

Chapter 8

Germany

8.1 INTRODUCTION

The Deutsche Windenergie Institut (DEWI) collects most of the data presented in this report, which is based exclusively on manufacturers' information and therefore depends on their exactness and reliability.

8.2 NATIONAL POLICY

General national policy guidelines are fixed in the coalition agreement of the German government.

Strategy

One of the general goals in German energy policy is to double the share of renewable energy in the total electricity consumption

until the year 2006, and wind energy is a major part of renewable energy. The federal government's goal for the erection of offshore wind turbines is to reach 500 MW by 2006 and 3,000 MW by 2010. The *Renewable Energy Sources Act*, or *Erneuerbare Energien Gesetz* (EEG) from 1 April 2000 will be adjusted to these goals.

8.3 COMMERCIAL IMPLEMENTATION

Installed Capacity

Support from the EEG and German wind turbine producers has grown for programs such as the 250-MW Program. By the end of December 2002, the number of installed wind turbines in Germany reached 13,759, with a total rated power of 12,001 MW. The number of turbines installed in 2002 was 2,328 with a total rated power of 3,247 MW (see Table 8.1).

The average rated power per wind turbine went up by 9% from 1,279 kW in 2001 to 1,395 kW in 2002. That means wind turbines

YEAR 2002	Total number of wind turbines	Total rated power [MW]
January	111	150
February	219	287
March	361	464
April	472	609
May	616	801
June	822	1,084
July	955	1,286
August	1,115	1,510
September	1,366	1,877
October	1,628	2,263
November	1,947	2,719
December	2,328	3,247

Table 8.1 Number of wind turbines and total rated power in Germany in 2002

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

Table 8.2 Total number of wind turbines and total installed rated power in Germany from 1989 to 2002

with a rated power of 1,500 kW or more reached a market share of 78% – these large turbines are therefore playing a dominating role in the German market. The trend towards larger wind turbines has continued in 2002.

The share of the calculated annual wind energy yield to the electric energy consumption of Germany was approximately 4.7% in 2002; in 2001, it was approximately 3%. This value reached approximately 29% in Schleswig-Holstein, 21% in Mecklenburg-Vorpommern, and 14% in Niedersachsen. Therefore, a considerable share of the electricity consumption is covered by wind power in the federal states in northern Germany.

8.4 MARKET DEVELOPMENT AND STIMULATION

Does not apply.

8.5 DEPLOYMENT AND CONSTRAINTS

With support from the German Ministry of Economics and Labour, ENERCON constructed the first 4.5-MW wind turbine in the world. It is named E-112 and was erected in August 2002 in a test site close to Magdeburg, with a 120-m high concrete tower. The generator cabin had to be mounted in several steps at the top of the tower due to its weight of 500 tons. Since October 2002, this wind turbine has been connected to the local grid.

Currently ENERCON investigates the behavior of the E-112 wind turbine, especially in comparison with existing computer simulations. A second wind turbine erection, close to Wilhelmshaven, is planned for 2003.

8.6 ECONOMICS

The German wind energy market annual turnover in 2002 is estimated to be more than 3.5 billion Euros.

8.7 INDUSTRY

Table 8.3 provides an overview of the market share of manufacturers in 2002.

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

Parameters such as hydrological, meteorological, oceanographic, physical, and environmental will be monitored at research platforms that are relevant for the construction of offshore wind plants and for the permission procedure of wind farms in the

German Exclusive Economic Zone compatible with nature and the environment.

The first platform (information can be found at www.fino-offshore.de) will be located in the North Sea about 45 km north of the coast of the island Borkum, which has a water depth of 28 m, adjacent to the location of the first planned German pilot wind farm. Data will be collected before, during, and after wind farm installations.

A mast up to 101 m above sea level enables the measurement of wind profiles with anemometers and ultrasonic sensors. Four containers will house measuring equipment, living/working space and emergency accommodations, data storage, communication systems, batteries, radar equipment, and a diesel-generator set. A telescope-crane will be used to take seabed samples of the surroundings. The platform is equipped with a helicopter pad for maintenance operations. Measurements can be done fully by remote control.

The data collected will be transferred onshore by directional radio and are available publicly after validation by the contributing research institutes. In 2002, construction of

Manufacturer	Share of the total rated power [%]
ENERCON GmbH, Aurich	34.0
VESTAS Germany GmbH	17.8
GE Wind Energy GmbH, Salzbergen	13.1
NORDEX AG, Norderstedt	8.7
NEG Micon Germany GmbH, Ostenfeld	8.3
AN Windenergie GmbH, Bremen	7.0
Repower Systems AG, Hamburg	6.8
DeWind AG, Lübeck	2.4
Fuhrländer AG, Waigandshain	1.4
OTHERS	0.2

Table 8.3 Manufacturer shares of newly installed rated power

the platform started after a Europe-wide invitation of tenders for supplies. The platform is expected to begin operation in the summer of 2003.

Two offshore wind farms have been approved in Germany. In November 2001, the Federal Maritime and Hydrographic Agency (BSH) approved the pilot offshore wind farm, Borkum West. The Prokon West GmbH will erect 12 wind turbines approximately 45

km north of the island Borkum in a first step starting in 2004.

In December 2002, the BSH approved the Buergerwindpark Butendiek wind farm. Beginning in 2005, 80 3-MW wind turbines will be erected approximately 35 km west of the island Sylt.

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