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Charnwood Renewable and Low Carbon Study

Final Report

Prepared by LUC in association with Ricardo: Energy and Environment
November 2018

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November 2018

Planning & EIA
Design
Landscape Planning
Landscape Management
Ecology
GIS & Visualisation

LUC BRISTOL
12th Floor Colston Tower
Colston Street Bristol
BS1 4XE
T +44 (0)117 929 1997
bristol@landuse.co.uk

Offices also in:
Edinburgh
Glasgow
Lancaster
London
Manchester

FS 566056 EMS 566057

Land Use Consultants Ltd
Registered in England
Registered number: 2549296
Registered Office:
43 Chalton Street
London NW1 1JD
LUC uses 100% recycled paper

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1 Introduction

1 Introduction

1.1 LUC and Ricardo Energy and Environment were commissioned in August 2018 by Charnwood Borough Council to undertake a Renewable and Low Carbon Energy Study. The study seeks to provide a robust evidence base to underpin planning policies relating to renewable and low carbon energy generation and low carbon development within the emerging Local Plan. The study includes an assessment of the technical potential for renewable and low carbon energy across the Borough of Charnwood and sets out potential policy options for consideration in the preparation of the emerging Local Plan.

1.2 A separate landscape sensitivity study is being prepared to assess the potential sensitivity of the landscape to wind and large scale solar developments. The findings of this study will be set out in a separate report titled 'Charnwood Landscape Sensitivity Study 2018'.

Background to the study

1.3 Charnwood Borough Council is in the early stages of a preparing a new Local Plan. The Council began initial work to prepare a new Local Plan in 2016 and undertook a consultation in the summer of 2016 to understand and engage with interested parties on the future for Charnwood, the scope of the plan and what it should contain. In April 2018 the Council published a discussion paper titled 'Towards a Local Plan for Charnwood' that explored the scale of development needed in the Borough, the key issues and opportunities that need to be taken into account and considered the options for an overall strategy for delivering the growth needed. The Council's Local Development Scheme (published in April 2018) sets out the programme for the future development of the Local Plan Review. This aims to submit the new Local Plan for examination in September 2019, with a view to adopting the plan in January 2020.

1.4 The new Local Plan will address and manage the needs for new development over the plan period up to 2036 and will include strategic and detailed policies. The single plan will supersede the adopted Local Plan, which is composed of two separate documents:

- Charnwood Local Plan 2011 to 2028 Core Strategy (2015).
- Borough of Charnwood Local Plan (2004) saved policies.

1.5 Charnwood Borough is faced with a wide range of challenges arising from a changing climate. Balancing the need to make a meaningful contribution towards reducing harmful emissions from energy use (through cleaner energy production) with the management of the landscape is one of these key challenges. The National Planning Policy Framework makes it clear that local authorities should take a positive approach towards renewable and low carbon developments. One of the core objectives that underpins the NPPF is:

> "*an environmental objective – to contribute to protecting and enhancing our natural, built and historic environment; including…mitigating and adapting to climate change, including moving to a low carbon economy."* [Para 8].

1.6 It also states that local planning authorities should:

> "*provide a positive strategy for energy from these sources, that maximises the potential for suitable development, while ensuring that adverse impacts are addressed satisfactorily (including cumulative landscape and visual impacts)*" [Para 151].

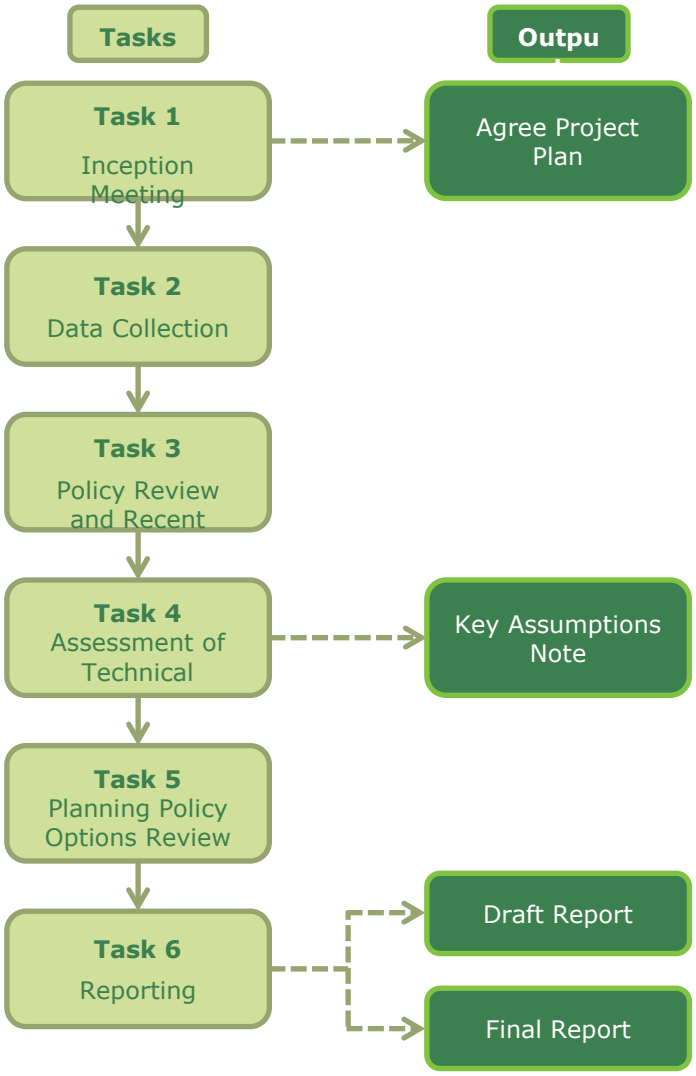
1.7 The Council recognises the need to provide a positive framework for renewable and low carbon energy generation (which can have environmental, economic, social and other benefits). However, the development of energy generating installations within the Borough needs to be managed carefully to achieve the greatest contribution towards energy needs, while at the same time ensuring that the environment and important characteristics of the landscape are not unacceptably harmed.

1.8 This study provides comprehensive, objective and independent evidence on the technical potential for renewable and low carbon energy within Charnwood. This will enable the Council to carefully consider how best to develop a positive strategy for the provision of renewable and low carbon energy across the Borough.

Study approach

1.9 The study involved six main tasks, as set out in **Figure 1.1** below:

Figure 1.1: Summary of Key project tasks and outcomes



1.10 A summary of the tasks undertaken is provided in **Table 1.1**:

Table 1.1: Summary of Key Study Tasks

Key Tasks	Detail
Task 1: Inception meeting	An inception meeting was held with Council officers in August 2018 to agree the scope of the study.
Task 2: Data collection	Background documentation was collected to build a comprehensive starting point for the energy evidence base as well as an energy consumption, generation and emissions baseline.
Task 3: Policy review and recent trends	A review was undertaken of the relevant background information to the study. This included: • A review of the policy context for renewable energy at the national, regional and local level (see **Chapter 2**). • A review of the recent trends in emissions and renewable energy installations in Charnwood (See **Chapter 3**).
Task 4: Standalone opportunities	An assessment was undertaken of the technical potential for a range of renewable and low carbon energy technologies within the Borough (see **Chapter 4**).
Task 5: Planning Policy Development	A review was undertaken of the various planning policy approaches that could be incorporated within the emerging Local Plan in relation to renewable and low carbon energy (see **Chapter 5**).
Task 6: Reporting	The findings of the study are set out within this report.

1.11 A more detailed explanation of the methodologies used is provided in the relevant chapters (as outlined below).

Report structure

1.12 The remainder of this report is structured as follows:

- **Chapter 2** provides a review of the policy context.
- **Chapter 2** provides a review of the recent trends in emissions and renewable energy installations in Charnwood.
- **Chapter 4** sets out the findings of the assessment of technical potential for renewable and low carbon energy.
- **Chapter 5** outlines the potential planning policy options for the emerging Local Plan.

2 Policy Context

2 Policy Context

Introduction

2.1 The chapter provides a review of the general context, policy framework and background documentation of relevance to the study in relation to renewable and low carbon energy issues. This includes a summary of the relevant international, national and local planning policies and strategies.

International and European Legislation and Policy

2.2 At the Kyoto conference of the United Nations Framework Convention on Climate Change in December 1997, most industrialised countries agreed to reduce emissions of the six principal man-made greenhouse gases to 5.2% below 1990 levels over the period 2008-2012. The UK agreed to a reduction target of 12.5%. The **Kyoto Protocol** became a legally binding treaty on 16th February 2005. The Doha Climate Change Conference in Dec 2012 led to the adoption of an amendment to the Kyoto Protocol establishing a second round of binding greenhouse gas emission targets for Europe, Australia and a handful of other developed countries.

2.3 The Paris Agreement was adopted through the twenty first session of the Conference of Parties (COP21) in December 2015. On 5 October 2016, the threshold for entry into force of the Paris Agreement was achieved, with at least 55 countries, which account for at least 55% of the world's greenhouse gas emissions, ratifying the Agreement. The **Paris Agreement** entered into force on 4th November 2016 and the UK ratified the Agreement on 18th November 2016. Article 2 of the Paris Agreement sets out the ambition of holding the increase of global average temperature to *"well below 2°C"* and to pursue efforts to limit temperature increase to 1.5 °C. It was acknowledged that to achieve these ambitions, there is a requirement to ensure Parties reach global peaking of greenhouse gas emissions as soon as possible and do so by employing means that allow pathways toward *"low greenhouse gas emissions and climate-resilient development"*.

2.4 In April 2009, the European Union adopted the **Directive on Renewable Energy** (2009/28/EC), which set targets for all Member States such that the EU will reach a 20% share of energy from renewable sources by 2020. The UK's binding target is to meet 15% of its energy generation from renewable sources by 2020 (this includes electricity, transport and heat). Article 22 of the Directive requires Member States to submit a report every two years to the European Commission (EC) on progress in the promotion and use of energy from renewable sources. The UK's first progress report on the Promotion and Use of Energy from Renewable Sources for the UK (2011) was delivered in December 2011 and showed that renewable energy accounted for 54TWh (3.3%) of the UK's total energy consumption in 2010 – an increase of 27% over a two year period. Subsequent reports delivered in 2014 and 2016 saw significant increases in the proportion of the UK's energy production coming from renewable resources - 4.2% of the UK's total energy consumption in 2012 and 6.3% in 2014.

National Legislation

2.5 The **Planning and Compulsory Purchase Act** (2004) sets out the structure of the local planning framework for England, including the duty on plan-making to mitigate and adapt to climate change. In other words, local planning authorities must make positive and proactive policies and decisions which contribute to the mitigation of, and adaptation to, climate change – polices and decisions that make measureable, ongoing reductions in carbon emissions reported in Council's annual monitoring reports. This legislation is supported by national planning policy and guidance set out below.

2.6 The **Climate Change Act** (2008) was passed, restating the UK Government's commitment to renewables in the move towards a low carbon economy. The Act commits the UK government to reduce UK carbon emissions by at least 80% by 2050 (from 1990 levels). As part of the Act, the Committee on Climate Change is required to report annually to Parliament on the progress made in reducing carbon emissions in line with the **UK Climate Change Programme** (2006) which includes a range of measures to be implemented at both the international and national levels including annual progress reports to be presented to Parliament on emissions reductions and domestic climate change adaptation. The Committee on Climate Change 2017 progress report on meeting carbon budgets showed that overall progress has been good. Economy-wide emissions fell by 6% in 2016 and UK greenhouse gas emissions are about 42% lower than in 1990. However, the report notes that progress is stalling. Since 2012, emissions reductions have been largely confined to the power sector, whilst emissions from transport and building stock are rising. The report recognises that there is now an urgent need for effective new strategies and policies to ensure emissions continue to fall in line with the commitments agreed by Parliament.

2.7 The **Planning Act** (2008) introduced a new planning regime for nationally significant infrastructure projects (NSIPs), including energy generation plants of capacity greater than 50 megawatts (50 MW). In 2011 six **National Policy Statements** (NPSs) for Energy were published. The energy NPSs are designed to ensure that major energy planning decisions are transparent and are taken against a clear policy framework, by setting out national policy against which proposals for major energy projects will be determined by the National Infrastructure Directorate (NID) (formerly the Infrastructure Planning Commission or IPC). The Overarching National Policy Statement for Energy (EN-1) sets out national policy for energy infrastructure and describes the need for new national significant energy infrastructure projects. EN-3 (NPS for Renewable Energy Infrastructure) then provides the primary basis for decisions by the NID on applications it receives for nationally significant renewable energy infrastructure, providing guidance on various technologies and their potential for significant effects. In 2016 onshore wind installations above 50MW were removed from the NSIP regime, and such applications are now dealt with by local planning authorities, based on the NPPF and associated Ministerial statements.

2.8 The **Planning and Energy Act** (2008) enables local planning authorities to set requirements for energy use and energy efficiency in local plans, including a proportion of energy used in development to be generated from renewable and low carbon sources in the locality of the development. Such requirements can relate to specific types and scales of development but also broad areas within a local planning authority's area of influence, such as areas with optimal conditions for decentralised heat networks. The Act also enabled local authorities to require standards for energy efficiency in new buildings beyond those in the Building Regulations. However, in 2015 the energy efficiency requirements were proposed to be repealed, to effectively make the Building Regulations the sole authority regarding energy efficiency standards for residential development, and leaving local authorities no longer able to set their own energy efficiency standards. However, while the power was removed in principle, the government has not yet produced a commencement date for repealing these powers, which therefore remain in place. More detail on the ability of local authorities to set higher building energy performance standards is provided in **Chapter 5.**

2.9 The **Neighbourhood Planning Act** (2017) strengthens the powers of neighbourhood plans, but also creates a new legal duty on local planning authorities to set out their strategic priorities and express them in a strategic plan. Details on how this principle has been articulated in national planning policy are set out in further detail below.

National Planning Policy

National Planning Policy Framework (NPPF)

2.10 The Government published an updated and revised NPPF in July 2018, which sets out the environmental, social and economic planning policies for England. The July 2018 NPPF replaced the original version published in March 2012. Central to the NPPF policies is a presumption in favour of sustainable development, that development should be planned for positively and individual proposals should be approved wherever possible.

2.11 One of the overarching objectives that underpins the NPPF is set out in Paragraph 8: "*an environmental objective – to contribute to protecting and enhancing our natural, built and historic environment; including …mitigating and adapting to climate change, including moving to a low carbon economy.*"

2.12 The revised NPPF supports the contents of the Neighbourhood Planning Act (2017) by making explicit reference to the need for local planning authorities to work with duty to cooperate partners on strategic priorities (paragraph 24) and defined strategic policies that make sufficient provision for climate change mitigation and adaptation (paragraph 20). These amendments provide a clear policy framework for local planning authorities to work collaboratively with partners and neighbours to tackle climate change mitigation and adaptation at a strategic scale and over the longer term.

2.13 Paragraph 149 of the NPPF states "*Plans should take a proactive approach to mitigating and adapting to climate change…in line with the objectives and provisions of the Climate Change Act 2008*". Paragraph 151 states that "*To help increase the use and supply of renewable and low carbon energy and heat, plans should:*

a) provide a positive strategy for energy from these sources, that maximises the potential for suitable development, while ensuring that adverse impacts are addressed satisfactorily (including cumulative landscape and visual impacts);

b) consider identifying suitable areas for renewable and low carbon energy sources, and supporting infrastructure, where this would help secure their development; and

c) identify opportunities for development to draw its energy supply from decentralised, renewable or low carbon energy supply systems and for co-locating potential heat customers and suppliers."

2.14 Paragraph 152 states that local planning authorities should "*support community-led initiatives for renewable and low carbon energy, including developments outside areas identified in local plans or other strategic policies that are being taken forward through neighbourhood planning.*"

2.15 In addition, when determining planning applications, local planning authorities should view sustainable developments favourably. Paragraph 154 states that "*…planning applications for renewable and low carbon development…should not be required to demonstrate the overall need for renewable or low carbon energy…and approve the application if its impacts are (or can be made) acceptable.*"

Planning Practice Guidance (PPG)

2.16 The Government published national Planning Practice Guidance (PPG) to support the delivery of the NPPF in 2014, and regularly updates guidance in light of changes in relevant international and national policy and legislation. The key elements of the PPG of relevance to this Study are set out below.

2.17 Paragraph 001 states that "*planning has an important role in the delivery of new renewable and low carbon energy infrastructure in locations where the local environmental impact is acceptable."*

2.18 Paragraph 003 states that "*all communities have a responsibility to help increase the use and supply of green energy, but this does not mean that the need for renewable energy automatically overrides environmental protections and the planning concerns of local communities. As with other types of development, it is important that the planning concerns of local communities are properly heard in matters that directly affect them.*

Local and neighbourhood plans are the key to delivering development that has the backing of local communities. When drawing up a Local Plan local planning authorities should first consider what the local potential is for renewable and low carbon energy generation. In considering that potential, the matters local planning authorities should think about include:

- *the range of technologies that could be accommodated and the policies needed to encourage their development in the right places;*
- *the costs of many renewable energy technologies are falling, potentially increasing their attractiveness and the number of proposals;*

- *different technologies have different impacts and the impacts can vary by place;*
- *the UK has legal commitments to cut greenhouse gases and meet increased energy demand from renewable sources. Whilst local authorities should design their policies to maximise renewable and low carbon energy development, there is no quota which the Local Plan has to deliver."*

2.19 The role community led renewable energy initiatives have is outlined in paragraph 004, which states that they "*are likely to play an increasingly important role and should be encouraged as a way of providing positive local benefit from renewable energy development…Local planning authorities may wish to establish policies which give positive weight to renewable and low carbon energy initiatives which have clear evidence of local community involvement and leadership."*

2.20 Paragraph 033 states that "*when considering applications for wind energy development, local planning authorities should (subject to the transitional arrangement) only grant planning permission if:*

- the development site is in an area identified as suitable for wind energy development in a Local or Neighbourhood Plan; and
- following consultation, it can be demonstrated that the planning impacts identified by affected local communities have been fully addressed and therefore the proposal has their backing.

2.21 *Whether the proposal has the backing of the affected local community is a planning judgement for the local planning authority."*

2.22 In terms of identifying suitable areas for wind energy development, Planning Practice Guidance, paragraph 005 states that "*There are no hard and fast rules about how suitable areas for renewable energy should be identified, but in considering locations, local planning authorities will need to ensure they take into account the requirements of the technology and, critically, the potential impacts on the local environment, including from cumulative impacts. There is a methodology available from the Department of Energy and Climate Change's website on assessing the capacity for renewable energy development which can be used and there may be existing local assessments. However, the impact of some types of technologies may have changed since assessments were drawn up (e.g. the size of wind turbines has been increasing). In considering impacts, assessments can use tools to identify where impacts are likely to be acceptable, for example, landscape character areas could form the basis for considering which technologies at which scale may be appropriate in different types of location."*

2.23 Paragraph 008 also explains that "*local planning authorities should not rule out otherwise acceptable renewable energy developments through inflexible rules on buffer zones or separation distances. Other than when dealing with set back distances for safety, distance of itself does not necessarily determine whether the impact of a proposal is unacceptable."*

National Strategies and Guidance

2.24 The **UK Renewable Energy Strategy** (2009) sets out how the UK will achieve its legally-binding target of generating 15% of its energy needs from renewable sources by 2020 in line with the EU **Directive on Renewable Energy** (2009/28/EC). Whereas the Government had been working towards a UK 2020 target of 20% of electricity coming from renewable sources, the lead scenario in the Renewable Energy Strategy is that this figure has to be raised dramatically, in light of the less mature markets in renewable heat and transport fuel. The strategy suggests that the UK may need more than 30% of electricity and 12% of heat to be generated by renewable sources in order to meet the overall energy target.

2.25 The UK Renewable Energy Strategy (2009) was subsequently supported by the **UK Renewable Energy Action Plan** in 2010 and the **UK Renewable Energy Roadmap** in 2011. The Action Plan outlines the electricity, heating, cooling and transport technologies that are expected to deliver the 15% renewable energy target by 2020. The Roadmap outlines the deployment of renewable energy throughout the UK, and focuses on the eight technologies that are considered to have the greatest potential, one of which is onshore wind energy.

2.26 The key actions in this area that are set out in the Roadmap include increasing overall grid capacity and upgrading transmission capacity, and co-funding the development of technical solutions to issues that can affect the viability of onshore wind farms, such as interference with aviation radar.

2.27 The **Clean Growth Strategy** was published in 2017 setting out a range of policies and proposals to increase the rate of reduction in carbon emissions. This includes investment in 'Green Finance', improve business and industry energy efficiency, improve housing energy efficiency, rolling out low carbon heating, accelerating the shift to low-carbon transport and further investment in electricity storage and transportation, nuclear power and renewable power.

2.28 In January 2018 the UK government published the **25 Year Environment Plan**. The Plan sets out what the government plans to do to improve the environment, within a generation. Although the plan does not directly address renewable energy, it does highlight the need to generate cleaner, more sustainable sources of energy.

Development Plan for Charnwood

2.29 The Development Plan for Charnwood comprises two adopted documents. The Charnwood Local Plan Core Strategy (2011 to 2028) was adopted in 2015 and represents the Borough's principle planning document. The adopted Core Strategy is further supplemented by saved policies from the Borough of Charnwood Local Plan adopted in 2004.

2.30 The emerging Charnwood Local Plan will replace the saved policies from the Local Plan adopted in 2004 and the newer Core Strategy (2015).

Borough of Charnwood Local Plan (2004) saved policies

2.31 The Borough of Charnwood Local Plan was adopted in January 2004. However, many of the policies within the Plan have become out of date and have been superseded by policies within the adopted Core Strategy (2015). There are considered to be no saved policies of direct relevance to the strategic direction, allocation or development management of renewable and low carbon technologies in the saved policies of the Local Plan adopted in 2004.

Charnwood Local Plan 2011 to 2028 Core Strategy (2015)

2.32 The Core Strategy was adopted in November 2015 and will be replaced by the emerging Charnwood Local Plan. The Charnwood Local Plan 2011 to 2028 Core Strategy policy of relevance to the generation of renewable and low carbon energy is **Policy CS16 Sustainable Construction and Energy** which sets out that the adaptation and mitigation against effects of climate change is encouraged through sustainable design and construction and the provision of renewable energy, where it does not make development unviable. Those sections of Policy CS16 relevant to energy considerations are set out in **Box 2.1**:

Box 2.1: Policy CS 16 - Sustainable Construction and Energy

We will adapt to and mitigate against the effects of climate change by encouraging sustainable design and construction and the provision of renewable energy, where it does not make development unviable.

