Cheshire and Warrington Climate Change Skills Fund Programme

Local Energy Networks

Supported by

NWIEP | CLASP.

Cheshire West and Chester

Cheshire East Council

Warrington Borough Council

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1 Introduction and background

1.1 Aims and structure of the report

AECOM has been commissioned by Warrington Borough Council, Cheshire East Council and Cheshire West and Chester Council to help raise awareness of the opportunities for local energy networks in the Cheshire and Warrington sub-region, and to outline the key steps which need to be taken to facilitate delivery of these networks. The study has been undertaken as part of the Climate Change Skills Fund Programme to build skills, capacity and knowledge in the use of low carbon energy.

Local energy networks including decentralised energy generation, district heating / cooling and smart grid technology are thought to be particularly appropriate for parts of the Cheshire and Warrington sub-region, due to the clusters of large towns that include a good mix of residential, industrial and commercial building uses. This diversity of energy load can help with the efficient operation of decentralised energy generation systems and can improve the financial viability of energy projects, such as the examples shown below in Figure 1.

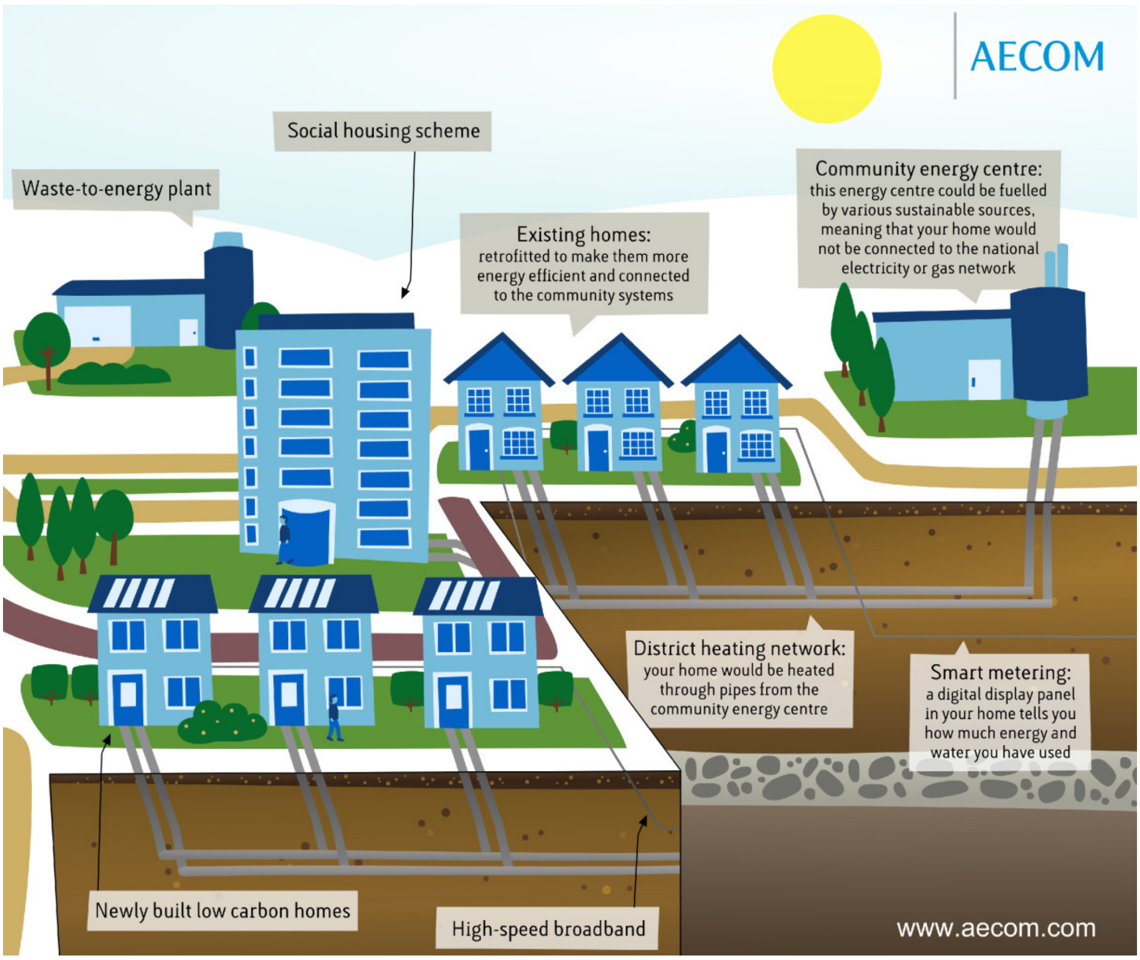


Figure 1: Diagram of a local energy network showing potential components including district heating network and smart metering

There are numerous work stages involved in taking a local energy network project from an opportunity through to an operating scheme, with the process requiring engagement from people with a variety of skills and experience. This report aims to outline this process and provide guidance for practitioners on what each stage involves and how common barriers can be overcome. In describing the process for planning and delivery of local energy networks the report aims to capture key lessons in respect of this process, with specific reference to three local and relevant case studies for Cheshire and Warrington (Section 1.6).

The report is structured around the steps set out in the Local Energy Network Roadmap that is presented in Section 2. These steps are:

- Step 1 – Identifying Opportunities (Section 3)
- Step 2 – Capacity Building (Section 4)
- Step 3 – Technical and Financial Assessment (Section 5)
- Step 4 – Stakeholder Engagement (Section 6)
- Step 5 – Strategy, Policy and Budgets (Section 7)
- Steps 6 and 7 – Detailed Investigations (Section 8)
- Steps 8 and 9 – Procurement and Delivery (Section 9)

This work builds on previous work and studies in this area and aims to provide an overview of the key stages/steps that are central to all local energy network projects.

1.2 Overview of the Cheshire and Warrington Sub-region

The Cheshire and Warrington Sub Region is comprised of the following three Unitary Authorities:

Cheshire West and Chester Council

Cheshire East Council

Warrington Borough Council

These authorities are shown spatially in Figure 2 below.

Figure 2: Location of the Warrington & Cheshire sub region and the key towns and cities within it

1.3 Relevant strategies, policies and studies

The local evidence base studies considered as part of this report have been completed highlighting some of the opportunities for creation of local energy networks in the sub-region. These include the following regional and local level documents:

North West

Northwest Renewable and Low Carbon Energy Capacity and Deployment Project Report (Sept 2010[1])

This assessment of the potential accessible renewable energy resources at 2020 suggests that low carbon technologies such as CHP could provide 4400MW energy in Cheshire (18% of the overall low carbon potential of the North West).

The report also shows that with a large number of landfill sites, Cheshire has the potential to supply over 37.5MW of electricity from biogas – the highest of any area in the North West.

Cheshire East Council

'*Ambition for All', Sustainable Community Strategy, 2010-2025*

[1] http://www.nwriu.co.uk/research_and_intelligence/environment/environment_publications/renewable_capacity.aspx

The Sustainable Community Strategy for Cheshire East includes priority actions on climate change. It outlines the challenge for the area, which has a level of CO_2 emissions per capita higher than the averages for the North West and the UK.

The vision by 2025 includes being "less reliant on oil and gas for our energy and [making] a step change in local production of energy from renewable sources."

Council's Corporate Plan, 2010-2013

One of the five headline objectives in the Council's Corporate Plan is: "To grow and develop a sustainable Cheshire East".

Local Development Framework Core Strategy Issues and Options Paper (Nov 2010)

The Issues and Options Paper sets out the proposed basis for Cheshire East's Core Strategy policies, including: "Incorporate low and zero carbon energy requirements into new developments, through decentralised energy supply, as well as through the use of combined/district heating networks."

Renewable Energy and Infrastructure Baseline studies are in progress and will form part of the evidence base for the Core Strategy.

Cheshire West and Chester Council

'Together We Can Aim High' Sustainable Community Strategy 2010-26

Cheshire West and Chester's Sustainable Community Strategy sets engaging with and supporting local communities to take positive action on climate change and sustainable living as a priority. This includes increasing the proportion of energy produced and consumed locally (Section 4.1.5).

LDF Core Strategy Issues and Options Paper (Nov 2009)

The Issues and Options Paper proposes "Decentralising energy production and securing energy sources, including renewable sources of electricity" as a Key Issue (Section 3.38).

The Paper's proposed Strategic Objectives include tackling climate change, "encourag[ing] sustainable development and prudent use of resources, including...the increased use of renewable and low carbon energy sources." (Section 4.5)

The Paper sets out some broad options for setting requirements for renewable and decentralised energy generation in new developments. Cheshire West and Cheshire's Core Strategy Preferred Option is scheduled for spring 2012.

Chester Central is proposed as a strategic site and the sub-regional centre.

Warrington Borough Council

'One Warrington: One Future' Sustainable Community Strategy for Warrington 2009-30

The Community Strategy commits Warrington to reducing its per capita CO_2 emissions by 40% by 2030, based on 1990 levels.

Warrington Climate Change Strategy

Warrington's Climate Change Strategy sets a 20% CO_2 reduction target for Warrington by 2020 over 2006 levels, which were estimated as 2.4 million tonnes per year (excluding Fiddlers Ferry Power Station). The Strategy notes that 40% of these emissions are attributed to the business sector, reflecting the presence of several intensive energy users (mainly from the chemicals industry) in the town.

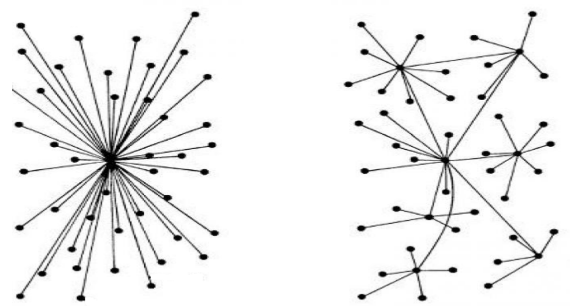
Core Strategy Objectives and Options Paper (2010)

Objective S1 proposed in this Paper is "To reduce emissions of greenhouse gases and the borough's carbon footprint", including by "generating more energy from renewable and low carbon sources." The Bridge Street Area is identified as a likely strategic site, suitable for a mix of town centre uses.

1.4 Overview of decentralised energy networks

Decentralised energy networks are networks of buildings that are all connected to a shared energy source. These networks provide an opportunity for communities or developments to generate their own low-carbon energy in a commercially viable way. Such projects can often require facilitation by a local authority and/or a proactive developer or energy company due to their scale, cost and the number of stakeholders involved.

Decentralised energy generation can be described as the generation of energy at, or very near the point of energy use. This is in contrast of the traditional centralised concept where energy is generated at remote power stations and transported across long distances via the National Grid..



Centralised Energy **Decentralised Energy**

Currently decentralised energy generation accounts for less than 1% of the UK's supply of energy. Despite this, decentralised energy generation has a number of benefits.

District heating can potentially offer a number of benefits for Cheshire and Warrington, including:

- Delivering significant and very cost effective reductions in CO_2 emissions from the public and private sectors
- Possible cost savings and profit share
- Improved Energy Performance Certificates (EPCs) and Display Energy Certificates (DECs) for public buildings
- Contribute to Carbon Reduction Commitment (CRC) targets
- Possible mechanisms to address fuel poverty
- Enabling new development to meet stringent forthcoming energy requirements
- Providing energy security
- Deliver reputational benefits for the authority and the wider area

In addition it can offer significant advantages to developers:

- Reduced capital costs for energy plant (if connecting to an existing system)
- Significant contribution towards compliance with future Building Regulation standards (particularly the incoming Zero Carbon standard)
- Reduced plant room space, both internal and roof-mounted
- CO_2 savings (around 20% reduction on standard systems)
- Management and operation risks mostly taken by a third-party operator

The environmental performance, much like the economics, will depend on a range of factors. These factors include:

- Diversity and size of proposed energy network
- Technology choice
- Technology efficiency
- Fuel type
- Energy demands to be supplied

Sharing energy supply across a network optimises the operating efficiency of the generating system. For instance, during the day most of the domestic users will be at work and heat and electricity will not be used as much. However commercial buildings are likely to be at peak occupation. Conversely in the evening this situation is reversed, with domestic properties occupied and commercial spaces empty. Taking this into account, a balancing of energy loads across a network provides a more constant demand on the generator meaning it can run more efficiently. Instantaneous demands for heat can further be smoothed with the use of thermal storage.

The most common form of decentralised energy supply is community or district heating. District heating networks (DHN, also referred to as community heating) supply heat via hot water through a network of insulated pipes. Systems are also often referred to as local energy networks, as they often also involve the delivery of electricity and/or cooling within separate networks of pipes and wires.

The network of hot water pipes is linked to one or more energy centres, typically containing a combination of energy generating technologies. Heat (and potentially cooling) from the network is transferred to individual properties through a heat exchanger, or heat interface unit (HIU, see Figure 3), and then used in a separate conventional heating (or cooling) system, controllable from within the property. Heat meters are usually used to measure the amount of energy that is taken from the network for billing purposes.

Figure 3: A heat exchanger inside one of the flats connected to the Aberdeen district heating network (Source: Aberdeen City Council: a case study of community heating CE65, Energy Saving Trust, 2003)

There is currently no system of regulation for heat networks so the generation, distribution and supply of the heat are usually owned either by the building owner or a private Energy Services Company (ESCo).

DHN's can be applied at a variety of scales from a few buildings to whole cities. In the UK there are numerous examples, including various schemes across housing estates (e.g. Oldham and Aberdeen), university campuses (e.g. Bath, Warwick and Liverpool), hospitals (e.g. Manchester) as well as city-wide schemes such as those in Birmingham, Southampton, Pimlico, Sheffield and Nottingham. Even larger schemes exist outside the UK. For example the Copenhagen district heating network serving the city has the heat generating plant located up to 40km outside the city centre.

District heating generally helps to deliver energy more efficiently because the system can run at relatively constant levels, smoothing out the demands of the various buildings connected to it, although to some extent this is mitigated by losses across the network. Similarly the ability to consolidate heat supply, together with the ability to bulk buy fuel, means that district heating can often provide cheaper energy, although the savings are to some extent offset by operational and maintenance costs. An example of a system that provides reduced fuel costs is the scheme in Birmingham which is able to offer customers a reduction in the order of 10% on their heating bills[2].

Reduction in CO_2 emissions can be achieved more easily with district heating schemes because of the ability to incorporate low or zero carbon technologies which are often not efficient or effective at smaller scales. It also enables strategic connection to waste heat from industrial or other sources, and/or connection to energy from waste systems.

The following table shows the CO_2 emissions associated with different fuels, taken from SAP 2009[3].

[2] Forthcoming EST case study of the Birmingham District Energy scheme
[3] The Government's Standard Assessment Procedure for Energy Rating of Dwellings (2009, with corrections May 2010)

Fuel	CO_2 emissions ($kgCO_2$/kWh delivered)
Gas	0.198
LPG	0.245
Heating Oil	0.274
Grid Supplied Electricity*	0.517
Wood Chips	0.009
Wood Pellets	0.028

**These figures are projected to reduce over time in line with the Government's plans to decarbonise the generation and supply of electricity from the National Grid*

The actual CO_2 and cost savings from using a DHN compared to individual systems are dependent on the type of system, the fuel used and the scale of energy generation. To maximise both the CO_2 reductions and cost savings the system needs to be efficient, potentially minimising the physical extent of the network (e.g. pipe routing) but delivering as much energy as possible. This therefore favours locations where the density of heat demand is high.

Meeting future Building regulations

Connection to district heating networks would provide developers with a straightforward and potentially cheaper solution for meeting the increasingly stringent energy performance standards of the current (and forthcoming revisions of) Building Regulations as well as higher standards of the Code for Sustainable Homes (CSH) and BREEAM.

Building Regulations were updated in 2010 requiring a 25% improvement in the rate of CO_2 emissions from new buildings relative to the 2006 standard (equivalent to the energy requirements of Code for Sustainable Homes level 3). In 2013, another revision of Building Regulations is planned, which will further reduce the required CO_2 emissions rate for new buildings by 44% beyond the 2006 baseline (equivalent to the energy requirements of Code for Sustainable Homes level 4). This will place a greater emphasis on improving fabric and energy efficiency standards but it will also force the use of high proportions of LZC technologies.

The revisions of Building Regulations in 2016 (for dwellings) and 2019 (for non-domestic buildings) are expected to require a 'zero carbon' standard to be achieved (equivalent to the energy requirements of Code for Sustainable Homes level 6). The proposed approach suggests that this should be achieved through three steps, Energy Efficiency (covering the building fabric), Carbon Compliance and Allowable Solutions (see Figure 4 below).

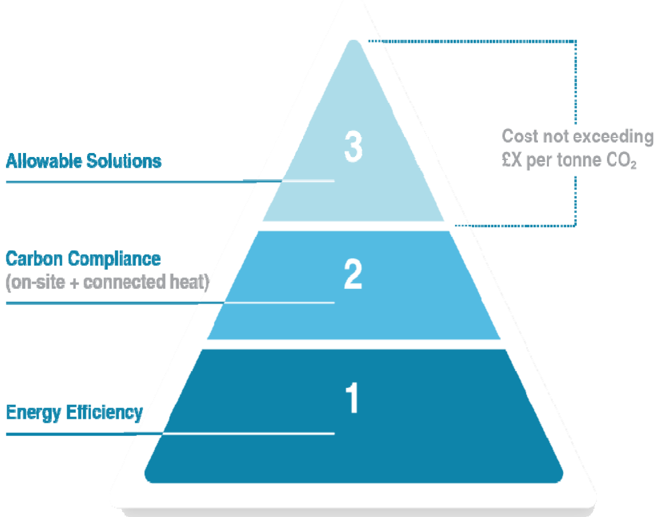


Figure 4: Proposed Zero Carbon Methodology

As noted above, the level of CO_2 savings that can be realised from a district heating system will depend upon the technology that is used to provide the heat. Most district heating schemes in the UK that use low and zero carbon energy technologies (LZCs) use either gas-fired Combined Heat and Power (CHP) or biomass-fired boilers. However there are other schemes in operation that use waste heat from power stations or incinerators (Nottingham), geothermal energy (Southampton) or biomass or biofuel CHP (proposed at the Hanham Hall development near Bristol). The inherent flexibility of a DHN allows additional technologies to be added, either as additional plant within the energy centre(s) or in new energy centres connected to the network as demand increases over time.

1.4.1 Combined Heat and Power (CHP)

CHP technology is an efficient way to deliver energy. Fuel is used to generate electricity but the heat from the process is also captured to generate hot water. Electricity that is produced and used locally is much more efficient than electricity supplied from power stations, which do not normally utilise the waste heat generated and have high losses associated with transmission of power over the national grid. This is illustrated in Figure 3 below.

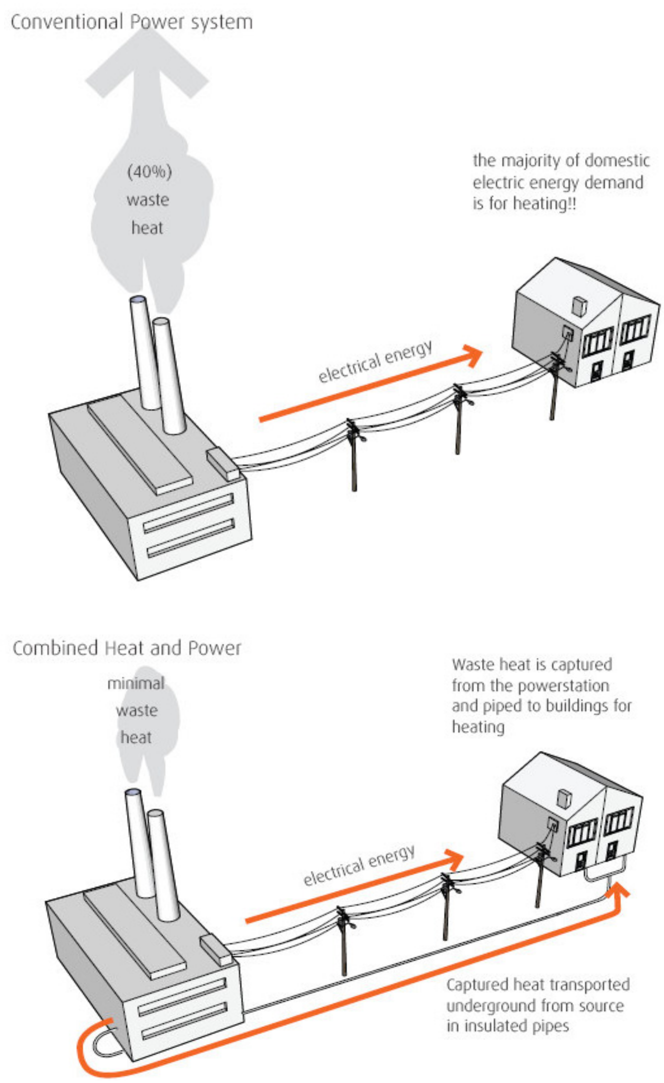


Figure 5: Diagram showing the conventional supply of power compared to the combined heat and power model

Predominantly CHP systems use gas as the fuel source, and are therefore classified as a 'low carbon technology' rather than a 'renewable technology'. However some systems are now available that use biomass or biofuel, thus qualifying as 'renewable'. The following diagram demonstrates the benefits of CHP (right side) over standard energy services delivered from individual boilers and the national grid (left side):

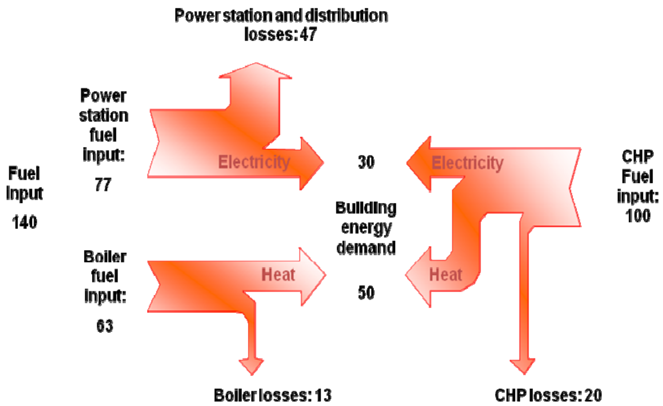


Figure 6: Energy flows from the use of CHP relative to standard utility provision

With CHP systems, the CO_2 savings and financial benefits are primarily derived from the production of electricity. However, the production of electricity is linked to the production of heat and the limiting factor for most systems will be the level of heat demand on the network. Systems should be sized to meet the base heat demands and avoid overproducing and dumping excess heat in order to generate more electricity.

CHP systems can adjust their output to follow the heat demand, but it is preferable for them to operate against a relatively stable demand. This is achieved by both sizing the CHP correctly and ensuring it has a sufficient base heat load to operate against by combining buildings on a heating network with different energy profiles. A CHP system can be an expensive item of plant compared to an equivalent gas-fired boiler so it is highly advantageous to run the unit for as long as possible in order to maximise the financial (and emission reduction) benefits. Additional ways of using heat, such as absorptive cooling (where heat is used to provide cooling) and ways of storing the heat (using large thermal storage vessels) can all help to increase and stabilise the heat demand, thus increasing the electricity generation and therefore the CO_2 savings and financial benefits. However, absorption chillers can be expensive and require significant space within an energy centre. Similarly, thermal storage vessels can be very large and have implications on both the footprint and the height of an energy centre.

