

Offshore Renewable Energy

Why do we need renewable energy?

It is largely recognised now that traditional sources of energy are unsustainable and we need to look to alternative sources to provide the UK's power.

The majority of our power comes from the burning of fossil fuels. Two problems face this source - the energy depends on the provision of a finite source of fuel and the production of the fuel has an environmental impact. The burning of fossil fuels releases emissions into the atmosphere, including carbon dioxide and sulphur dioxide, which are known to contribute to climate change and acid rain. The other main energy source in the UK is nuclear power. However there is concern about the safety of nuclear technology, the disposal of nuclear waste and the decommissioning of these power stations.

Renewable energy was identified as a potential alternative to these power sources and over the couple of decades technology has significantly developed. Sources of renewable energy include:

- Wind Power
- Hydropower (energy from water)
- Solar Energy
- Biomass (burning or digestion of plant or animal matter)
- Geothermal (tapping into the natural heat of the earth)

Currently around 3% of the UK's energy comes from a renewable source. The Government has signed up to an increasing commitment to electricity generated from renewable energies, with targets of 10% in 2010, 15% in 2015 and 20% in 2020.



This fact sheet will be looking how we harness energy from offshore and, in particular, wind.

Facts and figures

- By 2015 15% of the UK's electricity must be generated from renewable energies.
- The UK has 33% of the total European offshore wind resource.
- The first Kent offshore wind farm was commissioned in 2005.
- The Kentish Flats wind farm has an installed capacity of 90MW from 30 turbines - enough energy for 70,000 homes.
- The proposed Thanet Offshore Wind Farm will have a potential installed capacity of 300MW - enough to power 240,000 homes.
- The proposed London Array will have a potential 1,000 MW installed capacity - enough energy for 750,000 homes.
- Wave and tidal energy are also potential routes for renewable energy from offshore.

Offshore wind energy



Offshore wind energy will play a significant part in achieving the Government's renewable energy targets over the coming years. The UK's wind resource is considered to be one of the largest in the world and is estimated to represent over 33% of the total European resource. In fact it is estimated that the UK's wind resource could power the country nearly three times over. This strong wind resource, coupled with shallow offshore waters, means the UK is ideally placed to harness this renewable energy.

The first offshore wind farm was commissioned in 2000 at Blyth, Northumberland (3.8MW). Since then three further offshore developments have been commissioned at North Hoyle (60MW), Scroby Sands (60MW) and Kentish Flats (90MW), off the North Kent Coast.

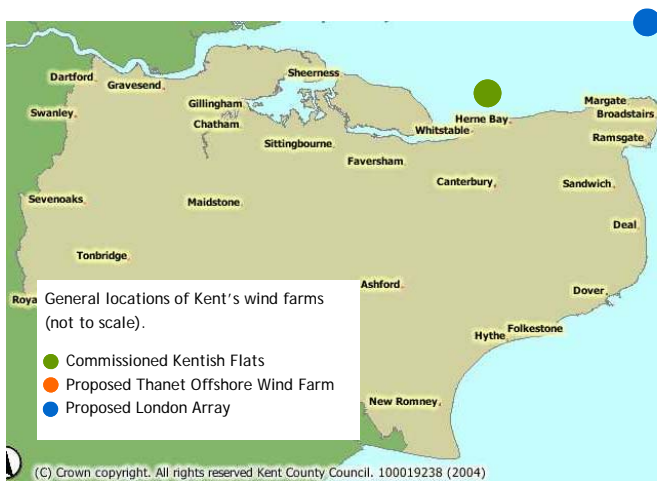
Offshore wind farms are considered to have fewer potential environmental impacts than onshore developments, however there are still a number of considerations including:

- Noise - thought to be very minor on offshore developments.
- Visual impact - there is the potential for seascape to become impaired with the presence of a wind farm but this view is very much subjective to the individual.
- Disturbance and erosion of seabed - this is in relation to both the construction and once it is in situ.
- Navigation - relating to passage of commercial and recreational vessels.
- Fisheries - there is the potential for environmental impacts and exclusion from fishing grounds.
- Marine life - concerns relating to effects during construction and potential effects, such as vibration, during operation.
- Birds - concerns exist on the potential for bird strike on the turbines and effects on migration routes.
- Landside impact - relating to impacts of bringing cables ashore and construction or alteration of sub-stations and power transmission equipment.



