Renewable energy opportunities in the Humber area



The Humber area is driving forward the development of the renewable energy sector providing opportunities for business

E.ON Climate & Renewables' wind farm at Out Newton, Easington.

To do this, the following partners have come together to form the Humber Renewables Network:

BP Carbon Green Homes Limited East Riding of Yorkshire Council E.ON Climate & Renewables Environment Agency Future Energy Yorkshire Hull City Council Hull Forward Hull Group of Colleges

ABP (Associated British Ports)

Humber Chemical Focus Humber Economic Partnership Lunar Energy NISP Yorkshire & Humber North East Lincolnshire Council North Lincolnshire Council Pulse Tidal Renewable Energy Growers Team Humber Marine Alliance University of Hull Virtual Enterprise Network Windmade Energy World Trade Centre Hull & Humber Yorkshire Forward

Hull Forward is acting as the first point of contact for enquiries and will signpost any enquiry, providing the knowledge, assistance and contacts to facilitate investment into the Humber area.

Contents

Energy is big business here
Our track record in renewable energy5
Why the Humber area?6
Driving innovation in tidal and wave technologies
Maximising the potential of onshore and offshore wind energy14
Pioneering the advancement of the next generation of biofuels
Harnessing energy from biomass and biowaste
How can we help?22

To find out how we can help you make your investment here a success, contact us on 0845 1200 186 info@humber-renewables.co.uk or via www.humber-renewables.co.uk

Energy is big business here

Our track record in renewable energy



Home to Centrica, International Power, ConocoPhillips, Total and BP, energy is big business here. The Humber area currently lands and distributes 20% of the UK's natural gas and provides more than a quarter of the UK's oil refining capacity. What is more, 32% of the UK's coal imports come through the Humber ports, most of which is supplied to the nearby power stations that generate around 17% of the UK's electricity.

With a pivotal role in the UK energy sector, established infrastructure, the capability to handle a diverse energy mix and the knowledge and expertise, the Humber area is capitalising on its strengths as a natural location for investment to establish a world class renewable energy hub.

To do this, experts in the private sector across the wind, tidal, biofuel and biomass sectors have come together with the University of Hull, training providers, business support agencies and the four local authorities, to drive the sector forward with the aim of putting the region on the world stage for renewable energy.

Total Lindsey Oil Refinery.

27%

20%

32%

of the UK's electricity generation in and around the area The Humber area already has a track record in leading the way:

Tidal technologies

Having worked closely with internationally renowned experts at the University of Hull, the Humber is home to two tidal energy test sites and is set to become the location of the first marine renewable device to feed power into the national grid on the UK mainland.

Biofuels

Home to the largest proportion of biofuel production facilities in the UK along with proposals for a high technology demonstration plant, designed to advance development of

Wind energy

There are over 20 onshore and offshore wind energy projects in the area, including two of the largest offshore wind farms in the UK currently under development.



Malcolm Joslin, Communications and External Affairs Manager, BP.

the next generation of biofuels.

Biomass

The Humber area offers significant potential for the biomass sector with an emerging supply chain providing feedstock, equipment, skills and technologies and a world first in the production of energy from food waste.

Why the Humber area?

1. Major energy infrastructure

The Humber area handles a diverse energy mix and has facilities of strategic importance to the UK's energy supply infrastructure.

- The Humber area is served by major infrastructure to supply the National Grid and accessible connection points for new renewable energy developments.
- Significant fuel and chemical feedstocks are imported into the

area, including natural gas, liquid crude oils, coal, ethylene and biomass.

- Immingham has one of the largest petroleum ports in Europe, processing, handling and distributing around 20m tonnes of fuel products per annum. Close proximity to the oil refineries provides a particular advantage to the newly emerging advanced biofuels sector in gaining access
- The Humber area hosts 20% of the UK's natural gas landings, which is distributed throughout the UK.
- Building on our unique location and ports connectivity, the Humber is the UK's busiest trading estuary and the 4th largest in Europe, handling 16% of the country's seaborne trade.
- The Humber ports are a vital part of our economy, employing

47,000 people both directly and indirectly.

