1 INTRODUCTION

1.1 THE PROPOSED DEVELOPMENT

J G Pears Ltd ('the Developer') is proposing to develop a wind farm ('the Development') at Spicer Hill, near Ingbirchworth in South Yorkshire. The location of the site is shown in Figure 1.1 of this Environmental Statement (ES). The installed capacity of the wind farm will be up to 6.9 MegaWatts (MW), depending on the final wind turbine selection, which could supply enough energy for up to 4,200 homes[1].

The wind farm will consist of three wind turbines, with associated infrastructure including access tracks, a control building and underground power cables. A meteorological mast will also be erected to monitor wind speed. The site layout is illustrated in Figure 1.2.

A planning application, which this ES accompanies, is being made under The Planning and Compensation Act 2004 to Barnsley Metropolitan Borough Council (BMBC). The Development falls within Schedule 2 of the Environmental Impact Assessment (England and Wales) Regulations 1999 (as amended) (EIA Regulations) and as such an Environmental Impact Assessment (EIA) of the Development has been undertaken by Arcus Renewable Energy Consulting Ltd (Arcus).

This planning application is a resubmission of an application which was submitted by the Developer for a five turbine scheme in April 2008.

The application seeks to construct the Development, generate electricity for a period of up to 25 years and then remove the Development. Should the Developer wish to extend the life of the Development, this would be subject to undertaking further environmental studies and obtaining the requisite planning consent.

The Development will be connected to the local or national electrical grid via a new control building on site. An application for connection to the grid will be lodged under separate cover and through the relevant consenting procedures.

1.2 THE DEVELOPER

The Developer, J G Pears Ltd, is a long established company in the South Yorkshire area and has been specialising in the recycling of animal by-products for over 30 years.

In recent years, J G Pears Ltd has been actively seeking opportunities to diversify the core business, including projects such as renewable energy developments. As part of this diversification process, renewable energy feasibility studies were carried out in respect of their landholdings in England.

The site at Spicer Hill was identified as suitable for a potential wind farm development, based on a range of environmental, technical and commercial factors whilst, at the same time, taking the presence of the existing Royd Moor Wind Farm into consideration. In addition to the Spicer Hill wind farm site, the Developer is now involved in the feasibility stages of using biomass to generate electricity.

[1] Latest figures for average annual UK household electricity demand of 3,890 kiloWatt-hours (kWh) (Digest of UK Energy) Statistics, 2007) and a typical generating and capacity factor for wind turbines in the UK of 27.3% for a 6.9 MW windfarm lead to electricity generation equivalent to the demand of 4,242 houses. It should be noted that the number of homes supplied will vary depending on site wind speeds and household electricity consumption.

1.3 THE NEED FOR RENEWABLE ENERGY

1.3.1 Scientific Background: Climate Change

Energy underpins virtually every aspect of the economy. However, the widespread use of fossil fuels, such as gas and coal, which currently provide the majority of our energy, releases greenhouse gases (such as carbon dioxide; CO_2) into the atmosphere. The demand for energy has increased to levels where the burning of fossil fuels is releasing enough greenhouse gases into the atmosphere to directly and significantly affect the global climate. There is now a scientific consensus that anthropogenic climate change is occurring and that it poses a serious global threat.

Atmospheric concentrations of CO_2 are at their highest for at least 650,000 years[2]. Currently there are around 430 parts per million (ppm) of CO_2 in the atmosphere compared to only 280 ppm prior to the industrial revolution (*i.e.*, before 1850 AD)[3]. These increased concentrations are estimated to have already caused the world to warm by 0.74 degrees centigrade (^oC)[4] in the last century and are likely to lead to a further half degree warming over the next few decades regardless of what is done now to reduce emissions[5]. The Stern Review[6] of the economics of climate change highlights the costs of failing to tackle climate change:

> *"With 5-6^{o}C warming - which is a real possibility for the next century - existing models estimate an average 5-10% loss in global GDP. Whereas the annual cost of stabilising greenhouse gases in the atmosphere is estimated to be around 1% of GDP in 2050".*

The UK is currently responsible for the release of around 2% of the world's global greenhouse gas emissions. In 2006, the main sources of UK CO_2 emissions were from public electricity and heat production (33%), followed by industrial/commercial/residential combustion (27.3%), other industrial combustion (11.3%) and road transport (24.6%). In the same year approximately 153 million tonnes of carbon are estimated to have been emitted as CO_2 from the UK[7].