We will do this by:

- encouraging developments to, where viable, exceed Building Regulations for carbon emissions by prioritising measures that reduce the need for energy and secure residual need for energy through low carbon or renewable sources;
- requiring the Design and Access Statements for major developments to demonstrate how the need to reduce emissions has influenced the design, layout and energy source used;
- supporting commercial, community and domestic scale renewable energy or low carbon energy developments where they contribute towards our target of at least 27.5MWe, having regard to the impact upon the wider landscape, biodiversity, the historic environment, public safety, noise, odour and other amenity considerations;
- in the case of proposals for wind energy development involving one or more wind turbines, planning permission will only be granted if:
    - the development site is in an area identified as suitable for wind energy in the Site Allocations and Development Management Development Plan Document or a Neighbourhood Plan; and
    - following consultation, it can be demonstrated that the planning impacts identified by affected local communities have been fully addressed and therefore the proposal has their backing.

2.33 The Core Strategy also states that there are opportunities to go beyond the Building Regulations in the case of the strategic developments outlined in Policies CS19 (North East of Leicester Sustainable Urban Extension) , CS20 (North of Birstall Direction for Growth), CS21 (Watermead Regeneration Corridor), CS22 (West of Loughborough Sustainable Urban Extension) and CS23 (Loughborough University Science and Enterprise Park). The Plan states that the Council have an aspiration that the schemes will result in a 10% reduction in CO_2 emissions when compared to the Building Regulations prevailing at the time that the detailed schemes are proposed.

Neighbourhood Plans

2.34 There are a four Neighbourhood Plans within Charnwood Borough which have either been adopted or are in the process of being adopted: Thrussington Neighbourhood Plan, Quorn Neighbourhood Plan, Barrow upon Soar Neighbourhood Plan and Thurcaston and Cropston Neighbourhood Plan.

2.35 Only the Quorn Neighbourhood Plan, the Pre-Submission Version of which is currently being consulted upon, contains planning policy of relevancy to renewable and low carbon energy. **Policy ENV 9: Renewable Energy Generation Infrastructure** states that renewable energy generation infrastructure will be supported if the proposal demonstrates that:

- it will not have an adverse impact (including, *inter alia,* noise, visual impact, reflection, glare, shadow flicker, water pollution, smell, air quality, gaseous or particulate emissions) on the health, wellbeing or amenity of residents and visitors;
- will not have an adverse impact on the Plan Area in relation to the identified important views (Policy ENV 8: Protection of Important Views) or the character of the surrounding landscape, including areas identified for environmental protection or enhancement in Charnwood Borough Council's Green Infrastructure Strategy;
- will not have an adverse impact on biodiversity (species and Priority Habitats);

- will not have an adverse impact on statutory or locally identified historic environment sites and features; and,
- is supported by appropriate and relevant assessments and documentation in respect of, *inter alia,* transport, heritage, archaeology, landscape (visual impact), environment and flood risk.

2.36 Policy ENV 9 states that wind turbine development will be supported if:

- turbine tip height is less than 25 metres; and,
- the proposal is for no more than one turbine.

2.37 Policy ENV 9 states that large scale solar energy generation proposals will be supported unless:

- the ground area covered by the panels exceeds 25 hectares (ha) (500mx500m);
- the array is visible from any valued and accessible viewpoint 250m or more from the proposal site, or from any private or residential property; and,
- reflection (glare) is evident from any viewpoint.

Local Strategies and Guidance

Leading in Design SPD (2005)

2.38 The supplementary planning document encourages renewable energy production. All proposals for development, new build or conversion of uses that consume energy are encouraged to include on site renewable energy facilities and/or energy saving technologies. All major development proposals will be encouraged to incorporate renewable energy production, providing for at least 10% of the predicted energy requirements.

Low Carbon Energy Opportunities and Heat Mapping for Local Planning Areas across the East Midlands (2011)

2.39 The study explored the technical potential of a number of different renewable energy technologies including solar, hydro, biomass, heat pumps and energy from wind. The study concluded that the greatest potential for large scale renewable energy in Charnwood was from wind energy. Large and small scale wind energy has potential for 525 MW of capacity across the borough. The study found it to be the most significant potential source for renewable energy compared to 36 MW for solar photovoltaics, 24 MW for energy from municipal solid waste, 23 MW for energy from sewerage gas and 18 MW for energy from crops. Only 1.4 MW of capacity was identified for small scale hydro power. The locations with technical potential for wind energy were mapped as part of this study and the key opportunity areas identified were across the Wolds, High Leicestershire, and small patches across Charnwood Forest.

Charnwood Climate Change Strategy 2018-2022

2.40 The strategy aims to help the council achieve its statutory commitment to local action on climate change and capture the opportunities and benefits of tackling climate change. These include savings on energy bills, encouraging renewable energy in the transition to a low carbon economy, strengthening business competitiveness, enhancing energy security, reducing air pollutants harmful to health, attracting new jobs and investment in 'green' industries, reducing flood risks and managing the impacts of extreme weather.

2.41 The strategy proposes encouraging renewable sources of energy supply by embedding their commitment in the emerging local plan. This will include policies that encourage developers to achieve high energy standards and to incorporate renewable and decentralised (on-site) energy technologies within developments.

Leicestershire and Leicester Waste Development Framework to 2021

2.42 This Waste Local Plan for Leicestershire and Leicester contains a set of core strategy policies and development management policies. The Plan promotes the waste hierarchy and contains **Policy WCS6** which allows anaerobic digestion (AD), incineration, mechanical-biological treatment (MBT) and other energy/value recovery technologies that would provide for the recovery of energy from waste, provided that:

- pre-sorting is carried out;
- value recovery from by-products of the process is maximised;
- energy recovery is maximised; any residue of the process can be satisfactorily managed and disposed; and,
- the proposal does not cause unacceptable harm to the environment or communities.

3 Emissions Trends Review

3 Emissions Trends Review

Introduction

3.1 This chapter provides an overview of national energy generation and emissions trends over recent years and also discusses the trends in relation to Charnwood. A review of existing renewable energy installations within Charnwood is also set out.

Emission Trends

3.2 The UK's greenhouse gas emissions fell 2.6% in 2017 continuing a long downward trajectory[1]. Emissions have fallen 43% since 1990, about halfway to the 2050 target, even while the economy has been growing and population rising. The decrease in emissions is primarily the product of two key trends. We are consuming less energy and the electricity supply is becoming less carbon intense.

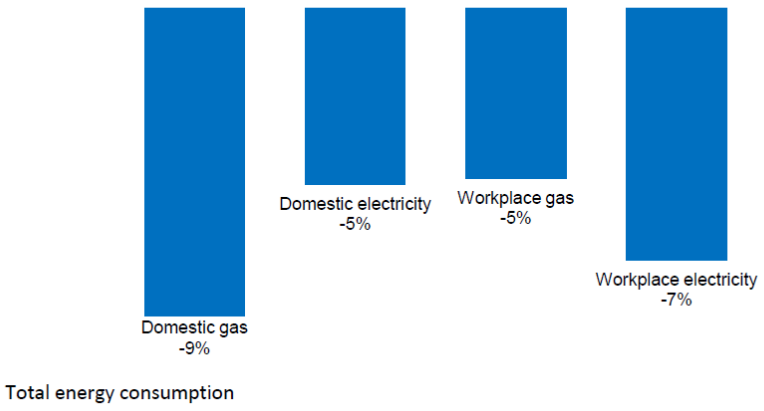
Energy consumption

3.3 Energy consumption is estimated to have fallen 11% since 1990. This has resulted from improvements in technology and a decline in the relative importance of energy intensive industries. The carbon intensity of the electricity supply fell 7.6% between 2016 and 2017 as renewable output increased and coal generation dropped 28%.

3.4 In 2016, Charnwood's electricity consumption was estimated to be 691GWh with a further 1,589GWh demand for gas. 60% of gas demand and 38% of electricity demand is from domestic uses with the remainder used in commerce & industry.

3.5 Energy demand is falling in Charnwood[2]. Gas consumption is down 7% and electricity demand down 6% between 2010 and 2016, despite a 12% increase in the population over the same period. The downward trend is consistent across both homes and workplaces.

Figure 3.1: Change in Charnwood total energy consumption between 2010 and 2016



[1] 2017, ONS, UK Greenhouse Gas Emissions, Provisional Figures Statistical Release
[2] https://www.gov.uk/government/publications/sub-national-electricity-and-gas-consumption-statistics-analysis-tool

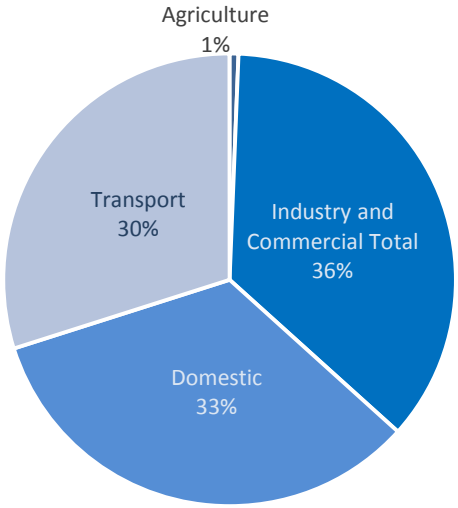
3.6 Falling workplace energy consumption has occurred while the economic output of the Leicestershire economy has grown[3]. This is associated with improved efficiency and changes in the structure of the economy. The changes in home consumption can be attributed to energy efficiency improvements as well as improved appliance, lighting and boiler efficiency.

Carbon emissions

3.7 Charnwood's carbon emissions fell 35% between 2005 and 2015[4] to 894 $ktCO_2$ (thousand tonnes of carbon dioxide). This can be attributed to falling local energy consumption combined with the decarbonisation of the electricity supply and switching away from dirtier coal and oil heating systems.

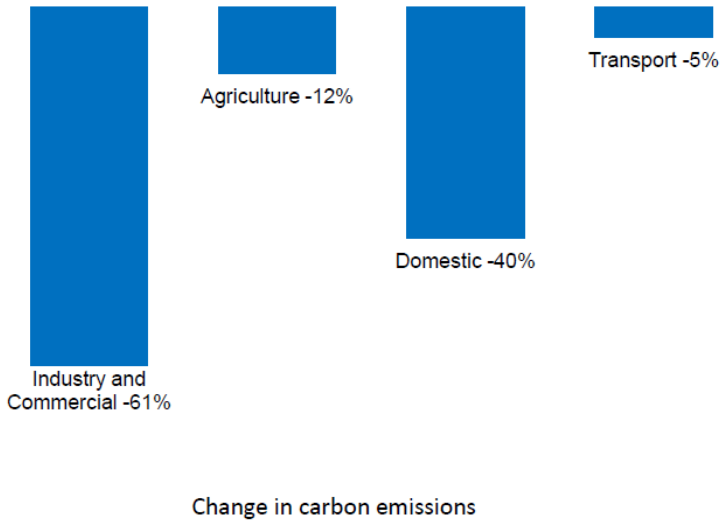
3.8 The source of emissions in 2015 came from industry and commercial (36%), domestic uses (33%) and transport (30%) in roughly equal measures with a smaller amount (1%) from agriculture.

Figure 3.2 Source of total emissions in Charnwood 2015



3.9 Since 2005, emissions have fallen fastest from industry and commercial uses. There have also been large reductions in domestic energy use with smaller reductions in transport and agriculture emissions.

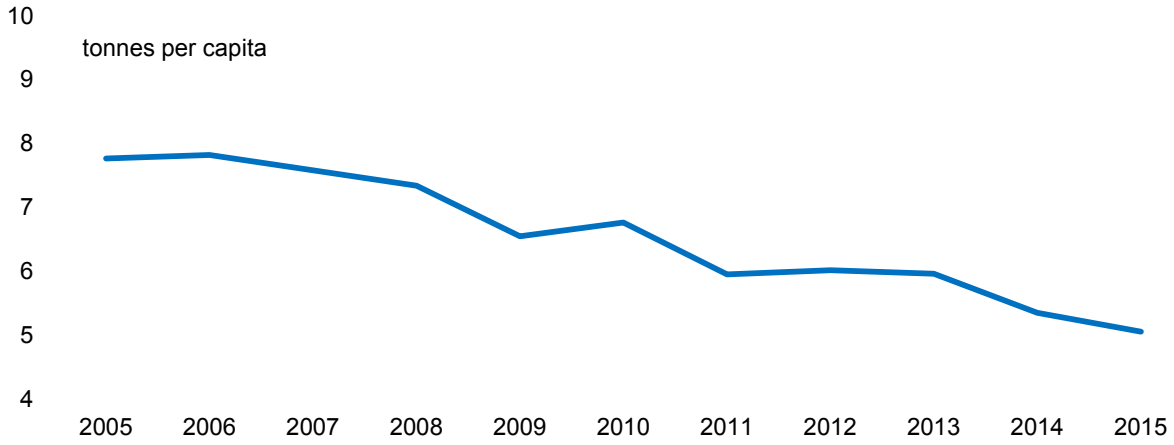
Figure 3.3: Change in carbon emissions in Charnwood by sector between 2005 and 2015



[3] https://www.llep.org.uk/our-economy/research-reports/llep-area-economic-report-2016/
[4] Carbon dioxide (CO2) is the main greenhouse gas, accounting for about 81 per cent of the UK greenhouse gas emissions in 2015.

Between 2005 and 2015, the local population increased by about 12% which means that on a per capita basis, emissions have fallen 54% at 5.1 tonnes. This is below the UK average of 5.9 tonnes per capita.

Figure 3.4: Per capita carbon emissions in Charnwood between 2005 and 2015

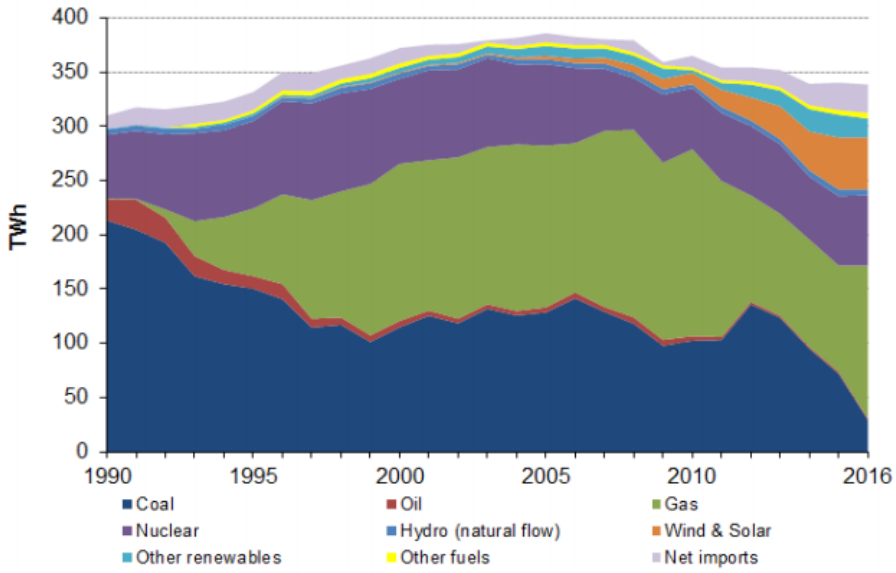


3.10 The evidence indicates that the changes in energy consumption and emissions patterns in Charnwood reflect the broader national trend of sustained reduction. This can be attributed both to the impact of the changing nature of industry, the economy and the energy sector, as well as local efforts to increase energy efficiency and to add renewable energy generation capacity, which is discussed below.

Renewable Electricity

3.11 UK renewable generation (hydro, wind, solar and bioenergy) increased by 19% between 2016 and 2017 (to 99.3 TWh). This was driven by increased renewable capacity and more favourable weather conditions[5]. Low carbon generation (nuclear and renewable) supplied more than half (50.4%) of all electricity for the first time. Planned renewable capacity additions over the coming years and the Government's commitment to ending the use of unabated coal by 2025 will ensure that this trend continues[6].

Figure 3.5: UK electricity supplied by fuel type 1990-2016



[5] 2018, BEIS, Provisional 2017 electricity statistics.
[6] 2018, BEIS, Implementing the end of unabated coal by 2025.

3.12 The extent of the electricity system transformation was symbolically marked in April 2017, with the first 24-hour period without coal powered generation since the first coal power station opened in 1882.

Renewable Energy Installations in Charnwood

3.13 Information on renewable energy installations in Charnwood has been collated using public datasets corroborated with information held by the Council. Key data sources include:

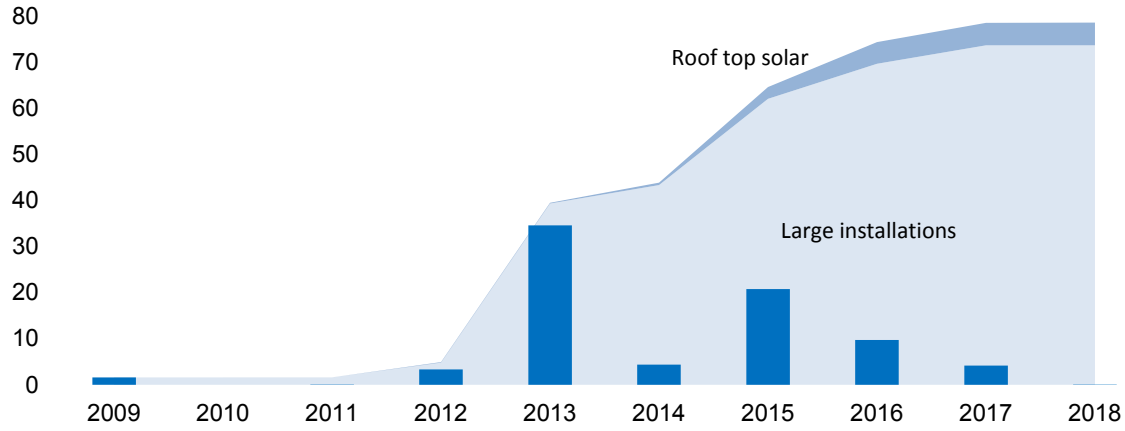
- Renewable Energy Planning Database.
- RESTATS renewable energy statistics.
- Ofgem's FIT and RHI installation datasets.
- Charnwood BC planning portal.

3.14 The existing installations set out below are standalone renewable energy developments, small roof mounted installations and small renewable heating systems are discussed separately under the section on Microgeneration Technologies in **Chapter 4** of this report.

Total installed renewable electricity capacity

3.15 The capacity of renewable electricity generators in Charnwood has grown over the last nine years, with 78.9MW operational as of Summer 2018. The majority of this was installed between 2013 and 2016.

Figure 3.6: Growth in installed renewable electricity capacity in Charnwood and annual capacity additions



3.16 **Table 3.1** and **Figure 3.7** present the existing renewable electricity installations above 20 kilowatt (kW)[7] capacity in Charnwood, as well as those granted planning permission but not yet built. The total operational capacity of renewable and low carbon electricity schemes with a capacity above 20KW is 73.95MW. In addition to the operational schemes, there is an additional 46.3MW of capacity due to be delivered through new consented schemes.

[7] Smaller solar PV and other projects may not require planning permission. This means that they do not appear in the planning database and that the Permitted Development Orders define the circumstances where development is permitted, rather than local planning policy. Smaller installations are likely to be accounted for in the FIT statistics.

Table 3.1 Standalone renewable and low carbon electricity installations in Charnwood

Name/location	Technology	Capacity (MW)	Status
Wymeswold Airfield	Solar PV	34.5	Operational
East Wymeswold Solar Farm	Solar PV	5.0	Operational
Land to the East of Burton Lane, Wymeswold	Solar PV	2.6	Operational
Six Hills Solar Farm	Solar PV	18.7	Operational
Gypsum Solar Plant, Barrow upon Soar	Solar PV	4.0	Operational
Shepshed Water Treatment Works	Solar PV	0.7	Granted consent July 2015
Melton Road, Burton on the Wolds	Solar PV	5.0	Granted consent Nov 2015
Land at Mill Farm	Solar PV	7.1	Granted consent Aug 2017
West Beacon Farm	Wind	0.05	Operational
Severn Trent Sewage Treatment Works, Wanlip	Wind, AD AD	2.5 1.5 3.2	Operational Operational Operational
Lodge Farm, Burton on the Wolds	Wind	0.5	Granted consent April 2014
Loughborough Sewage Treatment Plant	AD	0.3	Operational
Shepshed EfW, Newhurst Quarry	Energy from Waste	33	Granted consent Oct 2014
Mountsorrel Landfill Site	Landfill Gas	1.6	Operational

3.17 The existing renewable energy installations in Charnwood are reviewed by technology.

Solar photovoltaic (PV) farms

3.18 Five solar farms are operational in Charnwood, primarily in the north east of the Borough on open and agricultural land on the Leicestershire wolds. They have combined installed capacity of 64.8MW. This includes a 34.5MW solar farm at Wymeswold Airfield which was the largest solar farm in the country when constructed. It includes over 130,000 panels covering 60ha of land and has been operating since 2013.

3.19 Three further solar farms have been granted planning consent but have not yet started construction. Should they be developed, they will increase installed solar capacity by 12.8MW, bringing the combined total up to 77.6MW. To date, the majority of solar farm proposals that have entered the planning system have been consented, with two applications being refused and one withdrawn

Wind Power

3.20 Two wind power installations are operational in Charnwood, with a combined capacity of 2.57MW. Most of this capacity is provided by a single 2.5MW 132m tall wind turbine at the Severn Trent Sewage Treatment Works in Wanlip. It was installed in 2013 to provide power to the water treatment processes. It reduces the site's carbon emissions by an estimated 3,700 tonnes annually.

3.21 Two small 25kW turbines were installed at West Beacons Farm in 1990, as part of a pioneering demonstration of sustainable energy systems[8]. The turbines are now integrated with other technologies such as solar and hydrogen energy storage. The West Beacons Farm has links to local universities.

3.22 Permission was granted subject to conditions in 2015 for a single 500kW 78m wind turbine at Lodge Farm, Burton on the Wolds. While a number of conditions have been discharged, including mitigating safety concerns at East Midlands airport, the turbine has not been erected to date. A single 2MW turbine to be located just outside of Loughborough had planning permission granted in 2004 but it has since lapsed. A 2010 proposal to install 4, 127m wind turbines with a 9.2MW total installed capacity at Queniborough was submitted but was refused planning consent.

Energy from waste technologies

3.23 Three anaerobic digestion (AD) plants operate at sewage treatment works at Wanlip and Loughborough with a combined installed capacity of 5MW. The Severn Trent Sewage Treatment Works at Wanlip has a 3.2MW AD fuelled using sewage sludge. A 1.5MW AD plant operated by Biffa[9] processes household organic material such as kitchen scraps and garden cuttings from a mechanical waste treatment facility in Leicester as well as bulk and source segregated food wastes. In addition to the electricity generated from the methane gas, the heat produced is utilised on site as part of waste processing. There are no on-farm AD plants in Charnwood.

