

Capabilities on project:
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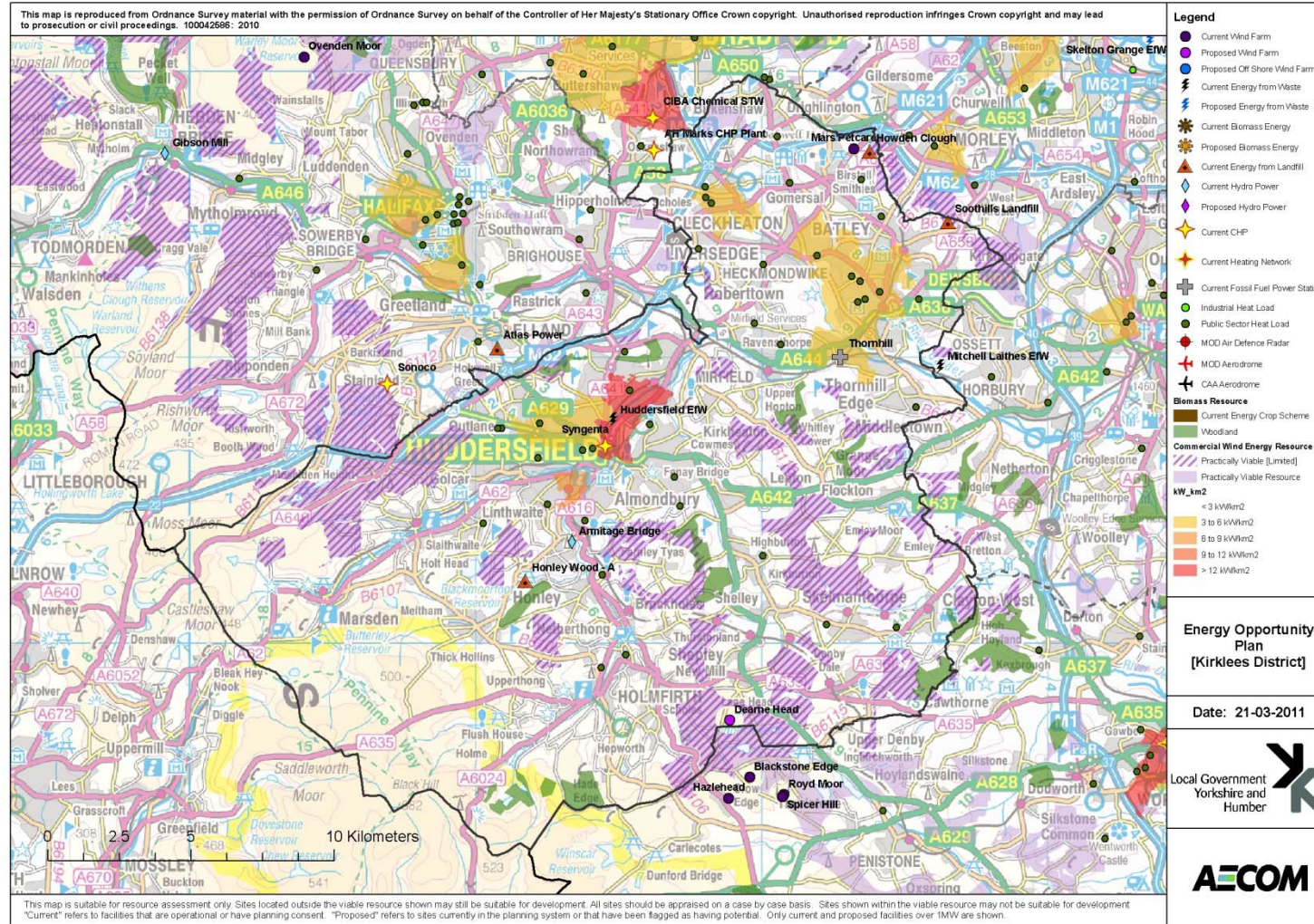


Figure 79 Energy opportunities plan for Kirklees. "Current" refers to facilities that are operational or have planning consent. "Proposed" refers to facilities currently in the planning system or sites that have been flagged as having potential. Only current and proposed facilities over 1MW are shown. 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 5.15 and appendix A for more details.

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B.11 Leeds

Population: 770,800

Land area (km²): 552



Leeds is the regional capital. The main urban area covers 28% of the district and is surrounded by a number of free standing market towns (including Otley and Wetherby).

As one of the UK's largest cities, it has a large area with high heat density. There is an existing district heating network in the city centre shared between the General Infirmary and the University of Leeds which is powered by a 15 MW_e CHP plant. There are many public buildings in close proximity to the network, which could act as anchor loads if the network were to be expanded. Surrounding towns and suburbs – Yeadon, Horsforth, Pudsey, Morley, Rothwell, and Garforth – also exhibit potential to support district heating networks.

Despite being quite urban with two airports and several environmentally designated areas, Leeds also has some potential for commercial scale wind energy, particularly in the east of the district.

Hydro is also a promising renewable energy in the district, ranking among the top five in the region. There is currently only one hydro scheme, Garnett Hydro, which borders on Harrogate to the north. With the potential to be a hydro leader in the region, other hydro options should be explored.

