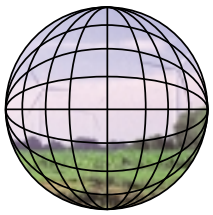


The wind energy sector in Germany is already at a peak in terms of installations. Its future – and the future of other renewables development – is tied up with the much-debated revision of the Renewable Energy Act, writes **Christian von Hammerstein.**

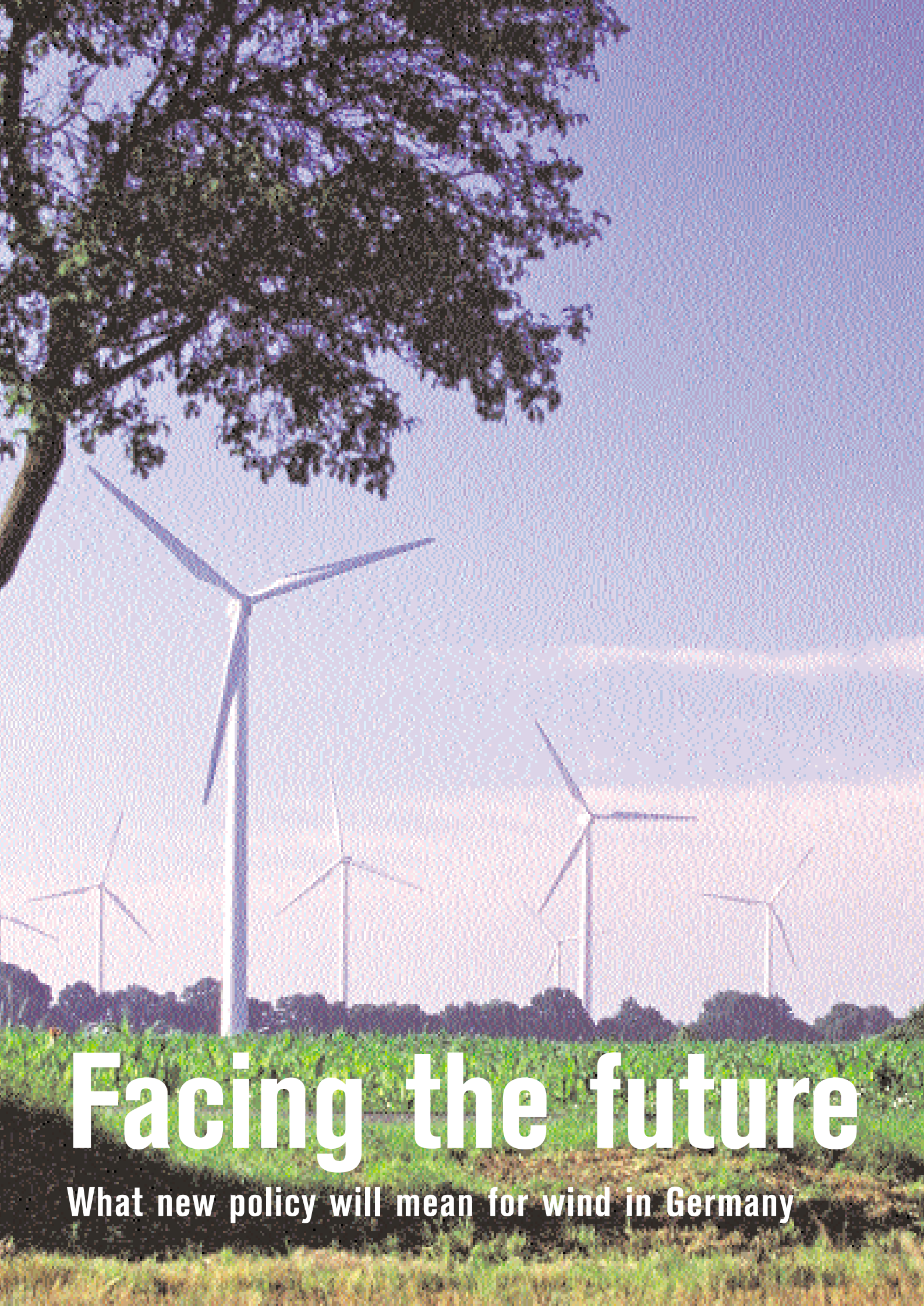
In August 2003, the German Government proudly reported that the country was the world leader in wind energy, with over 12,000 MW installed. Over a third of the world's – and about half of Europe's – wind power is generated in Germany, placing it ahead of even the US. Germany is also in a prime position in terms of installed photovoltaic capacity, with Japan alone ahead of it.

