

# The renewable energy industry in Germany

A glance at industry promotion policies in selected energy sectors

■ Thomas Grigoleit, Daniel Lenkeit

## Germany's renewable energy policy

The central theme of Germany's energy policy embraces three goals: security of supply, economic efficiency and environmental and climate friendly energy. Germany also supports an energy concept that focuses on a structural change in the energy supply. It is a long-term energy strategy from now until 2050 with ambitious goals to address the challenge of sustainable energy provision. In order to achieve the envisioned change, German legislation has placed a focus on increasing the use of renewable energies and improving energy efficiency. Europe's largest economy also signed a climate package with eager goals to cut emissions and expand renewable energies by 2020. Taking priority, is an 80 to 95 percent reduction of greenhouse gas emission levels (compared to 1990 levels) and an 80 percent renewable energy share of the power mix, of which a large part will be wind generated (including on- and off-shore production). With an impressive 20 percent renewable energy power mix share today, Germany is already well on the way to meeting the 2020 target of a 35 percent renewable energy share. A central piece of Germany's energy legislation is the *Renewable Energy Sources Act (EEG)* which was first created in 2000. The EEG has been tremendously successful in widely expanding the integration of renewable energies into Germany's energy mix, all the while strengthening the country's global leadership in the market of eco-friendly technologies.

### How the EEG works

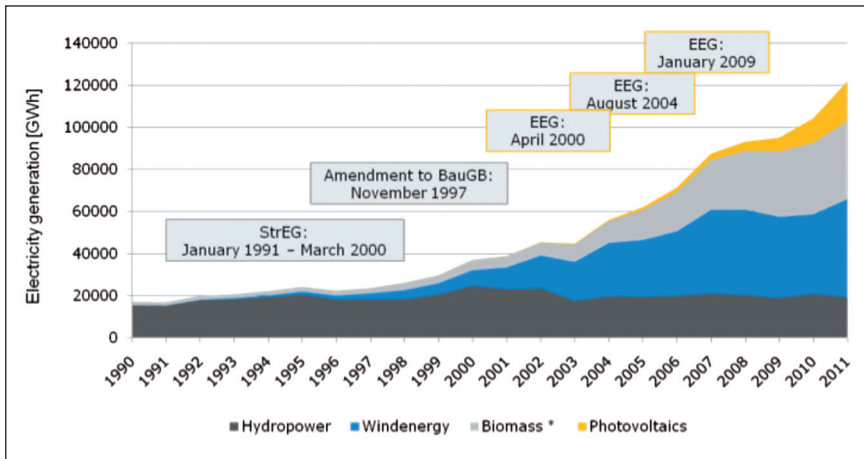
The legislation requires grid operators to purchase a certain amount of electric power from renewable

energy sources first before they feed in electric power generated from non-renewable sources. Hence, investments in renewable energy projects are protected through the guaranteed feed-in tariff (fixed for 20 years), while at the same time periodically decreasing tariffs (through a yearly degression) require plant builders to systematically innovate and reduce costs. The ensured favorable return on investment creates a high installation volume, pushing the market for green technologies and innovation further. A non-bureaucratic initiating process as well as a transparent administration helps to make the EEG highly efficient.

Among other initiatives to promote the use of renewable energies in Germany was the adoption of the *Biofuels Quota Act* in 2006 and the *Renewable Energy Heat Act (EEWärmeG)* in 2009. Heating takes up more than half of Germany's energy consumption and the percentage of heat produced by renewable energies is still in the single digits. The goal of the *Renewable Energy Heat Act* is to increase this percentage to 14 by 2020. The legislation requires the integration of heat production from renewable sources in new construction or cogeneration and as a consequence, using energy efficiency measures as substitutes.

With Germany's energy concept and policies, particularly the EEG, the country creates attractive in-

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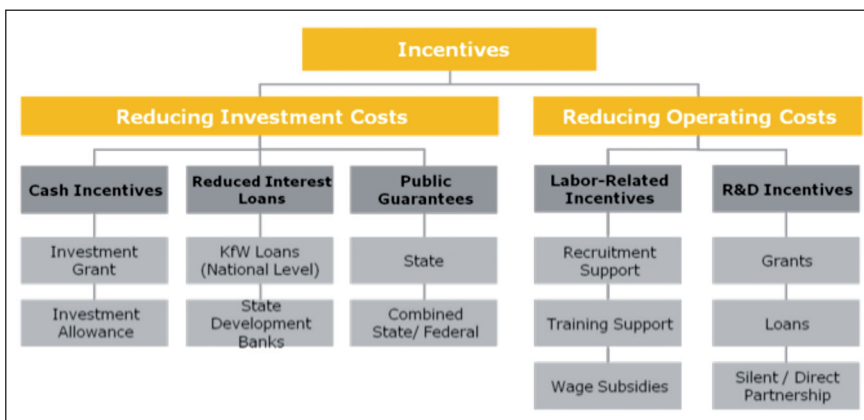
**FIGURE 1** Development of power generation from renewable energy sources in Germany 1990-2011  
 \*Solid, liquid, gaseous biomass, biogenic share of waste, landfill and sewage gas.  
 Source: BMU-KI III 1 according to Working Group on Renewable Energies-Statistics (AGEE-Stat)

