Date: **Friday 27 January 2017**

Subject: **Smart Systems and Heat Programme Update**

Report of: **Paul Dennett, Low Carbon Environment and Waste Lead and Steve Rumbelow, Chief Executive Lead, Low Carbon Environment**

PURPOSE OF REPORT

The purpose of this report is to outline the recommendations of the work undertaken by the Energy System Catapult (ESC) to determine which GM district is most suitable to undertake an EnergyPath modelling exercise , as part of GM's continuing participation in the Smart Systems and Heat (SSH) Programme. The report also provides an update on wider SSH Phase 2 activity to create a significant demonstrator programme.

RECOMMENDATIONS:

1. Note the report and the ESC's recommendation for the location of the EnergyPath modelling work;
2. Agree that Bury should be the preferred GM Local Authority area for Phase 1 ; and
3. Comment upon GM's proposed approach towards Phase 2 activity.

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BACKGROUND PAPERS:

Greater Manchester Spatial Energy Plan https://gmsf-consult.objective.co.uk/portal/2016consultation/supp_docs?pointId=1477648487723

1.   INTRODUCTION

In 2013, GM successfully bid to the Energy Technology Institute(ETi)/Energy Catapult(ESC)[1] to be one of three partner cities participating in the `Smart Systems and Heat Programme' (SSH), funded by the Department of Business Energy and Industrial Strategy (DBEIS). Greater Manchester, along with Newcastle City Council and Bridgend Council (working with the Welsh Government) are the preferred local delivery partners.

The focus of SSH is on creating future-proof and economical viable local heating solutions for the UK, as a fundamental shift in how we heat our homes and buildings is required to meet medium term UK carbon reduction targets.

The project has two elements:
•   **Phase One (until late 2016):** is the development of software tools to design location-specific smart energy systems. ETI has developed an EnergyPath data model to be tested in the 3 selected local authority areas which will deliver a local energy strategy and transition plan for each area.

•   **Phase Two (late 2016 onwards):** design of a significant scale demonstrator of the technology to demonstrate the benefits of a 'designed' local smart energy system. The demonstrator (subject to further DBEIS budget approvals) will then be deployed in each of the selected areas from 2018 onwards. In GM's case, it is possible that the demonstrator could result in projects located wider than just in the district selected for the Energypath model, as we wish to trial a systemic approach to energy innovation.

2.   PHASE 1 - MODELLING

The EnergyPath model uses local and national scale data to develop appropriate local future energy pathways for domestic supply and demand. The model is designed to identify 'least cost' options which meet future energy requirements. It is not expected that the least cost solution will be the most appropriate in most cases. The benefit of the model is that it will explore and compare different options.

A previous report to GM CEX's resulted in permission being given to undertake work to identify suitable GM locations for the Energypath modelling. As part of Phase 1, GM has already been supported by ETi to develop a heat and energy evidence base for the GM conurbation. This has been used to inform the development of the Greater Manchester Spatial Framework and also to analyse the suitability of each GM District for the, more detailed, Energypath modelling work by ESC (see link in Background Papers).

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[1] ETI were incorporated into Innovate UK's Energy Systems Catapult in late 2015.

ESC has used four main criteria as a baseline:

- **Energy Performance Certificate (EPC) rating** - Areas with significant numbers of thermally poor buildings (rated D or below) provide opportunities for retrofit with subsequent benefits for residents and local economy.

- **Off Gas** – Areas with properties without a gas connection (off gas grid). These areas tend to have fewer heating options and higher energy bills.

- **Fuel Poverty** – As decarbonisation strategies are likely to be more costly than `business as usual', understanding the potential impacts on fuel poor households will be highly valuable to ensure safeguards are in place.