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Leeds	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	0	0	0	80	211	0	0%
Small scale wind	0	0	0	3	4	0	15%
Hydro	0	0	0	3	9	0	0%
Solar PV	0	0	0	44	33	0	0%
Solar thermal	0	0	60	0	37	4012	17%
Air source heat pumps	0	0	31	0	49	2083	13%
Ground source heat pumps	0	0	4	0	8	285	3%
Biomass energy crops	0	0	10	6	85	692	2%
Biomass woodfuel	0	0	33	0	87	2219	9%
Biomass agricultural arisings (straw)	0	0	3	1	20	173	1%
Biomass waste wood	0	0	6	3	51	431	13%
Energy from waste wet	0	0	3	3	28	211	3%
Energy from waste poultry litter	0	0	0	0	0	0	0%
Energy from waste MSW	0	0	7	4	55	468	8%
Energy from waste C&I	0	0	19	9	148	1254	12%
Energy from waste landfill gas	9	45	0	0	0	0	0%
Energy from waste sewage gas	0	0	0	0	23	0	0%
Total	9	46	223	156	1,051	14,885	

Table 62 Current capacity and renewable energy resource in Leeds. Current^{tr} refers to facilities that are operational or have planning consent

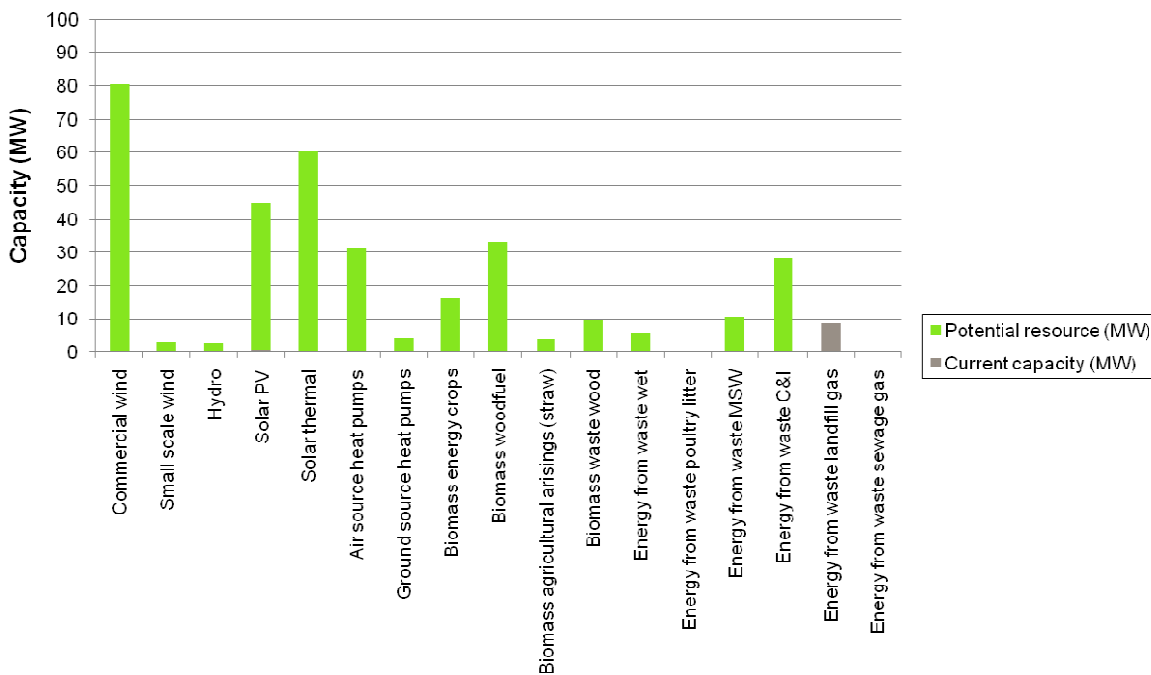


Figure 80 Current capacity and renewable energy resource in Leeds. Current^{tr} refers to facilities that are operational or have planning consent

