



Programme Area: Smart Systems and Heat

Project: EnergyPath

Title: Best practice and Opportunities

Abstract:

Local area energy planning presentation.

Context:

Energy consultancy Baringa Partners were appointed to design and develop a software modelling tool to be used in the planning of cost-effective local energy systems. This software is called EnergyPath and will evolve to include a number of additional packages to inform planning, consumer insights and business metrics. Element Energy, Hitachi and University College London have worked with Baringa to develop the software with input from a range of local authorities, Western Power Distribution and Ramboll. EnergyPath will complement ETI's national strategic energy system tool ESME which links heat, power, transport and the infrastructure that connects them. EnergyPath is a registered trade mark of the Energy Technologies Institute LLP.

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*Achieve
Ambitions*

Local Area Energy Planning

Report D7: Best Practice and Opportunities

In association with
Squire Patton Boggs (UK) LLP

Final

May 2018



- 1. Introduction**
- 2. Corporate Policies and Area Visions**
- 3. Preparing an Evidence Base**
- 4. Development Planning**
- 5. Development Management**
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A stack of white papers is shown from a low angle, fanned out from the bottom left towards the top right. The papers are slightly offset, creating a sense of depth. The background is a solid, dark grey color. The text '1. Introduction' is written in a red, italicized serif font on the right side of the papers.

1. Introduction

1: Introduction



Background and Scope

Jones Lang LaSalle (JLL) has been commissioned by the Energy Systems Catapult (ESC) to assist with the delivery of the Energy Technologies Institutes' (ETI) Smart Systems and Heat (SSH) Phase 1 Programme, which is looking at development of local area energy planning to support implementation of future low carbon solutions and networks within different local areas.

This report forms a deliverable of the Bidders Pack project within Work Package 2 of the SSH Phase 1 Programme. This aims to support local areas in local area energy planning. The Brief is to “*deliver a Planning Guide for Local Authorities (and other key stakeholders including Network Operators to support Local Area Energy Planning (LAEP). It is to inform stakeholders how to position, plan and prepare for undertaking LAEP including the preparation and use of a Local Area Energy Strategy to undertake demonstration and deployment projects*”.

The Planning Guidance document is to comprise information from Local Authorities, network operators and other stakeholders to make the case for Local Area Energy Planning. It is aimed at addressing how to support and enable the wider scale adoption of LAEP in other Local areas of the UK.

There are three report deliverables involved with and these are titled as follows:-

- D6: Local Area Energy Planning - Policy Drivers, Enablers and Barriers;
- D7: Local Energy Planning – Best Practice and Opportunities; and
- D8: Local Area Energy Planning - Step by Step Guide to Local Areas.

This Report is D7, it identifies examples of current best practices and opportunities, across areas of the planning system and other relevant aspects, that could be applicable to a new approach to

local area energy planning.

The Importance of Local Area Energy Planning

Local Area Energy Planning is seen by the ETI and ESC as central to achieving national greenhouse gas emission reduction targets and unlock the infrastructure investment needed to decarbonise heat.

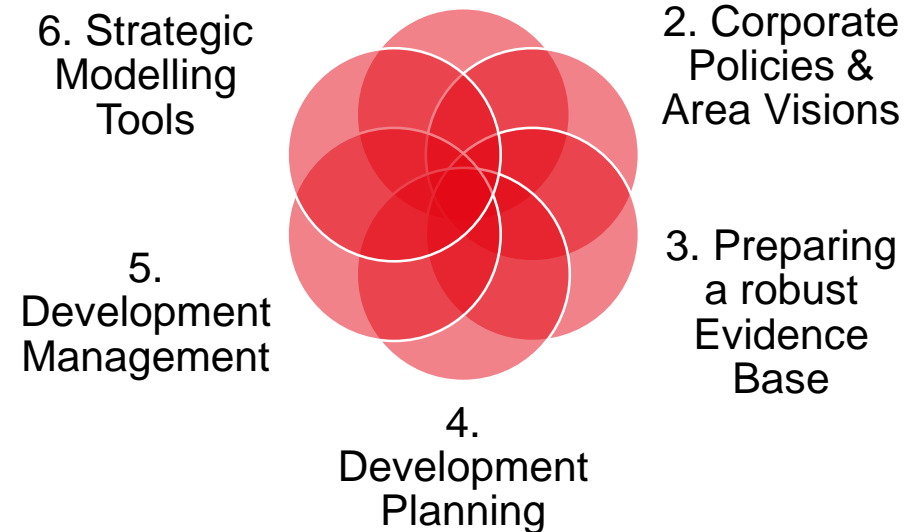
More effective local area planning supported by objective, technology agnostic evidence can support transition in a way that enables local communities to realise the benefits and understand the costs of decarbonisation. This document supports this objective by exploring existing best practice and opportunities by way of a number of case studies.

Chapter 1: Introduction

Structure of Report

- **Section 2** - Provides examples of Local Authority corporate approaches to energy, including spatial area 'visions' and target setting.
- **Section 3** – Examines energy studies and other information that currently contribute to an evidence base for a Local Authority, and particularly in relation to plan making.
- **Section 4** - Provides examples of current development planning in relation to energy and climate change – in particular development plan policy formulation.
- **Section 5** - Presents examples of development management activity.
- **Section 6** - provides examples of strategic modelling tools that support local area energy planning
- **Section 7** - Presents some examples of projects delivered with reference to area based low carbon objectives and planning policies.

The Inter-Relationship amongst Case Study Topics





2. Local Corporate Policies and Area Visions

2: Corporate Policies and Area Visions



Introduction

Long-term effective action on climate change and local area energy planning requires strong political leadership and a continuity of policy approach.

Long term planning and supporting strategies can contribute significantly to the implementation of decentralised energy opportunities and to delivering local area energy planning outcomes.

Furthermore, statutory duties, including in particular planning and development powers are important in enabling cross sector outcomes for clean and low carbon energy. Many Local Authorities have made pledges to radically reduce carbon emissions and achieve 100% clean energy in their administrative areas or key cities by 2050.

UKERC (2017) established that there are however, uncertainties about the future structure of Local Government services, powers and resources, making the Local Government role in energy systems is uncertain. In this context Local Authorities are increasingly treating energy provision and demand management as a driver of change in terms of local social, economic and environmental objectives. Some cities are making energy infrastructure and services central to capital investment and creating municipal energy companies and introducing new business models.

Such examples are generally constituted and delivered at the project, City wide or local authority wide level.

Local Authorities are one of the very few organisations committed to a local area for the long term and their local governmental status is a route to engaging many different stakeholders in the local energy system in decision-making about the necessary shift to clean energy.

There are good reasons for Local Government action on clean energy. Local Authorities democratic status, statutory duties, responsibilities in the sectors of housing, waste, environment and transport, economic development and regeneration combined with their planning and development powers, the scale and reach of their operations and assets, and their relationships with civil society and businesses, are all significant factors.

Delivering a lower carbon and more distributed energy system, with scope for local innovation and flexibility in energy supply and use, and making buildings integrated with a networked low carbon, low energy infrastructure, will have system-wide benefits. This would serve local and national policy goals for clean, affordable and secure energy. These benefits seem unlikely to be feasible without Local Government participation.

There is potential for a range of organisations to take a lead role in local

area energy planning, including Local Enterprise Partnerships (LEPs), combined authorities such as Greater Manchester, devolved administrations in Scotland and Wales and a range of local authorities.

In principle, Local Authorities can take on diverse roles in energy system transformation and this is evident from the range of actions currently being undertaken by authorities. These actions include:

- Establishing a cross-sector vision and strategy for their area;
- Identifying carbon reduction targets;
- Co-ordinating spatial and energy planning and investment with commercial network operators for parts of the Local Authority area;
- Investing in local energy provision and services, including building retrofit for energy saving, CHP, establishing policies to support energy from waste and heat recovery, heat networks, renewables, battery storage and electric vehicle infrastructure.

Setting the scene and the corporate policy framework for such action and implementation to enable these outcomes is essential. A number of examples are explored in the following case studies.

Case Study 1: Bristol's 'Our Resilient Future: A Framework for Climate and Energy Security'



Background

The Framework defines Bristol City Council's (BCC) strategy and action plan for improving the resilience of the City of Bristol in addressing the threat of climate change through the sustainable use and generation of energy.

Adopted for consultation in November 2015, the Framework sets out Bristol's existing climate and energy commitments, progress to date against these and what the Council considers must be done to meet them. Future actions which are to be led or enabled by BCC are defined as well as a broader range of initiatives which are in progress across the city.

The Framework is expected to be finalised for approval by the Mayor once Bristol's One City Plan has been adopted. In the meantime, the Framework will inform strategic documents including land use planning documents.

Key Projects & Stakeholder Involvement

Whilst the Framework has been informed by data, knowledge and inputs from a wide range of sources, two key projects have underpinned its development:

- The 'Systems Thinking for Efficient Energy Planning' (STEEP) project through its research into the use of group model-building workshops with stakeholders to reach a shared understanding of complex energy systems; and,
- 'The Economics of Low Carbon Cities: A Mini Stern Review for the City of Bristol' conducted by the University of Bristol, which provides a comprehensive economic assessment of the cost and carbon effectiveness of a wide range of the low carbon interventions that could be applied across the city in the domestic, commercial, industrial and transport sectors.

The Framework also draws on the experience of officers and senior managers from across BCC, as well as from the STEEP and University of Bristol project teams.

Targets & Goals

BCC proposes to adopt the following carbon, energy consumption and renewable energy targets from the 2005 baseline, in the context of targets already adopted for 2020 and 2050:

City of Bristol Proposed Reduction Targets

	2020	2025	2035	2050
Citywide CO₂ emissions	40%	50%	60%	80%
Citywide Energy consumption	30%	35%	45%	55%
Citywide Renewable Energy	To be developed through consultation			

(New targets shown in **Bold**)

Bristol City Council's Proposed Reduction Targets

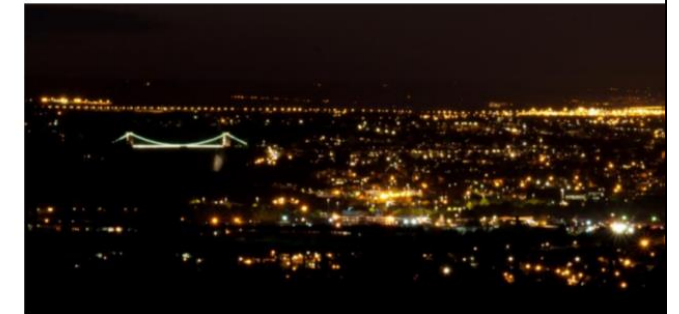
	2020	2025	2035	2050
BCC CO₂ emissions	50%		60%	
	(was 40%)			
BCC Energy use	40%		50%	
	(was 30%)			

(New targets shown in **Bold**)

1. To replace energy from fossil fuel (i.e. coal, oil and gas) with energy from renewable sources which produce lower carbon dioxide emissions – such as wind, tidal, hydro and solar energy.
2. To replace energy from fossil fuels with energy from low carbon sources, which are a by-product of resource use; e.g. anaerobic digestion, waste heat, biomass, and sewage sludge.
3. To make homes, transport and businesses much more energy efficient, reducing the overall demand for energy so that these sectors supply it from renewable and low carbon energy.

OUR RESILIENT FUTURE:

A FRAMEWORK FOR CLIMATE AND ENERGY SECURITY



Case Study 1: Bristol's 'Our Resilient Future: A Framework for Climate and Energy Security' continued



Action Plan

The Framework identifies a number of actions which BCC will **LEAD**, **ENABLE** others, and **EXPLORE** for the future. Under each of these categories, the Framework sets out actions in a tabular form, alongside the relevant evidence base obtained through stakeholder engagement, a review of existing initiatives and strategies, and the outputs from the STEEP project and Mini-Stern.

For each action, the Framework sets out its corresponding budget, why the action is required alongside a Key Performance Indicator (KPI) / target, who is responsible / involved, and what strategic theme the action falls within.

Key Actions

The following actions from the Plan are considered to be of most relevance:

Lead

- Heat Networks:
 - Phased installation of City-wide heat networks.
- Land Use Planning:
 - Through the Joint Spatial Plan and the forthcoming local plan, the Council will seek to reduce energy demand and greenhouse gas emissions. This will include consideration of: locating development in a way that reduces the need to travel and maximises the potential for Heat Networks, identifying the need for and locations of existing and future key energy infrastructure, and considering whether there is scope to apply other planning mechanisms such as CIL in a way that delivers energy efficiency and renewable programmes at scale. (*The West of England Joint Spatial Plan* was consulted upon in November 2017. It does not reference or use the Framework as part of the evidence base, however it includes policies which focus on sustainable development, mitigation and adaptation to climate change, and minimising energy demand and maximising the use of renewable energy. The forthcoming Local Plan is currently in the Call for Sites stage.)

Enable

- Delivery of a Low Carbon Temple Quarter Enterprise Zone (TQEZ):
 - BCC will seek opportunities to work with partner organisations to reduce energy demand directly and indirectly through the planning and urban design of TQEZ.

Monitoring and Reviewing

To ensure that BCC achieves its targets, the Framework contains monitoring and review provisions which include:

- Regular monitoring and review of the emissions inventory and Framework and the adoption of corrective measures if necessary.
- Performance against the framework is to be reviewed on an annual basis and the Framework will be refreshed every three years.
- As a signatory to the 'Covenant of Mayors' and the 'Compact of Mayors', BCC is required to set out and enact a process for monitoring, review and public reporting on emissions.
- A comprehensive review and drafting of a new action plan/Framework is required every 3 years.

Learning Outcomes

The key aspects of this case study, which could be transferrable to enabling more effective local area energy planning, can be summarised as follows :

- **Having a strong civic leadership and corporate approach is important;**
- **Monitoring and reviewing is essential to achieving outcomes;**
- **Emphasis on the Council as a leader and enabler in conjunction with other stakeholders helped to achieve the Framework's vision and targets;**
- **Recognises the role that land use planning can play in reducing energy demand and greenhouse gas emissions; and**
- **Commits the Local Authority to action, such as reducing its own emissions via a programme of corporate energy efficiency projects.**

Case Study 2: London Environment Strategy



Background

The Mayor of London issued the London Environment Strategy (LES) for consultation in August 2017. The LES provides an integrated framework for all people and organisations whose actions, activities and policies have an impact on London's environment.

The Mayors foreword sets out that the Strategy is the most ambitious plan to reduce air pollution anywhere in the world and that the Greater London Authority and Transport for London have been instructed to lead by example in delivery of the Strategy.

The Strategy is accompanied by a General Assessment of London's Environment which evaluates the current condition of London's environment at a city-wide level using high-level indicators. The main environmental issues identified in the General Assessment informed the development of the Strategy.

Vision and Aims

The Mayor's vision is to transform the city's environment. To do so, the Strategy lists the following six aims, all of which reference the role of the planning system.

Air Quality

By 2050, London will have the best air quality of any major world city by:

- Delivering 2,000 electric vehicle charging points; and,
- Using the planning system to help ensure new schools, and other buildings used by particularly vulnerable people, are not located in areas of poor air quality.

Green Infrastructure

By 2050, >50% of London's area will be green and tree canopy cover will increase by 10% by:

- Promoting green infrastructure through the planning system:
 - protect and better manage existing and incorporate new green infrastructure;
 - Use an Urban Greening Factor to make sure new developments are greener;
 - Protect the Green Belt from further development; and,
 - Protect biodiversity, offsetting any reductions caused by new developments with increases elsewhere.

Climate Change and Energy

For London to be a zero carbon city by 2050 by:

- Replacing old systems of heating, cooling and powering buildings with cleaner, local renewable energy;
- Developing a clean, smart and integrated energy system; and,
- Ensuring all new buildings are zero carbon.

Waste

To make London a zero waste city by:

- Ensuring there are sufficient sites to manage waste in London through the use of the Mayor's planning powers.

Adapting to climate change

For London to be resilient to severe weather and climate change impacts, such as flooding, heat risk and drought, this can be achieved through the planning system by making new development more water efficient and able to combat increased temperatures and flood risk.

