Energy, Waste and Climate Change

One of a series of background topic papers prepared by db symmetry in support of a public consultation on proposals for a strategic rail freight interchange in Blaby district, to the north-east of Hinckley in Leicestershire.

INTRODUCTION

1 In 2019 db symmetry will apply to the government for a Development Consent Order (DCO) for a proposed strategic rail freight interchange (SRFI) on a site in Blaby District, to the east of Hinckley in Leicestershire. The project is known as the Hinckley National Rail Freight Interchange (HNRFI).

2 A DCO is a special form of planning permission for large infrastructure projects. It can include a range of additional powers required to implement the proposals, such as powers to acquire land, undertake works to streets, trees and hedgerows and divert utility services.

3 This Topic Paper outlines the ongoing assessment of the potential impact of the proposed Hinckley National Rail Freight Interchange on energy resources, waste and climate change.

4 Relevant legislation, policies and guidance are summarised, along with an outline of the existing conditions at the site; the proposed approach to undertaking the EIA assessment in respect of energy and waste resources; the likely effects of the proposals; the mitigation measures envisioned to reduce, offset and address any potential adverse effects anticipated and further work planned in order to inform our assessment.

5 This Topic Paper has been prepared for db symmetry by Hydrock Building Performance Engineering Team.

LAW, POLICY & GUIDANCE

6 The following section summarises planning and environmental legislation, policies and guidance which are considered relevant to energy resources, waste and climate change in relation to the proposed development, and accordingly will be referenced and consulted in the undertaking of the EIA assessment.

7 The following Directives, regulations, legislation, policy and guidance is of relevance for energy and climate change, waste and climate change:

European

8 Energy Performance of Buildings Directive, (2010) & Energy Efficiency in Building Directive 2012/27/EU (European Parliament, 2012) – These are the EU's main legislative instruments promoting the improvement of the energy performance of buildings within the EU and providing a stable environment for investment decisions to be taken.

9 Renewable energy Directive 2009/28/EC, (2009) - The Renewable Energy Directive establishes an overall policy for the production and promotion of energy from renewable sources in the EU.

10 Landfill Directive (1999) - The Landfill Directive aims to reduce reliance on landfill as a disposal option, and seeking to decrease the environmental impacts of landfills and reduce the risk to human health while imposing a consistent minimum standard for landfills across the EU.

11 Waste Framework Directive (2008) – This sets the basic concepts and definitions related to waste management, such as definitions of waste, recycling, recovery.

National Legislation

12 Energy Act (2013) - This Act establishes a legislative framework for delivering secure, affordable and low carbon energy.

13 Climate Change and Sustainability Act (2006) - This Act is to enhance the United Kingdom's contribution to combating climate change. This includes alleviating fuel poverty and securing a diverse and viable long-term energy supply.

14 Green Energy Act (2009) – This Act is to define the term “green energy”; to promote its development, installation and usage; and for connected purposes.

National Policy

15 National Policy Statement (NPS) for National Networks (2014) - Sets out the need and government policies for nationally significant infrastructure rail and road projects for England, including the advice on climate change adaptation (NPS paras 4.36 – 4.47) and carbon emissions (NPS paras. 5.16 – 5.19).

16 UK Climate Projections (UKCP) for lifetime of development – using the UKCP09 High Emissions Scenario (High Impact, Low Likelihood) against the 2080 projections at the 50% probability level, in accordance with NPS requirements. This will also include the anticipated UKCP18 projections where appropriate.

17 Climate Change Levy (2001) - A tax on energy delivered to non-domestic users in the United Kingdom, aiming to provide an incentive to increase energy efficiency and to reduce carbon emissions.

18 Carbon Reduction Commitment () - A UK mandatory scheme aiming to cut carbon emissions by 1.2 million tonnes of carbon per year by 2020, to achieve an 80% reduction in UK carbon emissions by 2050.

19 Energy Savings Opportunity Scheme (ESOS) (2014) - ESOS is a mandatory energy assessment scheme for organisations in the UK that meet the qualification criteria.