- **Heat Networks** – GM has identified a number of heat network opportunities across the conurbation. These could provide the basis of low carbon energy infrastructure in the future. Inclusion of heat network areas in the EnergyPath area can allow further scoping of opportunities.
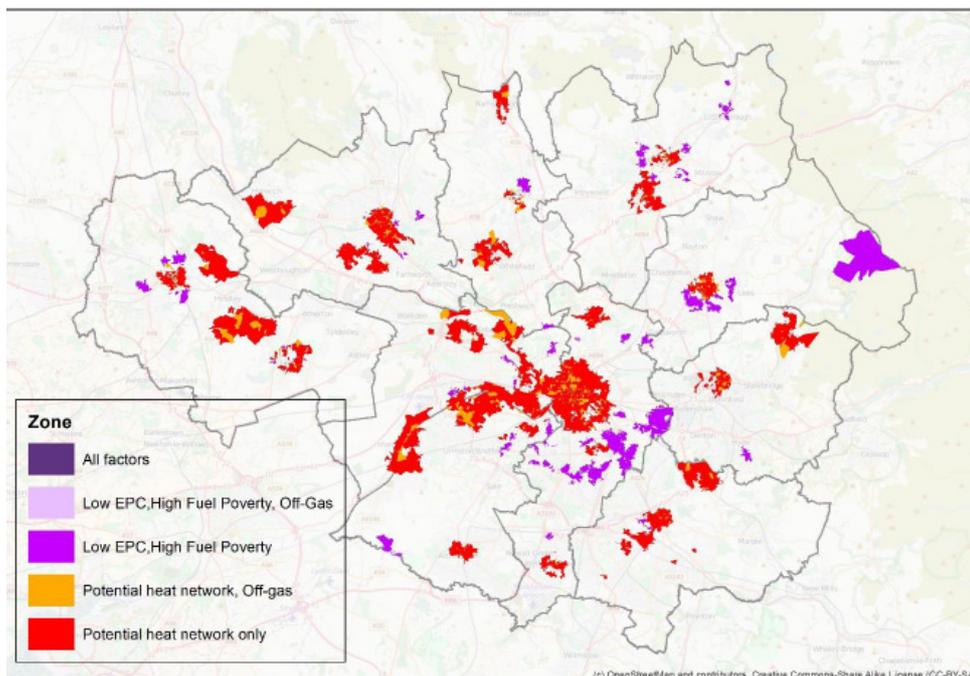
ESC ranked GM districts by each of the criteria and then cross referenced them to identify which districts had the highest scores. Based on this calculation, the top 3 GM districts of interest are:

1. Manchester/Trafford
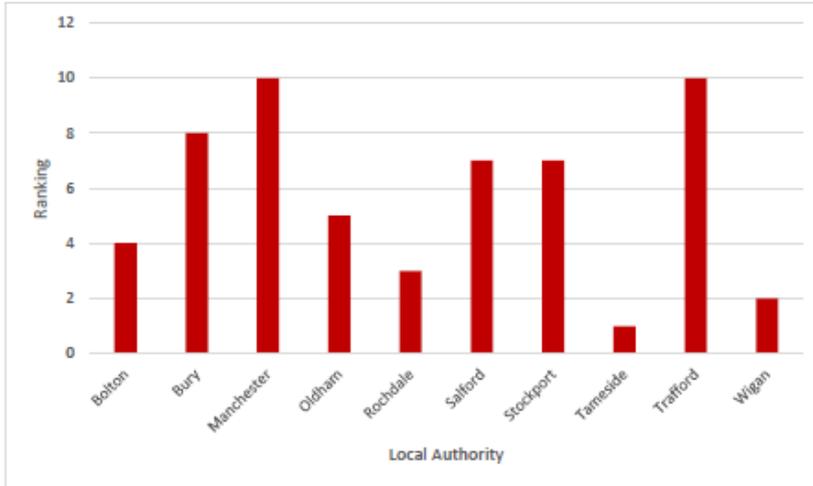2. Bury
3. Stockport/Salford

Figure 2: Overall Ranking for areas of interest (high values have a higher proportion of properties in the categories)

As the EnergyPath tool is still in development, the level of complexity to produce a localised route map can affect the suitability of a district to be modelled. The three most complex areas to model are:

1. Manchester
2. Stockport
3. Wigan

ESC has expressed the view that Manchester would prove too complex to run the Energypath Modal at this time.
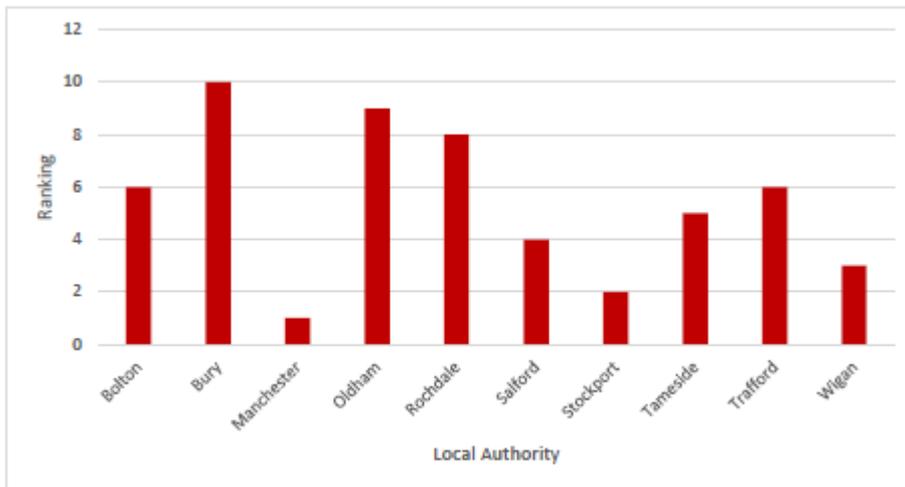

Figure 3: Local Authority ranking by complexity factor (low values are the most complex).