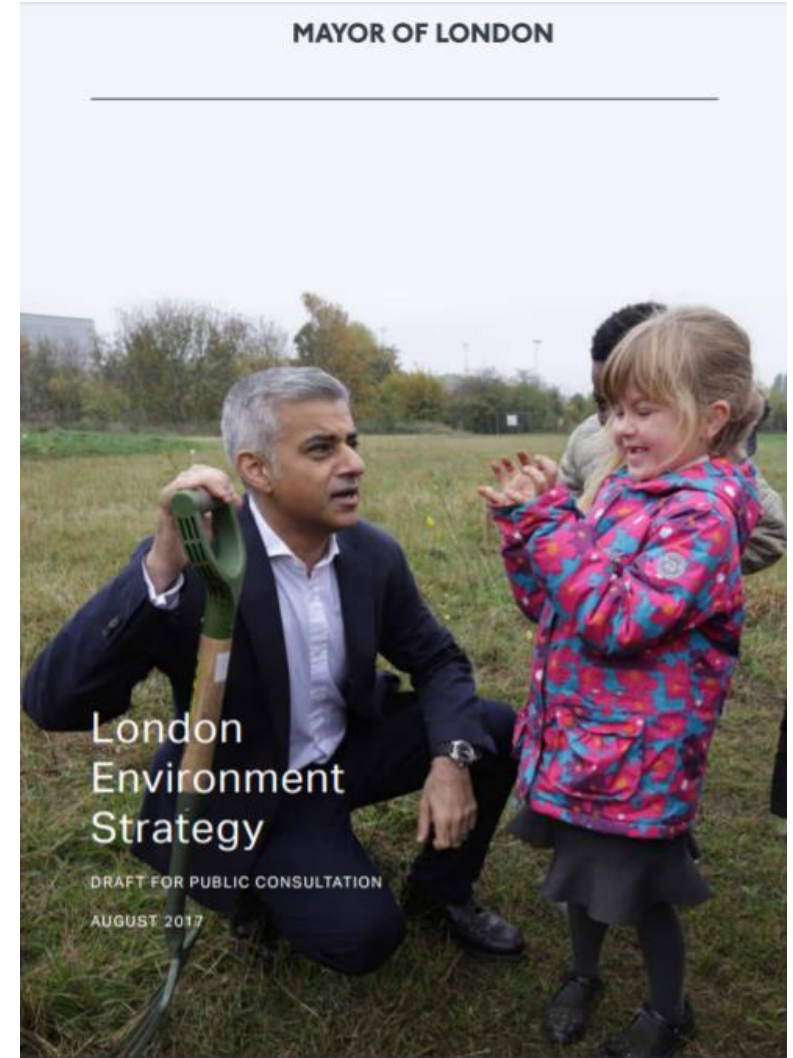
Noise

To improve quality of life by reducing the number of people adversely affected by noise and promoting more quiet and tranquil spaces by:

- Providing respite from noise through more green and tranquil spaces.

Whereas a lot of the aims set out above are medium term, the Strategy also identifies the following immediate aims and actions:

- Create a greener place by planting more trees, making green spaces more accessible, and ensuring more green roofs and green features are designed into developments;
- Make London cleaner by introducing less polluting buses, deterring polluting vehicles, rolling out more sustainable drainage systems, and improving the sewerage network; and,
- Ensure London is ready for the future by planning for new flood defences and a new water resource, rolling out smart meters and implementing higher recycling standards.



Case Study 2: London Environment Strategy – continued



Leadership

The Strategy has been developed to provide leadership on the environment. The Mayor's responsibilities and powers vary across the different environmental issues covered in the Strategy, and where direct powers to act are held by others, the Mayor will use leadership, influence and funding to ensure the right action is taken.

The Mayor has called upon the government to allow London planning policy to take precedence over national planning policy as “changes that resulted from the government's Housing Standards Review could potentially complicate London's ability to enforce existing emission standards on residential developments” (page 98).

The Strategy also places an onus on organisations which are directly controlled by the Mayor to lead by example. These organisations are known as the GLA group and their responsibilities include transport, policing and emergency response. The Strategy states that “the GLA group will tackle environmental challenges and spend its money responsibly”.

The Strategy is currently in draft form and was consulted upon between August and November 2017 and will be revised in light of comments received.

Stakeholder Involvement

The Strategy highlights the importance of the involvement of the national government, local councils, businesses, community groups, and Londoners themselves to realise the Mayor's vision.

Learning Outcomes

The key aspects of this case study, which could be transferrable to enabling more effective local area energy planning, can be summarised as follows :

- **Sets ambitious targets for transformation;**
- **Highlights the importance of civic leadership, as well as wide stakeholder involvement, to meet such targets;**
- **Places significant weight upon development planning and management to meet the Mayor's vision for the city;**
- **Calls for the Strategy to take precedence over national planning policy;**
- **Led by the GLA, which has development management planning powers that are unique on a UK wide basis for referable projects; and**
- **Expects Local Authority plans to also take account of the strategy.**



Case Study 3: Newcastle Energy Masterplan



Background

In 2010, Newcastle City Council agreed a Sustainable Energy Action Plan (SEAP) and a Citywide Climate Change Strategy and Action Plan. The SEAP is a scenario of possible carbon reduction projects and interventions, and formed a framework for carbon reduction projects in the city.

In the same year, NCC appointed the New and Renewable Energy Centre (Narec) as an energy masterplanner to assist the Council in a technical capacity to deliver the interventions set out in the Sustainable Energy Action Plan, and to develop an Energy Masterplan over the following two years.

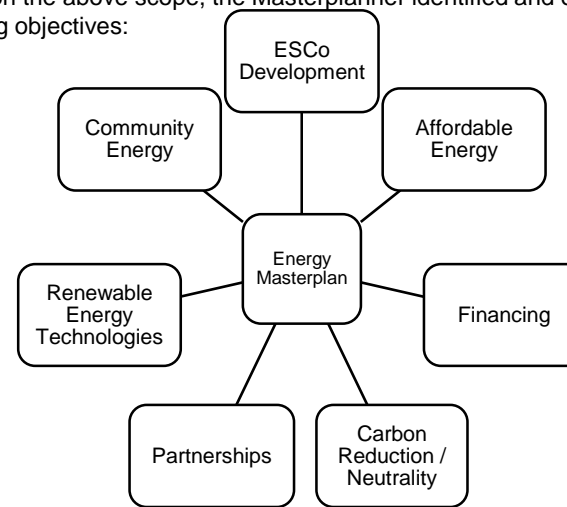
Accordingly, the Newcastle Energy Masterplan (approved May 2012) sets out the strategic direction and next steps that NCC should take over the next 20 years (from 2012) to help drive forward the delivery of renewable / low carbon energy schemes and affordable energy in the city. NCC's target for the city is to reduce its carbon emissions in excess of 34% by 2020 (based upon a 2005 baseline) and to be a 100% clean energy city by 2050.

Developing the Masterplan

NCC defined the following tasks for the Masterplanner:

- Develop an Energy Masterplan for the city to contribute to delivering the Council's aims, objectives and targets and assist the City's drive towards sustainability and carbon neutrality.
- To oversee and manage the transition of plans and strategy through to the delivery of sustainable affordable energy to local communities.
- Lead on the evaluation and implementation of sustainable community energy networks and the selection of Energy Service Companies (ESCOs) and other delivery vehicles.
- Advise on and support the design, procurement and implementation of sustainable energy systems in each of the regeneration programme areas and ensure the coordination of these within the Energy Master Plan.
- Develop appropriate policies and advice on sustainable energy for inclusion in the Local Plan.
- To attract and develop appropriate relationships with external partners both in respect of energy and the associated link with regeneration.

Based on the above scope, the Masterplanner identified and explored the following objectives:

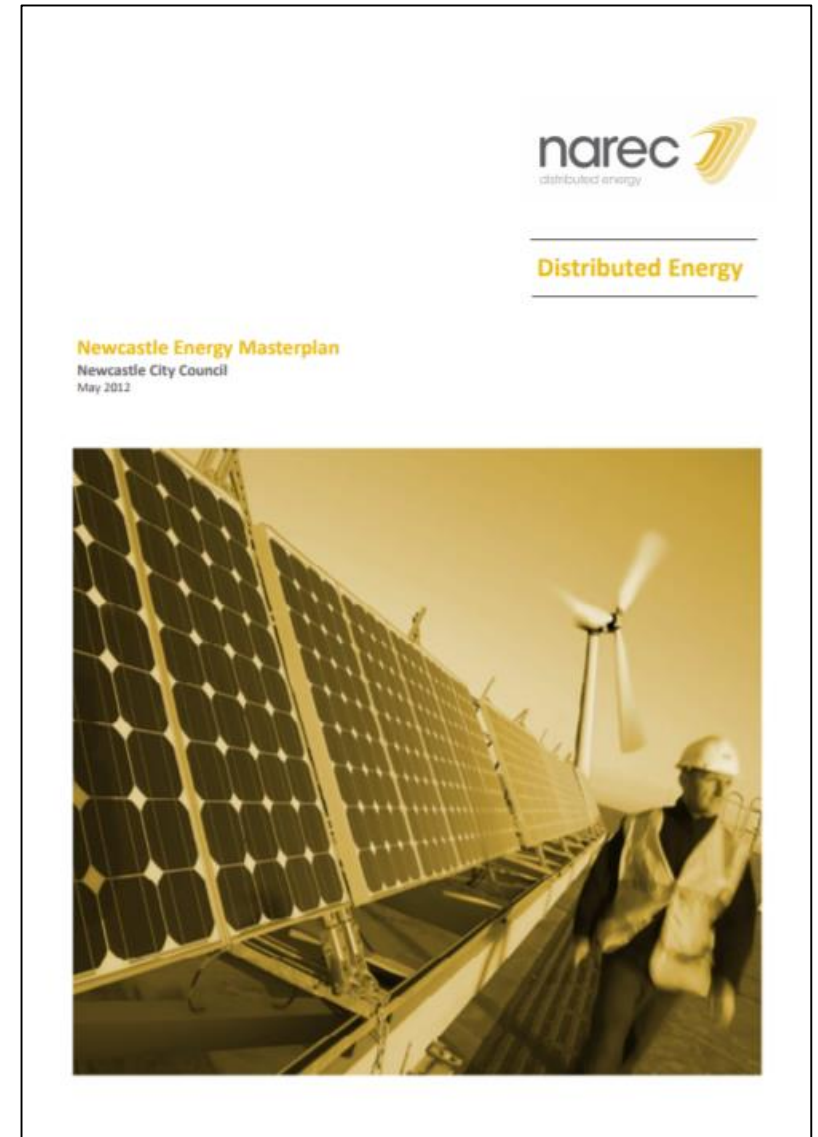


The Masterplan focused on the key aspects identified in achieving these objectives, namely:

- Reducing the demand for energy by improving the energy efficiency of buildings;
- Deployment of market ready renewable energy technologies;
- Low carbon energy production (District Heating / Cooling); and,
- The impacts of regeneration and development in the city.

Finally the Masterplan set the strategic direction and identified next steps the Council should take to deliver the objectives in these areas:

- Large scale district heating & cooling;
- Shared energy schemes;
- Installation of renewable energy generation;
- Improved insulation and energy efficiency of all housing stock and buildings; and,
- Energy related behavioral change and awareness across the city.



Case Study 3: Newcastle Energy Masterplan



Key Advice and Actions

The following advice and actions included within the Masterplan are of most relevance:

- The development of a low carbon district heating and cooling network is likely to have the largest impact in delivering low carbon energy to the city (planning policy is already being aligned to this vision (see Policy CS16 below));
- Regeneration and redevelopment are highlighted as “a major catalyst for the provision of low carbon energy solutions”, alongside embedded generation, as this will help to achieve energy targets and directly relates to the development of a low carbon district heating scheme.
- To ensure the provision of low carbon district heating can be driven by development, the Energy Masterplan links to the planning policies of the Local Plan and will focus on provision of low carbon energy strategies for each development site (e.g. Policy CS16);
- The Masterplan highlights the importance of investment and financial viability in realising the objectives; and
- Ensure a joined up approach across the Council and that all policies are aligned in support of the Energy Masterplan and vice versa.

Stakeholder Involvement

One of the key objectives the Masterplan sets out is ‘partnerships’. The Council already leads the ‘Newcastle Climate Change Partnership’ which engages with a range of stakeholders in the city from the public, private and academic sectors, however the Masterplan states that:

“the drive towards a low carbon city can only be achieved with significant financial investment. It therefore follows that the Council must engage with a number of partners and stakeholders to be able to take the lead in terms of carbon reduction and project implementation” (para. 4.6).

Such partners and stakeholders include investors, delivery partners, technology installers, the public sector, industry, and commerce.

Beyond the Masterplan

Further to the development of the masterplan s, NCC have been working with the ETI and Energy Systems Catapult as part of SSH Phase 1 Programme to pilot a more advanced whole system approach to local area energy planning using EnergyPath Networks (See Chapter 6) to investigate at a more granular level the decarbonization pathways for Newcastle’s buildings and networks to provide more detailed spatial understanding in support of the Energy Masterplan objectives.

Learning Outcomes

The key aspects of this case study, which could be transferrable to enabling more effective local area energy planning, can be summarised as follows :

- **Developing an Energy Masterplan involves a proactive approach and civic leadership;**
- **An Energy Masterplan can complement and link other policy documents;**
- **An Energy Masterplan can help focus attention on particular development and projects that can practically be delivered and financed; and**
- **The spatial aspects of local area energy planning is important, and effective implementation requires consideration of the interactions of buildings and networks over time.**

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3. Preparing an Evidence Base

3: Preparing an Evidence Base



Introduction

In its function as a Planning Authority, a Local Authority has to prepare a Local Plan, which must be supported by a robust evidence base. A Local Plan sets out local planning policies and identifies how land is used, determining what will be built where. Adopted Local Plans provide the framework for development across England. Evidence bases are a key component to all plan making and the National Planning Policy Framework (NPPF) supports the need for evidence bases to be objective and proportionate .

The NPPF makes clear that climate change is a core planning principle. Paragraph 17 states: that planning:

“should support the transition to a low carbon future in a changing climate, taking full account of flood risk and coastal change, and encourage the reuse of existing resources, including conversion of existing buildings, and encourage the use of renewable resources (for example, by the development of renewable energy)”.

To be in conformity with the NPPF, Local Plans should reflect this principle, ensuring that planning policy clearly and comprehensively deals with climate change mitigation and adaptation.

The NPPF reinforces the importance of the legal basis of the Local-Plan-led system and the need for a strong and proportionate evidence base, including the need to test the viability of policy.

In terms of climate change, the topic is a strategic priority of the NPPF. Action on climate change is therefore a key part of plan-making and should be embedded and integrated in policy preparation. Only by treating climate issues as central to policy formulation will a local authority have effectively discharged its duty under the 2004 Planning Act.

Evidence used by the Council to justify the objectives and policies in the Development Plan is therefore critical to ensuring that there are effective policies to mitigate the effects of climate change and to discharge the obligation on Local Authorities set out at paragraph 95 of the NPPF, namely: to support the move to a low carbon future, local planning authorities should:

- plan for new development in locations and ways which reduce greenhouse gas emissions;
- actively support energy efficiency improvements to existing buildings; and
- set local requirements for a building's sustainability.

Local Authorities currently make wide use of evidence and research in their decision and policymaking; but the extent of this use, and the approaches taken, vary amongst authorities. To a greater or lesser degree, evidence and research is used by almost all local authorities to inform decision and policymaking, although there is wide variation in the extent to which this is systematic use within or across organisations.

The level of capacity and skills, and the allocation of resources to prepare evidence and undertake research activities varies greatly between local areas. Councils also currently obtain evidence and research from other sources, including partnership arrangements / joint working, Government departments, and by way of consultancy commissions to engage specialist external advisors.

Depending on local ambition, an evidence base can also be used to support funding initiatives and potentially regional devolution deals.

A number of examples of evidence base reports to support policy formulation and decision-making are presented below.

Case Study 4: Glasgow's Energy and Carbon Masterplan (2015)



Background

The Energy and Carbon Masterplan (ECM) provides a strategic energy framework and updated Sustainable Energy Action Plan (SEAP) for Glasgow. It takes a holistic view of issues and opportunities and sets out how Glasgow can develop an energy system that promotes energy efficiency and low carbon energy generation, and integrates and co-ordinates development within a wider framework for sustainable energy. The ECM sits alongside the Development Plan and Supplementary Guidance.