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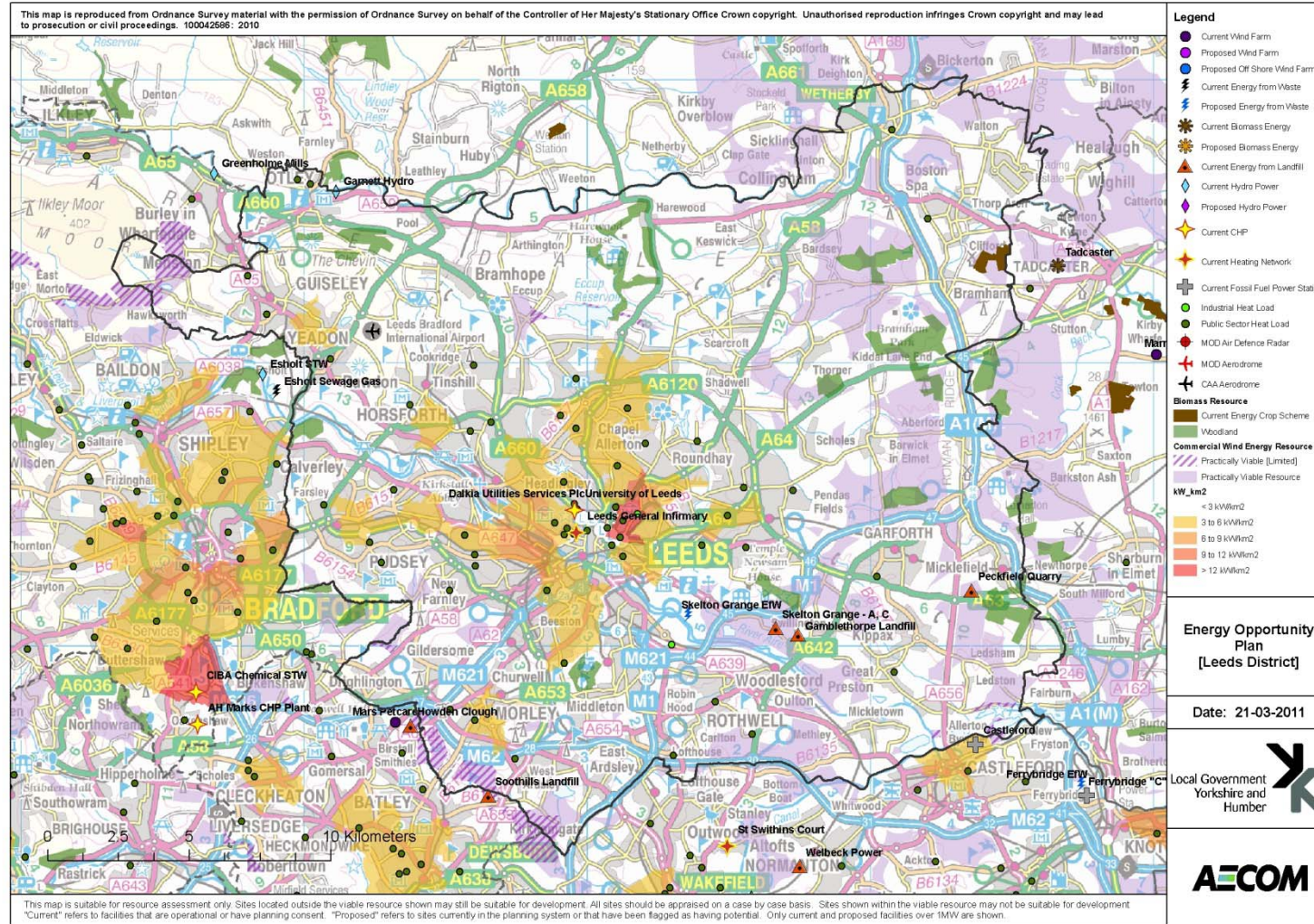


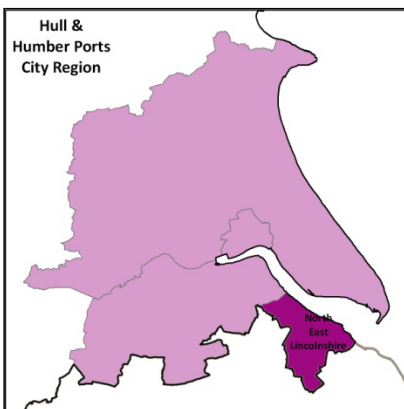
Figure 81 Energy opportunities plan for Leeds. "Current" refers to facilities that are operational or have planning consent. "Proposed" refers to facilities currently in the planning system or sites that have been flagged as having potential. Only current and proposed facilities over 1MW are shown. The 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 5.15 and appendix A for more details.

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B.12 North East Lincolnshire

Population: 158,200

Land area (km²): 192



North East Lincolnshire is a relatively small, unitary authority and includes the port towns of Grimsby and Immingham, the seaside resort of Cleethorpes, a range of villages of varying size and composition, and the attractive landscape of the Lincolnshire Wolds. Opportunities for renewable energy generation in North East Lincolnshire are fairly limited and are centred around the towns of Grimsby, Immingham, and Cleethorpes, which could be viable for district heating networks. There are already two CHP plants on the outskirts of Grimsby, and one in Immingham.

The study has found that there are very few opportunities for commercial wind and hydro. However, there are significant opportunities for the borough to become a hub in terms of processing waste and biomass for energy generation.

The borough is at the heart of the Humber Trade Zone with the biggest port complex in the UK. The Docks and industrial complex in and around Immingham together with the refineries in Killingholme and the adjacent North Lincolnshire Authority have come to be known as the South Humber Bank Energy Corridor with facilities to handle liquid, solid and renewable fuels.⁶⁷

Although there do appear to be significant opportunities for growing biomass, the area's excellent transport links and access to the Humber Estuary could make it a hub for biomass fuel processing. The 65 MW Helius biomass plant outside of Stallingborough will require up to 850,000 tonnes of sustainably sourced feedstock each year, primarily wood-based material. Drax and Siemens Project Ventures have also announced plans to develop a 290 MW biomass plant at the south west edge of the Port of Immingham. It is expected to process 1.4 million tonnes of biomass annually and although imported biomass will initially make up much of the fuel source, Drax have stated that they are "keen to develop the use of indigenous biomass fuels where available and the company is encouraging the development of local energy crops."⁶⁸

North East Lincolnshire Council is currently updating its waste strategy, which was published in 2004. It already treats around 56,000 tonnes per annum of its residual MSW at the 3.2MW_e Newlincs Energy from Waste and CHP incinerator in Grimsby. Its preferred approach to meeting the waste targets set out in the strategy is to use a second CHP facility located at the same site. The Energy Opportunities Map has not identified any users for the 3MW waste heat that is also produced.