20 National Planning Policy for Waste (2014) - This document sets out detailed waste planning policies. It should be read in conjunction with the National Planning Policy Framework, the Waste Management Plan for England and National Policy Statements for Waste Water and Hazardous Waste, or any successor documents.

21 National Planning Policy Framework (2018) - The National Planning Policy Framework sets out government's planning policies for England and how these are expected to be applied.

22 Waste Management Plan for England (2010) - This plan provides an analysis on waste management in England, bringing current and planned waste management policies together in one place.

23 Waste Regulations (2011) & Hazardous Waste Regulations (2005)

National (standards & guidelines)

24 Approved Document Part L: Conservation of fuel and power (2013) - Building regulation in England setting standards for the energy performance of new and existing buildings.

25 CIBSE Guide F: Energy Efficiency in Buildings (2012) - This Guide shows how to improve energy performance, reduce running costs and minimise the environmental impact of buildings.

26 CIBSE Guide L: Sustainability (2007) - This Guide provides building services engineers with guidance on how to respond to the sustainability agenda.

27 CIBSE Heat Networks: Code of Practice for the UK (2015) - The Code of Practice has been produced to raise standards in heat networks, by setting minimum requirements (and suggested) best practice and by integrating the supply chain across the whole life of a project.

28 CIBSE TM36: Climate change and the indoor environment: impacts and adaptation (2005) - This publication addresses the issue of how climate change in the UK over the 21st

century may affect summertime thermal comfort in buildings and the energy use of associated heating, ventilation and air conditioning (HVAC) systems.

29 CIBSE TM38: Renewable energy sources for buildings (2006) - This document gives guidance to developers, planners, designers and building owners to enable them to consider integrated renewable energy systems at this early stage.

30 BS 5906:2005 – Waste management in Buildings (2005) - This is a code of practice for methods of storage, collection, segregation for recycling and recovery, and on-site treatment of waste from residential and non-residential buildings and healthcare establishments.

Regional Policy

31 Leicester and Leicestershire Bio-diversity Action Plan (2011-2012) - This Biodiversity Action Plan sets out how to manage, promote and extend the city's natural habitats.

32 Leicestershire Municipal Waste Management Strategy Update (2011) - The Strategy addresses all of the waste arising within Leicestershire that come under the heading of Local Authority Collected Waste. This includes waste produced by households (including street sweepings, litter and waste collected at Recycling Household Waste Sites), as well as some commercial wastes, waste from municipal buildings and cleared up fly-tips.

33 Leicestershire and Leicester Waste Development Framework (2009) – This sets out policies and proposals for the development and use of land for waste management within the framework area which will guide decisions about planning applications for waste facilities and provide a 'spatial plan' or 'geographic blueprint' to help shape the future of the area in respect to waste.

34 Leicestershire Minerals and Waste Local Plan (2013)

Local Policy

35 Blaby District Council Local Plan (2013) - A document that sets out the 'spatial plan' for the area. It addresses environmental (including land-use), social and economic issues, specifically Policies CS19 (Bio-diversity and geo-diversity), CS24 (Presumption in favour of sustainable development) and CS21 (Climate Change).

36 The Blaby District Council Climate Change Action Plan (2008)

THE SITE

37 The land within the Draft DCO Boundary ("the site") is located to the northeast of Hinckley, Leicestershire which has a population of 45,249 (2011 Census). The wider surrounding

area (including the areas of Blaby, Leicester, Hinckley and Bosworth and Nuneaton and Bedworth) has a total population of around 300,000.

38 The site is bound by the Felixstowe to Nuneaton rail line which forms its north-western boundary and the M69 motorway to the east (including Junction 2 at the southeast corner of the site).

39 The B4669 Hinckley Road runs in an east-west alignment to the south of the site.

40 Burbage Common Road routes through the site and enters/exits at two separate locations to the east (B581 Station Road) and north (B4668 Leicester Road) of the site.

41 The existing site is currently farmland with a small number of dwellings and commercial premises which will be demolished for the proposed development.

