Module 1: LDF / plan making evidence base and implementation of the Yorkshire and Humber Renewable and Low Carbon Energy Study 2011. Tuesday 6th March, Leeds.

Group Activity – Using Evidence to Inform Policy Development

Local Authority District: ROTHERHAM

Background

Rotherham Metropolitan District Council commissioned Wardell Armstrong to undertake a Low Carbon and Renewable Energy Study. The study was commissioned following completion of the AECOM Low Carbon and Renewable Energy Capacty in Yorkshire and Humber Study.

The study refined the analysis undertaken in the AECOM work.

Evidence

Section 1: Extract from AECOM 2011 Low Carbon and Renewable Energy Capacity in Yorkshire and Humber Study

Section 2: Extract from Wardell Armstrong Rotherham Low Carbon and Renewable Energy Study, November 2011

Section 1: Extract from AECOM 2011 Low Carbon and Renewable Energy Capacity in Yorkshire and Humber Study

Appendix B.15. Renewable Energy Resource for Rotherham

Capabilities on project:
Building Engineering - Sustainability

B.15 Rotherham

Population: 250,000

The borough of Rotherham is located in South Yorkshire and was traditionally a major industrial centre based on coal and steel. Most of the traditional industries have now vanished, although there is still a steelworks at Aldwarke and a coal mine at Maltby.

Rotherham town centre has sufficient heat density to support heat networks, and there are several small scale networks covering estates throughout the borough.

Beyond the town centre and away from the Don Valley, Rotherham is largely (about 52%) rural. The borough has significant potential for commercial scale wind and also some potential for hydro; Jordan Dam has been identified as a potential site.

Capabilities on project:
Building Engineering - Sustainability

Rotherham	Current capacity (MW)	Current capacity (GWh)	Potential resource - heat (MW)	Potential resource - electricity (MW)	Potential resource (GWh)	Potential resource (No of existing homes equivalent energy demand)	Potential resource (Proportion of regional resource)
Commercial wind	26	69	0	91	239	0	0%
Small scale wind	0	0	0	1	1	0	5%
Hydro	0	0	0	1	3	0	0%
Solar PV	1	1	0	12	9	0	0%
Solar thermal	0	0	18	0	11	1220	5%
Air source heat pumps	0	0	10	0	15	643	4%
Ground source heat pumps	0	0	6	0	11	390	4%
Biomass energy crops	0	0	7	4	59	476	1%
Biomass woodfuel	1	2	14	0	36	908	4%
Biomass agricultural arisings (straw)	0	0	5	2	38	320	2%
Biomass waste wood	0	0	2	1	14	116	3%
Energy from waste wet	0	0	1	1	11	84	1%
Energy from waste poultry litter	0	0	0	0	0	0	0%
Energy from waste MSW	0	0	2	1	20	166	3%
Energy from waste C&I	0	0	4	2	35	297	3%
Energy from waste landfill gas	1	6	0	0	0	0	0%
Energy from waste sewage gas	0	2	0	0	6	0	0%
Total	29	79	86	117	582	5,757	

Table 66 Current capacity and renewable energy resource in Rotherham. Current" refers to facilities that are operational or have planning consent