Whilst a review of the opportunities from offshore renewable energy technologies are outside the scope of this study, it should be noted that as the Ports of Grimsby and Immingham are the UK's largest, they offer the capacity and resources to service offshore wind farms from here. Providing skills training for employment in this industry is important to supporting the development of this industry. Also, Pulse Tidal have installed a 0.15 MW tidal stream energy generator in the Humber estuary off the coast of North East Lincolnshire. This is connected to the grid at the Millennium Inorganic Chemicals plant.

⁶⁷ North East Lincolnshire Local Development Framework Annual Monitoring Report 2010, Balfour Beatty, December 2010

⁶⁸ Heron Renewable Energy Plant, Drax website accessed January 2011, http://www.draxpower.com/biomass/renewable_energy_plants/heron_plant/

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North East Lincolnshire	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	0	0	0	235	618	0	0%
Small scale wind	0	0	0	0	0	0	2%
Hydro	0	0	0	0	0	0	0%
Solar PV	0	0	0	5	4	0	0%
Solar thermal	0	0	9	0	6	633	3%
Air source heat pumps	0	0	7	0	10	434	3%
Ground source heat pumps	0	0	12	0	21	767	7%
Biomass energy crops	0	0	6	3	45	367	1%
Biomass woodfuel	0	0	3	0	9	228	1%
Biomass agricultural arisings (straw)	0	0	5	2	39	333	2%
Biomass waste wood	0	0	1	0	6	51	2%
Energy from waste wet	0	0	1	0	5	37	1%
Energy from waste poultry litter	0	0	0	3	13	0	0%
Energy from waste MSW	6	42	2	1	15	128	2%
Energy from waste C&I	0	0	3	2	25	214	2%
Energy from waste landfill gas	1	5	0	0	0	0	0%
Energy from waste sewage gas	1	3	0	1	3	0	0%
Total	0	0	12	0	52	798	2%

Table 63 Current capacity and renewable energy resource in North East Lincolnshire. Current^{††} refers to facilities that are operational or have planning consent

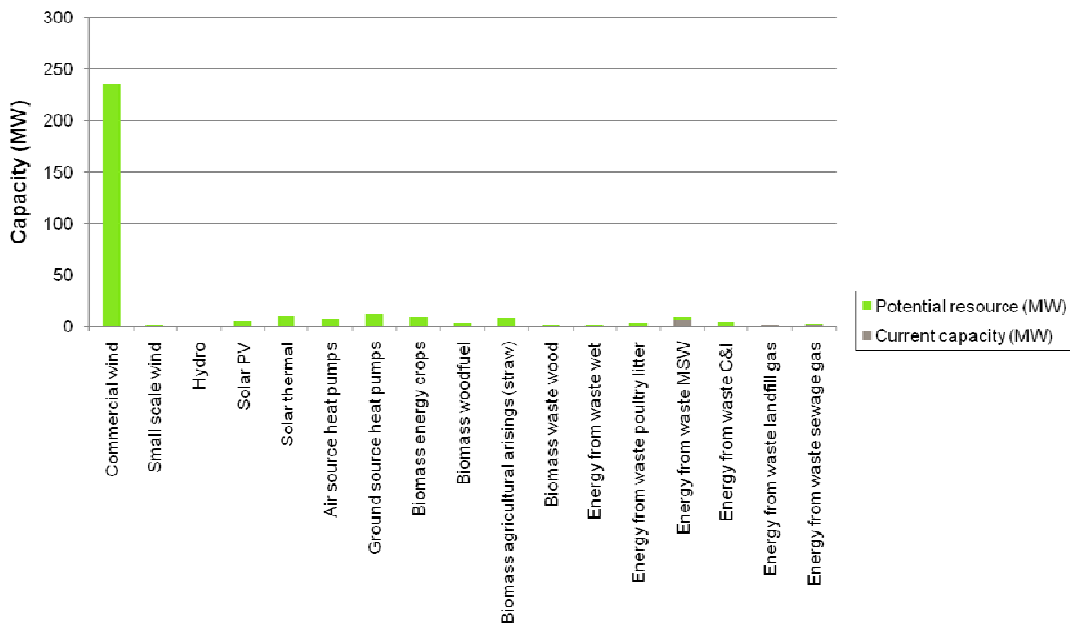


Figure 82 Current capacity and renewable energy resource in North East Lincolnshire. Current^{††} refers to facilities that are operational or have planning consent 83

