



Wind Energy

T H E F A C T S

Intelligent Energy  Europe

Contract N°: EIE-07-230 November 2007 - October 2009 Update: October 2008

FACTSHEETS

By the end of 2007,
the EU-27 had more than 56 GW
of installed wind power capacity,
including 1 GW offshore.

During 2007, over 8.5 GW of
wind power was installed,
including 0.2 GW offshore,
which represents more
net additional capacity than
any other power generating
technology.

- €11 billion of investments
- Electricity production of 119 TWh,
including 4TWh offshore
- Met 3.7% of total European electricity
demand
- Provided power equivalent to
the needs of 30 million average households
- Avoided 91 million tonnes of CO₂,
equivalent to taking 46 million cars off
the road (21% of the EU car fleet) and
equal to 26% of the EU-15's Kyoto obligation

GROWTH AND MARKET DEVELOPMENT

- With a compound **annual growth rate of over 20%** in MW installed between 2000 and 2007, wind energy is now a mainstream power source in Europe's generation mix. Wind power represented 30% of all power capacity installed in the EU in that period.
- Overall, the European wind market is expected to grow at a rate of over 9 GW annually through 2010, which translates into **annual investments pushing of €11 billion**.
- Europe remains the leading market for wind energy and new installations represented 43% of the global total. **European companies supplied 66% of the world's turbines in 2007**.
- According to EWEA's reference scenario, the EU-27 could see 80 GW of installed capacity in 2010; **180 GW by 2020**; and 300 GW by 2030.
- The Global Wind Energy Council (GWEC) predicts the **global market for wind turbines will grow by over 155%** from 94 GW in 2007 to reach 240 GW of total installed capacity by 2012.
- Depending on the increase in electricity demand, **wind power could cover 11.5 to 12.7% of global electricity demand in 2020**, according to GWEC, and as much as 20.2 to 24.9% in 2030.

EU OBJECTIVE FOR 2020

- The EU has set a binding target of **20%** of its energy supply to come from wind and other renewable resources by **2020**.
- To meet this target, more than one-third of European electricity demand will need to come from renewables.
- Wind power is expected to deliver **12 to 14%** of the total EU electricity demand in 2020.

The EU needs to increase by an average of 9.5 GW per year between 2008 and 2020 to supply 12-14% of EU's electricity. In 2007, wind energy capacity in the EU increased by 8.5 GW.

WIND INDUSTRY TARGET FOR THE EU-27 IN 2020

- 180 GW installed capacity, including 35 GW offshore
- Annual installations of 16.8 GW, including 6.8 GW offshore
- Electricity production of 477 TWh, including 133 TWh offshore
- Meeting between 11.6% and 14.3% of total EU electrical demand
- Providing power equivalent to the needs of 107 million average EU households



© Vestas

BENEFITS OF REACHING THE WIND INDUSTRY'S TARGET IN THE EU-27 IN 2020

- Avoiding 328 Mt of CO₂, equivalent to taking 165 million cars off the road (76% of the EU 2004 car fleet).
- Annual avoided fuel cost of €20.5 billion (assuming fuel prices equivalent to \$ 90 a barrel of oil).
- Annual avoided CO₂ costs of €8.2 billion (€25/t CO₂).
- Annual investments in wind power capacity of €16.9 billion.
- Total life-time avoided fuel costs of wind power capacity installed in 2011-2020 of €277 billion.
- Total life-time avoided CO₂ cost of wind power capacity installed in 2011-2020 of €114 billion.

TECHNOLOGY AND RESEARCH

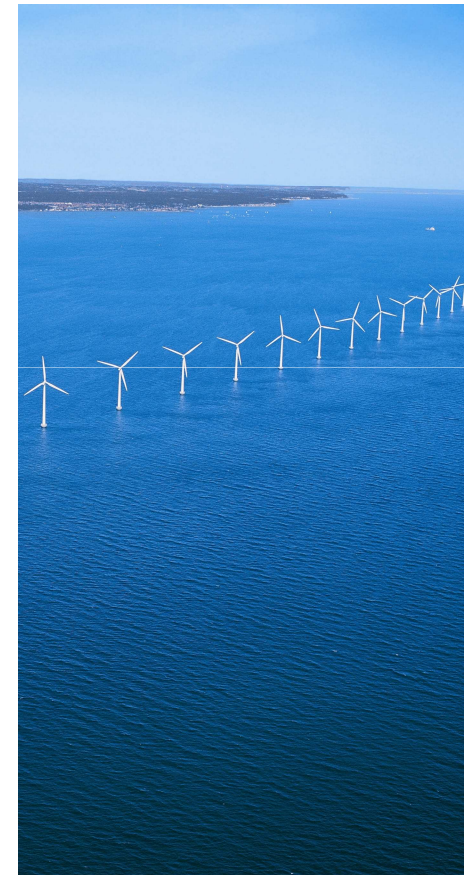
- Three-bladed, upwind, variable-speed, pitch-regulated turbines currently dominate the industry.
- Although the onshore wind energy sector has made great improvements, the industry requires more R&D money to fully explore wind conditions, turbine technology, wind energy integration and offshore deployment.
- To comply with the decision made at the Barcelona European Council, the R&D effort of the sector should be at least of **3%** of annual turnover.
- Based on a 3% investment, the R&D effort should be an average of **€430 million per year**. As two-thirds of this budget should be invested by the private sector and one-third by the public sector, the average public annual support should then be €143 million per year. If 50 % of this support is provided by national (Member State) programmes, and 50 % from EC programmes, the average effort both for EC and national programmes should be €72 million per year. The EC's efforts are now lagging but there are signs that its support will rise to approximately €40 million next year.

