Leeds Local Development Framework

Natural Resources and Waste Development Plan Document

Energy Topic Paper

Final

October 2010

SUMMARY

This paper summarises the key aspects of future energy generation and management that will inform and shape future planning policy development in Leeds.

At all levels of governance there is an imperative to act by planning to develop lower carbon energy systems that will reduce our contribution to climate change (by reducing greenhouse gas emissions such as carbon dioxide), whilst safeguarding the security and diversity of the energy supply.

This can be achieved through the objectives of:

- Reducing energy demand from development and the amount of carbon produced in its generation;
- Developing local solutions that minimise resource and energy use; and
- Safeguard future opportunities for flexibility in energy generation technology.

It is estimated that Leeds can provide up to 80MW of electricity from renewable and low carbon energy sources during the plan period through:

- **Larger scale wind energy which has the potential to contribute 20MW;**
- **Solar, photo-voltaics and other micro-generation has the potential to provide up to 10MW of electricity.**
- **Small scale hydro power schemes, which could provide upto 2MW.**
- **Energy recovery from waste facilities, through energy from waste and organic treatment. This could contribute up to 37MW.**
- **Supporting the future development of Combined Heat and Power and investigate the potential for a heat distribution network to serve parts of the City.**
- **A continuation of using landfill gas.**

1. INTRODUCTION

1.1 Energy is encountered in many forms. In terms of our everyday energy use, as related to planning policy, the main considerations are heat (typically for space heating and hot water) and electricity (also referred to as power). There are two dimensions to energy that planning policy can influence – demand (also called consumption) and supply (also called production). It is finding the right balance between the energy consumption and production that will help support a sustainable society, economy and environment. In this, the Leeds Planning Policy is in full alignment with the Government's Energy Statement (July 2010)[1].

1.2 The demand for energy has increased over time, although buildings have become increasingly energy efficient. Building Regulations set minimum standards for the energy performance of buildings, but local planning policy can help set the context for energy efficient communities.

1.3 In terms of the supply of energy, heat is typically produced locally and electricity is typically generated centrally, and then supplied to local use through the national grid and local high and low voltage networks. Heat is usually produced by the burning of fossil fuels (modern facilities are often gas, although some other fuels such as oil, coal, and even non fossil fuels, such as wood) are used. Some buildings and industrial processes use electrical energy to provide heat. Data compiled by the Department of Energy and Climate Change (DECC) on an ongoing basis shows that the majority of Britain's electricity is generated through the combustion of fossil fuels (gas and coal) in large power stations. Nuclear energy and large scale renewable installations (wind and hydro electricity) provide the remainder.

1.4 It is clear that in the short to medium term fossil fuels will continue to be used as a primary energy source. National energy policy is aimed at reducing the carbon burden of the UK energy supply, and increasing the resilience of UK energy infrastructure. These are both key sustainability objectives. Reducing the carbon burden of energy use is central to the UK Climate Change commitments of reducing the country's CO2 emissions to 20% of 1990 levels by 2050[2]. Energy resilience ensures social and economic life is not adversely affected by reliance on uncertain energy supplies and price variations.

Purpose of Paper

1.5 This paper provides an overview of energy generation and management issues for Leeds both currently and in the future, aiming to:

- Explore issues associated with planning for energy efficiency and meeting energy needs in a sustainable manner, providing background information for NRWDPD;
- Explain the targets that Leeds needs to meet – legislative requirements to reduce greenhouse gas emissions, provide energy from renewable sources; and

[1] "Annual Energy Statement, DECC Departmental Memorandum", Department of Energy and Climate Change, 27 July 2010
[2] The Climate Change Act 2008

- Set out the challenges for Leeds in trying to meet these targets – increasing energy efficiency and reducing carbon production, develop renewable energy supplies, and safeguard future opportunities for flexibility of energy supply.