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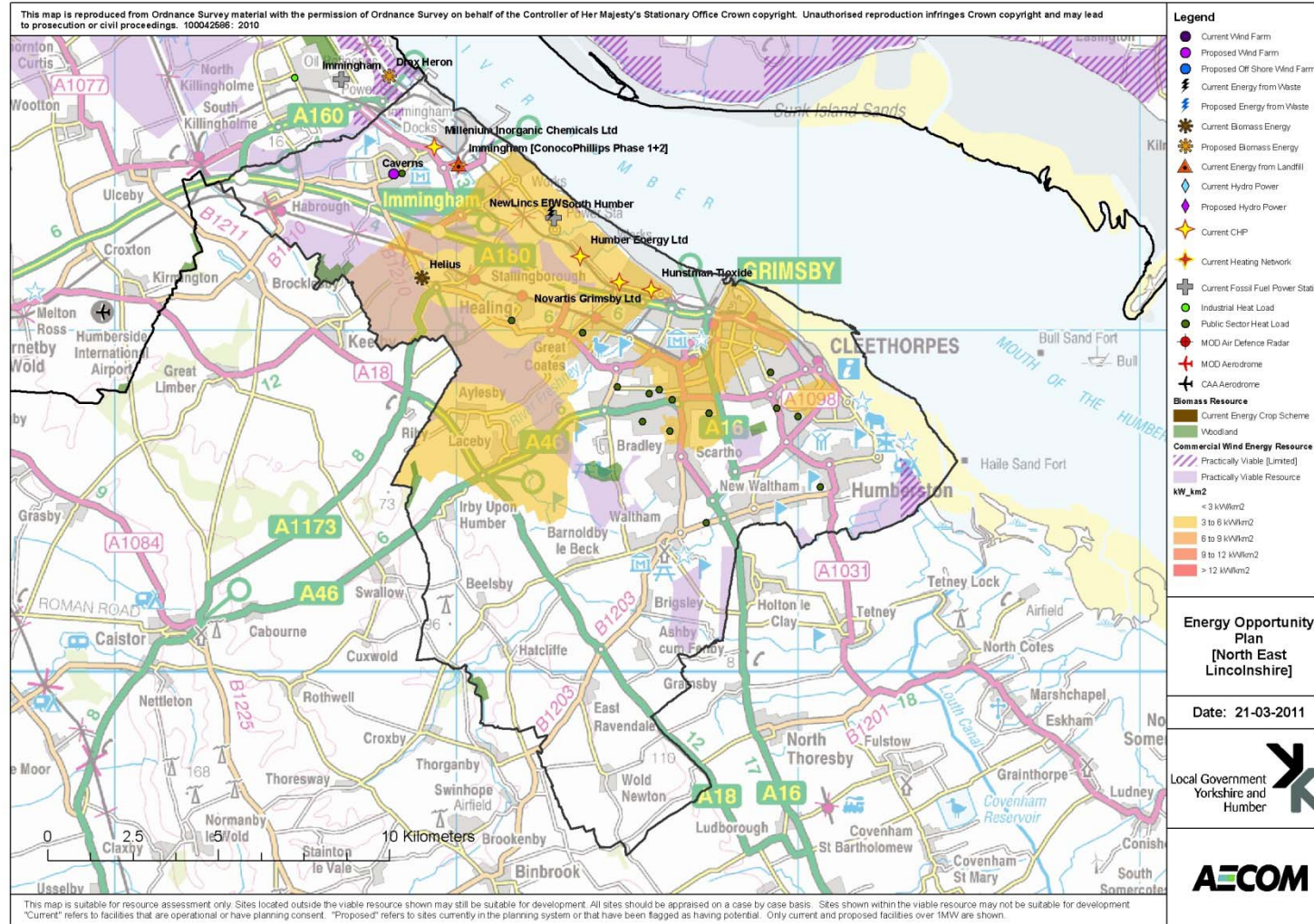


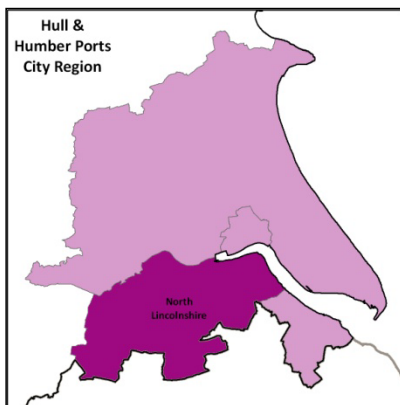
Figure 84 Energy opportunities plan for North East Lincolnshire. "Current" refers to facilities that are operational or have planning consent. "Proposed" refers to facilities currently in the planning system or sites that have been flagged as having potential. Only current and proposed facilities over 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 5.15 and appendix A for more details.