- Our closeness to the UK's heartland with 40m people and 75% of UK manufacturing within a 4 hour drive, makes us an important hub for trade and industry.
- Only 200 miles from Rotterdam and Zeebrugge, the Humber provides a gateway for access

into mainland Europe and many global markets.

- Humber-based logistics 130 within the EU.
 - World Trade Centre Hull & Humber enables access to over 300 World Trade Centres in more than 90 countries that serve



companies ship directly to more than 50 countries with over 170 shipping lines operating regularly,

750,000 businesses, providing connections, knowledge and practical support for international trade.

• Led by the region's development agency, Yorkshire Forward, and some of the UK's largest energy and industrial companies, the area is pursuing a unique opportunity for a Carbon Capture and Storage network to develop the assets that already exist in the Humber area and new infrastructure to liquefy and store CO₂ under the North Sea in depleted gas fields.

2. Development opportunities

With a number of development sites with outline planning consent around the ports and along the Estuary and East coast, the Humber area is attracting major investment not only from across the UK but also from international markets.

Significant new investments in ports infrastructure, transport links and access to the UK distribution network has meant that the Humber area is uniquely placed for further growth in business generation.

3. Planning support

The four local authorities in the Humber area are committed to supporting developments that contribute to the region's economy as well as addressing the challenges presented by climate change. With a track record embracing over 60 years of developments from wind farms to major industrial chemical plants, we will provide local knowledge, advice and support throughout the planning process.

Why the Humber area?

4. Expertise and skills

The Humber area is harnessing existing expertise and building our workforce and supply chains to service future renewable energy investments.

Chemicals, process and energy

The area is a major UK centre for the chemicals, process and energy generation sectors with investment exceeding £1bn over the last seven years. It hosts a wide range of energy intensive manufacturing companies such as glass, steel, chemical and petrochemicals.

Supporting the development of this sector is the specialist trade group, Humber Chemical Focus. With over 100 member companies, Humber Chemical Focus is a key link offering insight, knowledge and connections.

Advanced biofuels

BP's site at Saltend, near Hull, is home to the company's global centre for Research and Technology with a crucial role in the development of new technologies. Its recent investment proposal with Du Pont will see a high technology demonstration plant, designed to advance development work on the next generation of biofuels.

Logistics

Innovative international programmes and expertise at the University of Hull's £20m Logistics Institute, combined with specialist training programmes at other learning providers, support the area's drive to become a significant hub for renewable energy. The expertise available ensures logistical and supply chain support, research, development, consultancy and supply of appropriate graduatelevel skills for renewable energy organisations.

Advanced engineering

The Yorkshire and Humber area provides over 11,000 graduates and postgraduates each year, which is 12% of the UK total.

The Engineering Innovation Institute at the University of Hull is a Centre of Excellence providing expert knowledge, advice, analysis,

- Lab-on-a-chip technology to monitor problematic wastes as they move into the environment
- High performance computer modelling as well as physical modelling facilities for marine and freshwater environments

Marine engineering

The area's marine engineering sector has played a vital role over the years in ensuring the Humber achieves its position as the UK's largest port complex and 4th largest trading estuary in Europe.

Team Humber Marine Alliance, an expanding group of marine engineering, ship repair and fabrication companies based around the Humber Estuary, have joined together to apply their skills to provide a comprehensive supply chain offer to the renewable energy industry.



applied research and support to help organisations transform their product and engineering design processes.

In addition, the colleges offer a range of courses from school leaver entry level right through to HNC/HND. in both mechanical and electrical engineering and Humberside Engineering Training Association (HETA) provides training apprenticeships for the engineering and process industries.

Environmental technologies

The Environmental Technologies Centre of Industrial Collaboration (ETCIC), based at the University of Hull, offers valuable environmental solutions through a combination of the latest technology, analytical facilities and a vast pool of knowledge underpinned by ongoing R&D including:

• State-of-the-art analytical equipment including plasma mass spectrometry equipment (ICP-MS)

Marine renewable energy

The University of Hull, which is internationally renowned for its expertise in environmental and marine research, has completed research projects for some of the world's leading renewable energy companies.