Developing the Masterplan

The Masterplan was produced by Glasgow City Council (GCC) with support from the STEP UP European energy planning project. STEP UP is a European Union funded energy and sustainable city planning project that aims to assist cities in enhancing their SEAPs and integrate energy planning into their sustainable city planning. The diagram below shows how the Masterplan was developed:



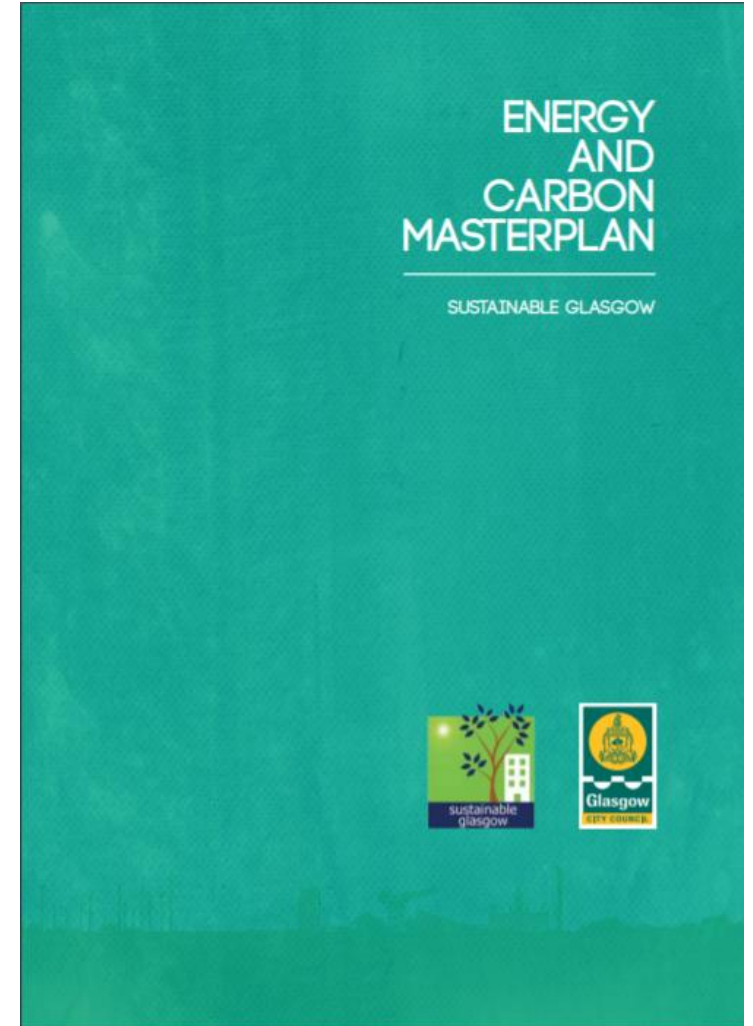
Vision and Objectives

As set out in the ECM, GCC's vision is to make Glasgow one of Europe's most sustainable cities by 2020 by meeting a target of reducing the city's carbon dioxide emissions by 30% by 2020 from 2006 levels.

The key objectives of the ECM are:

- To provide a strategic framework for the development of a transformed energy system for Glasgow that is based on low carbon and increasingly de-centralised energy sources as a contribution to making Glasgow one of the most sustainable cities in Europe.
- To provide a series of actions and projects that will enable Glasgow to meet its target of a 30% reduction in CO2 emissions by 2020 as a contribution to meeting the EU's 2020 climate and energy targets.
- To contribute to social and economic objectives such as the provision of affordable warmth and increased economic growth in Glasgow.

To build collaborative working arrangements that will enable all partners to contribute to the development of a sustainable energy economy in Glasgow.



Case Study 4: Glasgow's Energy and Carbon Masterplan (2015)



Policy Priorities

Section 4.3 of the ECM sets out several policy priorities and states that “*the creation of a supportive and integrated framework of policy measures from the national to the local level is vital in ensuring that the ECM can achieve its full potential for Glasgow*”. Such policy priorities include:

- Developing more extensive district heating networks in key areas of the city; and,
- Regeneration through integrating actions into mainstream regeneration programmes for areas of the city e.g. installing district heating as part of a comprehensive housing regeneration scheme.

In line with the above policy priorities, GCC's City Development Plan (CDP) (adopted March 2017) includes Policy CDP 5 'Resource Management' which states that “*the Council will support proposals to develop District Heating networks ...*”. The CDP includes a map which provides an initial indication of areas within the City considered to have greatest potential for District Heating networks, based on initial assessment of demand. Accordingly, the CDP has been informed by the findings set out in the ECM.

The City Development Plan also identifies that Supplementary Guidance will be prepared to integrate parts of the masterplan into the statutory Development Plan.

Stakeholder Involvement

GCC received support from the STEP UP project, the University of Strathclyde, Scottish Power Energy Networks, and the Sustainable Glasgow initiative in the production of the Masterplan. Sustainable Glasgow is a city-wide partnership which brings together partners from higher education and the public and private sectors to work with local people, communities and businesses.

GCC and Scottish Power Energy Networks are now working together to see how the existing electricity network can be made more efficient and where new development (including new renewable energy generation) might connect to the network in order to plan for new infrastructure.

The ECM highlights the importance of engaging with the community to deliver significant and meaningful behavioral change. GCC sees investment in a programme of change – such as the ECM – and the adoption of a group of policy actions that work together to deliver integrated benefits that reinforce and support behavioral change is likely to be more successful than one-off publicity campaigns.

The ECM sets out the following examples where certain projects can be designed to engage community support:

- creation of a fund (potentially as part of the Glasgow Green Fund) to facilitate local smaller scale community based renewable energy projects;
- training and jobs linked to projects;
- giving communities direct involvement in local projects – such as the creation of urban woodlands; and,
- improving the local environment as an integral part of implementing projects.

The community was also involved during the initial stages of developing the ECM. A stakeholder survey was conducted to gather views on tackling climate change and information on energy consumption.

Learning Outcomes

The key aspects of this case study, which could be transferrable to enabling more effective local area energy planning, can be summarised as follows:

- **Having a comprehensive and inclusive energy and carbon strategy, which sets out a number of immediate actions, is important;**
- **Rather than being solely Council-led, the ECM has been produced in partnership with several public and private bodies and the community. Highlighting the need for collaboration with key stakeholders;**
- **Recognises the role that planning, development and policy can play in transforming Glasgow's energy system; and**
- **Identifies very specific projects, such as more extensive district heating networks that have been integrated into the Development Plan and will be further supported through other guidance and activity. Highlighting that plans should result in identifying action.**

Case Study 5: Stockport Council



Background

One of the key objectives set out by Stockport Council within their Adopted Core Strategy DPD in 2011 is to have regard to enabling social progression and ensuring the prudent use of natural resources and maintaining high and stable levels of economic growth and employment, which are environmentally sustainable.

The Council recognise that a large proportion of the Borough's CO₂ emissions are as a result of fossil fuel usage, therefore the Council's objective is identify and enable opportunities for low and /or zero carbon developments. It is a key objective of the Core Strategy to make the best use of renewable energy sources and to reduce the Borough's carbon footprint.

The Core Strategy therefore includes a number of planning policies to reduce the impact of development in Stockport on Climate Change.

Existing Planning Policy Position

The adopted Stockport Core Strategy seeks to achieve the following:-

- Recognition of the impact of existing dwellings on Borough's CO₂ emissions performance.
- Encourage the delivery of an Energy Opportunities Plan which sets targets for domestic and non domestic building in defined "Network Development Areas" and defined "Microgeneration areas".
- Requirement for new development in "Network Development Areas" to install or connect in the future to a heat network.
- A commitment to community owned energy generation including wind and hydro energy and encourages new development in "microgeneration areas".

As part of the Core Strategy preparation the Council commissioned a Climate Change & Energy Evidence Study, this study led to the production of an Energy Opportunities Plan (See below) based on Stockport's physical characteristics that spatially maps the low carbon and renewable opportunities and provides the starting point for identifying appropriate delivery mechanisms.

The Opportunities Plan is designed to be used as a resource in policy and planning to guide key opportunities for consideration. This spatial plan will allow Stockport Council to identify delivery opportunities as new development opportunities come forward.

The Energy Opportunities Plan includes the following:

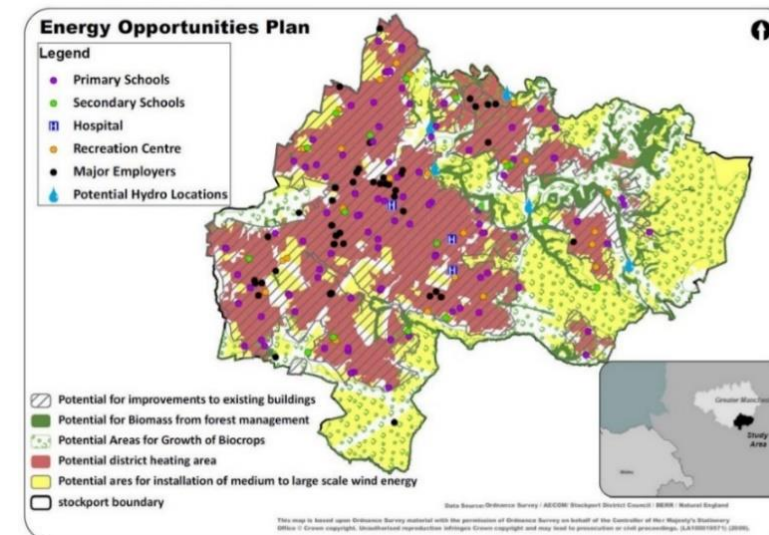
- Spatial distribution of opportunities and constraints relating to renewable resources including wind and biomass.
- Areas where the introduction of a district heating network is likely to be viable due to the existing intensity of heat demand.
- Urban areas where micro-generation technologies should be a focus for integration.

- The location of 'anchor loads' or large, consistent energy users which could form an anchor for district heating or CHP schemes.
- Location of possible hydro power schemes.
- Micro Generation opportunities are not mapped as potential exists across the borough subject to localised constraints, such as wind speed, shading and orientation, conservation areas etc.

Policy SD3 relates to the delivery of the Energy Opportunities Plans. It identifies a "Network Development Area" as locations where the proximity of new and existing buildings can support district heating and/or cooling networks and a Microgeneration Area as locations where building scale solutions are possible. New development should demonstrate how it will contribute to delivery of the opportunities identified. Developers should demonstrate compliance by submitting a carbon reduction statement setting out how the target designation was arrived at including any feasibility studies (e.g. to assess the feasibility of a heat network).The statement should set out how the developer will meet the appropriate target for the development.

Policy SD4 requires all developments, within the defined Network Development Areas, where possible make use of available heat, biomass and waste heat. Small developments of less than 100 dwellings or non-residential developments less than 10,000m² should connect to any available district heating networks or install heating and cooling equipment that is capable of connection at a later date. For large and mixed-use developments (over 100 dwellings or non-residential developments over 10,000m²) should install a district heating network to serve the site. New development should be designed to maximise the opportunities to accommodate a district heating solution.

www.stockport.gov.uk/ldfevidence



Case Study 5: Stockport Council



Objectives of the Policies

The policy approach seeks to accelerate a move towards zero carbon ahead of Building Regulations. All new buildings, both residential and non-residential, are expected to achieve a percentage reduction over the 2006 targets.

The long-term objective is to deliver a strategic district heating network across the Borough. The Core Strategy recognises that the opportunities for installing such a network across existing communities is, for the most part, beyond the scope of planning

The policy recognises that there are different character areas and development types will have different opportunities for achieving CO₂ reductions. e.g. developments in microgeneration areas will have different opportunities for delivering CO₂ reductions than those in a heat network development area. Developers are also required to demonstrate compliance with policy by submitting a carbon reduction statement setting out how the target designation was arrived at including any feasibility studies.

Delivery of the Policy

- The Council have a dedicated Officer in Planning Policy Team with a remit to promote sustainable design and constraints;
- The Council have an established record of energy policy implementation;
- The delivery of the Energy Opportunities Plan requires the Council to take an active role in management and delivery;
- The delivery requires a coordinated approach between the planning and other Council departments, other local authorities, the local community, and the Greater Manchester Combined Authority (GMCA).

Learning Outcomes

The key aspects of this case study, which could be transferrable to enabling more effective local area energy planning, can be summarised as follows :

- **In house expertise has been important to establishing policy and objectives;**
- **The use of spatial data and mapping is important to inform policy and decision making;**
- **Requires commitment from within the Council to establish policy and then support implementation; and**
- **Effective implementation of the Energy Opportunities Plan has proved difficult due to:**
 - **Lack of Council resources specifically dealing with energy and climate change**
 - **Climate change no longer seen as a political priority**
 - **Lack of skills, knowledge and willingness of developers**
 - **Developers using outdated “off the shelf” designs**
 - **Lack of national policy and guidance to support implementing policies and actions.**

For Local Area Energy Planning to succeed, it will be important to consider how similar barriers can be overcome



A stack of white papers is shown from a low angle, fanned out from the bottom left towards the top right. The papers have a slightly textured appearance and are set against a solid dark grey background. The lighting is soft, highlighting the edges of the pages.

4. Development Planning

4: Development Planning



Introduction

Within the Development Planning function of the planning system Local Planning Authorities must prepare a Local Plan which sets planning policies for the Local authority Area. The Development Plan is a key foundation of the planning system. Local Plans form part of the Development Plan and are the key documents through which Planning Authorities can set out a vision and framework for the future development of the area, engaging with their communities in doing so.

Local Plans address needs and opportunities in relation to housing, the local economy, community facilities and infrastructure. They should safeguard the environment, enable adaptation to climate change and help secure high quality accessible design. The Local Plan provides a degree of certainty for communities, businesses and investors, and a framework for guiding decisions on individual planning applications.

The NPPF at paragraph 97 states: “to help increase the use and supply of renewable and low carbon energy, local planning authorities should recognise the responsibility on all communities to contribute to energy generation from renewable or low carbon sources. They

should:

- have a positive strategy to promote energy from renewable and low carbon sources;
- design their policies to maximise renewable and low carbon energy development while ensuring that adverse impacts are addressed satisfactorily, including cumulative landscape and visual impacts;
- consider identifying suitable areas for renewable and low carbon energy sources, and supporting infrastructure, where this would help secure the development of such sources;
- support community-led initiatives for renewable and low carbon energy, including developments outside such areas being taken forward through neighbourhood planning; and
- identify opportunities where development can draw its energy supply from decentralised, renewable or low carbon energy supply systems and for co-locating potential heat customers and suppliers.”

The Planning Practice Guide (PPG) also addresses Planning for renewable and low carbon energy and specifically poses the question - How can decentralised

energy opportunities be identified? It states:

“There is an important contribution to be made by planning that is independent of the contribution from other regimes such as building regulations. For example, getting the right land uses in the right place can underpin the success of a district heating scheme. Similarly, planning can influence opportunities for recovering and using waste heat from industrial installations.

Planning can provide opportunities for, and encourage energy development which will produce waste heat, to be located close to existing or potential users of the heat. Planning can also help provide the new customers for the heat by encouraging development which could make use of the heat.

Information on local heat demand is published by the Department of Energy and Climate Change to assist planners and developers in identifying locations with opportunities for heat supply. See the ‘national heat map’ and the ‘UK combined heat and power (CHP) development map’. This information will be supplemented in future by further work, including detailed mapping, on the potential for combined heat and power and district heating and cooling”.

4: Development Planning

Local Plans are the cornerstone of the Development Plan and **are examined by an independent Inspector** whose role is to assess whether the plan has been prepared **in line with the relevant legal requirements** (including the Duty to Cooperate) and **whether it is “sound”**. The NPPF sets out four elements of soundness that Local Plans are considered against when they are examined. Local Plans must be:

- **positively prepared;**
- **justified;**
- **effective; and**
- **consistent with national policy.**

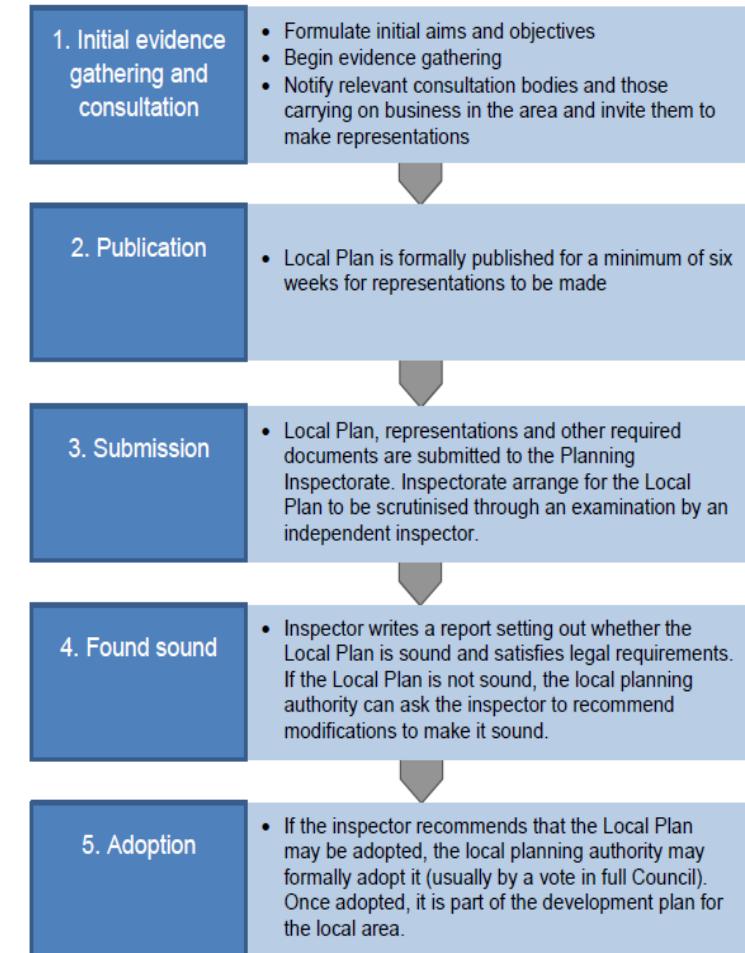
A Local Plan must be supported by a **robust evidence base** (as covered in the previous section of this report). This is essential to ensure that policies are justified, effective and have the desired outcomes.

