

## Case study

### Wired network wind farming at sea

The Siemens Power Generation company is responsible for one of the world's largest offshore wind farms in Lillgrund, off Sweden's south coast – all controlled using the Web.

Forty-eight turbines are placed offshore on piles sunk deep into the sea floor. Together, these will generate about 330 GW/h per year, enough to power about 60 000 homes.

To achieve maximum possible output, a wind turbine must be placed where winds are strong. The wind velocity at Lillgrund in the Öresund Sound is ideal for wind power. However, one problem with offshore wind farms is that the deeper the water, the more expensive the farms are to build. At Lillgrund, the depth of water is between 4 and 10 metres.

A second problem is the harsh open sea environment. Saltwater and severe weather conditions mean special precautions must be taken building offshore wind farms.

A third problem is caused by the difficulties in reaching and monitoring the turbines. Siemens uses a system to monitor the turbines, which provides remote control and data using a standard Internet browser. The browser delivers information such as electrical and mechanical data, operation and fault information, meteorological data and power grid data. Voltage and other power adjustments can be remotely controlled by the system.

The monitoring system continuously checks the main turbine components and gives early warning of any problems. A web server is located on site and generates reports and stores historical data.

The system and the wind turbines are linked with an internal communication network using optical fibre that are connected via modem, routers and an Ethernet network.

The system records wind, electrical, mechanical and statistical data that can be collected in a report and exported to a Microsoft Excel spreadsheet for quick analysis.



Mariusz Pazdziora/CC BY-SA 3.0

Each of the 48 turbines in the wind farm off the coast of Sweden is remotely controlled using the Internet.