1.3.2 Renewable Energy

To reduce future climate change, greenhouse gas emissions must be reduced and this may be achieved partially through the generation of energy from sources that emit low or even zero levels of greenhouse gases, such as renewable sources.

'Renewable energy' is that energy which occurs naturally and continuously in the environment, such as energy from the wind, waves or tides. The origin of the majority of these sources can be traced back to either energy from the sun or the gravitational effects of the moon, meaning that these sources are continuously replenished. In utilising this energy, the key challenge is how to extract it as effectively as possible and convert it into a usable form.

Renewable energy has the potential to displace electricity generated from fossil fuels and consequently prevent CO_2 from being released. The actual amount of CO_2 released through

---

[2] Siegenthaler, U., Stocker, T.F., Monnin, E. (2005). "*Stable carbon cycle-climate relationship during the late Pleistocene*", Science 310: 1313 – 1317. Using data from ice cores. The same research groups presented analyses at the 2006 conference of the European Geosciences Union, which suggest that carbon dioxide levels are unprecedented for 800,000 years.

[3] Intergovernmental Panel on Climate Change (2001a): *"Climate change 2001: summary for policymakers, A contribution of Working Groups I, II and III to the Third Assessment Report of the Intergovernmental Panel on Climate Change'"* [Watson RT, and the Core Writing Team (eds.)], Cambridge: Cambridge University Press.

[4] Brohan. P., Kennedy, J.J., Harris, I. *et al*. (2006). "*Uncertainty estimates in regional and global observed temperature changes: a new dataset from 1850*". Journal of Geophysical Research, 111, D12106, doi: 10.1029/2005JD006548

[5] Wigley (2005) and Meehl *et al*. (2005) looked at the amount of warming "in the pipeline" using different techniques: Wigley, T.M.L. (2005). "*The climate change commitment*", Science 307: 1766 – 1769. Meehl, G.A., W.M. Washington, W.D. Collins *et al*. (2005). "*How much more global warming and sea level rise?*" Science 307:1769 – 1772

[6] Stern, N. (2006). *The Economics of Climate Change The Stern Review*, Cabinet Office – HM Treasury, UK.

[7] Table 7.1 in DEFRA Report *UK Emissions of Air Pollutants 1970 to 2006* , AEA, October 2008.

electricity generation in the UK relates directly to the generating plant in use at any given time. This mix changes on a daily basis and will change in the future as UK generating plant is replaced.

As a consequence it is not possible to predict exactly how much CO_2 release the Development will prevent over its lifetime. Chapter 14: *Miscellaneous Issues* of this ES describes the potential prevention of emissions to the atmosphere as a result of the Development in more detail.

1.3.3 International and European context

The Kyoto Protocol[8] is an agreement under which industrialised countries will reduce their collective emissions of greenhouse gases by 5.2% compared to the year 1990. The goal is to lower overall emissions of six greenhouse gases: CO_2, methane, nitrous oxide, sulphur hexafluoride, hydro-fluoro-carbons (HFCs) and per-fluoro compounds (PFCs). Participating countries have been assigned targets stipulating the maximum amount that they can emit per year over the period of commitment (2008-2012).

The European Union ('EU') produces around 22% of global greenhouse gas emissions and has agreed, under the Kyoto Protocol, to a cut of 8% from 1990 levels by 2008-2012.

> "*I urge you also to look ahead, beyond the Protocol, which takes us only to year 2012. The longer-term challenge is to promote the use of low-carbon energy sources, low greenhouse gas technologies and renewable energy sources".* Message from Kofi Annan, United Nations Secretary General, to the 10th Conference of Parties, Framework Convention on Climate Change, 15th December 2004.

In March 2007, the European Council agreed to a common European strategy for energy security and tackling climate change. This includes a binding target of reducing greenhouse gas emissions by 20% by 2020 and by 30% in the context of international action.

The EU's 2001 Renewables Directive aims to increase the share of electricity produced from renewable energy sources in the EU to 21% by 2010, thus helping the EU reach its target of renewable energy generation producing at least 12% of the EU's overall energy consumption[9] by 2010.

The 2007 European Council agreement sets a further target for 20% of the EU's overall energy consumption to be from renewables by 2020.