The main legislation that sets out the process for the preparation of Local Plans is in Part 2 of the Planning and Compulsory Purchase Act 2004 as amended and The Town and Country Planning (Local Planning) (England) Regulations 2012 as amended. Further guidance is available in Planning Guidance.

Independent planning Inspectors must look at all Local Plan documents that Local Authorities in England prepare. This examination is the last stage of the process for producing a Local Plan. The process should have fully involved all parties who has an interest in the document and they should have had the chance to comment.

As noted above, it is essential that Local plans are positively prepared, justified, effective and consistent with national policy in accordance with section 20 of the Planning and Compulsory Purchase Act 2004 (as amended) and the NPPF. Once adopted, Local Plans provide the framework for development across England. There are broadly similar provisions covering Wales and Scotland.

Stages in Local Plan Preparation



Case Study 6: The London Plan Draft for Public Consultation December 2017



Purpose and Background of the London Plan

The London Plan is the strategic development plan document for Greater London. All planning decisions for new development should follow London Plan policies and it sets a policy framework for the preparation of all local plans across Greater London. A new draft was published in December 2017 and is currently out to consultation.

The Mayor's London Plan has set out the energy policies for new developments that seek to transform the city into a low carbon, resource efficient city and set the targets for a pathway towards zero carbon development by 2050.

The London Plan incorporates ambitious energy use/generation policies since adoption of the original plan in 2008. This has allowed monitoring and collection of data to form a robust evidence base for preparation of future policy.

The Evidence Base

The draft London Plan has been informed by data, knowledge and inputs from a wide range of sources, three key studies have underpinned its development and evidence base :

- Buro Happold's 'Driving Energy Efficiency savings through the London Plan - Data Analysis' report evaluated the benefits and costs of alternative energy efficiency targets through high-level analysis based on a large dataset of existing projects submitted to the GLA as well as Buro Happold's own project portfolio.
- AECOM's 'GLA Energy Efficiency Target Development Case Studies' published November 2017 undertakes a more detailed evaluation of the implication of the proposed energy efficiency improvements targets on specific examples of residential and non-domestic developments submitted to the GLA.
- AECOM's 'The Future Role of the London Plan in the Delivery of Area-Wide District Heating' published June 2017 the roll of London Plan in in promoting heat networks as a source of low cost, low carbon and renewable heat.

The evidence base documents provides the justification that supports the adoption of key energy efficiency policies of the draft London Plan. The resultant planning policies will require to be tested for 'soundness' at Examination in Public by an independent Inspector. The tests of soundness include:

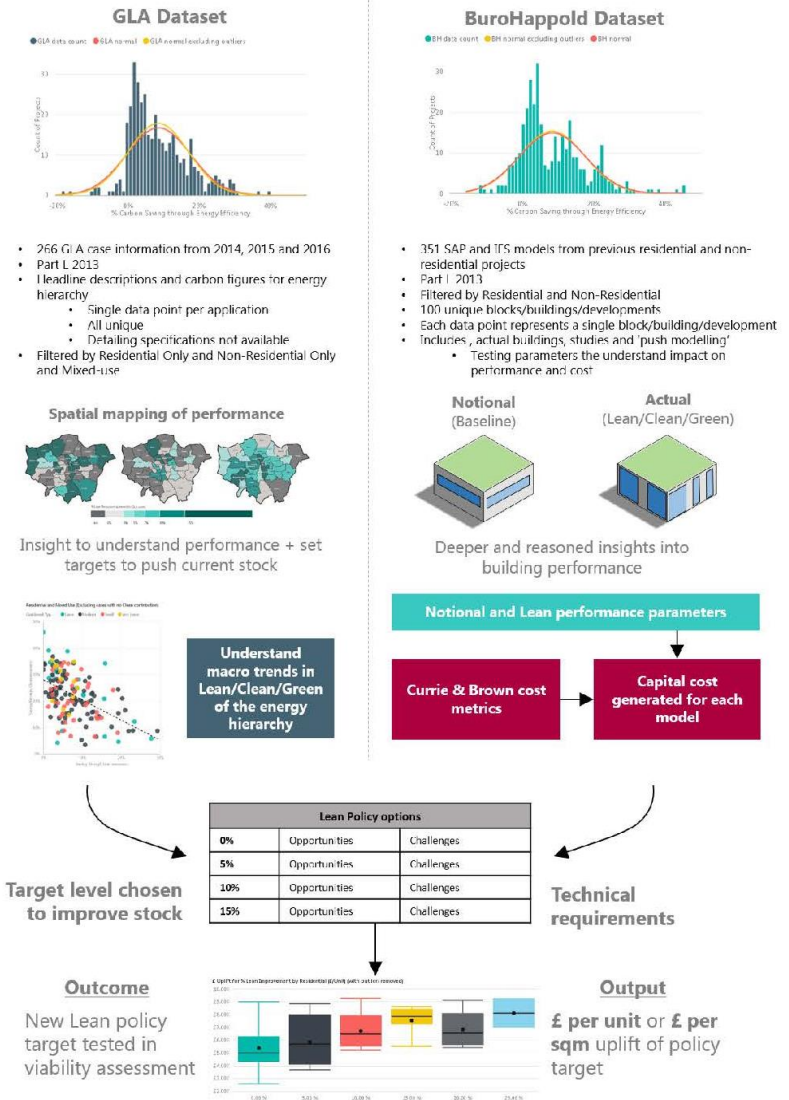
- "Positively Prepared - the plan should be prepared based on a strategy which seeks to meet objectively assessed development and infrastructure requirements and be consistent with achieving sustainable development;
- Justified - the plan policies should be the most appropriate strategy, when considered against the reasonable alternatives, based on proportionate evidence;
- Effective - the plan should be deliverable over its period and based on effective joint working on cross-boundary strategic priorities; and
- Consistent with national policy - the plan should enable the delivery of sustainable development in accordance with the policies in the Framework".

The evidence base documents play a key role in demonstrating the soundness of the plan's policies.

Robust Data

The GLA have developed a robust dataset from major planning applications and energy statements submitted to the GLA for planning permission from 2014, 2015 and 2016 tested under 2013 Building Regulations Part L.

A BuroHappold dataset has been used to understand the technical implications of meeting varying performance levels. It consists of energy models developed for BuroHappold projects within London. 100 unique blocks/buildings have been tested and 351 models generated from these with varying specifications. Incremental fabric and systems improvements for energy efficiency have been made to many of the projects to provide a range of models.



Case Study 6: The London Plan Draft for Public Consultation December 2017



Additional Currie & Brown data has been used to generate estimates of the cost uplift to achieve different levels of performance on a £/m² basis for Non-Residential and on a £ per unit basis for Residential. Both Notional and Actual buildings have been costed and the 'Cost Uplift' quoted is the difference between the two for each model/development.

Technical and cost implications of potential policy scenarios have then been evaluated, with cost ranges provided to the GLA's viability consultant. Third party peer review on this study has been provided by AECOM.

These documents are considered to provide a robust basis to support the key policies proposed in the draft London Plan.

Key Policies

The following policies are considered to be of most relevance:

- A zero-carbon target for major residential developments has been in place for London since October 2016. This target will be extended to include major non-residential developments on final publication of this Plan (expected 2019).
- To meet the zero-carbon target, an on-site reduction of at least 35 per cent beyond the baseline of part L of the current Building Regulations is required. The minimum improvement over the Target Emission Rate (TER) will increase over a period of time in order to achieve the zero-carbon London ambition and reflect the costs of more efficient construction methods. This will be reflected in future updates to the London Plan.
- Developments are expected to achieve carbon reductions beyond part L from energy efficiency measures alone to reduce energy demand as far as possible. Residential development should aim to achieve 10 per cent and non-residential development should aim to achieve 15 per cent over part L. Achieving energy credits as part of a Building Research Establishment Environmental Assessment Method (BREEAM) rating can help demonstrate that energy efficiency targets have been met. Boroughs are encouraged to include BREEAM targets in their Local Plans where appropriate.
- The price for offsetting carbon₁₂₀ is regularly reviewed. Changes to the GLA's suggested carbon offset price will be updated, in future guidance.
- New development is expected to get as close as possible to zero-carbon on-site, rather than relying on offset fund payments to make up any shortfall in emissions. However, offset funds do have the potential to unlock carbon savings from the existing building stock through energy efficiency programmes and by installing renewable technologies – typically more expensive to deliver in London due to the building age, type and tenure.

Monitoring and Review

To ensure that London Plan achieves its targets, the move towards zero-carbon development requires comprehensive monitoring of energy demand and carbon emissions to ensure that planning commitments are being delivered. Major developments are required to monitor and report on energy performance, such as by displaying a Display Energy Certificate (DEC) and reporting to the Mayor for at least five years via an online portal to enable the GLA to identify good practice through reporting on the operational performance of new development in London.

The GLA published specific Guidance on Preparing Energy Assessments in March 2016. This requires developers to demonstrate that climate change mitigation measures comply with London Plan energy policies, including the energy hierarchy. It also ensures energy remains an integral part of the development's design and evolution.

Status

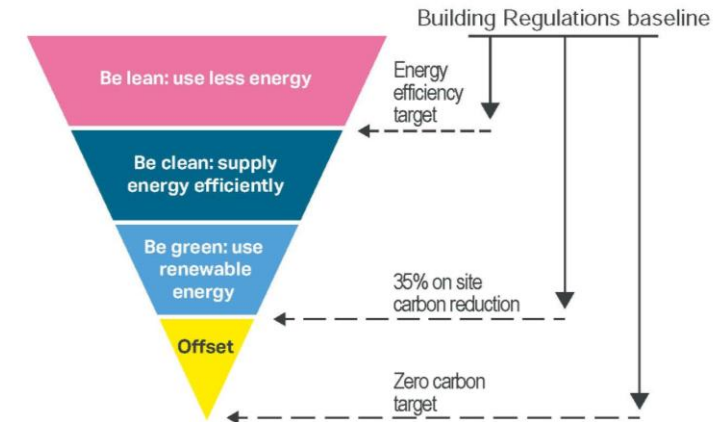
The draft Plan has been approved for public consultation until the 2nd March 2018. Comments will be reviewed by the independent Planning Inspector appointed by the Secretary of State to carry out the Examination in Public for the London Plan expected to be in Autumn 2018, with adoption of the plan in early 2019.

Learning Outcomes

The key aspects of this case study, which could be transferrable to enabling more effective local area energy planning, can be summarised as follows:

- **Significant value in having a robust evidence base and data – in this instance collected from planning applications and developments since 2014;**
- **Providing guidance is helpful to allow others to follow the process;**
- **Annual reporting of progress on monitoring and implementation; and**
- **Evidence enables analysis of the technical and cost implications of different policy scenarios.**

Figure 9.2 - The energy hierarchy and associated targets



Source: Greater London Authority

The background of the slide features several overlapping sheets of white paper with deckled, torn edges, set against a solid grey background. The papers are arranged in a way that suggests a stack or a collection of documents, with some sheets partially covering others.

5. Development Management

5: Development Management



Introduction

Development Management is the process of regulating new development, including new homes, buildings and infrastructure, by granting or refusing applications for planning permission, and of controlling unauthorised development.

Development management is the element of the UK's system of town and country planning through which Local Government regulates land use and new building. It relies on a "plan-led system" whereby development plans are formed and the public is consulted. Subsequent development requires planning permission, which is granted or refused with reference to the development plan as a material consideration.

As explained, the planning system is plan-led and any planning application must be determined in accordance with the development plan (Local and neighbourhood plans and, where relevant, the London Plan) unless other material considerations indicate otherwise.

Many issues are capable of being material considerations, but in broad terms should relate to the use and development of land. As a general principle, the planning system works in the public interest and matters that affect solely private interests are not usually material considerations in planning decisions. However, each application is considered on its merits.

The evidence base documents that informed a Local Plan and its objectives can be material considerations.

The NPPF stresses the importance of the development management process in the delivery of sustainable development. The NPPF sets out at paragraph 96 that "*in determining planning applications, local planning authorities should expect new development to:*

comply with adopted Local Plan policies on local requirements for decentralised energy supply unless it can be demonstrated by the applicant, having regard to the type of development involved and its design, that this is not feasible or viable;

and take account of landform, layout, building orientation, massing and landscaping to minimise energy consumption."

A number of aspects of development management activity that have some relevance to local area energy planning are explored in the following case studies.



Case Study 8: Atria 1 and 2



Background

Atria 1 and 2 comprise circa 202,000 sq.ft of grade A office accommodation located in Edinburgh's Exchange District. The office accommodation was constructed on a surface level car park and completed the vision of the Exchange District Masterplan, being the last remaining development site within the masterplan area.

The office accommodation was completed in 2013 and was progressed as an investment opportunity by the City of Edinburgh Council. The accommodation is fully let and is now owned by institutional investors.

Specification

The office specification is sustainable Grade A office accommodation that benefits from the following sustainability attributes:

- BREEAM 'Excellent Rating';
- EPC Rating of B+;
- Use of Low Carbon Energy Technology;
- Use of low water use systems;
- Energy efficient lifts;
- Green Sedum roof system; and
- All glazing 'low E glass'.

Sustainability Planning Policy Requirements

At the time of securing planning permission for Atria (2010), the Edinburgh Local Plan formed part of the statutory development plan. Policy DES 6 'Sustainable Buildings' required large commercial buildings to comply with the Edinburgh Standards for Sustainable Buildings (ESSB), which required all developments of over 1000 sq. m to comply with the sustainability standards, or, as an alternative to the sustainability standards, to obtain a BREEAM recognition. This is in addition to requiring compliance with Priority Standards 1 and 2 from ESSB.

The following table illustrates the requirements of the ESSB:

Priority Standard 1 requirement	Priority Standard 2 Requirement	BREEAM Requirement
TER of -5%	20% on site renewables if site considered as AMC (otherwise 10%)	'Very Good' or above

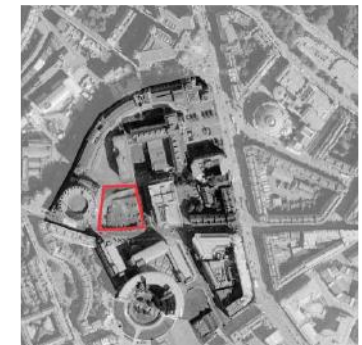
The office accommodation required to be compliant with ESSB and in order to meet Priority Standard 1, it required to be demonstrated that the building could meet a Target Emissions Rating (TER) of -5%. The office accommodation delivered an 11% TER. To meet Priority Standard 2, 20% onsite renewables generation was required. The renewables based technology selected as being the most sustainable option for the project was a heat pump technology using simultaneous heating, cooling and heat recovery. This achieved around 13% onsite renewables.

BREEAM 'Excellent' accreditation was achieved through the commitment to use sustainable construction products and techniques, low energy use services and energy use monitoring arrangements.

Development Delivery

The development received planning permission in 2010 and was considered as compliant with the objectives of the ESSB by the Planning Authority.

The construction tender was placed in 2010 and construction commenced in 2011. At this time the construction market was depressed due to low volumes of construction activity following the 2008 financial crisis. The build cost for the project was circa £140 per sq.ft and in 2013 was the only office development completion in excess of 100,000 sq.ft out with the London area.



Case Study 8: Atria 1 and 2



Within two years of completion the building was 90% let and was then sold by the City of Edinburgh Council as an investment opportunity owing to the investment profile of the development.

The ESSB was prescriptive in terms of its policy requirement for TER, BREEAM and 20% onsite renewable energy generation.

For a city centre office building, at the time, it was not possible to achieve 20% onsite renewable energy generation. This was due to the development constraints associated with the developable site area and the relationship of the site to the Edinburgh World Heritage Site, which prevented significant use of visible renewable technologies such as wind generators or photovoltaics. The site is also immediately adjacent to the underground rail network within Edinburgh city centre which constrained the use of ground sourced systems.

It was agreed with the planning authority that achieving 13% on site renewable generation coupled with the TER policy exceedance, met the objectives of the ESSB. It was also the case that the ESSB did not, itself, have development plan status and accordingly could not have received the same weight as the development plan in the overall planning balance. Had the ESSB been integrated within the development plan then the policy requirement for 20% onsite renewables may have been afforded greater weight in the planning decision.

The current sustainability standards for new buildings ('Edinburgh Design Guidance' 2017) is not prescriptive regarding a requirement for 20% onsite renewable energy generation but instead prescribes a requirement for low carbon development measures to be integrated within design. Policy compliance is now established on a points system basis much like the BREEAM model.

Learning Outcomes

The key aspects of this case study, which could be transferrable to enabling more effective local area energy planning, can be summarised as follows:

- **A flexible but well defined policy can enable developers to determine the most appropriate solutions to meet energy and carbon reduction objectives; and**
- **Clear policy objectives are paramount to ensure delivery and that the overall objectives of the policy are met.**



Case Study 9: The London Plan Retrofit



Purpose and Background of the London Plan

The London Plan is the strategic development plan document for Greater London. All planning decisions for new development should follow London Plan policies and it sets a policy framework for the preparation of all local plans across Greater London.