vestment opportunities and markets for green technologies. As a result, Germany is the world leader in renewable energies, moving towards a nearly 18 percent renewable energy share of total energy consumption by 2020 and 60 percent by 2050. Currently, 20 percent of electric power consumption is provided by renewable energies, a market with an overall turnover of more than EUR 25 billion. Moreover, nearly the same amount has been invested in renewable energy plants.

Remaining challenges are the integration of electricity, generated by decentralized green energy plants, into the power grid as well as the issue of energy storage. Efficient storage technologies play a pivotal role in a sustainable energy supply based on re-

wable energies. A number of studies forecast a significant renewable energy surplus from 2025 onward. Harnessing this renewable energy surplus allows seasonally adjusted wind and solar energy lulls to be addressed.

With regard to Germany's renewable energy market, the long-term objectives are: pushing ahead on the expansion of renewable energies, improving cost efficiency, driving market-, grid- and system integration and preserving the basic principles of the EEG (feed-in compensation and priority feed-in). The target path has already been laid out and the goal of having a 35 percent share of renewable energies for electric power consumption by 2020 (2030=50%; 2040=65%; 2050=80%) seems highly achievable.



**FIGURE 2** Types of incentives in Germany

### Investment promotion policy

Germany offers different incentive packages to reimburse the expenditures of investment projects. For instance, Greenfield investment projects are supported via different channels (figure 2).

In the field of renewable energy, innovation plays a critical role to constantly improve present technology. In Germany especially, with the EEG promoting the expansion of renewable energies while aspiring to achieve lower costs and a growing share of the total energy market, innovation has to be a force behind the success of the market. Consequently, research and development (R&D) programs are vital for many companies involved in the green technology sector.

Germany provides a range of R&D incentives at the national level. From all R&D funding schemes, programs with technological focus play the most important role. The annual grant volume measures approximately EUR 4 billion. The rate of grants given is in the range of 50 percent of total project costs but can be even higher when SME's are involved or cooperative projects are planned.

Also, the German government's High-Tech Strategy 2020 offers generous grants for R&D projects in different sectors. Among the five lead markets, Climate and Energy takes a prime position. Additionally, on a regional level, R&D incentives exist in various forms and sizes in each of the 16 federal states. For more detailed and hands on information (such as a project checklist regarding incentives availability, etc.), Germany Trade and Invest provides investor support services and information about investment opportunities.

### Germany's wind and photovoltaic industries – markets & industrial promotion

#### Photovoltaic

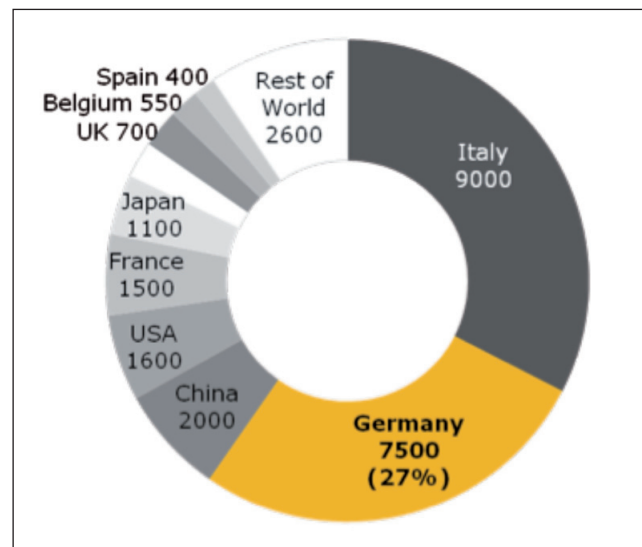
Germany and Italy are the world's largest photovoltaic (PV) markets and Europe, accounting for 74 percent of the global market. In total capacity, Germany is the global leader with close to 25 GW installed.

Annual PV installations [MWp] in Europe will greatly

exceed other markets for years to come and the German market is predicted to dominate. An important milestone for the German PV Market was reaching Grid-Parity (with domestic consumer prices) in 2011, prompting the Federal Ministry for Environment (BMU) to express their hope that PV can develop within a few years from the most expensive- to one of the cheapest types of power generation from renewable energies.

