German Renewable Energies Act

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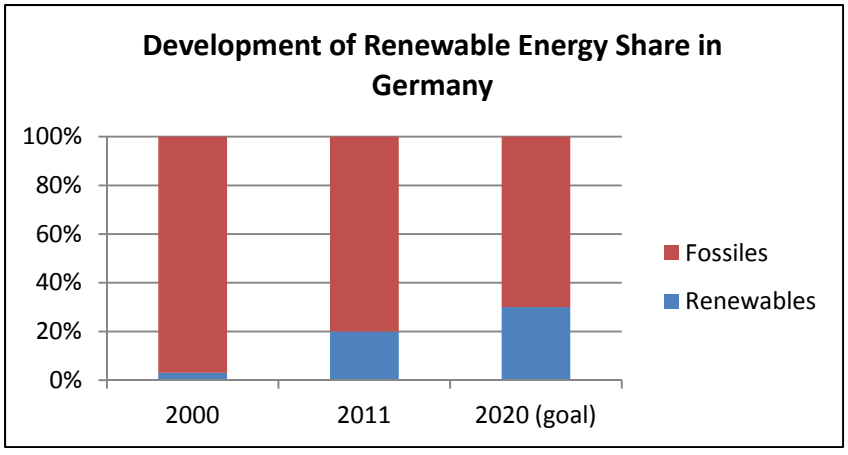
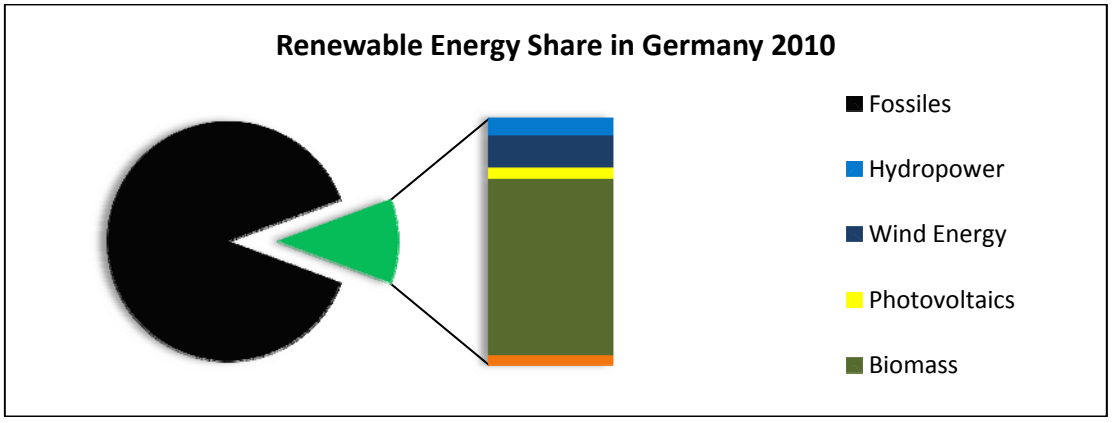
The Renewable Energies Act (Erneuerbare Energien-Gesetz – EGG) which came into force in 2000 clearly was and continues to be the main driver of the German renewable energy market, providing incentives for companies as well as regular citizens to increase the production and use of alternative energies, though it was subject to several changes over the years. In 2011, the share of renewable energies in Germany reached 20 % (3 % in 2000) of the countries' total electricity generation; the governmental goal is to reach 30 % by 2020 and 60% by 2050. Other, more ambitious industry players forecast a much faster development (50 % by 2030).

Key measurements of the Renewable Energies Act include:

- obligation for utilities to feed in electricity provided by renewable energy technologies at a set price
- guaranteed feed in tariff (FIT) per kilowatt-hour for a set time period depending on the technology/energy source.





Solar energy (Photovoltaics):

Solar energy accounted for 3 % of the total German energy production in 2011 (2000: 0.011 %).

