Japanese Gvt Agency to pilot Demand Side Response in 550 social homes with air source heat pumps

• **Buildings Efficiency** - Award Winning £9m Green Deal domestic energy efficiency programme & a £10m ECO Fuel Poverty Programme. £20m investment opportunity identified with Salix for non-domestic

• **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.
Smart Systems and Heat Programme

Whole System Analysis
Convene key stakeholders, develop and apply research, analysis and modelling capabilities to help UK make strategic choices about transition pathways and innovation priorities collaborating with industry, Government and academia.

Innovation & Commercialisation
Whole systems architectures; systems integration; consumer insights; subject matter experts; development; “product” management; energy knowledge exchange; collaboration; targeted support for SMEs.

Test & Demonstration Platform
Whole systems; facilities, capabilities and best practice; alliances and partnerships; appropriate scale; multi-vector; technical, commercial, business; Consumers insights; mitigate risk and reduce time to market; realistic pricing of risk.
Decarbonising Domestic Energy

**Change supply**
- Biomass boiler
- Gas boiler
- Gas Combined Heat & Power
- Reformation
- Gasification
- Electrolysis
- Natural Gas
- Biomass
- Coal

**Change vector**
- CCS
- Hydrogen
- Natural gas & bio-methane
- Electricity

**Change appliances**
- Smart Meter
- Gas boilers
- Electric air source heat pumps
- Solar Thermal
- Solar PV

**Change delivery**
- Hot water storage
- Wet pipe radiators
- Electric heaters
- Electric showers
- Battery storage

**Change heat losses**
- Loft insulation
- Mechanical venting and heat recovery
- Air tightness
- External solid wall insulation
- Internal solid wall insulation
- Double or triple glazing & coatings

(for illustration – not exhaustive)
EnergyPath Networks

Strategic, spatial planning to meet future carbon targets in a local area – focusing on decarbonising building energy demands, specifically heat

• Takes a ‘systems’ view
  • What? Where? When?
  • For investments in Buildings, Networks and Energy Production
  • Across Heat, Electricity, Gas

• Supports proactive planning and investment
• Identifies local energy network build and reinforcement
• Aids consensus building - stakeholders and local communities
• Works on a cost to society basis, so without current subsidies and taxes
To reach the proposed emission level, domestic heating systems in Districts may have to radically change between now and 2050.

Our (draft) modelling suggests the most cost effective pathway would be for:

- **30%** of domestic buildings to stay on gas
- **40%** to switch to district heat
- **30%** to use an electric heat pump option
Domestic Buildings – Transition 2

The modelled type of domestic heating systems varies significantly across District
Domestic Smart Energy Proposition

Reduce energy demand and cut carbon emissions by bringing together low carbon energy technologies with advanced IT.

Nega-Watt (Demand response)

Energy Balancing

Absorption of Surplus energy

Aggregate Load of HP

Energy trading

HP aggregation

ICT Platform

Install Heat Pump

Implement Heat Pump Aggregation

Heat Pump with hot water tank

Supply Side | Electricity Market | Demand Side

GMCA BOLTON BURY MANCHESTER OLDHAM ROCHDALE SALFORD STOCKPORT TAMESIDE TRAFFORD WIGAN
Future Possibilities for Delivery

SPV/ESCO

Energy management system

Tier-1 aggregator

Grid

Balancing service to National Grid and/or Local DNO

Controlling signals

I
Aggregation from HPs in GMCA

Local council

Social housing

Owner

Tenant

Local council (?)

Social housing

Owner

Tenant

Local power retailer

Owner

Tenant

Owner

Tenant

School

Office

University

III
Aggregation from multiple sources

Ⅰ
Aggregation from HPs

Ⅱ
Aggregation from HPs

Ⅲ
Aggregation from multiple sources

Ⅰ'

Ⅱ'

Ⅵ
EV & battery storage

Ⅴ

Ⅳ
Supply heat and electricity

Local renewable energy (heat and electricity) generation

Generator (Renewable)

VPP

GMCA

BOLTON

BURY

MANCHESTER

OLDHAM

ROCHDALE

SALFORD

STOCKPORT

TAMESIDE

TRAFFORD

TOGAN
Thank You