In accordance with s38(6) of the Planning and Compulsory Purchase Act 2004 these policies form part of the statutory development plan. Planning decisions must be made in accordance with the plan unless material considerations indicate otherwise.

The London Plan has incorporated ambitious energy policies since adoption of the original plan in 2008. Policy 5.4 'Retrofitting' sets out:

Strategic

A The environmental impact of existing urban areas should be reduced through policies and programmes that bring existing buildings up to the Mayor's standards on sustainable design and construction. In particular, programmes should reduce carbon dioxide emissions, improve the efficiency of resource use (such as water) and minimise the generation of pollution and waste from existing building stock.

LDF preparation

B Within LDFs boroughs should develop policies and proposals regarding the sustainable retrofitting of existing buildings. In particular they should identify opportunities for reducing carbon dioxide emissions from the existing building stock by identifying potential synergies between new developments and existing buildings through the retrofitting of energy efficiency measures, decentralised energy and renewable energy opportunities (see Policies 5.5 and 5.7).

Practice

Policy 5.2 of the London Plan requires each major development proposal to submit a detailed energy assessment. The purpose of the energy assessment is to demonstrate that climate change mitigation measures have been integrated into the scheme's design and evolution, and that they are appropriate to the context of the development. GLA have adopted guidance on preparing energy assessments to ensure uniform information is submitted.

The London Plan policy has been transposed into some local authorities Local Plans such as the Barnet Development Management Policies. This reiterates the London Plan policy at paragraph 5.4 Retrofitting. Barnet's housing stock has a relatively high level of carbon emissions compared to the London average. Nearly two thirds of Barnet's housing stock was built before 1944 (compared to a national figure of 40%). Thus there is considerable potential to reduce emissions if this older housing stock can have energy efficiency measures fitted and renewable energy technologies installed and/or be linked to decentralised energy schemes as part of new or refurbished developments.

Lambeth Local Plan adopted in September 2015 has a Policy EN3 'Decentralised Energy' and Policy EN4 Sustainable design and construction. These policies establish that retrofitting existing homes and buildings better to cope with impacts of climate change is an important part of climate change adaptation and the council will expect proportionate measures to be taken to improve the environmental sustainability of existing buildings.

Camden have adopted specific supplementary planning documents including:

- 'Retrofitting Planning Guidance' in June 2011; and
- 'Energy Efficiency Planning Guidance for Conservation Areas' in September 2014.

The guidance sets out a range of case studies and different sustainable technologies.

Learning Outcomes

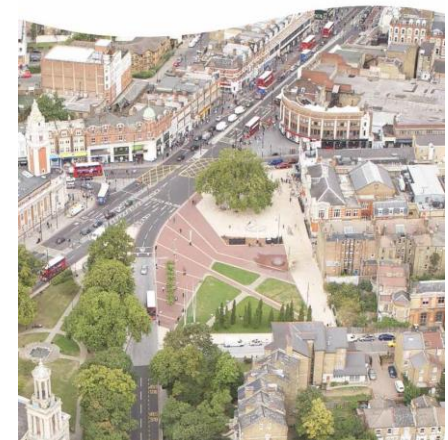
The key aspects of this case study, which could be transferrable to enabling more effective local area energy planning, can be summarised as follows:

- **Having local policies on retrofit have led to an 8% reduction in CO₂ emissions compared with Building Regulations alone;**
- **This has also necessitated Local Plans to incorporate specific energy guidance to support translating into development delivery on the ground; and**
- **This highlights the potential benefits from a forward thinking strategy to support targeted retrofit.**

Energy efficiency planning guidance for conservation areas



Lambeth Local Plan
Adopted September 2015



Case Study 10: Leeds District Heating Network Local Development Order



Background

Leeds City Council adopted the Leeds Climate Change Strategy in 2009 in line with national policy and guidance. The 2009 Strategy sought to reduce 1990s carbon emissions by 80% by 2050.

In acknowledgement of Leeds' need for growth while reducing carbon emissions, the City Council have sought to take a proactive approach to growth while ensuring low carbon initiatives are followed wherever possible. More recent local planning policies have included specific carbon reduction targets, sustainable design and District Heating Networks.

The Development Plan for Leeds includes:

- Leeds Core Strategy – Adopted on 12th November 2014
- Natural Resources and Waste Local Plan – Adopted January 2013
- Leeds District Heating Network Local Development Order March 2016

Development Plan Policy Drivers

The following policies, taken from the Core Strategy and the Natural Resources and Waste Local Plan provide the policy drivers which led to the Leeds District Heating Network Local Development Order

Core Strategy Policy EN1: Climate Change – Carbon Dioxide Reduction
All developments of 10 dwellings or more, or over 1,000 square metres of floorspace, (including conversion) where feasible, will be required to:

- Reduce total predicted carbon dioxide emissions to achieve 20% less than the Building Regulations Target Emission Rate until 2016 when all development should be zero carbon, and
- Provide a minimum of 10% of the predicted energy needs of the development from low carbon energy.

Core Strategy Policy EN4: District Heating

Where technically viable, appropriate for the development, and in areas with sufficient existing or potential heat density, developments of 1,000 sqm or more or 10 dwellings or more (including conversions where

feasible) should propose heating systems according to the following hierarchy:

- Connection to existing District heating networks,
- Construction of a site wide District heating network served by a new low carbon heat source,
- Collaboration with neighbouring development sites or existing heat loads/sources to develop a viable shared District heating network,
- In areas where District heating is currently not viable, but there is potential for future District heating networks, all development proposals will need to demonstrate how sites have been designed to allow for connection to a future District heating network.

Carbon savings and renewable energy generation achieved under this policy will contribute to EN1(i) and EN1(ii).

Natural Resources and Waste Local Plan Policy Energy 3: Heat and Power Energy Recovery

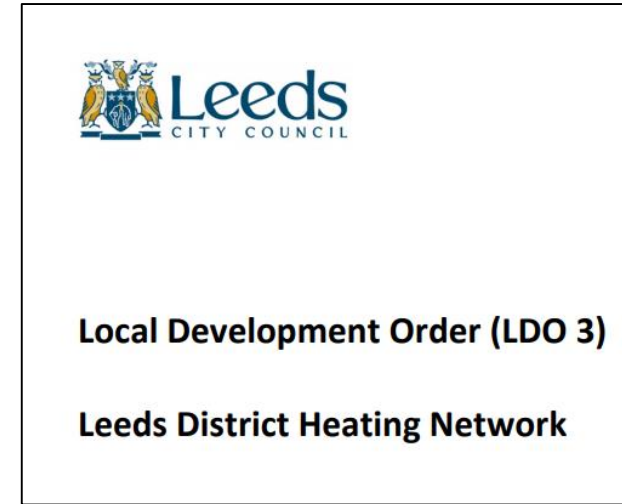
Proposals for low carbon energy recovery methods, including Combined Heat and Power applications, and supporting infrastructure will be supported in principle. The proposals must demonstrate that:

- The facility has the potential to connect to an outlet for any energy produced;
 - The development has addressed as a minimum the potential environmental impacts listed in WASTE 9; and
- New proposals for Energy Recovery from Waste should demonstrate the potential to contribute towards CHP.

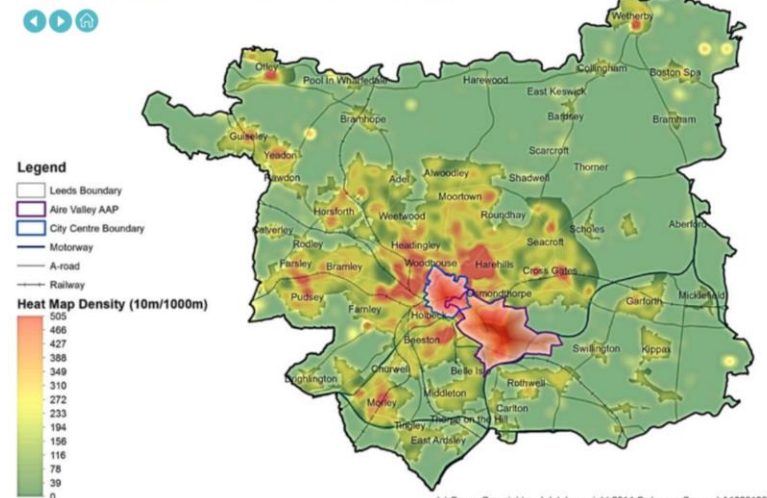
Natural Resources and Waste Local Plan Policy Energy 4: Heat Distribution Infrastructure

The promotion of heat distribution infrastructure will be supported providing that the following are undertaken and are satisfactory:

- An assessment of environmental effects;
- An assessment of heat source(s) and heat use.



Map 21 Locations with Greatest Potential for the Creation of Heat Networks



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Case Study 10: Leeds District Heating Network Local Development Order



Local Development Order Leeds District Heating Network

The Leeds DHN LDO was submitted on 19th November 2015 through the development management procedure in line with the Development Management Order 2015. Following the statutory public consultation process and minor amendments, the Order was approved on 9th March 2016.

The Leeds District Heating Network (DHN) Local Development Order (LDO) “grants planning permission for the development of a District Heating Network (DHN) comprising of pipes, cables and wires, heat exchange equipment, street furniture, informational signage and ancillary engineering works within defined areas of land in the City of Leeds and shown on the attached map”.

The aims of the LDO, as set out in the Order are to reduce vulnerable residents’ fuel bills by circa 10% to tackle fuel poverty, to maximise CO2 emissions reduction opportunities associated with the Recycling and Energy Recovery Facility and to establish the first phase of a city-wide district heating network to stimulate additional investment.

Development Permitted by the LDO

The LDO sets out

“Development of a district heating network, including pipes, cables and wires, heat exchange equipment, street furniture, informational signage and ancillary engineering works, subject to conditions.”

In addition, the LDO outlines the instances in which the development permitted above would not apply including works over a certain scale, works to a listed building and EIA related development.

The LDO also discusses a range of additional measures to protect trees and hedgerows, soil and biodiversity, outlines the measures required to reinstate roads and surfaces and ensuring works are carried out safely around contaminated land and on land above areas previously used for coal mining.

The plan included in the LDO (top right) shows the areas within the city in which the LDO will apply as well as highlighting Listed Buildings, exclusion areas around Listed Buildings, conservation areas and former coal mining areas.

Subsequent Developments

The areas shown in red in the original LDO map includes specific areas in the City Centre, Centenary Square, Chapel Allerton Hospital, St James’ University Hospital and the Recycling and Energy Recovery Facility east of the City Centre. The land included in the adopted LDO map also includes roads and highways owned or controlled by the Council in order to facilitate the distribution of the proposed DHN.

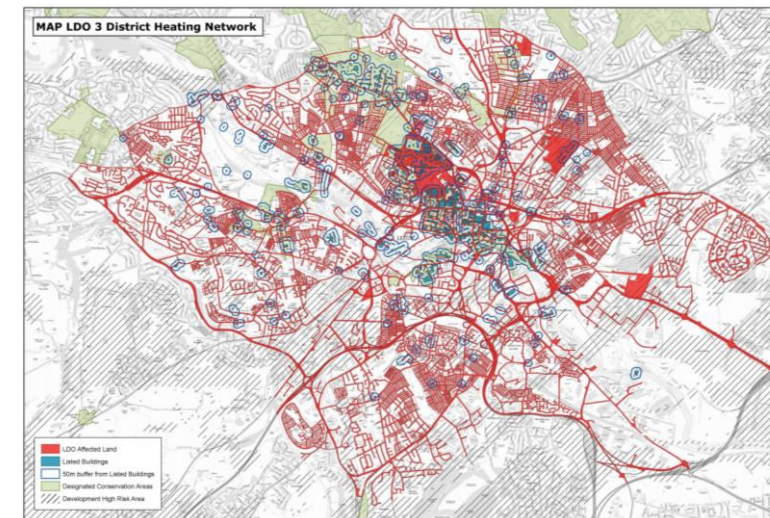
The Council consulted on an amended LDO in January 2018. The scope, aim and wording of the LDO remained as adopted with the addition of additional land Controlled by the Council, including parks, recreation facilities and other open spaces (bottom right).

In January 2018, Leeds City Council issued a Core Strategy Selective Review Publication Draft. The selective review identified specific areas including housing, open and greenspace requirements and energy and natural resources policies. Limited re-wording of Policies EN1 and EN4 are proposed to reflect Written Ministerial Statement of 25th March 2015.

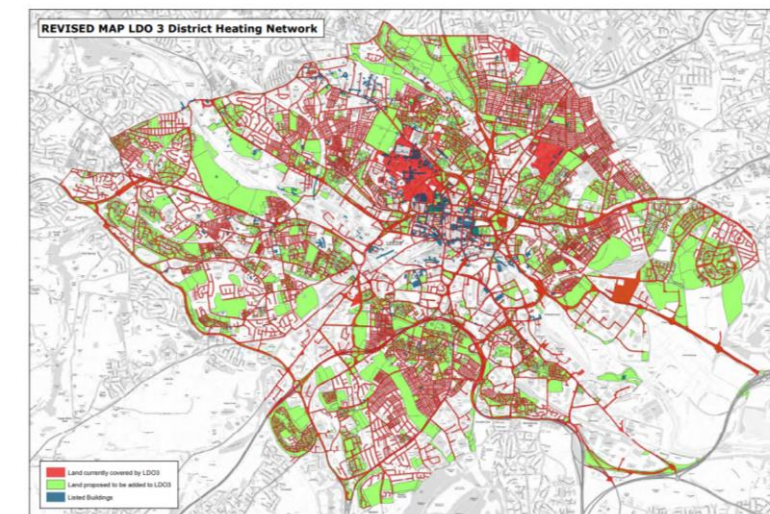
Learning Outcomes

The key aspects of this case study, which could be transferrable to enabling more effective local area energy planning, can be summarised as follows :

- **A proactive approach by Local Authorities is a critical enabler to the roll-out of District Heating;**
- **The investment in a new Recycling and Energy Recovery Facility have also been a stimulus to planning;**
- **The preparation and adoption of an LDO is a novel approach to encouraging and facilitating the deployment of a heat network in a local area . The adoption of a permitted development route in the LDO, similar to the approach and layout of the General Permitted Development Order allows more effective planning and implementation of infrastructure;**
- **The Council have “front-ended” much of the heat network planning by identifying the publicly-owned network of roads and open spaces on and under which DHN infrastructure can be deployed without requiring planning permission; and**
- **The inclusion of policy drivers combined with the permissive approach to infrastructure installation is intended to provide a “push-pull” approach to heat network development.**



Adopted LDO Plan



Proposed Amended LDO Plan

Case Study 11: Stockport Council – Development Management Policies



Background

Stockport Council adopted their Core Strategy in 2011 which provides the overall spatial strategy for the Borough up to 2026.

The Core Strategy sets out a vision for a more sustainable Borough, which will be achieved through the implementation of a series of policies.

In respect of Climate Change the Core Strategy seeks to ensure that development is located and designed so as to minimise susceptibility to the impacts of Climate Change and actively seeks to encourage development to contribute to a reduction in the Boroughs carbon footprint (Objective1). The Council is currently preparing a Local Plan which remains at a very early stage of preparation.

Existing Core Strategy Development Management Policies

Core Strategic Policies

Housing (Policy Objective 2)

- Objective is to focus new housing development in locations accessible to services and areas which are able to offer opportunities to utilise decentralised energy.

Detailed Policies

Climate Change (Policy CS1)

- Seeks to ensure that all proposed development meets an appropriate design and construction standard and must demonstrate how the development will contribute towards reducing the carbon footprint in the Borough.
- Policy CS1 specifically provides an Energy Opportunities Plan where opportunities for low and/or zero carbon developments are taken full advantage of.

Development Management Policies

Energy Efficiency Statements

Policy SD2 seeks to reduce CO2 emissions from existing residential buildings. The Policy requires the following:

- Planning applications for changes to existing domestic dwellings are required to undertake reasonable improvements to the energy performance of the dwelling over and above Part L of the Building Regulations.
 - Applicants must complete and submit an Energy Efficiency Statement checklist with planning applications to identify proposed measures.
 - The Policy applies to all housebuilder planning applications for planning permission to extend or materially alter a home in all areas of the Borough. Measures include loft and cavity wall insulation, draught proofing, improved heating controls and replacement boilers.
- Policy SD2 requires that where planning applications are required for improvements to existing dwellings

the Council will require reasonable improvements to the energy performance of the existing dwelling. The Council will require the submission of an 'Energy Efficiency Checklist' to identify which measures are appropriate to the dwelling.