Operators of solar systems (private households or companies) are guaranteed a feed-in tariff (FIT) for 20 years after the first day of service. The fee depends on size of the installation and, since 2009, the self-consumption of the electricity produced. The guaranteed tariffs are decreasing, reflecting the price decrease in modules and inverters. Grid parity for energy generated by PV is expected to be reached in 2013.

Feed-in tariffs for roof-mounted PV-systems in Eurocent/kilowatt-hour in Germany:

Year of installation	≤30 kW	>30 kW-100 kW	>100-1000 kW	>1000 kW	Self-consumption bonus (up to 30%) ≤30 kW	Self-consumption bonus (up to 30%) >30-100kW	Self-consumption bonus (up to 30%) >100-500kW
2011	28.74	27.33	25.86	21.56	12.36	10.95	9.48
***1/1 – 6/30/2012	24.43	23.23	21.98	18.33	8.05	6.85	5.60

Source: Solarenergie-Förderverein Deutschland e.V.

Feed-in tariffs for solar systems installed on the ground in Eurocent/kilowatt-hour in Germany:

Year of installation	Conversion area	Other spaces (e.g. industrial areas or next to motorways/rails)	Arable land
2011	22.07	21.11	-
2012 **	18.76	17.94	-

Source: www.solaranlagen-portal.com

To foster decentralized and privately owned PV systems, the tariffs for large solar parks are lower than for smaller installations. The feed-in tariff is digressing each year and solar parks on arable land are not promoted anymore.
In addition to the FIT, the Federal Government has implemented other methods to increase the number of solar systems. This includes low interest loans from KfW bank, a government-owned development bank, and tax write-offs for owners of PV installations.
The measurements taken in 2000 and afterwards have led not only to a drastic increase of solar systems but also to a solar module price drop. At the end of 2011, prices for crystalline modules produced in Germany were at 1.12 EUR/W_p (34.5% in just one year). Chinese modules sell for as little as 0.81 EUR/W_P.

Currently the government is discussing several changes to the Renewable Energy Act. Especially the further digression of the FIT on a monthly basis is being proposed.

*** Subject to change: Drastically reduced FIT for solar energy expected to come into effect on April 1, 2012

Wind:

Wind energy reached a share of 6.2 % of Germany's total use in 2011. This number is subject to increase to 20 % in 2020. Three off-shore wind farms exist today with 25 more approved by the federal government and 64 in the authorization procedure. In order to foster this development the government offers EUR 5 billion in low interest loans via its KfW bank to investors. Additionally, a feed-in tariff (FIT) applies to wind energy as well but with different parameters. The tariffs also apply to repowering procedures (substituting old farms by new ones with higher capacities).

Feed-in tariffs for on-shore wind parks in Eurocent/kilowatt-hour in Germany:

Year of installation	Basic compensation	Starting compensation	SDL-bonus	Repowering bonus	Small wind turbines (<50KW)
2012	4.87	8.93	0.48	0.5	8.93

Source: Federal Environment Ministry

Feed-in tariffs for off-shore wind parks in Eurocent/kilowatt-hour in Germany:

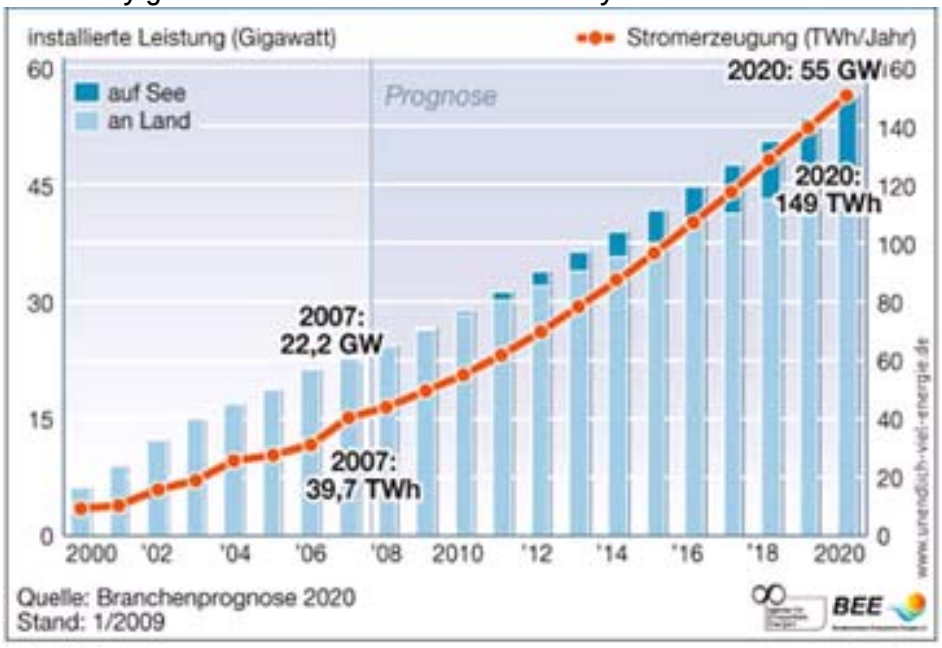
Year of installation	Basic compensation	Starting compensation	Compression model
2012-2017	3.5	15.0	19.0

Source: Federal Environment Ministry

On-shore wind parks are being paid a guaranteed price of 4.87 €c/kWh for 20 years. Additionally, 8.89 €c/KWh are paid for the first 5 years if the wind park is producing power before 2015. Furthermore, operators can benefit from the SDL-bonus for the same time span. This "ancillary service bonus" is a further incentive for operators to upgrade their technical equipment. The repowering bonus applies to new wind turbines replacing turbines that started operations before 2002. It is paid for 5 years.

Off-shore tariffs are guaranteed to remain at the same level until 2017. Basic compensation and starting compensation are the same, except the latter is paid for 12 years. A compression model was introduced recently which implies a higher compensation for a shorter duration. It is only paid for 8 years thus decreasing the total financial compensation for operators of windmills.

Electricity generated from windmills in Germany



Source: http://www.kwh-preis.de/wp-content/uploads/images/Strom_aus_Windenergie.jpg

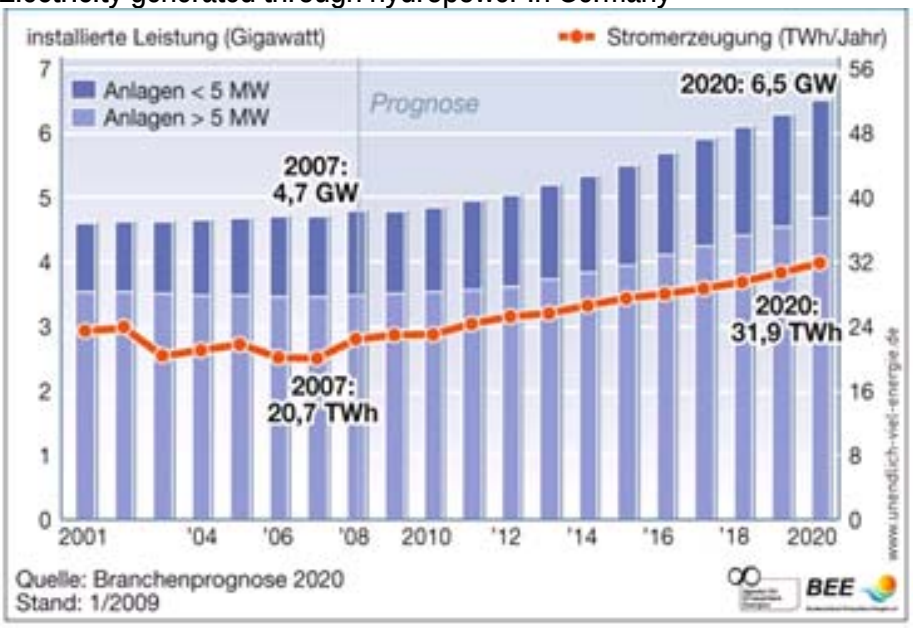
Left axis: installed capacity in Gigawatt
Right axis: electricity generation in TWh/year
Dark blue: off-shore
Light blue: on-shore
Orange: electricity generation in TWh/year

While on-shore wind turbine capacities will only slowly increase within the next years, the role of off-shore wind farms is going to grow in importance.