42 The energy usage from these buildings is small and is understood to be provided by utility connections to each premises.

43 The waste generated from these buildings is understood to be green waste from the farms, and a small amount of domestic and commercial waste from dwellings.

OUR APPROACH TO ASSESSMENT

Scoping Opinion

44 Table 1.1 summarises the responses received, in April 2018, as part of the EIA Scoping Opinion from those consultation bodies considered relevant to the assessment of the potential impact of the proposed Hinckley National Rail Freight Interchange on energy, waste and climate change, and/or other consultees who have raised the relevant topics within their response.

Table 1.1: Scoping Opinion Responses.

Consultee	Scoping Opinion Response
Blaby District Council	Council does not own any housing stock in area.
Burbage Parish Council	No comments on waste, energy or climate change.
Elmesthorpe Parish Council	No comments on waste, energy or climate change.
Environment Agency	Agree with level and detail of what has been scoped.
Highways England	No comments on waste, energy or climate change.
Leicestershire County Council	No comments on waste, energy or climate change.
Public Health England	Demonstrate compliance with the waste hierarchy. Review potential impacts associated with storing and transporting biomass, and mitigation measures to reduce risk of self-combustion.

Assessment Approach

45 Acknowledging comments received as part of the Scoping Opinion response, and in accordance with the guidance provided in the National Policy Statement for National Networks, we propose the 'Energy, Waste and Climate Change' Chapter of the EIA will assess the likely significant effects of the proposed development on the following receptors:

- Energy
- Waste
- Climate Change

46 The following outlines the proposed means of assessment for each receptor, in turn.

Energy

47 An initial energy demand assessment has been undertaken to ascertain the loads from the site in order to recommend appropriate energy generation options.

48 The assessment will be informed by the planning use classes of the buildings and their orientation. Regulated and Unregulated energy consumption will both be assessed.

49 Regulated energy consists of any energy consumed by fixed building services for occupants (heating, cooling, ventilation, domestic hot water, pumps, lighting). Unregulated energy consists of all other energy users in a building (plug-in loads, lifts, external lighting).

50 The development will be modelled to calculate the annual Regulated and Unregulated energy consumption. This modelling will be carried out using approved and accredited modelling software for energy calculations approved by the Secretary of State.

51 Any demand reduction measures will be modelled to assess their impact across the whole development and whether they should be adopted.

52 Available utilities in the area have been assessed to determine what capacities are available, if connection is required, or whether it can be generated on-site. Please see RPS Technical Feasibility Report.

53 The energy and sustainability assessment will review and respond to the local authority specific energy criteria contained in the Core Strategy and other local policy documents. All likely significant climate factors in terms of carbon impact will be assessed against UK government carbon budgets in accordance with NPS requirements and the Government's overarching carbon reduction strategy *Carbon Plan 2011*.

54 The scope of the energy and CO_2 (carbon dioxide) emissions assessment will cover all building and, where required, process loads (i.e. Regulated and Unregulated energy). Energy consuming activities will be reviewed across the site in order to develop a suitable energy strategy. This might include a mixture of localised and communal or site wide technologies to meet energy demand requirements. Technologies will be assessed in line with environmental objectives; air, land, noise pollution. Selection will be based on economic, technical and environmental viability. Mitigation measures may include flue dilution, filters and attenuators, if required. These will be developed in line with other design criteria for the site.

55 The operational stage assessment will include energy demand and energy used, the nature and quantity of materials used, residues and emissions, including light heat and radiation, risks of major accidents and disasters and the sustainable availability of resources such as land, soil, water and biodiversity.

56 Energy usage and emission generation by the development will be considered, associated with buildings, transport, waste, rail, etc.

Waste

57 The construction and operational waste assessment methodology will include:

- baseline waste assessment of the proposed development site and surrounding area;
- development of construction materials and waste volumes for the proposed development;
- materials and waste impact assessment associated with the operation of the development;
- formulation of mitigation measures where appropriate;
- identification of waste streams generated during the operation phases; and
- identification of any hazardous or potentially hazardous waste that may arise.