Key Policy Drivers

1.6 National legislation and planning policy establishes sustainability principles as central within the planning system and sets the context for a rapid transition towards renewable and low-carbon energy generation. Key policy drivers relating to energy are:

- The UK Climate Change Act (2008) sets a legally binding target for the United Kingdom to reduce greenhouse gas emissions by 80% compared to 1990 levels by 2050, with an interim target of 26% by 2020 (subsequently increased to 34%)[3];

- The Government is committed to meeting these targets through both lower carbon energy generation and more efficient energy use. The Energy Act 2010 requires regular reporting on progress in 'decarbonsing' energy generation and tightening of energy performance standards (3.1 below) will require significant shifts in performance during the next decade;

1.7 The UK has a target to generate 10% of its electricity from renewables by 2010. Further to this, Policy ENV5 of the revoked Yorkshire & Humber Plan (Regional Spatial Strategy) established specific targets for Leeds to generate 11MW from renewables by 2010 and 75MW by 2021. This includes energy produced through renewable technologies and as a result of other processes such as energy from waste. Although the RSS has now been revoked, the evidence base which supported it remains valid. As such, Leeds has adopted this as its target to be achieved. Leeds currently produces around 9MW (with permission for another 2MW), all from landfill gas (see below for a more detailed breakdown) and therefore a further 64 MW is required if this target is to be met.

1.8 A number of national Policy Planning Statements (PPS) provide relevant direction for local energy and renewable planning. PPS1 (Delivering Sustainable Development) establishes principles for delivering sustainability in the planning system, and a further amendment (PPS1a) directs local authorities to address climate change by establishing low carbon policies for energy generation and sustainable construction in their development plans.

1.9 PPS22 (Renewable Energy)[4] also established an expectation for local planning authorities to develop local policies that support the incorporation of renewable energy technologies in developments. Subsequent to this, the Planning and Energy Act 2008 reinforces the ability for Local Planning Authorities to introduce a policy setting out renewable energy generation in their development plans. It also enables authorities to exceed targets set out at the national level through building regulations, if such targets can be justified and are achievable.

[3] The Carbon Budgets Order 2009
[4] Office of the Deputy Prime Minister (now Department for Communities and Local Government) 2004

1.10 At local planning level, UDP Saved Policy N54 (Development of Renewable Energy)[5] states that proposals for the development of Renewable Energy Resources will in general be supported in accordance with the principles of the Green Strategy and the securing of Sustainable Development. They will be assessed against Saved Policy GP5 and national planning guidance.

Local Priorities and Objectives for Leeds

1.11 The City is highly reliant on imported energy from outside the Leeds area and most of this energy is produced from fossil fuels. If it is to meet targets for production of renewable energy, much more emphasis on local sources of energy production will be required and a significant expansion of renewable energy generation.

1.12 Planning for energy should not be viewed in isolation from other aspects of the NRWDPD, in particular there are strong linkages with waste (creation of energy supply from waste sources), water (energy efficiency), and land (reducing land take and encouraging tree planting).

1.13 Emerging Core Strategy are aiming to exceed the buildings energy performance targets set out in Part L of the Building Regulations (currently under revision and proposed to be subject to progressive tightening in the future). This would mean carbon reductions on new developments are achieved earlier than required by these regulations.

Evidence Base

1.14 The evidence base for energy management, low carbon development and responding to climate change has been collated from various sources. These comprise:

- Natural Resource Flow Analysis[6]
- State of the Environment Report[7]
- Leeds Climate Change Strategy 2009[8]
- Climate Change Action Plan for Yorkshire and Humber 2005[9]
- Leeds 2050 Study[10]
- Appendices Figure 9 Wind Speeds[11]
- CO_2 Performance of Issues & Alternative Options Spatial Scenarios[12]

1.15 The evidence generally highlights the need to address climate change and energy in mainstream planning in order to reduce the rising emissions associated with growth whilst significantly increasing the levels of renewable or low carbon energy currently generated. Opportunities and constraints are identified across the district for developing low carbon management, and are summarised in this paper. From this evidence, the main opportunities in Leeds which can be supported by the NRWDPD are identified as:

[5] Leeds Unitary Development Plan, Leeds City Council, 2001
[6] Leeds City Council, Natural Resource Flow Analysis, January 2008
[7] Environment Leeds, State of the Environment Report August 2003
[8] Environment Leeds, Leeds Climate Change Strategy 2009
[9] Yorkshire and Humber Asembly, Your Climate: Yorkshire & Humber's Climate Change Action Plan 2005
[10] Yorkshire Forward and Leeds City Council, Leeds 2050 Study July 2007
[11] Leeds City Council NRWDPD Appendices
[12] Leeds Initiative, Issues and Alternative Options Spatial Scenarios

- Wind energy in parts of the City where wind speeds are at least 45m per second and where development can be provided without causing significant harm to the amenity of the City;
- Supporting biomass at a scale which is appropriate to its overall sustainability (for example larger scale biomass which relies on importing fuel sources may not be as sustainable);
- Energy generated from small hydro-electric projects, particularly along the River Aire;
- Smaller scale micro-generation projects which can be retrofitted to existing buildings;
- Applying high levels of carbon reduction and energy efficiency in the future design of buildings;
- Energy from waste, through new residual waste treatment projects, which are already planned;
- Treating organic wastes to provide fuel which can then be used as an energy source.