3.24 Long running proposals for an energy recovery facility at Newhurst Quarry near Shepshed were given planning permission in 2014 by Leicestershire County Council as the waste planning authority after being initially refused in 2009. The proposed facility's capacity of 33MW would allow it to incinerate waste from collection services in Leicestershire and around the Midlands. In 2018 the operator is applying to increase its waste processing capacity from 300,000 to 350,000 tonnes of waste per year[10]. It represents a £250 million investment by Biffa and construction is due to begin in 2019.

3.25 The Mountsorrel Landfill Site is the only landfill gas facility in Charnwood and has been operational since 1996 with an installed capacity of 1.6MW. Applications for landfill gas facilities at Newhurst Quarry have been made in recent years but plans were withdrawn.

[8] http://www.beaconenergy.co.uk/pdfs/westbeaconfarm_050208.pdf

[9] https://www.biffa.co.uk/about-us/operational-infrastructure/anaerobic-digestion/#1443014515963-8a520d11-695c

[10] https://consult.environment-agency.gov.uk/psc/le12-9bu-biffa-waste-services-limited/supporting_documents/Non%20Technical%20Summary

Figure 3.7: Existing and consented renewable energy installations

Charnwood Borough boundary

Renewable Energy Installation (MW)

Anaerobic Digestion

- <5
- 5 - 19
- 20+

Energy from Waste (EfW)

- <5
- 5 - 19
- 20+

Landfill Gas

- <5
- 5 - 19
- 20+

Solar PV

- <5
- 5 - 19
- 20+

Wind

- <5
- 5 - 19
- 20+

Planning Status

Italicised labels indicate that installation has been consented for development. All other sites are operational.

Map Scale @A3: 1:100,000

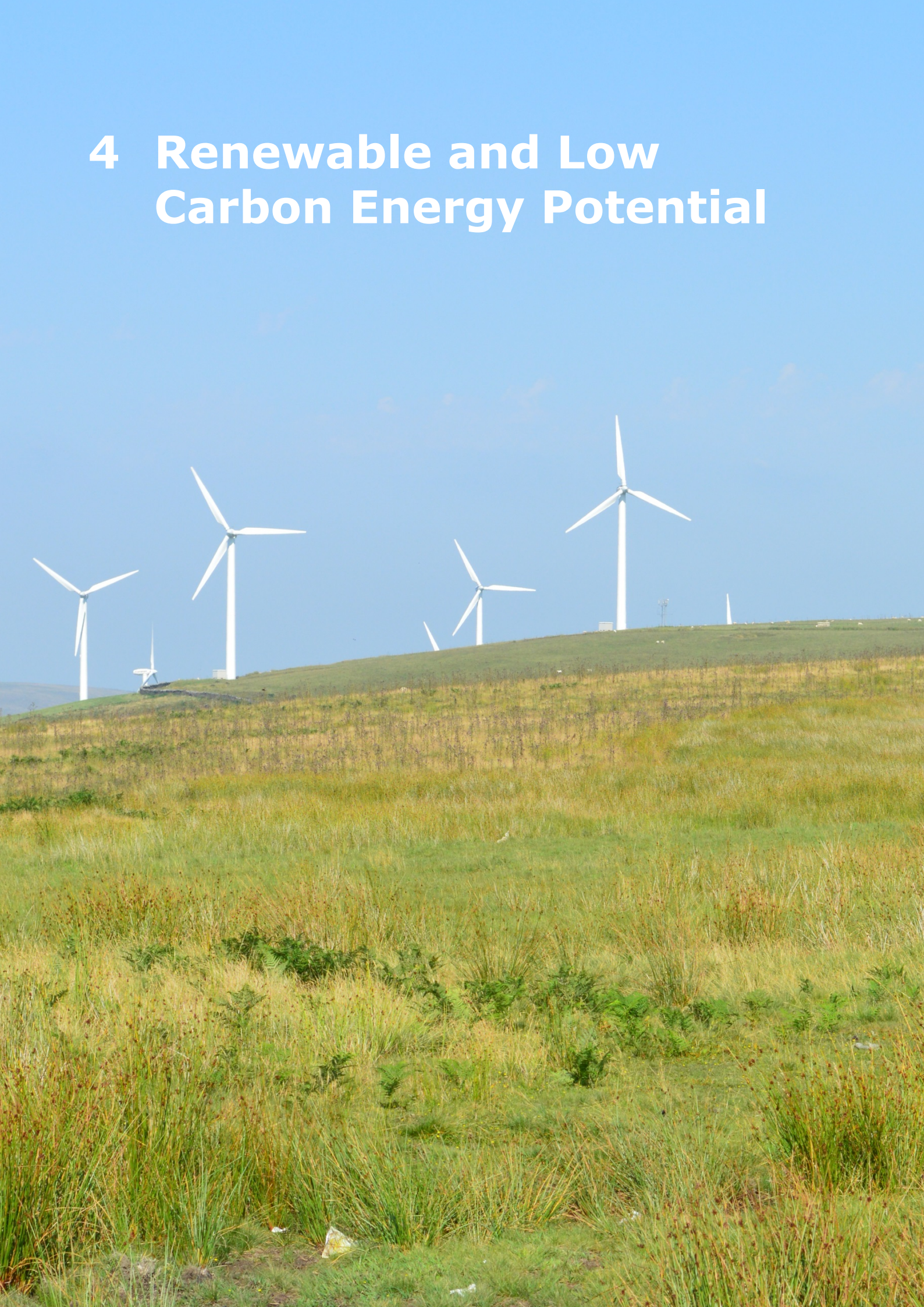
0 5 10 km

Service Layer Credits: Contains OS data © Crown Copyright and database right 2018

CB:BP EB:Packham_B LUC FIGX_10448_Existing_and_Consented_Renewable_Energy_A3L 25/10/2018

Source: Charnwood Borough

4 Renewable and Low Carbon Energy Potential



4 Renewable and Low Carbon Energy Potential

Introduction

4.1 This chapter sets out the results of the assessment of the technical potential for renewables within the Borough of Charnwood. The 'technical potential' is the total amount of renewable energy that could be delivered in the area based on a number of assumptions regarding the amount of resource and space. The chapter also includes a discussion of the issues that will affect what could be realistically delivered within the Borough. This includes the consideration of factors such as planning, economic viability and grid connection. It does not take into account landscape sensitivity which is being considered separately in the Charnwood Landscape Sensitivity Report.

Background

4.2 The assessment of technical potential builds upon the East Midlands *Low Carbon Energy Opportunities and Heat Mapping Study* which LUC, SQW and CSE completed on behalf of the East Midlands Councils in 2011. The East Midlands study was in turn based on a refinement of the DECC Methodology – *Renewable and Low Carbon Energy Capacity Methodology for the English Regions* (2010)[11].

4.3 The East Midlands Study involved an assessment of technical potential for renewable energy within the region based on the use of a number of clearly defined data sources and parameters/ assumptions for each technology. These data sources and assumptions were reviewed and refined as part of this study to ensure that the assessment reflects the local characteristics of Charnwood.

4.4 Where relevant, the results set out in this chapter have been presented in terms of:

- Installed capacity (MW);
- Generation capacity (GW/h) for electricity and heat as appropriate.

4.5 Where possible spatial data has been used to identify the locations/ areas with most potential for specific technologies. However it is not possible to identify locations for all types of renewable energy as many technologies such as building integrated solar, heat pumps, farm-scale Anaerobic Digestion (AD) and biomass which can be located in nearly all areas.

Results of Technical Potential Assessment

4.6 The following section provides a summary of the technical potential for each technology type, in the following format:

- Brief description of the technology.
- Existing projects within Charnwood.
- Main assumptions used to calculate the technical potential.
- Results and commentary on technical potential and issues affecting deployment.

[11] In March 2010, DECC published a methodology for quantifying the opportunities and constraints for deploying renewables and low carbon energy in the English Regions. The purpose of this methodology was to ensure that a consistent approach was used for the assessment of resource potential across the English regions. The methodology sets out a series of assumptions for calculating the technical potential for renewable energy within a region. It did not provide assumptions for assessing the 'deployable potential'.

Wind Energy

Description of technology

4.7 On-shore wind power is an established and proven technology with thousands of installations currently deployed across many countries. The UK has the largest wind energy resource in Europe.

4.8 Wind power uses energy from the wind to turn a rotor connected to an electrical generator. Although there are no rigid categories relating to the scale of wind turbines, for the purpose of this study, four size bands have been considered as follows:

- Small (<40m).
- Medium (40-80m).
- Large (80-120m).
- Very large (120-160m).

Table 4.1: Typical scales of wind turbines

Scale	Typical Turbine Installed Capacity	Typical Turbine Height (to blade tip)
Small	500kW	<40m
Medium	900kW	40-80m
Large	2.5MW	80-120m
Very Large	4.0MW	120m->160m

4.9 Most very large, large and medium developments are connected to the national grid. Medium and small scale turbines may provide electricity for a single premises (e.g. a farm) or be connected to the grid directly for export. The number of turbines used per site ranges from the deployment of single turbines up to large groups of turbines (known as wind farms) capable of generating tens of megawatts. The amount of energy that turbines generate will depend primarily on wind speed but will be limited by the maximum output (kW/ MW) of the individual turbine.

Current wind development in Charnwood

4.10 As detailed in **Chapter 3**, there are only two wind power installations are operational in Charnwood, with a combined capacity of 2.57MW.

Assumptions used to calculate technical potential

4.11 The assessment of technical potential for large, medium and small turbines was undertaken using GIS (Geographical information Systems) involving spatial mapping of the key constraints and opportunities. The assessment identified the areas with potential viable wind speeds and the number of turbines that could be theoretically deployed within these areas. A series of constraints relating to physical features and environmental/heritage protection were then removed.

4.12 The following key constraints and opportunities were considered. Please note: A discussion of micro generation is set out in the section later in this chapter.

Table 4.2: Wind Energy Assumptions

Parameter	Assumption	Data source	Justification and notes
Opportunities			
Wind Speed (see **Figure 4.1**: Wind Speed which shows the range of wind speeds found in Charnwood)	All areas with wind speed 5 m/s at 45m above ground level (agl)	NOABL Industry practice	All of Charnwood meets and exceeds the minimum requirement of 5m/s. Depending on the size of the turbine used the requirements for certain wind speeds change. Some turbine manufacturers produce models which cater for lower wind speed environments and the configuration of certain turbine models can be altered to improve yield in lower wind speed environments. As government policy could change in the future, and technological advances in turbines could improve, lower wind speed conditions can be considered. Therefore, a 5m/s threshold has been set to account for any future developments. Sites below 5m/s would be considered uneconomically viable for a developer.
Wind turbine size (See **Figures 4.6a-d**: Opportunities for Wind Development which show all the opportunity areas within Charnwood for each turbine size assessed)	Assess four turbine sizes: • Very large (120-160m+ tip height) • Large (80-120m tip height) • Medium (40-80m tip height) • Small (<40m tip height)	LUC Research into turbine manufacturers BEIS renewable energy planning database and other databases containing information on wind turbine applications	There are no standard categories for wind turbine sizes. Research conducted found that manufacturers will typically produce a number of models that fall into the assessed categories as well as the ability to change the configuration of turbine components to create custom sizes. A review of wind turbine applications across the UK showed tip heights ranging from less than 20m up to 180m, with larger turbine models in demand from developers to counter reductions in subsidies. The majority of operational and planned turbines range between 80m and 130m. Smaller turbines (those in the medium to small category) are typically used for single turbine developments
Wind turbine Density (See **Figures 4.6a-d**: Opportunities for Wind Development which show all the opportunity areas within Charnwood for each turbine size assessed)	• Very large: 4 turbines per km² • Large: 4 turbines per km² • Medium 10 turbines per km² • Small: 50 turbines per km²	Industry practice	The rotor diameter of a candidate turbine is used to determine spacing between turbines to ensure operational efficiency. At a minimum this will be 5x spacing. Factors such as prevailing wind direction are taken into account and turbine spacing will typically be agreed between developer and manufacturer prior to planning permission being sought. The density calculation will not take into account the site shape and minimum site size. It is assumed that if a parcel of land is considered suitable for a range of turbine sizes the largest turbine size will be used.

Parameter	Assumption	Data source	Justification and notes
Exclusions			
Roads (see **Figure 4.4a and Figure 4.5a** which show the constraints for small and very large turbines respectively. These constraints have been applied for all turbine size categories and the buffer distances reduced accordingly)	Roads with a buffer of the height of the turbine (to blade tip height) +50m	Ordnance Survey VectorMap District. Note: single and dual carriageways extracted and separated out from main dataset. In order to create a footprint from the road centrelines data, it was assumed that single carriageways were 10m in width and dual carriageways were 20m in width.	This buffer is applied as a safety consideration.
Railways (see **Figure 4.4a and Figure 4.5a** which show the constraints for small and very large turbines respectively. These constraints have been applied for all turbine size categories and the buffer distances reduced accordingly)	Railways with a buffer of the height of the turbine (to blade tip height) + 50m	Ordnance Survey VectorMap District. Note: In order to create a footprint from the railway centrelines data, it was assumed that railways were 15m in width.	This buffer is applied as a safety consideration.
Transmission lines (see **Figure 4.4a and Figure 4.5a** which show the constraints for small and very large turbines respectively. These constraints have been applied for all turbine size categories and the buffer distances reduced accordingly)	Major transmission lines with a buffer of the height of the turbine (to blade tip height) +50m.	National Grid	This buffer is applied as a safety consideration.
Public rights of way (see **Figure 4.4b and Figure 4.5b** which show the constraints for small and very large turbines respectively. These constraints have been applied for all turbine size categories and the buffer distances reduced accordingly)	Public Rights of Way and Bridleways with a buffer of the height of the turbine (to blade tip height) +50m.	Charnwood Borough Council Note: In order to create a footprint from the railway centrelines data, it was assumed that Public Rights of Way and Bridleways were 2m in width.	This buffer is applied as a safety consideration.
MOD Training (Not shown on figure, but have been considered as an exclusion when determining the unconstrained areas for wind energy development **in Figures 4.7 – 4.10**)	MOD Training Areas	Charnwood Borough council	This is applied as a safety consideration.

Parameter	Assumption	Data source	Justification and notes
NATS/ MOD (Not considered as an absolute constraint therefore will not affect the availability of opportunity areas for wind development) (see **Figure 4.11:** Aviation Constraints showing areas within 30km of East Midlands Airport)	Guidance includes the following safeguarding areas: • 30km for aerodromes with a surveillance radar facility. • 17km for non-radar equipped aerodromes with a runway of 1,100 m or more, or 5km for those with a shorter runway. • 4km for non-radar equipped unlicensed aerodrome with a runway of more than 800m or 3km with a shorter runway. • 10km for the air-ground-air communication stations and navigation aids. • 15 nautical miles (nm) for secondary surveillance radar.	NATS/MOD	Further consultation between potential developers and NATS is required to determine if there is any impact from a proposed development.
Noise (see **Figure 4.4a and Figure 4.5a** which show the constraints for small and very large turbines respectively. These constraints have been applied for all turbine size categories and the buffer distances reduced accordingly)	Residential and commercial buffer zones - Residential and commercial properties with a buffer to exclude areas within which it would be categorically impossible to meet the ETSU-R-97 noise limits for small and medium turbines: • Small: 200m for residential, 150m for commercial • Medium: : 200m for residential, 150m for commercial and highly unlikely to meet the ETSU-R-97 noise limits for, large and very large turbines: • Large: 500m for residential, 200m for commercial • Very large: 600m for residential, 300m for commercial For properties outside of (but close to) the Borough Boundary, indicative buffers have been applied to the available property/buildings data. As it is not possible to differentiate between residential or commercial properties within the publicly available data, it has been assumed that all properties are residential.	Charnwood Borough council Local Land and Property Gazetteer (LLPG) Residential and Commercial address points OS OpenMapLocal Buildings layer for buildings adjacent to the Borough Boundary	The two main issues that determine the acceptable separation distance between residential properties and wind energy developments are visual amenity and noise. Commercial-scale wind turbines are large structures and can have an effect on visual amenity from residential properties. All wind turbines also generate sound during their operation. As such, appropriate distances should be maintained between wind turbines and sensitive receptors to protect residential amenity. The key question however is whether buffer distances should be applied (to take account of noise issues) when identifying suitable areas for wind energy developments. In order to secure planning permission, wind turbine applications have to provide evidence that they adhere to the required noise thresholds set out in the ETSU Guidance – The Assessment and Rating of Noise from Wind Farms (1995). Based on the opinion of acoustic specialists, buffers have been defined for areas within which it would categorically not be possible to meet the ETSU-R-97 noise limits. For large and very large turbines, an additional buffer has been applied to rule out areas within which it would be highly unlikely, but not categorically impossible, to site wind turbines and still meet ETSU-R-97 noise limits. Shadow flicker has not been considered as a constraint in this study as modern turbines are now equipped with the technology to be

Parameter	Assumption	Data source	Justification and notes
			able to turn off when shadow flicker is predicted to occur.
Future developments (see **Figure 4.4a and Figure 4.5a** which show the constraints for small and very large turbines respectively. This constraint has been applied for all turbine size categories)	Strategic Housing Land Availability Assessment sites	Charnwood Borough council	Sites allocated for development with planning permission granted are considered as an exclusion.
Natural features (see **Figure 4.4b and Figure 4.5b** which show the constraints for small and very large turbines respectively. This constraint has been applied for all turbine size categories).	Slopes greater than 15 degrees.	Ordnance Survey Terrain50	This is a development/operational constraint. Developers have indicated that this is the maximum slope they would consider for development. Although theoretically possible to develop on areas exceeding 15° slopes, turbine manufacturers are unlikely to allow turbine component delivery to sites where this is exceeded.
Water Environment (see **Figure 4.4b and Figure 4.5b** which show the constraints for small and very large turbines respectively. This constraint has been applied for all turbine size categories).	Rivers and waterbodies with a 50m buffer.	Ordnance Survey VectorMap District: Surface Water Area	A 50m buffer has been applied around all rivers and waterbodies to take account of good practice such as pollution control during construction.
Woodland **(See Figure 4.4b and 4.5b)**	Woodland as shown on the National Forest Inventory	Forestry Commission	All areas of woodland are excluded.
Biodiversity (see **Figure 4.2**: Nature Designations showing all designated areas within Charnwood)	National designations: • Sites of Special Scientific Interest • National Nature Reserves *(none within Charnwood boundary)* There are no Internationally designated sites within Charnwood boundary	Natural England	As protected by: Wildlife and Countryside Act 1981. Conservation of Habitats and Species Regulations 2010 (as amended).
	Other designations: • Ancient woodland • Local Nature Reserves • Sites of Importance for Nature Conservation	Natural England Charnwood Borough Council	National Planning Policy Framework. Natural Environment and Rural Communities Act 2006.
Cultural heritage (see **Figure 4.3**: Heritage Designations showing all designated features and areas	Designated sites • World Heritage Sites *(none within Charnwood boundary)* • Registered Parks and	Historic England	National Planning Policy Framework. The Convention Concerning the Protection of the World Cultural and Natural Heritage. National Heritage Act 1983.

Parameter	Assumption	Data source	Justification and notes
within Charnwood)	Gardens • Scheduled Monuments • Listed Buildings • Registered Battlefields *(none within Charnwood boundary)*		Ancient Monuments and Archaeological Areas Act of 1979. Planning (Listed Buildings and Conservation Areas) Act 1990. *Note: A 5m buffer has been applied to Listed Buildings, providing a footprint to a point dataset. This is not intended to identify a 'setting' zone.*
	Other cultural heritage considerations: • Conservation Areas • Archaeological Interest Sites • Archaeological Alert Sites	Charnwood Borough Council	National Planning Policy Framework. Planning (Listed Buildings and Conservation Areas) Act 1990.

4.13 The potential impact of wind turbines on the landscape is a key issue which can significantly affect where turbines are located. This has not been considered as part of the technical assessment but will be by the Council alongside the findings of the landscape sensitivity assessment

Results

Technical potential

4.14 **Table 4.3** below provides a summary of the technical potential for wind energy within the Borough. The analysis examined the potential for very large, large, medium and small turbines and where potential existed for more than one size of turbines, it was assumed that the larger turbines would take precedence – i.e. to calculate the maximum technical potential.

Table 4.3: Summary of Technical Potential for Wind Energy

Resource	(MW)	(GWh)
Very large	68.74	140.30
Large Wind	64.10	130.83
Medium Wind	435.87	889.65
Small Wind	383.25	782.24
Total – electricity[12]	**951.96**	**1943.02**

4.15 In order to calculate the technical potential a series of opportunity and constraints maps were produced. **Figure 4.1** shows the wind speed within the Borough at 45m above ground level (agl). All areas within the Borough have wind speeds in excess of the minimum cut off of 5m/s with the highest wind speeds in the north east of the Borough and the lowest wind speeds in the west. Wind speeds of 5m/s or above at hub height are needed to operate wind turbines efficiently, although many developers would not look to develop sites at the present time at sites with wind speeds lower than 7m/s or even higher than that.

[12] 1. Area of unconstrained land is treated as a single block of land. This is not the case in reality.
2. Density of turbines per square km is based on having 5 rotor diameters between turbines.
3. Typical turbine dimensions based on consultation with developers and manufacturers as well as other studies.
5. Land available for large turbines will also be suitable for medium and small turbines.
6. Land available for medium turbines will also be suitable for small turbines.
7. For these calculations, it is assumed that developers would choose the largest turbine size suitable for each parcel of land.
8. GWh calculated using the formula MW x 8760 x capacity factor/1,000.
9. Capacity factor figure obtained from BEIS FiT load factors, calculated at 23.3% for East Midlands.

4.16 It is important to acknowledge that macro scale wind data (such as NOABL[13]) which was used for this assessment can be inaccurate at the site specific level and therefore can only give a high level assessment of potential within the area. Developers looking at specific sites (particularly for large scale turbines) will normally require wind speeds to be accurately monitored using anemometers for an extended period of time, typically at least one-two years.

4.17 The results show that there is a total technical potential to deliver around 1,010MW of electricity from wind power in the Borough with the greatest potential for small and medium wind turbines as there are fewer constraints to these sizes of turbines in relation to proximity to dwellings. In reality, the deployable potential for wind is significantly lower.

4.18 **Figures 4.6a-d** show the areas which have technical potential for wind energy for each category of turbine size. Please note that this assessment does not provide a sufficient evidence base for the actual siting and delivery of wind turbines but gives a high level assessment of potential areas. **Figures 4.6a-d** indicates that there are pockets of land throughout the Borough that have the technical potential for very large, large, medium and small scale wind turbines.