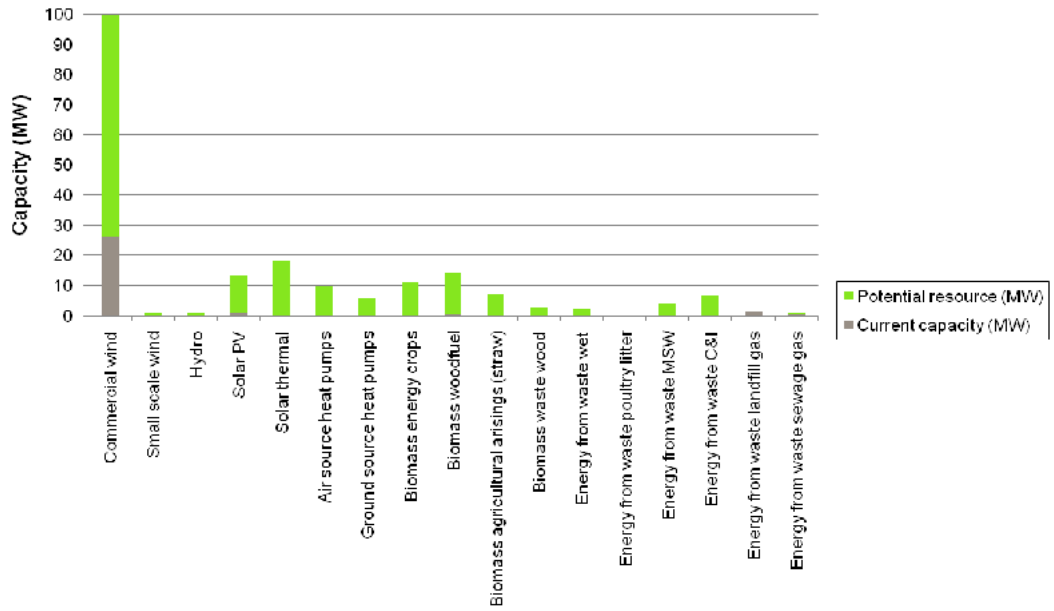

Figure 88 Current capacity and renewable energy resource in Rotherham. Current" refers to facilities that are operational or have planning consent