The 20% renewables target is an ambitious goal representing a large increase in member states' renewables capacity. The latest data shows that the current share of renewables in the EU as a whole is around 6% and projections indicate that by 2020, on the basis of existing policies, renewables are unlikely to exceed 10% of the EU's energy consumption. The Commission brought forward detailed proposals for each member state's contribution to the EU targets on renewables in January 2008. The draft Renewable Energy Directive takes into account different national starting points and potentials for renewable energies and the UK has been set a target of 15% of energy from renewable sources in final energy consumption in 2020.

Globally, 20 GigaWatts (GW), or 20,000 MW, of new wind power was installed in 2007, up by 30% compared to new wind installations in 2006. At the end of 2007 the total installed wind power capacity worldwide stood at over 94 GW (94,000 MW). The global capacity of 94 GW of wind power will save about 123 million tonnes of CO_2 every year[10], equivalent to around 20 large coal fired power stations[11].

[8] United Nations (1998): *Kyoto Protocol to the United Nations Framework Convention on Climate Change,* United Nations

[9] Note that electricity consumption comprises only a part of all energy consumption.

[10] Based on 25% capacity factor and 600t/GWh typical of fossil fuel mix (G*lobal Wind Energy Outlook 2008* Global Wind Energy Council (GWEC) and Greenpeace International, October 2008 (http://www.gwec.net/))

[11] *Global Wind 2007 report* , GWEC, Second Edition, May 2008

In 2007, 8.5 GW of new wind power capacity was installed in the EU, taking the total installed capacity in Europe at the end of 2007 to 57 GW, representing 61% of the global total. Over the past 10 years, cumulative wind power capacity in the EU has increased by an average of 30% per year[12].

1.4 UK CONTEXT

The United Kingdom is obliged to reduce greenhouse gas emissions by 12.5% from 1990 levels by 2008-2012 as part of the Kyoto Protocol.

In November 2000, the UK Government launched the UK Climate Change Programme, setting a domestic target of 20% for reduction of CO_2 emissions over and above the aforementioned 15% commitment to the EU from 1990 levels by 2010. Renewable sources of energy are an essential element of this climate change programme. In 2003, the Energy White Paper, 'Our Energy Future - Creating a Low Carbon Economy'[13] was published, in which the Government announced a goal to dramatically cut CO_2 emissions by 2050, with 'real progress' by 2020.

The Climate Change Programme 2006[14] contained further commitments to help achieve this goal and, in the long-term, reduce emissions by 60 per cent by 2050. Following this in May 2007, 'Meeting the Energy Challenge - A White Paper on Energy[15]' was published. In this, the UK Government reiterated its commitment to cut the UK's carbon emissions by 60% by 2050 and by between 26 and 32% by 2020 against a 1990 baseline.

In the Climate Change Act 2008, the UK Government has set a binding commitment to cut the UK's carbon emissions by 80% by 2050 and requires that limits be set on the total amount of emissions in successive five year periods (carbon budgets), with a minimum 26% reduction by 2020, against a 1990 baseline. This makes the UK the first country in the world to set such a long-term and significant carbon reduction target into law.

Latest estimates show that total UK greenhouse gas emissions fell by 16% between 1990 and 2006, while CO_2 emissions fell by 6.4% between 1990 and 2006[16]. However, annual net CO_2 emission levels in the UK rose by 1.2% during 2006. Further action is needed to curb CO_2 emissions over the next few years if the Government's targets are to be met.

The Government has a target of 10% of the UK's electricity supply to come from renewable sources by 2010, with an aspiration for 20% renewable generation by 2020. In 2007, electricity generated from renewable sources stood at only around 5% of the UK's total supply[17]. The recent draft Renewable Energy Directive[18] set a target of 15% of the energy consumed in the UK to come from renewable sources by 2020. This implies an increase in the renewable proportion of UK electricity alone, from 5% currently, to about 40% by 2020. The UK Government now plans to review its renewable energy strategy in order to meet the UK share of the EU renewables target.