However, at the same time as these reported successes, there was an intense dispute about future support for renewables between Jürgen Trittin – a member of the Green Party and also the Federal Environment Minister – and the Federal Economics Minister, Wolfgang Clement, of the Social Democrats. While the former wanted to stick to the Government's goal of doubling the share of renewable energy in the country's energy supply by 2010 compared with 2000, the latter was aiming to scale back subsidies for renewable energy, which would subject wind energy, in particular, to more competition from conventional energy suppliers.

> The future of support for renewables in Germany has been intensely disputed

In December 2003, the German Government adopted a compromise, and passed this to the Parliament for further discussion. On 2 April 2004 the first chamber of the Parliament (the Bundestag) adopted the amending bill in spite of votes from the conservative opposition. With the revised Act, the conditions for renewable energies are supposed to be further differentiated and developed. The Government is pursuing an ambitious aim of covering half of energy consumption by 2050 from renewable energy sources. However, the economic support for renewables will now be based on economic efficiency to a larger extent than in the past. The revised Act also aims to implement the European Directive on Renewable Energy. The Government expects the new Act to be in effect by

Over a third of the world's wind power is installed in Germany NORDEX



Facing the future

What new policy will mean for wind in Germany

New tariffs for wind power are on the horizon NORDEX

1 June 2004, but this is still subject to legislative proceedings, and there is still strong opposition from the conservative majority in the second chamber of Parliament (the *Bundesrat*).

COMPETITION AND LEGAL REMUNERATION

The Renewable Energy Act is the most important instrument for supporting renewable energy. It regulates the purchase of power by electricity companies operating general supply networks, as well as its remuneration. Network operators are required to connect renewable energy generation facilities to their networks and to purchase the entire power generated from those facilities in return for a statutory fixed minimum tariff, the full amount of which is based on the type of renewable energy (hydro power, wind power, photovoltaic power, geothermal energy, landfill gas, biogas, biomass, mine gas or marsh gas) and the size of the facilities. For wind energy, the location of the facility also has an impact on the tariff. The rates are based on actual power generation costs, limited in most cases to 20 years, and declining from year to year.

In order equally to distribute the burdens resulting from the Renewable Energy Act across all energy companies, the Act contains a complicated balancing system. Those energy companies and electricity dealers that actually deliver the electricity to the customers (either via their own distribution network or via a third party's distribution network) receive a uniform share of power from renewable energy sources at an average rate of remuneration that is standardized throughout Germany. Since this system does not call for subsidy of renewable energy from budgetary funds, the European Court of Justice, the European Commission and national courts do not consider the remuneration provisions to be a subsidy (subsidies are not permitted under European law).

BALANCING POWER AND ITS IMPACT ON COSTS

In addition to setting the remuneration rates, the Renewable Energy Act imposes a legal duty on network operators to bear the costs of connecting renewable generation facilities to their networks, and they are required to reserve adequate capacity at all times for the inclusion of additional electrical energy. One of the main points of contention in this regard is the cost of balancing power. Due to the sometimes considerable fluctuation in connection with the generation of power from wind facilities, network operators have to add balancing power, even if there is only a short-term drop in wind energy. Particularly affected are network operators in the open regions of northern Germany, where the share of wind energy is considerably larger than in the southern half of the country, due to the favourable wind conditions there. As a result, operators in northern Germany face an increased need for balancing power and increased costs. The amount of these costs is also partly due to the antiquated German power plant structure; according to German Government estimates, 40,000–60,000 MW of generating capacity – about half of the existing power plant stock – will have to be replaced within

The forecast for German wind energy development is a blustery one DEWIND

the next 20 years. This does present the opportunity for more extensive use of gas turbine power plants, which can handle short-term peak loads in a considerably better and faster way than coal or nuclear power plants. This is one reason for the growing importance of gas in energy generation; another will be the introduction of an emissions trading scheme on 1 January 2005.