Capabilities on project:
Building Engineering - Sustainability

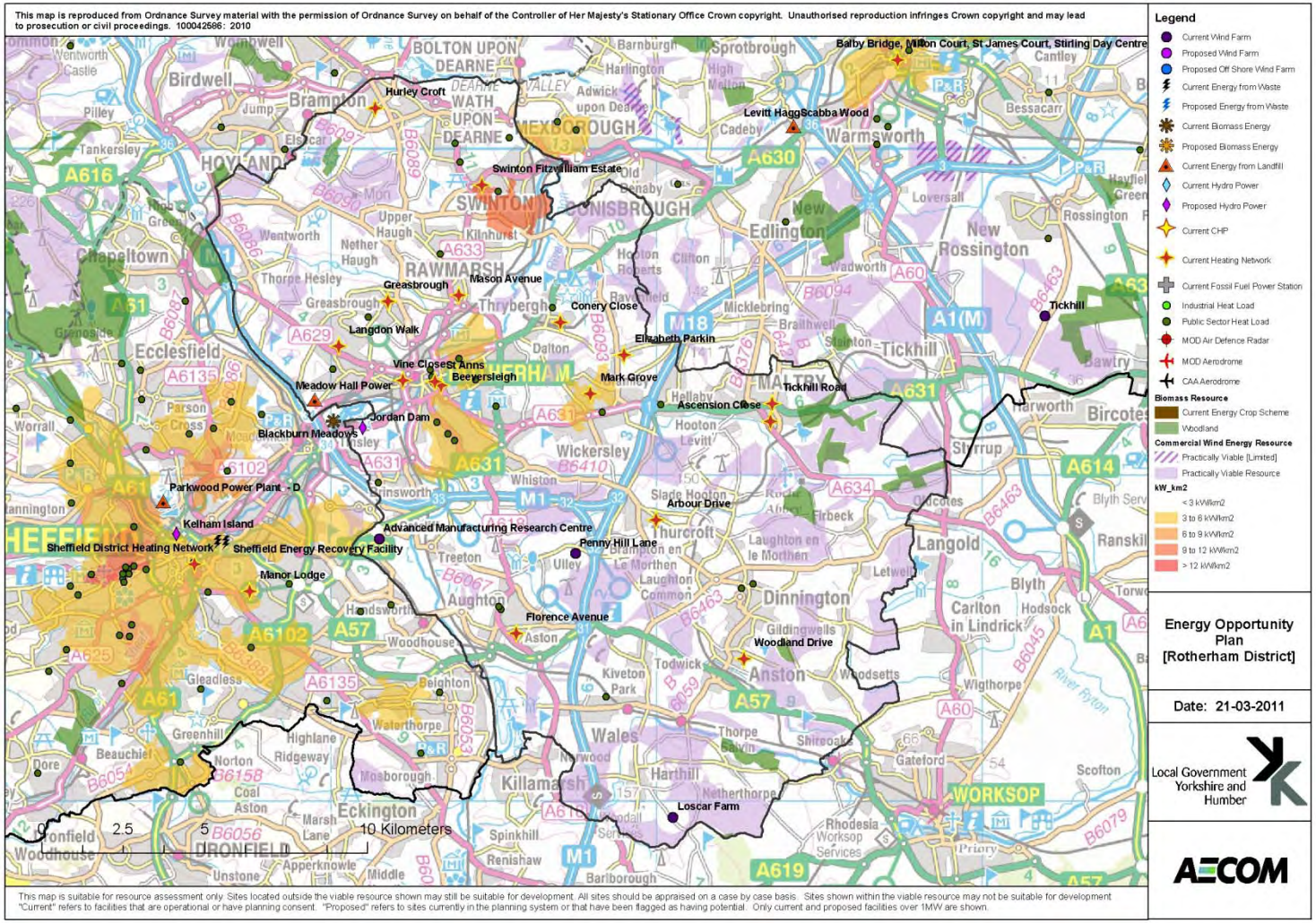

Figure 89 Energy opportunities plan for Rotherham. “Current” refers to facilities that are operational or have planning consent. “Proposed” refers to facilities currently in the planning system or sites that have been flagged as having potential. For all technologies except hydro, only current and proposed facilities over 1MW are shown. The areas with purple hatched shading described as “Practically viable [Limited]” represent areas where commercial scale wind energy development should be viable but the number of turbines may be restricted due to environmental constraints. Please refer to section 5.14 and appendix A for more details.

Section 2: Extract from Wardell Armstrong Rotherham Low Carbon and Renewable Energy Study, November 2011

Executive Summary (pages 1-6)

Conclusions

EXECUTIVE SUMMARY

Introduction

This report relates to a Renewable and Low Carbon Energy Evidence Base Study commissioned by Rotherham Metropolitan Borough Council (RMBC) in July 2011 to facilitate the formulation and justification of Local Development Framework (LDF) policies relating to renewable and low carbon energy.

This report is designed to follow on from the regional study, undertaken by AECOM, entitled 'Low carbon and renewable energy capacity in Yorkshire and Humber'. A review of the AECOM study identified a number of areas where the original energy Opportunity Plan (EOP) could be improved. WA has sought to make these improvements by enhancing the original study whilst avoiding any unnecessary repetition. The following areas were selected for more detailed/finer grain analysis:

- Heat and power mapping
- Large scale wind resource
- Medium scale wind (Feed in Tariff) resource
- Biomass (specifically dedicated energy crops and woodlands)

Heat and Power Mapping

The current total energy demand for Rotherham Metropolitan Borough (RMB) based on the analysis contained in this report but excluding transport is estimated at:

Electricity	788	GWh/yr
Heat	2,560	GWh/yr
Total	3348	GWh/yr

This equates to a total annual CO_2 emission figure for RMB, excluding those associated with transport, of 983,000 tonnes.

In comparison, energy demand values provided by DECC identified gas consumption as being 2,477GWh/yr and electricity consumption as being 563GWh/yr for 2009. These came

to an overall total value of 3,040GWh/yr. This is a reasonably good agreement given the assumptions used in the demand modelling.

The heat mapping exercise identified several high density heat loads that are potentially exploitable for retrofitting district heating/CHP schemes. Potential candidate sites include:

- Wath Upon Dearne – area around Beech Road, Avenue Road and Sandymount Road.
- Holmes, Rotherham – area around Hartington Road, Cavendish Road, Josephine Road and Belmount Street
- St Ann's, Rotherham - RMBC Leisure Centre and housing to the east (*it is understood that a 500kW biomass boiler was installed nearby at Shaftsbury House in 2007 but has yet to be fired. Furthermore, it is not clear that the leisure centre is serviced by this and so there is some potential for expansion*)
- Moorgate, Rotherham - Rotherham District General Hospital and adjacent housing
- Rawmarsh – Goosebutt Street, Netherfield Lane and Spalton Road.
- Locations along Bawtry Road, Bramley, Rotherham

Wind

The potential for large and medium scale wind resource is shown below. This was revised from the regional study to include medium scale wind turbines under the Feed in Tariff.

Revised Potential Wind Resource in Rotherham							
Scale	Area (ha)	Number of Turbines	Capacity (MW)	Energy (GWh/yr)	CO_2 Savings (t/yr)	Electricity Demand	Total Energy Demand
Large	517	27*	55	180	90,444	31%	6%
Medium	304.5	133	66.5	219	97,877	39%	7%

*equivalent number of 2MW wind turbines.

Although this represents the practically available wind resource in RMB, site specific constraints may arise during the planning and the development of a wind project which may prevent this resource potential being fully achieved.