Large communal systems are usually able to provide cheaper utility costs arising from the large scale delivery of CHP across a range of buildings with varying energy profiles which combine to create a good base load for the CHP. Savings are further enhanced by the ability to bulk buy fuel, although there are additional costs for management, operation and billing which offset a proportion of these savings.

Ideally, a system would have at least 4,500 run hours per year for a reasonable return on investment. This equates to around 17.5 hours per day five days per week, or 12.5 hours per day every day of the year. CHP is therefore most effective when serving a mixture of uses, which guarantees a relatively constant heat load over a 24 hour period. An example of a large-scale CHP within an energy centre is shown in Figure 7 below.

Figure 7: Energ100kWth, 70kWe gas-fired CHP plant, installed at Highbury Stadium redevelopment, London.

Another contributory factor to the economic viability of CHP is the difference between the cost of electricity and gas, referred to as the "spark gap". The greater the cost of electricity over gas is, the more likely a CHP installation is to be viable.

The potential for district heating powered by CHP can be assessed at a high level by setting a threshold heat density above which schemes become viable. Previous research into the economics of district heating and CHP has suggested that a threshold of 3,000 kW/km^2 can give financial returns of 6%, which is below typical commercial rates of return but greater than the discount rate applied to public sector financial appraisal.

A standard, gas-fired CHP typically achieves a 35% reduction in energy usage compared with conventional power stations and gas boilers. CHP can also be run using biomass or biogas to provide reductions in CO_2 emissions nearing 100% and in such a case can be counted towards renewable energy targets.

It is worth noting that the benefits of gas-fired CHP with regards to reducing CO_2 emissions will reduce over time as the CO_2 emissions associated with grid electricity fall.

The Department for Energy and Climate Change (DECC) have set out the projected emissions from different fuel sources including electricity from the national grid up to 2050[4] (see Figure 8 below). This shows a substantial drop in the predicted CO_2 emissions from grid electricity over the next 40 years, as power generation changes to cleaner and greener forms of electricity generation.

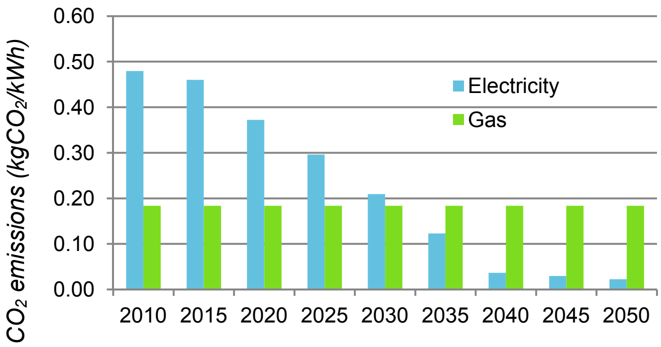


Figure 8: Graph showing the projected CO2 emissions (kgCO2/kWh) from gas and grid electricity to 2050 (DECC)

If these reductions are realised then the CO_2 emissions savings from the use of gas-CHP will decrease over time and become negligible around 2030 at which point it is predicted that the CO_2 emissions associated with electricity will be lower than those for gas.

Potentially gas-fired CHP could be used in the short term to provide the financial viability for delivering decentralised energy infrastructure. After 15-20 years, when the plant reaches the end of its life, if the benefit of using gas is significantly reduced it could be replaced or supported by an alternative system connected onto the network. Possible options are set out below.

[4] Valuation of energy use and greenhouse gas emissions for appraisal and evaluation (DECC, June 2010)

1.4.2 Biomass heating

Biomass heating is based on the use of a boiler just as standard heating technologies, but using wood fuel instead of fossil fuel as the source of energy. Wood fuel comes in a number of different forms, each with different characteristics. Chips can be obtained from arboriculture waste or other wood waste streams and are often cheap and locally available but can often be of variable size, shape and moisture content. This can significantly affect the efficiency of heat output. Pellets made from compressed saw dust usually have much lower moisture contents, higher calorific value and lower space requirements than chips but tend to have higher processing requirements and can be more easily transported from the delivery vehicle to the boiler (pellets can be blown). Logs can also be used but are very rarely used for systems larger than stoves serving individual domestic dwellings.

Biomass boilers come in a variety of capacities (rated in kW). The main difference between biomass boilers and conventional gas boilers is their considerably larger physical size and thermal inertia. Because of this they are normally designed to meet the base heat load for space and hot water with gas back-up to meet peak loads. This arrangement means that the majority (around 80%) of energy use for heating and hot water can be met using biomass. Although wood fuels do have a CO_2 emission factor (0.09 - 0.028kgCO_2/kWh depending on the type of fuel) to account for processing and transportation, this is much lower than the factor associated with gas (0.198kgCO_2/kWh) and therefore the use of biomass can result in considerable CO_2 savings.

The use of biomass can have air quality implications which are associated with its higher nitrogen oxides (NO_x) and particulate matter (PM_{10}) compared to conventional gas boilers. The suitability of these systems, particularly in smoke control areas and locations within or near to Air Quality Management Areas, would need to be assessed. The government has a standard approach to test the potential impacts and more detailed dispersion modelling can also be used.

Biomass boilers also have significant space requirements for plant and fuel storage. Access is needed for fuel delivery. A large fuel demand can require regular HGV deliveries, with impacts on roads and sensitive receptors nearby. The fuel costs can also be higher than for a gas system depending on the fuel used.

The Cheshire East Climate Change and Sustainable Energy Planning Research looked at the available biomass reserves in the area and provide scenarios of the potential energy resources available[5].

The use of biomass also qualifies for the Renewable Heat Incentive (RHI), which offers a payment tariff for use of heat generated by renewable means. The tariff levels set for non-domestic biomass systems are set out in the table below (the higher tier is paid for a set portion of the energy generated annually, based on the system size, and the lower tier is paid for the remainder):

[5] Cheshire East Climate Change and Sustainable Energy Planning Research

Scale	Tariff
Less than 200 kWth	Tier 1: 7.6p/kWh Tier 2: 1.9p/kWh
200 kWth to 1,000 kWth	Tier 1: 4.7p/kWh Tier 2: 1.9p/kWh
1,000 kWth or more	2.6p/kWh

Tariffs are guaranteed over a 20 year lifetime and will be adjusted with inflation. All heat generated will have to be metered using heat meters for hot water or steam.

1.4.3 Other technologies

The flexibility of a DHN allows additional technologies to be added to the system over time if it makes technical and commercial sense to do so. These could include:

Waste incineration

Incineration is a means of releasing the energy in waste through combustion at high temperatures. This can reduce the amount of municipal solid waste sent to landfill by 90% and generates useful amounts of heat and electricity. With current technology, around 100,000 tonnes of municipal solid waste can provide 7MW of electricity. Incinerators also produce large amounts of waste heat. This can be a resource when it is exported to nearby buildings/consumers. Energy from Waste (EfW) schemes utilising CHP are now eligible for Renewable Obligation Certificates (ROCs), providing additional financial incentive.

Incineration plants typically operate on large scales and require large plant, resulting in significant land take. Incinerators are also normally accompanied by tall stacks which may constitute a significant impact on both landscape character and visual amenity. Incineration plants are regulated by the EU Waste Incineration Directive which sets emissions limits for many substances. Air quality is a material planning consideration and can be an issue of great public concern. Detailed emissions studies will be required along with careful stack design and management. Incineration plants can handle large amounts of waste requiring regular delivery access. Good transport links are important although site traffic should be constrained to operations during only daytime hours, where possible. Due to the quantity of waste handled, incinerators are good candidates for integration with rail and water transport networks.

Pyrolysis and gasification:

Pyrolysis and gasification are alternative methods for extracting energy from municipal solid waste. Both operate at high temperature in a reduced oxygen environment turning waste into useful resources.

Pyrolysis produces syngas which can be used to generate electricity while other chemical compounds are bound in a solid material referred to as char. The binding of these chemicals helps reduce emissions and leaching to the environment and the char can be used as a fertiliser. Gasification operates at higher temperatures with some oxygen. It produces a gas along with an ash residue with little calorific value.

These thermal treatments currently have a small market penetration but are becoming increasingly common, partly due to the EU landfill tax. Costs remain high but are expected to reduce as their development of the technology continues. Pyrolysis and gasification have similar site constraints to waste incineration but may be able to run at slightly smaller scale, meaning land take may not be as great.

Anaerobic digestion:

Anaerobic digestion is a biological process for the treatment of organic waste. It requires separation of the biodegradable (or putrescible) waste stream. The process produces a gas which is methane rich and can be used for energy production. It also has a liquid by-product that can be used as a fertilizer and the solid, fibrous fragment can be used as a soil conditioner. This approach to dealing with organic waste has the advantage of limiting the risk of nitrogen leaching into water systems, an issue that is particularly important in Cheshire which is a nitrogen-sensitive area.

Anaerobic digestion has been applied on a small scale in the UK, processing sludge, agricultural and industrial waste. Larger scale facilities are active across Europe and North America accepting a greater range of organic feedstocks including parks waste. A few of these types of facilities are now operational in the UK (e.g. Reaseheath College, Nantwich and Greenfinch, Shropshire) and others are being planned (including the feasibility study at the Cholmondeley Estate). Many existing Waste Plans refer to anaerobic digestion as a future waste treatment option.

Anaerobic digestion is thought to be more viable at smaller scales than some of the thermal waste treatment processes but would still result in significant land take due to requirements for waste storage, vehicle turning etc. Odours from decomposing waste can become a nuisance so typically as part of an anaerobic digestion facility there would be a requirement for enclosed waste storage. The digestion process itself is also enclosed and emissions to the atmosphere are controlled.

Fuel Cells:

Like CHP engines fuel cells produce heat and power and can be linked to district or communal heat networks. They are similar to batteries in that they produce electricity from a chemical reaction. However, whereas a battery delivers power from a finite amount of stored energy, fuel cells can operate indefinitely provided that a fuel source is continuously supplied. Most fuel cells operating today use natural gas which is reformed to produce hydrogen.

There is debate as to whether electricity generation from hydrogen is better than generating electricity directly from renewable sources such as PV and wind. The virtue of fuel cells is that they guarantee continuity of supply, and clean, quiet and very efficient electricity generation. The ratio of electricity production versus heat is also better than from CHP engines meaning fuel cells can deliver better levels of carbon reduction.

The capital cost of fuel cells is currently much higher than most other competing low and zero carbon technologies. Commercial models currently available cost approximately £3,000/kW. Fuel cell prices are expected to drop in the next decade with further advancements and increased manufacturing volumes.

Geothermal Energy:

Heat for a district network can be extracted from large geothermal wells, either extracting warm brine from aquifers or pumping water down to hot rocks and collecting the steam that is returned.

There is already a local energy network in the UK that uses this technology. The Southampton District Heating Scheme, operated by Cofely, extracts brine from the Wessex deep saline aquifer at 76°C from a depth of 1.8km. The brine is pumped to the surface and the heat is extracted using a heat exchanger in the energy centre, before it is discharged into the sea at 28°C. This heat meets a proportion of the demand on the district heating network, the rest being met using gas-fired CHP.

Cheshire is one of only five areas in the country with a deep saline aquifer basin, the others being located in Northern Ireland, Yorkshire & Lincolnshire, Worcester and Wessex. The main resources are located at the bounding of the fault which is centred on Crewe. Studies have been undertaken by the British Geological Survey to assess the geology of the area and quantify the available resources of the aquifer.

If this opportunity was to be pursued then more detailed feasibility work would need to be undertaken. The British Geological Survey could be approached and/or Cofely to understand the nature of the opportunity and the steps required to assess and implement a geothermal scheme.

1.5 Overview of Smart Grids

A significant transformation of the national electricity grid is underway that will see a complete modernisation of the technologies of generation, transmission, distribution and final use of electric energy. The national grid is the infrastructure that allows us to transport power (electricity) from where it is generated to the end user. It consists of a transmission network that moves electricity over long distances at high voltages, and a number of lower voltage regional distribution networks that feed electricity into homes and businesses.

Most electricity networks were originally designed to generate power in central locations for distribution to consumers over a distance. However, when electricity is transmitted over long distances, significant energy losses can result. Furthermore, heat created during the generation process itself is often wasted.

Smart Grid should be understood more as a concept than a technology or specific equipment. It is based on the intensive use of information technology, automation and communications in order to monitor and control the electric grid, which will allow the implementation of control strategies and optimization of the grid in a more efficient way.

Broadly stated, a smart grid could respond to events which occur anywhere in the power generation, distribution and demand chain. Events may occur generally in the environment, e.g., clouds blocking the sun and reducing the amount of solar power or a very hot day requiring increased use of air conditioning. They could also occur commercially in the power supply market, e.g., customers change their use of energy as prices are set to reduce energy use during high peak demand.

The introduction of Smart Grids will produce a vast interaction between the generation, transmission and distribution infrastructure and the digital communications and data processing infrastructure to allow more efficient use of energy resources. Intelligent Electronic Devices (IEDs) will be a key component of this, allowing the instant exchange of information and control between components of the grid.

Smart Grid will demand the development of new methods of control, automation and optimization for the operation of the electrical grid. The main characteristics of Smart Grids are:

- A central measurement based on the use of smart meters and communication nets of dedicated data, which will allow a bidirectional communication between the electricity companies and the customers;
- Smart Sensors and controllers throughout the grid that will automatically allow the reconfiguration of the grid in case of any failure, reducing the interruption time of the energy supply;
- Easy connection and disconnection to the electric grid of generators and energy storing devices, using similar procedures to the computation equipment.

An example of a smart grid network is shown in Figure 9 below.

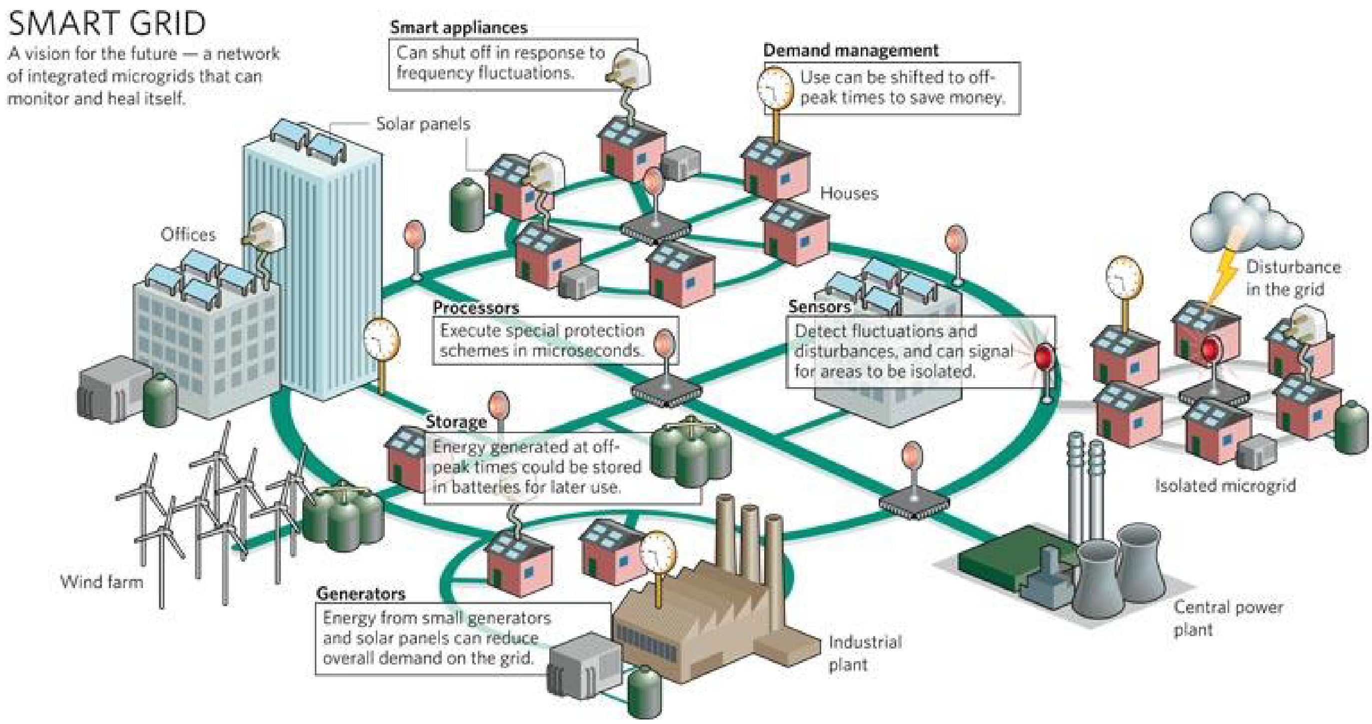


Figure 9: Diagram showing the components of a smart grid and the potential benefits that they could offer to an energy network

The above characteristic will provide substantial changes in the functioning of electrical systems in the following key areas:

- Demand Management: the possibility of fast communication of consumption information and changeable energy tariffs in real time will allow an improvement in the electric consumption profile, eliminating demand peaks, reducing the requirements for new electric plants and transmissions lines, and consequently its environmental and economic impacts;
- Security and Quality: the opportunity of automatic reconfiguration of the electric grid will allow a rise in the level of trustworthiness in the provision of electric energy within the distribution grids. Automatic reconfiguration will also allow for faster isolation of affected parts on the grid and the reestablishment of the supply to most of the customers in the transmission line. The use of PMUs (Phasor Measurement Units), which consist of systems of measurement of electric dimensions in distant positions synchronized through GPS signals, will allow the early detection of potentially catastrophic situations in order to reduce the occurrence of blackouts;

Decentralised generation and Energy Storage: the easy connection of medium (few MW) and small (few kW) generators to the distribution grid, allowed by smart grids, will strengthen the drive to supplement the centralised power stations with smaller decentralised systems. This will present the advantage of reducing the environmental impact of big central generation plants and long distance transmission systems

The potential benefits offered by smart grids include:

- Improved metering will enable real time management of supply and demand reducing peaks in demand and the need for peak generation capacity; this has carbon benefits as well as reducing the need for investment in upgrades to existing supply and generation capacity.
- Increased use of embedded renewable generation in buildings and at a community scale can offer benefits in terms of the reduced need for investment in central generation capacity, and reduced carbon intensity of the grid, but it will require networks to be designed to maintain required fault protection levels and security of supply
- Appliances such as fridges in homes can be fitted with dynamic demand control to sense when there are peaks in demand and to delay their cycle until demand is reduced.
- Providing smart meters in homes can provide real time feedback to occupants on energy use and cost but more importantly could be linked to time of use tariff structures which reward users who avoid using appliances during periods of peak demand or reduce their demand overall.
- Appliances can be programmed either manually or remotely to avoid operation at periods of peak demand. This applies particularly to appliances such as washing machines, dish-washers etc.
- There is scope for increased automation in homes allowing remote access and control of temperature or allowing single point cut off of all non essential power uses.
- The potential for greater uptake of electric vehicles has the potential to impact on the peak capacity of existing infrastructure. If planned effectively however, it could enable car owners to take advantage of low cost off peak power and potentially export this power back to the grid at periods of peak demand.
- The use of incentives and payments to encourage greater rates of recycling will require mechanisms for measuring and monitoring waste that would be provided by a smart network.
- The provision of high speed telecommunications networks will enable real time information to be provided for homes and businesses, potentially covering local transport times, daily energy and water costs, air quality etc, this can be displayed on televisions PCs, mobile phones for ease of access.

1.6 The Case Study Areas

To illustrate the steps in creating local energy networks three case studies have been used, selected in agreement with the project steering group.

The three selected locations were:

- **Warrington town centre**
- **Crewe town centre**
- **Chester City centre**

As previously discussed, the creation of local energy networks is likely to provide most benefits, both environmental and financial, in areas of high heat demand. As the three largest urban centres within the sub-region these areas are likely to offer the most potential and as such have been selected as the case study areas.

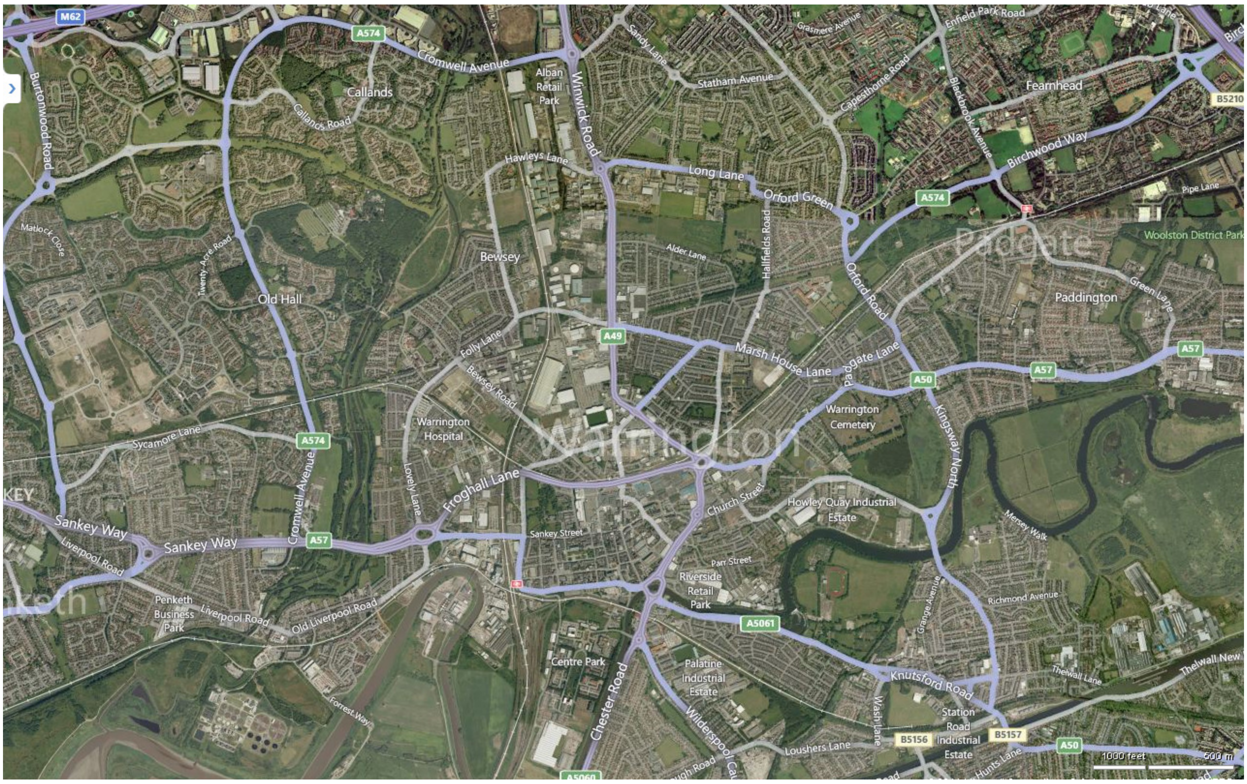
These areas also include significant regeneration plans which could potentially act as catalysts for delivering low carbon energy networks. In each of the case study areas one or more of the key development sites has been identified to act as the focus of developing a local energy network.

The following pages provide an introduction to each of the three case study areas and the key development sites.

The introduction to the three case studies includes information taken from the UK Heat Map, which is available on the DECC website[6]. This is a publicly available data source which uses data on energy consumption for heating to map out the density of heat demand across the country. This can be used as a first step in the identification of areas where the potential for district heating systems could be explored.