The University's expertise lies in numerical modelling and laboratory and field testing of wave and tidal power systems and the analysis of the marine energy resource. To support this cutting-edge research the University has established the Total Environment Simulator, based at The Deep, as a key resource, which has been used by Pulse Tidal and Neptune Renewable Energy in trialling their devices.

The University of Hull is developing a Centre for Adaptive Science as part of a regional 'Centre for Low Carbon Futures' initiative led by the Universities of Hull. Leeds. Sheffield and York



- 1. BP Saltend, soon to host a research and demonstration facility to advance the next generation of biofuels.
- 2. University of Hull Logistics Institute.
- 3. CATCH, Europe's only facility for training a workforce on full size chemical equipment.
- 4. The Deep, home to the Total Environment Simulator used to trial marine energy devices.
- 5. The Humber Ports, where the area's marine engineering skills play a vital role.

Building our future workforce

Education and training providers in the Humber area are harnessing existing capabilities and addressing the skills requirement of the emerging renewable energy sector, from the design and build to the operation and maintenance of developments.

Training centres such as CATCH (Centre for Assessment of Technical Competency) provide Europe's only full scale chemical training plant. CATCH is already expanding its training capabilities to meet the needs of offshore and biofuel developments and is working closely with the newly formed National Skills Academy for Process Industries (NSAPI).

Other established training providers such as the Humberside Engineering Training Association (HETA) and Humberside Offshore Training Association (HOTA) are aligning their activities to support future investments.

Furthermore, the award-winning Grimsby Institute of Further and Higher Education and Hull Group of Colleges, which is consistently ranked in the top 10 performing colleges in the UK, offer accredited courses and tailor-made training to provide a highly skilled workforce.

Driving innovation in tidal and wave technologies

The area is leading the development of tidal and wave technologies thanks to our natural asset that is the Humber Estuary and the University of Hull's cutting-edge research facilities and expertise in environmental and marine renewable research.

Opportunities:

- Promote opportunities for the installation and testing of tidal prototypes in the Humber Estuary.
- Support the promotion of the skills and expertise which exist in the area's supply chain.
- Use the combination of the area's assets and expertise to progress tidal technology innovations.

Case Study **Neptune Renewable Energy**

Neptune Renewable Energy Ltd was formed in 2005 in order to progress the development of both tidal power and wave power projects in the UK. The company is currently in the process of developing a full scale demonstrator tidal stream device that will generate electricity from the tidal flow of the Humber Estuary. The device, named the Proteus, will be rated at 500kW, with an annual energy output of 1000MW hours of electricity.

The Proteus device has been successfully trialled at the University of Hull's Total Environmental Simulator research facility.

"The Humber area is contributing to the development of groundbreaking technological developments in tidal power technology"



Following this research, the company has achieved a design, which delivers equal efficiency on both the flow and ebb tides to maintain a consistent output. Construction and maintenance costs of the device are reduced due to its simple design and its environmental impact is relatively low - roughly the same as a moored river barge.

Local naval architects IMT Marine designed the full-scale demonstrator, which is to be built by MMS Ship Repair & Dry Dock Co. Ltd with the majority of components sourced from local companies.

The Neptune Proteus prototype is due to be installed in the Humber Estuary in 2009. If this trial is successful, it is proposed that two arrays of ten devices will be installed.

Case Study Pulse Tidal

12

Pulse Tidal has developed tidal power technology that is set to become the first marine renewable device to feed power into the national grid on the UK mainland.

The test device, which is the size of a house, has been manufactured locally at Corus in Scunthorpe. It has been put into the water at Stallingborough, close to Immingham and will produce 100kW of power, enough electricity to power up to 70 homes. If the trial is successful, larger models will be developed with the aim of powering up to 70,000 homes.

Already successfully trialled at the University of Hull, the Pulse Tidal device will capture some of the vast energy in the tides that flow up and down the Humber Estuary twice daily and convert this to electricity to be fed back to the national grid onshore. It will be connected to the UK's power system through Millennium Inorganic Chemicals, part of Cristal Global, on the south bank of the Humber.