58 Waste generated on site will be assessed as to whether this can be reduced at the design stage and how it can have a smaller impact on the surrounding area.

59 An assessment will be carried out to ascertain if composting the biodegradable waste on site is viable and possible.

60 An assessment into the potential to process waste on-site and generate energy from waste will be undertaken.

61 Construction material selection will involve review of certification standards and application of appropriate and sustainable material selection.

62 Blaby District Council provides trade waste collection and disposal services for dry waste to businesses throughout the district. The destination for composting, landfill, recyclables, material recovery facilities and any treatment plant are to be determined.

63 In operation, the proposals will lead to the generation of increased amounts of municipal and commercial waste and the introduction of on-site recycling and waste storage facilities.

Climate Change

64 Assessment of the impact of predicted climate change scenarios on the proposed development will be undertaken in accordance with methodologies as detailed in the National Policy Statement for National Network and will use the UK Climate Projections (UKCP18) 2080 weather file to assess impacts.

65 During the detailed design, buildings will be assessed to determine whether any unnecessary predicted heat gains from buildings can be reduced, as well as including thermal mass to reduce internal temperatures.

66 Climate change adaptation will also be reviewed, this includes the effect of future temperature rises on building operation and occupant comfort (namely risk of overheating) and planning for resilience in building design:

- increase in annual average temperatures;
- increase in number and severity of hot days;
- increase in rain downpours and winter rainfall; and
- increase in dry spells and drought events, particularly in summer months.

67 The baseline assessment will be undertaken as follows:

- establish the energy and sustainability performance planning requirements for the project;
- determination of demolition effects and their potential climate change impacts;
- assessment of the baseline energy consumption and CO_2 emissions, against a Building Regulations compliant scheme;

- building modelling using CIBSE AM11 approved dynamic thermal modelling tools (Simplified Building Energy Model);
- analysis of energy delivery options including site wide communal infrastructure;
- development of scheme and building layout to optimise energy efficiency without undermining viability;
- provision of passive and active design measures;
- consideration of large scale renewable and/or low carbon energy generation technologies to support the scheme demand requirements;
- identify the future impacts caused by climate change on the site and surrounding areas;
- identify climate change vulnerability and sensitivity of receptors; and
- formulation of mitigation measures where appropriate.

68 Mitigation measures for climate change scenarios will be considered within the design.

THE MAIN LIKELY EFFECTS OF THE PROPOSALS

Proposed

69 The proposed strategic rail freight infrastructure development is approximately 650,000 m² GIA with an additional 200,000 m² in size.

70 The nature of the development means that the energy load per square metre will be relatively low density when compared to other building types such as hospitals, data centres, etc.

71 The predicted level of waste produced from the proposed development will be an increase from existing levels.

72 The introduction of a number of large buildings on site would increase the hard-standing surfaces (roofs, roads, etc.) and will increase the potential for urban heat island effect.

73 Blaby District Council has set objectives to improve the energy efficiency of existing and new developments and to promote the use of renewable energy sources. It is working to improve the energy efficiency of council-owned properties and is investigating how improvements to energy efficiency and renewable energy technology might be achieved in new developments through planning policies.

74 At present, the existing site is a mixture of farmland, small holdings and private dwellings. The site is largely greenfield and the creation of an employment site will increase energy and water consumption. Opportunities to provide efficient energy and water distribution systems including, where appropriate, renewable technologies will be investigated as part of the scheme development.

75 Development will directly or indirectly increase greenhouse gas emissions; locally or offsite depending on the chosen heat and power generation technologies deployed. Greenhouse gas emissions will also increase as a result of increased traffic and energy use associated with the development. Opportunities to minimise CO_2 emissions will be explored in detail as part of the energy strategy and infrastructure development.

76 Demolition effects will require consideration in terms of climate change impact. This is covered under the Geology, Soils and Contaminated land, Hydrology topic paper.