4.19 The maps show negligible land availability in the more urban and suburban areas of the Borough including Loughborough, Montsorrel, Rothley, Sileby and Syston. There is greatest potential for large and very large turbines in the more rural areas to the west of the Borough (See **Figure 4.9 and Figure 4.10**), where there are fewer property and infrastructure constraints (see **Figure 4.5**). There are significant areas of rural farmland throughout the Borough which are technically suitable for medium and small scale wind (see **Figures 4.7 and 4.8**), although access to the grid could be more problematic.

4.20 The assessment of technical potential has not considered aviation constraints as detailed consultation with the MOD and NATS/NERL is needed on a site by site basis to ascertain if it is likely to be a significant concern or not. **Figure 4.11** illustrates that the whole of the Borough lies within 30km of the East Midlands Airport and radar interference could be a constraint for large and very large turbines. A clearer understanding of these issues is required at the site specific level to determine their applicability and as such aviation constraints have not been used to rule out areas of potential as part of this technical assessment.

Issues affecting deployment

Subsidies

4.21 The main issues affecting the deployment of wind energy schemes are linked to the significant reduction in financial incentives in recent years, most notably the closure of the Renewables Obligation to onshore wind schemes in May 2016 and all wind schemes in March 2017. The Renewables Obligation was designed to encourage generation of electricity from eligible renewable sources in the UK. The Renewables Obligation has since been replaced by the more competitive Contracts for Difference scheme but onshore wind schemes in England have been excluded from competing for contracts since 2015.

4.22 In addition to the closure of the Renewables Obligation, the Government's Feed-in Tariff scheme designed to encourage uptake of a range of small-scale renewable and low-carbon electricity generation technologies has been cut a number of times. Cuts to wind tariff rates were made in 2011, 2012, 2015 and 2016. On 19th July 2018 the Department of Business Energy and Industrial Strategy (BEIS) published a consultation in which they stated their intention to close the FIT scheme to new applicants from 1st April 2019, barring several exceptions.

[13] NOABL (National Oceanic and Atmospheric Administration (NOAA) Boundary Layer) wind speed database developed by ETSU for the DTI (Department of Trade and Industry) in 1997. This provides an estimated wind speed for a 1 km square at 10 m, 25 m and 45 m above ground level. The wind speed data in the ETSU NOABL database is the result of an air flow model that estimates the effect of topography on wind speed. There is no allowance for the effect of local thermally driven winds such as sea breezes or mountain/valley breezes or local roughness such as buildings and trees which can have a considerable effect on wind speeds.

Planning

4.23 Although the English planning system supports the delivery of all types of renewable energy technology within the country, in June 2015, National Planning Practice Guidance was updated to state that "*when considering applications for wind energy development, local planning authorities should (subject to the transitional arrangement) only grant planning permission if:*

- *the development site is in an area identified as suitable for wind energy development in a Local or Neighbourhood Plan; and*
- *following consultation, it can be demonstrated that the planning impacts identified by affected local communities have been fully addressed and therefore the proposal has their backing.*
- *Whether the proposal has the backing of the affected local community is a planning judgement for the local planning authority."*

4.24 This new planning policy approach has made it harder for developers to obtain permission for schemes, unless it can be clearly evidenced that the proposal lies within an areas of suitability for wind and that the issues raised by local communities have been addressed. In combination with the cut to subsides, this has meant that there have been very few wind energy applications submitted anywhere in England in recent years as developers seek to invest in other locations such as Scotland, where there are no such planning restrictions in place.

Grid Connection

4.25 Another significant barrier to the development of renewable and low carbon energy schemes within the UK includes grid connection constraints and a lack of grid capacity. Despite significant ongoing investment in the National Grid, the country's private sector Distribution Network Operators (DNOs), which carry electricity from main grid to commercial and domestic users, continue to be slow in permitting and facilitating new grid connections, connections which often come at significant cost to the new energy generators, including costs for any necessary network reinforcements.

4.26 Western Power Distribution is the DNO in Charnwood and they publish high-level information on the potential for new renewable schemes to connect to the distribution network. This indicates that the majority of Charnwood is grid constrained. Charnwood is served by seven primary substations (11kV) that are connected to upstream bulk supply points (33kV) at Loughborough, Willoughby and Leicester North. **Table 4.4** below presents their size, existing and proposed connections and the headroom for new connections.

Table 4.4: Capacity for new grid connections at Charnwood grid bulk supply points

Bulk supply point	Generation capability	Connected generation	Possible future connections	Available headroom
Willoughby 33kV	58.50 MVA	79.69 MVA	1.56 MVA	-23.24 MVA
Loughborough 33kV	39.00 MVA	32.49 MVA	58.00 MVA	-51.49 MVA
Leicester North 33kV	58.50 MVA	8.37 MVA	0.23 MVA	49.40 MVA

4.27 While the primary substations themselves have available capacity, the Loughborough and Willoughby bulk supply points are constrained and are operating at or near full capacity with further new connections already under discussion that would go significantly beyond this. Grid reinforcements would be needed before large renewable generators could be connected. Leicester North has additional capacity available and serves communities in Charnwood near Leicester including Wanlip, Birstall and Newtown Linford. It should be noted that this is a snapshot and reinforcement works may be undertaken to address the constraints identified.

Solar Arrays

Description of technology

4.28 In addition to PV modules associated with built development, there are a large number of solar PV arrays or solar farms within in the UK. Free-standing solar PV arrays consist of panels that are usually mounted around 0.7m-3m above ground level allowing the growth of vegetation beneath and between the arrays and the associated grazing of stock. Panels are arranged in groups or 'arrays' of around 20 panels. The panels are encased in an aluminium frame, supported by aluminium or steel stands, and positioned at a fixed angle between 20-40 degrees from the horizontal, facing south. These arrays usually take the form of a linear rack of panels. These arrays or linear racks are usually sited in parallel rows with gaps between the rows for access and to prevent shading of adjacent rows. They therefore do not cover a whole field.

4.29 A 5MW development would typically require a site of approximately 10-15ha but there are proposals in England for schemes of up to 350 MW[14] (Cleve Hill in Kent). The output of a typical panel used would be approximately 200 watts, so a 1MW solar farm would require 250 racks containing 20 panels in each rack. Like wind turbine schemes, solar PV developments are usually given planning permission for 25 years.

Current wind development in Charnwood

4.30 As outlined in **Chapter 3**, there are currently five solar farms that are operational in Charnwood, primarily in the north east of the Borough on open and agricultural land on the Leicestershire wolds. They have combined installed capacity of 64.8 MW.

Assumptions used to calculate technical potential

4.31 The assessment of technical potential for solar arrays was undertaken using GIS (Geographical Information Systems) involving spatial mapping of the key constraints and opportunities. The assessment identified the areas with potential suitable solar insolation and then a series of constraints relating to physical features and environmental/ heritage protection were overlaid. The areas of land covered by constraints were then removed from further consideration.

4.32 The key constraints and opportunities considered are set out in **Table 4.5**. A discussion of solar in relation to micro generation is set out later in this chapter.

Table 4.5: Solar Energy Assumptions

Parameter	Assumption	Data source	Justification and Notes
Opportunities			
Solar output	• Average annual generation of 928kWh/kWp for a south facing 30 degree system in Charnwood with some shading.	Helioscope modelling	All areas within Charnwood boundary considered theoretically suitable for solar development. South facing slopes free of constraint are the most optimal locations.
Solar farm size (See **Figure 4.16:** Opportunities for Solar Development which show all the opportunity areas within Charnwood)	• Minimum solar farm size of 0.5MW and a maximum solar farm size of 350MW.	The proposed 350MW solar farm at Cleve Hill has been used as a benchmark for the likely maximum size of a potential solar farm within the Borough. If consented, the Cleve Hill solar farm will be the largest in the UK.	

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Parameter	Assumption	Data source	Justification and Notes
Solar density (See **Figure 4.16**: Opportunities for Solar Development which show all the opportunity areas within Charnwood)	• Assumes a density of approximately 9MW/km^2 (approximately 0.56km^2 per 5MW scheme).	Solar Trade Association	The density calculation will not take into account the site shape and minimum site size.
Exclusions			
Physical, Land Use and Infrastructure (See **Figure 4.14:** Constraints for Solar PV)	• Roads • Railways • Major overhead transmission lines • Public Rights of Way and Bridleways • Rivers and waterbodies • Airfields and airports, should be taken into consideration, due to potential for glare, but no buffer applied due to site specific nature of this consideration unless NATS layer indicates it is an exclusion zone. (None within Charnwood boundary) • MOD training areas (not shown on mapping but taken into consideration when determining opportunity areas for solar) • Operational Minerals Sites with 250m buffer • Agricultural land use classifications grades 1, 2. [Ground Mounted Solar PV projects, over 50kWp, should ideally utilise previously developed land, brownfield land, contaminated land, industrial land or agricultural land preferably of classification 3b, 4, and 5]	• Roads: OS VectorMap District • Note: single and dual carriageways extracted and separated out from main dataset. In order to create a footprint from the road centrelines data, it was assumed that single carriageways were 10m in width and dual carriageways were 20m in width. • Railways: OS VectorMap District • Note: In order to create a footprint from the railway centrelines data, it was assumed that railways were 15m in width. • Other Datasets: National Grid, Charnwood Borough Council, NATS, MOD, Natural England	• Physical features taken into account which prevent the development of solar PV. No requirement for safety buffers. • Operation mineral sites buffered to account for dust emissions which will affect the generation output. Research has shown that 98% of airborne dust settles within 250m of the emission source. • Agricultural Land Use a consideration, preserving grade 1 and 2 land for such uses as food production. Further investigation will be required on grade 3 land (as shown on **Figure 4.14**) to determine suitability for a proposed development.

Parameter	Assumption	Data source	Justification and Notes
Natural environment (See **Figure 4.13:** Constraints for Solar PV)	• Special Areas of Conservation (None with Charnwood boundary) • Special Protection Areas (None with Charnwood boundary) • Ramsar (None with Charnwood boundary) • Sites of Special Scientific Interest • National Nature Reserves (None with Charnwood boundary) • Sites of Importance for Nature Conservation • Local Nature Reserves • Ancient woodland • Other woodland areas	• Natural England, Defra Spatial data layers, Charnwood Borough Council, Forestry commission	As protected by: Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora, commonly known as the Habitats Directive. Directive 2009/147/EC of the European Parliament and of the Council on the conservation of wild birds, commonly known as the Birds Directive. Conservation of Habitats and Species Regulations 2010 (as amended). Wildlife and Countryside Act 1981. Conservation of Habitats and Species Regulations 2010 (as amended). National Planning Policy Framework. Natural Environment and Rural Communities Act 2006.
Historic environment (See **Figure 4.13**: Constraints for Solar PV)	• Scheduled monuments • World heritage sites *(None with Charnwood boundary)* • Registered battlefields *(None with Charnwood boundary)* • Registered parks and gardens • Listed buildings • Conservation Areas • Archaeological Interest Sites • Archaeological Alert Sites	• Historic England, Charnwood Borough Council	• National Planning Policy Framework. • The Convention Concerning the Protection of the World Cultural and Natural Heritage. • National Heritage Act 1983. • Ancient Monuments and Archaeological Areas Act of 1979. • Planning (Listed Buildings and Conservation Areas) Act 1990. *Note: A 5m buffer has been applied to Listed Buildings, providing a footprint to a point dataset. This is not intended to identify a 'setting' zone.*
Terrain (See **Figure 4.12:** Constraints for Solar PV)	• Slope and aspect – exclude areas with north-east to north-west aspect and inclinations greater than 3 degrees, exclude all areas greater than 15 degrees	• Ordnance Survey Terrain 50	• Although possible to develop Solar PV installations on slopes facing north-east to north-west it would be uneconomically viable. However, those slopes that are north facing and below 3° are considered, as generation output will not be significantly affected.
Built up environment areas (See **Figure 4.14:** Constraints for Solar PV)	• Settlements • Strategic Housing Land Availability Assessment sites	• Office of National Statistics • Charnwood Borough council	• 20m exclusion zone around settlements applied to account for shading effect of buildings • Sites allocated for development with planning permission granted considered as an exclusion

Results

Technical potential

4.33 **Table 4.6** below provides a summary of the technical potential for electricity generation from large scale solar PV arrays within the Borough.

Table 4.6: Summary of Technical Potential for Large Scale Solar PV Arrays

Resource	(MW)	(GWh)
Total - electricity	**750.42**	**986.05**

4.34 The assessment estimates that there is a technical potential of around 750MW of electricity that could be generated from large scale PV arrays within the Borough. This is clearly a significant resource and a considerable overestimate of what could actually be delivered within the Borough. A summary of the areas that are constrained for solar array developments are shown in **Figure 4.16**. Essentially, there are large areas of agricultural land that could be used to accommodate large scale solar PV arrays as all of Charnwood exceeds the suitable solar irradiation threshold of >800kWh/kW peak.

Issues affecting deployment

Subsidies

4.35 The main issues affecting the deployment of solar energy schemes are linked to the significant reduction in financial incentives in recent years, most notably the closure of the Renewables Obligation to >5MW solar PV schemes in March 2015, followed by <5MW solar PV schemes in March 2016 and all solar schemes in March 2017. The Renewables Obligation was designed to encourage generation of electricity from eligible renewable sources in the UK. The Renewables Obligation has since been replaced by the more competitive Contracts for Difference scheme but large solar arrays have been excluded from competing for contracts since 2015. In addition to the closure of the Renewables Obligation, the Government's Feed-in Tariff scheme designed to encourage uptake of a range of small-scale renewable and low-carbon electricity generation technologies has been cut a number of times. 50KW solar PV schemes were made not eligible for the scheme in August 2011. Further cuts to solar PV tariff rates were made in 2011, 2012 and 2015 and 2016. On 19th July 2018 the Department of Business Energy and Industrial Strategy (BEIS) published a consultation in which they stated their intention to close the FIT scheme to new applicants from 1st April 2019, barring several exceptions.

4.36 The cost of solar has however fallen dramatically in recent years. On 26 September 2017 Clayhill solar farm, located in Milton Keynes, was officially opened which is the first subsidy free solar farm in England. It includes 10MW of solar PV co-located with 5 energy storage units totalling 6MW. Several other solar farm developers are also actively progressing with sites. The number of solar array applications has however decreased significantly since the loss of subsides and it remains to be seen the extent to which developers will pursue subsidy free schemes.

Hydro

Description of technology

4.37 Hydropower generates electricity from the kinetic energy stored within flowing and falling water. Given the geography of Charnwood, only run-of-river hydropower is likely to be practical. In run-of-river schemes, the water is taken directly from the river, passed through a turbine which generates renewable electricity and returned to the watercourse. Other types of hydropower plant, such as impoundment dams and pumped systems, are more common in mountainous regions where water falls from greater heights.

4.38 Run-of-river systems are designed to ensure that the river maintains its normal flow above minimum levels; protecting the river's ecological functions. Run-of-river hydro schemes do not impound the river so are unlikely to have any role in flood management. The key elements of a scheme are a water source with sufficient flow and head, an inlet pipeline (penstock) to direct water, turbine generating equipment and housing, a tailrace to return water to the watercourse, and electricity transmission equipment.

4.39 Run-of-river hydro schemes normally have a limited visual impact on the landscape because only the powerhouse, intake and possibly the penstock are visible. Both the turbine house and intake are relatively small structures and can be designed sympathetically with the local environment. In addition, new infrastructure can often be constructed around existing river infrastructure such as weirs and locks.

Current hydro development in Charnwood

4.40 The Soar is the principal river in Charnwood with its catchment extending across much of Leicestershire. It flows north from Birstall through Barrow upon Soar and leaves Charnwood just beyond Loughborough. The Soar is a major tributary of the river Trent which it meets at Trent Lock south of Sawley. Its tributaries include the Wreake which enters Charnwood at Thrussington and flows west into the Soar at Rothley.

4.41 The Soar was heavily industrialised in the nineteenth century which brought along the construction of many factories and warehouses along its banks, potentially providing opportunities for new run-of-river schemes. However, there are currently no operational hydro schemes in Charnwood or Leicestershire, nor any in development.

Assumptions used to calculate technical potential

4.42 The Environment Agency published maps in 2009 showing where there might be opportunities for small-scale hydropower across the UK, considering both generating capacity and potential environmental sensitivity based upon modelled fish population data and Special Areas of Conservation (SAC)[15]. While the maps are indicative only, they provide an initial assessment of the hydro resource as well as the constraints and opportunities. Opportunities are typically where existing barriers along the watercourse, such as weirs and locks, could be refurbished to include a hydro turbine. This would limit any additional impact on the surroundings or the river's ecology.

Results

Technical potential

4.43 The map in **Figure 4.17** identifies the potential hydropower sites in Charnwood. Those estimated to have the greatest potential generating capacity are located along the Soar and the Wreake. There are a number of small (0-10KW) potential sites across Charnwood.

4.44 **Figure 4.18** highlights potential "win-win" sites where hydropower could potentially be generated. These are sites which present an opportunity for medium to high power potential on heavily modified water bodies; sections of a river where natural conditions have been significantly altered. These are typically installations alongside weirs and locks which often create an opportunity to improve fish passage that can reconnect upstream ecosystems.

4.45 An assessment has been undertaken of the potential generating capacity and output from the development of all sites in **Figure 4.18**. Given the information available, the estimate provides a broad range of generating capacity and outputs using industry standard capacity factor assumptions. Most mini-hydro power schemes are sized so that they operate at between 40% and 60% of their installed maximum capacity to reduce the strain on a turbine[16].

[15] Mapping Hydropower Opportunities in England and Wales. Environment Agency. 2009. See also Mapping Hydropower Opportunities and Sensitivities in England and Wales, Technical Report, Final Report, February 2010.
[16] http://www.british-hydro.org/wp-content/uploads/2018/03/A-Guide-to-UK-mini-hydro-development-v3.pdf

Table 4.7 Potential generation from run-of-river hydropower in Charnwood

Category (kW)	No. of sites	Generating capacity (kW)	
		Min	Max
1 – 10	8	8	80
10 – 20	5	50	100
20 - 50	3	60	150
50 - 100	5	250	500
100 - 500	3	300	1,500
Total (kW)		**668**	**2,330**
Estimated capacity factor		40%	60%
Annual Energy Output (GWh)		**2.3**	**12.2**

4.46 It is estimated that the potential annual energy output of the potential hydropower sites in Charnwood falls between 2.3 and 12.2GWh. Charnwood's total annual electrical energy consumption in 2016 was 691GWh. Hydropower could therefore meet between 0.3-1.8% of local demand should all sites be developed.

Issues affecting deployment

4.47 Ecological constraints and environmental sensitivity are critical considerations in the location of hydropower schemes. **Figure 4.19** indicates that most of the potential sites in Charnwood are considered to have medium environmental sensitivity, including all the larger opportunities along the Soar and Wreake. Few are considered to be of low sensitivity.

Renewable and Low Carbon Heat

Description of technology

4.48 Renewable and low carbon heat can be generated by a range of technologies including biomass boilers, heat pumps, solar thermal and gas-fired combined heat and power (CHP). These can serve single homes or businesses through to communal heating systems providing heat to whole neighbourhoods with district heating.

4.49 District heating is the distribution of heat from a central energy centre which contains the heating system through a network of insulated pipes to homes and businesses. The large size of the heating system means that the plant can be more efficient. District heat networks can also make use of the waste heat from industrial processes or thermal power stations and can be used to provide space heating, hot water and heat for use in industrial processes.

Current renewable and low carbon heat in Charnwood

4.50 Renewable heating is most attractive to households without a connection to the gas network due to the higher costs of electric and oil heating. In Charnwood an estimated 96% of households are thought to be connected[17] to the gas grid with areas with significant off gas-grid homes found only to the north east of Loughborough (See **Figure 4.20**). This high gas penetration may, in part, explain the relatively low uptake of the Renewable Heat Incentive (RHI) (88 domestic and 18 non-domestic systems renewable heating installations) when compared to other predominantly rural boroughs. It should be noted that wood burning stoves and similar biomass secondary

[17] https://www.gov.uk/government/statistics/lsoa-estimates-of-households-not-connected-to-the-gas-network

heating systems are not covered by the RHI. These are explored further in the wood fuel section below.

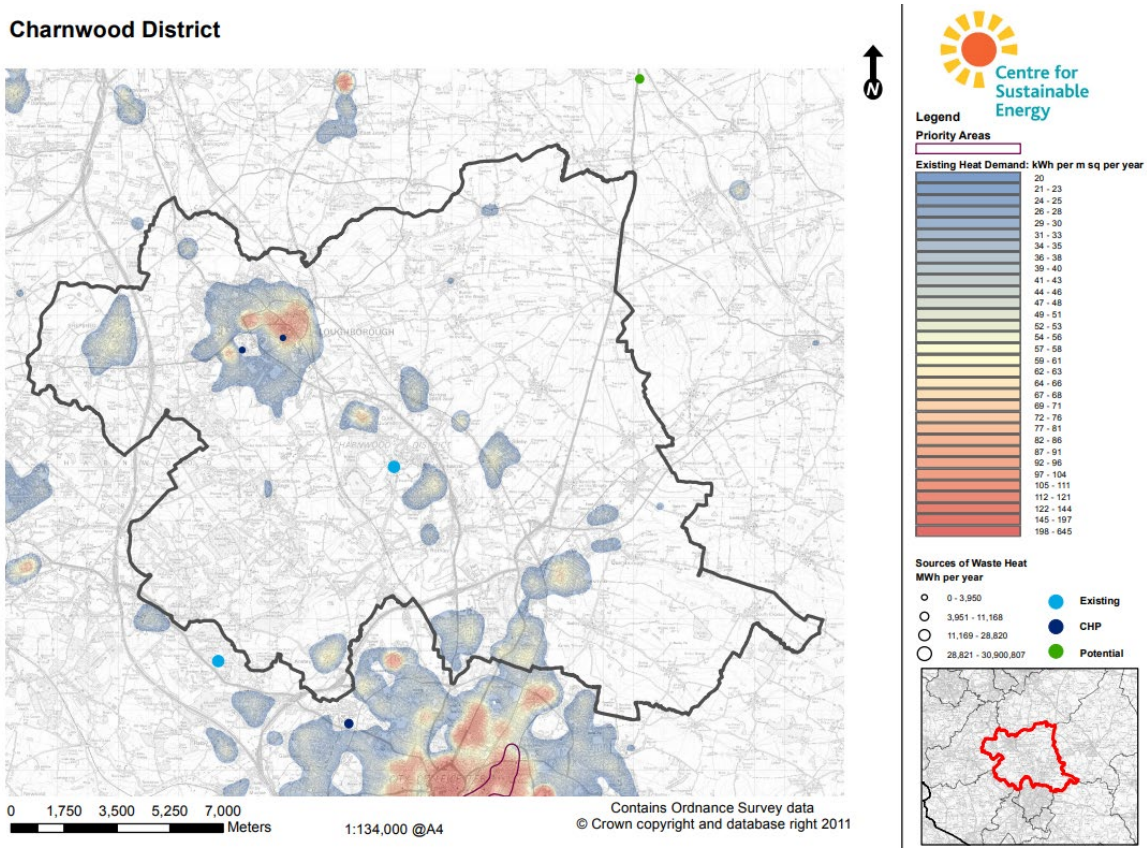
4.51 Permitted development rights allow many buildings with integrated renewable and low carbon heating technologies to be installed without planning permission. It can therefore be expected that homeowners and businesses will continue to install renewable heating systems in existing buildings where it makes sense for them and opportunities arise. The Council can take a more active role in supporting renewable heat in new build homes. These opportunities are described in more detail in **Chapter 5.**

Assumptions used to calculate technical potential

4.52 In 2011 the Centre for Sustainable Energy published a heat demand map as part of an assessment of low carbon heating opportunities in the East Midlands[18]. **Figure 4.21** shows the map for Charnwood with estimates of annual heat demand in kWh/m^2. A high density of heat demand is a key factor in determining whether a district heating network could be viable. Based on metrics defined in a previous area-based district heating assessment[19], a heat density of at least 30kWh/m^2 would indicate that a heating network might be technically feasible in an existing neighbourhood, with a density above 50kWh/m^2 indicating a potentially promising opportunity.