1.16 The NRWDPD also supports the preparation of additional research work to support policies on Combined Heat and Power (CHP) and heat distribution networks. This could include mapping existing and potential sources and recipients of heat. This exercise has not been completed to date as it is considered that in order to provide a comprehensive study the locations of new development proposed through the Local Development Framework process need to be defined. This exercise will also require significant engagement with the private sector to obtain data on heat generation and user requirements.

1.17 Combined Heat and Power (CHP) where energy is transferred directly from where it is generated to an end user. More work is required to investigate the infrastructure required to deliver such a network in the City and where this is most appropriate. For example, the City Centre and the main industrial areas, such as the Aire Valley, may represent the best opportunities.

1.18 CHP also requires a dedicated heating network to link the energy source with the end user. CHP works best where the heat users need a constant source of energy and where they use energy on a large scale e.g. schools, hospitals and factories.

Consultation

1.19 The consultation held on both the Issues and Options report and the Policy Position report[13] sought views on future direction for energy management and renewable generation in the district.

1.20 The majority of respondents supported the desire to increase energy generation from renewable sources in the City. Respondents also supported a reduction in the demand for energy through increased energy efficiency.

[13] Consultation report refs

2. CONTEXT AND CHARACTERISTICS OF LEEDS

Existing renewable energy generation

1.21 Installed grid-connected capacity in Leeds currently stands at 9.37 MW comprising the following sites:

Installed Grid-connected Renewable Energy Capacity (MW) in Leeds (July 2009)	
Location	**Capacity (MW)**
Skelton Grange Landfill	3.00
Peckfield Quarry & Landfill	3.09
Howden Clough Landfill	1.82
Gamblethorpe Landfill (Swillington)	1.00
Morley former Sewage Works	0.46
Total Installed Capacity	**9.37**

1.22 Permission has been given for two more gas engines at Skelton and it is likely that Peckfield will also increase.

1.23 Landfill gas qualifies to be included in renewable energy targets because the targets include energy generated from both renewable sources and low-carbon sources.

1.24 The total installed capacity for Leeds shows that by the end of 2009, the 2010 target has almost been met and is likely to be exceeded with the production of an additional 2MW at Skelton Grange and 1MW at Peckfield landfill sites. However, it should be recognised that landfill gas generation will decrease with time as the resource becomes exhausted. A reasonable assumption would be that come 2021 the output from landfill gas would peak at say 12MW but will tail off thereafter, depending on commercial factors as well as gas yield.

1.25 Leeds is also reliant on landfill gas for its existing provision. This means other types of renewable energy installations and micro-generation schemes will be required to deliver a significant increase in provision.

Potential Sources of Renewable Energy

1.26 As a major urban centre with significant residential, commercial and industrial uses, energy demand is high and primarily supplied through fossil fuel sources. The energy demand profile of these sectors has varied in recent years as a result of energy efficiency improvements and differential growth, with the recession having a further short term impact.

1.27 As a major regional growth centre Leeds has substantial planned new development in the period to 2026 consequently overall emissions are likely to rise. Its role as a major employment provider, including the services, research and industrial sectors, also gives rise to significant potential.

1.28 In terms of environmental and climatic characteristics studies have been undertaken to evaluate the potential application of renewable energy through solar, wind and water power. These indicate some potential, as highlighted in this paper, as well as constraints associated with the city's location and topography.

1.29 In common with other urban centres the potential for utilising household, commercial and industrial waste for energy generation has also been examined. The characteristics of Leeds mean that certain forms of renewable energy are more appropriate than others and offer greater generation potential:

- Wind speeds of over 45m per second are required for wind energy to be viable subject to topography and mast height;
- Leeds is not a coastal or mountainous location so the potential contribution from hydro energy is not considered to be significant. There are opportunities along the three main rivers although as these are slow moving they do not offer an ideal environment for such uses;
- The urban nature of Leeds means south facing roofs have the potential for on-site energy production. This can be achieved both through retro-fitting existing buildings and providing for solar energy in new buildings;
- Biomass can provide a useful contribution but has to be weighted against its overall life cycle impact. There are likely to be local sources of fuel which can be used to support smaller scale biomass schemes, but larger scale projects which rely on the importation of fuel sources from a long distance away are not always sustainable;
- The population size and commerce of the City means it is a major producer of waste which is a significant resource in its own right. The right balance between re-use and recycling and using waste as a source of energy is required to achieve sustainability;
- The size and functions of the City also means there is significant demand for all forms of energy. This means there is an enormous amount of untapped potential for new forms of renewable and low carbon energy;

1.30 The contribution which these energy sources can provide is discussed in more detail below.

3. KEY ISSUES

THE ENERGY HIERARCHY

1.31 In the same way as the commonly recognised waste hierarchy (reduce, re-use, recycle), successful energy planning follows a hierarchy of actions. The energy hierarchy prioritises efforts to reduce energy use by avoiding consumption at the highest tier of the hierarchy, and at the lowest tier tries to reduce ways of using fuels with the highest carbon footprint. The version of the Energy Hierarchy informing this plan is derived from that articulated by both the Institute of Engineering Technology Energy Principles (August 2009) and the Institute of Mechanical Engineers Energy policy statement 09/03:

- Avoid energy use – change design to eliminate unnecessary use
- Reduce energy use – using technology to improve energy efficiency
- Replace energy sources – use renewable, low carbon energy generation
- Exploit non-sustainable energy sources – using e.g. Combined Heat and Power

AVOIDING ENERGY USE AND ENERGY EFFICIENCY

1.32 It is important to support the efficient use of energy in new development. The Core Strategy includes policies that aim to avoid energy demand, support sustainable construction methods to increase energy efficiency in new development, and exceed the national minimum standards set by Building Regulations Part L.

ENERGY EFFICIENCY

Government Strategy

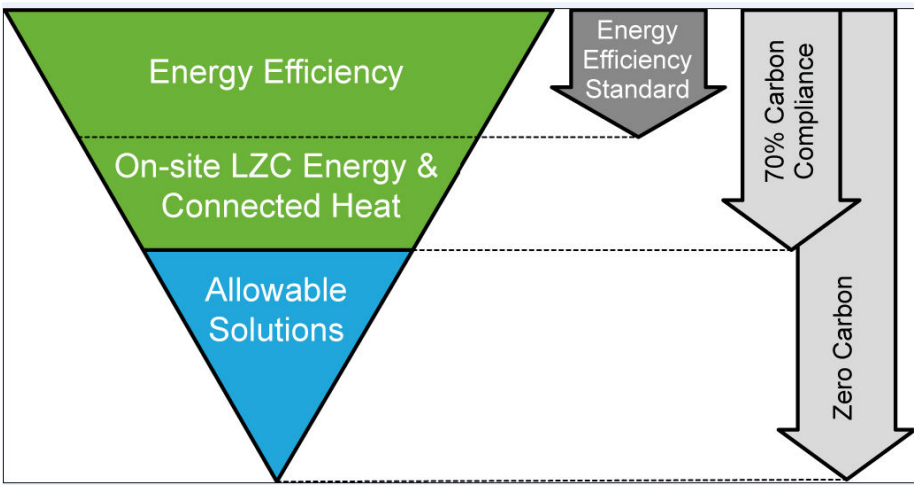
1.33 A key element of the Government's strategy for reducing carbon emissions is improving energy efficiency performance of buildings and infrastructure – both for new and existing development.

1.34 For new development the intention is to progressively move towards 'zero carbon' buildings, a principle originally established in the Government's 'Building a Greener Future: Towards Zero Carbon Development' (2006). Through this approach energy efficiency of the fabric and systems of the building are improved and low carbon energy is utilised to reduce overall net energy demand. This will be achieved by staged increases in the energy performance standards required for buildings, measure in relation to the Building Regulations Part L (2006).

1.35 Current Government intentions, outlined in the recent 'Definition of Zero Carbon Homes and Non-Domestic Buildings: Consultation' (2008) are for residential developments to be zero carbon by 2016, public buildings by 2018 and other commercial and industrial development to achieve these standards by 2019.

1.36 To deliver this strategy, energy efficiency standards for building design will be increased under the Building Regulations, with the performance 'gap' that cannot be achieved through further energy efficiency gains being delivered through a flexible combination of on- and off-site generation options. Establishing the most appropriate and flexible approach for future generation options is therefore a key consideration for local development planning.