The Pulse generator is unusual as it can operate in shallow waters, allowing the system to deliver low cost power close to areas of high demand and has obvious benefits in terms of installation and maintenance costs.

"This is the most appropriate location for the test, not least because the Humber area is world leading in terms of tidal power technology"

Howard Nimmo, Director, Pulse Tidal.

Case Study Lunar Energy

Hull-based company Lunar Energy has signed a £500m tidal power deal to create what will be the world's largest tidal power development.

The joint venture agreement with Korean Midland Power, one of Korea's three main power generation businesses, will see the creation of a 300MW tidal power field off the South Korean coast.

The plant will provide renewable energy to Korean Midland Power by December 2015. Fabrication and installation of the tidal turbines will be carried out by Hyundai Samho Heavy Industries (HSHI), while Rotech Engineering provides design optimisation and specialist components.

Founded in 2001, Lunar Energy is at the forefront in developing an economical and viable submerged tidal turbine with the aim of producing reliable renewable energy in an unobtrusive manner.

This latest contract follows a deal between Lunar and E.ON in March 2007 to develop a major underwater tidal stream power project off the Pembrokeshire coast. The pioneering project will use the power contained within fast moving deep sea tidal streams, created by rising and falling tides, to turn a field of 60 foot turbines situated on the sea floor. If given the go ahead, the multi-million pound scheme would be capable of generating enough electricity to power up to 5,000 homes.

"Lunar's leading role in this tidal stream project gives a British company massive potential to exploit the roll out of tidal energy worldwide"

William Law, Founder & Chairman, Lunar Energy.



Maximising the potential of onshore and offshore wind energy

The Humber area is maximising the potential of wind energy both onshore and offshore, with over 20 wind energy projects, including two of the UK's largest offshore wind farms under development.

Operations & management infrastructure

The area's infrastructure and logistics network has attracted a number of operators specialising in the handling and transportation of wind turbine components.

Grimsby has seen considerable interest from turbine operators using the Port as a base for operations and management activity for offshore wind farms due to its

proximity to the current and proposed wind farms, coupled with the significant marine infrastructure and services available.

Grimsby Fish Dock Enterprises has provided facilities for the operations activity of Siemens and Centrica and is in discussion with other operators as the larger wind farms come on stream.

Highly skilled workforce

A combination of strengths in marine engineering and experience in working in an offshore environment in the North Sea has given the area a head start in being able to support and service major wind array infrastructure.

Opportunities:

- Broker discussions with major developers to achieve clarity on their investment plans, their expectations from the Humber area and to identify synergies and opportunities.
- Maximise opportunities throughout the supply chain for the supply and maintenance of onshore and offshore wind farms.

"A wind turbine provides the most feasible option for establishing an effective renewable energy source on our site in Hull and will also reduce energy costs, helping the company maintain its competitive market position in the face of significant UK energy price increases and ensuring the long term success of the site."



Viewpoint of Humber Gateway Offshore Wind Farm from Spurn Head Visitor Centre.

Vaughan Weighill, Development Manager Humber Gateway, E.ON Climate & Renewabl

"The availability of suitable ports for construction and maintenance activities, coupled with favourable wind and wave conditions and a flat, stable seabed, make the Humber an ideal location for us to develop a major offshore wind farm."

Case Study **E.ON Climate & Renewables**

E.ON is one of the UK's largest integrated power and gas companies and is committed to reducing the carbon intensity of its emissions across Europe by 50% by 2030. To achieve this, E.ON is investing billions of pounds in investment, E.ON has submitted a planning application for an offshore wind farm located off the East Yorkshire coast, known as Humber Gateway.

The proposed scheme will host up to 83 turbines. With a maximum installed capacity of 300MW, it will generate enough clean energy to power up to 195,000 homes per year. The Humber Gateway site is located

off the East Yorkshire Coast, 8km to the east of Spurn Point and was chosen ahead of a number of alternatives due to the area's high winds, low waves, flat and stable seabed and availability of suitable ports for construction and

maintenance of the turbines.