THE AMBITIOUS GOALS OF THE GERMAN GOVERNMENT

In accordance with the EU Directive of 27 September 2001 on the promotion of electricity from renewable energy sources in the internal electricity market, Germany announced its objective for increasing the proportion of renewable power in its electricity market to about 12.5% by 2010. Growth was already apparent, with the percentage of renewable energy in gross electricity consumption increasing from around 4.6% in 1998 to approximately 8% in 2002. Among the types of electricity generated from renewable energy, hydro power and wind power have the greatest significance, with about 53% and 38% respectively as of 2002. The German Government expected wind power to become level with hydro power in 2003. In addition, the share of renewable energy sources in the production of heat and transport fuel is increasing. The structure of overall energy generation from renewable sources is shown in Table 1.

TABLE 1. Percentage of energy generation (electricity and heat) from renewable energy sources. Source: German Ministry for Environment, March 2003

Source	Approximate percentage
Biomass – heat	50%
Hydro power	22%
Wind energy	16%
Biofuel	5%
Biomass – electricity	4%
Solar heat	2%
Geothermal heat	1%
Photovoltaic energy	0.1%

The German Government estimates that the generation of power and heat from renewable energy sources saved about 50 million tonnes of CO_2 emissions in 2002. Thus, Germany is only 2% away from its goal of reducing greenhouse gas emissions by 21% compared with 1990, a goal set with its signing of the Kyoto Protocol. At the same time, renewable energy has established itself as a major factor on the labour

Renewable energy sources in Germany avoided about 50 million tonnes of CO_2 emissions in 2002

market: according to Government estimates, about 120,000 new jobs have been created in the various sectors of the renewable energy market, either directly or indirectly. The main employer in this regard is the biomass sector, with approximately 50,000 employees. The wind power sector counts around 40,000 employees, and the solar power industry

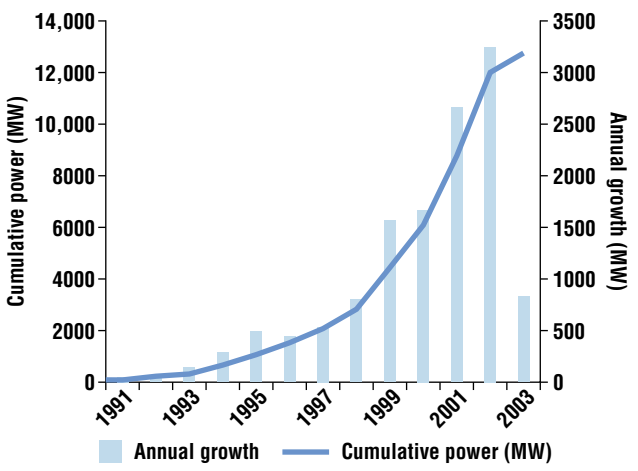


FIGURE 1. Installed wind power capacity; data from 2003 is up to June. Source: Bundesverband Windenergie e.V., June 2003

numbers about 18,000. Total renewable energy turnover was approximately €8.2 billion in 2001, with an investment volume of €5.3 billion – indicating that renewable energy has become a significant economic factor in Germany.

WIND POWER AS AN ENGINE OF GROWTH

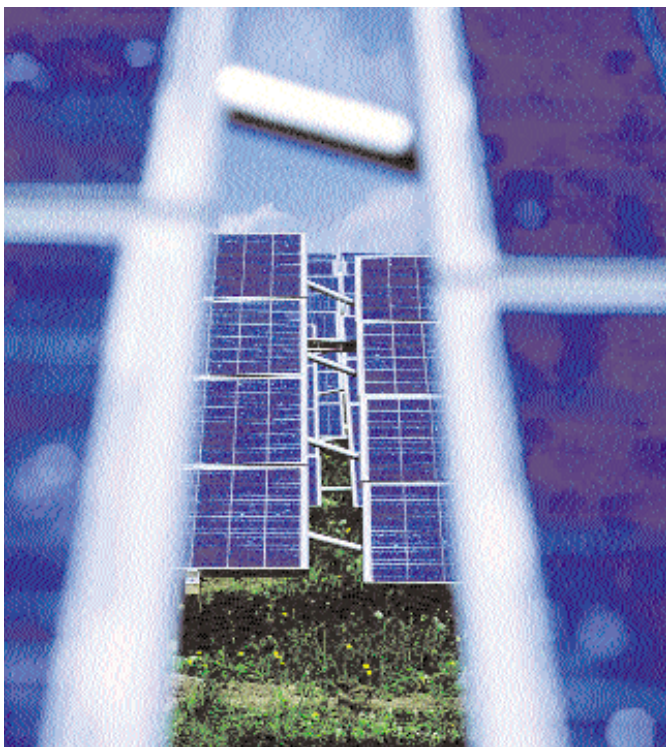
Of all forms of renewable energy in Germany, wind power has the greatest significance. Someone travelling through the country today will find a changed landscape, compared with 10 years ago. There is an increasing density of installation from south to north, and the traveller would count (as of July 2003) a total of 14,283 wind energy facilities, with a total capacity of 12,828 MW. In the first half of 2003 alone, 536 new wind energy facilities were installed in Germany, with a total capacity of 835 MW, an increase of around 7% from the total at the end of 2002. With about 16.5 TWh generated in 2002, wind power made up around 3% of overall power generation there.