Proposed Zero Carbon Hierarchy (Building a Greener Future)[14]



1.37 Improving energy performance is also an important component of sustainability construction standards that are now commonly applied in local planning policies. These standards include the Code for Sustainable Homes for new residential dwellings, BREEAM for public, commercial and industrial buildings and CEEQUAL for civil engineering projects. As sustainable construction techniques and materials improve there are increasing expectations that high sustainability standards can be met and hence further benchmarks may be developed over time.

1.38 For existing development, there is general recognition that the energy efficiency performance of current housing stock is a major issue in the UK, accounting for a high proportion of overall emissions. Hence schemes are emerging at community level, through local authorities, energy providers and other partnerships to promote energy efficiency improvements such as roof and wall insulation, low energy fittings and energy monitoring.

Energy Infrastructure

1.39 In order to meet these increasingly stringent energy performance standards for building construction there is a need to explore opportunities for joint energy solutions that could efficiently distribute heat and/or power across communities in Leeds. Connection of buildings to 'district' energy networks utilising lower carbon energy could also significantly reduce baseline carbon demand for the city.

Heat Distribution

1.40 Heat distribution networks have been successfully adopted in similar UK Cities, including Birmingham, Southampton and Sheffield. This shows such networks are viable and deliverable. They deliver heat from a central generation source to a district via hot water or steam. They can utilise heat from local industry that would otherwise be wasted or can be linked to power generation technology such as Combined Heat and Power (CHP). Central generation technology can also combine heat, power and cooling (trigeneration) to allow response to seasonal demands of heat.

[14] CLG, Building a Greener Future – Towards Low Carbon Development, July 2007

1.41 By comparison with the traditional methods of distributing fuel, heat distribution is safe, clean and efficient and also removes the need for individual space heaters or boilers within buildings. Networks can be flexibly applied to individual buildings, larger commercial and industrial complexes and districts of housing.

1.42 However the cost effectiveness of implementing such networks will be determined by a range of factors, including:

- The scale and density of development, influencing the energy demand and thus the financial viability of a district network;
- The need for heat, when tightening energy efficiency standards may reduce heat demand;
- The ability to design in such systems for new developments. Laying the necessary pipe work is a more cost effective exercise than retro-fitting; and
- Establishing cost effective network energy management arrangements.

1.43 Mapping the opportunities for implementing district energy networks across Leeds will allow stakeholders to consider options and plan to achieve a more integrated energy network. This exercise is supported through the NRWDPD. It will require significant consultation with the private sector to identify existing and potential opportunities. It is considered that carrying out such an exercise in advance of the site allocations for new housing, employment and other built development being brought forward through other relevant DPDs would be premature as an understanding of future spatial development is necessary.

Optimising the Grid

1.44 Although energy demand management and decentralised energy opportunities can reduce the reliance on grid supplies, conventional grid supplies of both gas and electricity will continue to be the main ways in which energy is conveyed to us. Therefore it is important that developments take due regard of energy (and more broadly utility) infrastructure requirements such as gas supply pipes, high voltage supplies and sub-stations. Given the increasing expectations on smart metering and smart grid supply, provision should be made for associated energy for more effective control of energy distribution through electronic monitoring and management.

Low Carbon Energy Generation

1.45 Whilst improving the efficiency of how energy is both delivered and used are fundamental priorities of an overall energy strategy, a further imperative is to address how this energy is generated, aiming to reduce emissions by utilising low or zero carbon technologies.

1.46 A range of technologies such as wind, solar and biomass are being adopted or developed in the UK and worldwide that may be viable in Leeds, subject to both technical and financial considerations. Their application can be either at site level on a small scale (microgeneration) to generate energy for a particular facility or process or at a wider community level. This range of potential technologies are summarised below, with indications of their likely contribution towards meeting the renewable energy generation target for Leeds.

Wind Power Generation

1.47 Large-scale installed grid-connected onshore wind energy development could significantly contribute to meeting Leeds' (and the UK's) targets. However, being low lying and away from the coast, Leeds is not a particularly favourable location and is also subject to other constraints, largely due to the predominantly urban nature of the district.