4.53 Loughborough is the biggest and most urbanised town within the study area and has the highest concentration of heat demand with estimated heat demand densities of 60-100kWh/m2. This could present a promising technical opportunity for district heating.

Figure 4.21: Estimated Heat Demand in Charnwood



[18] http://www.emcouncils.gov.uk/write/Documents/Energy%20Study/Emids-Heat-Map-Charnwood-District.pdf

[19] GLA Decentralised energy capacity study (2011). Available at: http://www.london.gov.uk/sites/default/files/de_study_phase1.pdf

4.54 Heat maps can help to identify areas for further investigation but must be treated with caution. The heat identified can only be served by a network in some cases. The type of building, the characteristics of its heat demand and current heat costs must all be considered when analysing the potential for district heating. For example, the cost of retrofitting individual dwellings into a network is high and they are therefore unlikely to connect, at least at the outset. As a result, while other towns such as Shepshed and Quorn achieve heat demand densities of circa 50-60 kWh/m^2 these are over small areas and are unlikely to present viable opportunities.

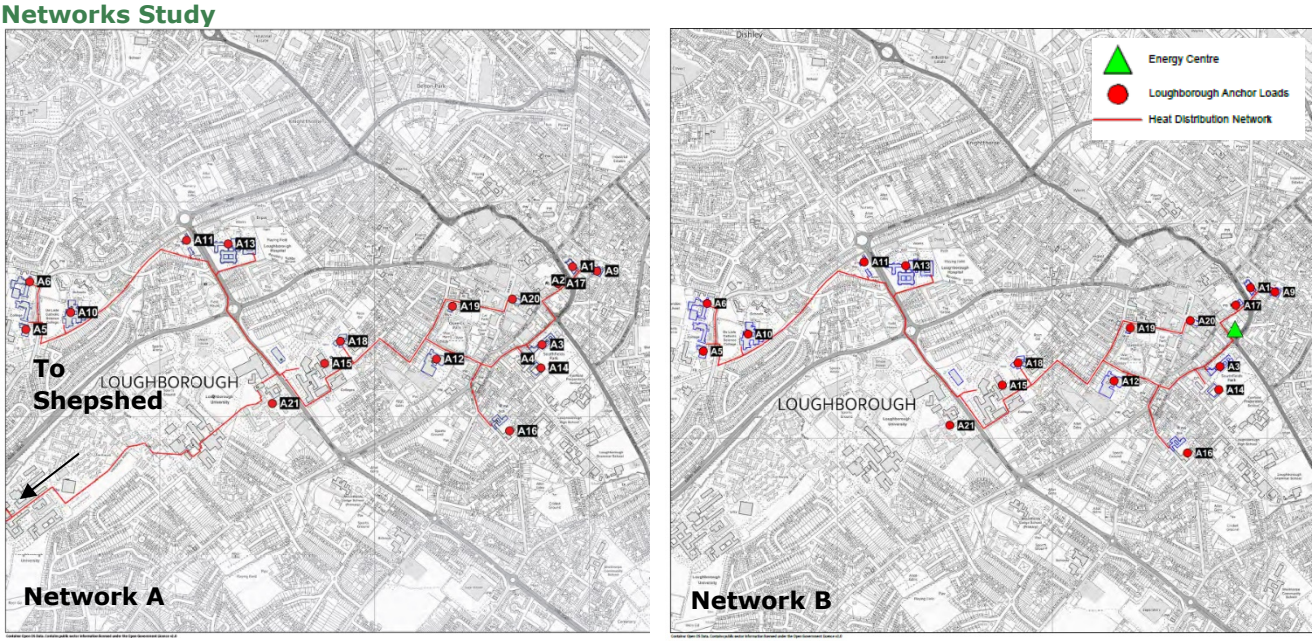
4.55 The heat map also identifies existing sources of waste heat that could potentially be exploited via district heating networks. This includes Loughborough University's existing CHP units and the 1.6MW Mountsorrel landfill gas site in central Charnwood. The third source identified in Loughborough town centre is suspected to be another university CHP installation, though this has not been confirmed.

Results

Technical Potential

4.56 The Leicestershire Heat Networks Study was published in February 2017. It was commissioned by Leicestershire County Council and its partners, North West Leicestershire District Council and Charnwood Borough Council to identify opportunities for developing heat networks in the county through a heat mapping and masterplanning assessment. The work was primarily targeted at potential sites in Coalville and Loughborough, the Broadnook Sustainable Urban Extension north of Birstall and existing social housing in two off-gas areas, Ramscliff Avenue in Donisthorpe and St. Matthews Avenue in Worthington. Loughborough was the only opportunity considered in Charnwood.

Figure 4.22: District Heating Networks A and B identified in Leicestershire Heat Networks Study



4.57 The study assessed two district heating network options in Loughborough. **Network A** supplies heat to public buildings in the town centre and to Loughborough University buildings utilising waste heat from the proposed Shepshed EfW plant via a pipeline from the facility to the town via the university. **Network B** is a smaller variant of this network, with heat supplied from a gas-fired CHP located in the town centre rather than connecting the EfW plant. The network does not serve the university buildings.

4.58 Network A would supply 129,406MWh/year, much larger than Network B's 27,266MWh/year as a result of the larger network including the university site. The carbon reduction benefit of Network A is also larger due to the use of waste heat from the EfW facility. Network A was found to be the more favourable option financially, with a capital cost, £11,068,475 (compared to £7,685,999 for Network B) breaking even after 7 years and reducing carbon emission at a cost of £123 per tCO2. However, Network A is contingent upon the EfW plant being developed and connected. A design report published by SLR Consulting in 2014 states that the proposed design of the facility has enabled it to be "CHP ready".

Issues affecting deployment

4.59 Reducing emissions from heating is the primary driver for new district heating schemes. However, as the electricity supply continues to decarbonise, the gap between the carbon intensity of electric heating and gas heating is closing. If current trends continue, the case for gas-fired CHP district heating becomes weaker and, in some contexts, individual electric heating systems will become increasingly preferable. The business case for investing in new networks must therefore take this into account. In the medium term, opportunities for using district heating based on lower carbon biomass CHP, large communal heat pumps or low carbon waste heat are likely to become of greater interest.

Energy from Waste

Description of technology

4.60 Our historic reliance on landfill to manage our waste is being replaced with a suite of more environmentally-friendly options. Today, waste management policy is guided by the waste hierarchy, which sets the order of preference, starting with waste prevention, reuse and recycling. What can't be recycled (the residual waste) could either go to energy recovery or as a last resort, landfill. Recovering energy from waste is prioritised over sending it to landfill because efficient conversion technologies can produce usable energy that, with the right waste, is a low carbon energy source.

4.61 Electricity and heat generation from 'Energy from waste' plant is well-established in the UK and research into advanced conversion technologies has resulted in more efficient processes and a greater proportion of the various waste streams being converted into energy classed as renewable.

Current energy from waste development in Charnwood

4.62 The waste authority for Charnwood is Leicestershire County Council. The 2016 Leicestershire Minerals and Waste Local Plan outlines the county's current waste management capacity and projected needs up to 2031[20]. In line with the waste hierarchy, it sets targets for recycling of composting of waste and then seeks to reduce the fraction of the residual that is sent to landfill, using energy from waste technologies.

4.63 Waste management indicators[21] show that the amount of waste each household produces is falling. Almost 50% of waste is reused, recycled or composted and a target has been set to send less than 30% of municipal waste to landfill. At the beginning of 2018 the figure was 32.3%.

4.64 There are three anaerobic digestion (AD) EfW plants operating in Charnwood with a combined installation capacity of 5MW. The Severn Trent Sewage Treatment Works at Wanlip has two facilities, a 3.2MW AD fuelled using sewage sludge and a 1.5MW plant processing household organic material such as kitchen scraps and garden cuttings.

4.65 There is one landfill gas facility in Charnwood, the Mountsorrel Landfill Site has been operating since 1996 and has an installed capacity of 1.6MW.

[20] http://politics.leics.gov.uk/documents/s118729/Appendix%20A%20-%20MWLP%20Pre-submission%20Document%20FINAL.pdf
[21] Environment and Transport Overview And Scrutiny Committee – 31 May 2018 Performance Report Quarter 4 2017/18

Assumptions used to calculate technical potential

4.66 The Minerals and Waste Local Plan sets out the county's need for additional energy recovery capacity. There is existing planning permission for two energy recovery facilities which are not yet operational.

Results

Technical Potential

4.67 The Minerals and Waste Local Plan indicates that 98,000 tonnes per annum of additional energy recovery capacity will need to be constructed to meet residual waste targets by 2031. Sufficient capacity has already been consented to meet this requirement across the following approved, but not yet operational sites:

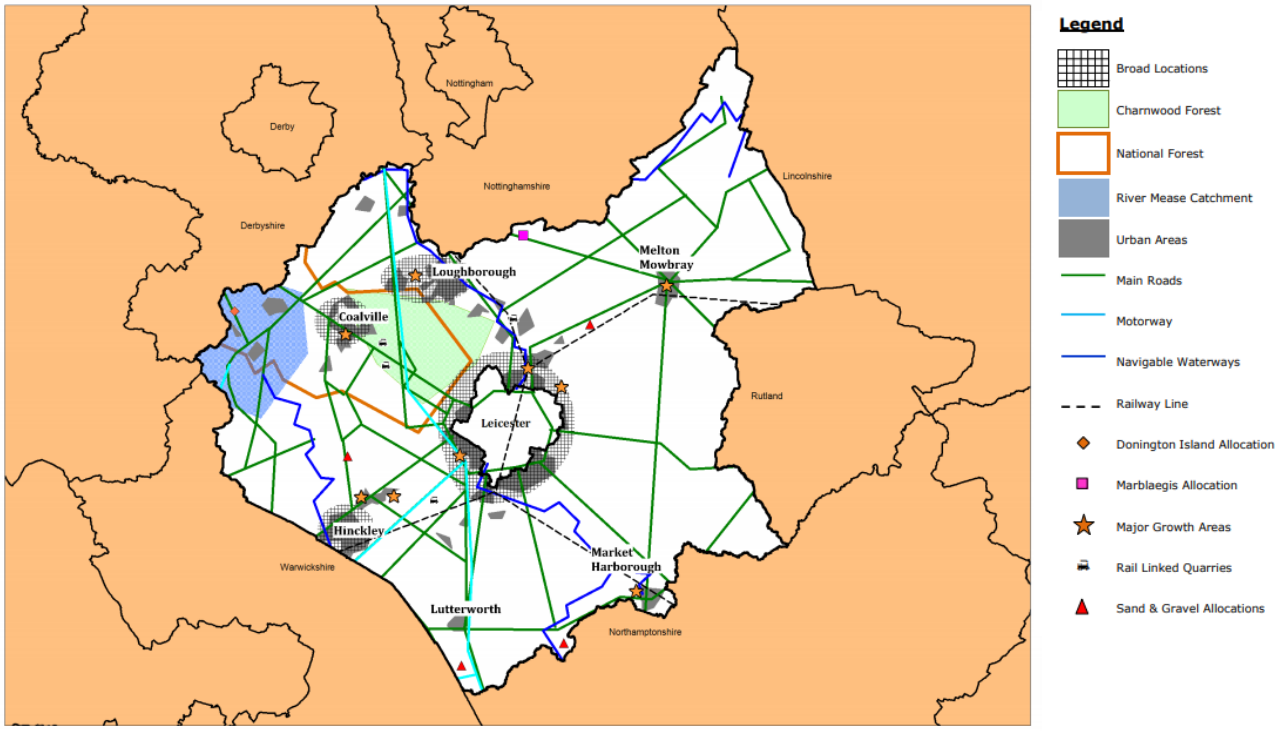
	Heat source	MW_{elec}	GWh_{elec}	MW_{therm}	GWh_{therm}
Shepshed EfW	350,000tpa C&I and municipal waste.	33	173.5	See para 4.58	
Sutton Lodge Farm AD	35,000tpa C&I and municipal waste.	1.5	6.5	-	-

4.68 If developed, the capacity of these facilities would meet or exceed requirements up to 2031. The proposed Shepshed facility would go significantly beyond the Council's 98,000tpa waste recovery requirement, requiring it to identify and secure waste resources from across the East Midlands or beyond.

Issues affecting deployment

While additional capacity beyond the consented facilities may not be needed, if further new facilities were to be proposed, the Minerals and Waste Local Plan provides guidance on the most sustainable locations. Strategic facilities are those which manage significant amounts of municipal waste and should be located close to major urban areas. Policy W3 has identified broad locations for strategic waste facilities (see **Figure 4.23**). This includes Loughborough/Shepshed and Birstall (due to its proximity to Leicester) in Charnwood. Note that the consented Shepshed EfW facility is within the Broad Location covering Loughborough.

Figure 4.23: Waste Key Diagram from the Leicestershire Minerals and Waste Local Plan



Biomass

Description of technology

4.69 Biomass fuels can be used in heating and electricity generation. Heating is the most appropriate use for biomass in Charnwood, using local woodland resources to meet all or part of a buildings heat demand. There are a number of boilers available on the market that are suitable to meet the heat demand of housing and small-scale community buildings (such as schools, sports centres etc.)[22]. These boilers have a good commercial record within the UK. The fuels that they are able to take include logs, chips and wood pellets.

4.70 There has been some concern about emissions from domestic stoves and new requirements have been outlined in the Ecodesign Directive to address this issue[23]. By 2022 all wood burning stoves must adhere to these requirements. Boiler manufacturers will provide a specification for the fuel for their boiler and woodfuel suppliers are able to meet these standards with the fuel they supply.

Current biomass development in Charnwood

4.71 Biomass is currently used for firewood in Charnwood. 'Casual' supply is available from local woodland in the form of seasoned logs. Wood chips and wood pellets are available from local suppliers registered on the BSL. Wood fuel originating in and around the Charnwood area comes from clean wood harvested from woodland as part of woodland management, for example from the felling of trees under licence, for thinning, clearance of invasive or diseased stock and felling of conifer wood land.

4.72 Other wood fuels can be produced from waste wood by reprocessors. There are no local waste wood reprocessors in Charnwood and the use of this wood will probably need to be permitted by the Environment Agency. To make this process worthwhile, it is likely that the scale of use would be higher than is appropriate in Charnwood and we have assumed that this use will not happen within the Borough.

4.73 Charnwood has good woodfuel resources within Charnwood Forest. The Charnwood Forest is an upland landscape with a rare geology that is rich in wildlife. It plays a part in the identity of the area and its history. Biomass can help contribute to the management of woodlands across Charnwood, improving its habitats and its value to the community.

4.74 Thinning, harvesting and coppicing trees can open the woodland floor to sunlight, which creates a richer habitat where a wider range of plants, animals and insects can flourish. Woodfuel production from these practices can be an important part of sustainable woodland management, while creating new revenue streams. The Forestry Commission's woodfuel strategy supports this, saying that 'the potential for woodfuel to underpin a new market for products from our woodland presents a unique opportunity for the UK to restore healthy woodland ecosystems based upon sustainable management'[24].

4.75 Charnwood Forest also forms part of the National Forest and significant forest resources across the East Midlands. This presents the opportunity to develop the woodfuel supply and to nurture a local demand for it.

Woodlands and forestry in Charnwood

4.76 According to Natural England[25] woodland makes up approximately 16% of Charnwood or 2379 ha. This is above average (13%) for the predominately rural local authorities in England[26] with an average of 10% across the East of England and East Midlands[27] . Natural England's data indicates that broadleaf woodland accounts for two thirds of the resource in Charnwood (1,971 ha) and around 302ha of coniferous woodland. The remainder is mixed and other woodland.

[22] See http://www.yougen.co.uk/renewable-energy/Biomass+Boilers/ for a guide on biomass boilers
[23] See, for example: http://www.stoveindustryalliance.com/ecodesign-ready-stoves-and-air-quality/
[24] From a Wildlife and Countryside Link statement supporting the Forestry Commissions Woodfuel Strategy.
[25] Natural England Charnwood National Character profile, see: publications.naturalengland.org.uk/file/4633163
[26] Non-unitary district councils from Woodland Trust (2016) Woodland Indicators by Local Authority
[27] From Forest Commission Facts and Figures for 2017.

4.77 While woodlands are found across the whole Borough, they are more common in the west within the Charnwood Forest, which is part of the National Forest. **Figure 4.24** shows the areas of the Charnwood Forest and the National Forest within the Borough.

Charnwood Forest

4.78 Charnwood Forest extends across around 175km^2 of Leicestershire[28] with Charnwood Borough at its eastern extent. It is a nationally important landscape characterised by granite-topped hills, wooded valleys, heathlands and grasslands. Almost a tenth of its area (1,614ha) is Biodiversity Action Plan (BAP) priority habitats. Its timber has long been exploited and only 16% of it remains wooded (2,379ha) of which 629 ha is wet woodland and 741 ha is ancient semi-natural or planted ancient woodland.

4.79 The *Charnwood Forest Landscape Partnership* scheme works to preserve the character of the forest and its landscape and is funded through the Heritage Lottery Fund. This scheme has ambitions to showcase the area for visitors, sharing its unique character while supporting the local economy, including through grants for community heritage projects. The Partnership provides an important basis for further exploring how Charnwood Forest could become a supply of wood fuel and how this can help to support their existing objectives.

4.80 The land in Charnwood Forest is in varied ownership including private estates, the Leicestershire and Rutland Wildlife Trust, Forestry Commission, National Trust, Woodland Trust, Leicestershire Country Council and Charnwood Borough Council. Many local woodlands are under conservation management, with a focus on protecting the character of the woodland, maintaining biodiversity and improved amenity value. While management includes felling, these are not commercial woodlands and are generally not managed for timber or woodfuel alone. However, woodfuel can form part of the general management, as on the Bradgate Estate and in the Outwoods (a 44.6 ha woodland Site of Special Scientific Interest (SSSI) which is described in **Box 4.1**).

Box 4.1 Outwoods management

Charnwood Borough Council is responsible for managing the Outwoods woodland. Its management plan[29] aims to undertake conservation measures to protect the character of the landscape.

Current management includes thinning, cropping and replanting. The area includes densely planted coniferous woodland that will need to be felled if the original character is to be restored. The management also aims to control invasive species like rhododendron and sycamore and replace recently planted alien species.

While management is mainly focussed on conservation there is timber available for wood fuel production. The management plan says that "*Under the terms of the Management Agreement with English Nature, between 25% and 75% of the timber produced should be removed from the site and the brash chipped, burned or placed in brash piles to provide habitats for wildlife. Due to the nature of the terrain, and therefore extraction costs, timber companies are not interested in buying this timber as a standing crop; it is therefore felled and stacked within the wood where it is offered for sale to timber companies or used to manufacture charcoal. The heating and hot water system at the Outwoods Lodge also utilises firewood produced as a waste product during forestry operations.*"

The original Deed of Trust for the site includes the provision that any proceeds from the sale of timber should be used firstly for the management of Outwoods and then towards its improvement.

This indicates that firewood is already available from Outwoods and that this a more formal supply chain for woodfuel could be developed.

[28] Natural England: publications.naturalengland.org.uk/file/4633163
[29] Charnwood (2013) The Outwoods: Management Plan 2013-2018

The National Forest

4.81 The other important woodland resource that could be considered in the development of woodfuel is the National Forest. The part of Borough that falls within the National Forest area is 37.12 km^2 of which 9.9km^2 (990 ha) is woodland. In addition to this existing forest resource, the National Forest overlaps the Charnwood area in the west of the Borough and provides additional opportunity for developing new woodland across 520km^2 of Derbyshire, Leicestershire and Staffordshire.

4.82 The National Forest was conceived in the 1980s to transform the landscape of central England by increasing woodland cover. It covers an area of 200 square miles in Derbyshire, Leicestershire and Staffordshire and has an ambition to link the ancient Forests of Charnwood with Needwood Forest in the west, increasing cover to 30% of the land within its boundary from its current 20% (this compares to 26.6% woodland cover in the area of Charnwood covered by the National Forest).

4.83 In 2014 there were 7,233 ha of woodland, of which 3,000 ha was managed. The forest cover in the area has increased from 6.1% in 1991 to around 20.4% in 2017[30]. Estimated projections for the future are: 5,000ha managed woodland in 2020 (of a total forest area of 8739 ha); anticipated 8,500 ha manged woodland in 2030 (of an estimated 11,249 ha woodland). This will be mixed woodland, with around 77% of the woodland being broadleaf. Ultimately the aim is for 20,000ha of woodland. Further information is provided in its annual reports[31].

4.84 The National Forest area overlaps with Charnwood Borough and is an important part of its forestry resource. The development of the National Forest is important to Charnwood for two reasons.

- It presents an opportunity to develop local woodland within the National Forest area. A good example of this is the Charnwood Forest Landscape Partnership scheme mentioned above, which is being led by the National Forest company.
- The National Forest provides a potential woodfuel resource close to Charnwood, which provides a larger local potential woodfuel resource and helps the business case for developing woodfuel in the region.

Wood fuels for bioenergy

4.85 The main local market for woodfuel is small scale wood use for heat. This splits into two subsets: domestic firewood use that is not eligible for the Renewable Heat Incentive (RHI), and small-scale woodfuel use that is eligible for the RHI. The domestic market is generally for seasoned logs and briquettes and the wood is referred to as **firewood**. In this case the firewood only supplies some of the heat use in a domestic setting using stoves, open fires or range cookers, usually in locations away from the gas grid.