When both of the above rankings are considered together, the ESC listed which GM districts would be most suitable for EnergyPath modelling:

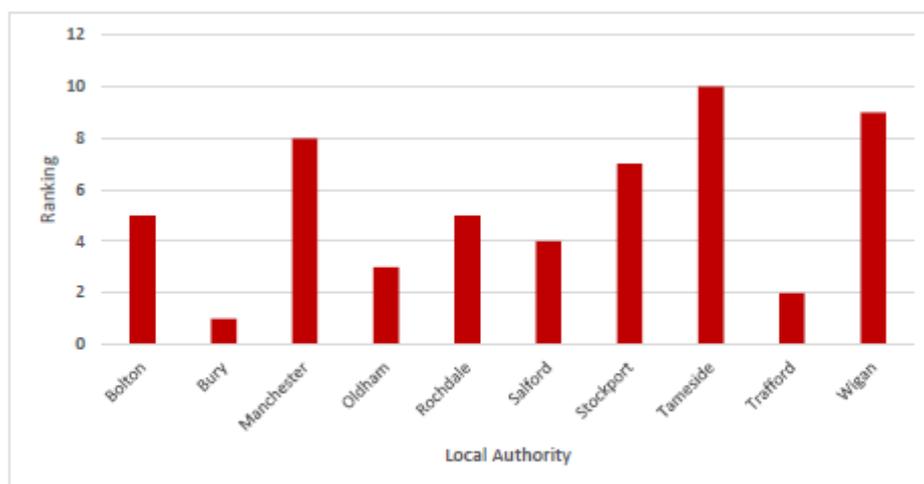1. Bury
2. Trafford
3. Oldham
4. Salford

Figure 4: Overall ranking considering consideration factors and modelling complexity (lower values are more favoured choices).

3.   OTHER CONSIDERATIONS

There are other factors which should be taken into consideration when selecting a location for GM's localised route map. The EnergyPath software will require robust and comprehensive data in order to produce an effective route map. Earlier work, undertaken with Newcastle, (as part of the Smart Systems and Heat Programme) has identified the following issues which should be taken into account:

Access to a wide range of data sources including; UPRN, postcode, housing stock condition and maintenance programmes, growth projections, regeneration plans, infrastructure development (eg Heat networks, electric vehicle charging points)

Robust data sets to ensure that EnergyPath uses standardised and completed data where applicable to build a validated route map

Dedicated support/resource within the selected district to coordinate data gathering and validation.   Local Authority data sets can be often outdated/incomplete/non standardised and an embedded resource will be required to manage and 'clean' the data before its inclusion in the EnergyPath model.

Timescales ESC believe that the EnergyPath model will take approximately 9-12 months and are keen to initiate data gathering in the chosen district to ensure that overall SSH timescales are met and development of Phase 2 activities (see below) are aligned. An outline timetable of works is outlined below:

Convene Key Stakeholders Group (Bury, GMCA, Electricity North West, National Grid Gas) to: · explain the project · get everyone on board · explain the data we will be looking to gather	early January
Secure Legal agreements/NDAs with all parties to enable data sharing	January
Data gathering from Key Stakeholders	January – March
Initial base run of the EPN model – will need most data before this	March
Closing date for any final data to be included in the model	end March
Final base run	April
First outputs available to Key Stakeholders	end April
Sensitivity testing and optimisation	May-August
Final model run	September
Analysis, report writing	October-November
Report available	December

4. LOCAL RESOURCE IMPLICATIONS

ETI have already learnt much from running their model in Newcastle. ETI has provided assurances that the requirements of Phase 1 will be kept to a minimum, however we understand that Newcastle has found the exercise quite labour intensive. Ideally, we would seek part of an FTE (funded by the project) within the selected District to work with the GM Environment Team on accessing the data and interpreting the results of the model between October 2016 and March 2017. The person selected would ideally need to be well connected to several different departments in the LA and to wider stakeholders to access data and knowledge.

5. PHASE 2 - DEMONSTRATOR

GM and the other SSH pilot cities are also in discussion regarding the scope of SSH Phase 2 Demonstrator activities which will test business models, technological innovation and delivery methods in each pilot city.

The current proposals are to primarily focus Phase 2 activity within the GM district selected for EnergyPath modelling however, given that we are promoting a systemic approach to energy innovation, building on existing GM projects, the SSH demonstrator could include projects in a number of GM Districts. Phase 2 Demonstrator activities are due to commence 2018 – 2020 and ESC has secured conditional funding from DBEIS to develop a programme of pilot activity over the next 18 months.