77 Opportunities to provide efficient energy and water distribution systems including, where appropriate, renewable technologies will be investigated as part of the scheme development. Resource consumption will include water, land and minerals.

78 Climate change adaptation will include an assessment of air temperature rise over the lifetime of the building, and its impact on occupant comfort and building resilience.

79 Impacts relating to water management and flood protection, air, land, noise, light and water are covered under separate topic papers.

Waste

80 The proposed development will result in the creation of more waste than at present. Consequently, assuming there was no mitigation, the volume of waste from the site will increase compared to the baseline situation.

81 Such a scenario will increase the frequency, extent, and amount of waste generated on site, thus increasing the amount of transport to the site, and an increase in the amount of waste going to all waste facilities (e.g. landfill, recycling, incineration, etc.)

Climate change

82 Climate change is likely to have a significant impact in Leicestershire, along with the rest of the country, particularly through increased rainfall intensity resulting in an increase in the number and severity of flooding events, and periods of drought at other times.

83 A Climate Change and Renewable Energy Study was undertaken in 2008 (IT Power) to quantify the potential for renewable energy in the Leicestershire and Rutland area. This identifies one potential wind farm site located to the west of Enderby, north of the M69. Other large scale forms of renewable sources of energy including hydropower, biomass,

and solar do not appear to offer the potential to generate more than 2MW of electricity at individual locations, although the rapid deployment of field-scale solar photovoltaics in the decade since the IT Power report was prepared suggests a higher potential for this particular technology.

84 The predicted impacts of climate change include:

- general increase in annual temperatures;
- enhanced urban heat island effect;
- wetter winters and more intense rainfall;
- dryer summers; and
- higher daily mean winter wind speeds.

85 The introduction of large new buildings will increase the amount of hard-standing and reflective surfaces across the site. This will increase the potential for urban heat island effect in the area and increase temperatures locally.

86 Carbon emissions will increase off or on site depending on the location of the energy generation process.

87 Water consumption will also increase on site to serve the 6,500-8,000 occupants envisioned on site as part of the proposed development (occupant numbers referenced from Land Use and Socio Economic topic paper).

PROPOSED APPROACH TO MITIGATION

Energy

88 The following principles should be used to mitigate the effects of an increased energy usage:

- reduce demand;
- meet end use demand efficiently;
- supply from low carbon sources;
- supply from renewable sources;
- renewable energy management.

89 The energy demand on site will be reduced by specifying a more efficient building fabric than required by building regulations. An EPC of "A" will be targeted for each building.

90 The energy demand will also be reduced by using more energy efficient equipment within the buildings and using appropriate energy saving controls.

91 Building form, orientation and occupancy has a large impact on energy consumption – which can look to be optimised through modelling and following best practice guidelines.

92 An airtightness value of 3 $m^3/hr/m^2$ @ 50 Pascals will be targeted to reduce thermal losses through the building envelope.

93 The site has the potential to be served from a central energy centre, allowing energy to be generated locally and without the distribution losses associated with off-site energy from utility providers.

94 The site could be supplied completely through energy sources on site, due to its relatively low-density of energy demand and the availability to install low carbon/renewable energy generation equipment.

Waste

95 The amount of waste produce from the site can be mitigated through the following principles, with disposal considered as a last resort:

- reduce waste;
- reuse materials and equipment (and facilitate future reuse);
- recycle waste (and facilitate recycling);
- compost biodegradable waste;
- recover energy from waste (and facilitate energy recovery from waste).

96 Waste on site can be reduced by appropriate control and use of materials by occupants and by the design of the site. Selecting appropriate building materials can also help in reducing waste on-site.

97 Waste water can be reduced by capturing it for reuse in grey or black water systems for non-potable uses (flushing toilets, process uses, etc.)

98 If waste cannot be reduced any further, materials should be used that can be recycled.

99 The size of the site and location allows the possibility for generated biodegradable waste to be composted on site, utilising the green space and/or purpose-built treatment reed-beds.