Another important energy issue is security of supply, which is vital to the UK economy[19]. The UK's natural energy resources are declining and are currently only partially replaced by indigenous supplies of energy such as wind. The UK energy industry still relies on finite, diminishing sources of fossil fuel such as coal, oil and gas. In 2006, approximately 78% of

[12] Global Wind Energy Council (2008): http://www.ewea.org/fileadmin/ewea_documents/documents/statistics/gwec/08-02_PR_Global_Statistics_2007.pdf

[13] DTI (2003): "*Our Energy Future - Creating a Low Carbon* Economy". http://www.berr.gov.uk/files/file10719.pdf

[14] DEFRA (2006), *Climate Change The UK Programme 2006*

[15] BERR (2007): *Meeting the Energy Challenge – A White Paper on Energy*. http://www.berr.gov.uk/files/file39387.pdf

[16] AEAT/ENV/R/2318. Technology, *Greenhouse Gas Inventories for England, Scotland, Wales and Northern Ireland 1990-2006* ,- AEA Technology, AEAT/ENV/R/2318

[17] "Renewable Electricity – Generation Technologies: Government Response to the Committee's Fifth Report of the Session 2007 – 2008" (October 2008), published by House of Commons http://www.publications.parliament.uk/pa/cm200708/cmselect/cmdius/1063/1063.pdf

[18] Commission of the European Communities (2008): *Proposal for a Directive of the European Parliament and of the Council on the promotion of the use of energy from renewable sources,* Commission of the European Communities, Brussels.

[19] DTI (May 2007): Meeting the Energy Challenge, A White Paper on Energy.

the UK's electricity was generated from fossil fuel sources, 15 % from nuclear sources, and 5% from renewable sources[20].

Consequently, the UK will become more dependent on imported fuels to meet its energy demand. The May 2007 White Paper on Energy states that, by 2020, around 80% of the UK's fuels are likely to come from overseas. Consequently, the UK faces greater exposure to developments in the global energy system including becoming more vulnerable to the impact of overseas disruptions to energy supplies caused by international disputes and accidents, facing higher and more volatile energy prices.

Increasing the use of indigenous renewable sources of energy will reduce our dependence on imported fossil fuels and will bring diversity and security of supply to the UK's energy infrastructure and business.

1.4.1 Renewables in Yorkshire and the Humber

In "The Yorkshire and Humber Plan - Regional Spatial Strategy to 2026"[21], Policy ENV5 sets out renewable electricity targets for 2010 and 2021 and indicates that Local Development Documents should facilitate the achievement of these targets. Policy ENV5 (B) sets a minimum target for the total installed renewable energy generation capacity in the Yorkshire and Humber Region of 708 MW by 2010 and 1,862 MW by 2021. The Regional Spatial Strategy identifies that, in 2007, installed renewable energy capacity in the region totalled approximately 168 MW, including both wind turbines and biomass firing of combustion power stations.

The sub-regional target for South Yorkshire is to have 47 MW of installed renewable energy generation capacity by 2010 and 160 MW by 2021. Currently there is one onshore wind farm operating in South Yorkshire[22], with an installed capacity of 13 MW. Four further windfarms have been consented in South Yorkshire and are either not yet constructed or under construction, which together would have an installed capacity of 85.4 MW.

1.4.2 Spicer Hill Wind Farm Emissions Savings

The Business Enterprise and Regulatory Reform (BERR) Digest of UK Energy Statistics 2008[23] states that, in 2007, 405 tonnes of CO_2 were released each gigawatt hour (GWh) when generating electricity from gas; this increased to 939 tonnes per GWh when generation was from coal. The average CO_2 release from the fossil fuel mix, which also includes oil, was 643 tonnes per GWh.

On this basis the Development, with an estimated energy yield of approximately 16.5 GWh (6.9 MW installed capacity) per year[24], would displace a minimum of 6,682 tonnes of CO_2 emissions each year from entering the atmosphere based upon generating electricity from gas[25]. 10, 857 tonnes would be displaced from generation of electricity from the fossil fuel mix[26] and 15, 495 tonnes would be displaced from the generation of electricity from coal[27]. The actual savings will depend on which source of electricity generation the Development generating capacity is displacing at any given time.

[20] BERR (2007): *UK Energy In Brief, July 2008.* http://www.berr.gov.uk/files/file46983.pdf

[21] Yorkshire and Humber Assembly (2008). "The Yorkshire and Humber Plan - Regional Spatial Strategy to 2026". http://www.goyh.gov.uk/goyh/plan/regplan/?a=42496

[22] British Wind Energy Association (BWEA) (February 2009). http://www.bwea.com/ukwed/index.asp

[23] BERR (2008) '*Digest of UK Energy Statistics 2008'* (DUKES 2008) Pg 124 [Chapter 5 Electricity, Table 5C. Figures for 2007] (www.berr.gov.uk/energy/statistics/publications/dukes/page45537.html)

[24] Assuming a capacity factor of 27.3% (taken from Table 7.4 in BERR DUKES 2008)

[25] Based on displacement of electricity generated by gas for 2007 (405 tonnes of CO_2 per GWh) that is considered to be an underestimate of the emissions of CO_2 displaced by the operation of the Development.