4.86 The RHI small scale market is more relevant to the use of boilers in which heat is supplied to meet a significant proportion of the heat demand in a building or cluster of buildings. The fuel used in this circumstance may include seasoned logs but also includes wood pellets and wood chips. This wood is purposely produced for a **woodfuel** market and woodfuel use for the RHI meet Government sustainability requirements. For small scale schemes this woodfuel is commonly sourced through the Biomass Suppliers List (BSL) mentioned above[32], which guarantees that the woodfuel meets sustainability requirements (see **Figure 4.24**). Self-supply in farms and estates is also possible. **Figure 4.24** shows biomass suppliers on the BSL in Charnwood and its neighbouring region. In this section both firewood and woodfuel are referred to as both are relevant to Charnwood, but the focus is placed on the development of woodfuel supply chains.

[30] Figures taken from The National Forest Strategy, 2014-2024 and The National Forest Annual Report and Accounts 2017.
[31] http://www.nationalforest.org/about_us/about_us.php
[32] https://biomass-suppliers-list.service.gov.uk/

Assumptions used to calculate technical potential

4.87 To estimate the potential wood fuel available from the woodland in Charnwood the Forestry Commission standard estimates for wood fuel have been used. The assumptions are set out in **Table 4.8**.

Table 4.8: Biomass Wood fuel Assumptions

Parameter	Assumption
Estimate of Residues	• The Forestry Commission provides an estimate for the residues that are available for woodfuel in woodland. The residues are small roundwood that has no other market, thinnings and branches etc that have no other market. • It estimates that around 25% of the potential resource can be extracted from forest economically and practically. Typically, this equates to some 0.4 oven dried tonnes (odt)/ha for broad wood forests and 1.5 odt/ha for coniferous woodland. • The term 'oven dried wood' refers to wood with no water in it. Wood can have a moisture content between 40 and 60% at harvest, and around 30% after seasoning, so the actual tonnages of wood that would need to be transported would be higher (by at least 30%). In reality, wood fuel production depends on many factors, including forest ownership, terrain, management methods, equipment available, distance to woodfuel markets and competing uses for the wood, so the calculations provide an estimate only, not an accurate assessment.
Woodfuel	• The wood available for the woodfuel estimate above would come from the branches of trees, thinning of woodland, clearance of invasive species of no timber value and small round wood (<5cm) of little value in other timber markets.
Woodfuel Mix	• The woodland harvested would be 70% broadleaf and 30% coniferous.
Growth Estimates	• Two growth estimates have been made for the woodfuel resource in Charnwood. The '2030 (high)' estimate assumes rapidly growth to 2030 to up to 2,660ha of National Forest in Charnwood, in line with National Forest expansion targets to 20,000ha of forest in its whole area. • The '2030 (low)' estimate assumes slower growth using estimates that 225ha woodland/y is planted across the whole National Forest (this figure is quoted as a current target in the National Forest business plan[33]). This lower growth in woodland results in an estimate of 1,219 ha of National Forest in Charnwood (up from 990 ha now). It has been assumed that the area of woodland outside of the National Forest (585 ha) does not increase.
Conversion factor	• 1 kg of dry wood fuel provides 5.2kWh of heat.
Average heat demand	• Average heat demand per house is: 4,000kWh for new build and 12,000kWh for existing houses[34].

Results

Technical Potential

4.88 The results are presented in **Table 4.9,** which shows that there is a considerable resource in the area that could be exploited in off gas grid areas for housing or could be used in local council buildings, schools, village halls etc. **Table 4.9** shows the number of houses that could be heated using the estimates for heat demand.

[33] Taken from the National Forest 2016-17 business plan

[34] https://www.ofgem.gov.uk/gas/retail-market/monitoring-data-and-statistics/typical-domestic-consumption-values

Table 4.9 Technical potential for the wood fuel resource in Charnwood Borough

Year	2018	2030 (low)	2030 (high)
Resource (oven dried tonnes per year, odt/y)	1,120	2,000	2,237
Thermal energy generation (GWh)	5.8	10.4	11.6
Number of **new houses** that could use this resource for all heat requirements	1,312	2,598	2,908
Number of **existing houses** that could use this resource for all heat requirements	437	866	970

Comparison with previous estimates for woodfuel resources

4.89 In order to sense check the findings in **Table 4.9**, a review was undertaken of other estimates of woodfuel resources such as those provided by the National Forest. Recent data provided by the National Forest in 2014[35] estimate a total resource of 25,500t wood chip a year, which is equivalent to around 4,000t or 2,800odt/y in Charnwood's National Forest area. These figures feed into estimates provided by the Charnwood Forest Landscape Partnership Scheme that indicate that the National Forest resources in 2030 has the potential to provide an annual domestic electricity supply to 26,900 homes (this is equivalent to a town the size of Loughborough). If it is assumed that Charnwood represents around 13% of this area, then this represents 3,497 houses, higher than the number estimated in **Table 4.9**. It is not clear whether these are new or old houses, nor is the average heat demand clear, so it is difficult to compare with the figures from the National Forest with those in **Table 4.9.** However, the figures do support the conclusion that there is a considerable woodfuel resource in and around Charnwood and that this could meet the heat demand of a significant number of houses.

4.90 In addition to the wood fuel resource calculated from the residues from the forest, it is clear from local reports on woodland management that there is a considerable timber resource that is not used at present in any timber market. Part of this resource is kept in the forest to provide habitat for insects and other wildlife, but a proportion could be used for woodfuel. This could represent a significant resource in addition to the one estimated above, particularly coniferous and invasive timber, which is considered detrimental to the character of much of the Charnwood Forest. It is not possible to estimate the amount of this woodfuel resource, but this timber is the larger part of the tree (by both weight and volume). In terms of sustainability it would be preferable if this timber could be used in other timber markets, which is why it is not included in **Table 4.9.** However, in the absence of other markets it could significantly increase the amount of wood available for fuel from Charnwood Forest.

Issues affecting deployment

4.91 The major issue affecting deployment is the lack of mature woodfuel supply chains in the region that connect management of the forest with woodfuel suppliers. However, there are regional woodfuel suppliers and these would be valuable in helping the development of the local woodfuel supply chain. The following section summarises the local woodfuel suppliers and the key actions that could be taken to develop the supply chain.

4.92 As indicated in the Biomass Suppliers List (BSL) (**Figure 4.24**) there are woodfuel suppliers in the region around Charnwood. Some of these suppliers also manage mini-hubs for storage or processing of woodfuel. For example, Forever Fuels has pellet storage capacity at Retford and a new 20,000 t/year woodchip production facility near Nottingham; Fosseway at Thrussington has a kiln to dry logs for the firewood market; and Hunterelm provide local forest management services, integrated with logs and firewood supply. Any initiative to develop woodfuel or firewood supply locally would benefit from this kind of local experience, both in terms of understanding what needs to be done for supply and what local demand is for the fuel.

[35] The National Forest Company (2014) The National Forest – economic impact and future economic potential

4.93 There is potentially a good supply of woodfuel in the Charnwood region and the estimates outlined in **Table 4.9** could be conservative, as there is potential for some of the local timber resource to be exploited as well, providing this does not compete with other timber markets. Firewood is already being marketed in the area, on the Bradgate Estate and there is informal supply at Outwoods and elsewhere. There is also considerable additional resource in the National Forest near to Charnwood, which is already being exploited for woodfuel for seven woodfuel heating systems and which, together with the Charnwood resource provides the basis for a significant woodfuel supply chain. Developing this woodfuel resource would result in wider benefits in Charnwood, as it would increase the management of local forests and offset the costs of conservation management where the woodland is already managed.

4.94 A key issue affecting deployment is mobilising the supply chain. The Council has the potential to ensure that potential woodfuel supply is considered in the management of local woodlands and to bring key players in the area together through the National Forest initiatives in the Charnwood area. It can play a role itself through its own management of Outwoods, by asking the managers at Outwoods to consider including development of a woodfuel supply chain in association with other relevant organisations in the regions, such as established woodfuel suppliers and the National Forest.

4.95 There is potential to grow the wood fuel supply chain in Charnwood... In addition, there are local key players who have experience in woodfuel supply and in woodland management that includes the production of woodfuel. There is also experience in the use of woodfuel in the neighbouring National Forest area. Bringing more woodland into management can help create a sustainable woodfuel supply while also meeting conservation goals.

Microgeneration Technologies

Description of technology

4.96 Microgeneration is a term that is used to describe kW scale technology which as a result is usually deployed at the domestic level.

4.97 Solar thermal to produce domestic hot water was popular in the period before the introduction of the Feed-in Tariff, but this subsidy made it more attractive to use roof space for electricity generation. Now that the Feed-in-Tariff is being withdrawn, solar thermal is likely to make a comeback and Solar PV installations are on the decline. There are two kinds of solar thermal technology, one is a simple flat plate design, where a small volume of water/antifreeze mix is circulated over a black surface, contained by a glass plate. The second design uses evacuated glass tubes to increase the efficiency of thermal transmission to the circulating water. Both designs are closed systems and the heat is transferred to the domestic heating system but via either a second hot water tank or a specially designed hot water store. This requires the installation of additional pumps and controls. All of the estimations of solar PV potential apply to solar thermal in terms of the locations of the installations, whereas the efficiency of heat collection is largely down to the system design and the size of the demand being met as it is not possible to 'overspill' excess energy generation meaning that this energy is lost.

4.98 Micro hydro can be achieved using Archimedes screw type technology. This lends itself to low head systems where the volume of water flow is sufficient to support energy generation. The 'open' nature of these systems also present fewer issues when it comes to impact on fish, etc. but these considerations must be undertaken with the same rigour as for larger systems. In reality, the relatively low income from the smaller generation makes the cost of development more critical and limits the opportunities to apply this technology.

4.99 Building mounted wind was a technology that was being promoted in the past, but less so now. This is because there are a number of issues with this technology. The first is that the wind speed at roof height in most domestic locations is too low and is well below the speed at which more efficient larger scale systems are considered to be economically viable. Another issue is that noise and vibration is transferred from the building mounted turbine into the building structure. As a result, micro wind is now almost exclusively confined to remote battery charging applications.

4.100 It is also worth noting that micro gas CHP was also under consideration at one point with British Gas briefly offering a domestic 'CHP Boiler'. This was based on a Sterling engine in which a gas is expanded by the heat of the boiler and this is used to drive a microgeneration. The issue with all Stirling engines is the need to contain a gas at high pressure in a system that rapidly heats and cools without leaks forming. For this reason, this technology has not advanced.

Current microgeneration development in Charnwood

Small renewable electricity generators

4.101 The Feed-in Tariff (FIT) offers a premium payment per unit of electricity generated from renewable energy technologies. It is the principal financial mechanism supporting smaller renewable energy generators such as roof top solar PV. Since the incentive was introduced in April 2010 it has led to significant growth in small and medium scale renewable energy with 6GW of capacity across more than 820,000 installations as of May 2018. The majority of these are rooftop solar PV arrays as well as around 7,500 wind installations and smaller volumes of AD, hydro and micro CHP.

4.102 Ofgem's recent quarterly Feed-in Tariff Installation Report (data to end June 2018) provides information about the installations in Charnwood:

- There are 680 domestic solar PV installations, most of which are small arrays below 4kW that have been retrofit to existing homes. They have a total generating capacity of 2.5MW and are located across the whole of Charnwood, in both rural and urban areas.
- There are 27 non-domestic solar PV installations which range from small 2kW arrays up to large roof-mounted systems up to 1.1MW. The total capacity of these installations is 2.5MW.
- There are no community or school solar installations.
- There is no hydro or micro-CHP in receipt of FIT in Charnwood.

Renewable heat installations

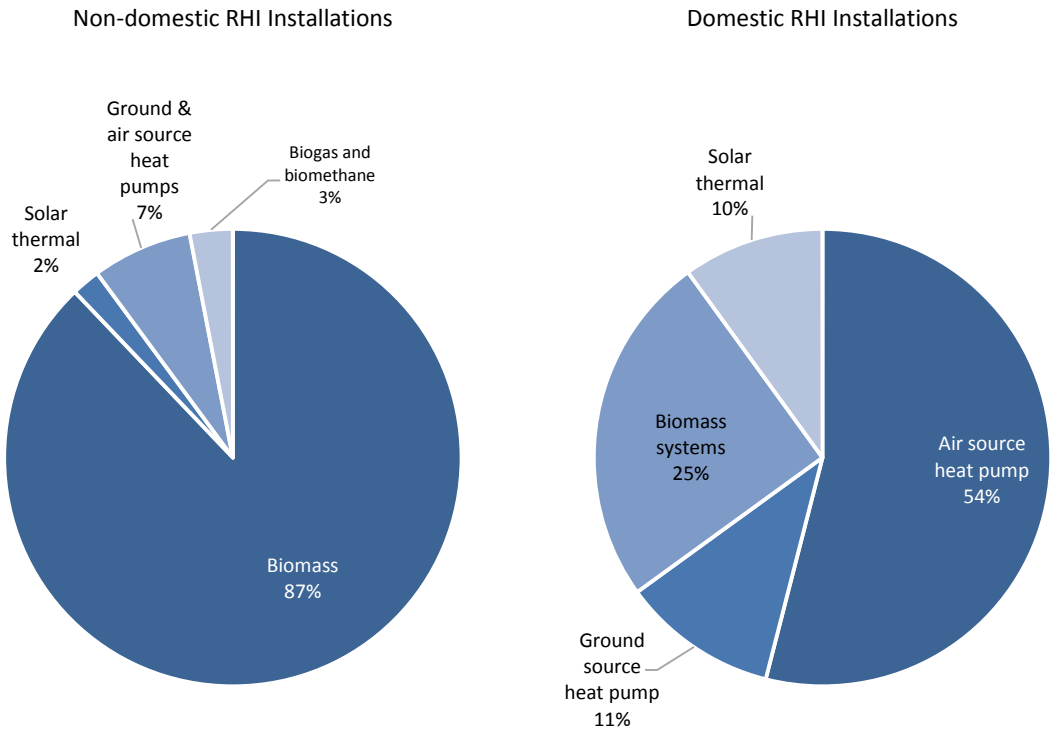
4.103 The Renewable Heat Incentive (RHI) is similar to the Feed in Tariff as it offers a payment per unit of heat generated in order to encourage both domestic and non-domestic switching to renewable heating. A range of technologies including solid biomass, biogas, solar thermal and heat pumps are eligible.

4.104 The RHI schemes are periodically revised to enhance installation standards and monitoring and adjust tariff rates. Recent changes to the non-domestic scheme addressed shortcomings which rewarded inefficient use of energy, particularly in drying agricultural products and wood fuel. The domestic scheme has been revised and has improved standards of heat pumps installations and government enforcement powers among others changes.

4.105 BEIS's monthly statistics for the RHI from July 2018 provides information on uptake in Charnwood. 88 domestic renewable heating installations have been installed since April 2014, which is 11% of all domestic RHI installations in Leicestershire. A further 18 non-domestic systems are operating with a combined installed capacity of 2.4MW, which is 11% of all non-domestic installations in Leicestershire. There is one existing district heating network within the borough which supplies heat to the Loughborough University campus. The network is fed by three CHP units with a total power capacity of 1.6MWe.

4.106 While more detailed information about the technology and size of these installations is not available at local authority level, national data indicates that nearly 90% of non-domestic installations are biomass boilers (primarily with a capacity <200kWth) and over half of domestic systems are air source heat pumps, with ground source heat pumps, biomass boilers and solar thermal panels also present in significant proportions (**Figure 4.25**).

Figure 4.25: Renewable heat installations by technology type. National data from BEIS's monthly RHI statistics



Technical Potential

4.107 The technical potential for micro renewables is only limited by the number of existing buildings within the Borough as most dwellings will be suitable for some sort of microgeneration technology. The limiting issue is therefore primarily the cost of installation.

Issues affecting deployment

Subsidies

4.108 On 19 July 2018 the Department of Business Energy and Industrial Strategy (BEIS) confirmed its intention to close the FIT scheme to new applicants from March 2019. The government are exploring mechanisms to provide a route to market for small scale renewables. Actions could address regulatory barriers, giving access to additional revenue streams such as an export tariff. The changes have created policy uncertainty and have generated concerns within micro renewable industry.

Planning issues

4.109 The installation, replacement or alteration of solar panels, ground source heat pumps etc on or within the curtilage of a dwelling or building is considered to be 'permitted development' and therefore does not normally require planning consent. There are however a number of conservation areas within the Borough, within which installations may be restricted if they are considered to have a negative impact on the area.

Summary

4.110 The assessment has shown that there is significant 'technical' potential for wind, solar, energy from waste, district heating, biomass and microgeneration development in Charnwood but little potential for small scale hydro. As **Figures 4.7-4.10** indicate, there are greater opportunities for small and medium scale wind compared with large and very large scale wind. The most suitable areas with technical potential for large and very large scale wind (not taking into account landscape sensitivity issues which are being assessed separately) lie within the rural areas to the north and east of the Borough. There are also extensive areas throughout the Borough which are technically suitable for freestanding solar PV developments.

4.111 **Table 4.10** summarises the technical potential for the standalone wind, solar and small scale hydro energy technologies in terms of installed and generating capacity.

Table 4.10: Summary of Technical Potential for Wind, Solar and Small Scale Hydro

Technology	Scale	(MW)	(GWh)
Wind	Very large	68.74	140.30
	Large Wind	64.10	130.83
	Medium Wind	435.87	889.65
	Small Wind	383.25	782.24
Solar		750.42	986.05
Small Scale Hydro		0.67 – 2.3	2.3-12.2

4.112 Whilst there may be technical potential for standalone wind and solar and to a limited extent hydro energy within the Borough, there are a number of factors that will affect what can actually be deployed. The key factors that will limit the potential of what is deployable within the Borough include:

- Grid connection potential at local substations. This is a key constraint that could physically limit development potential. Developers will need to liaise early with the DNO, Western Power Distribution, in order to determine the potential and costs for grid connection.
- Planning issues – including the NPPG policy on wind energy and the need to ensure that wind energy schemes have demonstrated that the *"planning impacts identified by affected local communities have been fully addressed and therefore the proposal has their backing."*
- Project economics and the availability of Government subsidies for different forms of renewable energy projects. The loss of subsides for wind and solar will have a significant impact on the deployable potential of these forms of renewable energy development.

4.113 The renewable and low carbon heat and energy from waste sections comprised reviews of existing studies and recent evidence to consider the technical potential for new schemes in Charnwood. The technical potential for district heating network schemes reflects evidence from the Leicestershire Heat Networks Study (2017) that identified two network layouts serving Loughborough. The Leicestershire Minerals and Waste Local Plan (2016) identified the need for 98,000 tonnes per annum of additional energy from waste by 2031. Already consented and allocated schemes offer the potential to go beyond this need.

4.114 **Table 4.11** summarises the technical potential for district heating and energy from waste schemes in terms of both electrical and thermal installed capacity and generation.

Table 4.11: Summary of Technical Potential for district heating and energy from waste

	Heat source	MW_{elec}	GWh_{elec}	MW_{therm}	GWh_{therm}
Network A	Proposed Shepshed EfW	-	-	25	129.4
Network B	Gas-fired CHP	9.1	47.7	4.6	27.3
Shepshed EfW	350,000tpa C&I and municipal waste.	33	173.5	-	-
Sutton Lodge Farm AD	35,000tpa C&I and municipal waste.	1.5	6.5	-	-

4.115 The technical potential for biomass wood fuel available in Charnwood has been estimated, considering the forest resource in Charnwood and the growing resource in Charnwood's National Forest area. **Table 4.12** summarises the technical potential for biomass wood fuel in terms of thermal energy generation capacity today and in 2030, based on low and high assumptions for the growth of the National Forest.

Table 4.12: Summary of Technical Potential for biomass wood fuel

Technology	2018	2030 (low)	2030 (high)
Biomass wood fuel (GWh)	5.8	10.4	11.6

4.116 Increasing the supply of biomass wood fuel can also help contribute to the management of woodlands across Charnwood, improving its habitats and its value to the community.

4.117 The technical potential for microgeneration is only limited by the number buildings within the Borough as most dwellings will be suitable for some sort of microgeneration technology. Microgeneration technologies can most effectively be supported by the Council through energy performance standards for new homes. Advice on local energy planning and evidence of the costs for meeting the national technical standard is provided in **Chapter 5**.