Policy SD3 relates to the delivery of the Energy Opportunities Plans. It identifies locations where the proximity of new and existing buildings can support district heating and/or cooling networks and a "Microgeneration Area". New development should demonstrate how it will contribute to delivery of the opportunities identified. Developers should demonstrate compliance by submitting a carbon reduction statement setting out how the target designation was arrived at including any feasibility studies (e.g. to assess the feasibility of a heat network). The statement should set out how the developer will meet the appropriate target for the development.



Case Study 11: Stockport Council – Development Management Policies



Delivery

- The requirement for the submission of Energy Statements has seen success within the Borough, this has however been dependent on training and guidance for applicants, including major housebuilders.
- There is a growing recognition within the Borough of the benefits of low carbon buildings as a result of Policies SD2 and SD3.
- Decentralised energy policies have proved difficult to implement due to :-
 - Cost
 - Lack of skills, knowledge and willingness of developers
 - Developers using outdated designs and software and slow to implement
 - Lack of and cuts to resources within the Council
 - Other material planning matters now prioritised with a focus on delivery of housing and commercial development above energy
 - Lack of national policy and guidance support to implement energy and carbon management policies and the cost benefits of this.

Learning Outcomes

The key aspects of this case study, which could be transferrable to enabling more effective local area energy planning, can be summarised as follows :

- **Requires expertise by local officers and developers to deliver policy;**
- **In house expertise has been important to undertake training and oversee implementation;**
- **The benefits of low carbon solutions need to be clearly defined and communicated**
- **Cost of low carbon solutions is a major barrier; and**
- **implementation of the local policy has proved difficult due to development costs, resources, political will, lack of skills on the part of the development industry and lack of support in national policy and guidance. These highlight the type of barriers Local Area Energy Planning will need to consider.**



A stack of white papers with a dark grey background. The papers are slightly offset, creating a sense of depth. The text is centered on the middle paper.

6. Strategic Modelling Tools

6: Strategic Modelling Tools



Introduction

There is currently a range of modelling tools that could assist in developing more robust evidence to support more effective local area energy planning. This chapter highlights UK focused modelling tool examples.

Each of the modelling tools covered in this chapter have different data input requirements and will also result in different outputs. Modelling tools are important to help build a robust evidence base. Having a quality and trusted evidence base, developed through engaging with relevant stakeholders, is important to allow decision making. Modelling tools can be used to assess large quantities of complex data to understand options and risk to make better choices. When identifying an appropriate modelling tool, well defined project objectives, available data, resources and skills will be key considerations.

The following models are described below by way of summary descriptions.

- 1) UK MARKAL
- 2) Siemens CyPT (City Performance Tool)
- 3) Energy Savings Trust - SicedS (Stakeholder interactive City Energy Demand Simulator)
- 4) Energy Savings Trust - Home Analytics
- 5) Energy Savings Trust – Falcon
- 6) Arup: DENet
- 7) Ricardo: EDIS
- 8) Delta EE: Pathways
- 9) EA Technology: Transform
- 10) Future Cities Catapult: Growth Planner
- 11) Centre for Sustainable Energy: DIMPSA
- 12) Southampton University
- 13) Cardiff University
- 14) UCL: 3D Stock
- 15) City Science
- 16) EnergyPath Networks



Modelling Tools

1. UK MARKAL

UK MARKal (UKM) is a national model (like the ETI's Energy System Modelling Environment - ESME). It was originally developed to provide insights for the Energy White Paper of 2003. It was adopted and completely revised by the UCL Energy Systems team in 2005 and was under constant development until 2012. The development of the original model was funded by the UK Government but the current academic version was developed and supported primarily by the UK Energy Research Centre.

UKM is a multi-time period linear optimisation model. Its simplest formulation is to minimise discounted energy systems cost, under a wide variety of physical and policy constraints. This minimisation takes into account evolving costs and characteristics of resources, infrastructures, technologies, taxes and conservation measures - to meet energy service demands; under a range of physical and policy constraints.

UKM is a very large model, with some 1,500 technology types, 250 energy carriers and also includes constraints, taxes, emissions and other

model parameters. The model has well over half a million data elements.

UKM portrays the entire energy system from imports and domestic production resources (fossil and renewable), through fuel processing and supply (e.g., refining, bio-processes), explicit representation of infrastructures (e.g., gas pipelines), conversion of fuels to secondary energy carriers (including electricity, heat and hydrogen), end-use technologies (residential, commercial, industry, transport, agricultures, non-energy), and energy service demands (at a sub-sectoral level) for the entire UK energy system.

2. Siemens CyPT (City Performance Tool)

The City Performance Tool (CyPT) is a dynamic simulation tool which studies a series of more than 70 technologies from building, transport and energy technologies – at different time periods and implementation rates. It is designed to reduce the environmental impact of everyday activities in cities. It covers greenhouse gas emissions from buildings and transport, as well as air pollutants such as particulate matter and nitrogen oxides (NOx). It also examines the creation of new employment to install, operate and maintain city solutions.

The model calculates the environmental and economic impacts of individual technologies at different implementation levels. In transport, for example, CyPT assesses how a technology could reduce demand (reduce parking search traffic), shift the mode (public transport instead of cars) or improve efficiency (automated trains). The model is based on a life cycle assessment methodology. Potential employment that could be created is based on reference projects or economic studies in the transport, building and energy sectors in a regional context.

Visualisation of results is by way of a “Sankey” style diagram of emissions reductions against a baseline. CyPT is not a spatial modelling tool. Three categories of technology are covered: energy production (from low-carbon and renewable sources), energy efficiency (lighting and building insulation and controls), public and shared transport solutions and electric vehicles (to create modal shifts and remove ICE cars). The model

6: Strategic Modelling Tools

calculates the CO2 saved per pound invested. City inputs are at a generic statistical survey level, comprising around 300 city-specific data points on energy, heating and cooling in buildings, transport network and passenger and freight demand. The tool calculates a baseline for pollutants and models the impact on these by adjusting scenarios to implement varying levels of alternative technologies over time.

3. Energy Savings Trust - Sicedes (Stakeholder interactive City Energy Demand Simulator)

SiCEDs was developed by the Energy Savings Trust (EST) with an InnovateUK grant and piloted with Exeter and Birmingham City Councils. The project finished in March 2017 and EST is currently evaluating how the Local Authorities use the tool and the value they can get from it. It is understood that in the pilot projects SiCEDs did not use Local Authority sourced data. Rather, all data was sourced by EST. This approach could be carried forward to reduce Local Authority resource commitment.

SiCEDs enables exploration of different scenarios which are user defined. The purpose is to aid

stakeholders in the design and implementation of plans with a data and model design tool considering the following criteria:

- Fuel poverty;
- Improved health;
- Enhanced energy security;
- Improved economics; and
- Reduced greenhouse gas emissions.

SiCEDs uses EST Home Analytics database for data on every domestic building nationally.

4. Energy Savings Trust - Home Analytics

EST describe Home Analytics as containing an extensive and unique level of data on the UK housing stock. It makes use of statistical and geo-spatial models to develop an accurate profile of the housing stock at the individual address level. The data provided is a statistically modelled value based on probabilities rather than an actual value

provided by a householder or surveyor. EST suggest the data can be used to:

- Understand the market for energy efficiency measures.
- Target energy efficiency activity successfully.
- Develop effective strategies and policies for improving the housing stock.

6: Strategic Modelling Tools

- Target customers for Feed-in Tariffs, Renewable Heat Incentive and Green Deal Home Improvement Fund measures.
- Help deliver measures to achieve ECO obligations.
- Enable evidence based strategic business planning and market assessment.
- Maximise conversion rates by only targeting homes that are suitable for the measures being promoted.
- Help energy suppliers, retailers and other organisations to understand and engage with their customers.
- Help organisations to reduce the cost of marketing campaigns by targeting the right properties with the right products and messages.
- Help Local Authorities to develop effective strategies for improving housing stock and secure funding.

EST consider that Home Analytics is unique given the quality of the data that underpins it and which the modelling processes used in order to predict accurate information on the UK's housing stock.

5. *Energy Savings Trust – Falcon*

Western Power Distribution (WPD) secured funding as part of the energy regulator Ofgem's Low Carbon

Networks Fund (LCNF). The Energy Savings Trust built the Falcon modelling software for electricity and heat modelling at a very granular building level to examine impacts on the low voltage network. It was applied to the WPD network in Milton Keynes and the surrounding area. This provided a 'bottom up' model of electricity and heat demand at the individual building level, aggregating the impact of low carbon transition adoption assumptions, to predict 11kV network constraints.

6. *Arup: DENet*

DENet is a simple toolkit developed by Arup to identify the best areas to introduce district heating systems. It was created as part of a commission by the London Borough of Haringey with funding from the Local Carbon Frameworks programme sponsored by the former DECC.

The pre-feasibility stage assessment tool is designed to help Local Authorities and other stakeholders identify the geographical areas that will enjoy optimum returns from the installation or extension of a district heating system.

DENet removes some cost uncertainty by identifying areas that will deliver positive paybacks. DENet is intended to allow Local Authorities to take direct control of an assessment process, building internal capacity and saving money by avoiding costly technical studies on marginal or poor opportunities.

7. *Ricardo: EDIS*

Energy Data Integration System (EDIS) is a multivariate data analysis tool - it is not a model and can therefore be a lot more flexible about the data sets it uses. It fits the category of early data analysis to deliver near term 'general local energy analysis and insights'. It was developed under an Innovate UK grant including pilots in Oxford and Coventry. In respect of EPN, EDIS would be used as a lead-in tool.

The EDIS approach is 'service' first. This involves a needs analysis to determine what a city requires to establish and act-on. Ricardo compares the needs analysis to existing Local Authority data sets to establish what can be answered immediately and what requires more data.

The approach includes tools to clean and fill data records for each building in a city. The software builds a 'data signature' for each building record (including information on occupants) and identifies those that fit the question criteria. A Local Authority can then select and act on the buildings/occupants identified. This process helps use data to find opportunities to save Local Authorities operational costs, e.g. by establishing a short list of properties for ECO3 that they could sell to energy companies, reducing the number of physical audits that need to be done.

6: Strategic Modelling Tools

EDIS is applied to Local Authority energy related data sets (potentially EPN data if already in place), augmented with other data sets such as social data. In the context of an EPN/LAEP Framework, it is an early tool for sourcing operational value from data as it is being collated. It is a lead-in to EPN by highlighting where more detailed modelling is required.

8. Delta EE: Pathways

Pathways is a multi-client subscription based service that models market demand scenarios for heating products in UK, France, Italy and the Netherlands. The model is helpful for developing internal market share predictions and identifying sectors to target for sales.

Tool design is on-line and kept relatively simple in order that users can run their own scenarios. The underlying model projects demand for heating solutions across UK, based on replacement rates, housing types and insulation measures (and incentives).

9. EA Technology: Transform

The Transform model is intended to determine the best investments for network operators to ensure that the grid can sufficiently meet the demands of

the network in the future (looking at every year from now until 2050), in the most cost effective way possible. The model is utilised on license by all GB Distribution Network Operators (DNOs).

Initiated by the DECC/Ofgem Smartgrid Forum in 2012, the model was designed to determine the level of electrical network investment required to support the potential forecast of low carbon technologies (LCT's) such as electric vehicles, heat pumps and solar panels and other forms of distributed generation.

The dataset held within Transform is managed through a co-ordinated governance activity supported by the GB network operators. This ensures that the latest information is used and allows industry stakeholders to suggest refinements to the inputs or the structure of the model.

The Transform Model is a parametric representation of the electricity distribution network in Great Britain. The model builds on data derived from a number of sources including distribution networks, local authorities, central government and a range of other sources allowing understanding of the demands currently placed on the electricity grid. It then overlays onto this the anticipated future demands that will come from various low carbon

technologies. It does this by considering 'conventional' solutions (such as new cables and transformers) and 'smart' solutions (such as energy storage, real-time thermal ratings, demand side response, etc.).

10. Future Cities Catapult: Growth Planner

Growth Planner is a tool developed with Greater Manchester Combined Authority (GMCA) and used with Belfast City Council. It uses data from planners, utilities companies, and developers in the planning pipeline to visualise current and future capacity on the water, wastewater and electricity networks. It does not rely on Local Authority data or GIS. It is intended to predict when constraints will be reached and new capacity will be needed in electricity networks, water and waste-water networks (mainly as result of new developments). It is a Web and Cloud based tool.

A key benefit is establishing clarity of base data and bringing disparate elements together. It assists parties seeking to invest or develop in a city and can assist in quickly finding sites and providing Local Authorities with an evidence base for the allocation of land.

6: Strategic Modelling Tools



11. Centre for Sustainable Energy: DIMPSA

DIMPSA (Distributional Impacts Model for Policy Scenario Analysis) is based upCentre for Sustainable Energy (CSE) has collated and made available in a single location (www.cse.org.uk/projects/view/1259).

on various publically available datasets that the This data includes:

- 1) Display Energy Certificate data;
- 2) Lower Super Output Area data;
- 3) Fuel poverty data (including 'hard-to-treat' data);
- 4) Energy Company Obligation data;
- 5) Energy consumption data (domestic);
- 6) Heating and housing census data (at smallest output area level);
- 7) GB household emissions dataset;
- 8) GB postcodes off the mains gas grid; and
- 9) Energy Performance Certificate data (at Parliamentary Constituency level).

DIMPSA has been used under license by the former DECC for the Government's own assessments of the distributional impacts of policies. DIMPSA enables the assessment of the impact of both the costs and the benefits of policies for domestic energy consumers.

12. Southampton University

Professor AbuBakr S Bahaj of the Sustainable Energy Research Group at Southampton University has developed a methodology to understand the state of housing stock and to indicate the most appropriate interventions for different house types. It combines data from a variety of publically available national data sets.

The model is GIS based with all information associated with individual buildings on the 'MasterMap'.

The following data sets are used with this model:

- 1) National address gazetteer database;
- 2) Building footprints from MasterMap;
- 3) National census data;
- 4) DECC energy use data (at MSOA level); and
- 5) Energy performance certificates.

13. Cardiff University

Cardiff University has developed the Energy and Environmental Prediction (EEP) model. This is a model to quantify energy use and associated emissions at city level (<http://www.cardiff.ac.uk/archi/eep.php>). The model is GIS based and uses Standard Assessment Procedures (SAP) calculations. It assumes certain building fabric and heating systems are associated with particular archetypes. The tool has been applied to both Camden and Leicester amongst other locations.

As part of developing the EEP tool, the University has worked on analysis of OS Mastermap to establish building archetypes with different levels of success depending on building archetypes.

6: Strategic Modelling Tools

The University acknowledge that there is ‘a maximum accuracy to which built age can be identified by an automatic analysis’. Changes in style with period of build are notable but gradual so that some properties will be allocated to incorrect age groups by automated processes.

The University suggest that uncertainty could also be placed on parameters such as installation of double glazing. This would appear to fit well with the EPN approach. The automated analysis may be appropriate as the ‘base level’ of analysis for EPN. It would allow an analysis of the benefits of collecting better data. However, the number of houses required to be averaged to get good data by this approach (LSOA scale) may be too large for EPN.

The team at Cardiff has been involved in development of an ‘urban scale’ energy modelling framework, which uses thermal simulation of buildings (<http://www.cardiff.ac.uk/archi/computermodelling.php>) and Google SketchUp to analyse groups of buildings and to provide visualisation of energy supply and demand at an urban or regional scale. Data for the model is collected from a variety of sources including maps, historical records and ‘drive by’ surveys. The EEP model acts as a database to store property based information that is collected. The methodologies involved and described above may be applicable to data collection for EPN.

14. UCL: 3D Stock

3d Stock is a three-dimensional model of British building stock which primarily focuses on non-domestic buildings, where an archetype approach is not appropriate due to the wide variety of buildings and associated uses. The model differs from other 3D urban and stock models, in that it represents explicitly, and in detail, the spatial relationships between ‘premises’ and ‘buildings’. It also represents the pattern of activities on different floors within buildings.

The geometrical/ geographical structure of the model is assembled automatically from two existing national data sets. Additional data from other sources including figures for electricity and gas consumption are then attached. The first purpose of the model is in the analysis of energy use in the building stock.

With actual energy data for very large numbers of premises, it is possible to take a completely new type of statistical approach, in which consumption can be related to a range of characteristics including activity, built form, construction and materials. Models have been built to date of the London Borough of Camden and the cities of Leicester, Tamworth and Swindon. Work is in progress to extend the modelling to other parts of Britain. Due to the coverage of the data, this will be limited however to England and Wales.

15. City Science

City Science is a private sector organisation which has developed a whole-system evaluation framework for cities and authorities. The analysis seeks to develop an evidence base to support funding and investment, identify opportunities for economic growth and improved social outcomes, and to provide a clear roadmap of activities targeting factors such as energy efficiency, air quality improvement and carbon reduction.

The approach has been progressed for the City of Exeter, as illustrated in ‘Exeter City Futures’ which required an evidence base to support the Local Authority’s vision of an ‘Energy Independent’ city by 2025. With a requirement to convert analysis into clear action and stakeholder alignment, the Authority required an authoritative analysis, technically rigorous in its approach, but with clear, prioritised, easy-to-understand recommendations and next steps.

