



Data and facts relating to

# Wind Power in Germany

Supplement 2006 to the E.ON Netz Wind Report

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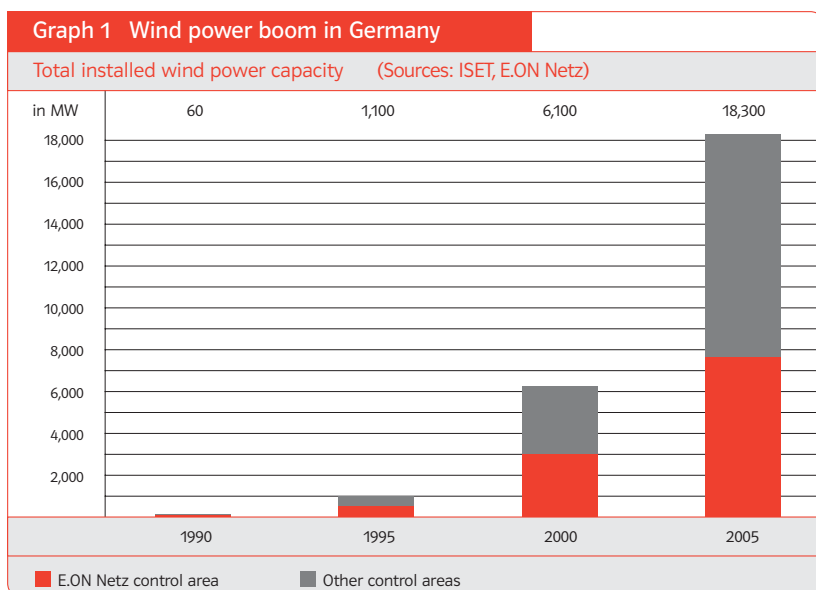
# Wind power: installed capacity and feed-in in 2005

## Wind farm expansion continues

Wind power expansion in Germany continued throughout 2005. By the end of the year, wind farms with a total rated power of 18,300 MW were connected to the grid, a rise of around 12 % over the previous year. Germany therefore remains a global frontrunner in wind power. Below average wind levels resulted in only a slight increase, of 1.5 %, in the wind power feed-in volume.

With feed-in levels of close on 7,600 MW, the greatest proportion of German wind farms (41 %) is installed in the E.ON Netz control area.

In 2005, the maximum wind power feed-in in the E.ON Netz control area was 6,234 MW, which was achieved at 9 a.m. on 15 December. In contrast, generation capacity at 12.15 p.m. on 27 May 2005 was only 8 MW, the lowest value of the year. The average feed-in power of the wind farms in the control area totalled 1,327 MW, 18 % of the average installed capacity over the course of the year.



**Wind power: installed capacity and feed-in**

Installed wind power capacity in Germany	18,286 MW*
- of which in the E.ON Netz control area	7,558 MW*
Average wind power feed-in in the E.ON Netz control area during 2005	1,327 MW
Maximum wind power feed-in in the E.ON Netz control area during 2005 (at 9. a.m. on 15.12.2005)	6,234 MW
Lowest wind power feed-in in the E.ON Netz control area during 2005 (at 12.15 p.m. on 27.05.2005)	8 MW

\*Source: Institut für Solare Energieversorgungstechnik (ISET) Status: 31.12.2005

# 2005 wind power production

## Wind power generation remains approximately at the same level as in the previous year

Wind availability was below average in 2005. As a result, wind power generation remained at around the same level as in the previous year, despite a further increase in generation capacities. It totalled 26.4 billion kWh throughout Germany as a whole, around 1.5 % more than in 2004. This meant that it was possible to cover around 4.7 % of Germany's gross demand for electricity.

11.6 billion kWh (44 %) of this total was fed-in in the E.ON Netz control area. As shown in graph 2, wind power feed-in in the E.ON area was unevenly distributed over the individual months. As an example, wind power production in January (2,170 million kWh) was more than twice as high as in February (1,009 million kWh), and more than four times higher than in September (511 million kWh). Despite a very windy January, total feed-in over the course of the year was only slightly higher than the previous year's level of 11.3 billion kWh.

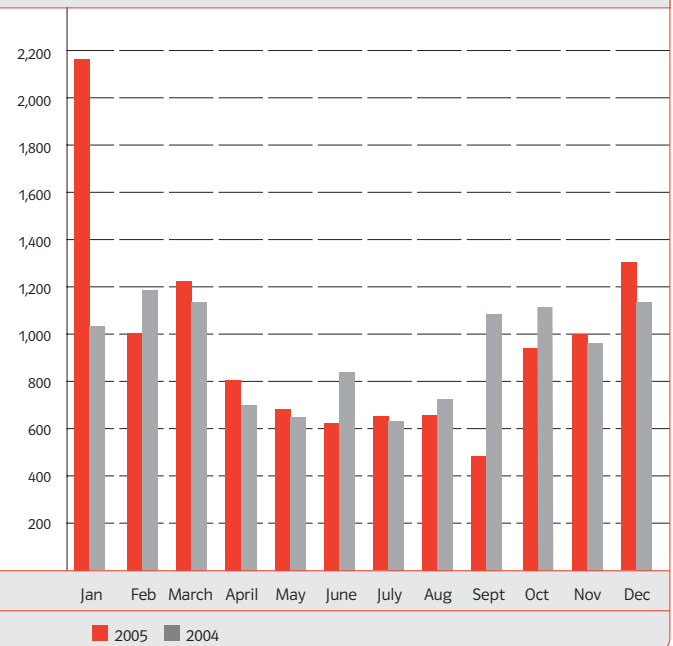
### 2005 wind power production

Wind power production in Germany	26.4 bill. kWh *
- of which in the E.ON Netz control area	11.6 bill. kWh