Renewable and Low Carbon Study for Charnwood Borough

Figure 4.1: Wind Speed

Charnwood Borough boundary

Wind speed at 45m (m/s)

7.6

5.6

Map Scale @A3: 1:100,000

0 5 10 km

CB:LA EB:Packham_B LUC FIGX_10448_Wind_speed_A3L 28/09/2018

Source: NOABL

Renewable and Low Carbon Study for Charnwood Borough

Figure 4.2: Nature Designations

- Charnwood Borough boundary
- Site of Special Scientific Interest
- Ancient woodland
- Local Nature Reserve
- Sites of Nature Conservation Interest

Map Scale @A3: 1:100,000

0 5 10 km

Service Layer Credits: Contains OS data © Crown Copyright and database right 2018

CB:BP EB:Packham_B LUC FIGX_10448_Nature_Conservation and_Heritage_A3L 25/10/2018

Source: Natural England, Charnwood Borough Council

Renewable and Low Carbon Study for Charnwood Borough

Figure 4.3: Heritage Designations

- Charnwood Borough boundary
- Listed building grade I
- Listed building grade II
- Listed building grade II*
- Scheduled monuments
- Conservation areas
- Registered parks and gardens

Leicestershire County Council Heritage Environment Record

- Archaeological interest sites
- Archaeological alert sites

Map Scale @A3: 1:100,000

LUC

Charnwood

CB:BP EB:Packham_B LUC FIGX_10448_Heritage_Conservation_A3L 25/10/2018

Source: Historic England, Leicestershire County Council

Renewable and Low Carbon Study for Charnwood Borough

Figure 4.4a: Physical constraints for small scale wind development (housing and transport)

- Charnwood Borough boundary
- Property noise buffers
- Strategic housing land availability assessment sites
- Roads, Railways and Overhead Lines with 90m buffer

Map Scale @A3: 1:100,000

LUC

Charnwood

CB:BP EB:Packham_B LUC FIGX_10448_Physical_Constraints_Small_Housing_Transport_A3L 24/10/2018

Renewable and Low Carbon Study for Charnwood Borough

Figure 4.4b: Physical constraints for small scale wind development (recreation, physical features and landform)

- Charnwood Borough boundary
- Public Rights of Way with 90m buffer
- Watercourses and Waterbodies with 50m buffer
- Woodland and Forestry
- Slope greater than 15 degrees

Map Scale @A3: 1:100,000

LUC

Charnwood

CB:BP EB:Packham_B LUC FIGX_10448_Physical_Constraints_Small_Recreation_Woodland_Hydro_A3L 24/10/2018

Source: Environment Agency, Forestry Commission, Leicestershire Count Council

Renewable and Low Carbon Study for Charnwood Borough

Figure 4.5a: Physical constraints for very large scale wind development (housing and transport)

- Charnwood Borough boundary
- Property noise buffer
- Strategic housing land availability assesment sites
- Roads, Railways and Overhead Lines with 210m buffer

Map Scale @A3: 1:100,000

0 5 10 km

CB:BP EB:Packham_B LUC FIGX_10448_Physical_Constraints_Very_Large_Housing_Transport_A3L 24/10/2018

Renewable and Low Carbon Study for Charnwood Borough

Figure 4.5b: Physical constraints for very large scale wind development (recreation, physical features and landform)

- Charnwood Borough boundary
- Public Rights of Way with 210m buffer
- Watercourses and Waterbodies with 50m buffer
- Woodland and Forestry
- Slope greater than 15 degrees

Map Scale @A3: 1:100,000

0 5 10 km

CB:BP EB:Packham_B LUC FIGX_10448_Physical_Constraints_Very_Large_Recreation_Woodland_Hydro_A3L 24/10/2018

Source: Environment Agency, Forestry Commission, Leicestershire Count Council

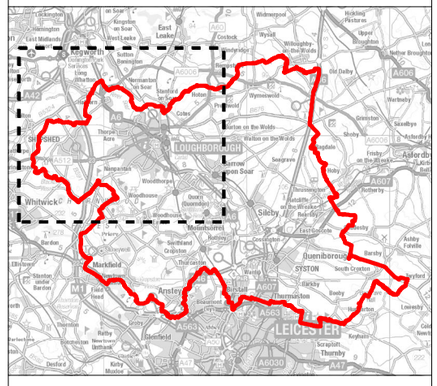
Renewable and Low Carbon Study for Charnwood Borough

Figure 4.6a: Opportunities for wind development (all scales)

Charnwood Borough boundary

Opportunity Areas for wind turbine development

- Small turbines only (<40m tip height)
- Small to medium turbines only (<40m - 80m tip height)
- Small to large turbines only (<40m - 120m tip height)
- All turbine scales (up to 160m tip height)



Map Scale @A3: 1:45,000

LUC

Charnwood

CB:BP EB:Packham_B LUC FIG_4_6_10448_Opportunities_for_wind_development_a_A3L 24/10/2018

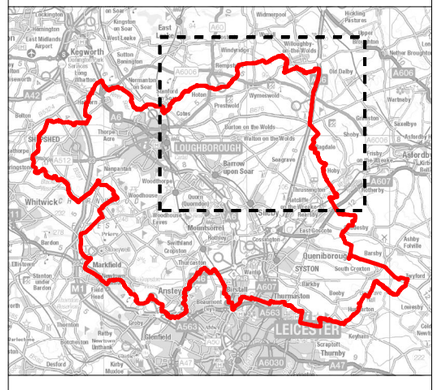
Renewable and Low Carbon Study for Charnwood Borough

Figure 4.6b: Opportunities for wind development (all scales)

Charnwood Borough boundary

Opportunity Areas for wind turbine development

- Small turbines only (<40m tip height)
- Small to medium turbines only (<40m - 80m tip height)
- Small to large turbines only (<40m - 120m tip height)
- All turbine scales (up to 160m tip height)



Map Scale @A3: 1:45,000

LUC

Charnwood

0 1 2 km

CB:BP EB:Packham_B LUC FIG_4_6_10448_Opportunities_for_wind_development_b_A3L 24/10/2018

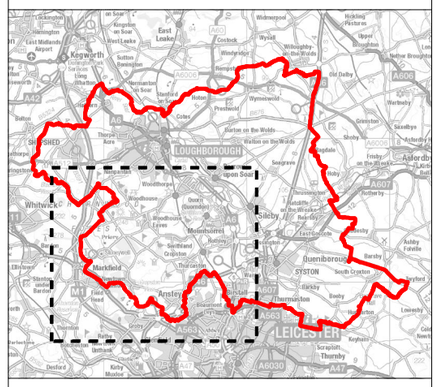
Renewable and Low Carbon Study for Charnwood Borough

Figure 4.6c: Opportunities for wind development (all scales)

Charnwood Borough boundary

Opportunity Areas for wind turbine development

- Small turbines only (<40m tip height)
- Small to medium turbines only (<40m - 80m tip height)
- Small to large turbines only (<40m - 120m tip height)
- All turbine scales (up to 160m tip height)



Map Scale @A3: 1:45,000

LUC

Charnwood

CB:BP EB:Packham_B LUC FIG_4_6_10448_Opportunities_for_wind_development_c_A3L 24/10/2018

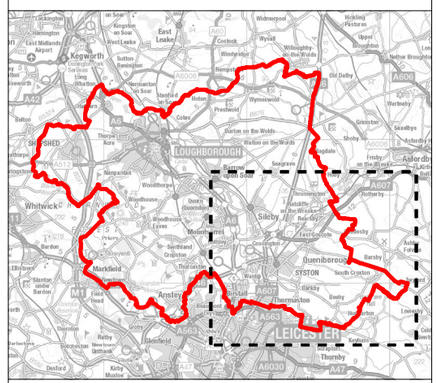
Renewable and Low Carbon Study for Charnwood Borough

Figure 4.6d: Opportunities for wind development (all scales)

Charnwood Borough boundary

Opportunity Areas for wind turbine development

- Small turbines only (<40m tip height)
- Small to medium turbines only (<40m - 80m tip height)
- Small to large turbines only (<40m - 120m tip height)
- All turbine scales (up to 160m tip height)



Map Scale @A3: 1:45,000

LUC

Charnwood

0 1 2 km

CB:BP EB:Packham_B LUC FIG_4_6_10448_Opportunities_for_wind_development_d_A3L 24/10/2018

Figure 4.7: Opportunities and constraints for small scale wind development

- Charnwood Borough boundary
- Unconstrained areas for small scale wind development
- Constrained areas for small scale wind development

Map Scale @A3: 1:100,000

0 5 10 km

CB:BP EB:Packham_B LUC FIG_4_7_10448_Opportunities_and_constraints_for_small_wind_A3L 24/10/2018

Renewable and Low Carbon Study for Charnwood Borough

Figure 4.8: Opportunities and constraints for medium scale wind development

- Charnwood Borough boundary
- Unconstrained areas for medium scale wind development
- Constrained areas for medium scale wind development

Map Scale @A3: 1:100,000

LUC

Charnwood

CB:BP EB:Packham_B LUC FIG_4_8_10448_Opportunities_and_constraints_for_medium_wind_A3L 24/10/2018

Figure 4.9: Opportunities and constraints for large scale wind development

- Charnwood Borough boundary
- Unconstrained areas for large scale wind development
- Constrained areas for large scale wind development

Map Scale @A3: 1:100,000

LUC

Charnwood

0 5 10 km

CB:BP EB:Packham_B LUC FIG_4_9_10448_Opportunities_and_constraints_for_large_wind_A3L 24/10/2018

Renewable and Low Carbon Study for Charnwood Borough

Figure 4.10: Opportunities and constraints for very large scale wind development

- Charnwood Borough boundary
- Unconstrained areas for very large scale wind development
- Constrained areas for very large scale wind development

Map Scale @A3: 1:100,000

LUC

Charnwood

0 5 10 km

CB:BP EB:Packham_B LUC FIG_4_10_10448_Opportunities_and_constraints_for_very_large_wind_A3L 24/10/2018

Renewable and Low Carbon Study for Charnwood Borough

Figure 4.11: Aviation Constraints

Charnwood Borough boundary

East Midlands Airport

30km Buffer

Map Scale @A3: 1:100,000

LUC

Charnwood

0 5 10 km

CB: EB:Packham_B LUC FIGX_10448_Aviation_Constraints_A3L 28/09/2018

Source: Civil Aviation Authority

Renewable and Low Carbon Study for Charnwood Borough

Figure 4.12: Slope

Charnwood Borough boundary

Slope (degrees)

- 0° - <=3°
- >3° - <=6°
- >6° - <=9°
- >9° - <=12°
- >12° - <=15°
- >15° (Unsuitable)

Map Scale @A3: 1:100,000

0 5 10 km

CB:BP EB:Packham_B LUC FIGX_10448_Slope_A3L 28/09/2018

Renewable and Low Carbon Study for Charnwood Borough

Figure 4.13: Constraints for Solar (Natural Heritage, Cultural Heritage and Recreation)

- Charnwood Borough boundary

Nature Conservation

- Sites of Special Scientific Interest
- Ancient woodland
- Local Nature Reserves
- Sites of Nature Conservation Interest
- Woodland areas

Cultural Heritage

- Scheduled Monuments
- Registered Parks and Gardens
- Listed Building Grade I
- Listed Building Grade II
- Listed Building Grade II*
- Conservation Areas
- Archaeological Interest Sites
- Archaeological Alert Sites

Recreation

- Public Rights of Way
- Bridleways

Map Scale @A3: 1:100,000

LUC

Charnwood

CB:BP EB:Packham_B LUC FIGX_10448_Solar_Constraints_Nature_Heritage_and_Rec_A3L 25/10/2018

Source: Natural England, Historic England, Charnwood Borough Council, Leicestershire County Council

Figure 4.14: Constraints for Solar (Physical, Land Use and Infrastructure)

- Charnwood Borough boundary
- Settlements with 20m buffer
- SHLAA Developable Sites
- Roads
- Railways
- Overhead Lines
- Watercourses and waterbodies
- Slope greater than 15° or Slope facing NW through NE and greater than 3°
- Mineral Sites with 250m Buffer

Agricultural Land Classification

- Grade 2 (Excluded from opportunity areas)
- Grade 3 (Further investigation required to determine suitability, not excluded from opportunity areas)

Map Scale @A3: 1:100,000

LUC

Charnwood

CB: EB:Packham_B LUC FIGX_10448_Solar_Constraints_Phys_Land_Use_Infra_A3L 25/10/2018

Source: Charnwood Borough Council, National Grid, Leicestershire County Council, Natural England

Renewable and Low Carbon Study for Charnwood Borough

Figure 4.15: Opportunities for solar development

Charnwood Borough boundary

Areas of potential for solar development

Map Scale @A3: 1:100,000

LUC

Charnwood

0 5 10 km

CB:BP EB:Packham_B LUC FIGX_10448_Opportunities_for_Solar_Development_A3L 28/09/2018

Renewable and Low Carbon Study for Charnwood Borough

Figure 4.16: Opportunities and constraints for solar development

- Charnwood Borough boundary
- Unconstrained areas for solar development
- Constrained areas for solar development

Map Scale @A3: 1:100,000

LUC

Charnwood

0 5 10 km

Renewable and Low Carbon Study for Charnwood Borough

Figure 4.17: Opportunities for hydropower development

Charnwood Borough boundary

Watercourses and waterbodies

Potential Hydropower opportunity

Power Category

- 0 - 10 kW
- 10 - 20 kW
- 20 - 50 kW
- 50 - 100 kW
- 100 - 500 kW

Map Scale @A3: 1:100,000

LUC

Charnwood

0 5 10 km

CB:BP EB:Packham_B LUC FIG_4_17_10448_Opportunities_for_Hydropower_Development_A3L 08/11/2018

Source: Environment Agency

Renewable and Low Carbon Study for Charnwood Borough

Figure 4.18: Win Win Opportunities for hydropower development

Charnwood Borough boundary

Watercourses and waterbodies

Potential Hydropower opportunity

Power Category

- 0 - 10 kW
- 10 - 20 kW
- 20 - 50 kW
- 50 - 100 kW
- 100 - 500 kW

Map Scale @A3: 1:100,000

LUC

Charnwood

Service Layer Credits: Contains OS data © Crown Copyright and database right 2018

CB:BP EB:Packham_B LUC FIGX_10448_Win_Win_Opportunities_for_Hydropower_Development_A3L 25/10/2018

Source: Environment Agency

Renewable and Low Carbon Study for Charnwood Borough

Figure 4.19: Environmental sensitivity to hydropower development

Charnwood Borough boundary

Watercourses and waterbodies

Potential Hydropower opportunity

Environmental sensitivity

- No sensitivity data
- Low
- Medium

Map Scale @A3: 1:100,000

LUC

Charnwood

0 5 10 km

Renewable and Low Carbon Study for Charnwood Borough

Figure 4.20: Percentage of households not connected to gas network

Charnwood Borough boundary

Off-grid households by LSOA (%)

- 0 - 5
- 6 - 9
- 10 - 15
- 16 - 20
- 21 - 25

Map Scale @A3: 1:100,000

LUC

Charnwood

Service Layer Credits: Contains OS data © Crown Copyright and database right 2018

CB:BP EB:Packham_B LUC FIGX_10448_Off_Grid_Housing_A3L 25/10/2018

Source: Department for Business, Energy & Industrial Strategy

Renewable and Low Carbon Study for Charnwood Borough

Figure 4.24: Biomass and woodland within Charnwood

- Charnwood Borough boundary
- Biomass Supplier
- Charnwood forest
- National forest
- Woodland

Map Scale @A3: 1:100,000

LUC

Charnwood

Service Layer Credits: Contains OS data © Crown Copyright and database right 2018

CB:BP EB:Packham_B LUC FIGX_10448_Biomass_Suppliers_and_Woodland_A3L 25/10/2018

Source: Forestry Commission

5 Planning Policy Considerations

5 Planning Policy Considerations

5.1 This section reviews the various planning policy approaches that could be incorporated within the emerging Local Plan in relation to renewable and low carbon energy. This includes a consideration of:

- Setting building performance energy standards.
- Separation distances.
- Criteria-based policies.
- Identifying areas of suitability for wind.
- Identifying areas of energy generation opportunity.
- Site allocation policies.
- Community renewable policies.
- Local development orders.

5.2 These are discussed in turn, with a summary provided of the strengths and weaknesses of each policy approach.

Setting Building Performance Energy Standards

5.3 Around 40% of the UK's energy consumption is used to provide heating and hot water in buildings. It accounts for 20% of our greenhouse gas emissions[36]. Planning policy gives local authorities powers to increasing the energy efficiency of our homes and workplaces.

5.4 While building regulations have already improved energy performance they will need to be tightened further to meet our long-term climate change commitments. Without further enhancing standards, new homes built under the local plan will still need to undergo a deeper, and potentially disruptive, energy efficiency retrofit in future. It is far easier and cheaper to design and build low carbon buildings from the outset.

Building energy policy context

5.5 Charnwood's current Local Plan's Policy CS16 on Sustainable Construction and Energy (2011 adopted November 2015) encourages new developments to exceed Building Regulations for carbon emissions through energy efficiency as well as renewable and low carbon energy where viable.

5.6 Since then the policy context for housing energy standards has changed substantially. The Government was committed to introducing a national zero carbon standard for new homes by 2016 but the Code for Sustainable Homes was withdrawn and the zero-carbon standard was abandoned to reduce construction costs as part of a renewed focus on increasing housing delivery.

5.7 Through a Written Ministerial Statement in March 2015, the government also sought to limit the ability of local authorities to set energy performance standards higher than the equivalent of Code for Sustainable Homes Level 4 'until commencement of amendments to the Planning and Energy Act 2008'. However, after the General Election in 2015 the amendments were not enacted. These changes led to uncertainty as to what local authorities could do at the local level to encourage enhanced energy and emissions standards in new homes.

[36] https://www.theccc.org.uk/wp-content/uploads/2016/10/Next-steps-for-UK-heat-policy-Committee-on-Climate-Change-October-2016.pdf

5.8 Recent government clarifications[37] and supportive statements[38],[39] have made it clear that local planning authorities do have the powers to require energy performance standards equivalent to Code Level 4, equivalent to a 19% reduction on the current Part L of Building Regulations 2013. Brighton and Hove City Council and Ipswich Borough Council have recently adopted this standard which provides a clear precedent for its use.

5.9 The new Revised National Planning Policy Framework was published on 24th July 2018 and reaffirms this position. Paragraph 150 on planning for climate change, states:

> *New development should be planned for in ways that… b) can help to reduce greenhouse gas emissions, such as through its location, orientation and design. Any local requirements for the sustainability of buildings should reflect the Government's policy for national technical standards.*

5.10 The government provides unambiguous clarification on the ability of local authorities to set energy requirements above Building Regulation in its summary response to the consultation. The answer to Question 33 states:

> *"the Framework does not prevent local authorities from using their existing powers under the Planning and Energy Act 2008 or other legislation where applicable to set higher ambition. In particular, local authorities are not restricted in their ability to require energy efficiency standards above Building Regulations".*

5.11 Legal interpretation[40],[41] also suggests that local authorities may be able to set energy requirements beyond the national technical standards should they wish, with some authorities implementing ambitious zero carbon standards, as with London's emerging new London Plan policy which includes a 35% reduction in emissions over Building Regulations.

Building Regulations Part L 2013

5.12 The current building energy and emissions standards are set out in Part L 2013 and came into force in April 2014. It includes a layered approach to ensuring minimum energy performance is met. It includes:

- Minimum insulation values for the building fabric components and air permeability.
- A fabric energy efficiency standard that sets an overall minimum heating and cooling demand.
- An overall carbon emission standard. The 2013 regulations required a 6% reduction in emissions over the previous 2010 Building Regulations.

5.13 Developers have considerable flexibility in how they meet the standards. In practice, they might choose to fit triple glazing, install additional insulation, or install on-site low carbon heat and/or power.

---

[37] An exchange in the House of Lords on 6th February 2017 during the passage of the Neighbourhood Planning Bill:
Baroness Parminter asked in relation to carbon reductions: "Can the Minister confirm that the Government will not prevent local councils requiring higher building standards? There is some lack of clarity about whether local authorities can carry on insisting in their local plans on higher standards. Will the Government confirm that they will not prevent local authorities including a requirement for higher building standards?"

Lord Beecham replied: "The noble Baroness asked specifically whether local authorities are able to set higher standards than the national ones, and I can confirm that they are able to do just that."

[38] On 21 May 2018 prime minister Theresa May pledged to at least halve the energy use of new buildings by 2030 as part of the clean growth, strategy and industrial strategy: https://utilityweek.co.uk/may-pledges-halve-energy-usage-new-buildings/

[39] The Government's response to the draft revised National Planning Policy Framework consultation, July 2018 states "the Government intends to consult on further improving energy requirements for new homes where the evidence suggests that there are cost effective and affordable opportunities, and it is safe and practical to do so".

[40] TCPA, May 2018, Planning for Climate Change A Guide for Local Authorities.

[41] Solar Trade Association, April 2018, Leading Lights How local authorities are making solar and energy storage work today.

Meeting the national technical energy standard

5.14 The national technical energy standard is set at the equivalent of Code for Sustainable Homes Level 4, or a 19% reduction in the overall carbon emission standard over the current Part L of Building Regulations 2013.

5.15 To meet the standard developers still need to meet the Building Regulations minimum insulation values and fabric energy efficiency standard and then decide on the most appropriate approach to meeting the higher overall carbon emissions performance level.

5.16 Evidence to support the technical feasibility and economic viability of the national technical energy standard is provided below and establishes it as a sensible target which can be achieved on a wide range of housing types and development sites without adding substantial development costs.

Technical Feasibility

5.17 New homes have already been built to the national technical standard for energy performance at scale. The UK Green Building Council's research suggests that as of early 2018 there were approximately 107,000 homes in England built to this standard. They can be built using traditional construction methods and materials.

5.18 The national technical standard for energy performance is flexible and there are many options available to developers to meet both energy carbon emission reductions targets. These approaches fall into two main categories:

- Improved fabric energy efficiency standards and installing low carbon generating technologies, usually roof top PV. See 'Good' in the table below.
- A fabric first approach which meets the standard through improved insulation, air tightness and reducing heat lost through thermal bridges and mechanical ventilation. See 'Advanced' in the table below.

5.19 **Table 5.1** compares these standards to the Building Regulations 2013 Part L limiting fabric parameters alongside specifications for fabric improvement packages that can be used to meet Code level 4.

Table 5.1: Comparing Building Regulations 2013 Part L limiting fabric parameters and Code 4 fabric improvement packages from DCLG Cost of building to the Code for Sustainable Homes: Updated cost review (2011)

Fabric Specifications	Part L 2013	Good + PV	Advanced
Wall U-value (W/m2K)	0.3	0.18	0.15
Floor U-value (W/m2K)	0.25	0.15	0.1
Roof U-value (W/m2K)	0.2	0.13	0.1
Window U-value (W/m2K)	2.0	1.4	1.1
Door U-value (W/m2K)	2.0	1.4	1.1
Air permeability (m3/m2/hr)	10	3	1
Thermal Bridging (W/m2K)	0.15	0.06	0.04
Mode of ventilation	Natural	Natural	MVHR

5.20 For example, a 3 bed semi-detached house could meet the national technical standard using the 'Good' fabric package with a 1kW PV array or with the 'Advanced' fabric package only. The AimC4[42] project worked with a consortium of house-builders to demonstrate volume production of affordable Code Level 4 built using the fabric first approach. Such precedents give confidence that the standard is technically feasible and is applicable to all housing types and development sites, including dense urban infill to detached off gas grid properties.

Economic viability

5.21 As stated previously, meeting the national technical standard (a 19% improvement beyond Part L 2013) requires either enhanced building material specifications and/or low and zero carbon generation, usually PV. These result in an additional development cost which much be considered in viability testing.

5.22 There have been several studies which assess the additional capital costs of meeting the Code for Sustainable Homes levels and these have been reviewed to provide evidence of the estimated costs meeting the national technical standard.

5.23 The data below is from a government commissioned report as part of the Housing Standards Review published in 2014. **Table 5.2** presents the extra cost of building homes to the national technical energy performance standard over current Building Regulations Part L 2013. Figures are provided for both technically deliverable approaches and are applicable to a range of development scales.

Table 5.2: The extra cost of building to the national technical energy performance standard over current Building Regulations Part L 2013 (DCLG, Housing Standards Review Cost Impacts 2014)

Approach	1 Bed Flat	2 Bed Flat	2 Bed House	3 Bed House	4 Bed House
Renewables approach (PV)	£125	£500	£469	£625	£938
Fabric first approach	£278	£412	£703	£812	£1,150

Summary and next steps

5.24 The legislative context for enhanced energy standards has recently been clarified and makes it clear that local authorities have the freedom go beyond Building Regulations requirements. Charnwood Borough Council should consider using the review of the Local Plan as an opportunity to implement the national technical standards for energy. The UK Green Building Council[43] have proposed potential policy wording which could be adopted. It uses a carbon emissions-based outcome indicator as it provides a clear and common basis while giving developers flexibility in how the standard is met.