6: Strategic Modelling Tools

City Science developed a framework based on established industry methodologies. Using this framework, City Science combined analysis across technologies, assessing opportunities for energy reduction alongside new generation.

The maximum potential of energy efficiency and generation opportunities was fully quantified and barriers to deployment were explored across each. These barriers were also quantified and ranked developing a clear list of priority actions to achieve energy independence.

Demand reductions were evaluated across domestic building stock and commercial and industrial activities with an in-depth focus on the types of businesses located within the region. A regional building and business assessment model was created within which, individual energy efficiency opportunities were calculated and aggregated.

Energy generation potential was then investigated covering a diverse range of technologies including photo-voltaics, onshore and offshore wind, hydroelectric, bioenergy, wave energy, tidal range, tidal stream, geothermal and emerging technologies such as small modular reactors. The potential role of supplementary technologies including smart grids, hydrogen networks and heat networks was also investigated.

The output is a detailed and comprehensive evidence base, openly available from the City Science website. The recommendations are informing policy, funding discussions and innovation activities across the city of Exeter and the wider region. Subsequent economic work is intended to will link the strategies discussed into wider regional context, developing clear bids for funding.

16. EnergyPath Networks

The Energy Technologies Institute (ETI) has developed EnergyPath Networks (EPN) modelling tool to help identify potentially cost-effective system designs able to support a local area's emissions reduction ambitions, whilst delivering economic growth and ensuring affordable energy for businesses, communities and consumers that recognises the unique energy resources and energy demand of different local areas.

EPN is a 'whole system' optimisation software tool that provides a robust, technology agnostic evidence base which considers the technical aspects of the whole energy system. Built on a detailed local area representation of the energy system, which has been designed in partnership with Local Authorities to develop cost-effective local energy system options in the UK.

component of effective local area energy planning. Whole system analysis considers the relationship between all related areas/components of any given subject: the energy system alongside related and essential consumer, commercial and policy/regulatory aspects. Considering the whole system is crucial if informed investment based decisions are to be made on specific decarbonisation solutions.

EnergyPath Networks is unique in combining four aspects of energy system planning in a single tool, coveting:

- 1) A multi-vector approach which allows trade-offs between energy vectors / networks to be understood.
- 2) The ability to understand the spatial relationships between buildings and the networks that serve them so that costs and benefits correctly represent the area being analysed.
- 3) Use of an optimisation process to compare a large number of combinations of options (over 17,000 building pathways in Newcastle)
- 4) Optimisation for multiple analysis areas within the study area (17 for Newcastle) and for 4 separate time periods out to 2050.

6: Strategic Modelling Tools

The benefits of EPN include:

- It involves information from the national energy system from generation to end use, considering multi-energy networks and vectors through its links to ESME (The ETI's internationally peer reviewed energy system modelling environment (ESME) - a national energy system design and planning capability.) .
- It is based on developing a detailed spatial representation of a local area with the ability to understand the spatial relationship between the buildings and networks that serve them enabling decarbonisation options to be analysed at a detailed and localised level.
- It considers a local area both now and in the future (to 2050) in terms of building stock, planned new development, energy demands and energy networks.
- It utilises an optimisation process to compare many combinations of options (>1 million)), enabling comprehensive sensitivity analysis, to inform multi-objective system decisions.
- It allows users to define drivers or constraints relevant to their local area.
- It supports proactive planning and investment by giving confidence in a local area strategy outcome with supporting analysis.
- It aids consensus building with key stakeholders and local communities.

Using EPN involves running hundreds of simulations, exploring the variation on cost-optimal designs within a range of assumptions and constraints to identify robust strategies and near-term priorities set against a broad range of uncertainties. This uses whole-system optimisation and option comparison process to compare different low carbon technology options to meet a local carbon constraint, providing the ability to make informed choices based on our current understanding of the world and its inherent uncertainties. EPN has been piloted in three UK cities: Newcastle, Bury in Greater Manchester and Bridgend in Wales identifying pathways and network choices that reflect each local area's unique geography, energy demand, resources and decarbonisation ambitions.



Learning Outcomes

The key aspects of this case study, which could be transferrable to enabling more effective local area energy planning, can be summarised as follows:

- **A range of modelling tools are available at different stages of development and complexity;**
- **There is currently no de-facto standards or guidance on requirements and method for applying such tools at a local level to support local area energy planning;**
- **There is limited skills and resource capacity at present within local areas to utilise such modelling; and**
- **All modelling tools are reliant on the quality and granularity of data inputs.**

Case Study 12: Transport for Greater Manchester



Introduction

Over time transport planning has evolved to become more effective and effectively supported by better data and tools moving from being reactive to pro-active. To achieve this transport models and assessment tools have played a crucial role in helping decision-makers to understand existing transport usage and consider the impact of policy interventions and infrastructure choices. Open data and new software are now integral to more effective and analytical transport planning and to realising better outcomes and lower costs. The activity and approach taken to transport planning could provide a template for more effective local area energy planning in the future.

Transport for Greater Manchester (TfGM) is the public sector body tasked with delivering and managing public transport within Greater Manchester. TfGM are tasked with delivering the public transport policies set by both the Greater Manchester Combined Authority (GMCA) and from the directly elected Greater Manchester Mayor.

TfGM operate a Highways Forecasting and Analytical Service (HFAS) which provides advice, modelling and technical analysis on a commercial basis to public and private sector clients. The Transport Systems and Model Development Group within HFAS is tasked with developing and maintaining transport models such as SATURN and PARAMICS.

SATURN

The SATURN model is proprietary software described as “a powerful and flexible highway assignment package to create both strategic and local traffic models”. The GM SATURN model currently provides the key source of information on highways modelling in Greater Manchester. The SATURN model allows TfGM and local authorities to model the impact of modifications to the GM transport network at a strategic level including road and junction improvements, new roads and the potential impact of proposed development.

PARAMICS

HFAS operates and maintains a micro-simulation transport model using PARAMICS software. PARAMICS can be used to interrogate the impact of new road or junction schemes, proposed developments and the impact of large scale events on the road network. It includes a simulated visual model which can be easily understood by non-technical members of the public. The micro-simulation modelling provided by PARAMICS requires considerably more data input than the strategic scale SATURN model that covers Greater Manchester as a whole.

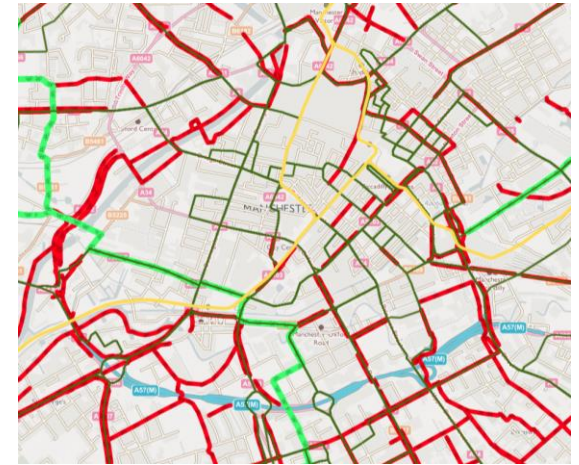
Modelling Conclusions

In a general sense, SATURN is used to inform Development Planning activities and for the assessment of large scale developments that could have regional impacts upon the transport network. PARAMICS, being a more detailed modelling system is used for the assessment of individual developments at the Development Management stage. Accordingly, each model has a different application and this requires to be reflected in practice in order for the application of the model to be effective.

Learning Outcomes

The key aspects of this case study, which could be transferrable to enabling more effective local area energy planning, can be summarised as follows :

- **More effective local area energy planning could be enabled by more effective and robust modelling and analytical tools to support low carbon system designs as has happened in transport planning**
- **Both SATURN and PARAMICS are examples of widely used commercial software developed in response to an identified need to support better transport planning better predict the impact of highways schemes, junction improvements and new development that could impact the transport network.**
- **The development of both strategic and individual development scale modelling has allowed transport planners, developers and decision makers to accurately predict the impact of developments.**
- **It has also allowed planning for accommodating additional demands on transport network capacity and to inform developer contribution requirements where additional demands are placed on the transport network.**
- **highways modelling is useful well tested example of how local modelling requirements have been met by public and private sector software products developed in tandem with industry-wide best practice.**



The background of the slide features several overlapping sheets of white paper with deckled, torn edges, set against a solid grey background. The papers are arranged in a way that suggests they are being pulled apart or are part of a stack.

7. Project Delivery

7: Projects / Delivery



In this section we set out a number of examples of implemented local area energy projects. It is important to consider project delivery, as this is the key test of effective policies and plans.

Most of the case study projects have been delivered in response to policies, plans, programmes or corporate requirements and/or from the catalysing effect of projects that are of regional or national significance.

This Chapter presents the following case studies that examine the key drivers for project delivery:

- Leeds Climate Change Innovation District;
- Bunhill Heat and Power Project, Islington;
- Sustainable Glasgow and the Commonwealth Games Athletes Village; and
- Aberdeen Heat and Power Company.



Case Study 13: Bunhill Heat and Power, Islington, London



Background

Bunhill Heat and Power is Islington Council's ground-breaking, innovative scheme that is retrofitting district heating in an inner-city environment. It is the first project of its kind in the UK and one of the first in Europe. The scheme retrofitted two kilometres of CHP-powered district heating in an inner-city environment to serve over 850 dwellings, two leisure centres and four office blocks. In October 2017 the development was recognised by the Association of Decentralised Energy with a Homes & Communities Project of the Decade Award.

Bunhill Heat and Power Phase 1 development was progressed by the London Borough of Islington through a major planning application. The system features a district heating scheme powered by an energy centre that is a 1.9 MWe gas CHP engine with a 115 m³ thermal store, extending to a height of some 14m.

Phase 1 of the scheme was considered in JLL's report 'Volume 2: Consenting Strategy Report – Final Report' in 2014.

Phase 2 of the Bunhill Heat and Power network is currently under construction having obtained planning permission in 2015 to build a new energy centre (P2015/1008/FUL).

The proposal is to design and construct up to two new Energy Centres and a heat network to supply heat in the form of Low Temperature Hot Water (LTHW) to a core portfolio of five communally heated residential blocks (the Kings Square estate).

The network will also take wasted urban heat from the London Underground tube system and also from an electricity sub-station on City Road to help heat the homes. The capture of waste heat from the Tube is the first project of its kind in the UK and one of the first in Europe.

The heat network will connect to the existing Bunhill Phase 1 heat network and two new Energy Centres and then to the connecting buildings via thermal substations located in the communal boiler rooms of the buildings to be connected.

Energy Centre 2: An above ground energy centre on the land between London Underground's ventilation shaft, UKPN's existing 11kV/400V substation and Kestrel House, located at City Road EC1V 1AB;

Energy Centre 3: A below ground energy centre located within the compound of the UKPN substation along City Road, formed by constructing an enclosure in an existing accessible below ground void.

The scheme will add up to two heat pump systems to the new energy centre(s) and CHP generation sets to one of the two energy centres. The scheme is also seeking to supply an additional three new communally heated council residential developments, (an increase of approx 215 dwellings, giving a revised total of 669 homes), a school, a sheltered housing block, and a community centre and nursery.

The scheme also has the possibility of connecting a further 13 private and council developments along the network route.

Funding

The project is funded by:

- the EU CELSIUS research project managed by the GLA in London of £1.2 millions Euros;
- Islington Council for £6 million; and
- the Bunhill Ward Partnership funding secured through Section 106 obligations of £320,000.

Key Policies

Islington Council's Development Management Policies were adopted in 2013 and include Policy DM7.3 Decentralised Energy Networks, which sets out that all major developments are required to be designed to have the ability to connect to a Decentralised Energy Network (DEN).



Case Study 13: Bunhill Heat and Power, Islington, London



Major developments located within 500 metres of an existing DEN, and minor new-build developments located within 100 metres, will be required to connect to that network, including provision of the means to connect to that network and a reasonable financial contribution to the connection charge, unless a feasibility assessment demonstrates that connection is not reasonably possible.

Feasibility assessments should consider a range of factors, including:

- the size of the development, and the heat load and energy demands;
- the distance to network pipes;
- physical barriers e.g. roads and railways, and
- other developments in the vicinity that may also be required to connect to the network.

Community Infrastructure Levy

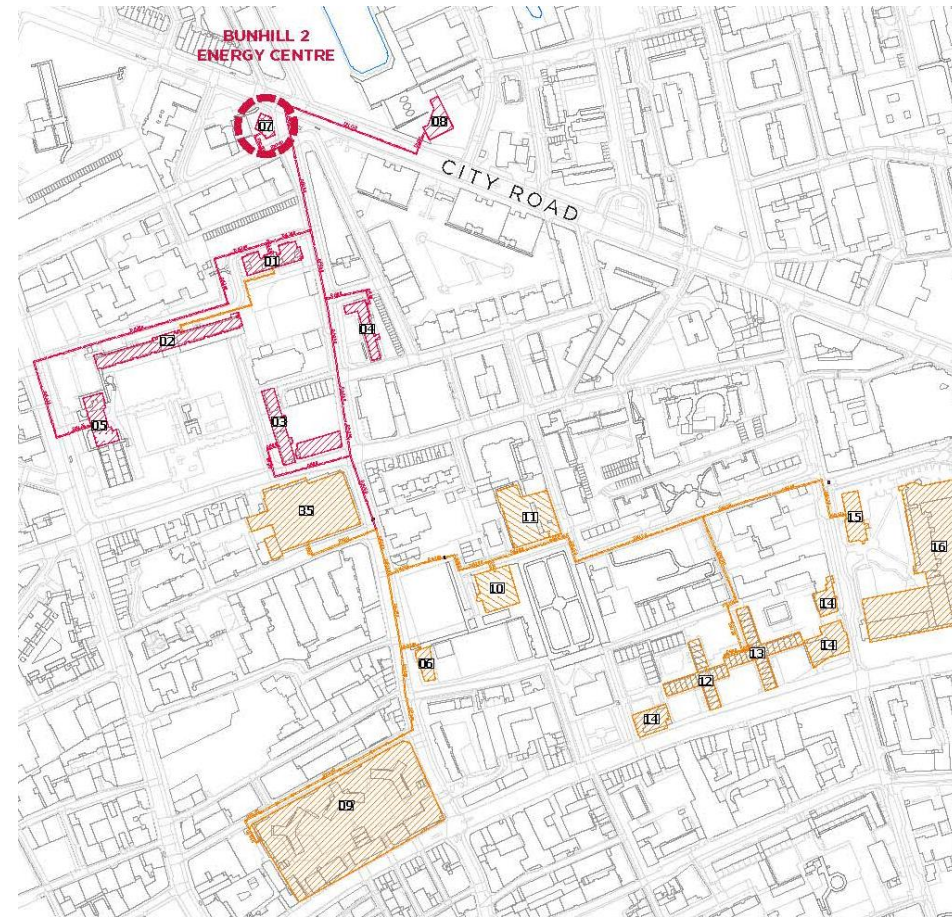
The Council's CIL charge includes provision for investment in DENs in the borough. This is intended to increase the size of the network to bring more sites within a reasonable connection distance.

Islington Council Community Infrastructure Levy (CIL) Income and Expenditure Report – 2016/17 sets out that funding for the Expansion of Bunhill Heat and Power Network was funded through CIL in the order of £2 million.

Learning Outcomes

The key aspects of this case study, which could be transferrable to enabling more effective local area energy planning, can be summarised as follows :

- **The Bunhill scheme has been an exemplar project for the retrofit of a district wide heat network;**
- **The scheme has taken a long time to come forward with original planning application taken to Planning Committee in April 2011 and Phase 2 recently commencing construction;**
- **Public consultation and engagement with stakeholders has been an important part of the process. Design considerations and the materials used for the above ground elements were key factors in the determination of the planning applications; and**
- **Funding has been secured through a range of sources including the Council's Community Infrastructure Levy rather than being purely market funded, which has been essential to ensure delivery. These examples suggest that local area energy planning should focus on the high level plan, rather than specifying project level detail given the resource and coordination needed to progress individual projects**



List of Connected Buildings	
01	Rahere House
02	President House
03	Barnabus House
04	Macclesfield House
05	Turnpike House
06	Energy Centre 1
07	Energy Centre 2
08	Energy Centre 3
09	Stafford Cripps Estate
10	Finsbury Leisure Centre
11	Ironmonger Row Baths
12	Bartholemew Court
13	Steadman Court
14	Redbrick Infill
15	Godfrey House/St
16	Lukes Housing
17	Seward Street Estate

Case Study 14: Sustainable Glasgow and the Commonwealth Games Athletes' Village



Background

Now comprising 700 homes and a 120-bed care home, the Commonwealth Games Village first provided accommodation for 6,500 athletes and officials during the Games before being converted into residences.