To address such concerns, consent for wind farm developments is only given after due consideration of the environment, including environmental impact assessments and wide consultation. As with any new technology the environmental impacts of wind farms are not fully understood and COWRIE (Collaborative Offshore Wind Research into the Environment) has established a programme of research to improve understanding.

Offshore wind farms - a Kent perspective



In 2000 the Crown Estate announced it would be leasing areas of seabed for the purpose of offshore wind farm developments. The Kentish Flats wind farm was proposed under this round one call and was granted consent in 2003.

Following this, the Energy Minister announced in 2003 that no further areas of seabed would be leased until a strategic review of and consultation on offshore wind farm development had taken place. This review, Future Offshore, set the policy framework and proposed that further development would be restricted to three strategic areas, one being the Thames Estuary. Following the completion of a Strategic Environmental Assessment for these areas, the Crown Estate announced its tender process for round two sites. Two developments off the Kent coast were successful - London Array and Thanet Offshore Wind Farm. These projects are currently in the process of applying to DTI for consent to develop the wind farm.

Kentish Flats was commissioned in 2005 and is situated 8.5km due north of Herne Bay and Whitstable. The project has been developed and is owned by Elsam development and, at the time of its completion, was the largest offshore wind farm in the UK. The 30 turbines, located in the 10km² site, are each rated at 3MW capacity, providing a total project capacity of 90MW. The power is brought ashore via seabed cables to a new sub-station at Herne Bay. The potential annual output of the Kentish Flats is 280,000,000kWh, which is roughly half of the annual consumption of Canterbury, Whitstable and Herne Bay. It is estimated that this output will supply the equivalent of over 70,000 households with clean electricity and over its 20 year life time, the Kentish Flats project will displace an estimated 4.4 million tonnes of carbon dioxide, compared to conventional fossil fuel generation.

Thanet Offshore Wind Farm is being developed by Thanet Offshore Wind Ltd, a subsidiary of Warwick Energy Ltd. If consent is granted the development will consist of up to 83 turbines, generating a total of 300MW - enough to power 240,000 homes. Located 12km north east of Foreness Point, the wind farm will cover an area of 35km² with turbines of 150m in height at its highest point. Power will be brought ashore from this wind farm to an existing sub-station at Richborough. If consents are granted construction could commence March 2007, with commissioning beginning in October 2007.

London Array, if successful, will be located 20km (12miles) off the Kent and Essex coasts, in the outer Thames Estuary. The development is being taken forward by a consortium called London Array Ltd, comprising Shell Wind Energy Ltd, E.ON UK Renewables and CORE Ltd. If consent is granted, up to 271 turbines will be installed over a four year period occupying an area of around 245km², with power brought ashore to a new sub-station at Graveney. Once operational, the capacity of the whole wind farm would be 1,000 MW - this would be enough energy to provide 750,000 homes with their domestic electricity needs, the equivalent of a quarter of Greater London or all the homes in Kent and Sussex. Subject to the award of the consent, the wind farm could be fully operational by 2010.



Wave and tidal power

Currently, wind generated energy offers the greatest potential for renewable energy owing mainly to the fact that its technology is already advanced. However developments are progressing in the advancement of wave and tidal power. The UK has one of the largest wave energy resources in the world because of its situation on the north-east corner of the Atlantic, where waves are generated throughout thousands of miles of ocean. Likewise, large amounts of energy is stored in incoming and outgoing tides and with the use of tidal power stations this can be captured. Both types of energy generators are being tested at various sites throughout the UK.

Sources of information:

- www.nef.org.uk/greenenergy/index.htm
- www.thecrownestate.co.uk/34_windfarms.htm
- www.bwea.com/index.html
- www.kentishflats.co.uk
- www.warwickenergy.co.uk/thanet.htm
- www.londonarray.com
- www.vliz.be/projects/SAIL/