COSTS AND INVESTMENTS

- Capital costs of onshore wind projects are dominated by turbine price. An average turbine installed in Europe costs about **€1.23 million/MW**, including all additional fees for foundations, electrical installation and consultancy (2006 prices).
- Conventional electricity production costs are usually determined by fuel, CO₂ emissions, operation and maintenance (O&M), and capital. Implementing wind power avoids the full fuel and CO₂ costs, as well as a considerable share of a conventional power plant's O&M costs.
- There are still many small privately owned wind projects but there is a shift towards bigger, utility-owned projects. This brings new money to the industry and decreases dependence on banks for initial funding.
- Cumulative investments in wind energy over the three decades from 2000 to 2030 will total €390 billion. According to EWEA's reference scenario, approximately **€340 billion** will be invested in wind energy in the EU-27 between 2008 and 2030.

OFFSHORE

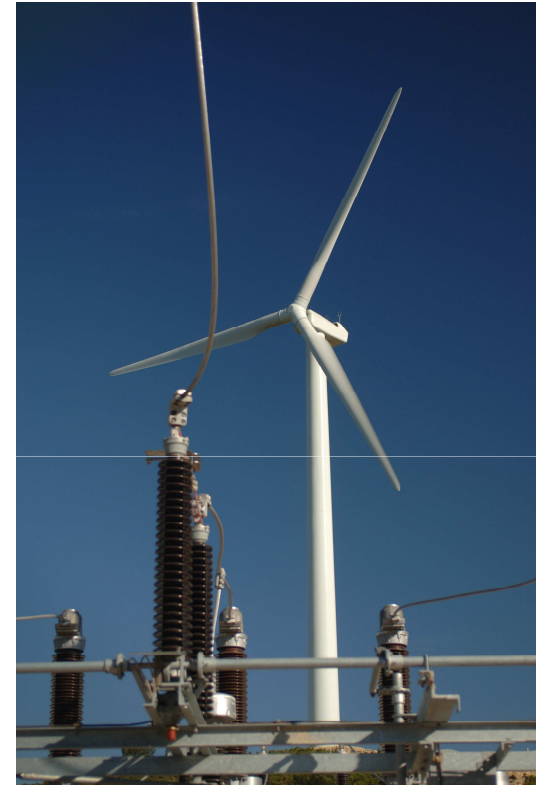
- Five countries worldwide – all of them in the EU – had operational offshore wind farms by the end of 2007:
Denmark, Sweden, the UK, the Netherlands and Ireland.
- **Germany, France and Belgium** also have huge potential and started building their first offshore wind farms in 2008.
- There are 1,080 Megawatts (MW) of installed capacity offshore – providing 4 Terawatt hours (TWh) of electricity, enough power for the equivalent of **one million average EU households.**
- Special vessels and techniques for erecting turbines have been developed. In addition, individual turbine size is significantly larger, and turbines of **5 MW and greater** are being aimed at the offshore market.
- EWEA's reference scenario for offshore development suggests there could be 3.5 GW of offshore wind in the EU in 2010, **35 GW in 2020** and **120 GW in 2030.**



© Siemens

GRID INTEGRATION

- The large-scale integration of wind power requires a substantial increase in **transmission capacity**.
- In addition to the construction of **new lines**, adequate and fair procedures need to be developed to provide grid access to wind power, even where grid capacity is limited.
- A **transnational** offshore grid would provide access to the huge offshore resource. It would also improve the cross-border power exchange between countries and alleviate congestion on existing interconnectors



© EWEA/Winter



Wind Energy

T H E F A C T S

www.wind-energy-the-facts.org

Intelligent Energy  Europe

Contract N°: EIE-07-230 November 2007 - October 2009 Update: October 2008