[6] http://chp.decc.gov.uk/developmentmap/

Warrington



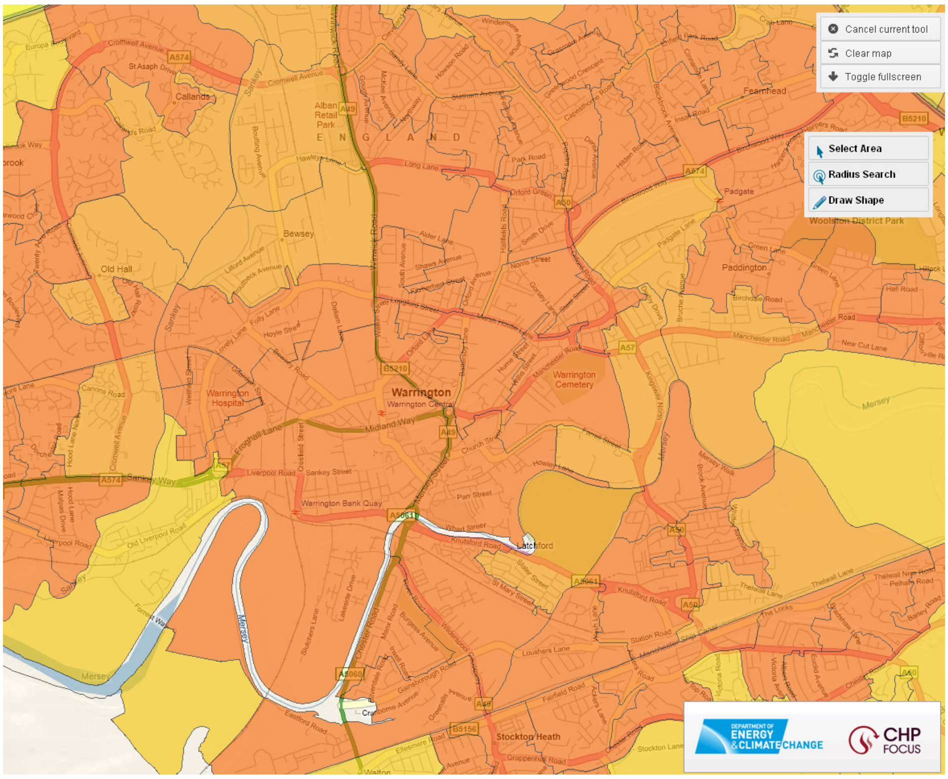
A large redevelopment project, known as Bridge Street Quarter, has been proposed in the town centre of Warrington. This site is currently occupied by the market as well as other retail, office and leisure uses. The proposed redevelopment aims to keep these uses (in addition to adding some residential units) but also to create an attractive and sustainable town centre with better facilities for residents and visitors. The vision for the development includes an aim to deliver "high standards in terms of environmental quality and energy efficiency".

This case study focuses on the potential for the Bridge Street redevelopment to be a potential catalyst for the implementation of a DHN within the Town Centre and in the later sections of this report the steps that would be required to investigate and deliver a network in this location are described in more detail.

Details of the proposed development have been obtained from the masterplan commissioned by Warrington Borough Council which forms part of the Warrington Town Centre Regeneration Framework. This report takes into consideration the agreed preferred options for the regeneration and transformation of the Bridge Street Quarter.

Existing Heat Demands

The UK Heat Map shows that the centre of Warrington has some of the highest areas of heat density in the Borough. The analysis of the central areas of the town show that the heat demand is from large industrial and domestic users although commercial offices, public buildings and retail users also contribute. It is worth noting that the heat demand density of the very centre of the town is probably underestimated in parts due to large scale of the data collection area. Fiddlers Ferry, a 1989MW coal and biomass co-fired power station is located on the edge of the Borough.

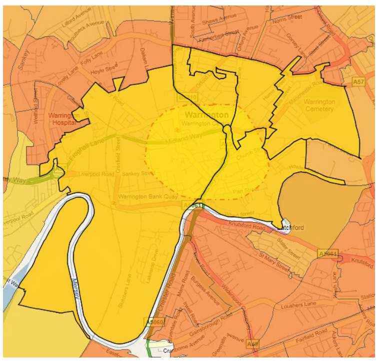


Heat Map Values

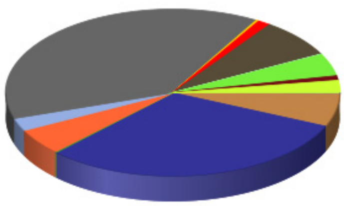
The legend for heat loads (kW/Km^2) is shown below:

- 500 - 1,000
- 1,000 - 5,000
- 5,000 - 10,000
- 10,000 - 50,000
- 50,000 - 100,000
- > 100,000

Please note the colouring on the map is for illustrative purposes only

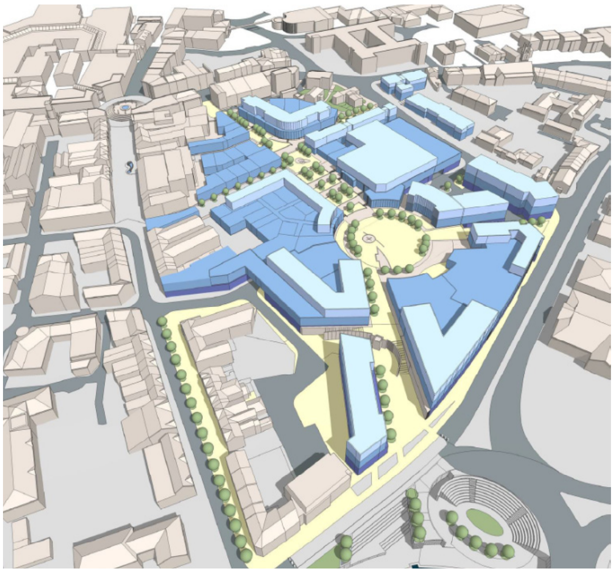


Sector Name	Share	Total KW
Communications and Transport	0.23%	245 KW
Commerical Offices	6.35%	6,799 KW
Domestic	30.73%	32,927 KW
Education	0.17%	178 KW
Government Buildings	5.06%	5,423 KW
Hotels	2.47%	2,644 KW
Large Industrial	38.35%	41,089 KW
Health	0.27%	290 KW
Other	1.23%	1,316 KW
Small Industrial	7.5%	8,032 KW
Prisons	0.09%	91 KW
Retail	4.31%	4,614 KW
Sport and Leisure	0.89%	952 KW
Warehouses	2.36%	2,534 KW
Total heat load in Area		**107,134 KW**



New Development

Bridge Street Quarter

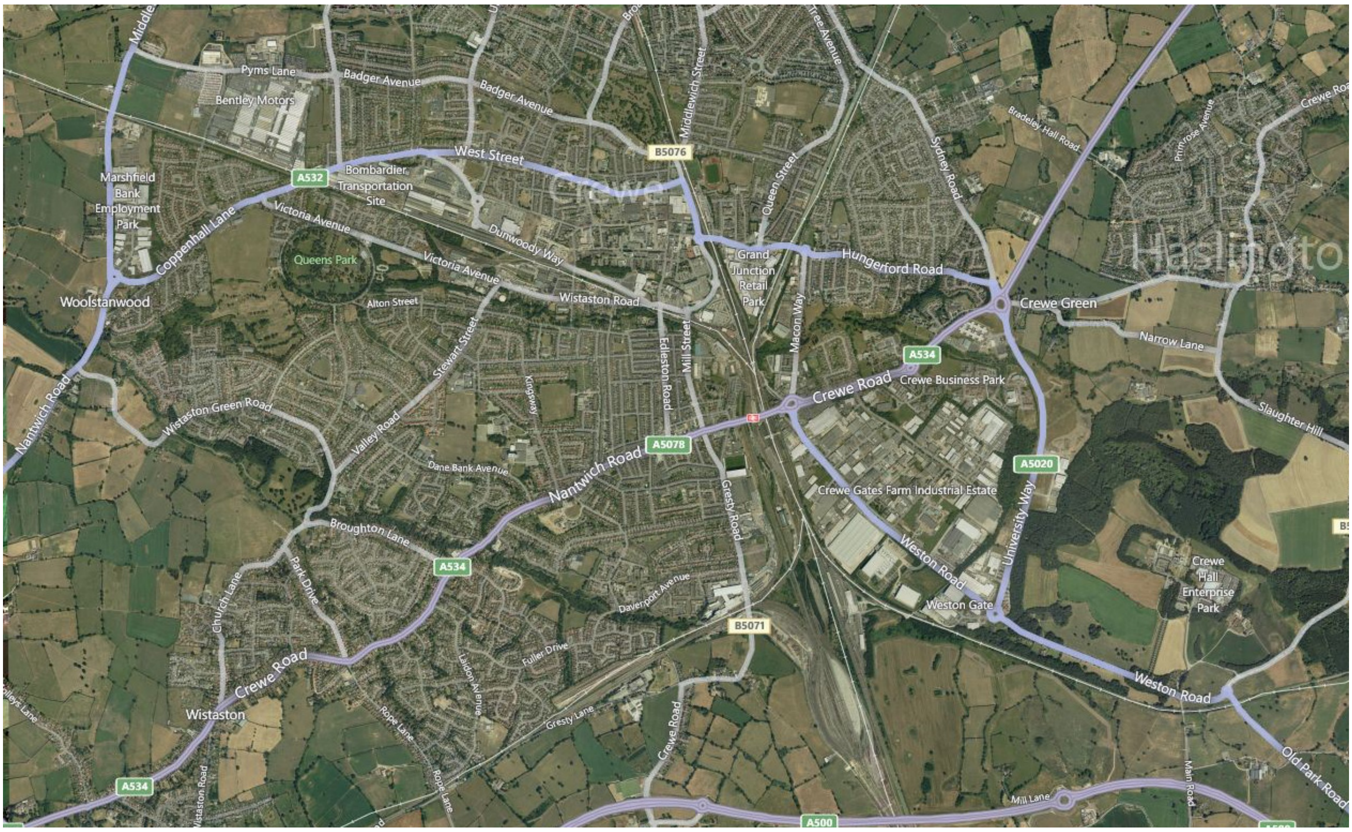


The Bridge Street Development project encompasses the area around the market in the centre of Warrington. The development proposals are made up of three phases, which are planned to start in 2014/15, due for completion in 2022/23. The masterplan proposals for Phase 1 include a large food store, a new market, retail units, offices, apartments and car parking. The Phase 2 masterplan includes a new hotel, retail, offices and apartments and Phase 3 is comprised of additional apartments.

Muse Developments were selected as the preferred developer for this scheme in summer 2011. In their tender Muse stated an ambition to look into the implementation of a local energy network. The Council has a major stake in this scheme both as landowners for the majority of the site as well as future tenants (the scheme will involve the creation of new Council offices) and is therefore in a strong position to negotiate for a design which addresses the priorities in the core strategy.

This case study has been based on the masterplan proposals rather than any alternative proposals produced by the preferred developer, which are currently being progressed and have not been published for consultation as yet. The mix of development, phasing and uses proposed for the site may well change in the future; however this case study illustrates the potential of the site and the feasibility of a local energy network.

Crewe

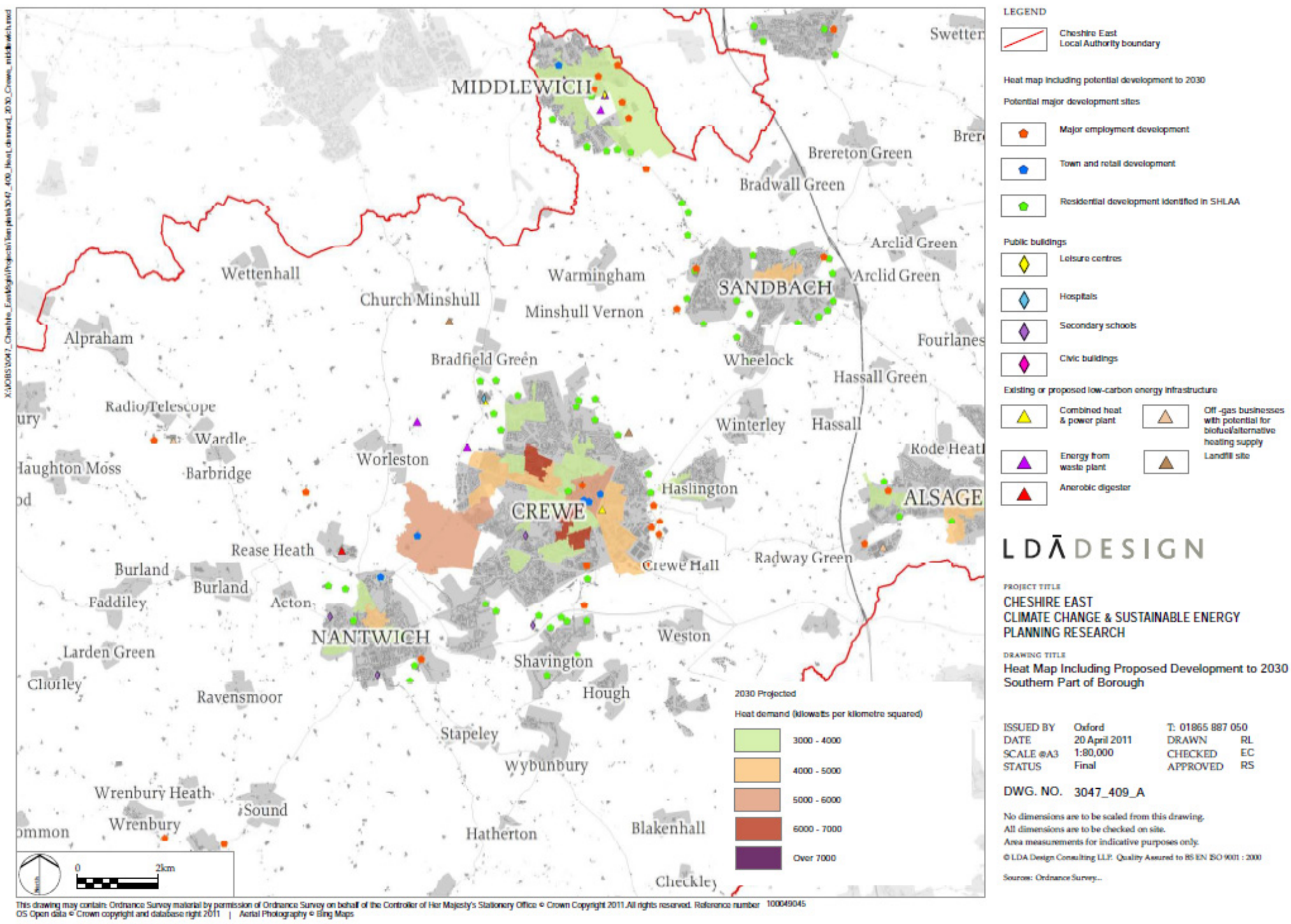


Crewe has been identified as a major growth area within the Cheshire and Warrington sub-region and over the next 20 years significant regeneration of existing areas and the development of new sites, supported by physical and social infrastructure, will deliver new housing and drive economic development in the area.

The Crewe Framework provides a guide for the next 10-15 years and beyond for planning, investment and delivery. Amongst the measures planned for Crewe are the regeneration of the town centre and the railway corridors, development of the Basford sites and associated access works, sustainable urban extensions and regeneration of Crewe's priority neighbourhoods.

This case study focuses on the potential for the redevelopment in Crewe as a potential catalyst for the implementation of a low carbon district heating network within the Town Centre; the steps that would be required to investigate and deliver a network in this location are detailed in the later sections of this report.

The Cheshire East Climate Change and Sustainable Energy Planning Research Study[7] identifies the centre of Crewe as a potential location for the use of district heating. The following image taken from the report shows, at a low resolution, the projected heat demand density in Crewe in 2030. A DECC study[8] suggests that a demand density of 3000kW/Km^2 could indicate suitability for district heating; all the coloured sections shown are at or above this threshold. The icons on the map also indicate the locations of potential developments and existing opportunities for heat generation or supply.

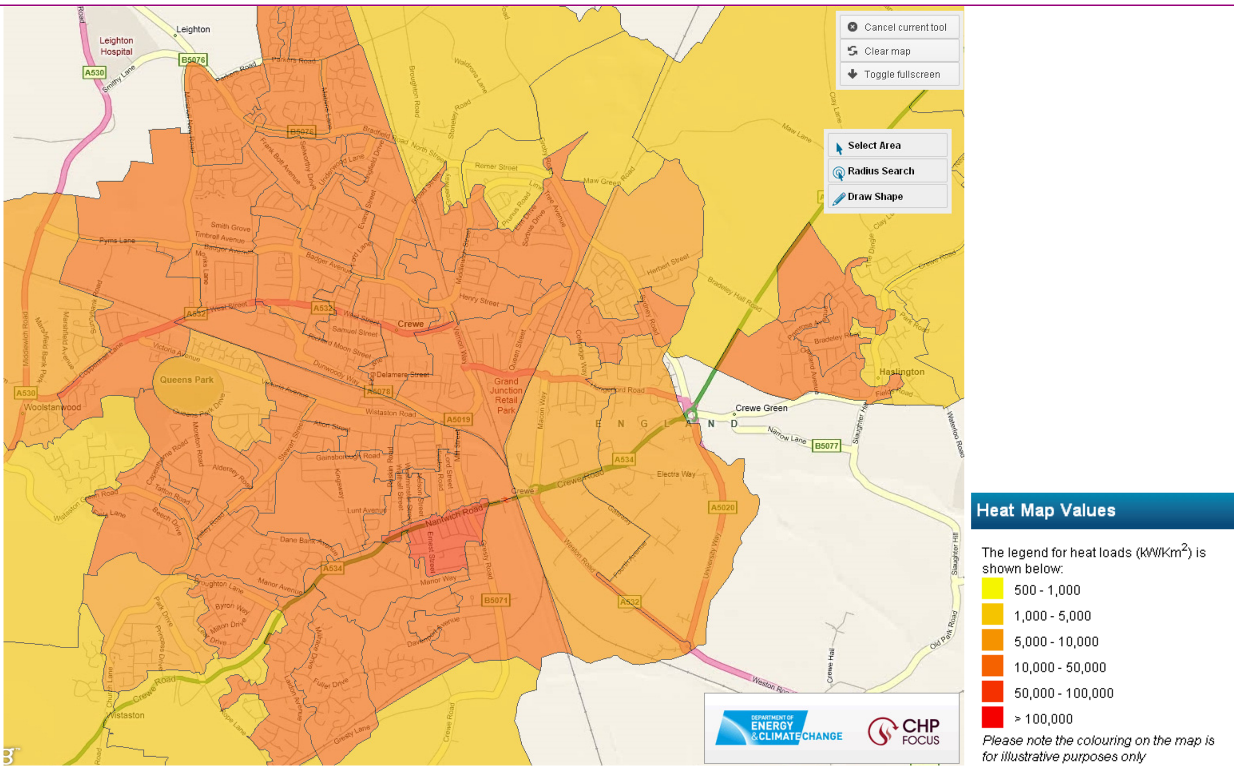


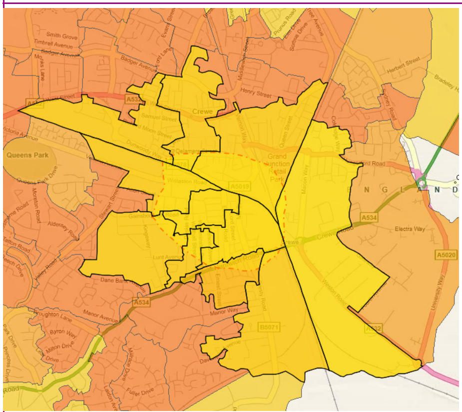
Extract from Figure 5.2 of the Cheshire East Climate Change and Sustainable Energy Planning Research report showing the heat demand (kW/km^2) around Crewe

[7] Cheshire East Climate Change and Sustainable Energy Planning Research Study (LDA Design, 2010)
[8] The potential and costs of district heating networks in the UK (AECOM & Poyry, 2009)

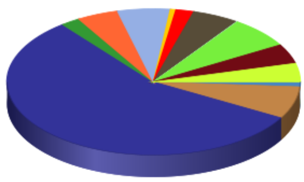
Existing Heat Demands

The UK Heat Map shows that the centre of Crewe has some of the highest areas of heat density in the Local Authority area, although it is worth noting other areas of high demand, particularly Macclesfield and the business parks in Middlewich. The analysis of the centre and closely surrounding areas of the town shows that residential heat demands are the most significant with the remainder derived from of a mix of uses including commercial offices, public buildings, retail, hotels, leisure and warehouses.





Sector Name	Share	Total KW
Communications and Transport	1.07%	936 KW
Commerical Offices	7.12%	6,210 KW
Domestic	56.15%	48,957 KW
Education	2.13%	1,853 KW
Government Buildings	4.57%	3,985 KW
Hotels	5.8%	5,058 KW
Health	0.61%	533 KW
Other	1.98%	1,727 KW
Small Industrial	5.17%	4,507 KW
Prisons	0.09%	83 KW
Retail	6.86%	5,984 KW
Sport and Leisure	4.34%	3,786 KW
Warehouses	4.09%	3,564 KW
Total heat load in Area		87,182 KW



Major New Development

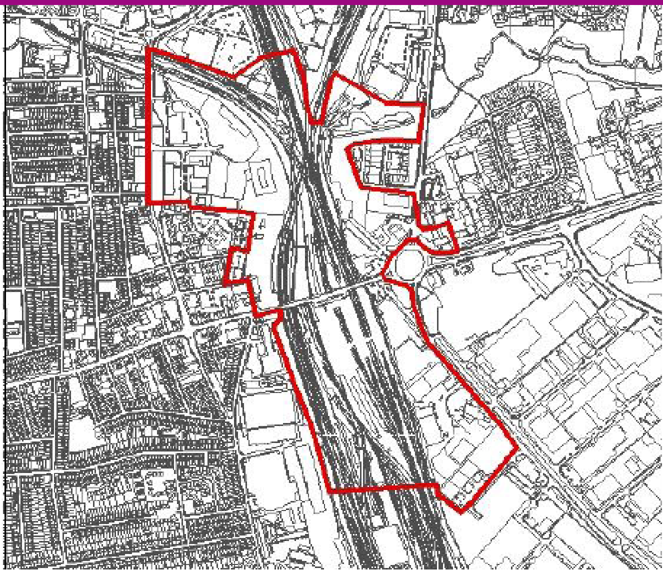
Basford West

Basford West is situated to the south of the town centre and is currently a Greenfield site. Outline planning permission has been received for development comprising office, light industrial and storage and distribution uses. The development will be delivered in three phases, with Phase 1 due to start in 2011-2012, although at this stage the specific details of each phase are not known. This site is planned to be delivered much sooner than the adjoining Basford East. Transport improvements are planned alongside the development to improve connection to the motorways although the site is not dependant on these works.

Basford East

The development brief for the Basford East site suggests that the site will comprise of mainly B1, B2 and B8 uses. Development is dependant on a road being built between the two roundabouts to the north and south of the development site, as well as further connection improvements.

Gateway Site



The Crewe Gateway Site comprises the area around the main railway lines that pass to the west of the town centre and extends to the car-park adjacent to the Tesco store on Vernon Way.