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B.13 North Lincolnshire

Population: 160,300

Land area (km²): 846



North Lincolnshire is a mostly rural unitary authority with almost 90% of land being in agricultural use. Almost half the population reside in North Lincolnshire's principal urban area of Scunthorpe and Bottesford. A further 25% live in the towns of Barton upon Humber and Brigg, the smaller market towns of Epworth, Crowle, Kirton in Lindsey and Winterton, and in the larger villages of Messingham and Broughton. The remainder of the population is dispersed widely amongst the many villages and rural hamlets scattered throughout North Lincolnshire.⁶⁹

It traditionally been an area of energy generation; with 4 major gas power stations (Immingham, Glanford Brigg, Keadby and Killingholme) comprising 2,400 MW of capacity. Centrica Brigg Ltd are proposing to construct a new 2,000 MW power station adjacent to the existing Glanford Brigg Power Station, which will reach the end of its nominal design life in 2018.⁷⁰

North Lincolnshire has a huge energy demand compared to the size of its population, predominantly caused by the loads at the Humber and Lindsey oil refineries.

The opportunities for renewable energy generation in North Lincolnshire are relatively homogenous: there is very little hydro energy potential and the mostly rural population rules out district heating (although the Energy Opportunity Plan shows clear potential for a linear district heating network in Scunthorpe connecting public sector buildings to the west of the A15).

The main renewable energy opportunities are focused around wind power, with much of the land having minimal constraints. The 8 turbine, 16 MW Bagmoor Wind Farm has been in operation since August 2009 and is expected to provide enough electricity for 10,800 homes. The large 34 turbine, 85 MW Keadby Wind Farm is currently in construction and is expected to provide enough electricity for around 38,000 homes.

Biomass energy generation is also an attractive option. There are already a number of areas of biomass energy crop planting in the north of the district. The access to the river would make transport of biomass to other parts of the region straightforward.

Another significant opportunity for North Lincolnshire is injection of biogas into the grid. The gas infrastructure is well developed in this area, for example, an existing National Transmission System high pressure gas pipeline currently transports natural gas from Glanford Brigg power station compound to the south. The agricultural nature of the borough should encourage the development of anaerobic digestion facilities.

As a unitary authority, North Lincolnshire Council is responsible for the collection, recycling and disposal of municipal solid waste (MSW) arising in the authority. Its municipal waste strategy concluded that out of seven scenarios modelled (including a base case where waste continued to be diverted to landfill), the best score was achieved by a pyrolysis/gasification energy from waste facility from 2012, capable of processing 100,000 tonnes per annum. The public consultation on the draft waste strategy revealed that there is strong support for treating the non-recyclable component of waste produced by local residents in a facility located within the authority which recovers both electricity and heat from the waste.⁷¹

⁶⁹ Annual Monitoring report, North Lincolnshire Council, December 2009

⁷⁰ Brigg 2 Power Station Environmental Impact Assessment Scoping Report, Scott Wilson, September 2010

⁷¹ North Lincolnshire Council's Municipal Waste Strategy 2008-2025, North Lincolnshire Council, September 2008

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North Lincolnshire	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	105	276	0	188	493	0	0%
Small scale wind	0	0	0	2	2	0	9%
Hydro	0	0	0	0	0	0	0%
Solar PV	0	0	0	7	5	0	0%
Solar thermal	0	0	11	0	7	738	3%
Air source heat pumps	0	0	8	0	12	505	3%
Ground source heat pumps	0	0	11	0	19	701	7%
Biomass energy crops	0	0	16	9	133	1075	3%
Biomass woodfuel	0	0	30	0	78	1969	8%
Biomass agricultural arisings (straw)	0	0	26	13	203	1721	9%
Biomass waste wood	0	0	1	1	9	75	2%
Energy from waste wet	0	0	1	1	11	82	1%
Energy from waste poultry litter	14	72	0	13	69	0	0%
Energy from waste MSW	0	0	2	1	16	136	2%
Energy from waste C&I	0	0	4	2	28	236	2%
Energy from waste landfill gas	5	28	0	0	0	0	0%
Energy from waste sewage gas	1	2	0	1	4	0	0%
Total	125	379	133	237	1,194	8,842	

Table 64 Current capacity and renewable energy resource in North Lincolnshire. Current^o refers to facilities that are operational or have planning consent