If the site receives government boost to the local economy, creating job opportunities during the construction phase, contracts for local suppliers and also longer term benefits to local service industri

E.ON already owns and operates a 7-turbine onshore wind farm at Out Newton in the East Riding of Yorkshire.

Pioneering the advancement of the next generation of biofuels



With current levels of investment, the Humber area will be producing 50% of the UK's biofuel within the next five years.

The Humber area is attracting significant investment into biofuel production facilities and new supply chains; including early investments from companies such as Rix, Vivergo Fuels Ltd and Greenergy.

Infrastructure & expertise

The growth of the biofuels hub in the area has been driven by the synergies created by market access, co-location of petrochemical companies, the availability of prime sites around the ports and access to UK and global non-food crop agricultural supply chain. The Humber area also has the largest concentration of liquid bulk storage in the UK and is at the centre of the pipeline network.

Research & development

The area's track record in biofuels started in 2002 when Rix was one of the first companies in the UK to produce biodiesel. The company was recognised in 2008 as leading the UK biofuel sector for its innovation in the production and marketing of biodiesel.

More recently, BP and Du Pont are developing proposals to invest in a high technology biobutanol demonstration plant to advance development work on the second generation of biofuels.

Opportunities:

• Explore opportunities for further R&D investment with the long term aim of being recognised as a world class research and distribution centre for biofuels.

Case Study **Vivergo Fuels Ltd**

Vivergo Fuels Ltd is a joint venture company, established to build and operate a wheat to bioethanol plant and to create a biofuels business.

The collaboration brings together BP's fuels technology expertise and access to major fuel markets; British Sugar's experience in the agricultural value chain and links to feedstock supply and co-product expertise;

and DuPont's biotechnology and bio-manufacturing capabilities.

The plant will produce bioethanol from UK wheat and will be built at BP's chemicals site at Saltend, near Hull, which has access to steam and power and significant experience in the construction and running of chemical process plants. The plant capacity will be 420 million litres (330,000 tonnes) of bioethanol per

biofuels plant"



year. On target to be fully operational in summer 2010, the plant will create around 80 full time jobs.

The company considered a number of potential locations for this renewable energy investment -Saltend, near Hull emerged as the preferred site due to a combination of existing infrastructure and utilities, available land and skilled workforce.



Greenergy is a leading player in the biofuel industry, supporting the UK's Renewable Transport Fuels Obligation requiring all road fuels to have a five per cent biofuel component by 2010. Greenergy supplies approximately a third of the biodiesel used around the country to forecourt and fleet operators.

Greenergy has invested in the Humber area, establishing two world class biodiesel processing facilities located at the Port of Immingham. The first plant was opened in March 2007 and the second in May 2008. Combined. the two plants produce 200.000 tonnes/228 million litres of biodiesel a year.

Both biodiesel plants are located on a brown-field site at Immingham West Terminal which has existing sea, rail and road access as well as pipeline links to local petroleum oil refineries. Its sea-fed location enables effective logistics and trading with the UK and European vegetable oil and biodiesel markets as well as the wider world vegetable oil markets. Greenergy also conducts significant biodiesel blending operations in the port of Rotterdam.

The plants are capable of using a variety of feedstocks including rapeseed, soy and used cooking oils. A mix of different feedstocks is used to get the best balance of quality, price, carbon and environmental impact to meet individual customer requirements.

Rapeseed is a key feedstock for Greenergy biodiesel production and the fact that it is sourced locally is obviously an advantage. Cargill, with seed crushing facilities in Hull, is an investor in the biodiesel plant. Rape oil crushed in Hull can easily be transported by barge across the estuary.

Cargill has been working with Greenergy to manage the supply of rapeseed and to provide the crush facilities for its conversion into oil for biodiesel production.

The day to day management of the plant is operated by PX Limited which is also based at the Immingham West Terminal.

"Greenergy has selected the Humber area for its biodiesel production facilities as it is ideally situated to sell our output into the two world scale refineries located here. It also combines the benefits of a deep sea port, allowing us to move product in and out, access to a local market and of course it allows us to source feedstock from the nationally important farming district that surrounds the port"

Harnessing energy from biomass and biowaste

The Humber area offers significant potential for the biomass sector with an already emerging supply chain providing feedstock, equipment, skills and technologies.

