

Chapter 8

Germany

8.1 INTRODUCTION

The Deutsche Windenergie Institut (DEWI) or the Bundesverband WindEnergie e.V. collected most of the data presented in this report, which is presented by the German Federal Ministry of Environment, Nature Conservation and Nuclear Safety. All data are based exclusively on manufacturer information and therefore depend on manufacturer exactness and reliability.

8.2 NATIONAL POLICY

General national policy guidelines are fixed in the coalition agreement of the German government and outlined on page 38 of the Coalition Agreement 2002-2006, dated 16 October 2002. These guidelines can be found online at <http://www.bundesregierung.de/-/414/bundesregierung.htm>.

Strategy

In general, the German strategy in wind energy for 2003 has not changed significantly since 2002. One of the general goals in German energy policy is to double the share of renewable energies in the total electricity consumption by the year 2006. One major part of renewable energies is wind energy.

The federal government's goal for the erection of offshore wind turbines is to reach 500 MW by the year 2006 and 3,000 MW by the year 2010. *The Renewable Energy Sources*

Act, or Erneuerbare Energien Gesetz (EEG) from 1 April 2000 will be adjusted to these goals. However, some details remain under discussion, and a draft for an amending law of the EEG was prepared by the German government on 17 December 2003.

8.3 COMMERCIAL IMPLEMENTATION

Installed Capacity

Support from the EEG and German wind turbine producers has grown for programs such as the 250-MW. By the end of December 2003, the number of installed wind turbines in Germany reached 15,387, with a total rated power of 14,609 MW. The number of turbines installed in 2003 was 1,703 with a total rated power of 2,645 MW (Table 8.1).

Compared to total wind energy use in previous years, there was an increase in newly installed turbines of approximately 6% and an increase in new power of approximately

Year 2003	Total number of wind turbines	Total rated power [MW]
January	84	132
February	161	254
March	230	358
April	310	486
May	403	631
June	535	835
July	635	998
August	754	1,188
September	888	1,401
October	1,073	1,696
November	1,328	2,091
December	1,703	2,645

Table 8.1 Number of wind turbines and total rated power in Germany in 2003

Date	Number of wind turbines	Number increase [%]	Rated power [MW]	Power increase [%]
31.12.1989	256	--	20	--
31.12.1990	506	97.6	60	200.0
31.12.1991	806	59.3	111	85.0
31.12.1992	1,211	50.2	183	64.7
31.12.1993	1,797	48.4	334	82.5
31.12.1994	2,617	45.6	643	92.5
31.12.1995	3,528	34.6	1,120	74.2
31.12.1996	4,326	22.6	1,546	38.0
31.12.1997	5,102	17.9	2,033	31.5
31.12.1998	6,205	21.6	2,874	41.4
31.12.1999	7,874	26.9	4,430	54.1
31.12.2000	9,369	19.0	6,095	37.6
31.12.2001	11,438	22.1	8,754	43.6
31.12.2002	13,759	20.1	12,001	37.1
31.12.2003	15,387	11.8	14,609	21.7

Table 8.2 Total number of wind turbines and total installed rated power (MW) in Germany from 1989 to 2003

28%, as shown in Table 8.2. The increase of newly installed turbines and newly installed power was a little bit lower than the increases in previous years.

The average rated power per wind turbine went up 11%: from 1,395 kW in 2002 to 1,552 kW in 2003. That means wind turbines with more than 1,500 kW rated power are playing a dominant role in the German market. The 2002 trend towards larger wind turbines has continued in 2003.

The share of the calculated annual wind energy yield to the electric energy consumption of Germany amounted to about 6% in 2003. In 2002 it was about 4.7%.

8.4 MARKET DEVELOPMENT AND STIMULATION

Does not apply.

8.5 DEPLOYMENT AND CONSTRAINTS

Within the Energy Research and Technology Program, the German government supported the design and construction of the first 4.5-MW wind turbine in the world. It is named E-112 and was erected by ENERCON with a 120-m high concrete tower in August 2002 at a test site close to Magdeburg. Due to its weight of 500 tons, the generator-cabin had to be mounted in several steps at the top of the tower. Since October 2002, the wind turbine has been connected to the local grid.

In 2003, the behavior of the E-112 wind turbine was investigated, especially in comparison to existing computer simulations. It has been shown that the E-112 wind turbine is running successfully. In 2003, the erection of a second and third E-112 began.

8.6 ECONOMICS

Does not apply.

8.7 INDUSTRY

Table 8.3 provides an overview of manufacturer market share in 2003.

8.8 GOVERNMENT-SPONSORED R,D&D

Offshore Siting

In 2001, the government's Future Investment Program (ZIP) was set in force. Part of this program is a fundamental measuring program for the implementation of offshore wind utilization in Germany.

Offshore Measuring Platform

The first German Offshore Measuring Platform, FINO 1, was erected in July 2003 in the North Sea, about 45 km north of the coast of the island Borkum (at a water depth

of 28 m), adjacent to the location of the first planned German pilot wind farm.

Hydrological, meteorological, oceanographic, and physical data relevant for the construction of offshore wind plants and their foundations are recorded. Environmental, especially biological, parameters will be monitored for the next few years and will gather basic data and information about the environmental impact of offshore wind farms. Results of the environmental monitoring are urgently needed for the permission procedure of wind farms in the German Exclusive Economic Zone.

A mast up to 101 m above sea level enables the measurement of wind profiles with anemometers and ultrasonic sensors. Four containers house living/working space (emergency accommodations), data storage and communication systems, a diesel-generator set, and batteries and radar equipment. A telescope-crane is used to take seabed samples for biological investigation. The platform is equipped with a helicopter pad for maintenance operations.

Measurements can be done in a fully remote-controlled modus. Data collected are transferred onshore by directional radio and are available publicly after validation by the contributing research institutes. First results will be published under <http://www.fino-offshore.de>.

Hydrographic data are collected in the MARNET database of the Federal Maritime and Hydrographic Agency (see www.bsh.de/de/Meeresdaten/Beobachtungen/MARNET-Messnetz/Stationen/fino.jsp). Many users from industry and from public research institutes request the FINO 1 data.

Figure 8.1 shows the FINO 1 platform deck and the lower part of the measuring mast. The arms for the wind sensors and the antenna of the directional radio transmission

Manufacturer	Share of the total rated power [%]
ENERCON GmbH, Aurich	34
VESTAS Germany GmbH	23
GE Wind Energy GmbH, Salzbergen	11
Repower Systems AG, Hamburg	11
NEG Micon Germany GmbH, Ostfeld	8
AN Windenergie GmbH, Bremen	5
NORDEX AG, Norderstedt	5
DeWind AG, Lübeck	1
Fuhrländer AG, Waigandshain	1
OTHERS	1

Table 8.3 Shares of newly installed rated power by manufacturer



Photo credit: Neumann, DEWI

Figure 8.1 Top view to the FINO 1 platform deck and the lower part of the measuring mast

can also be seen. Below the helicopter deck, the telescope crane of the sea bottom benthos sampler is sticking out.

References

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