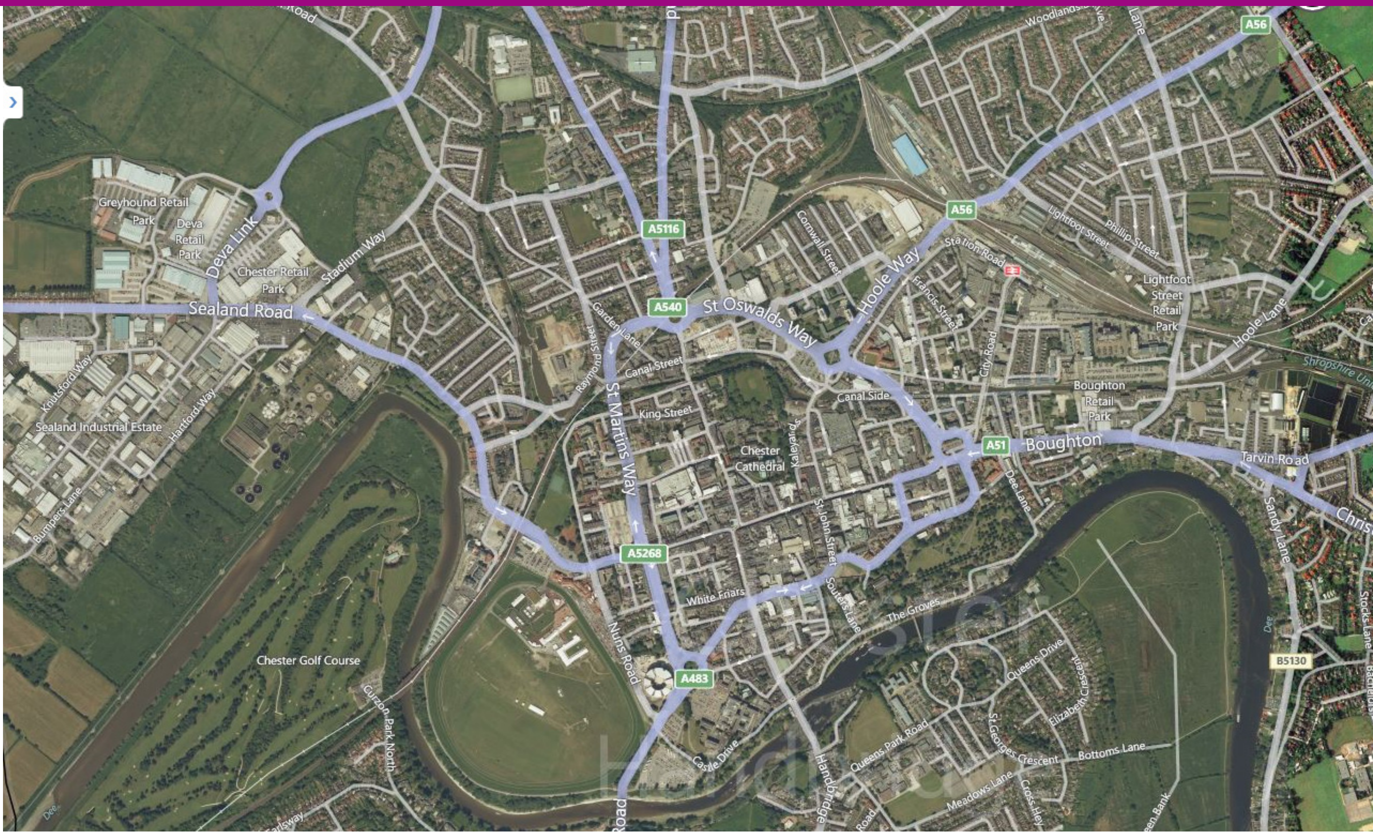
A review of the Supplementary Planning Document (SPD) for this development is planned and although the site had originally been identified for commercially driven development, this could change upon reappraisal.

A site-wide regeneration scheme is planned but much of this will depend upon the results of the refranchising of the west-coast mainline and the associated train station improvement works.

Delamere Place

Delamere Place is located in the centre of the town between Victoria Street and Chester Street. A previous development plan for this site has been dropped but the redevelopment of this area is still being considered. It is anticipated that the site will include offices and retail units and potentially also residential dwellings although more specific details will not be known until a new scheme has been prepared.

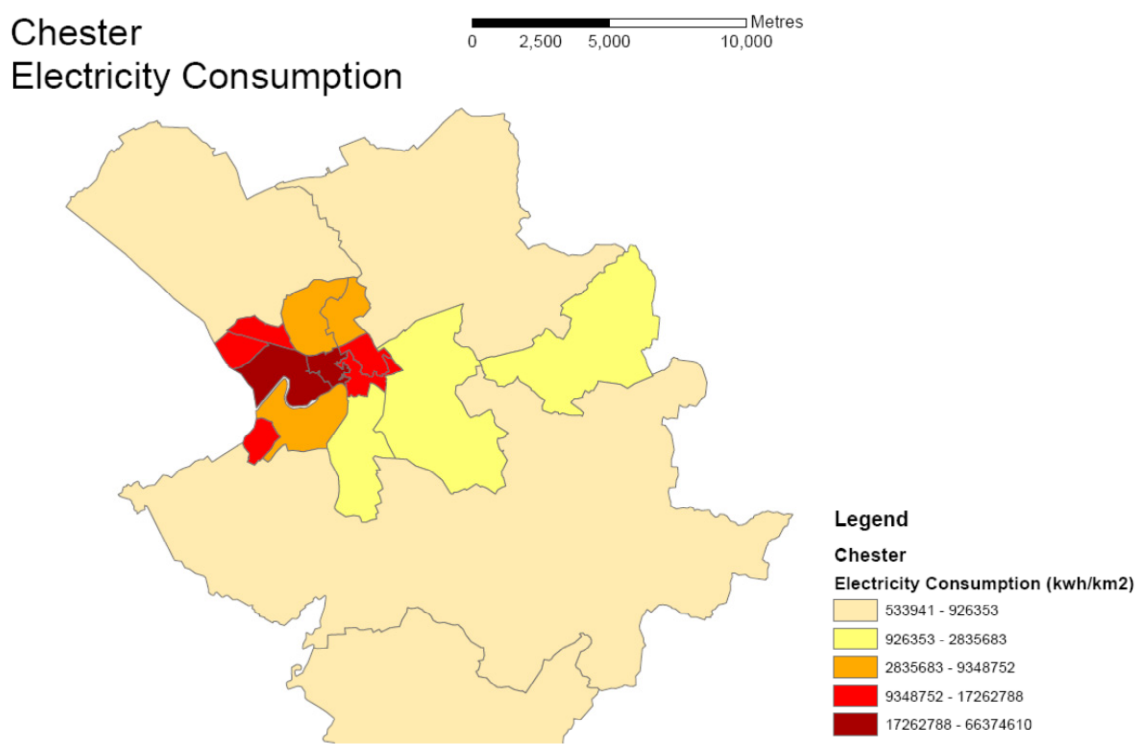
Chester



The key development site in Chester is the proposed Business Quarter in the area adjacent to the railway station. This case study focuses on the potential for the redevelopment in Chester to be a potential catalyst for the implementation of a smart metering scheme highlighting the differences between integration on new building and retrofitting to existing buildings. The steps that would be required to investigate and deliver a network in this location are detailed in later sections of this report.

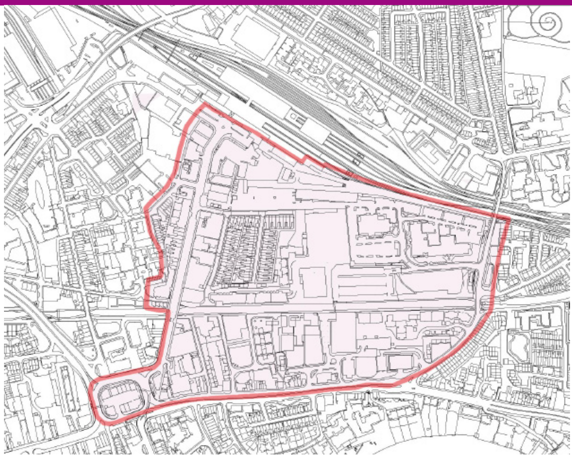
Existing Electricity Demands

For Cheshire West and Chester a similar map to the Heat Maps shown previously for the other two Authorities has been created, but showing the density of electricity demand across the Authority. This clearly identifies the very centre of the city as the area with the highest demand density.



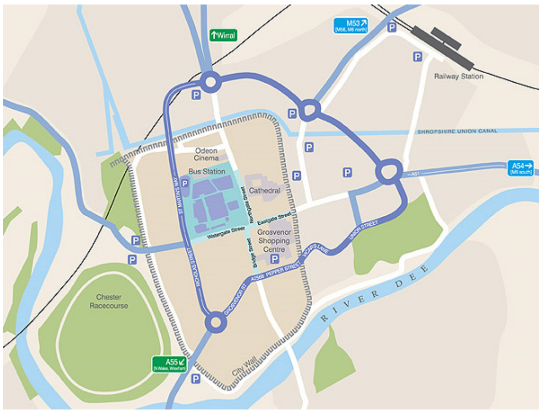
Major New Development

Business Quarter



The Business Quarter is located to the south of the railway station. The majority of the site is now owned by Muse Developments, following their purchase of the land from Lloyds. The current proposals are for around 500,000sqft of office space, including two six-storey buildings along with significant new public realm works. A planning application is expected in early 2012 with construction anticipated to start in 2013.

Northgate



The Northgate development is located in the historic centre of the city on land between King Street, St Martin's Way, Watergate Street and Northgate Street. The scheme has recently been granted an extension on the planning approval for the project, which includes retail, commercial, leisure and entertainment facilities, a new library, a new market hall, 123 homes, a performing arts centre, restaurants and cafes.

2 The Local Energy Network Roadmap

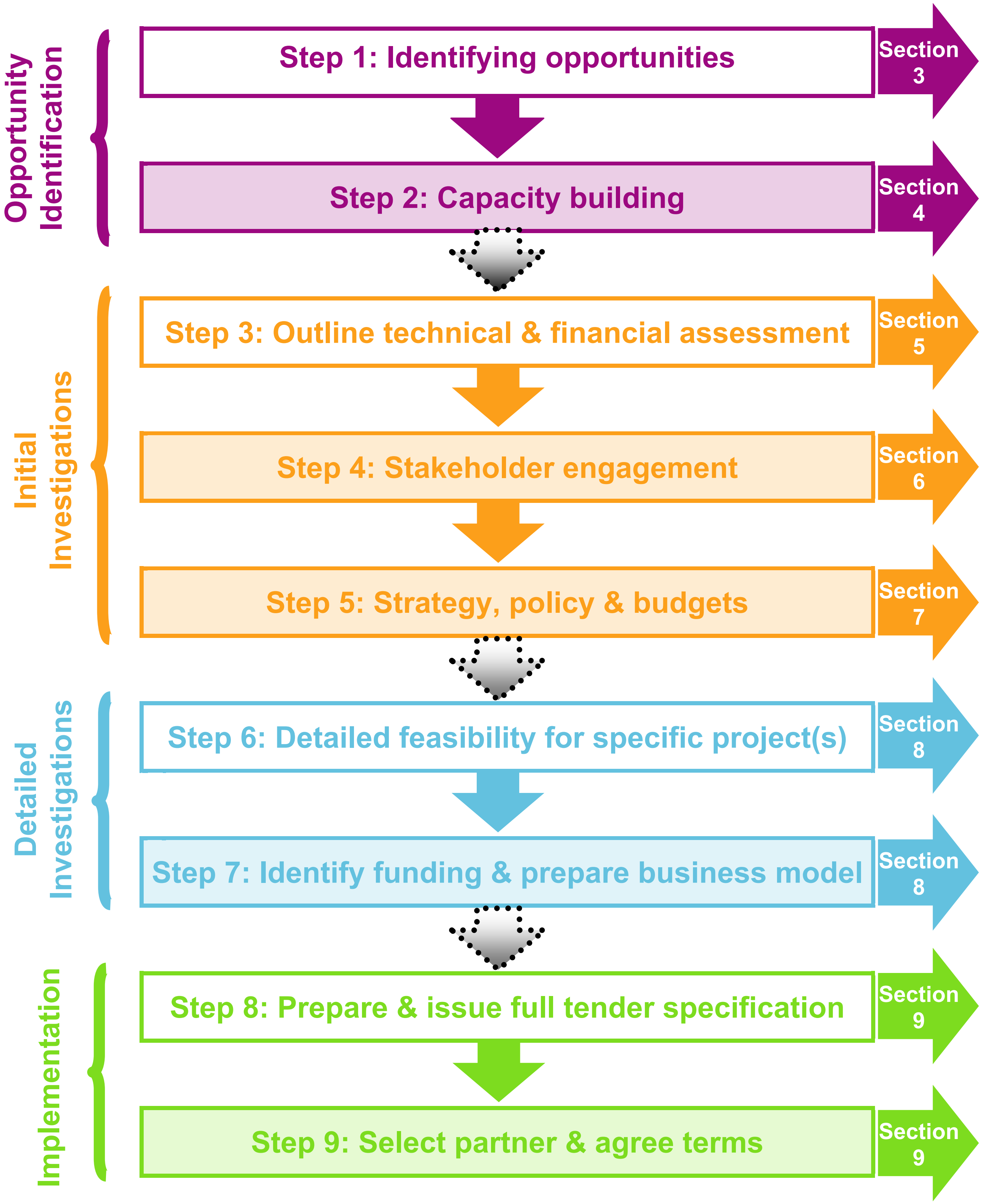
2.1 Creating a Roadmap

The Roadmap set out on the following page outlines the steps required in setting up a local energy network.

This roadmap has been used to form the structure of this report. Within each section of the report the requirement at each step is broken down into discrete tasks and, for the initial steps, these are applied to three local case studies to show how they can be taken forward. The final stages 'Detailed Investigations and Implementation' have been combined to form the final chapter of this report.

The roadmap stages that are highlighted indicate steps where the Local Authority is directly responsible for delivery, whereas the other steps are likely to require technical support from consultants or other experts. The dotted arrows indicate key decision points, which occur where further financial investment and political support will be required to continue with the project.

Cheshire & Warrington
Low Energy Network Roadmap



3 Step 1: Identifying opportunities

Introduction

Existing data, such as the UK Heat Map and Local Development Framework evidence base studies, can help to identify the broad locations within a local authority area with high energy demands, thereby providing a high level indication of where local energy networks might be attractive.

These studies indicate areas where the potential for local energy networks could be explored in more detail. However, they do not provide enough detail to identify the specific locations and buildings that could form part of a network. In order to provide such detail, data relating to specific buildings within the areas being assessed should be collected alongside an assessment of any other opportunities and constraints that could impact upon the technical or financial viability of a local energy network.

3.1 Collecting energy data for existing buildings

Ideally the following information (in respect of building energy use) should be consolidated and mapped spatially:

- Building type
- Location details – OS grid references/name and address of site
- Ownership of building
- Whether the building is proposed or existing
- Type and age of building
- Type of heating system and fuel
- Fuel consumption (MWh/year)
- Gross internal floor area
- Installed capacity (thermal and electrical where combined heat and power [CHP] is present)
- CO_2 emissions associated with fuel consumption (tCO_2/year)
- New development: construction start and completion year
- Year of data collection
- Data source
- Confidentiality of data

For council owned buildings an energy manager or the property services department should have access to much of this information, which is usually held within a central database.

Further information can be found on national or local datasets or maps. Further refinements can be made by requesting information from known large energy users in the area of study. The aim should be to collect as much of this data as possible, prioritising large buildings that are likely to have high energy demands. Public buildings are of particular interest as they are required to lead the way in terms of energy improvements and are more likely to be able to enter into long term energy contracts and to provide 'anchor loads' for DHNs.

Local searches should focus on the following building types, for example:

- Hospitals
- Central government estate
- Local government estate

- Registered Social Landlords
- Sport and leisure facilities
- Other public buildings (e.g. theatres, fire stations, police stations)
- Other educational facilities such as universities, colleges, academies and private schools
- Hotels
- Museums and art galleries
- Churches
- Private commercial developments
- Private residential developments

Obtaining data from private companies can be extremely difficult as many are understandably cautious about sharing such commercially confidential information. At the national level, the Carbon Trust is working with some of the largest private companies (such as the major supermarket chains) to raise this issue at the corporate level in the hope that they will then support the development of energy networks by engaging with local authorities undertaking feasibility studies and actively looking to connect to new and existing schemes.

3.2 Estimating energy demands from new developments

For new developments estimating the energy demands is more difficult and requires the prediction of the likely scale, type and phasing of future development sites.

This is likely to be highly speculative because, although the Local Development Frameworks for the three authorities will set out development sites, the current financial and property market situation will have a significant effect on the nature and delivery of any new development.

The following information on each of the large proposed development sites (>10 dwellings or 100m^2 floor area for non-domestic buildings) should be collected:

- Site name(s)
- Site location
- Number of dwellings
- Type and floor area for each non-domestic use
- Delivery date and start and end date of development period

Benchmark energy data can then be used to estimate the energy demands associated with the proposed developments. If sufficient information is available these should reflect the building regulation requirements.

For domestic dwellings benchmarks are available from studies undertaken by EST[9] and the Zero Carbon Hub[10]. For non-domestic buildings benchmarks can be derived from CIBSE TM46 and Guide F (available from the CIBSE website bookshop).

[9] http://www.energysavingtrust.org.uk/business/Business/Housing-professionals/Publications-and-case-studies
[10] http://www.zerocarbonhub.org/

3.3 Identifying other existing features and opportunities

The location and details of the heat supply or system size for the following should also be sought:

- Existing district and communal heating systems – likely to be located in Hospitals, University Campuses and social housing estates
- Existing CHP systems – these details can be sourced from the national database (http://chp.decc.gov.uk/app/reporting/index/viewtable/token/2) but should also be obtained from the local data collection exercise
- Existing and proposed heat sources, such as power stations, energy from waste facilities, anaerobic digestion facilities, geothermal power stations etc.

3.4 Mapping the data

To better enable the identification of the specific areas with potential the information described above should be presented in maps. This can be done using Geographical Information Systems (GIS).

At the national level the UK Heat Map[11] (shown previously for the three case study areas) can provide a low resolution guide to the areas with the highest potential for district heating networks. More accurate heat mapping is gradually being undertaken at the local scale, such as that included in the Cheshire East Climate Change and Sustainable Energy Planning Research.

The maps created using the building specific data are essentially a much more detailed version of the maps referenced above but at the highest possible resolution, allowing the components of a network to be defined and providing the data for the technical feasibility study and financial viability assessments.

The following information will need to be prepared in a spreadsheet to create a GIS layer:

- X and Y coordinates
- Building/development name
- Heat and/or electricity demand
- Building type
- Presence of CHP technology
- Other potential energy supply options

It is helpful to show buildings on the map as circles that are coloured to show the building type, sized according to the scale of the heat demand and numbered in accordance with a ranking of the heat demand (with lower numbers referring to higher demands). The locations of other relevant opportunities or potentially significant heat demands, but for which no annual energy demand is known, can be shown with separate identifiers. This representation enables easy identification of possible 'clusters'.

3.5 Assessing the opportunities

The GIS maps and associated data should be used to identify the specific areas and clusters of buildings that could be connected together to form a network.

[11] http://chp.decc.gov.uk/developmentmap/

In undertaking this analysis the following criteria should be used:

Energy demand density

Energy mapping can be used to locate areas with the highest levels of demand density and which are therefore of most interest. These can then be interrogated to determine which buildings are contributing most.

Total energy demand

The total energy demand should be comprised of metered data supplemented with modelled or benchmark data where this is not available. Assessing the total energy demand provided an indication of the size of revenue from energy sales and therefore what level of initial capital investment could be supported.

Presence of 'Anchor Loads'

Identify locations where there are a number of buildings with high and stable energy demands (particularly heat in the case of DHNs) in close proximity. These are likely to include hospitals, universities, large public buildings and leisure centres. A cluster of anchor loads could provide the initial demand to stimulate the creation of a wider network.

Building types

Locations with a range of building types will provide a good balance of energy demand profiles. For example, a residential area will require heat in mornings, evenings and weekends, but there is less demand for heat in the daytime. If commercial buildings are also present, which have a daytime heat demand, the overall demand profile is more consistent and will enable the system to operate more efficiently.

Future plans

As well as reviewing the existing energy demands and densities, the future development plans within the area should be assessed to assess the potential for future development and expansion of a network.

New development sites can provide some of the capital funding through connection charges which can help to facilitate the installation or expansion of a scheme.

Building ownership

Building ownership will have a key impact on the practicality of setting up a network as well as highlighting the potential stakeholders in a scheme. It is easier to secure customers for a network if there is one point of contact to coordinate with, rather than many individual customers. For example, a block of 50 social housing dwellings could be connected more easily under one agreement with the Housing Association, rather than 50 individual private homeowners. Local Authorities are also usually more able to enter into long term energy supply contracts than private companies.

Proximity to key opportunities and constraints

Other opportunities such as the presence of existing district or communal heating schemes, combined heat and power systems and strategic waste sites will increase the potential of an area. Equally there are a number of constraints that could adversely impact on the potential for establishing district heating in a particular location, such as air quality restrictions, listed buildings/roads or physical barriers such as rivers or railway tracks.

The following table summarises the criteria that can be used to prioritise the clusters:

Technical viability criteria	Financial viability criteria	Deliverability criteria
• Size of energy loads • Type of building • Proximity to other high potential buildings • Phasing of development • Potential for extension of network	• Ownership of buildings • Financial delivery mechanisms • Length of pipe work • Potential for extension of network • Presence of existing Energy Services Companies (ESCos)	• Proposals and extent of refurbishment for existing buildings • Proposals for energy strategy for new buildings • Timescales and phasing of proposed refurbishment/ development • Practical barriers to district network installation (e.g. railways, utilities)

Site prioritisation criteria for local energy networks

3.6 Quantifying the benefits

The results of the initial assessment should provide sufficient information to allow an outline assessment of the potential CO_2 savings compared with a business as usual case, i.e. buildings continue to use the same fuels with individual plant and/or without smart meters and control systems.

3.7 Application for the case study areas

The following pages include some of the initial work that will be required as part of this step in the roadmap.

Information on opportunities within the three locations was collected at a Local Energy Workshop held in Warrington on the 14th July 2011. Additionally, the three local authorities have also provided energy consumption data for their buildings which has allowed some initial mapping to be undertaken. Further work would be required to build up this information to a greater level of detail to enable the opportunities to be fully assessed.

Warrington

Existing buildings

The local authority buildings with the most significant heat demands in the vicinity of the Bridge Street are shown in the following table and map, which includes annual consumption data taken from the local authority records. These buildings could potentially be connected to a network and would offer a direct benefit to the local authority by providing a low carbon source of heat and therefore reducing the CO_2 emissions as well as potentially reducing energy costs.

Map Ref	Building Type	Building Type	Fuel Type	Annual Consumption (kWh/year)
G1	Retail Market	Mixed use	Gas	2,983,745
G21	Poll Tax House	Offices	Gas	583,960
G25	Warrington Library & Museum	Cultural	Gas	430,524
G44	Pyramid (crown Court)	Other	Gas	299,657
G46	West Annexe	Offices	Gas	296,927
G56	Pyramid (centre Sport)	Cultural	Gas	255,138
G63	Town Hall	Offices	Gas	223,652
E3	Retail Market	Mixed use	Elec	857,389
E4	New Town House	Offices	Elec	832,224

In addition there are two local authority buildings of high electricity consumption located adjacent to the Bridge Street site. These buildings could be of significance if gas-fired CHP was considered since they would potentially provide a user for the electricity generated, whilst improving the revenue of a scheme by avoiding the sale of generated electricity to the grid (which gives a lower rate of return compared to offsetting electricity at import cost).