[26] Based on displacement of electricity generated by fossil fuel mix for 2007 (643 tonnes of CO_2 per GWh) that is considered to be an underestimate of the CO2 emissions displaced by the operation of the Development.

[27] Based on displacement of electricity generated by coal for 2007 (939 tonnes of CO_2 per GWh) that is considered to be an underestimate of the CO2 emissions displaced by the operation of the Development.

Based on an average annual household electricity consumption of 3,890 kWh[28], the Development would provide electricity for up to 4,200 households[29].

1.5 THE PURPOSE OF THE ENVIRONMENTAL STATEMENT

An application for planning permission for the Development is being made under the Planning and Compensation Act 2004 to BMBC.

This ES has been prepared to accompany the planning application for the Development, in accordance with The Town and Country Planning (Environmental Impact Assessment) (England and Wales) Regulations 1999 as amended ("the EIA Regulations").

Under Schedule 2 of the EIA Regulations, proposed wind farms consisting of two or more turbines, or where the hub height of any turbine or height of any other structure exceeds 15 metres, shall be subject to an EIA wherever such proposals are considered to have potentially significant effects on the environment by virtue of factors such as size, nature or location.

The purpose of the ES is to:

- Explain the need for the proposals and describe the physical characteristics, scale and design of the Development;
- Examine the existing environmental character of the application site and the area likely to be affected by the Development;
- Predict the possible significant environmental impacts of the Development;
- Describe measures which would be taken to avoid, offset or reduce adverse environmental impacts; and
- Provide the public, the planning authority and other consultees with information on the Development, which would assist the planning authority in the determination of the planning application.

1.6 THE PROJECT TEAM

The EIA has been project managed by Arcus Renewable Energy Consulting Ltd ("Arcus"), with technical input from a range of specialist consultants with renewable energy expertise. The ES has been compiled by Arcus in consultation with the Developer. Table 1.1 identifies the team members and their responsibilities.

Table 1.1 Project Team

Area of Expertise	Organisation
Project Management	Arcus
Public Consultation	J G Pears and Arcus
Planning	Arcus
Landscape and Visual	RV Design Ltd
Ornithology	Arcus
Ecology	Arcus
Hydrology	Arcus
Archaeology and Cultural Heritage	Arcus
Noise	Arcus

[28] Latest figures for average annual UK household electricity demand of 3,890 kiloWatt-hours (kWh) (Digest of UK Energy) Statistics, 2007) and a typical generating and capacity factor for wind turbines in the UK of 27.3% for a 6.9 MW windfarm lead to electricity generation equivalent to the demand of 4,242 houses. It should be noted that the number of homes supplied will vary depending on site wind speeds and household electricity consumption.

29 Calculations based on current figures for average annual household electricity demand of 4,606 kWh (Digest of UK Energy Statistics, 2007)

Existing Infrastructure	Arcus
Shadow Flicker and Reflectivity	Arcus
Traffic and Transport	Tarmesar
Other Issues (*e.g.*, Aviation)	Arcus
Socio-economics, Tourism and Recreation	Arcus
Geotechnical	Donaldson Associates

The Developer has provided key information and input on the Development, the site selection process, the iterative site layout design process and mitigation measures to minimise the environmental effects of the Development.

1.7 THE STRUCTURE OF THE ES

This ES comprises the following documents:

- **Volume I:** Text (this document) which reports the findings of the EIA;
- **Volume II:** Accompanying figures and visualisations;
- **Volume III:** Technical Appendices which contain detailed technical information supplementing the findings presented within Volume I; and
- **Non-technical summary** providing a summary of the information presented in Volume I.

Planning and Design and Access Statements have also been prepared in support of the application, however these documents do not form part of the formal ES.

Volume I of the ES is structured as follows:

- Chapters 1 and 2 provide an overview of the proposed wind farm and the environmental assessment process including an outline of the consultation process;
- Chapter 3 provides a full description of the Development, the site selection process, consideration of alternative designs and outlines the construction and decommissioning phases;
- Chapter 4 examines relevant national, regional and local planning policies; and
- Chapters 5 - 15 cover individual technical areas, with each containing a discussion of likely significant effects, proposed mitigation measures, and subsequent residual effects.

A separate non-technical summary (NTS) is provided as part of the ES, which summarises the findings of the technical studies.