In addition to the industry promotion through the EEG, the powerful R&D scene of Germany also guarantees that its PV industry attains a key position in the world. There are more than 50 state-of-the-art research institutes as well as university faculties researching PVs. Collaborating with first-class PV research ensures a sustainable edge for many companies producing in Germany. According to EuPD research, more than EUR 300 million was invested in PV R&D by the industry in 2010 and the German Patent and Trademark Office registered 290 German patents in solar technologies in 2010 alone.

The cluster effect adds to the strong dynamics of the German PV market as well. Of course, a close proximity to leading PV equipment companies accelerates not only production ramp-up but also access to PV



**FIGURE 3** New photovoltaic installations 2011 (in MWp)  
Source: EPIA, 2012

### About Germany Trade and Invest

Germany Trade & Invest (GTAI) is the foreign trade and inward investment agency of the Federal Republic of Germany. The organization advises foreign companies looking to expand their business activities in the German market. It provides information on foreign trade to German companies that seek to enter into foreign markets. All inquiries relating to Germany as a business and investment location are treated confidentially. All investment services are available at no charge.

GTAI's areas of activity for companies abroad (foreign investors) include:

- Identification of attractive markets and companies
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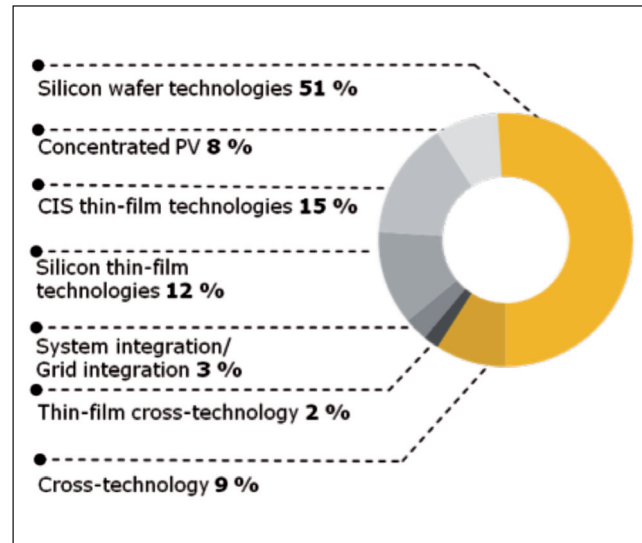
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know-how. Germany hosts the world's largest PV cluster for companies in wafer-based technologies and companies in thin-film and other technologies. Industry networks like Solar Valley Mitteldeutschland, Berlin Solar Network, Silicon Saxony, Organic Electronics Saxony, and Forum Organic-Electronics help bundle shared interests and strengths.

Making sure to further evolve the PV industry, Germany offers strong R&D incentives. The Federal Ministry of Education and Research (BMBF) as well as the BMU are aiding Photovoltaic R&D projects through funding. On a regional level there is a diverse array of incentive programs adding to a strong investment environment.

As for the specific promotion of innovation areas, the BMU funding spreads as showed in figure 4.



**FIGURE 4** Photovoltaic: innovation areas funded by Federal Ministry for Environment (BMU)  
Source: BMU 2011

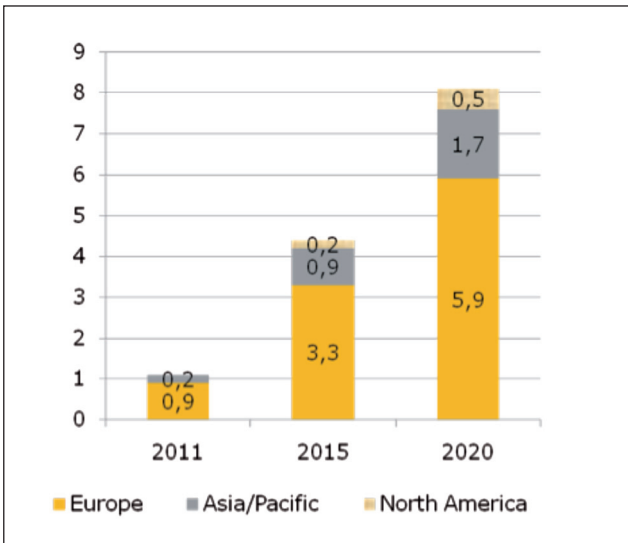
### Wind

Germany's wind energy market amounts to 30 percent of Europe's installed capacity (12 percent of global capacity), making it the prime wind energy market on the continent. By the end of 2011, total installed capacity accounted for more than 29 GW. According to the German Wind Energy Association (BWE), it could reach 55 GW by as early as 2020. With 40 percent of all renewable energy sources, wind is already the dominant driver of renewable electric power generation and will be the motor for future growth.