Other key buildings of interest in the area shown on the map are:

1. Cockhedge Shopping Centre
2. Golden Square Shopping Centre
3. DW Fitness
4. HM Revenues and Customs Offices
5. Unilever Site
6. Warrington Hospital

New development

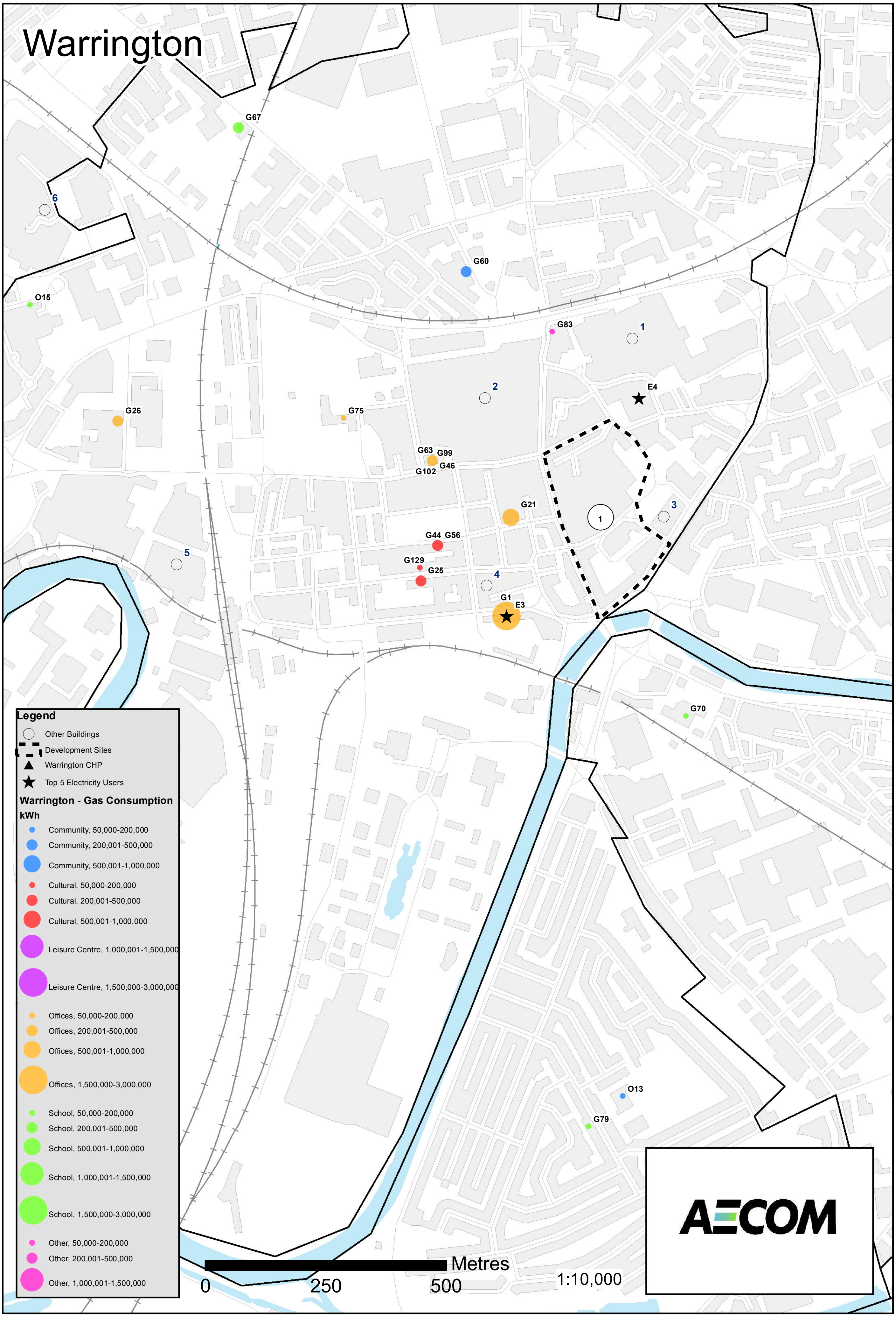
The indicative location of the Bridge Street development site is shown on the following map. An indicative assessment of the likely heating loads of the building areas and uses proposed for development has been carried out using information from the Bridge Street Masterplan document and benchmark data. The annual heat demands and peak heating loads are given in the table below:

Building Name	Building Floor area (m^2)	Annual Gas consumption (kWh/yr)	Indicative peak heat load (kW)
Offices	8,800	695,000	616
JJB	2,800	182,000	308
Residential	15,225	3,045,000	914
Hotel	4,075	1,060,000	611
Leisure	4,530	1,196,00	1,359
Retail	10,850	2,105,000	1,194
Library	1,400	158,000	126
Market	4,585	367,000	413
Food Store	4,500	900,000	405
Total	**56,765**	**8,512,000**	**5,946**

From the table above is possible to see that the main consumers are the residential units, followed by retail, leisure and the hotel. These building types have a large and stable heat demand and could act as the anchor loads for an energy network

Other Opportunities

- The Unilever facility located near to Bank Quay Station which, although it is a relatively long distance from the Bridge Street site, is worth investigating to understand if there are high heat demands and/or heat waste that could be of use
- The possible use of a heat pump in the river was discussed at the workshop
- The council is currently considering rolling out PV to schools through a recycle fund
- A previous district heating scheme was proposed for another site which included retail uses and a college with possible connection to an EfW facility but this did not go ahead. There may therefore be other areas of the town that are suitable for consideration of district heating in the future


Warrington
G67
6
G60
O15
G83
1
2
E4
G26
G75
G63
G99
G46
G102
G21
3
1
G44
G56
5
G129
G25
4
G1
E3
G70
O13
G79
Legend
Other Buildings
Development Sites
Warrington CHP
Top 5 Electricity Users
Warrington - Gas Consumption
kWh
Community, 50,000-200,000
Community, 200,001-500,000
Community, 500,001-1,000,000
Cultural, 50,000-200,000
Cultural, 200,001-500,000
Cultural, 500,001-1,000,000
Leisure Centre, 1,000,001-1,500,000
Leisure Centre, 1,500,000-3,000,000
Offices, 50,000-200,000
Offices, 200,001-500,000
Offices, 500,001-1,000,000
Offices, 1,500,000-3,000,000
School, 50,000-200,000
School, 200,001-500,000
School, 500,001-1,000,000
School, 1,000,001-1,500,000
School, 1,500,000-3,000,000
Other, 50,000-200,000
Other, 200,001-500,000
Other, 1,000,001-1,500,000
Metres
0
250
500
1:10,000
AECOM

Crewe

Existing buildings

The local authority buildings with the most significant heat demands in the centre of Crewe are shown in the following table and accompanying map, and is based on annual consumption data taken from the local authority records. These buildings could potentially be connected to a network and would offer a direct benefit to the local authority by providing a low carbon source of heat and therefore reducing the CO_2 emissions as well as potentially reducing energy costs.

Map Ref	Building Type	Building Type	Fuel Type	Annual Consumption (kWh/year)
G3	CREWE CEMETERY	Other	Gas	1,152,546
G4	CREWE SWIMMING POOL	Leisure Centre	Gas	1,026,622
G5	DELAMERE HOUSE	Offices	Gas	906,736
G6	KINGS GROVE SCHOOL	School	Gas	888,516
G7	SIR WILLIAM STANIER - VICTORIA SITE (V)	School	Gas	727,556
G8	SIR WILLIAM STANIER COMMUNITY SCHOOL (C)	School	Gas	680,193
G9	RUSKIN SPORTS AND LANGUAGES COLLEGE	School	Gas	638,480
G10	ST THOMAS MORE CATHOLIC HIGH SCHOOL	School	Gas	573,191
G12	MUNICIPAL BUILDINGS CREWE	Offices	Gas	393,017
G14	ST MARYS CATHOLIC PRIMARY SCHOOL CREWE	School	Gas	337,339
G15	BEECHWOOD SCHOOL	School	Gas	330,884
G17	CREWE LIBRARY	Cultural	Gas	318,835
G18	MACON HOUSE DAY CENTRE	Offices	Gas	309,703
G19	SPRINGFIELD SCHOOL	School	Gas	275,977
G21	BRIERLEY BUSINESS CENTRE	Offices	Gas	262,332
G23	BRIERLEY PRIMARY SCHOOL	School	Gas	239,915
G24	UNDERWOOD WEST PRIMARY SCHOOL	School	Gas	236,318
G25	GAINSBOROUGH PRIMARY AND NURSERY SCHOOL	School	Gas	230,616
G26	OAKEFIELD PRIMARY AND NURSERY SCHOOL	School	Gas	226,002
G27	SCOPE HOUSE	Offices	Gas	224,117
G28	UNDERWOOD WEST PRIMARY SCHOOL	School	Gas	224,073
G29	PEBBLE BROOK PRIMARY SCHOOL	School	Gas	220,965
G31	LYCEUM THEATRE	Cultural	Gas	202,456

E1	SIR WILLIAM STANIER COMMUNITY SCHOOL (C)	School	Electricity	962,686
E2	MUNICIPAL BUILDINGS CREWE	Offices	Electricity	654,334
E4	PYMS LANE DEPOT	Other	Electricity	405,210
E5	DELAMERE HOUSE	Offices	Electricity	369,936

Other buildings of interest highlighted on the following map include:

1. Leighton Hospital
2. Pyms Lane Waste Site
3. Bentley Factory (including Legends Fitness Centre) South Cheshire College
4. Crewe Police Station
5. Total Fitness Sports Centre
6. South Cheshire College

Other buildings of interest not shown on the map include:

- Manchester Metropolitan University Campus
- Orion Business Park
- Crewe Business Park

The map of heat demands suggests that there are two clear sites of interest: the centre of the town and a cluster of schools to the south west of the town.

New development

The indicative areas of the key development sites in the city are highlighted on the following map:

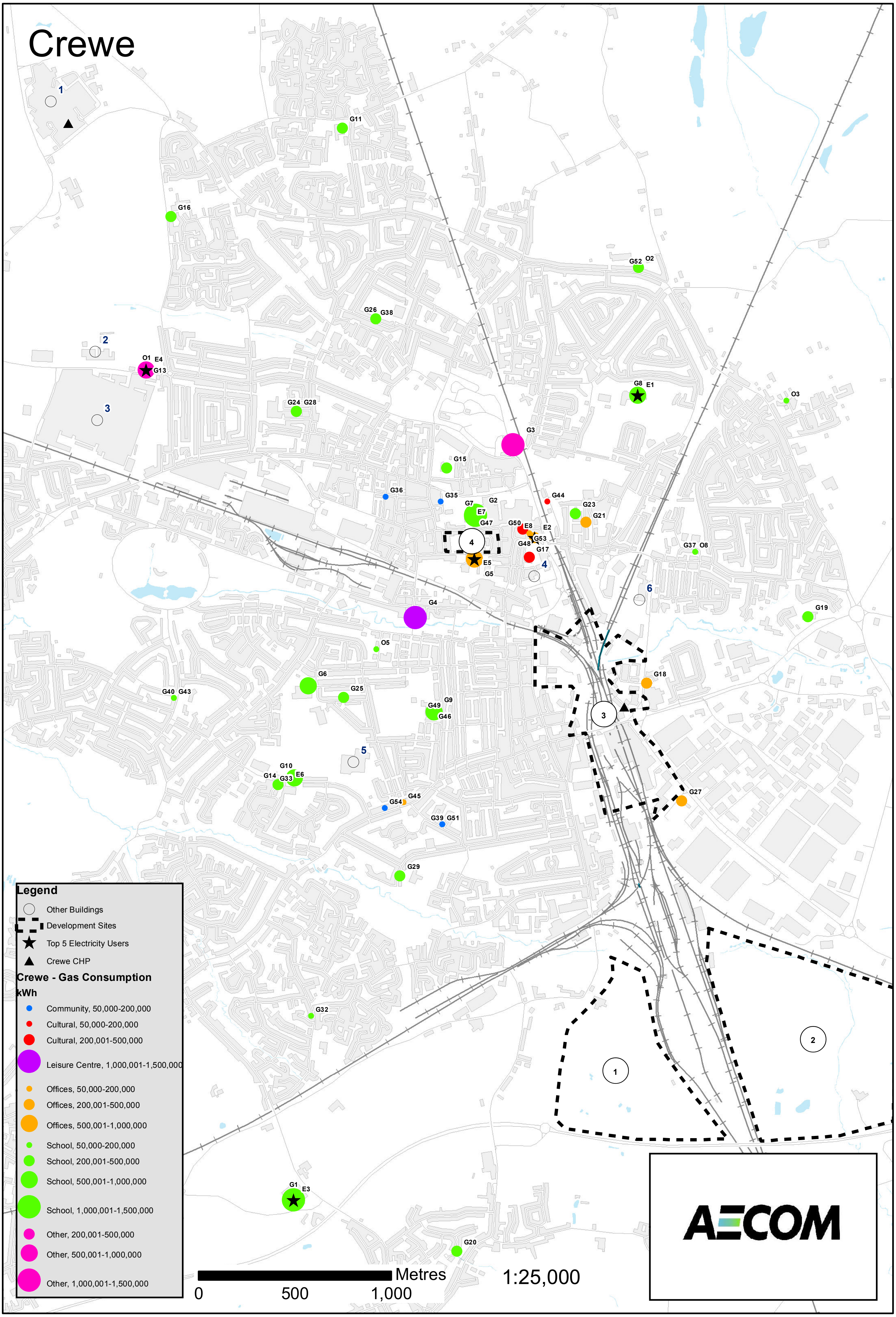
1. Basford West
2. Basford East
3. Gateway Site
4. Delamere Place

Sufficient detail is currently unavailable on the key new development sites to enable the heat loads to be predicted with any degree of confidence. However, as shown in the Warrington Bridge Street example, once a reasonably clear picture of the building types and areas is known then benchmark data can be used to establish some initial estimates.

Other new development not shown on the map that could be of interest includes:

- New manufacturing facilities are planned along the A5078 and A532 to the Northwest of the town centre
- Aspirations to establish the concept of a lifestyle centre in the town. This would integrate several

	community services into a lifestyle centres which would be located within or near to the town centre.
Other Opportunities	• Bentley manufacturing site to the west of the town centre, including proposals for a large-scale PV array • Waste site located off Pym's Lane near to Bentley factory • Medium-scale biomass supplier located in Middlewich • Potential for Anaerobic Digestion due to the large proportion of livestock farms; an existing facility is located at Reaseheath College, Nantwich a feasibility study has also been performed for a facility in the Cholmondeley Estate. • Geothermal potential (see section 1.5.3) • An Energy from Waste plant at Middlewich is currently at appeal stage • Maw Green landfill site, which has permission to operate until 2017. The potential to use the landfill gas should be explored, if this has not already been pursued


Crewe
Legend
Other Buildings
Development Sites
Top 5 Electricity Users
Crewe CHP
Crewe - Gas Consumption
kWh
Community, 50,000-200,000
Cultural, 50,000-200,000
Cultural, 200,001-500,000
Leisure Centre, 1,000,001-1,500,000
Offices, 50,000-200,000
Offices, 200,001-500,000
Offices, 500,001-1,000,000
School, 50,000-200,000
School, 200,001-500,000
School, 500,001-1,000,000
School, 1,000,001-1,500,000
Other, 200,001-500,000
Other, 500,001-1,000,000
Other, 1,000,001-1,500,000
Metres
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AECOM

Chester

Existing buildings

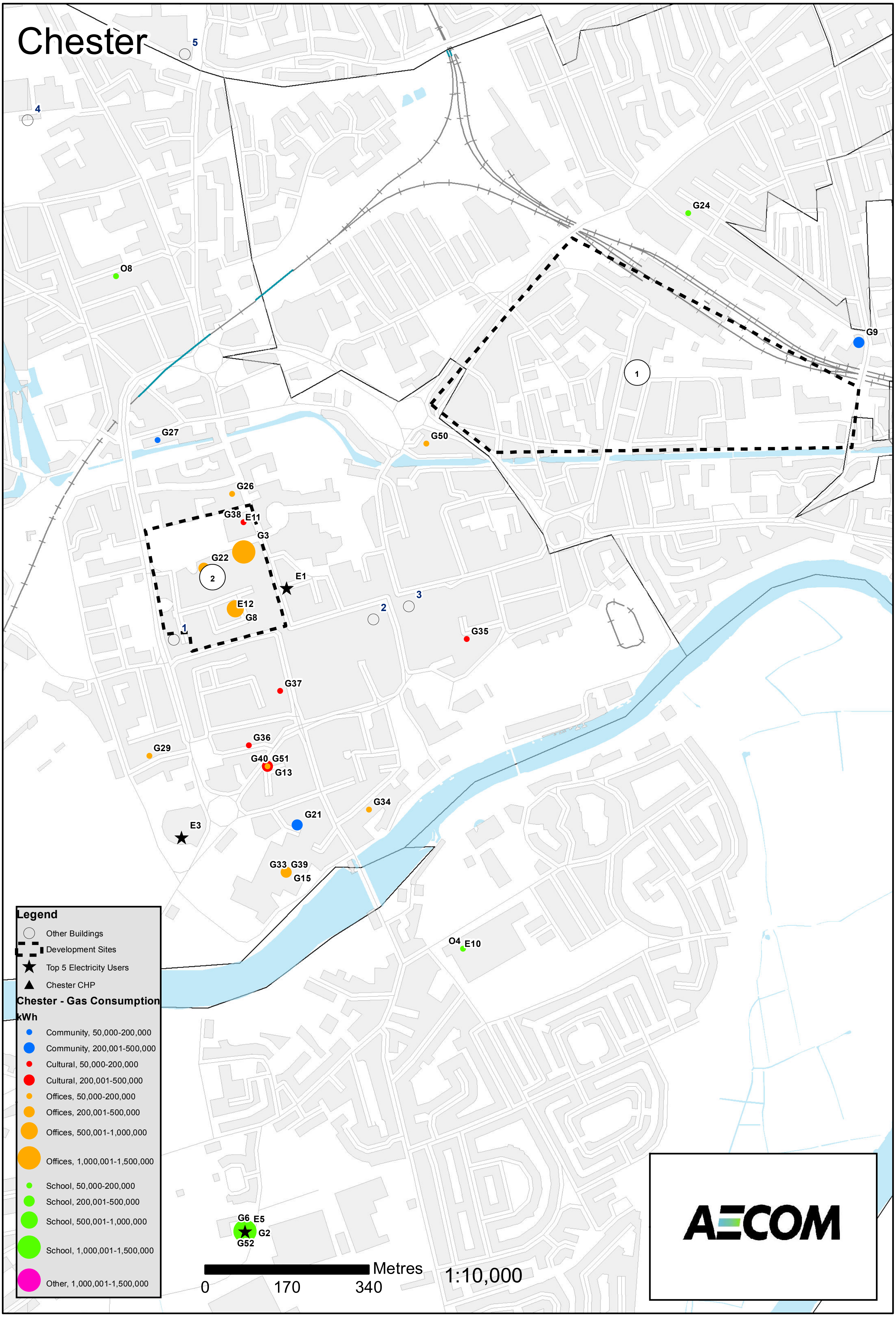
The local authority buildings with the most significant heat demands in the centre of Chester are shown in the following table and accompanying map, and is based on annual consumption data taken from the local authority records.

Map Ref	Building Type	Building Type	Fuel Type	Annual Consumption (kWh/year)
G2	THE CATHOLIC HIGH SCHOOL CHESTER	School	Gas	1,334,294
G3	CHESTER TOWN HALL AND FORUM OFFICES	Offices	Gas	1,287,353
G6	OVERLEIGH ST MARY'S CE PRIMARY SCHOOL	School	Gas	774,859
G8	GOLDSMITH HOUSE	Offices	Gas	536,610
G9	LIGHTFOOT LODGE COMMUNITY SUP CENTR	Community	Gas	469,897
G13	GROSVENOR MUSEUM	Cultural	Gas	391,729
G15	COUNTY HALL	Offices	Gas	369,590
G21	ST MARY'S CENTRE	Community	Gas	226,842
G22	MARKET HALL, CHESTER	Offices	Gas	223,328
E1	COUNCIL OFFICES THE FORUM	Offices	Elec	1,633,813
E3	HQ BUILDING	Offices	Elec	945,382
E5	THE CATHOLIC HIGH SCHOOL CHESTER	School	Elec	586,672
E10	QUEENS PARK HIGH SCHOOL	School	Elec	413,921
E11	CHESTER LIBRARY	Cultural	Elec	331,662
E12	GOLDSMITH HOUSE	Offices	Elec	271,590

Other existing buildings of interest highlighted on the following map are:

1. Crowne Plaza Hotel (includes a swimming pool)
2. Grosvenor Hotel & Spa
3. Macdonald New Blossoms Hotel
4. Chester University
5. Total Fitness Leisure Centre (includes a swimming pool)

New development	The indicative areas of the two key development sites in the city are highlighted on the map: 1. Chester Business Quarter 2. Northgate Insufficient detail is currently available on these sites to enable the energy demands to be predicted with any degree of confidence. However, as shown in the Warrington Bridge Street example, once a reasonably clear picture of the building types and areas is known then benchmark data can be used to establish some initial estimates.
Other Opportunities	The mixture of historic buildings and new development could be of interest for a smart grid trial to compare and contrast the difficulties and successes of both the installation and operation of smart meters, controls and possible electric vehicle infrastructure. It should be cheaper and easier to 'design-in' the smart grid infrastructure to the buildings within the new business quarter but potentially there are greater savings to be made from addressing the existing building stock, particularly if other interventions are limited due to the limitations of working on the existing building fabric. The following low and zero carbon energy generating technologies have been identified in Chester. Future feasibility studies should investigate these further to assess the potential to contribute to a local energy network: • Hydropower scheme at Cheshire Weir • Biomass CHP scheme at Tower Blocks • Biogas from the sewage plant • Possible PFI waste scheme • New 'Superhub' data centre being considered



Chester
5
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O8
G24
G9
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G50
G26
G38
E11
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G22
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E1
E12
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G37
G36
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G40
G51
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E3
G33
G39
G15
O4
E10
G6
E5
G2
G52
Legend
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Chester - Gas Consumption kWh
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Cultural, 200,001-500,000
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Offices, 200,001-500,000
Offices, 500,001-1,000,000
Offices, 1,000,001-1,500,000
School, 50,000-200,000
School, 200,001-500,000
School, 500,001-1,000,000
School, 1,000,001-1,500,000
Other, 1,000,001-1,500,000
Metres
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170
340
1:10,000
AECOM

Step 1: Identifying Opportunities			
Ref	**Action**	**Discrete tasks**	**Responsibility**
1.1	**Collect Council Energy Data**	• Collect energy consumption data for council buildings • Prepare a spreadsheet with building name, postcode, annual gas/oil/electricity use	• Local Authority
1.2	**Collect data for other key buildings**	• Identify other buildings with high energy/heat demands • Prepare a spreadsheet with the building name, postcode and building type • Find contact details for those building owners • Prepare a standard letter to issue as a request for information	• Local Authority • Technical Consultant
1.3	**Collect data for other opportunities**	• Identify locations and details of existing energy generation systems • Identify locations and details of any existing communal and district heating systems • Identify locations and details of existing and planned waste sites • Identify locations and details of existing and planned power stations and other large energy generation systems	• Local Authority • Technical Consultant
1.4	**Collect existing GIS maps**	• Identify areas of Air Quality, Conservation Areas, Archaeology/Protected sites and Allocated development sites	• Local Authority
1.5	**Map the data**	• Process the data collected in steps 1.1 to 1.3 and use to create maps to display the information geographically	• Local Authority • Technical Consultant
1.6	**Quantify the potential CO_2 savings**	• Use some benchmarks to estimate the CO_2 savings that could be expected from a potential scheme	• Local Authority • Technical Consultant

4 Step 2: Capacity Building

4.1 Introduction

If the high-level opportunity assessment carried out at Step 1 indicates the potential for energy networks is favourable, the local authorities will need to engage with officers and members early to build the capacity to progress the project.