Biomass

The potential for biomass energy crops was revised as part of this study as the original biomass data was not available. The total yields were used to estimate a practical resource potential for heat and electricity generation from biomass, as shown below.

Revised Current Capacity and Potential Biomass Resource in Rotherham					
Renewable Energy Resource	Current Capacity MW	Current Capacity GWh	Potential Resource - heat (MW)	Potential Resource - electricity (MW)	Potential resource GWh
Energy crops	0	0	7.4	3.7	88.8
Forest residues	1	2	1.2	0.6	14.4

The biomass resource in RMB is limited and could meet just 6% of its electricity needs. To increase this additional biomass resource will need to be imported from outside the Rotherham boundary.

Energy Opportunity Plan

The table below shows the revised Energy Opportunity Plan based on the findings of this study and the regional study undertaken by AECOM.

Revised Current Capacity and Potential Renewable Resource in Rotherham					
Renewable Energy Resource	Current Capacity MW	Current Capacity GWh	Potential Resource - heat (MW)	Potential Resource - electricity (MW)	Potential resource GWh
Large scale wind	26	69	0	55	179.7
Medium scale wind	0	0	0	66.5	219
Small scale wind	0	0	0	1	1
Hydro	0	0	0	1	3
Solar PV	1	1	0	12	9
Solar Thermal	0	0	18	0	11
Air source heat pumps	0	0	10	0	15
Ground source heat pumps	0	0	6	0	11
Biomass energy crops	0	2	7.4	3.7	88.8
Biomass woodfuel	1	0	1.2	0.6	14.4
Biomass agricultural arisings	0	0	5	2	38
Biomass waste wood	0	0	2	1	14
Energy from waste wet	0	0	1	1	11

Energy from waste poultry litter	0	0	0	0	0
Energy from waste MSW	0	0	2	1	20
Energy from waste C&I	0	0	4	2	35
Energy from waste landfill gas	1	6	0	0	0
Energy from waste sewage gas	0	2	0	0	6
Total	29	80	56.6	146.8	572.7*

*This is equivalent to approximately 18% of the current energy demand in RMB

Wardell Armstrong Revisions	
AECOM study	

RMBC is currently preparing a Local Development Framework to identify key areas for development over the 15 years from 2012 - 2027. This study has assessed the potential for low carbon and renewable energy resources within the LDF target and specifically in the key areas highlighted for development, which include:

- Waverley
- Bassingthorpe Farm
- Dinnington

The study identified that large mixed-use developments may be able to benefit from district heating and combined heat and power plants or wind turbines whilst smaller developments may not have high enough energy demand or the land area to accommodate these technologies, however building integrated renewable technologies could provide significant CO_2 savings for these buildings. As part of the assessment an economic appraisal tool (EAT) was developed which has now been provided to RMBC to facilitate the assessment of low carbon and renewable energy technologies on a site by site basis.

Consultation Event

A stakeholder Consultation Event was held on the 30th of September 2011 at Rotherham Town Hall. The primary objectives were to inform stakeholders about the draft results of the study in terms of the enhanced evidence base and also to solicit comments on the options for low carbon and renewable energy targets and the planning policies being developed.

Although there was some polarisation between the attendees, private sector versus public/voluntary sector, there was no clear steer towards pragmatic or pioneering targets/polices.

Renewable Energy Targets

The outcomes of this study and the accompanying consultation have identified that the following targets would offer both a pragmatic and pioneering approach to achieving increased levels of renewable energy deployment within RMB.

Borough Wide Targets	
Renewable energy sources should provide 10% of predicted energy use within the whole Borough plus a notional 1% uplift per annum up to 2020.	
Development Year*	**Renewable energy target**
2012	10%
2013	11%
2014	12%
2015	13%
2016	14%
2017	15%
2018	16%
2019	17%
2020	18%**
**Subject to Core Strategy adoption date* ***Maximum currently available renewable energy resource within RMB*	

It should be noted that from a practical perspective the currently available renewable energy resource within RMB equates to only 18% of the current energy demand.

Local Development Targets

For new housing developments targets should be adopted in line with current proposals for zero carbon homes and new Building Regulations as shown below.