The major part of the installed capacity is located onshore, whereas future expansion is expected to be driven strongly by offshore wind energy. Europe is and will remain the most important offshore market in the future with many projects in the northern part of the country and the Baltic Sea (figure 5).

Germany is leading the current offshore wind project pipeline with around 8.5 GW of approved projects (figure 6).

Business opportunities and advantages in the German wind energy market are plentiful. This is partly because the German government is highly committed to wind energy. Further growth is promised through



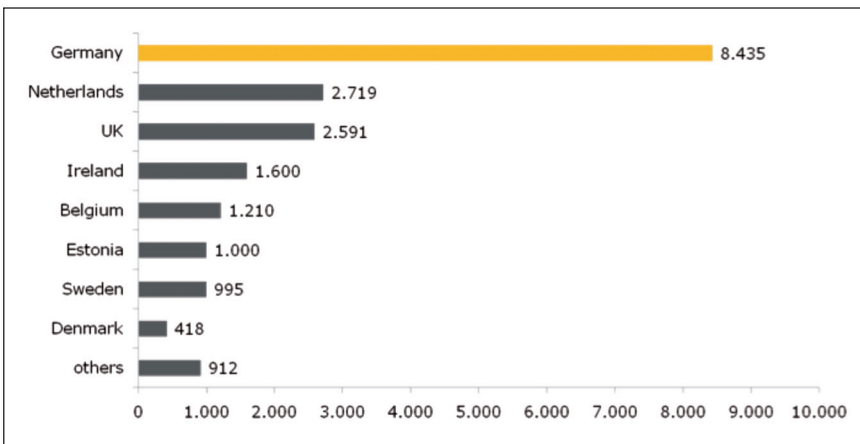
**FIGURE 5** Estimate of yearly installed offshore wind capacity (in GW)  
 Source: Roland Berger 2011: wind Turbine Manufacturing – a case for consolidation

massive investment in offshore and repowering. The so-called “Repowering” concept refers to updating onshore wind turbines to become more efficient as technologies advance. The EEG provides bonuses of 0.5 cents (€) for wind energy facility repowering per kWh respectively. This adds an additional development potential in Germany due to “Repowering”. The requirement of transmission system operators

to provide grid connections at sea for offshore wind farms is part of the federal promotion policy. At the same time, it remains a major challenge. Initiatives like the KfW “Offshore wind energy” program that offers EUR 5 billion for financing of offshore wind farms and abundant incentives for R&D make for an attractive investment environment in Germany.

A new business opportunity arose just recently under the EEG revision that entered into force in January 2012. Sellers of renewable electric power can decide on a monthly basis whether to feed their electric power into the grid and receive the feed-in tariff or market their electric power themselves. Choosing direct marketing, producers have the chance to claim a market premium (the difference between the EEG feed-in tariff and monthly average price at the energy exchange) and a management fee in addition to their sales revenue. The management fee covers costs of forecasting and feed-in management.

Furthermore, Germany has the world’s strongest wind energy manufacturing cluster. Close cooperation between Germany’s R&D institutes and equipment manufacturers helps maintain an internationally unparalleled competitive edge. Correspondingly, many offshore wind industry networks are located along the coastline in Northern Germany. Supported by seaports along the German coastline that are preparing to fulfill infrastructure demands to cater to the wind industry, they add another element for Germany to remain a world leader in installations.



**FIGURE 6** Approved offshore wind projects in Europe until mid 2011 (in MW)  
 Source: WAB 2011

- **Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU)**  
[www.bmu.de/english](http://www.bmu.de/english)  
Renewable Energies  
[www.erneuerbare-energien.de/english](http://www.erneuerbare-energien.de/english)  
Renewable Energy Sources Act (EEG) 2012  
[www.erneuerbare-energien.de/english/renewable\\_energy/acts\\_and\\_ordinances/eeg/eeg\\_2012/doc/47883.php](http://www.erneuerbare-energien.de/english/renewable_energy/acts_and_ordinances/eeg/eeg_2012/doc/47883.php)  
Act on the Promotion of Renewable Energies in the Heat Sector (Heat Act, EEWärmeG)  
[www.erneuerbare-energien.de/doc/42351.php](http://www.erneuerbare-energien.de/doc/42351.php)
- **Federal Ministry of Education and Research (BMBF)**  
[www.bmbf.de/en/](http://www.bmbf.de/en/)  
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- **Wind Energy Agency (WAB)**  
[www.wab.net/](http://www.wab.net/)
- **European Photovoltaic Industry Association**  
[www.epia.org](http://www.epia.org)