4.2 Develop a vision

A vision for the development of low carbon energy networks will be crucial to build internal support in the early stages of the project. The vision needs to provide a clear explanation of the opportunity and benefits for the Council and other stakeholders with an overview of how it will be achieved.

Also as it may take a few years for any heat network to be fully developed, it is critical that any new buildings that are being built, or existing buildings that are to have heating systems refurbished, should be designed to be compatible with the network. This will help to ensure that these buildings can be relatively easily and cost effectively connected to the network when it reaches them. The early-stage vision will give developers confidence in the council's intentions.

4.3 Leaders and Champions

Leadership within the council, from both officer and member level will be vital to securing the political support necessary to deliver these schemes, which will require a number of difficult steps including: putting policies into place, setting up the delivery vehicles, obtaining funding, pulling together the various stakeholders and agreeing contractual terms with potential partners.

The following people and groups should be identified:

- A member champion to provide the political support to secure the resources and funding to carry out further work in this area
- A steering group comprised of representatives from across the Council and potentially other key local stakeholders that can provide cross departmental support and input into project development. Key departments that should be represented on this steering group are likely to include: planning, development management, property services, estates, sustainability/climate change, highways, air quality, finance and legal services
- A dedicated decentralised energy project manager or team to take responsibility for the actions required to take the identified project opportunities forward

It should be noted that in the early stages the three local authorities could pool resources to form a sub-regional working group until such time as their separate projects are more developed.

4.4 Gaining Internal Support

In the early stages it will be important to highlight the cross-departmental benefits that could be offered by a local energy network, some of which are shown in the diagram in Figure 10 below:

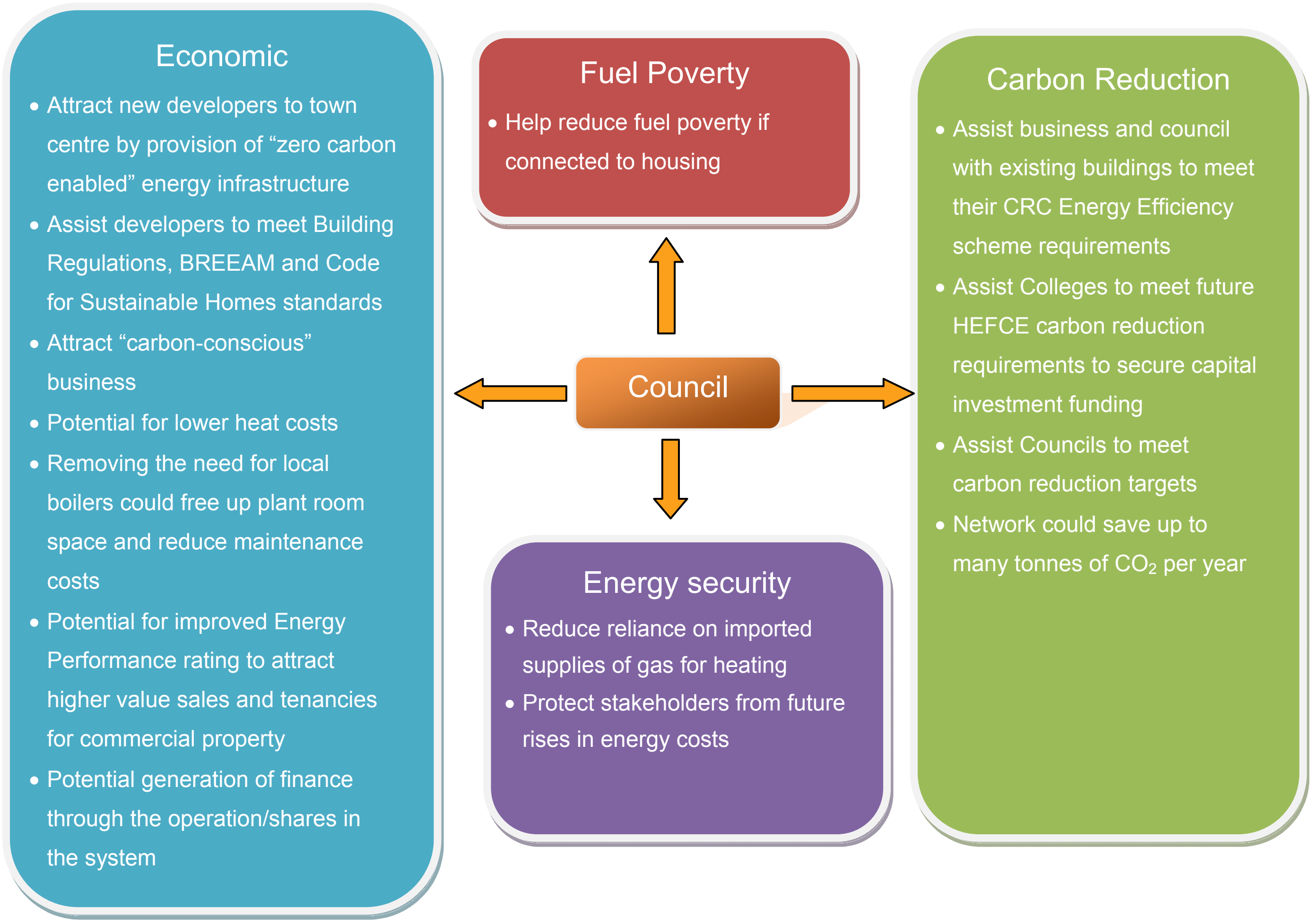


Figure 10: Potential benefits of low carbon energy networks to a Local Authority

Once the vision for the network has been established, it will then be important to ensure that those activities and plans of the Council and other key partners that could have an influence on the network, or be influenced by it, are coordinated to facilitate delivery of the network and to, in turn, take maximum benefit from it.

Some of the key areas of overlap are likely to include:

- Local Development Framework, identifying the development plan for the area
- Sustainable Community Strategy, identifying the aspirations of the community
- Highways maintenance strategy and programme of works within the target areas
- Other public sector plans and standards for new development and building refurbishments in the target areas
- Energy procurement strategies and corporate plans for the Council and other public sector stakeholders

- Housing and fuel poverty strategies
- Economic and regeneration strategies

4.5 Cheshire and Warrington Local Energy Workshop

A Local Energy Workshop was held on the 14th July 2011 as part of this study and the following people from each authority were in attendance.

Name	Authority	Role
Daniel Corden	*Cheshire East*	*Planning*
Mike Sidebottom	*Cheshire East*	*Regeneration*
Steve Jones	*Cheshire East*	*Planning*
Shea O'Neil	*Cheshire East*	*Regeneration*
Anna Mosquera	*Cheshire West*	*Minerals & Waste*
Gemma Easter	*Cheshire West*	*Regeneration*
George Ablett	*Cheshire West*	*Sustainable Development*
Peter Bulmer	*Cheshire West*	*Sustainability/ Climate Change*
Hazel Honeysett	*Cheshire West*	*Planning*
Andy Doyle	*Warrington*	*Finance*
Clive Perrin	*Warrington*	*Development Management*
Kevin Usher	*Warrington*	*Planning Policy*
Laura Stanley	*Warrington*	*Sustainability/ Climate Change*
Rachel Waggett	*Warrington*	*Sustainability/ Climate Change*
Matthew Turner	*AECOM*	*Project Team*
Taiza Kirkpatrick	*AECOM*	*Project Team*
Emma Gardner	*AECOM*	*Project Team*
Alex Trebowicz	*AECOM*	*Project Team*

The workshop was intended as the first stage in the capacity building process.

The workshop included a discussion of the opportunities and constraints in each of the Local Authorities and this information has been captured in the case study analysis on the following pages.

Warrington	

Developing a vision	The Bridge Street development offers an opportunity to start up a local energy network within Warrington City Centre.
	
	The benefits for a local energy network should be set out so that both the developer and the Council are aware of the potential benefits that this approach can offer and are then in a position to consider whether to invest in further research to test the technical and financial feasibility. Preparing this vision should focus on the following:
	• Demonstrating how a low energy network could help to achieve objectives set out in key Council Policies and Strategies for example:
	  ○ Sustainable Community Strategy – potentially significant contribution to the 40% CO_2 reduction target
	  ○ Core Strategy – promotes generation of energy from low and zero carbon energy
	• Clarify the benefits for the developers. Key amongst these will be the following:
	  ○ The Bridge Street development is a mixed-used scheme that will be phased over a long period and is likely to be assessed against more onerous future revisions of the building regulations.
	  ○ Potentially cost effective both in regards to the initial capital costs and ongoing running costs.
	  ○ Potential to achieve financial returns if the developer becomes a partner in establishing the network

Leaders and champions	At the workshop held on the 14th July 2011 the following officers from Warrington Borough Council were in attendance: Andy Dowell – Finance Lead for Bridge Street Quarter Clive Perrin – Project Lead for Bridge Street Quarter Rachel Wagget – Climate Change Manager Laura Stanley – Climate Change Officer Kevin Usher – Principal Planning Officer It was decided that this group would form the initial working group for the local energy network project in Warrington.
Internal support	At this early stage it will be important to highlight individuals elsewhere in the authority that will need to be engaged in future stages of a project. A key group will be the Climate Change Board which includes the Chief Executive, Climate Change Portfolio Holder and Finance Director.

Crewe	
Developing a vision	Key components of a vision will include demonstrating how a low energy network could help to achieve objectives set out in key Council Policies and Strategies for example: • Sustainable Community Strategy • Carbon Management Plan • Corporate Plan • Renewable Energy and Infrastructure Baseline Studies for the Local Development Framework • Policies within the emerging Local Development Framework The ability to address the potential liabilities from the CRC scheme will also be attractive and may help to further highlight the potential financial benefits that are likely to be of interest to members. When communicating with developers the benefits for compliance with the local planning policies should be a key part of the message. At the workshop it was noted that five-year paybacks are likely to be required for all implemented measures due to availability of funds in the current financial climate. As it is unlikely that a local energy network would meet this criterion a case will need to be made for a longer-term view.
Leaders and champions	In the immediate period the core local energy network champions are likely to be the attendees at the Workshop, which comprise members of planning and regeneration. However additional officer champions with a wider energy/sustainability brief will also be required. In the medium to long term Member buy-in is seen as key for the development of a local energy network. The Director for Regeneration is seen as a key person to engage in the initial stages of a project
Internal support	The following support from within Cheshire East Council has been identified which could potentially be used to support further stages of a local energy networks project: • Energy champions • An ‘Eco Reps’ network has been established across the authority, this includes officers who may be able to contribute to the project • The Local Economic Partnership, chaired by the head of the Crewe Bentley Motors site

Chester	
Developing a vision	The representatives of Cheshire West have expressed an interest in looking to apply for funding to trial smart grid technology within the city, based around both the new Buisness Quarter and the existing buildings within the town centre. The local authority may also decide to look into the potential for creating a DHN, perhaps as part of the same smart network. The council should seek to engage with SP Energy Networks who are the designated network operator (DNO) for this area. The DNO is required to access the financial support available under the Low Carbon Networks Fund. SP Energy Networks are already working on a trial in Liverpool as part of a consortium with EA technology consulting, Plus Dane Group and Liverpool City Council and should therefore be aware of what kind of scheme would be able to attact funding. Reseach carried out for DECC by the Energy Networks Strategy Group[12] to identify the challenges to the roll out of smart grid technology sets out a wide range of pilot projects that are required to test options to address the challenges indicating a range of schemes that could attract funding, ranging from product specifc test to city-wide networks. A consortia may need to be formed with the DNO and working alongside Muse Developments, the developer of the Business Quarter and existing tenants of properties in the histroic centre to identify a suitable scheme to test. The local authority have highlighted fuel poverty as a key goal and the case should therefore be made as to how the creation of local energy networks could help to address this issue.
Leaders and champions	In the immediate term the attendees at the workshop, comprising officers from planning, regeneration and sustainability were considered to be the initial working group that could undertake the preparatory work and begin to generate support to take a project forward.
Internal support	The following key internal groups and people have been highlighted as important internal stakeholders that should be approached during the initial stages of a project to ensure early engagement and support including: • The Council Leader • Committees and systems • Cheshire Renaissance • Scrutiny • Finance • LDF Panel

[12] http://www.decc.gov.uk/en/content/cms/meeting_energy/network/strategy/strategy.aspx

Step 2: Capacity Building			
Ref	**Action**	**Discrete tasks**	**Responsibility**
2.1	**Develop a vision**	• Prepare a clear picture of the opportunity and benefits from the development of a local energy network in the Local Authority area for both the Local Authority and other key stakeholders • Frame the vision around key strategies and policies • Establish a clear rationale for further studies	• Local Authority
2.2	**Identifying leaders and champions**	• Identify a Council member to champion the project • Identify an officer champion to project manage further work and to co-ordinate the required actions set out in this checklist • Set up a working group of key personnel	• Local Authority
2.3	**Internal support**	• Set up a workshop with key personnel within the Authority to make them aware of the initial study and the plans for moving forward	• Local Authority
2.4	**Obtain sufficient support to commission the next stage of work**	• Lobby for the financial and political support to continue to the next stage of the Roadmap.	• Local Authority

5 Step 3: Outline Technical and Financial Assessment

5.1 Introduction

The detailed technical and financial assessment of a local energy network is likely to require the appointment of a technical specialist. Sufficient evidence will be required by this stage to support the decision to proceed with a project, both in terms of the finances to commission a study and the officer resources required to support the work.

Although the work is likely to be undertaken by a third-party the local authority will still be required to provide significant input into the study, as explained below.

The details in the following two sub-sections relate mostly to the work required for assessing the feasibility of a district heating network, but the broad principles will also apply to the investigation of a smart grid or roll-out of other local energy systems.

5.2 Commissioning a feasibility study

The costs of undertaking a feasibility study to assess the potential for district heating could be in the region of £20,000 or more depending on the scope of the study and may take around 3 months to complete.

The Carbon Trust provide support for such work under their strategic design advice (SDA) service. Although no financial support is available, the Carbon Trust (as of July 2011) are able to provide resources at no cost to assist local authorities with the following:

1. Statement of works and project brief
2. Identifying key stakeholders within the organisations
3. Tender process
    a. Identifying relevant accredited consultants
    b. Management of tender process
    c. Client advisory role
    d. Renegotiating project brief, if necessary
4. Continued client project advisory role throughout the process to ensure deliveries are met
5. Advise on next steps on project completion.

The contact at the Carbon Trust (as of August 2011) is Ben Lynch (Implementation Support manager for SDA)

5.3 Undertaking a technical assessment

5.3.1 Network Design

Based on the buildings identified for connection, a route will need to be identified for a network. The local authority will need to provide the following information to support this work:

- Commentary on network route options
- Information on possible constraints
- Information on location of future road improvements

5.3.2 Energy Centre

The location of an energy centre is often one of the most difficult elements of the creation of a local energy network, particularly for large district heating systems where the space requirement for the plant, fuel storage (in the case of biomass) and thermal store can be very significant. The footprint of a large energy centre can be in the order of $200m^2$ or more with a height of at least two storeys and a flue. There are several options when locating and designing an energy centres, which can range from highly concealed spaces within a building (for example at Media City, Salford) or within a highly visible buildings (for example at Liverpool University and the Olympic Park in London).

The technical consultant will therefore be looking to the Local Authority to provide the following:

- Possible site locations for the energy centre
- Details of air quality management restrictions and implications on scale, size and technology options.
- Traffic management inputs (where delivery vehicles for fuels such as biomass will be using local roads)
- Business development activity for fuel suppliers (i.e. biomass) to ensure a robust local supply chain

5.3.3 Modelling of plant

To assess the size of the demands, modelling will be needed to predict the energy demand profiles of the buildings proposed for connection to a network in order to assess the likely size of the heating plant required.

It is likely that as a minimum gas-CHP and biomass will be considered. Modelling of the operation of the plant will allow the heat and electricity outputs to be estimated, from which the environmental and financial benefits can be calculated.

It may be necessary to test several variations in the size of the plant. For example a larger CHP would potentially deliver greater CO_2 savings but the smaller system may improve the commercial viability of a scheme.

5.3.4 Calculating CO_2 savings

The outputs of the modelling will enable the CO_2 savings from a district heating system to be calculated relative to the base case assumption of ‘business as usual’ with the retention of the existing plant in existing buildings and the use of standard systems in new build (in most cases this is likely to be a gas-fired boiler).

To calculate the CO_2 savings the emissions factors for different fuels from Building Regulations Part L 2010 should be used.

5.4 Undertaking a financial viability assessment

To assess the commercial viability of DHNs the following need to be calculated:

- Capital costs, which will include the costs associated with the energy centre, network infrastructure, heating interface units and energy meters. The technical study should provide the necessary data for these to be calculated. If sought, developer contributions can be included in the capital cost assessment
- Operational costs, which will be comprised of the cost of the fuel used, maintenance costs for the plant and operational/staffing costs for the system
- Operational Revenue, which will include heat sales, electricity sales and any financial incentives (such as the RHI)

Costs should be assessed over a 25 year period to calculate the following key indicators of financial viability:

- Simple payback period – the time taken to return the initial capital expenditure
- Net Present Value (NPV) – this is the yield of the investment based on the capital investment and the costs and returns over time together with the discount factor (the rate of return that could be earned on an investment of similar risk). Different discount factors can be applied to show the attractiveness to private investment. Local Authorities are able to use a discount factor of 3.5% but for private investment this should be set to 9-12%[13]
- Internal Rate of Return (IRR) – this shows the return on the investment

Capital cost assumptions should be based on quotes from suppliers and/or an understanding of systems and schemes currently in operation. Operational cost assumptions should be based on utility prices over the lifetime of the system. For future prices the interdepartmental analysts group (IAG) work can be used[14].

[13] CE55 A guide to Community Heating (EST, 2004)
[14] http://www.decc.gov.uk/en/content/cms/about/ec_social_res/iag_guidance/iag_guidance.aspx

Application for the case study areas	
All sites	Once there is sufficient support to commission a technical and financial study the Carbon Trust could be approached to provide some strategic support. There is also the potential for the three authorities to continue to work together to share learning from the more detailed studies since much of this will apply to other projects and therefore help to build capacity across the sub-region.
Warrington	A study could be commissioned to assess the potential across the whole local authority in more detail or just focus on the Bridge Street site. The timing of a technical and financial study will need to tie in with the progress of the Bridge Street scheme to provide the right level of detail at the right time. Undertaking this work at an early stage will better enable the proposals to be integrated into the designs, however sufficient details of the likely type and scale of building types will be required to ensure the technical analysis provides useful outputs. Some key considerations that could be discussed with the developer and the appointed design team to feed into the study include: • Possible energy centre locations within the new development site • Network routes across the site • Likely design implications
Crewe	A single study will be able to assess the technical and financial viability of the two sites identified in Step 1 as well as other locations of interest across Cheshire East. A separate study is likely to be required to assess the geothermal potential; the British Geological Survey may be able to assist with this. This could follow an assessment of a district heating system, using the data generated by that study to identify the viability of using geothermal energy as a heating source.
Chester	A feasibility study to assess the potential opportunity for a smart grid trial is likely to be undertaken by the DNO. The Local Authority could seek to identify partners and prepare a portfolio of potential stakeholders including the owners and occupiers of key buildings and the preferred developers of the two key sites.

Step 3: Capacity Building			
Ref	**Action**	**Discrete tasks**	**Responsibility**
3.1	**Commission a technical and financial feasibility study**	• Contact Carbon Trust for support under the Strategic Design Advice service (if required) • Prepare a brief, tender the work and select a preferred bidder to undertake the work	• Local Authority Working Group
3.2	**Provide input to the study**	• Provide commentary and input on the location of infrastructure, such as an energy centre, network routes and buildings to be connected • Provide further details on specific buildings, opportunities and constraints as required or the contact details of other officers who can provide this • Assess the technical and financial assumptions for their relevance to the local area • Consult with colleagues in planning department regarding issues especially in relation to the Energy centre site	• Local Authority Working Group • Planning Officers

6 Step 4: Stakeholder consultation and engagement

6.1 Who are the stakeholders

The successful delivery of an energy network will depend upon a coordinated approach and efforts of a number of organisations, the key groups are listed below:

- **Planners:** Getting the planning framework right for district heating is an important stimulus.
- **Other Local Authority Officers:** The practical delivery of infrastructure on such a large scale will need the support and co-operation of a range of different departments within the Local Authority.
- **Members:** Council members will be key to obtaining the political support required to drive through a large infrastructure project like this which may have significant financial and physical implications for the area. They will also be needed to figurehead the stakeholder engagement process.
- **Consultants:** Technical consultancy services are likely to be required to provide the technical support in the initial stages of the development of an energy network. This expert advice is required in two specific areas:
    - Engineering – Support from an engineering consultant is likely to be required for the feasibility stage and the detailed design and specification stages.
    - Finance – A cost consultant may be needed towards the later stages of the process to help prepare a business model, delivery plan and identify the required funding.
- **Customers:** When an area has been selected for further assessment, the owners and users of the key buildings within the area should be contacted to inform them of the potential opportunities and implications of creating an energy network**.** Important customers will include large anchor loads; these may include Primary Care Trusts, education facilities, Registered Social Landlords and other public sector bodies.
- **Developers:** With the tightening of Building Regulations and moves within the planning system to encourage greater early consideration of low-carbon energy technologies the creation of local energy networks offers significant advantages to developers. The developers should be engaged as early as possible to gain support for decentralised energy proposals.
- **Residents Associations:** Members of the public, particularly those that would be customers of the scheme or in close proximity to the proposed infrastructure should be informed and represented in the process.

6.2 Marketing and Communication

As with any major new venture, it will be important for the Council to develop, at an early stage, a clear communications and PR strategy, building on the vision created in the Capacity Building step in order to:

- Develop a clear identity and brand for the network

- Clarify and market its benefits to:
    - The Local Authority
    - Residents
    - Developers
    - Funders and financiers (including Council Elected Members)
    - Potential customers
- Raise awareness and keep people up to date on progress of scheme

6.3 Support and information for developers

The delivery and expansion of local energy networks will be reliant upon the support from developers that are involved in delivering the developments in these locations.

To support developers the Authorities will need to provide clear guidance on the ambitions and policy requirements in regards to the delivery of local energy networks and how these can be practically realised on the various sites.

This may require technical studies to be undertaken at a high level to support the masterplans that can provide the overarching energy plan for each location as well as information on design requirements and costs to inform developers and design teams of the technical and financial implications.

Similar guides have been produced for other schemes, in particular the guide for developers on implementing district heating within Barking and Dagenham, which can be found on their website[15].