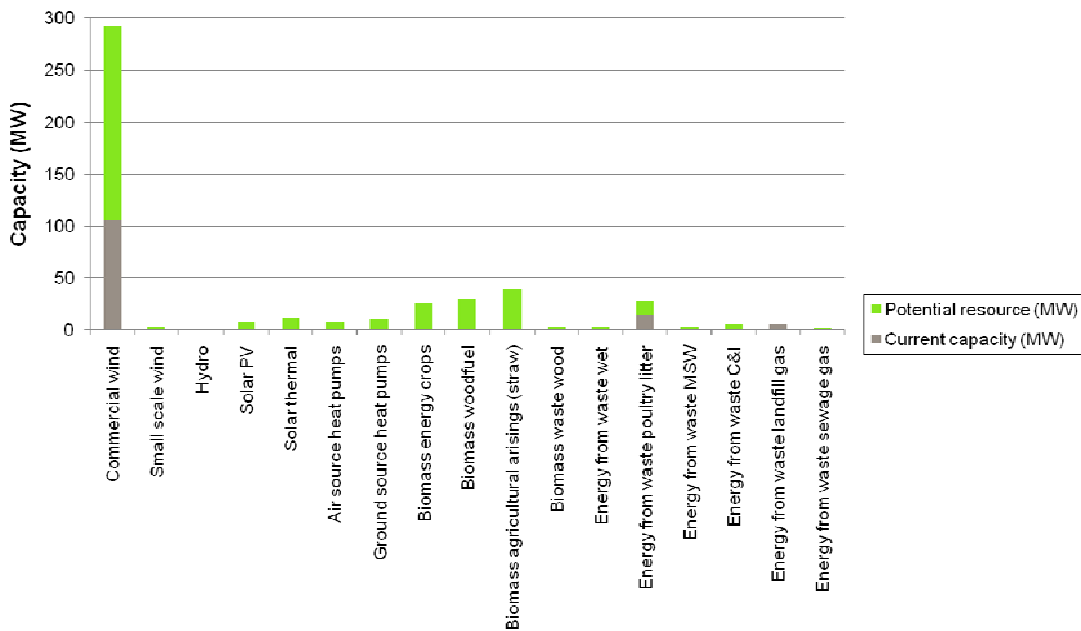


Figure 85 Current capacity and renewable energy resource in North Lincolnshire. Current^o refers to facilities that are operational or have planning consent

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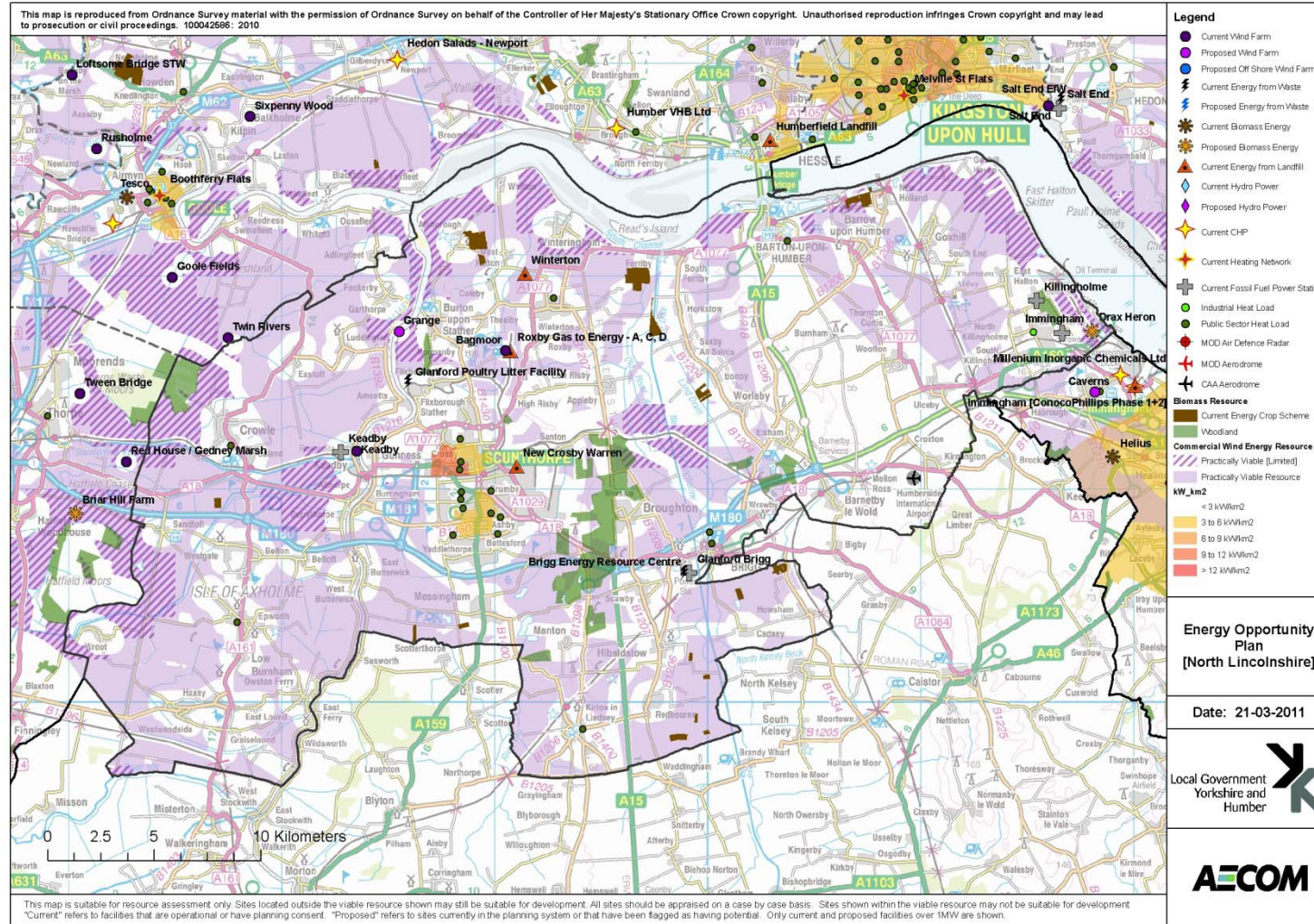


