Wind Energy

What is... Wind Energy
We have been exploiting the power of the wind for hundreds of years to undertake tasks such as pumping water, grinding corn or powering industrial processes. The use of wind power in the United Kingdom is once again increasing rapidly, mainly through technological developments which have allowed electricity generation to become economical and commercially viable.

Operation
The wind turns the rotor blades in the same way as sails turn on a traditional wind mill. The rotor blades turn a horizontal shaft which drives a generator, sometimes through a gearing mechanism, producing electricity to supply a local demand or feeding directly into the electricity supply grid.

Turbines need to be sited in such a position to take maximum advantage of the available wind, with the rotor blades being continually moved to face into the wind either by the use of tail blades (in the case of smaller turbines) or through the use of other automated means.

Critics often claim that wind does not blow all of the time and so cannot be relied upon as a source of generation. Whilst this argument has some merit, turbines do generate electricity for approximately 80% of the time.

Wind Farms
The first commercial wind farm in the UK was built in 1991 at Delabole in Cornwall. The site used 400kW turbines compared to current models which are capable of generating in excess of 10 times this level. The term "Wind Farm", is given to sites employing multiple turbines and are generally used to feed power directly into the national grid, although large turbines are becoming more common on large industrial sites to supplement the energy taken directly from the grid.

Typical Onshore Wind Farm

The impact of wind farms on the environment and the effects on wildlife is a continual point of debate. The visual impact of such large structures and the noise generated is a major cause of concern, particularly since some of the most beautiful parts of the country can prove to be ideal locations. However, wind provides a renewable source of energy which has the ability to meet a substantial part of our future energy requirements, so it is crucial that these issues are dealt with effectively.

Off shore wind farms are now being built to take advantage of higher off shore wind speeds and to help reduce the environmental impact, although installation costs are inevitably much higher.

Typically turbines have a working life of 25 years and require minimal ongoing maintenance. The fuel for this power source, i.e. the wind, is free and endless.

Small Scale Generation
Another area which is increasing in popularity and cost effectiveness is that of small scale generation for the home, community or business application.

Where as wind farms generally feed power directly into the grid, small scale generation tends to be a complete mix of stand alone or grid connected turbines, dependant on the location and operation being supplied.

Small scale turbines can vary in size from 100W up to 50kW. Mounting can either be on a pole or small tower, with rooftop versions becoming more common for turbines of up to 2.5kW.

Stand-alone Systems
This type of system is used where it is not necessary or practical to have a connection to the mains electricity supply. Typically this system would generate power to charge batteries so that a constant supply was available to cover times of low wind speed.

Typical installations would include power provision to remote locations, where the cost of installing a mains connection is uneconomical or impractical, isolated buildings and community projects, boats and caravans etc. Typical uses are lighting, water pumping and other small power applications.

It is also becoming more common for this type of system to be used in conjunction with other forms of power generation e.g. solar panels.

Grid Connected Systems
In this situation, power from the turbine is used to supplement power taken from the electricity grid. In times of low wind speed, power is predominantly supplied from the grid to meet the demand. However, in times of good wind speed and low power demand, it is possible for additional generation from the turbine to be fed back into the electricity grid.

There can be additional financial benefits available where generation may qualify for claiming Renewable Obligation Certificates and business users in particular may benefit from certain exemptions towards the Climate Change Levy.

Large USA based Wind Farm

With in excess of 100 wind farms in operation across the UK and a further 200 under construction or in the planning stage, wind energy is seen by many as one of the most practical and cost effective sources of renewable energy currently available.

Provided environmental concerns are investigated and properly addressed, wind energy will undoubtedly play a major part in meeting our future energy needs.

Wind energy can provide an ideal solution for reducing the amount of energy used from burning fossil fuels. Consideration should, however, be given to all forms of renewable energy to ensure that the most appropriate solution is implemented. Watt-Knots are able to undertake a feasibility study to assess your renewable energy options, allowing you to make the decision that is right for you.

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