An example of the information that is likely to be needed in guidance for connection to an existing or planned DHN is outlined below:

- Designed flow and return temperatures - It is important to maintain low return temperatures on the network, increasing the capacity of the system.
- Controls in the building - Variable volume controls of the heating circuit in the building are required. The BSRIA guide on variable-flow water systems (Application Guide AG 16/2002) can be referenced.
- Location of the plant room for connection
- Removable panel in the plant room or trench under the plant room wall to allow incoming pipes to be easily fitted
- Network interface - the preferred option is to use an indirect connection, where the hot water distribution system within the building is separate to the primary heating network. The HIU acts as the interface between the two systems
- Establishing the heat supply demand – the developer/client would need to agree the peak heat supply which is expected to ensure the DHN can supply this
- List of plant which the developer would be required to provide
- Details of metering requirements

[15] http://www.barking-dagenham.gov.uk/6-living/envir-protect/envir-sustainability/pdf/btc-eea-developer-guidance-sept-07.pdf

Application for the case study areas	
All authorities	The technical and financial feasibility study will provide specific details of the viability and the key benefits provided by the energy network opportunities. If a project has potential, this information can be presented at workshops both across the sub-region and within the local authorities to gain stakeholder engagement in pursuing the scheme.
Warrington	If the technical and financial assessment identifies a viable scheme then the information should be used to present the benefits and implications for the key stakeholders which will include the Bridge Street developer and design team, Council Members and Council Officers from planning, property services, finance and several other key departments. In addition to a workshop the technical details of the assessment should be shared with the Bridge Street design team to inform them of the technical and design requirements of incorporating a decentralised energy network on the scheme.
Crewe	If the technical and financial assessment identifies that one or more of the schemes is viable then the information should be used to present the benefits and implications for the key stakeholders. For the two sites initially identified this is likely to include various local authority Members and officers as well as representatives from schools and colleges, developers and other potential customers.
Chester	If a smart grid project can be identified with the DNO then the requirements and implications for the potential parties involved, including the developers, existing building users, generators and local energy companies, will need to be presented for consultation.

Step 4: Stakeholder Consultation and Engagement			
Ref	**Action**	**Discrete tasks**	**Responsibility**
4.1	**Identify the stakeholders**	• Identify the specific stakeholders within the Authority • Identify external stakeholders • Map out the likely point of involvement or engagement with each stakeholder	• Local Authority Working Group
4.2	**Marketing and communication**	• Contact key stakeholders to make them aware of the project and identify a contact for further communications • Prepare a simple document to provide to stakeholders highlighting the opportunities and next steps	• Local Authority Working Group
4.3	**Stakeholder event**	• Once the feasibility stage is complete organise a presentation to introduce the concept, disseminate the results of the feasibility study	• Local Authority Working Group
4.4	**Provide information for developers**	• Set out the expectations for delivering local energy networks and the implications for developers within an Supplementary Planning Document (SPD) or similar	• Local Authority Working Group • Planning Officers

7 Step 5: Strategic support

7.1 The need for strategic support

If a technical and financial assessment indicates that a local energy network may offer a high level of technical feasibility and commercial viability then further investment will be required to undertake more detailed assessment and move towards the later steps of the Roadmap.

The work completed to this stage will provide a greater level of evidence to support planning policies promoting connection to low carbon energy networks and for integration with other Council strategies.

7.2 Reviewing current policies and strategies

The details of the technical and financial assessment will indicate the viability of creating a local energy network and should be used to further clarify the benefits that it could bring to the local area and the links with Council policies and strategies, including:

- Specific details on the reductions in CO_2 emissions that can be used to show the contribution towards meeting targets set by the local authority
- Potential contributions towards CRC
- Possible energy cost reductions from local authority buildings connected to the network
- Potential long-term financial benefits for the local authority from investment and profit-share arrangement
- Possible improvements to the EPCs and DECs of local authority buildings connected to the network

7.3 Further support

Additional support may be required to both support the later stages of the project and to ensure that opportunities are not lost in the period leading up to implementation. Further support to address this can be provided in the following areas:

- Planning Support
  - Safeguarding of energy centre locations
  - Safeguarding of network routes
  - Strengthening of support for the inclusion of infrastructure that will support an energy network
  - Ensuring that any new development in key locations that is likely to be delivered before a network is implemented is designed with the ability to connect
- Asset management
  - Programming of boiler replacement and refurbishment schemes
  - Retention of infrastructure that may support a local energy network
- Highways
  - Reviewing scheduled highway improvements along highlighted network routes in line with project timings

Application for the case study sites

Warrington	Warrington Borough Council has set targets for the reduction of CO_2 emissions and the technical study should provide an indication of the extent to which the DHN could support the strategy for meeting these. There is also support in the Core Strategy (Objectives and Options) for renewable and low carbon energy generation. Further support, based on the evidence provided by the technical and financial feasibility study, could be provided in a SPD for the Bridge Street Site or in design requirements agreed with the developer.
Crewe	There is support within Community Strategy and the Core Strategy (Issues and Options) for the local production of energy with specific reference to district heating. Further support, based on the evidence provided by the technical and financial feasibility study, could be gained through more detailed planning policy, either relating to specific sites or providing more detail on the expectations for the delivery of decentralised energy generation.
Chester	The Community Strategy provides support for local production and consumption of energy and the Core Strategy (Issues and Options) specifically refers to decentralised energy. Further strategic support could include specific reference to the consideration of smart grid infrastructure within the Area Action Plan or Supplementary Planning Documents created for the Business Quarter and Northgate development sites.

Step 5: Strategic Support			
Ref	**Action**	**Discrete tasks**	**Responsibility**
5.1	**Identify existing policies and strategies that will support the case for a Local Energy Network**	• Review support in existing planning policy • Review support in other Council strategies • Review finances available for the next step of the project including both internal funding and funding that may be available from external sources • Determine council asset plans and refurbishment/plant replacement plans for Council-owned buildings	• Local Authority Working Group
5.2	**Assess what further support may be required in future policies and strategies**	• Identify proposed Development Plan Documents or Supplementary Planning Documents that could provide more support for local energy networks • Identify work programmes that could have links with the infrastructure work required	• Local Authority Working Group
5.3	**Obtain support to progress to the next step of the Roadmap**	• Obtain political and financial support to continue the project	• Local Authority Working Group

8 Steps 6 & 7: Detailed Investigations

8.1 Introduction

The Detailed Investigations section of the roadmap contains two steps:

Step 6: Detailed feasibility of projects

Step 7: Identify funding and business models

Both of these steps are likely to require significant input from specialist consultants but it will be both necessary and important for the Local Authority to have an input into the work

8.2 Detailed feasibility of projects

This stage is likely to require input from technical consultants:

- An engineering consultant may be required to undertake more detailed assessments to develop the projects identified in the feasibility study. Further work or more detailed investigations could be required on the location and size of an energy centre, network routes and plant requirements.
- A cost consultant may be required to add more detail to the financial analysis undertaken in the feasibility study. This will be required to both feed into and incorporate the results of the next step in the roadmap.

The costs of such studies will greatly depend upon the nature of the work that is required but could be expected to be in the region of £20-50k.

8.3 Identify a suitable business model

At this point the Authorities should start to consider the possible delivery and funding mechanisms that could be employed to implement the proposed schemes.

Different approaches could be used for different sites but there are likely to be some contractual, fiscal or other issues that the Council are either likely to require or would like to avoid. Whichever route is chosen, a delivery vehicle should be put in place as early on in the development process as possible, so that its technical and financial requirements can be fed through into negotiations with potential customers.

With regards to local energy networks, a special purpose (delivery) vehicle (SPV) would be required to undertake the following tasks:

1. Finance
2. Design
3. Install
4. Operate
5. Maintain
6. Meter and Bill

There are several significant decisions to be made when looking to create an SPV, two key strategic decisions of which are:

- The number of partners involved
- The level of public and private involvement

There are several ESCOs that can offer the full 'turnkey' package, although this may involve sub-contracting parts of the work to others, and often comes at a premium. It can be cheaper to split the elements up, for example procuring the design and installation of a DH network and plant separately and then employing a third party to operate and maintain. The risk with this approach is that there are unclear lines of responsibility, although this can be mitigated by getting the parties to work to a specification that is signed off by both.

With regards to the involvement of third parties, the greater the private input the lower the risk to the authority, but the less control the authority will have on the development of the infrastructure.

Potential advantages and disadvantages associated with the level of public and private interest in an SPV are shown in Table 1 below:

	Private sector Led SPV	Public sector Led SPV
Advantages	• Private sector capital • Transfer of risk • Commercial and technical expertise	• Lower interest rates through Prudential Borrowing • Transfer of risk on a DHN through construction contracts • More control over strategic direction • No profit needed – profit will be retained by the public sector organisation(s) • More drive for expansion • Low set-up costs
Disadvantages	• Loss of control • Most profit retained by private sector • Incremental expansion more difficult • High set-up costs	• Greater risk • Less access to private capital and expertise, though expertise can be obtained through outsourcing and specific recruitment

Table 1: Some advantages and disadvantages of public and privately led SPVs

The images on the following page describe different SPVs that are being used in a number of existing DHN schemes across the country.

Each of these models entails a different level of risk and commercial interest.

The separate components referred to in the models are explained below:

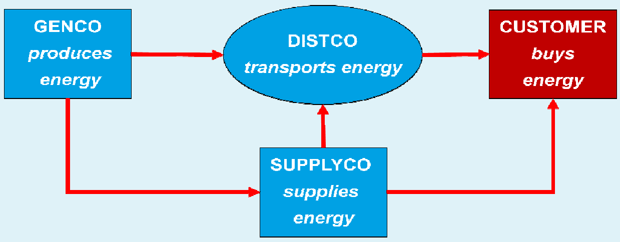
GENCO refers to the part of the organisation that owns and is responsible for the operation and maintenance of the generating plant and energy centre.

DISTCO refers to the part of the organisation that owns and is responsible for the distribution network.

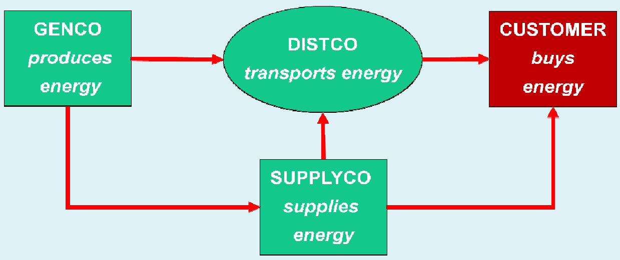
SUPPLYCO refers to the part of the organisation that is the energy supplier i.e. the interface with the customer.

The blue shaded shapes represent private ownership and green shaded shapes represent public (Local Authority) ownership.

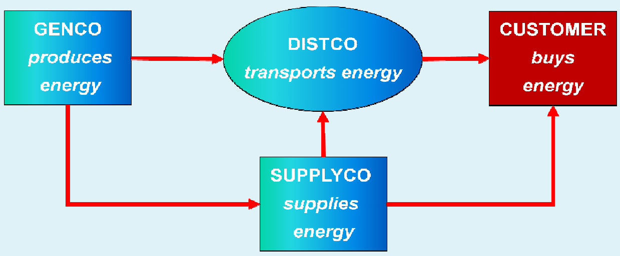
1. Private sector ownership e.g. Citigen, Sheffield



2. LA Ownership e.g. Pimlico



3. Joint Ownership e.g. Birmingham



4. LA owns network and supply business, private sector owns heat source, e.g. Nottingham

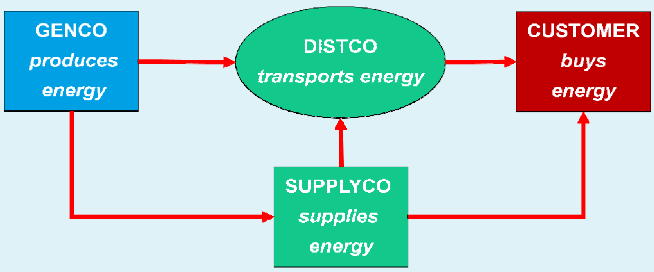


Figure 11: Four models for delivering a local energy network

8.4 Identification of funding sources

Even if a feasibility study suggests that a network could potentially be economically viable at public sector rates, it is likely to be a challenge to secure upfront capital funding, particularly given the current financial climate. Such schemes also carry a high level of uncertainty, particularly when they are based on future developments (and hence future energy sales and ROCs) which adds risk and limits the attractiveness to investors.

There will also be the cost of upfront technical studies that will need to be carried out, as well as the preparation of the guidance.

It is likely that the funding will come from a combination of the following:

- An ESCO partner
- Local or regional authorities
- Developer contributions
- Allowable solutions/Community Energy Fund
- National or EU funding (see below)

The ability of the public sector to raise finances is likely to be severely hampered for the foreseeable future by the current funding cuts. Alternative sources of capital may need to be explored including: bond financing; local asset-backed vehicles; accelerated development zones or tax increment financing. The following sources of funding may also be able to support the investigation, implementation and delivery of projects:

- Joint European Support for Sustainable Investment in City Areas (JESSICA)

- European Local Energy Assistance Fund (ELENA)
- CERT/CESP

It will be important to understand what implications, if any, this funding may have on the structure of the ESCo model.

Further detail on potential sources of funding is provided in Appendix C.

8.5 Application for the Case Study sites

The specific issues relating to the further detailed investigations at this stage will be dependent on the specific nature of the project.

In regards to the preferred approach to delivering a local energy network project this will also depend upon a number of specific factors related to the particular local authority including the approach to risk, availability of funding and the strategic objectives of the project. Early involvement of key decision makers will allow some of the possible barriers to delivery to be identified and addressed.

Steps 6 & 7: Detailed Investigations			
Ref	**Action**	**Discrete tasks**	**Responsibility**
6.1	**Further technical work**	• Determine whether more work is required to assess the technical viability and if so commission this	• Local Authority Working Group • Engineering Consultant
6.2	**Further cost analysis**	• Determine whether more work is required to assess the financial viability and if so commission this	• Local Authority Working Group • Cost Consultant
7.1	**Evaluate delivery models**	• Review possible delivery vehicle options and their applicability to the project	• Local Authority Working Group • Procurement & Legal Officers
7.2	**Identify funding**	• Assess possible funding sources and applicability to the project	• Local Authority Working Group • Procurement & Legal Officers
7.3	**Risk assessment**	• Review the risks associated with the project and which will need to be taken by the Local Authority and which can be placed on the ESCo	• Local Authority Working Group • Procurement & Legal Officers

9 Steps 8 & 9: Procurement & Implementation

9.1 Introduction

The Procurement and Implementation section of the roadmap contains two steps

Step 8: Prepare & Issue full tender specification

Step 9: Select partner and agree terms

A significant decision point will be reached at the end of the Detailed Investigations stage as to whether to proceed with the project.

If the approval is obtained and sufficient political will is behind the project to obtain the strategic and financial support then the following steps should be undertaken:

9.2 Design and technical specification

This stage is likely to cost in the region of £100,000 to undertake, although this will depend greatly on the scale of the project amongst other factors. This work could be expected to take up to 12 months to complete, after which a tender can be prepared for issue to the market.

Some local authorities have hired a separate technical consultant at this stage to support the project management and to provide more technical assessment of the work undertaken by the consultancy team.

9.3 The tender package

The detailed design and technical specification will form one part of the tender document. The other components are likely to include:

- Tender Instructions
- Project Agreement
- Risk Matrix

The Carbon Trust's Good Practice Guide 377 'Guidance on procuring energy to deliver community heat and power schemes'[16] sets out the steps of the procurement process and includes examples of the project agreement and output specification.

9.4 The tendering process

An indicative procurement timeline for the tendering process, taken from GPG377, is set out in the following table.

Step	Details	Duration
1	Preparation of invitation to negotiate	6-8 weeks
2	Pre-qualification	3-4 weeks
3	Tender period including site visits and review meetings	8-12 weeks
4	Evaluation and selection of preferred bidder	3-4 weeks
5	Negotiation with preferred bidder and financial close	24-36 weeks

This indicates that the total time from 'decision to proceed' with the project to 'financial closure' is likely to be in the order of 44-64 weeks.

[16] http://www.carbontrust.co.uk/Publications/pages/publicationdetail.aspx?id=GPG377

The construction period will be project specific and the likely timeframe for this will not be known until the tender responses are received.

9.5 Application for the Case Study sites

As with the previous section, the specific issues relating to the procurement of a project in each of the case study sites are difficult to predict at this early stage of the process.

Each of the authorities is likely to have specific procedures relating to procurement of large infrastructure projects and, as an interim step in the earlier stages, the contents of GPG377 could be used in discussion with the financial, legal and procurement officers to highlight some of the key considerations that are likely to be needed.

Steps 8 & 9: Procurement & Implementation			
Ref	**Action**	**Discrete tasks**	**Responsibility**
8.1	**Output specification**	• Commission sufficient work to ensure the contractors are provided with sufficiently detailed information on which to base tender returns	• Technical Consultant • Local Authority
8.2	**Preparatory work (if required)**	• Secure planning approval for an energy centre • Review utility connections for the energy centre with providers	• Technical Consultant • Local Authority
9.1	**Preparation of the Invitation to Negotiate**	• Tender instructions • Output specification • Project Agreement • Risk Matrix • Details of requested information	• Technical Consultant • Local Authority
9.2	**Pre-qualification stage**	• Place an OJEU notice including Prior Information Notice if appropriate • Carry-out prequalification and select list of tenderers	• Local Authority procurement team
9.3	**Tender Stage**	• Issue tender package to bidders • Review tender returns and assess responses • Issue clarification requests • Interviews with shortlisted bidders (if required) • Select preferred contractor	• Local Authority procurement team
9.4	**Select partner and agree contract**	• Negotiate contract with the preferred contractor	• Local Authority • Contractor

10 Conclusions & Recommendations for the Case Study Sites

10.1 Warrington

Opportunities

The initial assessment of potential heat demands from the Bridge Street redevelopment project and the heat demands from existing buildings in close proximity to this site indicate that a DHN could be a viable option.

Roadmap Progress

The initial opportunities identification work carried out as part of this study completes part of **Step 1** of the roadmap although some additional data could be sought to add further detail to this.

The workshop and conference that have been run as part of this study, at which some of the key stakeholders for the Bridge Street site were in attendance, have contributed to **Step 2** of the roadmap. This report and the accompanying executive summary document can be used to provide information to other key stakeholders and interested parties.

Recommendations

The following additional detail could help to support the opportunities assessment:

- Further details of the existing buildings located in close proximity to the location of the DHN opportunity
- Mapping additional opportunities and constraints

Further support may be required to build more capacity within the authority and gain the necessary political support to secure the funding required for the next step. This could be achieved in the following ways:

- Setting up a sub-regional working group to share resources during the initial stages
- Running a locally specific internal workshop for key internal stakeholders

Once this has been completed, and if there is the project can move to the next stage in the process (**Step 3**). The Council may wish to engage with the Carbon Trust to obtain some support to commission a technical and financial study

10.2 Crewe

Opportunities

The initial assessment of potential heat demands from existing and planned development within Crewe suggests that there are two sites that could potentially support a DHN. These are the town centre and a cluster of schools and colleges located between Nantwich Road and Stewart Road. Crewe is located on top of the Cheshire basin and the potential to exploit the geothermal energy available in this location should be investigated further.

Roadmap Progress

The initial opportunities identification work carried out as part of this study completes part of **Step 1** of the roadmap although some additional data could be sought to add further detail to this.

The workshop and conference that have been run as part of this study, at which some of the key stakeholders from Crewe were in attendance, have contributed to **Step 2** of the roadmap. This report and the accompanying executive summary document can be used to provide information to other key stakeholders and interested parties.

Recommendations

The following additional detail could help to support the opportunities assessment:

- Discussion with the schools and colleges identified
- Mapping additional opportunities and constraints

Further support may be required to build more capacity within the authority and gain the necessary political support to secure the funding required for the next step. This could be achieved in the following ways:

- Setting up a sub-regional working group to share resources during the initial stages
- Running a locally specific internal workshop for key internal stakeholders

Once this has been completed, and if there is the project can move to the next step in the Roadmap, **Step 3**. The Council may wish to engage with the Carbon Trust to obtain some support to commission a technical and financial study.

10.3 Chester

Opportunities

Defining the level of opportunity for setting up a smart grid is a difficult task because at present only trial schemes are being rolled out and these are highly site specific. However Chester does have a number of unique aspects, including the balance of new and historic buildings and the planned installation of a number of low carbon energy generating technologies. If the Council is able to use its influence to create a partnership with key stakeholders and collect together buildings and energy schemes that could be used to deliver a project that meets one of the Government's identified trials, then funding could be applied for.

Roadmap Progress

The initial opportunities identification work carried out as part of this study completes part of **Step 1** of the roadmap although some additional data could be sought to add further detail to this.

The workshop and conference that have been run as part of this study, at which some of the key stakeholders from Chester were in attendance, have contributed to **Step 2** of the roadmap. This report and the accompanying executive summary document can be used to provide information to other key stakeholders and interested parties.

Recommendations

To pursue a Smart Grid trial the local authority would need to engage with the local Distribution Network Operator (DNO) as well as the developers for the two principle new development sites, key building owners in the city centre and existing and planned energy generators to identify a possible project opportunity.

The potential viability of a district heating network in the city centre could also be explored further.

Appendices

Appendix A: Glossary

AAP – Area Action Plan

Aggregate method – The government's preferred approach for calculating acceptable CO2 emissions (non-dwellings) under future Part L Building Regulations. New non domestic buildings on aggregate would achieve the national target of overall 25 per cent lower emissions than under the 2006 Part L. However, the 2010 TER for certain new buildings may be more (or less) than 25 per cent lower than the 2006 TER for similar buildings.

Allowable Solutions – A proposed mechanism for reducing carbon emissions off site as part the Government's definition of Zero Carbon Policy

Anchor Load – The pre-existing load for a given area or to be met by any system under consideration.

BIS – Government Department of Business, Enterprise and Regulatory Reform

BREEAM – The Building Regulations Establishment Environmental Assessment Method. It measures the environmental performance of a building.

Carbon Compliance – The minimum reduction in carbon emissions to be delivered on site as part of the Government's Zero Carbon Policy.

Carbon Emissions Reduction Target (CERT) – Government scheme to promote the uptake of energy efficiency measures by requiring utility companies to promote and facilitate energy efficiency improvements.

The Carbon Reduction Commitment (CRC) – A mandatory carbon trading scheme, coming into force in 2010, designed to encourage organisations with large property portfolios to manage energy consumption and emissions.

CIBSE – Chartered Institution of Building Services Engineers

Code for Sustainable Homes – This is an environmental assessment method which attempts to rate the sustainability of residential dwellings by assessing them against nine key criteria including water, energy and CO_2 emissions.

Combined Heat and Power (CHP) – This system works by generating electricity near or on-site, capturing the heat for space and water heating.

Community Heating – An alternative description for district heating, usually referring to smaller residential systems within blocks of flats or housing estates.

CHP – Combined Heat & Power

CIBSE – Chartered Institute of Building Services Engineers

CIL – Community Infrastructure Levy

CO_2 – Carbon Dioxide

DEC – Display Energy Certificate

DECC – Department of Energy and Climate Change

Distribution Network Operator (DNO) – Companies licensed to distribute electricity within a defined geographical area.

District Energy Network (DEN) – A more general term for a local network providing heat, electricity and power, often used interchangeably with DHN (below)

District Heating Network (DHN) – This term is generally given to a system where a centralised heat generating plant (using any one of a range of technologies) provides heat to surrounding buildings in the area by means of a network of pipes carrying hot water or steam.