An equally rapid development has occurred in the technology used in these facilities. Ten years ago, wind turbines of the 100 kW class were seen as the latest technology. Today, turbines of 1.5 MW and over are capable of generating about 20 times as much power per year at the same location per individual installation. Replacing obsolete wind energy facilities with such new, more powerful facilities (referred to as 'repowering') will be a major component of future operations in this sector.

In contrast to Denmark, Sweden and the UK, all German wind energy facilities are located on land. However, due to the increasing scarcity of suitable locations, where the level of ecological damage would be minor and the wind conditions are acceptable, the German Government in 2002 proposed a strategy for using wind energy at sea. Potentially suitable areas were identified in the North and Baltic Seas, and, with the adoption of the Federal Nature Protection Act in March 2002, the preconditions for the identification of protected areas were created. The German Government plans to install a total of 500 MW of power in offshore wind parks in the initial phase through to 2006, and about 2000–3000 MW of power in the medium term, by about 2010. In the long term – up to 2025–2030 – the Government aims to install 20,000–25,000 MW offshore. In order to achieve this goal, investors in offshore wind parks and the energy industry must create the necessary conditions for transporting power generated offshore in such large quantities. If this is accomplished, wind power on land and at sea could make up 25% of overall power generation in about 25 years. At the moment, however, Germany is very far from this goal. There are not enough companies of sufficient financial means, even though companies like E.ON and General Electric are preparing to enter the offshore market.

> The revised Act fosters the installation of offshore wind parks but reduces the base remuneration for onshore wind energy

PV in the background: though it provides just 0.1% of the country's energy at present, the photovoltaic sector is a major employer in Germany SOLARWORLD



TARIFF REVISIONS

The new Act of 2 April 2004 fosters the installation of offshore wind parks and reduces the base remuneration for onshore wind energy.

For the first five years after the date of installation of an onshore facility, a maximum remuneration of 8.7 Eurocents/kWh will be granted provided that it achieves 150% of the yield calculated for a reference installation (described in detail in an annex to the new act). After that period, and in cases where such a reference yield will not be achieved, the consideration will be only 5.5 Eurocents/kWh. In addition, onshore facilities that do not achieve at least 65% of the

reference yield do not have any legal right to be compensated by the network operator.

The remuneration for offshore wind parks will be increased to a maximum of 9.1 Eurocents/kWh for the first 12 years, if the facility becomes operational by 2010. (Until now, this only applied to facilities ready for operation by 2006.) After that starting period, the remuneration will be reduced to 6.19 Eurocents/kWh.

Part of the compromise between the Environmental and the Economic Ministers was the ongoing reduction in remuneration for new onshore and offshore facilities. Onshore installations in operation after 1 January 2005 will face a 2% reduction each year; offshore facilities will face a similar reduction if they become operational after 1 January 2008. (In the existing act, the reduction rate is only 1.5 %.)

STAGNATION AND MOMENTUM

Some of the market forecasts are considerably less optimistic than the Government about development in wind energy use in Germany in the coming years. The drop in the first quarter of 2003 was over 20% in relation to the first quarter of the previous year; this trend is expected to continue until 2008, and will not reverse itself until then. Repowering and the development of offshore wind energy use are expected to take place in Germany later than was expected a few years ago. Deutsche WindGuard GmbH submitted a brief report at the request of the Federal Environment Ministry in August 2003, and this speaks of a market slump in the years to come. [See also the article by Eize de Vries, page 60].