The development phase will work to develop pilot activity into Business Case level proposals including; stakeholder identification, timescales, costs and appropriate routes for funding. As an indication, ESC aims to develop a

pipeline of circa £20m of investment in GM Phase 2 activity, comprising of a range of funding streams including; public, private & European. GM currently has a part time Project Manager allocated to oversee the project. ESC will be providing dedicated resources to support GM in this activity.

GM's proposal is to build on local strengths and aspirations to 'capitalise on existing low carbon GM programmes, enhancing and combining them with new smart heat projects and processes to create a national demonstrator of smart heating which exemplifies a systemic approach to innovation in technology, product integration and delivery models, in order to test the business models outlined in the SSH Phase 2 programme.'

In practice, GM aims to build on the foundations of three systemic innovation areas; an interconnected set of innovations where each influences the other and the ways in which they interconnect:

a)   Laboratory Testing of Tech (Technology Innovation)

Using and building on GM's existing capabilities to develop, test and innovate low carbon products which can then be piloted at scale in a physical demonstrator. The University of Salford's Energy House, and proposed Energy House 2.0, is a prime example of the ability to test products in a physical environment under laboratory conditions. Work undertaken by the Manchester Metropolitan University (Hydrogen Partnership) and University of Manchester's (Manchester Energy) in energy forecasting and grid balancing could also feed into demonstration activity.

b) Pilot Scale Testing of Tech (Integration and Network Innovation)

Technological innovation can be combined with the innovative integration of products, with each other and the grid, to blend and test different types of technology within demonstrator homes. GM already has a developing district heating programme, a pre-existing base of domestic homes retrofitted for energy efficiency, others fitted with smart technology through the NEDO project which could be further utilised and expanded to provide data on air source heat pumps and/or 'home gateways'. Domestic demonstrators could also include emerging commercial market offers around PV & storage, which include retrofit and HEMS units, and potential expansion of existing capital projects (such as Heat Networks and energy storage) depending on timescales, funding and feasibility. Wider stakeholders, (such as the DNO) can also support this area and already have plans for network wide IT to support demand side response.

c) Delivery Models & Control (Delivery Innovation)

GM has the expertise to test different business models at scale in order to determine which are the most appropriate for the market. GM has a history of delivering large domestic projects (such as Green Deal Communities, Fuel Poverty alleviation and the NEDO Smart Communities projects) which required customer role out, marketing, engagement, contracted delivery and installation of retrofit measures in the private and social housing sectors. The

potential for establishing project specific SPV/ESCOs could provide a bespoke delivery route for market testing of designed business models.

Separately, GM has the ability to stimulate the local supply chain through procurement and existing support programmes, such as the Green Growth programme, which supports SMEs to grow (or diversify) into the low carbon environmental goods and services (LCEGS) sector.

The attached graphic (Annex 1) provides an idea of how the concept of a SSH demonstrator could be built upon the interaction of a wider set of existing and proposed GM programmes.

6. NEXT STEPS

The success of the EnergyPath data modelling phase will rely on enthusiastic support from the chosen district and the Phase 2 Demonstrator Programme will be enhanced through cohesive delivery of existing planned projects, by a range of GM stakeholders, including collaboration on new project opportunities as they arise.

It is recommended that GMCA:

1. Note the report and the ESC's recommendations for the location of the EnergyPath data modelling work.
2. Agree that Bury should be the preferred GM Local Authority area for Phase 1.
3. Comment upon GM's proposed approach towards Phase 2 activity.

ANNEX 1 – DRAFT Schematic – Aims of Potential GM Smart Systems and Heat (SSH) Demonstrator

TECHNOLOGICAL INNOVATION

Energy Generation Tech

Energy Storage and Management Tech

Energy Efficiency Tech

Manchester Energy

Salford Energy House 2.0

Hydrogen Partnership

Smart Systems and Heat

Salford Energy House 1.0

Lab Scale

INTEGRATION

Energy Efficiency Measure

Energy Generation

Storage

Energy Management Systems

Non Domestic EE Programme

Domestic EE Programme

PV and hydro

Triangulum

Smart Systems and Heat

Building scale

GRID INNOVATION

Smart Grid

Demand Side Response

C2C SMART STREETS

Heat Networks

Virtual Private Wire

SSH Local Area Planning

Nobel Grid

NEDO Project

Community Scale

DELIVERY INNOVATION

Public Procurement eg. DEPA

ESCO/SPV

Smart Systems and Heat

Green Growth Programme

Home Improvement Agency

Commercialisation

SYSTEMIC INNOVATION

PLAN

DO

EVALUATE

LEARN

Key
System Requirements
Existing Programmes
Potential Programmes