DPD – Development Plan Documents

EPBD – Energy Performance of Buildings Directive (EU)

Energy Supply Company (ESCo) – A commercial entity which typically operates and maintains the plant associated with a DHN. They would also normally bill any user of the DHN.

EPC – Energy Performance Certificate

EST – Energy Saving Trust

FEES – Fabric Energy Efficiency Standard proposed by Zero Carbon Hub as the minimum energy efficiency standard for Zero Carbon policy.

FITs – Feed in Tariffs. Government incentive paid for electricity generated from renewable sources

Geographic Information System (GIS) – Visual representations in map form so that relationships of physical location can be observed.

Green Deal – The Government's proposed programme to establish a framework to: enable private firms to offer consumers energy efficiency improvements to their homes, community spaces and businesses at no upfront cost; and recoup payments through a charge in instalments on the energy bill.

GFA – Gross floor area

Heat and Energy Saving Strategy – Government strategy to increase the scope and ambition of energy saving measures, as well as decarbonising the generation and supply of heat.

Heat Density Mapping – A visual representation of the heat demand in a given area, shown as thermal energy demand per Km.

Home Energy Conservation Act (HECA) – The 1995 Act mandates all Local Authorities to carry out voluntary cost effective and practical measures that will reduce home energy consumption by 30% over 10 to 15 years.

KWh – Kilowatt hours, unit of energy

LDF – Local Development Framework

LZCs – Low and Zero Carbon energy generation technologies, such as biomass, wind, solar etc.

MWh – Megawatt hour, unit of energy consisting of 1000 kilowatt hours

On-site – In this context, on-site means any measures taken by a developer within the boundary of the building required to comply with Part L of the Building Regulations

Part L 2006 – Building Regulations for Conservation of heat and power, Approved Documents, in place from April 2006.

Part L 2010 – Building Regulations for Conservation of heat and power, Approved Documents, in place from October 2010

PDZs – planning delivery zones

PV – Solar Photovoltaic panels that convert sunlight to electricity

Regulated Emissions – CO_2 emissions resulting from energy uses currently regulated by Part L1a or L2a of Building Regulations, these include CO_2 emissions resulting from space heating, space cooling, water heating, auxiliary energy for pumps and fans and some allowance for fixed lighting. They exclude energy use and emissions associated with domestic appliances, decorative lighting and equipment in non-domestic buildings.

Renewable energy – Energy derived from sources which are replenished within the lifecycle of their consumption and involve zero, or near zero, carbon emissions over this lifecycle

ROCs – Renewable Obligation Certificates

RHI – Renewable Heat Incentive. Government's proposed fiscal incentive for sale of heat from renewable sources

Special Purpose Vehicle (SPV) – A subsidiary corporation designed for high risk investments.

SPD – Supplementary Planning Document

Unregulated Emissions – CO_2 emissions resulting from energy uses not currently regulated by Part L1a or L2a of Building Regulations. These are principally the CO_2 emissions resulting from domestic appliances, non fixed lighting, office equipment and process energy uses that are influenced by the occupier and which change with changing occupancy.

Zero Carbon Hub – Not for profit public/private partnership established to take day-to-day operational responsibility for co-ordinating delivery of low and zero carbon new homes on behalf of Government.

Zero Carbon Policy – Government policy that all new homes built from 2016 and all new non-domestic buildings built after 2019 will have zero net CO_2 emissions. Work is still underway on this definition but the current indication is that this will cover only regulated emissions.

Appendix B: Local Energy Networks – Roles and Responsibilities

The key people or organisations involved in setting up and operating a Local Energy Network are listed below:

Champion

Almost every successful community energy scheme in the UK has had someone who could be identified as its Champion. Often this is a local councillor or local authority manager; sometimes it is a senior executive in a commercial organisation. For smaller, rural schemes, it is often a resident or community group. The Champion helps to create and own the vision for the project, and provides authority and support throughout its development. They usually help the project to maintain momentum particularly when any barriers arise.

Local authorities

Local authorities can play various roles in a DH project, including initiating a project (e.g. commissioning feasibility studies), collecting information about local heat sources and heat usage, using planning authority powers to enable network development, promoting the benefits of district heating to potential users, and acting as a significant heat customer. This variety of roles makes local government a particularly significant actor.

The structure of the national and local district heating systems in the UK place local authorities in a central position through their powers as planning authorities, their scope for knowledge development, incentives placed on them to reduce carbon emissions from both their own activities and their areas, and expectations of other actors, for example through national level planning statements.

It is notable that successful European district heating schemes have generally had strong public sector involvement, and while these schemes were developed under different conditions there are a number of reasons for public sector involvement.

Initial phases of district heating scheme development are characterised by high risks and long payback periods, making investment much less attractive than for established, expanding networks. The public sector can address these issues in various ways. In addition to their powers to secure heat connections through the planning process, local authorities can act as significant heat customers, and a commitment to connect council offices, schools, leisure centres, etc. to a network can act as a stabilising force during initial development phases

Gas and electricity licenses provide distribution companies with various powers such as street access. For district heating schemes, analogous powers relevant to the installation and maintenance of a network have to be specially granted by the local authority.

Planners

Getting the planning framework right for district heating is an important stimulus. In some parts of the country, local planning guidance requires developers to consider the opportunity for CHP and community heating in any new development of a certain scale. Perhaps the best known example of this type of requirement is included in the London Plan.

Energy Managers in the Public and Private Sectors

Energy managers play a vital role in developing the business case for community energy schemes as well as in bringing together delivery partnerships and financial packages. They are also the people likely to take responsibility for operations and maintenance of a system once installed. Coordination and communications skills are essential. University and health sector energy managers have a great track record in delivering schemes.

Public sector buildings often act as the anchor loads for community heating schemes and energy managers play an important role in identifying and modelling heat loads to help build the viability of a scheme. In the private sector, energy managers have to make the business case for CHP and ensure its ongoing operation and maintenance.

Customers

Important customers include large anchor loads (e.g. hospitals, schools, leisure centres, shopping centres, etc.) groups of buildings (e.g. housing associations) and possibly (connecting at later stages in development) individual households.

Many residents play an active part in consultation around how schemes will be developed, including issues such as siting and design of energy centres.

There can be disruption involved with establishing a scheme – from digging the roads to lay district heating pipework to installing new equipment in people's homes – so it is vital for scheme developers and energy services companies to engage with local residents early in the process, and maintain clear two-way communication throughout.

Financial institutions

Risks and potential income of a particular project will be assessed by institutions approached for financing. The greater the perceived risk, the more expensive loans will be.

Community groups

Community energy schemes are a great way for those living or working in an area to come together and take ownership of an asset that benefits all. Many groups may have an interest in district heating as a means of reducing carbon emissions in an urban setting where other community energy options, such as purchasing and erecting a local wind turbine are unavailable.

Groups may undertake some initial research, play a role in publicising the benefits of a system and may work with the energy company (e.g. through representation on the board).This approach helps to ensure that the benefits of energy generated and jobs created stay within a community and can provide an educational resource and visitor attraction for a locality.

Energy Company

The body which operates the DHN may be set up in a variety of ways, from being an in-house local authority operation to being a privately owned ESCo with a partnership agreement with the local authority.

ESCos are specialist energy companies which work with private and public sector customers to deliver sustainable energy schemes. In particular, they use innovative approaches which share the risks of projects and the financial costs; in many cases, the ESCo will provide all up front capital for a project and recoup costs from the customer's energy. ESCos can be private companies or joint ventures between business and the public sector.

Developers

Sustainable energy has come to the forefront of new property development in recent years, with the introduction of the Code for Sustainable Homes, tightening of Building Regulations and moves within the planning system to encourage greater early consideration of low-carbon energy technologies.

Various companies operating in the UK (e.g. Veolia, Dalkia, Utilicom, ENER-G and Vital Energi) may be contracted to construct or operate a DHN, or may be more closely involved in a District Heating Energy company (e.g. Utilicom owns the Southampton ESCo).

Architects

Architects are facing increasing demand from their clients to deliver sustainable buildings, supported by guidance and encouragement from the RIBA. Architects should work closely with their clients and engineers to design and implement energy systems which are appropriate to the patterns of demand in a building or development, and should recognise the opportunities for a district heating that may arise.

Councils should engage with architects in order to have them considering alternative energy approaches earlier on their developments. Council could even provide some support for architects and developers regarding this topic.

Engineers

The importance of high quality engineering cannot be underestimated. There is a growing pool of talented district heating engineers in the UK. Their work in bringing architects' designs to life and in delivering technically excellent schemes on time and to budget helps to make sure that residents' and businesses' expectations are fulfilled and that the reputation of district heating schemes in the UK continues to be enhanced.

Procurement or Operations Professionals

Establishing a district heating project can present a range of challenges, not least around procurement. It is important to identify an appropriate contract framework which recognises the sharing of risks and responsibilities between partners. Many projects are procured by the public sector and delivered by private sector partners over significant periods of time (e.g., 15 years or more), and contract frameworks need to support this duration of project whilst providing incentives for continuous improvement. Further information is provided on the delivery section later on this report.

Legal consultant

Given the complexity of district heating schemes, many will need the support of a legal consultant to draw up initial contracts and to develop contracts for new connections over time.

Electricity export actors

If a network incorporates CHP and relies on revenue from selling electricity, the roles of distribution network operators and aggregators or consolidators (to whom electricity is likely to be sold) will have an important effect on the financial viability of the scheme.

Consultants

Consultancy services may be called on at various stages in the project development to provide technical and financial assessment of network opportunities.

Appendix C: Financial Incentives and Sources of Funding

Renewable Obligations Certificates (ROC's)

The Renewables Obligation requires licensed electricity suppliers to source a specific and annually increasing percentage of the electricity they supply from renewable sources. The current level is 9.1% for 2008/09 rising to 15.4% by 2015/1617. The types of technology and the number of ROCs achieved per MWh are outlined in the table below. The value of a ROC fluctuates as it is traded on the open market.

Technology	ROCs/ MWh	Technology	ROCs / MWh
Hydro	1	Energy from Waste with CHP	1
Onshore wind	1	Gasification/Pyrolysis	2
Offshore wind	1.5	Anaerobic Digestion	2
Wave	2	Co-firing of Biomass	0.5
Tidal Stream	2	Co-firing of Energy crops	1
Tidal Barrage	2	Co-firing of Biomass with CHP	1
Tidal Lagoon	2	Co-firing of Energy crop with CHP	1.5
Solar PV	2	Dedicated Biomass	1.5
Geothermal	2	Dedicated energy crops	2
Geopressure	1	Dedicated Biomass with CHP	2
Landfill Gas	0.25	Dedicated Energy Crops with CHP	2 [18]
Sewage Gas	0.5		

[17] What is the Renewables Obligation? (department for Business, Innovation and Skills website http://www.berr.gov.uk/energy/sources/renewables/policy/renewables-obligation/what-is-renewables-obligation/page15633.html, accessed August 2009)

[18] Renewable Obligation Certificate (ROC) Banding (DECC websites http://chp.defra.gov.uk/cms/roc-banding/, accessed August 2009)

Feed-in-tariff (FIT)

Feed-in-Tariffs were introduced in April 2010 with the aim of providing additional incentive to the uptake of technologies generating electricity in order to overcome the barriers to investment. The electricity produced by these technologies will be bought by the utilities at above market prices. These prices will decrease over time to reflect the impact of increasing installation rates on end prices charged to consumers, the goal being to enable industries to "stand alone" at the end of the tariff period.

For the latest tariff details visit the Ofgem website: http://www.ofgem.gov.uk/sustainability/environment/fits/Pages/fits.aspx

In addition to the generation tariff, financial benefits are also gained from the use of generated electricity on-site or the export to the grid.

Renewable Heat Incentive (RHI)

The Renewable Heat Incentive is a parallel scheme to the FiT, which aims to provide a financial incentive for the delivery of heat from low or zero carbon sources.

The following table, taken from the RHI policy document released in March 2011, this sets out the tariff levels for non-domestic installations:

Levels of support					
Tariff name	**Eligible technology**	**Eligible sizes**	**Tariff rate (pence/ kWh)**	**Tariff duration (Years)**	**Support calculation**
Small biomass	Solid biomass; Municipal Solid Waste (incl. CHP)	Less than 200 kWth	Tier 1: **7.6** Tier 2: **1.9**	20	Metering Tier 1 applies annually up to the Tier Break, Tier 2 above the Tier Break. The Tier Break is: installed capacity x 1,314 peak load hours, i.e.: **kWth x 1,314**
Medium biomass		200 kWth and above; less than 1,000 kWth	Tier 1: **4.7** Tier 2: **1.9**		
Large biomass		1,000 kWth and above	**2.6**		Metering
Small ground source	Ground-source heat pumps; Water-source heat pumps; deep geothermal	Less than 100 kWth	**4.3**	20	Metering
Large ground source		100 kWth and above	**3**		
Solar thermal	Solar thermal	Less than 200 kWth	**8.5**	20	Metering
Biomethane	Biomethane injection and biogas combustion, except from landfill gas	Biomethane all scales, biogas combustion less than 200 kWth	**6.5**	20	Metering

The RHI for domestic installations is not planned to open until October 2012 but an RHI Premium Payment grant is available in the interim period.

Green Deal

The Green Deal is a finance mechanism aimed at improving the energy efficiency of the existing building stock in the UK and is due to be launched in October 2012.

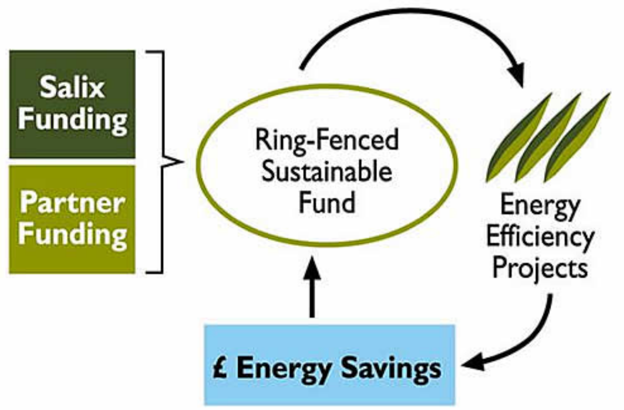
Homes and businesses will be able to obtain loans for improvement measures that are paid back through savings in the utility bills. The 'golden rule' of the scheme is that the financial savings must be equal to or greater than the costs attached to the energy bill over the lifetime of the loan agreement.

A governance structure will be put in place to ensure that the proposed measures are checked and approved and there will be a certification process for installers.

Salix Finance

This is a publicly funded company designed to accelerate public sector investment in energy efficiency technologies through invest to save schemes. Funded by the Carbon Trust, Salix Finance works across the public sector including Central and Local Government, NHS Trusts and higher and further education institutions. It will provide £51.5 million in interest free loans, to be repaid over four years, to help public sector organisations take advantage of energy efficiency technology.

Salix launched its Local Authority Energy Financing (LAEF) pilot scheme in 2004. The success of this programme has allowed the pilot to be rolled out into a fully fledged local authorities programme.



The Community Infrastructure Levy (CIL)

The CIL, unlike Section 106 contributions, can be sought 'to support the development of an area' rather than to support the specific development for which planning permission is being sought. Therefore, contributions collected through CIL from development in one part of the charging authority can be spent anywhere in that authority area. This makes CIL potentially an ideal mechanism for operating a carbon fund.

The Community Energy Saving Programme (CESP)

This is a £350million programme for delivering "whole house" refurbishments to existing dwellings through community based projects in defined geographical areas. This will be delivered through the major energy companies and aims to deliver substantial carbon reductions in dwellings by delivering a holistic set of measures including solid wall insulation, microgeneration, fuel switching and connection to a district heating scheme. Local authorities are likely to be key delivery partners for the energy companies in delivering these schemes. CESP has two grant initiatives; both are available to not-for-profit community based organisations in England.

Carbon Emission Reduction Target (CERT)

The Carbon Emissions Reduction Target is a legal obligation on the six largest energy suppliers to achieve carbon dioxide emissions reductions from domestic buildings in Great Britain. Local authorities and Registered Social Landlords (RSL) can utilise the funding that will be available from the energy suppliers to fund carbon reduction measures in their own housing stock and also to set up schemes to improve private sector housing in their area.

The main different types of measures that can receive funded under CERT are:

- Improvements in energy efficiency
- Increasing the amount of electricity generated or heat produced by microgeneration
- Promoting community heating schemes powered wholly or mainly by biomass (up to a size of 3MW thermal)
- Reducing the consumption of supplied energy, such as behavioural measures.

Energy Companies Obligation

From the end of 2012 the CERT & CESP schemes will be replaced by the Energy Companies Obligation (ECO). This will be linked to the Green Deal to provide additional support to vulnerable people and help to treat those buildings that are less able to be addressed through the Green Deal

Section 106 Agreements

Section 106 agreements are planning obligations in the form of funds collected by the local authority to offset the costs of the external effects of development, and to fund public goods which benefit all residents in the area

Prudential borrowing and bond financing

The Local Government Act 2003 empowered Local Authorities to use unsupported prudential borrowing for capital investment. It simplified the former Capital Finance Regulations and allows councils flexibility in deciding their own levels of borrowing based upon its own assessment of affordability. The framework requires each authority to decide on the levels of borrowing based upon three main principles as to whether borrowing at particular levels is prudent, sustainable and affordable. The key issue is that prudential borrowing will need to be repaid from a revenue stream created by the proceeds of the development scheme, if there is an equity stake, or indeed from other local authority funds (e.g. other asset sales).

Currently the majority of a council's borrowing, will typically access funds via the 'Public Works Loan Board'. The Board's interest rates are determined by HM Treasury in accordance with section 5 of the National Loans Act 1968. In practice, rates are set by Debt Management Office on HM Treasury's behalf in accordance with agreed procedures and methodologies. Councils can usually easily and quickly access borrowing at less than 5%.

The most likely issue for local authorities will be whether or not to utilise Prudential Borrowing, which can be arranged at highly competitive rates, but remains 'on-balance sheet' or more expensive bond financing which is off-balance sheet and does not have recourse to the local authority in the event of default.

Best Value

Local authorities have the right to apply conditions to sales of their own land, whereby a lower than market value sale price is agreed with the developer in return for a commitment to meet higher specified sustainability standards. Rules governing this are contained within the Treasury Green Book which governs disposal of assets and in within the Best Value - General Disposal Consent 2003 'for less than best consideration without consent'. It is our understanding that undervalues currently have a cap of £2 million without requiring consent from Secretary of State.

Local Asset-Backed Vehicles (LABV)

LABVs are special purpose vehicles owned 50/50 by the public and private sector partners with the specific purpose of carrying out comprehensive, area-based regeneration and/or renewal of operational assets. In essence, the public sector invests property assets into the vehicles which are matched in case by the private sector partner.

The partnership may then use these assets as collateral to raise debt financing to develop and regenerate the portfolio. Assets will revert back to the public sector if the partnership does not progress in accordance with pre-agreed timescales through the use of options.

Control is shared 50/ 50 and the partnership typically runs for a period of ten years. The purpose and long term vision of the vehicle is enshrined in the legal documents which protect the wide economic and social aims of the public sector along with pre-agreed business plans based on the public sector's requirements.

Many local authorities are now investigating this approach, with the London Borough of Croydon being the first LA to establish a LABV in November 2008.

LABVs are still feasible if adapted to suit the current macro economy. The first generation of LABVs were largely predicated on a transfer of assets from the public sector to a 50/50 owned partnership vehicle in which a private sector developer/investor partner invested the equivalent equity usually in cash. The benefits were in some instances compelling.

This transfer of assets suited the public sector given yields and prices had never been stronger. There is now a need for a second generation of LABVs that deliver many of the recognised benefits of LABVs as set out above but protect the public sector from selling 'the family silver' at the bottom of the market.

The answer may lie in LABV Mark 2 – a new model that is emerging based on the use of property options that will act as incentives. A better acronym would be LIBVs (Local Incentive Backed Vehicle) in which the public sector offers options on a package of development and investment sites in close 'place-making' proximity. The private sector partner is procured, a relationship built, initial low cost 'soft' regeneration is commenced such as; understanding the context, local consultation, masterplanning, site specific planning consents etc. Thereafter, as and when the market returns, the sites and delivery process will be ready to respond, options will be exercised, ownership transferred and a price paid that reflects the market at the time.

JESSICA

JESSICA is a policy initiative of the European Commission and European Investment Bank that aims to support Member States to exploit financial engineering mechanisms to bring forward investment in sustainable urban development in the context of cohesion policy.

Under proposed new procedures, Managing Authorities in the Member States will be allowed to use some of their Structural Fund allocations, principally those supported by ERDF, to make repayable investments in projects forming part of an 'integrated plan for sustainable urban development' to accelerate investment in urban areas. Funds will be invested in the form of equity, loans or guarantees, and returns arising from successful investments will be returned to the fund.

Intelligent Energy – Europe

The objective of the Intelligent Energy – Europe programme aims to contribute to secure, sustainable and competitively priced energy for Europe. It covers action in the following fields:

- Energy efficiency and rational use of resources (SAVE)
- New and renewable energy resources (ALTENER)
- Energy in transport (STEER) to promote energy efficiency and the use of new and renewable energies sources in transport

The amount granted will be up to 75% of the total eligible costs for projects and the project duration must not exceed 3 years.

European Local Energy Assistance (ELENA) technical assistance facility

To facilitate the mobilisation of funds for investments in sustainable energy at local level, the European Commission and the European Investment Bank have established the ELENA technical assistance facility financed through the Intelligent Energy-Europe programme. ELENA support covers a share of the cost for technical support that is necessary to prepare, implement and finance the investment programme, such as feasibility and market studies, structuring of programmes, business plans, energy audits, preparation for tendering procedures – in short, everything necessary to make cities' and regions' sustainable energy projects ready for EIB funding.

Many EU cities and regions have recently started to prepare or are initiating large energy efficiency and renewable energy proposals to tackle energy and climate change challenges. However, most of them are still at the conceptual stage and their implementation is proving difficult because many regions and cities, particularly medium to small ones, often do not have the technical capacity to develop large programmes in this area. ELENA helps public entities to solve such problems by offering specific support for the implementation of the investment programmes and projects such as retrofitting of public and private buildings, sustainable building and energy-efficient district heating and cooling networks.

Biomass Grants

If grown on non-set-aside land then energy crops are eligible for £29 per hectare under the Single Farm Payment rules (set-aside payments can continue to be claimed if eligible). The Rural Development Programme for England's Energy Crops Scheme also provides support for the establishment of SRC and Miscanthus. Payments are available at 50% of actual establishment costs, and are subject to an environmental appraisal to help safeguard against energy crops being grown on land with high biodiversity, landscape or archaeological value.

Local Authorities Carbon Management Programme

Through the Local Authority Carbon Management Programme, the Carbon Trust provides councils with technical and change management guidance and mentoring that helps to identify practical carbon and cost savings. The primary focus of the work is to reduce emissions under the control of the local authority such as buildings, vehicle fleets, street lighting and waste.

Participating organisations are guided through a structured process that builds a team, measures the cost and carbon baseline (carbon footprint), identifies projects and pulls together a compelling case for action to senior decision makers. Carbon Trust consultants are on hand throughout the ten months. Direct support is provided through a mixture of regional workshops, teleconferences, webinars and national events. The Programme could provide a useful mechanism for the Council to address its carbon emissions of which energy planning and delivery will be an important part.