Strengths:

- Going beyond Building Regulations to meet the National Technical Energy Standard has been established as a sensible target which can be achieved on a wide range of housing types and development sites without adding substantial development costs.
- New homes have already been built to the national technical standard for energy performance at scale and the standard can be met using traditional construction methods and materials.
- Enhanced building energy performance standards represent the most cost effective way of meeting our climate change commitments.

[42] https://www.designcouncil.org.uk/sites/default/files/asset/document/DC%20CABE%20HOUSING%20CASE%20STUDY_2_AIMC4_310316%20FINAL.pdf

[43] UK Green Building Council, July 2018, Driving sustainability in new homes: a resource for local authorities version 1.1

Weaknesses:

- Developers need to be convinced of the benefits of going beyond the Building Regulation requirements and the potential impacts on viability.
- Enhanced building energy standards incur additional development costs which should be included in plan viability testing.
- Local authorities have the ability to require developers to go beyond Building Regulations until commencement of amendments to the Planning and Energy Act 2008. These amendments have not been enacted and it is unclear when they will be.

Separation Distances

5.25 The proximity of large wind turbines to residential properties has become an important consideration in planning decisions for wind energy developments. Several councils in England have sought to impose separation distances between proposed turbines and residential properties. However, developers and climate change groups are concerned that this effectively represents an "anti-wind farm policy" that is not based on evidence.

5.26 It is important to note that there are no minimum separation distances required in English planning law or guidance. The Planning Practice Guidance which accompanies the NPPF [44] clearly states that:

> "*Local planning authorities should not rule out otherwise acceptable renewable energy developments through inflexible rules on buffer zones or separation distances. Other than when dealing with set back distances for safety, distance of itself does not necessarily determine whether the impact of a proposal is unacceptable. Distance plays a part, but so does the local context including factors such as topography, the local environment and near-by land uses. This is why it is important to think about in what circumstances proposals are likely to be acceptable and plan on this basis.*"

5.27 A number of local authorities have however sought to introduce separation distances. For example Wiltshire Council amended its Core Strategy Pre-Submission Document to impose minimum separation distances of 1 kilometre for turbines over 25 metres, 1.5 kilometres for turbines over 50 metres, 2 kilometre for turbines over 100 metres and 3 kilometres for wind turbines over 150 metres high. In that case, the Inspector ruled that it was contrary to the Planning Practice Guidance (PPG) and the policy was removed.

5.28 Allerdale Borough Council has however successfully managed to include a separation distance policy (of 800m between wind turbines and residential properties) within their Local Plan. The policy does however include a caveat that:

> "*it is recognised that in some cases due to site-specific factors such as orientation of views, landcover, other buildings and topography it may be appropriate to vary this threshold, where it can be demonstrated through evidence that there is no unacceptable impact on residential amenity".*

5.29 Allerdale Borough Council published its Local Plan prior to the publication of the PPG. However, the Inspectors report, which was published after the publication of the PPG (in July 2014), did not refer to the PPG in consideration of this policy and it is not clear why this was so. It would appear that the Inspector was perhaps not aware of the guidance within the PPG as she states – "*There is nothing in prevailing planning policy, or in up to- date guidance to exclude, as a matter of principle, a minimum separation distance".*

[44] Available at: http://planningguidance.planningportal.gov.uk/blog/guidance/renewable-and-low-carbon-energy/developing-a-strategy-for-renewable-and-low-carbon-energy/

5.30 From discussions with planning officers at Allerdale Borough Council, it is understood that the separation distance policy was included at the request of Members, and that since its adoption the caveat included in the policy has been predominantly used in the determination of applications, rather than adherence to the 800m separation distance.

5.31 Reviews of appeal decisions have also shown that large scale wind turbines have been built with a wide range of separation distances and that they do not show any general rule, but rather judgements have been made according to the specifics of the case and local circumstances. This reflects the fact that the size of the turbines, orientation of views, local topography, buildings and vegetation and trees can all have a significant impact on what may be deemed an acceptable distance between a wind farm development and a residential property/ settlement.

5.32 As outlined in paragraph 2.7.6 of the national policy statement for Renewable Energy Infrastructure (EN-3), the two main issues that determine the acceptable separation distance between residential properties and wind energy developments are visual amenity and noise. Shadow flicker can also potentially determine the minimum acceptable separation distance. Commercial-scale wind turbines are large structures and can have an effect on visual amenity from residential properties. All wind turbines also generate sound during their operation. As such, appropriate distances should be maintained between wind turbines and sensitive receptors to protect residential amenity. The key questions however is whether these safeguards are best achieved through the application of blanket Borough wide separation distances or through robust criteria based policies and appropriate guidance. The provision of guidance by the Council on how residential amenity and noise issues should be assessed arguably provides a much more robust framework which can be used to assess potential wind farm applications.

5.33 If a separation distance policy is included with the emerging Local Plan, there is a high risk that this will be rejected by the Inspector as it is contrary to the guidance provided in the PPG. Any such potential policy would also need to be accompanied by a caveat recognising that site specific factors also need to be taken into consideration. With the inclusion of such a caveat, as the experience in Allerdale Borough Council has shown, it is doubtful what purpose the policy is serving. Arguably, only by considering the factors affecting residential amenity and noise on a site by site basis can a fair and transparent decision be reached on what is an acceptable distance between a wind farm development and a residential property.

Strengths:

- Puts the onus on the developer to set out why the distance between the wind turbine(s) and residential property is acceptable (if the proposed development is closer than the required distance). However, an Environmental Impact Assessment (EIA) for a wind energy development should already cover these issues.

Weaknesses:

- Contrary to National Planning Policy Guidance.
- Would require the inclusion of caveat to take account of local circumstances which makes the purpose of the policy questionable.
- Aim of policy could be better served through the provision of guidance on how developers should consider residential amenity and noise issues in their planning applications/ EIAs.

Criteria Based Policies

5.34 The NPPF states that local authorities should design their policies to maximise renewable and low carbon energy development while ensuring that adverse impacts are addressed satisfactorily. No guidance is currently provided within the Adopted Core Strategy on the criteria that will be applied in assessing applications for renewable energy projects within the Borough and therefore this is a policy approach which should be considered seriously by the Council.

5.35 The PPG provides helpful guidance for local authorities on how to develop robust criteria based policies in relation to renewable and low carbon energy projects. Key points include:

- The criteria should be expressed positively (i.e. that proposals will be accepted where the impact is or can be made acceptable).
- Should consider the criteria in the National Policy Statements (published by the Department of Energy and Climate Change) as these set out the impacts particular technologies can give rise to and how these should be addressed.
- Cumulative impacts require particular attention, especially the increasing impact that wind turbines and large scale solar farms can have on landscape and local amenity as the number of turbines and solar arrays in an area increases.
- Local topography is an important factor in assessing whether wind turbines and large scale solar farms could have a damaging effect on landscape and recognise that the impact can be as great in predominately flat landscapes as in hilly areas.
- Care should be taken to ensure heritage assets are conserved in a manner appropriate to their significance, including the impact of proposals on views important to their setting.
- Protecting local amenity is an important consideration which should be given proper weight in planning decisions.

5.36 Drawing on the guidance outlined in the PPG, after expressing positive support in principle for renewable and low carbon energy development, Local Plans should list the issues that will be taken into account in considering specific applications. This should not be a long negative list of constraints but it should set out the range of safeguards that seek to protect the environment – including landscape and townscape. Other key considerations may include residential amenity, aviation, heritage etc. It is important that policy does not preclude the development of specific technologies other than in the most exceptional circumstances and does not purely repeat national policy but is relevant to the process of decision-making at the local level and focuses on locally distinctive criteria related to local assets, characteristics and sensitivities. In the context of Charnwood this could specifically relate to managing the scale and impact of renewable and low carbon developments in in specific sensitive landscapes and townscapes, drawing on the findings of the landscape sensitivity assessment etc. It may also be appropriate for more detailed issues and guidance to be included in a Supplementary Planning Document (SPD) on renewables.

5.37 The Inspector's report which accompanied the Blackburn with Darwen Borough Council[45] Site Allocations and Development Management Policies Plan (adopted in 2015) noted that in order for the Plan to be found sound, the Borough's criteria-based policies would need to be supported by a Supplementary Planning Document (SPD) which identified suitable areas. It is therefore recommended that any criteria-based policy designed to manage the development of renewable and low carbon technologies should also be supported by guidance on the most suitable locations (see appropriate sections relating to suitable areas, energy opportunities and allocations below), either within the Local Plan or an accompanying SPD.

Strengths:

- Creates greater policy certainty for developers.
- Allows the Council to clearly set out the circumstances in which renewable energy proposals will and will not be permitted.

Weaknesses:

- Maybe perceived to be overly restrictive by certain stakeholders.

[45] Blackburn with Darwen Borough Site Allocations and Development Management (2015), Blackburn with Darwen Borough Council

Identification of 'Suitable Areas for Wind Energy'

5.38 In line with PPG, when considering applications for wind energy development, local planning authorities should (subject to the transitional arrangement) only grant planning permission if the development site is in an area identified as suitable for wind energy development in a Local or Neighbourhood Plan.

5.39 When identifying suitable areas for wind, as outlined in **Chapter 2**, the PPG does not dictate how suitable areas for renewable energy should be identified, but in considering locations, local planning authorities will need to ensure they take into account the requirements of the technology and, critically, the potential impacts on the local environment, including from cumulative impacts and views of affected local communities. It also makes reference to the former Department of Energy and Climate Change's (now part of the Department for Business, Energy and Industrial Strategy) methodology on assessing the capacity for renewable energy development. The guidance notes the value of landscape character assessments in identifying which technologies are appropriate in different locations, including the appropriate scale of development.

5.40 The assessment of technical potential outlined in **Chapter 4** is based on a refinement of the DECC methodology and **Figures 4.6a-d** identifies those areas which are technically viable for wind energy – i.e. they are not constrained by grid capacity, environmental or heritage constraints.

5.41 One of the key factors determining the acceptability or otherwise of wind turbines is their potential impacts on the local landscape – this is due to their height and the movement they introduce into the landscape (i.e. rotating blades). Different landscapes present different opportunities for renewable energy, and landscape sensitivity studies can assist both planners and developers in identifying what scale of development may be appropriate in which areas. This approach is endorsed by the PPG which states that *"landscape character areas could form the basis for considering which technologies at which scale may be appropriate in different types of location."*

5.42 **Figures 4.6a-d** could therefore be overlaid with the findings of the landscape sensitivity assessment to identify the areas which are most 'suitable for wind'. A judgement would need to be made regarding the level of sensitivity that is considered to be acceptable – i.e. this could potentially include all areas of less than moderate sensitivity. The identified areas could then be included on the Local Plan proposals map as 'areas of potential suitability for wind'.

5.43 It is important to note that if such areas were identified in a Local Plan or Neighbourhood Plan they would be broad designations rather than allocations and would not therefore provide a definitive statement of the suitability of particular location for wind energy. Site specific assessment and design would still be required and all applications would still be assessed on their individual merits. It is also not possible at a strategic level, to take into account cumulative effects. Residential amenity, the setting of heritage assets, telecommunications, ecology and air traffic safety etc., would also need to be carefully considered at a site level. It is therefore recommended that such policies are also supported by development management criteria designed to judge individual planning applications against (see section on criteria-based policies above).

5.44 All applications would also have to meet second test set out in the PPG i.e. that it can be demonstrated that the planning impacts identified by affected local communities have been fully addressed and therefore the proposal has their backing.

5.45 The Council may also want to give consideration to including a policy stating where proposals for wind energy development outside of the identified areas will be considered. For example where it can be demonstrated that:

- projects are community-led and supported schemes that meet the identified needs of local communities to offset their energy and heat demand; and
- projects are appropriately scaled and sited to meet the demands of local utilities, commercial facilities, agricultural holdings, etc.

5.46 The Redcar and Cleveland Local Plan[46] adopted in May 2018 includes Renewable and Low Carbon Energy Policy SD 6 which identifies areas with potential for wind and solar technologies in the Proposal Map accompanying the Local Plan. These areas were identified by undertaking a technical assessment of wind and solar potential overlaid with the findings of a landscape sensitivity assessment.

Strengths:

- Enables planners to have informed discussions with developers and communities about potential opportunities for wind– i.e. proactive rather than reactive planning
- Meets NPPF, PPG and Ministerial statement that LPAs should consider identifying suitable areas for renewable and low carbon energy sources and supporting infrastructure.
- Can act as a useful tool for neighbourhood planning.

Weaknesses:

- There may be concern that it will lead to multiple wind energy applications within the areas identified as being suitable for wind. However all applications would still need to be assessed on their own merits, in isolation and in combination with existing developments, and it would not be a replacement for detailed site studies.
- It does not provide a definitive statement on the suitability of a certain location for wind turbine development – each application must be assessed on its own merits. It is not a replacement for detailed site studies.

Development of 'Energy Opportunities Map'

5.47 The NPPF and PPG encourage local planning authorities to "*consider identifying suitable areas for renewable and low carbon energy sources, and supporting infrastructure.*" The Council should therefore consider identifying suitable areas for other forms of renewable and low carbon energy sources, and supporting infrastructure, where this would help secure the development of such sources.

5.48 Clearly identifying and mapping an area's renewable and low carbon sources of energy represents a positive and proactive way to spatially plan for renewable and low carbon energy generation. With a spatial map illustrating energy opportunities it is easier for local authorities to work with local communities and developers to identify the areas that would be most appropriate for development in strategic terms, accelerating the planning and development processes and avoiding conflict.

5.49 An energy opportunities map would provide a spatial summary of the key opportunity areas (in terms of their technical potential) for various forms of renewable energy. This can be used to inform development decision and discussions and guide development towards the most suitable areas. As outlined above, if the energy opportunities map is informed by a landscape sensitivity study and the location of graded agricultural land, it could also be used to guide solar developments away from the most sensitive landscapes and best and most vulnerable agricultural land, in line with PPG.

5.50 It would be important, however, that any locational policies are framed such that they do not preclude projects in other (constrained and currently considered suboptimal) areas; for example if better solar data becomes available or if the factors determining optimal sites for solar PV arrays change.

[46] Redcar and Cleveland Local Plan (May 2018), Redcar and Cleveland Borough Council.

5.51 With the introduction of neighbourhood planning, the energy opportunities map could also provide a useful tool for communities and other stakeholders to identify the key opportunities for renewables within their area. It is important to note however that it is not possible to identify locations for all types of renewable energy, as many technologies such as building integrated solar, heat pumps, farm-scale AD, and small-scale biomass can be located in nearly all areas.

5.52 As outlined above, the Redcar and Cleveland Local Plan[47] adopted in May 2018 includes Renewable and Low Carbon Energy Policy SD 6 which identifies areas with potentially for wind and solar technologies in the Proposal Map accompanying the Local Plan.

Strengths:

- Enables planners to have informed discussions with developers and communities about potential opportunities for renewable and low carbon energy technologies – i.e. proactive rather than reactive planning
- Meets NPPF, PPG and Ministerial statement that LPAs should consider identifying suitable areas for renewable and low carbon energy sources and supporting infrastructure.
- Can act as a useful tool for neighbourhood planning.

Weaknesses:

- Not possible to identify locations for all types of renewable energy technologies.
- It does not provide a definitive statement on the suitability of a certain location for a particular development – each application must be assessed on its own merits. It is not a replacement for detailed site studies.
- May identify potential areas for renewable energy development which are unpopular.

Allocating Sites for Standalone Renewable and Low Carbon Energy Schemes

5.53 The local plan could allocate sites specifically for standalone renewable developments. This could provide more strategic direction to the siting of renewables for developers, investors, the local authority, statutory stakeholders and communities. It may be possible to allocate sites which have the greatest potential for sustainable energy and carbon reduction or sites that could potentially be developed for other purposes (e.g. resulting in the sterilisation of potential sites).

5.54 If sites exist that have potential for standalone renewable or low carbon energy use but are constrained in a way that would make them less attractive to commercial developers, then allocating the site is a way of promoting that site for renewable/low carbon development to a wider audience such as land owners or co-operatives. Alternatively or in addition, the Council could undertake a 'call for sites' exercise for renewable and low carbon development and consider the merits of promoted sites in isolation or in combination with other planned types of development. It should however be noted that such call for sites exercises tend to generate a relatively poor level response.

5.55 Again, it would be important that site allocations only highlight appropriate schemes/areas; site developers and communities would still be required to undertake detailed site-based assessment work to support individual development planning applications and if required Environmental Impact Assessments. Furthermore, site allocations are framed such that they do not preclude projects in other locations.

[47] Redcar and Cleveland Local Plan (May 2018), Redcar and Cleveland Borough Council.

Strengths:

- Provide strategic direction to the siting of renewables.
- Ensure sites with the greatest potential are identified.
- May promote sites to a wider audience such as co-operatives.

Weaknesses:

- Resource intensive to gather necessary evidence to justify allocation.
- Would be desirable to secure agreement of landowner which may be resource intensive.
- May identify potential sites for renewable energy development which are unpopular.

Encouraging Community Renewables

5.56 The NPPF states that local authorities should support community-led initiatives for renewable and low carbon energy, including developments being taken forward through neighbourhood planning. Community-led renewable energy projects are increasingly being seen as an attractive option for local communities wishing to contribute to local/national climate change targets and as a way to generate local revenue to directly benefit the community. Driven by the launch of the Feed-in Tariff in 2010 and other government initiatives, a large number of community renewable energy projects have been delivered, including a broad technologies, such as wind , solar PV, biomass heating and hydro schemes. Despite government support, the Feed-in Tariff has been considerably cut and the government is in the process of considering its long term future.

5.57 Community groups can face considerable challenges in the pre-planning stage and there are a number of opportunities for local authorities to provide advice and guidance throughout this stage, including the provision of early advice on planning requirements and lending support to consultation activities within the community. Engaging communities for the earliest stages of plan-making to provide clear information on local issues and the decision making process.

5.58 The Redcar and Cleveland Local Plan[48] outlines support for community based renewable energy schemes which can help to deliver cheap energy sources to local communities through a local supply network. The Local Plan also supported the potential for waste heat from industrial processes being used to heat homes, businesses and community services.

5.59 The Council's emerging Local Plan could broaden its support for community renewable schemes by stating that the Council would actively support community renewable energy schemes which are led by or meet the needs of local communities. Such developments would normally be conceived by and/or promoted within the community within which the renewable development will be undertaken, delivering economic, social and/or environmental benefits to the community. Neighbourhood plans provide a particular opportunity to define detailed local site allocation policies for renewable and low carbon technologies.

Strengths:

- Provides support to local communities to develop renewables and low carbon energy.
- Generates local revenue to directly benefit the local community.
- Can secure a broad base of local support for renewable energy schemes.

[48] Redcar and Cleveland Local Plan (May 2018), Redcar and Cleveland Borough Council.

Weaknesses:

- Care may need to be taken not to prescribe the process of community ownership (i.e. shared ownership etc.) as some would argue it is not the role of the planning system to do this.

Preparation of Local Development Orders (LDOs)

5.60 LDOs[49] can be made by local planning authorities and give a grant of planning permission to specific types of development within a defined area. They streamline the planning process by removing the need for developers to make a planning application to a local planning authority, and create certainty and save time and money for those involved in the planning process.

5.61 LDOs are very flexible tools, and can be either permanent or time limited, depending on their aim and local circumstances. For example, an LDO in fast-developing may be time limited so that it can be revised and updated in the future. Another key point is that LDOs can be revoked and modified by a local planning authority at any time; however, modifications may require re-consultation.

5.62 It is important to bear in mind that LDOs only grant planning permission, and do not remove the need to comply with other relevant legislation and regulations. Similarly, conditions can be imposed in a LDO, which may be similar to conditions imposed on a normal grant of planning permission. However, a local planning authority should try to avoid imposing excessive numbers of conditions on LDOs, as their purpose is to simplify and speed up local planning.

5.63 There are also restrictions on the use of LDOs, for example, an LDO cannot grant planning permission for development which is likely to have a significant effect on a European Site.

5.64 Some renewable energy developments already fall within Permitted Development Rights (PDR). Part 14 of the Town and Country Planning General Permitted Development Order (2015)[50] sets out the permitted development rights for a range of small scale renewable and low carbon development technologies, including:

- Solar photovoltaic and solar thermal equipment on dwellings, on buildings within the curtilage of dwellings, on non-domestic premises and stand-alone within the curtilage of non-domestic premises.
- Ground, air and water source heat pump equipment on dwellings or on buildings within the curtilage of dwellings or non-domestic premises.
- Biomass heating systems and combined heat and power and their flues on dwellings or non-domestic premises.
- Wind turbine equipment on dwellings on buildings within the curtilage of dwellings, or stand-alone turbines within the curtilage of dwellings.

5.65 However it may be possible for example for an LDO to be created allowing the installation, alteration or replacement of small scale renewable energy systems on any industrial, warehouse, business and commercial buildings within a defined area, such as the Loughborough University Science and Enterprise Park. At 53ha and with 35ha of permitted development well underway, the campus is one of the UK's largest science parks in heart of the Loughborough and Leicester Science and Innovation Enterprise Zone. The Park contains a range of high tech academic and commercial organisations and business including the Energy Technologies Institute which acts as a conduit between academia, industry and the government to accelerate the development of low carbon technologies.

[49] Planning practice guidance on LDOs can be found at Paragraph 076 – 085 at: http://planningguidance.planningportal.gov.uk/blog/guidance/when-is-permission-required/what-types-of-area-wide-local-planning-permission-are-there/

[50] The detailed conditions within which the permitted development rights relating to renewable and low carbon technologies apply can be found at: https://www.planningportal.co.uk/info/200187/your_responsibilities/37/planning_permission/2

5.66 Swindon Borough Council has adopted several LDOs which relate to renewable and low carbon technologies[51], including Swindon Low Carbon LDO1 which relates to Boroughwide non-domestic air source heat pumps and district heating installations and several separate LDOs which prescribe appropriate sites for solar arrays and solar farms within the Borough.

Strengths:

- LDOs can streamline and simplify the planning process for specific development types and locations.
- They can create certainty and save time and money for all those involved in the planning process.
- They can be flexible tools and can be revised and updated as circumstances and policy change.

Weaknesses:

- As technologies change, LDOs may need to be revised and updated to reflect any key changes.
- There may not be enough demand for an LDO to warrant its creation.
- An EIA may need to be undertaken by the Local Authority.

[51] Further details of Swindon Borough Council's LDOs can be found at: https://www.swindon.gov.uk/info/20113/local_plan_and_planning_policy/648/local_development_orders/2