1.48 Some of the windiest parts of Leeds fall within nationally recognised designations (Sites of Special Scientific Interest, Scheduled Monuments, Conservation Areas, Listed Buildings, Registered Historic Battlefields and Registered Parks and Gardens). Requirements of local airports (Leeds Bradford Airport and Church Fenton Airfield) and potential interference with their activities are also constraints. Appropriate impact assessment for wind power developments will be required, ensuring that impacts on the local environment and community are identified and addressed. These constraints are shown on Figure xx

1.49 One turbine has been granted planning permission (2.5 MW) and there are current applications or pre application enquiries for approx 12MW of capacity. It is estimated that, subject to these constraints, if potential wind power sites were to be utilised across the district to maximum potential effect, this could contribute approximately 20 MW of power by 2021, which is a significant proportion of the overall 75 MW target.

1.50 Micro and small scale wind may also be viable, but there are some basic principles of physics that severely limit the power generation potential of such technologies. Therefore, it is anticipated that smaller-scale wind energy development and individual wind turbines will only make a limited contribution.

Solar Thermal and Photovoltaic

1.51 Solar thermal systems heat domestic hot water through capturing the sun's heat energy. System sizes are limited by available collection area and hot water storage. Performance is also strongly influenced by seasonal climatic variation, meaning that this technology is usually adopted in conjunction with conventional heating.

1.52 Solar Photovoltaic (PV) systems generate power through the effect of sunlight falling on semiconductors within a panel. Domestic solar micro-generation technology no longer requires planning permission, subject to certain conditions being met. With the introduction of Feed In tariffs that provide a financial return for electricity generated back to the grid, this technology is becoming a more cost-effective option.

1.53 In common with other urban areas, Leeds has a significant proportion of facades and roofs which are southerly facing and have the potential to contribute several MW of low carbon electricity if retrofitted

with solar technology. New houses are planned for Leeds in the plan period although the number has yet to be determined. If half of the houses given planning permission are required to generate 1kW of electricity (as they may have to under the Code for Sustainable Homes), there is the potential to contribute between 1 and 2MW capacity of low carbon electricity generation by 2021.

Biomass

1.54 Biomass heating systems can make a significant contribution to low carbon energy generation because the fuel is effectively carbon neutral, as it releases on combustion the carbon dioxide that it has absorbed during its growth.

1.55 There are various sources of biomass including wood chips, wood pellets and energy crops such as miscanthus (elephant grass). Leeds land use is dominated by urban area, green belt and high quality agricultural land (see Figure 7 Appendices). Lower quality agricultural land that may be more viable for biomass crop production is localised, however land of high flood risk or contaminated land can provide local opportunities for crops such as Willow. Whilst beneficial, or at least neutral, in carbon terms, emissions from such systems can have air quality impacts and fuel delivery, storage and handling will need to be considered carefully in the planning process.

1.56 There is the potential to increase the amount of energy produced from organic materials, such as surplus food, garden waste, agricultural waste and even sewage waste. The waste policies allow for new technologies, such as Anaerobic Digestion or In-Vessel Composting to be developed in Leeds particular at the strategic sites highlighted in the waste section. These technologies have the potential to treat organic wastes into liquid or solid form which can then be used to provide a source of fuel. Based on practice elsewhere, 50,000 tonnes of organic waste can generate between 1.5 and 2MW of energy (enough to fully power approximately 2000 homes)[15].

Heat Pumps

1.57 Heat Pumps work in the same way as a domestic fridge in reverse, using the compression and expansion of fluids to transfer heat from one place to another. Ground source heat pumps are quite well known, and use the fact that the ground temperature in the UK below the frost line is at a standard temperature of between 10 and 12 degrees C. Low grade heat energy from the ground is then upgraded to 45 to 50 degrees C and used in underfloor heating or oversized radiators. Water and Air Source Heat Pumps are similar, but obviously use different sources of low grade heat. Different installations will have different planning implications and it is difficult to estimate what potential this may provide. Heat pumps are supported in the NRWDPD as part of an overall drive to increase micro-generation.

Hydro-electricity

1.58 Hydro-power utilises water flow or fall to generate electricity and it can be used for individual properties, or a local set of properties.

1.59 Water power has previously been harnessed in Leeds to power numerous mills. In all cases a weir was constructed across the river and water diverted either directly into the mill to turn a large wheel or fed along a goit to a mill constructed nearby along the river bank. Many of these mills are historic sites and

[15] GWE Biogas facility, Driffield, East Yorkshire. See P30 of Defining Municipal Site Requirements: Final Report, September 2009.

are now listed buildings, including Armley Mills, now Leeds Industrial Museum. The rivers Wharfe, Aire and Calder which cross Leeds from west to east are generally slow moving and therefore offer limited generating potential.