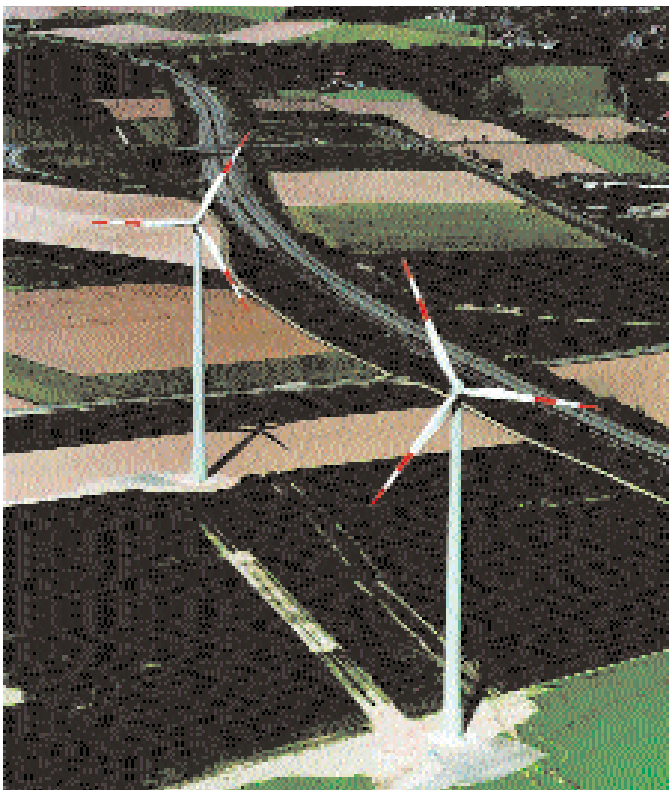
Many companies are expecting the promotion of offshore wind energy by the new Act to provide a strong impulse for offshore technology.

CONCESSIONS TO THE INDUSTRY

In July 2003, the Government began to give in to pressure from industry to release large energy consumers from the financial burden of the remuneration system of the Renewable Energy Act. Manufacturing companies and railway companies with an annual consumption of more than 10 GWh of power and a 15% share of the power costs in their *Bruttowertschöpfung* (gross added value) may file an application to pay not more than 0.05 Eurocents/kWh as their contribution for renewable energy fed into the network.

A DIFFICULT ENVIRONMENT AND HOME-MADE PROBLEMS

Although the debate about the legal framework conditions for the promotion of renewable energy is of central importance, the industry also has other problems, some of which are home-made. German banks have become much more reluctant to issue loans; until now, the financing of wind parks through investment funds with tax incentives proved to be a successful model, but the interest of wealthy individuals in the funds has declined due to an amendment made to the Income Tax Act in October 2002 and the Funds Decree of the Finance Ministry from October 2003, which tightened the requirements for tax benefits. As a result, investments are insufficient, leading to



Towering view: though Germany generates the highest level of wind energy in the world, there is an increasing scarcity of suitable wind farm sites onshore UMWELTKONTOR

bottlenecks in the financing of planned projects. The approval procedures for wind farms are becoming more difficult due to increased resistance, thus increasing planning and transaction costs, while at the same time, insurance companies are demanding much higher premiums to insure claims – the repair and loss rate was about €40 million in 2000, well above original expectations. Insurance companies will in some cases use the increased loss frequency as an argument for drastic increases in insurance premiums.

These issues are exacerbated by home-made problems. One after another, listed companies had to downgrade their forecasts for the current financial year. The Chief Executive of Nordex AG resigned from office in autumn 2003 following an operating loss of over €40 million. Plambeck Neue Energien came under pressure due to its acquisition of a Danish rotor blade manufacturer, while Umweltkontor AG received criticism last year due to the acquisition of a start-up owned by its management families.

Thus, a general adjustment in the market is expected. As experienced in other sectors, market consolidation is likely to set in after the stormy growth of the past five years. However, Germany is still – and most likely will continue to be for some time – the largest market for wind energy. Despite the dispute over the new energy Act, the German Government does not want to lose its market leadership.

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