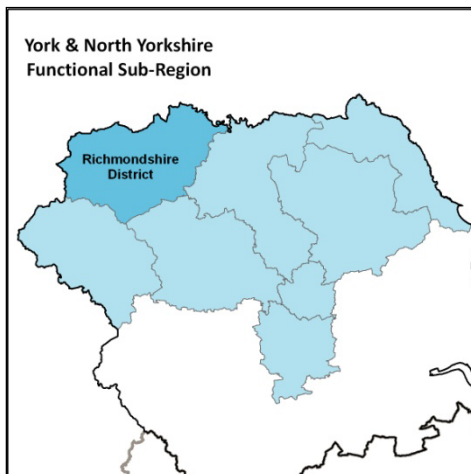
Figure 86 Energy opportunities plan for North Lincolnshire. "Current" refers to facilities that are operational or have planning consent. "Proposed" refers to facilities currently in the planning system or sites that have been flagged as having potential. Only current and proposed facilities over 1MW 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 5.15 and appendix A for more details.

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B.14 Richmondshire

Population: 51,400

Land area (km²): 1,318



Located in the northwest of the region, the Richmondshire district is dominated by the Yorkshire Dales National Park, where development of larger scale renewable energy technologies will be severely constrained. It is a rural district with one of the most sparsely populated districts in the country, which will also limit any potential for district heating.

However, the district does have some potential for hydro energy, with three schemes already operational or with planning permission; Gayle Mill, Bainbridge and Yore Mill. There is also some potential for commercial scale wind energy to the east of the district and for microgeneration technologies throughout the district.

Electricity is also generated at the 0.8 MW Scorton Landfill site near Brompton on Swale.

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Richmondshire	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	0	0	0	85	223	0	0%
Small scale wind	0	0	0	1	1	0	3%
Hydro	0	0	0	2	8	0	0%
Solar PV	0	0	0	2	1	0	0%
Solar thermal	0	0	3	0	2	194	1%
Air source heat pumps	0	0	6	0	10	411	2%
Ground source heat pumps	0	0	8	0	14	510	5%
Biomass energy crops	0	0	25	14	204	1655	5%
Biomass woodfuel	0	0	7	0	20	500	2%
Biomass agricultural arisings (straw)	0	0	5	2	39	329	2%
Biomass waste wood	0	0	0	0	2	20	1%
Energy from waste wet	0	0	4	3	34	253	4%
Energy from waste poultry litter	0	0	0	2	12	0	0%
Energy from waste MSW	0	0	1	0	5	42	1%
Energy from waste C&I	0	0	1	0	5	39	0%
Energy from waste landfill gas	1	4	0	0	0	0	0%
Energy from waste sewage gas	0	0	0	0	1	0	0%
Total	1	5	89	113	713	5,960	

Table 65 Current capacity and renewable energy resource in Richmondshire. Current^{tt} refers to facilities that are operational or have planning consent

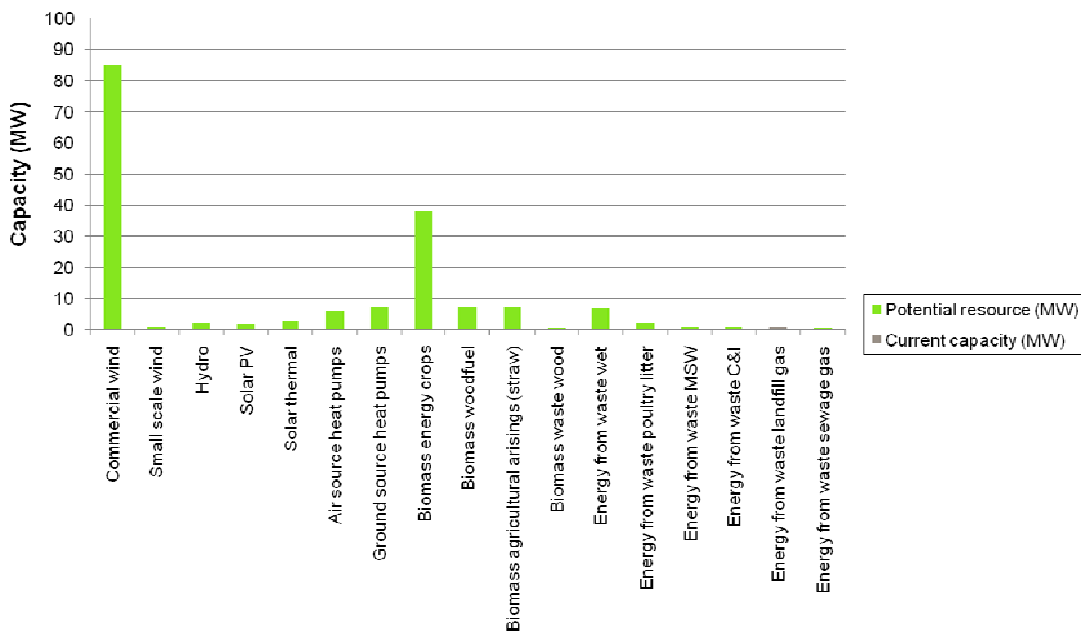


Figure 87 Current capacity and renewable energy resource in Richmondshire. Current^{tt} refers to facilities that are operational or have planning consent