The approach to the design and build of the Village was key to achieving the environmental principles which underpinned Glasgow's ambitions for a lasting sustainable legacy from Glasgow 2014.

The homes, as well as the adjacent sports arenas, are powered by a state-of-the-art district heating system. This system, alongside a Fabric First Approach to housing design as well as the use of solar PV panels, contributed to a 95% carbon reduction on 2007 levels.

Approach

GCC's planning policy at the time did not require the incorporation of a district heating network, however, the Sustainable Glasgow Report (2010), which was produced by 'Sustainable Glasgow', a GCC initiative, sets out opportunities to reduce and manage the city's energy consumption, and establish Glasgow as a centre of excellence in the development of sustainable energy solutions, technologies and expertise.

The Report sets out several proposals, one being:

"The implementation of public policies (e.g. in planning and procurement) that support the delivery and use of energy management, sewerage, district heating, and Combined Heat and Power systems".

The Sustainable Glasgow Report identified 'potential district heating zones' which have subsequently been included and expanded upon within the Glasgow City Development Plan (adopted March 2017) (see right – the red shading showing the Commonwealth Village).

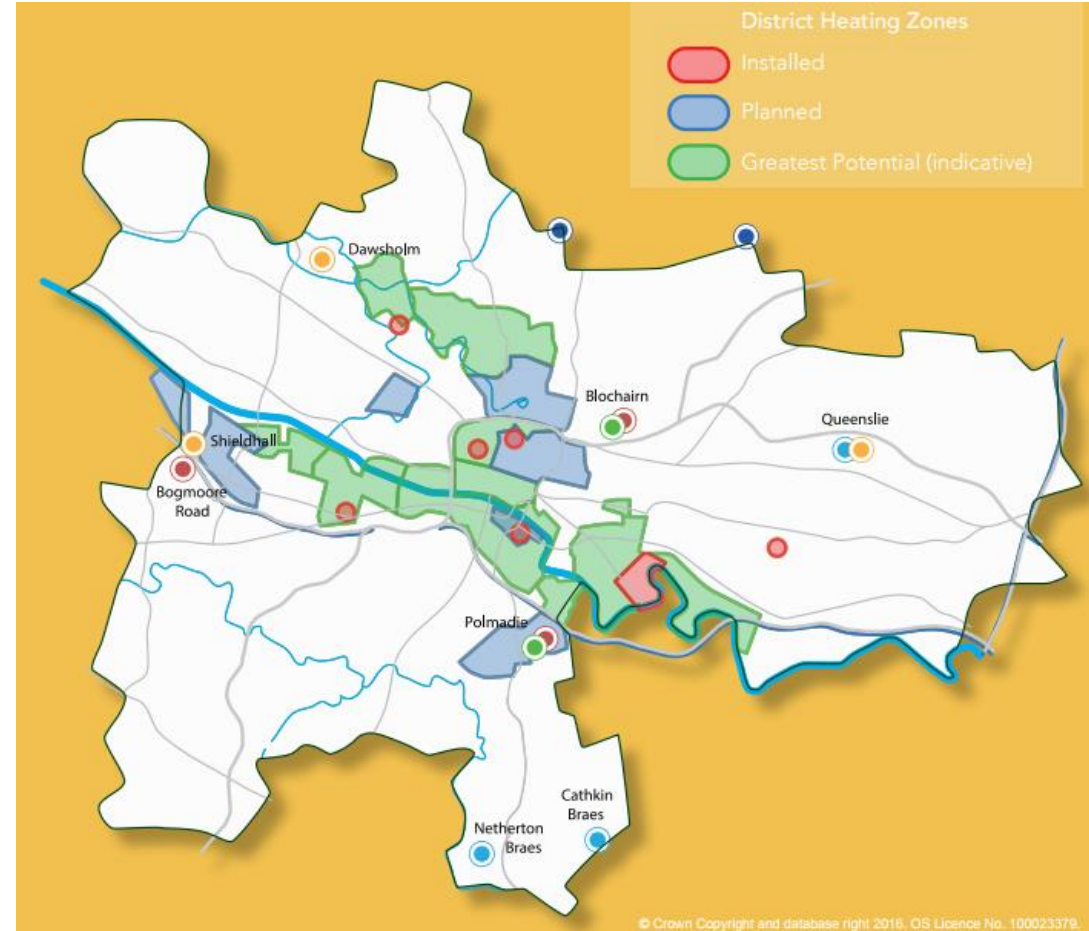
The City Development Plan also includes the following policy CDP5 'Resource Management' which supports the development of district heating networks.

"... District Heating

The Council will support proposals to develop District Heating networks based on low carbon and renewable sources, or that facilitate the more efficient use of heat from existing energy generation or other processes.

Figure 12 provides an initial indication of those parts of the City considered to have greatest potential for District Heating networks, based on an initial assessment of demand. This position will be updated through heat mapping to more accurately identify the potential for co-locating developments with a high heat demand with sources of heat supply, and Supplementary Guidance will be brought forward to identify the areas with greatest potential.

In these areas, in particular, the Council expects that the feasibility of delivering district heating/connecting to existing schemes, and the potential to extend such a system to adjacent uses/sites, as part of a local heat network, will be fully evaluated by the developer during the design of new development and incorporated into the design where viable. The Council will support proposals by developers who wish to connect to existing district heating schemes..."



Case Study 14: Sustainable Glasgow and the Commonwealth Games Athletes' Village



Stakeholder Involvement

Sustainable Glasgow is a collaboration between the University of Strathclyde, Glasgow City Council, Source One/Veolia, Scottish and Southern Energy, Blitzer Clancy and Company, and Scottish Enterprise. Additional partners, including Scottish Power, are now assisting Sustainable Glasgow to help make the sustainable city a reality. The collaboration partners bring together skills and experience from a range of backgrounds, all valuable for the preparation and delivery of the strategy through development delivery. Sustainable Glasgow's business model for implementing many of the major projects, such as the Commonwealth Games Village, is through public / private partnership. It believes the Council's support and involvement will reduce the risk perceived by investors, thus making it easier to draw significant private sector funding. The Council's involvement can also maintain a strategic approach, assisting in coordinating the delivery of Glasgow's sustainability goals and increasing the impact of individual projects.

Learning Outcomes

The key aspects of this case study, which could be transferrable to enabling more effective local area energy planning, can be summarised as follows:

- **Sustainable Glasgow is an example of a successful collaborative initiative which has influenced both planning policy and development on the ground. The Commonwealth Games' Village is award winning and has been a catalysing public sector led development, particularly with regards to district heating provision;**
- **The City Development Plan is also driving deployment of district heating where Major developments coming forward in the future are required to demonstrate how connecting to/extending existing networks (those delivered by the Commonwealth Games) or developing new networks has been fully evaluated by the developer;**
- **As stated in Policy CDP 5, updates will be provided through heat mapping to more accurately identify the potential for co-locating developments with a high heat demand with sources of heat supply;**
- **Supplementary Guidance will be produced to identify these areas with greatest potential, continuing the evolution of the policy framework as additional data becomes available and through the use of heat map modelling.**



Case Study 15: Aberdeen Heat and Power Company

Background

In 1999, Aberdeen City Council (ACC) adopted a Affordable Warmth Strategy and conducted a survey of its housing stock. In doing so, it was established that a large number of tenants lived in fuel poverty due to high energy bills resulting from low energy efficiency standards. Accordingly, in 2002, ACC set up the 'not for profit' company Aberdeen Heat and Power (AH&P) to develop and operate district heating and Combined Heat & Power (CHP) schemes. The district heating scheme component has grown from the development of four principal projects and now supplies around 2,350 flats in 33 multi storey blocks and 15 public buildings on a commercial basis.

AH&P decided Combined Heat and Power (CHP) and district energy schemes were the most cost effective development options to achieve a sustainable Aberdeen. The Company has arrangements in place to actively manage the CHP plants and to sell the electricity generated to Green Energy, or to individual domestic or commercial customers in the City.

Projects

The first project (Stockethill) related to 268 domestic dwellings in four blocks of flats, two of which are sheltered accommodation. AH&P installed two boilers and one 212kW generator which has now been increased with a larger generator to connect a further four blocks consisting of 350 flats. The district heating network is currently being further extended where new housing is being connected. AH&P have four other projects which have involved building CHP plants to heat several multi storey blocks, schools and public buildings.

Legal Structure, Set-Up and Stakeholder Involvement

AH&P was incorporated as a company limited by guarantee. The company is governed by a board of ten directors where directorships are open to tenants and is required to include two mandatory Council representatives. AH&P carries out consultation and there are active community groups.

Financing

The total cost for the initial development at Stockethill was £1.6 million (€2 million). £730,000 (€910,000) of the required capital cost came from the Community Energy Programme, a UK government scheme that ran for two years and closed in 2007. Subsequent projects have benefited from different funding through schemes including Carbon Emissions Reduction Target (CERT), Community Energy Saving Programme (CESP) and Energy Companies Obligation (ECO).

rate, which is set by AH&P and reviewed annually. The aim is to provide affordable warmth and alleviate fuel poverty - household savings are estimated at 25-40% and overall CO2 savings of 40%, when compared to individual household electric heating systems.

With connection charges paid by ACC, AH&P can sustain itself in terms of operation and maintenance costs. However, without further access to capital funding, expansion and a planned move away from gas to non-fossil fuel sources is a key challenge.

Learning Outcomes

The key aspects of this case study, which could be transferrable to enabling more effective local area energy planning, can be summarised as follows :

- **ACC successfully set up a not for profit company to focus on developing and operating district heating and CHP schemes, especially in relation to multi storey blocks and other public buildings.; and**
- **The network has expanded significantly since inception, which has been reliant on consistent and reliable funding streams.**



Case Study 16: Leeds' Climate Innovation District, South Bank



Background

Sustainable development company, Citu, has a vision to create a Climate Innovation District (CID) in Leeds. Drawing on international best practice and harnessing the latest technology, the development will incorporate more than 500 new low carbon homes alongside manufacturing, leisure, offices and climate resilient public realm.

It is proposed that the City's heat network, once installed, will extend to the CID via a new innovative bridge design, providing future resilience of low carbon heating. A District Heating Network (DHN) Local Development Order (LDO) was adopted on 9th March 2016. The LDO grants planning permission for the development of a DHN within defined areas of land in the City of Leeds.

The £125 million scheme is a key part of the city's development plans for South Bank and the wider Aire Valley Leeds (AVL) area.

Community Interest Company

Citu is setting up a Community Interest Company (CIC) which is a not for profit organisation that owns and controls the development. All the revenue it generates stays within the development and every household has a vote on investment decisions.

The CIC will maintain all communal areas and parks, making sure the building envelope is kept at the highest standard of efficiency. It will also allow residents to manage their sustainability credentials with residents having the ability to decide whether to invest in the latest sustainable technologies as they become available.

The Community Interest Company is funded by the residents paying a bond (£3,500, the equivalent of purchasing the freehold) when they move in, and the running costs covered by profits generated by the utility cooperative which is controlled by the CIC.

The utility cooperative owns all the on-site renewables, and provides electricity, water and data at cost prices to all residents. By buying in bulk on behalf of all residents it can provide these utilities cheaper than for-profit energy companies. Additional revenue is generated by selling the excess solar energy generated on the development back to the grid.



Planning Policy

The deployment of district heating networks and sustainability is engrained within the Leeds City Council's (LCC) planning policy.

LCC's adopted Core Strategy (November 2014) identifies AVL, within which the CID is proposed, as one of Leeds City Region's Urban-Eco Settlements, where sustainable development will be promoted by seeking delivery of commercial and residential areas which have high quality environment, energy efficient buildings and operations, low carbon and green business, and sustainable transport. Core Strategy Policy EN4 (see right) encourages district heating where technically viable and appropriate for the development.

The Aire Valley Leeds Area Action Plan (adopted November 2017) (AVLAAP) forms part of the Development Plan and provides a spatial planning framework with a focus on delivering an innovative and integrated approach to the sustainable regeneration of the area. Policy AVL17 (see extract right) deals with Heat Networks and should be read with reference to Policy EN4. The AVLAAP will be supplemented by the South Bank Leeds Regeneration Framework Supplementary Planning Document (SPD), once adopted, which builds upon the Core Strategy's policies and the AVLAAP and has been produced to provide clear guidance for the future development of South Bank and to establish principles to drive the growth of the area. The SPD states that Combined Heat and Power (CHP) technologies should be considered as part of the energy strategy for the South Bank, which Citu has evidently done with the proposition of connecting to the heat network via an innovative bridge design.

Stakeholder Involvement

LCC has worked with partners, stakeholders, local communities, landowners, businesses and developers to create joint visions for the future delivery of the Development Plan and specific sites.

Learning Outcome

The key aspects of this case study, which could be transferrable to enabling more effective local area energy planning, can be summarised as follows :

- **LCC has heavily relied upon planning policy and the use of a Local Development Order to encourage the deployment of heat networks throughout the city;**
- **Stakeholder involvement has played a key role. Local Area Energy Planning should incorporate stakeholder engagement;**
- **This highlights that strong policy is needed to facilitate new network development**

“Core Strategy Policy EN4

Where technically viable, appropriate for the development, and in areas with sufficient existing or potential heat density, developments of 1,000 sqm or more or 10 dwellings or more (including conversions where feasible) should propose heating systems according to the following hierarchy:

- Connection to existing District heating networks,*
- Construction of a site wide District heating network served by a new low carbon heat source,*
- Collaboration with neighbouring development sites or existing heat loads/sources to develop a viable shared District heating network,*
- In areas where District heating is currently not viable, but there is potential for future District heating networks, all development proposals will need to demonstrate how sites have been designed to allow for connection to a future District heating network.*

Carbon savings and renewable energy generation achieved under this policy will contribute to EN1(i) and EN1(ii)”.

“AVLAAP Policy AVL17 (extract)

The Council will support the delivery of a phased heat network in AVL during the plan period forming part of a wider scheme linking to the city centre and other areas.

The routes for the district heating pipe network and locations for other infrastructure to support the network are shown on Map 6 (but may be subject to future amendments or refinement to the routes and infrastructure based on further detailed technical feasibility work) and are safeguarded to ensure that development does not preclude the future delivery...”.

8. *Summary*

8: Conclusion



This report has explored a range of best practice approaches in the current policy and regulatory environment that could be applied to Local Area Energy Planning. Key learning outcomes examples are summarised as follows:-

Local Corporate Policies and Area Visions

Long-term effective action on climate change and local area energy planning requires strong political leadership and a robust policy approach from Local Government. Key examples of best practices and opportunities identified include:-

- Corporate buy in and ambitious visioning are essential ingredients to success.
- Emphasis on Local Government acting as a leader and enabler in conjunction with other stakeholders can help to achieve area visions and targets.
- It is important to align energy/climate change to other corporate objectives
- Ensuring a monitoring & review process.

Preparing an Evidence Base

Creating a credible evidence base is essential to underpin policy formulation, to ensure that policies are robust and to achieve desired policy outcomes. Key examples of best practices and opportunities identified include:

- Timely and positive information needs to be presented to ensure emerging policy requirements are understood and reflected in design processes.

- Stakeholder engagement and incorporating the outcomes within the evidence base is important.
- The availability of resources and skills needs to be matched with the evidence base requirements.

Development Planning

Key examples of best practices and opportunities identified through the current Development Planning process include:-

- Undertaking thorough analysis is key to creating an evidence base to inform policy provision.
- Developing an awareness of the technical and cost implications of different scenarios.
- Monitor implementation to test the effectiveness of policies and address policy requirements and additional evidence base requirements accordingly.

Development Management

Key examples of best practices and opportunities identified in Development Management include:-

- Local planners should act as facilitators.
- A proactive approach by Local Authorities can support energy infrastructure investment.
- Requires expertise by local officers and developers to deliver policy.

Strategic Modelling Tools

Modelling tools are important to help build a robust evidence base. Evidence bases are a well regarded and important component of plan making and it is expected that local area energy planning will need to be based on an evidence base derived from credible whole system analysis.

Key examples of best practices and opportunities identified include:-

- Having a quality and trusted evidence base, developed through engaging with relevant stakeholders, is important to allow decision making.
- Modelling tools can be used to assess large quantities of complex data to understand options and risk to make better choices.
- When identifying an appropriate modelling tool, well defined project objectives, available data, resources and skills will need to be considered.

8: Summary



Project Delivery

The benefit of more effective local area energy planning is ultimately to inform the energy system and network choices needed to decarbonise a local area, however, the process can also unlock significant investment and opportunities to improve the local area by identifying and enabling projects and activities to take forward to progress the plan.

The following key learning outcomes have been drawn from the Project Delivery case studies:-

- Developing a plan or strategy is vital where it should lead to the identification and delivery of activities to benefit the local area.
- Public consultation and engagement with stakeholders is important to take activity forward.
- Local areas can think about the options to take activities forward, whether through public, public/private, private or not for profit initiatives.
- Taking projects forward can provide new evidence to better inform future decisions/activities.