100 If waste cannot be reduced, reused, recycled or composted, it can be thermally treated to recover energy from it before it goes to landfill. This process could be accommodated on site to reduce quantities of waste being taken off-site, along with generating energy locally on site.

101 Rainwater harvesting will be considered for toilet facilities and other non-potable applications.

102 Low water/flush sanitary appliances are proposed to conserve water.

Climate Change

103 In order to reduce the risks of the effect of future increases in external temperatures on thermal comfort, the following principles should be applied:

- reduce unnecessary heat gains;
- make effective use of thermal mass;
- apply an appropriate ventilation strategy;
- apply active cooling;
- enable future adaptability.

104 At the HNRFI site there is significant scope for building integrated solutions to cumulatively deliver a significant supply. Key objectives include:

- minimising energy and water use in addition to developing renewable energy resources; and
- reducing greenhouse gas emissions to mitigate the rate of climate change.

105 Reducing unnecessary heat gains on site is achieved through pragmatic design and working closely with the architect to achieve optimal orientation, building form, and function. Typical measures include measures such as introducing external shading for solar control and reducing glare.

106 Buildings should also make effective use of thermal mass, reducing the temperature within spaces and using the effects of massive structure to passively cool buildings for occupants' comfort.

107 In order for the proposed buildings to be resilient to climate change, they should be able to be adapted in the future to suit the current climate.

108 In line with Blaby District Council's Core Strategy requirements, the development will seek to adopt the following measures:

- a hierarchy of waste management in the following priority order: waste prevention, re-use, recycle/compost, recovery, and disposal as a last resort;
- design and services flexible enough to allow new technological developments to be accommodated;
- consideration of waste collection to maximise recycling opportunities;
- provision of secure waste management facilities;
- any new sensitive receptors are not located near to or do not place additional burdens on existing licenced waste management facilities;
- the use of a Site Waste (Resource) Management Plan.

109 The total embodied carbon of the development can be influenced by the design and choice of materials. Building materials will be selected for the scheme to ensure, where feasible, that they:

- have a low embodied energy;
- are sustainably sourced;
- are durable to cater for their level of use and exposure;
- will not release toxins into the internal and external environment.

110 Where necessary, consideration within the design stage of the development process will be provided, outlining appropriate mitigation measures in order to ensure that relevant waste guidelines can be met.

NEXT STEPS

111 New national networks infrastructure will be typically long-term investments which will need to remain operational over many decades. The development will need to be resilient to climate change and adaptable through its design. The life of the asset is thought to be

60 years or greater. Hence, a long-term approach to energy, waste and climate change should be adopted to ensure the long-term investment is beneficial to the country.

112 An energy and sustainability strategy will be developed and submitted with the DCO application. This will detail the proposed energy strategy, local or offsite CO2 emissions and sustainable design measures including responses to climate change adaptation.

113 Energy and sustainability measures are recommended to be examined as part of these submission documents rather than the EIA, as the environmental impacts relating to air, land, noise, light and water resulting from buildings and energy generation equipment will be covered under other chapters of the EIA.

114 In order to progress the ongoing assessment of the potential impact of the proposed Hinckley National Rail Freight Interchange on energy and waste resources, along with sustainability and climate change, the following future work is proposed:

- continue to undertake EIA assessment, with ongoing consultation, discussions and agreements being sought with relevant consultees;
- produce an energy strategy including SBEM modelling;
- prepare a sustainability assessment for the site.

115 Produce a waste management strategy using the following process:

- predict waste arisings through approved calculation methodologies;
- consider the composition of waste;
- predict potential reduction in waste arisings;
- determine feasibility of recovery options;
- calculate the storage, containment and equipment requirements for effective waste management.

116 Db symmetry will undertake a climate change assessment using UKCCP climate change scenarios and addressing the following topics:

- assess impacts of climate change scenarios;
- mitigate the impacts of predicted climate change scenarios though design;
- adapt measures for the site to mitigate impacts;

- produce a climate change strategy.

117 This will be undertaken along with consultation with planning authorities and the relevant consultation bodies.

Hydrock ◆ October 2018