Residential Carbon Compliance Levels			
Carbon Compliance levels for 44% CO_2 reduction from 2013	All dwellings	**14**	$kgCO_2/m^2/yr$
Carbon Compliance levels for Zero Carbon Homes from 2016	Detached houses	**10**	$kgCO_2/m^2/yr$
	Attached houses	**11**	
	Low rise apartment blocks	**14**	

These compliance levels are only applicable to residential properties. Non-residential developments should adopt the Borough wide targets above and generate further renewable or low carbon energy or incorporate appropriate design measures to reduce the development's overall predicted carbon dioxide emissions by 20% until appropriate carbon compliance targets are introduced via the Buildings Regulations.

Post 2016 CO_2 emissions up to the relevant compliance level are expected to be met by allowable solutions.

Policy

There is a clear framework through EU, national and local legislation for the inclusion of planning policies designed to encourage the implementation of suitable renewable energy schemes to help achieve European and national targets on CO_2 emissions and climate change.

This evidence base study has shown that the largest potential for renewable energy delivery lies with large scale and particularly medium scale wind. In essence, they offer over half the potential resource across all technologies. Solar PV and thermal can also offer a substantial opportunity, however the successful deployment of this technology tends to be linked to government incentives which tends to introduce constraints in terms of the timing of applications. Existing stock retro-fit tends to be somewhat at the behest of Governmental intervention but should be offered serious consideration, in particular any district heating opportunities.

Rotherham MBC's Local Development Framework (LDF) has the critical role in ensuring future development is delivered in a sustainable manner. The Council's Core Strategy is the primary document within the LDF.

Draft policy CS27 contained within the Core Strategy, as it currently stands, is in line with national guidance, primarily laid out in PS22: Renewable energy. Although this type of policy is adequate, the evidence set out in this study suggests that Rotherham MBC could improve its local distinctiveness by incorporating specific technologies identified in the Energy Opportunities Plan and targets.

9 CONCLUSIONS

9.1 On the basis of the heat modelling conducted for this analysis total residential heat demand in RMB is estimated to be 1,788GWh/yr, commercial demand is expected to be 488GWh/yr and industrial demand is expected to be 284GWh/yr. Total aggregated heat demand within the Borough is expected to be 2,560GWh/yr.

9.2 As a result of the modelling of the total electrical demand in residential properties in RMB is estimated to be around 416GWh/yr. Commercial demand is estimated at 304GWh/yr and industrial demand at 68GWh/yr. Total overall electrical demand has been modelled to be 788GWh/yr.

9.3 The revised evidence base found 13 sites that would be suitable for large scale wind development and 101 sites that would be suitable for medium scale wind development. It should be noted that whilst technical and environmental constraints have been considered in this study further constraints to development may arise for specific projects in these areas. These may include aviation constraints, access limitations, landscape and visual impact objections etc.

9.4 The biomass resource was also included in the revised evidence base and identifies large areas that would be suited to growing energy crops (Miscanthus or Short Rotation Coppice) or contain existing forestry residues. It would not be practical to turn all this land over to energy crops however the resource assessment helps to identify suitable land where this could be developed.

9.5 The report identified that biomass resource in Rotherham could meet 6% of borough's electricity needs through biomass CHP. To increase this additional biomass resource will need to be imported from outside the Rotherham boundary.

9.6 The existing district heating networks dataset obtained from AECOM identifies 16 district heating installations in RMB. These installations are of various sizes and are scattered across the Borough near urban areas.

9.7 In addition to this, the heat mapping exercise has identified several high density heat loads that are potentially exploitable for retrofitting district heating/CHP schemes.

Although from high level observation these sites appear to have some potential, it is important that detailed investigation and financial analysis be completed on each site to ascertain its true viability as this work has not been done.

9.8 Some potential candidate sites include:

- Wath Upon Dearne – area around Beech Road, Avenue Road and Sandymount Road.
- Holmes, Rotherham – area around Hartington Road, Cavendish Road, Josephine Road and Belmount Street
- St Ann's, Rotherham - RMBC Leisure Centre and housing to the east.
- Moorgate, Rotherham - Rotherham District General Hospital and adjacent housing
- Rawmarsh – Goosebutt Street, Netherfield Lane and Spalton Road.
- Bramley, Rotherham

9.9 Rotherham MBC is currently preparing a Local Development Framework to identify key areas for development over the next 15 years. These areas will provide new homes and employment land and offer an excellent opportunity to encourage the development of low and zero carbon technologies.