\* Source: Institut für Solare Energieversorgungstechnik (ISET)

### Graph 2 Monthly wind power feed-in

in the E.ON Netz control area in 2005 (in mill. kWh)





# Feed-in charge for wind power

## Total wind power charge of EUR 2.7 billion in 2005

In its latest forecast, the Verband Deutscher Netzbetreiber (VDN) estimated the payments made for wind power feed-in throughout the whole of Germany during 2005, in accordance with the EEG (Renewable Energy Act), at EUR 2.7 billion. A charge of around EUR 1.2 billion was incurred in the E.ON Netz control area. According to the forecast, the average wind power charge in 2005 was 8.9 €ct/kWh.

Definitive values for 2005 will not be available until the end of September 2006.

### 2005 EEG charge

2005 EEG wind power feed-in charge (Germany)	approx. € 2.7 bill.
- of which in the E.ON Netz control area	approx. € 1.2 bill.
Total EEG feed-in charge in Germany (all types of generation)	approx. € 4.4 bill.

Source: VDN forecast 10/2005



# Wind power related grid expansion

## Approval procedures need to be speeded up

By the year 2020, it is the declared aim of the Renewable Energy Act (§ 1(2) EEG) that renewable energy should cater for at least 20 % of German electricity requirements. Wind power will play a key role. However, the existing power transmission grid was constructed for relatively decentralised power generation. The concentration of high wind power capacities in North Germany is already reaching the limits of its transmission capabilities, since the fed-in power has to be transported to the consumer centres, e.g. the Ruhr region and Southern Germany, over considerable distances. The existing transmission grid is not designed to meet these requirements. Thus further expansion of wind power use in Northern Germany urgently necessitates a parallel expansion in the power grid.

Under current legislation, lengthy approval and legal protection procedures must be followed. It can sometimes take 10 or more years for lines applied for to actually be commissioned. However, this would compromise planned wind power expansion.

As a result, E.ON Netz supports political endeavours to speed up official approval procedures, this being the only way in which the ambitious wind power expansion goals pursued by politicians can be achieved. This has been confirmed by the grid study conducted by the Deutsche Energie-Agentur (dena).

E.ON Netz is currently working on six wind power related line construction projects.

### Current 110 kV projects at E.ON Netz

(all in Schleswig-Holstein)

Breklum - Flensburg	approx. 27 km
Heide - Pöschendorf	approx. 32 km
Göhl - Lübeck	approx. 50 km
<b>Total:</b>	<b>approx. 110 km</b>

### Current 380 kV projects at E.ON Netz

Ganderkesee - St. Hülfe (Lower Saxony)	approx. 60 km
Altenfeld - Redwitz (Thuringia, Bavaria)	approx. 25 km*
Hamburg/Nord - Dollern (Lower Saxony, Schleswig-Holstein)	approx. 45 km
<b>Total:</b>	<b>approx. 130 km</b>

\* Proportion for which E.ON Netz is responsible

# Public debate: cables versus overhead lines

## Overhead line construction affords clear advantages over cable

In the debate surrounding the expansion of the wind power transmission grid, repeated demands are made for construction of the necessary new lines as underground cables, without weighing up the costs and benefits. However, cable solutions at high voltage levels involve considerable additional costs. Dependent on local circumstances, high voltage cable investment requirements are 4 to 10 times higher than those for overhead lines. Gas-insulated transmission lines (GIL) are in fact 10 to 12 times more expensive. Even taking into account the lower transmission losses of cables and GIL, overhead lines offer far more benefits, even based on overall costings over a period of 40 years. This has been confirmed based on the example of the Ganderkesee - St. Hülfe project, a joint study conducted by Prof. Oswald (Hanover University) and the ForWind Institute on behalf of Lower Saxony.

If the entire grid expansion which has been identified in the dena grid study as being necessary by 2020 were to use cable technology, this would necessarily bring significant additional costs for grid users. Since E.ON Netz is especially affected by the expansion, this could have the effect of virtually doubling the extra-high voltage grid charges.

In § 4(2) of the Renewable Energy Act, the legislator requires grid operators to "immediately" expand their grids as necessary. However, grid operators are also subject to the provisions of the Energy Industry Act (EnWG), and are therefore committed to "efficient service provision" (§ 21(2) EnWG).

Since July 2005, the grid charges of the German transmission grid operators have been subject to regulation by the Bundesnetzagentur (BNetzA), which has made it clear on a number of occasions that it does not consider the high additional costs of cable solutions to be compatible with the criterion of efficiency laid down in the Energy Industry Act.

However, overhead lines offer considerable benefits in addition to those related to costs. As an example, far less intrusion into the environment is necessary during the construction phase than in the case of cable: the earthmoving necessary to construct a cable link is far greater than that required to set up an overhead line. The motto "out of sight, out of mind" is an inadequate description of the environmental impact of cable solutions. Even cables represent a lasting intrusion into the environment and the landscape.

For high and extra-high voltage use, overhead lines are state of the art and represent the most economical solution. This view is shared by grid operators and regulatory authorities at international level, as demonstrated by the fact that out of 110,000 kilometres of line within the European extra-high voltage grid, less than 100 km, i.e. 0.09 %, is laid in the form of underground cables.

As a result, E.ON Netz is planning its wind-related grid expansion in the form of overhead lines.



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