



# WIND POWER

Wind power is one of the most environment-friendly sources of energy for large-scale electricity production. It is a renewable form of energy that produces no pollution. Wind turbines produce electricity by converting the kinetic energy of the wind into electrical power. The best available wind resources in Europe are found in Norway and the UK.

## POWER PRODUCTION FROM WIND

The rotor blades on a wind turbine transfer the power of the wind via a drive shaft and gear box to a generator in the nacelle. The rotor blades are adjustable to produce the largest amount of electricity, regardless of whether the wind is blowing hard or gently.

When the wind is blowing faster than 3 m/s, the nacelle turns so that the rotor blades are facing the wind and electricity production begins. Maximum output is reached when the wind is blowing at 13m/s. At 25m/s the wind turbine shuts down to prevent damage to the machinery.

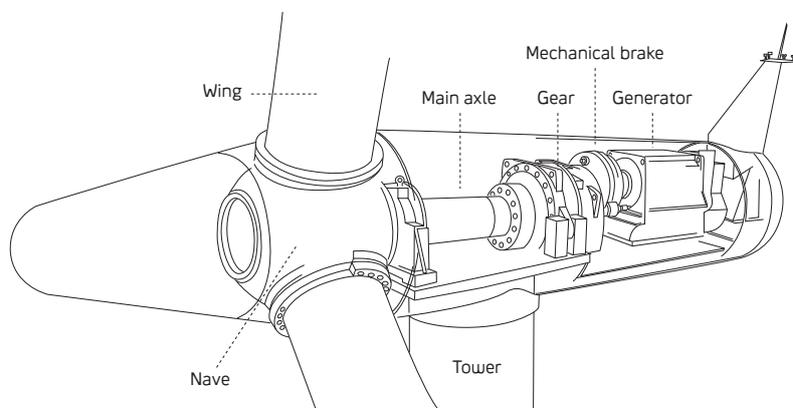
The height of the tower, the diameter of the rotor blades and the power output can vary. Most of the turbines in Statkraft's wind farms have an installed capacity of 2.3 MW. The towers are 70 m high. The rotors are 83 m in diameter, and each turbine weighs just over 260 tonnes in total.

## ENVIRONMENTAL ASPECTS

All large-scale energy production has an impact on the environment. Wind farms are highly visible in the landscape. Another challenge is to avoid spoiling areas of pristine nature or the habitats of threatened bird or animal species.

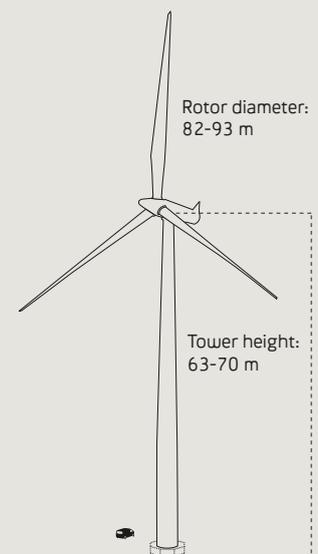
Wind farms must be located where the wind blows. They generally stand exposed in the landscape because they are built on high ground or in flat, open countryside. However, it has been shown that simple adjustments and adaptations can be implemented to mitigate the visual impact of the wind farms on the surrounding area.

To improve the general level of knowledge about the impact of wind farms on local birdlife, Statkraft is working with several research institutions. How the sea eagle population on Smøla is affected and how to avoid bird casualties is a key element in the research.



## FACTS

- Wind turbines produce electricity by converting the kinetic energy of the wind into electrical power.
- Wind power is renewable and has zero emissions.
- Wind power is the world's fastest growing source of energy, and is most widely used in the US, Germany, China, Spain and India.
- Statkraft owns and operates three wind farms in Norway: Smøla, Hitra and Kjøllefjord, and one in Wales: Alltwalis Wind Farm.
- Statkraft is developing wind power projects in Norway, Sweden and the UK.



## Statkraft and wind power

### → Statkraft decision

In 1997, Statkraft decided to include wind power as part of the company's portfolio and started project development.

### → Opening of Smøla I

Norway's King Harald opened Statkraft's and Norway's first large wind farm, Smøla I, with 20 wind turbines, in 2002.

### → Opening of Hitra

The Hitra Wind Farm, with a total installed capacity of 55 MW, was opened in October 2004.

### → Opening of Smøla II

When the second phase of the Smøla Wind Farm facility was completed in the autumn of 2005, the wind farm became for some years Europe's largest land-based wind farm.

### → London office

In the spring of 2006, Statkraft opened an office in London to pursue the development targets for wind power in the UK.

### → Opening of Kjøllefjord

Kjøllefjord Wind Farm opened in October 2006, with a total installed capacity of 39 MW.

### → First licence in the UK

In March 2007, Statkraft was given the licence to build a wind farm in Wales. The following years Statkraft received several licences in England and Scotland in co-operation with different partners.

### → Entering Sweden

In September 2007 Statkraft and Swedish company SCA established a common wind power company which is developing six wind power projects in Sweden. In addition, Statkraft and Södra has established a company to develop wind power projects in the south of Sweden. Em Wind Farm (9.2 MW) is currently under construction.

### → Cooperation in Norway

In August 2008 Statkraft and Agder Energi established a common wind

power company. SAE Vind DA will handle all new onshore wind power projects in Norway.

### → First offshore wind farm

In April 2009 Statkraft and Statoil joined forces to build the 317 MW Sheringham Shoal Offshore Wind Farm off the coast of Norfolk, England. ([www.sheringhamshoal.com](http://www.sheringhamshoal.com))

### → Dogger Bank

Statkraft, Statoil, SSP and RWE has established the Forewind consortium. Forewind was in December 2009 awarded licence to develop offshore wind power at Dogger Bank in the North Sea, with a potential of 9-13 GW. ([www.forewind.co.uk](http://www.forewind.co.uk))

### → Opening of Alltwalis Wind Farm

In November 2009 Statkraft opened Alltwalis Wind Farm in Wales, 23 MW. ([www.alltwaliswindfarm.co.uk](http://www.alltwaliswindfarm.co.uk))



Smøla Wind Farm, Møre og Romsdal, Norway.

### SMØLA WIND FARM, NORWAY

The Smøla Wind Farm comprises 68 wind turbines with a combined capacity of 150 MW. The annual production is about 450 GWh, corresponding to the average electricity consumption of 22 500 Norwegian households. The site lies in a flat, open country, 10-40 meters above sea level, with the wind turbines built along ridges in the terrain. The wind turbines in each row stand 240-350 meters apart. The distance between the rows varies from 700-800 meters. Roads have been built to each of the wind turbines. Cables have been laid in the roads from the turbines to a centrally located transformer.

### SHERINGHAM SHOAL OFFSHORE WIND FARM, ENGLAND

Statkraft and Statoil are constructing the 317 MW Sheringham Shoal Offshore Wind Farm. The site is located 17-23 kilometers



Sheringham Shoal Offshore Wind Farm, under construction off the coast of Norfolk in England.

off the coast of Norfolk, in the Greater Wash east of England. The wind farm will consist of 88 x 3.6 MW turbines, and the electricity production is expected to be around 1.1 TWh each year, enough to power around 220,000 British homes.

Total investments are estimated at approximately NOK 10 billion. Installation of turbine foundations started in June 2010, and the wind farm is planned to be completed by the end of 2011.