Biomass

Being on the doorstep of three biomass co-firing coal power stations and local authorities actively engaged in the sector, the area provides a substantial outlet for the utilisation of this resource.

The area's agricultural hinterland has the potential to produce more biomass without impacting on the food supply chain. Crop supplies such as sugar beet, cereals and rapeseed are well established whereas miscanthus and willow are maturing feedstocks.

Opportunities:

- Increase the production of sustainable biomass resources with the long term aim of becoming a major supplier of feedstock.
- Exploit synergies derived from the by-products of bioethanol, to produce high grade animal feed and alternative heating sources.

Carbon neutral energy crops grown by local farmers help Drax cut $\rm CO_2$ emissions.

Renewable Energy Growers Ltd, based in the area, represents the majority of farmers growing Short Rotation Coppice (SRC) in the UK and is the country's largest and most experienced provider of SRC woodfuel. The organisation pioneered the growing, harvesting and marketing of willow and is the largest producer and an established provider to power stations across the UK. Drax Group plc has secured rights to a site at the Port of Immingham and is currently evaluating it for one of the proposed three 300MW biomass-fired generation plants in the UK. The company plans to phase construction of the plants over 4–7 years, with the first due to commence in late 2010 and be operational in 2014.





"The Humber area was chosen as the location for Encycle's energy from food waste power plant due to the existence of the UK's largest food manufacturing cluster"

Phil Nicholas, Chief Executive, Inetec.

Biowaste

There is a growing trend in the area for the conversion of biodegradable waste to energy and new feedstocks including the world's second poultry litter fired renewable energy power station which was established near Scunthorpe in 1993, to more recent investments such as Encycle that will generate energy from food waste – the first of its kind in the world.

Encycle's renewable electricity power station, to be located near Immingham, will divert up to 210,000 tonnes of food waste and non-recyclable packaging away from landfill each year and generate around 24MW of green electricity for supply to the national grid. EnCycle has already secured contracts with three of the top ten UK food producers Northern Foods, Greencore and Greggs and will be processing all of their food and non-recyclable packaging waste.

NISP (National Industrial Symbiosis Programme) is an organisation in the Humber area that engages traditionally separate industries with the aim of improving cross-industry resource efficiency through the commercial trading of materials, energy and water and sharing assets, logistics and expertise. NISP Yorkshire & Humber played a key role in Encycle's investment.

How can we help?

We want to help you tap into our skills and resources so that you can establish a thriving and profitable business here in the Humber area and provide you with links into supply chains and support networks.

We can help with site selection and financial assistance.

We can support you in securing suitable development sites and industrial and office premises, including managed workspace and business incubator space. We can also help you identify and secure grants and financial support for your investment and research and development.

We can help you prepare your business case

Let us be your eyes and ears – our in-depth knowledge means that we know where specific opportunities lie. We can help you prepare your business case through the provision of specific market sector information and if we can't help, we will know somebody who can.

We can help you find the right people with the right skills

As well as a number of reputable recruitment agencies specialising in search and selection in a variety of sectors and a healthy graduate market, businesses can also take advantage of initiatives that work in partnership with Jobcentre Plus and a network of advisors to source appropriately skilled people.

We can help your staff train to reach their full potential

Our nationally recognised and accredited training courses and providers offer accessible courses geared towards helping people maximise their potential through management and coaching workshops or specialist degree programmes and practical vocational training.

We can connect you to a thriving business network

In the Humber area we are united by one passion – to see the area succeed. We have developed a valuable network of contacts ranging from small private companies and large corporate organisations as well as influential contacts in the public arena, so that you can find the right suppliers or support to grow your business.

We can help you find out more about your new home

In the Humber area, we don't believe in all work and no play. We can provide information about what life is like here, from leisure and sporting facilities to housing and suitable schools and colleges for your family.

With all this and much more, the skills and resources are here to help your investment succeed.



Contact us on 0845 1200 186 info@humber-renewables.co.uk or via www.humber-renewables.co.uk to find out how we can help you make your investment here a success



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