1.60 An initial assessment by Leeds City Council indicates, that the rivers have potential to physically accept up to 10 small scale water power devices such as archimedes screws. If all were to go ahead the total capacity is unlikely to exceed 2 MW.

Combined Heat and Power (CHP)

1.61 CHP, also known as cogeneration, is the production of heat and power at the same time. Conventional power stations typically emit heat when generating electricity that may otherwise be wasted; however CHP captures this heat that can then be utilised for domestic or industrial purposes on various scales. Overall energy efficiency is greatly increased as a result, however such systems need to operate for a significant amount of time during the year and are dependent on the need for consistent heat demand to be viable. One way of ensuring a year round heat load is to include absorption chilling.which uses heat energy to provide cooling. This is known as trigeneration, or Combined Cooling Heat and Power (CCHP).

1.62 CHP is increasingly regarded in the UK as an important component of energy plans, with opportunities to implement systems at all scales from single units to district schemes and the flexibility to drive CHP units through conventional fuels such as gas or low carbon alternatives such as biomass.

1.63 Leeds has not yet commissioned a detailed study of the potential for CHP within the City. Therefore, this will need to be commissioned early in the plan period to consider where in the City such a network is most appropriate and also to identify where the potential users of energy are located.

Energy from Waste

1.64 Energy from Waste (EfW) processes are being increasingly planned and adopted across the UK as a means of both reducing waste volumes to landfill and delivering sustainable energy generation. Leeds City Council is working to reduce the amount of waste produced and to fulfil the ambition for a zero waste city by regarding waste as a resource.

1.65 Depending on the waste stream, different technologies can be adopted, including a range of incineration processes, mechanical biological treatment (MBT), anaerobic digestion (AD) and pyrolisis. EfW can contribute to reducing carbon emissions by both generating energy and reducing the impact of landfill biodegradation caused by release of greenhouse gases such as methane.

1.66 There are a number of proposed facilities for Leeds which are currently in the early planning stages. If commissioned, these are anticipated to provide generation capacity of approximately 35 MW based on similar scale facilities elsewhere in the Country. The NRWDPD supports the provision of such facilities at three strategic locations within the Aire Valley Leeds, particularly where they are close to grid connections and potential sources of energy (see the waste section).

1.67 Additionally, a significant amount of energy is being obtained from existing landfills in Leeds through capture of landfill gas that is then utilised to generate electricity. This is currently providing approximately 9MW, a level that should continue until the volume of landfill gas produced eventually declines.

POTENTIAL CONTRIBUTION FROM RENEWABLE AND LOW CARBON ENERGY SOURCES IN LEEDS

1.68 The table below summarises the potential contribution from renewable and low carbon energy in Leeds:

Potential Renewable and Low Carbon Energy Contribution in Leeds

Energy Source	Potential Contribution
Landfill Gas	12
Wind Power	20
Micro-generation including solar power, heat pumps	10
Energy from Waste	35
Hydro-power	<2
Energy from biomass	2
Total	**80**

Delivery Mechanisms

1.69 The implementation of lower carbon energy management plans requires partnership working that includes major roles for both the public and private sectors to work together to establish the most effective long term energy solutions.

1.70 Local stakeholders need to be engaged as participants where joint energy solutions are proposed, to maximise uptake and future viability. Specialist infrastructure development and management skills may also be necessary, often provided through Energy Service Companies (ESCOs).

1.71 Within this context Leeds is liaising with neighbouring authorities and is currently exploring the formation of a strategic body ('Energy Leeds') that will encourage all major new developments in the sub-region to investigate the potential for renewable energy technologies. This body will employ delivery vehicles such as ESCOs which are tailored to meet the needs of specific projects or initiatives in order to deliver low carbon projects.

1.72 The Council will also need to work with energy providers in advance of planning applications for new facilities being received.

1.73 Small-scale domestic micro generation technologies, such as biomass, CHP, solar and ground source heat pumps do not require planning permission under Part 40 of the General Permitted Development Order but some others, such as micro wind energy, do require permission. There are also circumstances where planning permission may still be required on domestic properties, for example where it is a listed building and where other exceptions outlined in the GDPO are not met. The

coalition Government set to relax further the types and scale of technologies where planning permission will not be required subject to further legislation being passed[16].

[16] See the planning portal.gov.uk for updates on the most recent guidance on micro-generation as the planning rules are likely to change during the plan period.