9.10 The proposed LDF has a target of 12,750 homes by 2027 and 235ha of employment land. It is likely that this will be achieved through the development of key sites at Waverley, Bassingthorpe Farm and Dinnington with more scattered sites providing a smaller contribution. Large mixed-use developments may be able to benefit from district heating and combined heat and power plants or wind turbines. Smaller developments may not have high enough energy demand or the land area to accommodate these technologies however; building integrated renewable technologies could provide significant CO_2 savings for these buildings

9.11 Low and zero carbon technologies should be encouraged, if not enforced, in new developments. The range of technologies available provides a number of options for all size and type of development.

9.12 Building integrated solutions are best suited to smaller developments where the energy demand is low and variable. The best of these technologies would be either solar PV or solar thermal, both of which provide a good reduction in CO_2 in comparison with other technologies and solar PV also gaining a good return on investment due to the Feed in Tariff. In addition biomass boilers can offer a good solution for schools, hospitals and commercial offices.

9.13 The installed cost of building integrated solutions can be relatively high in terms of the capacity installed. It is likely that this cost will be added to the house price to ensure the developers redeem their costs.

9.14 For larger mixed use developments whole site solutions offer the best option in terms of CO_2 reduction and investment opportunities. District heating can meet both heat and power demand when coupled with a CHP plant. A base load CHP plant coupled with a gas CHP offers the best solution for matching the demand of most developments whilst still providing a significant reduction in CO_2. The investment opportunities for these plants are good as the generation from the biomass plant will receive a financial incentive in addition to the heat and electricity sales. In order for a biomass CHP plant to operate efficiently it should be run at a constant load throughout the year. This makes CHP most suited to mixed use developments where energy demand will continue all year round despite a reduction residential heating.

9.15 A biomass plant will require fuel storage alongside the boiler and turbine house. Typically a biomass fuelled steam turbine will require at least 5 days fuel stored at any given time. The plant will also need to allow turning space for articulated delivery Lorries. These requirements mean that the footprint of a biomass CHP plant will be substantially bigger than a gas boiler or gas CHP plant. There will need to be constant management and staffing to oversee the delivery and handling of the fuel as well the general operation of the plant.

9.16 Commercial wind turbines offer a whole site solution with less operation requirements. For the developments assessed, 3-4 large scale wind turbines could adequately meet the demand of a development, providing significant CO_2 reduction. A windfarm can also prove a good investment opportunity and all electricity generated can be exported to the grid, ensuring no energy is wasted. However, there

are a number of issues which often restrict locations in which large scale wind turbines may be deployed. These include but are not limited to: the proximity of residential dwellings, the perceived visual impact, noise, electromagnetic interference (EMI) and accessibility of the site. There are also associated exclusion zones for protected areas and airports. Typically, building integrated technologies need to be deployed in or around urban centres and therefore several of these restrictions may apply, however the turbines could be located off site in the areas identified as suitable by the large scale wind resource study.

9.17 In order for a developer or company, or indeed local authority, to benefit from the investment opportunities available from the whole site solutions it may be necessary for the company to form an Energy Service Company (ESCo) to manage the plant and heat network and/or windfarm. From experience, developers are not keen to undertake this commitment and it may be beneficial to encourage community owned or local authority ESCOs to take on the management and operation of these plants once constructed.

9.18 Rotherham has a landscape with abundant natural resources, which clearly lend themselves toward wind and solar opportunities. These resources provide an excellent opportunity to deploy a good range of Renewable and Low Carbon Energy Technologies to deliver significant outputs.

9.19 The Borough of Rotherham is set to see significant growth promoted by an LDF policy framework. The implementation of carefully thought out policies will enable Rotherham to utilise its natural resources in the most effective and sustainable manner, and can be achieved through maximisation of opportunity on strategic site proposals.

9.20 This Evidence Base Study has shown where the technical resource exists and provides guidance as to how best to develop supporting LDF policies for the deployment of Renewable and Low Carbon Energy Technologies. Rotherham MBC is therefore in a much more knowledgeable position about how to make use of these technologies to meet, or potentially exceed, their energy obligations and targets.

9.21 This is based on the potential resource and deployment strategy for the range of Renewable and Low Carbon Energy Technologies.

10 RECOMMENDATIONS

10.1 It is recommended that Rotherham Metropolitan Borough Council adopt the suggested low carbon and renewable energy targets and policies in their forthcoming LDF.

10.2 Rotherham Metropolitan Borough Council should maximise the implementation of low carbon and renewable energy resources on their own estate.