Water:

Water accounted for 3 % of Germany's total production of electricity in 2011. The share is to increase over the next years, yet more slowly than e.g. energy production from PV and wind. This is mainly due to the limited amount of suitable locations available and environmental concerns. Repowering will contribute most to future growth

Electricity generated through hydropower in Germany



Source: http://www.unendlich-vielenergie.de/uploads/media/Strom_aus_Wasserkraft_01.jpg

Left axis: installed capacity in Gigawatt
Right axis: electricity generation in TWh/year
Dark blue: plants capacity <5 MW
Light blue: plants capacity >5 MW
Orange: electricity generation in TWh/year

Like for the other renewable energies, the EEG also determined set feed-in tariffs for hydro power. As additional government measurement, KfW loans are available for construction, acquisition, extension (repowering) of hydro-electric power plants.

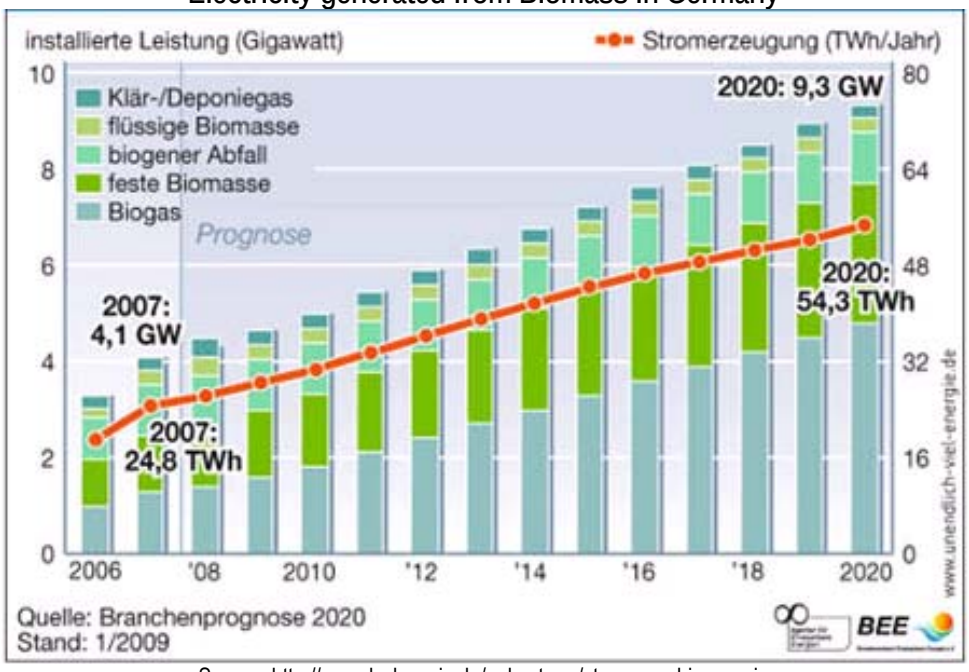
Feed-in tariffs for hydro power for plants built in 2011 in Eurocent/kilowatt-hour

Year of Construction	New hydro-electric power plant up to 5 MW			Extended/repowered hydro-electric power plant up to 5 MW		Extended/repowered hydro-electric power plant above 5 MW				
	<500 kw	500-2000 kw	2000-5000 kw	<500 kw	500-5000 kw	<0.5 MW	0.5-10 MW	10-20 MW	20-50 MW	>50 MW
2011	12.67	8.65	7.65	11.67	8.65	7.14	6.19	5.68	4.25	3.43

Biomass:

Biomass contributed 8 % to the total German power generation in 2011. This segment is expected to grow and reach 11-15 % in 2020, also since it includes generation through imported biomass being processed in Germany. The most important contributor to biomass production in Germany is wood, but also 17% of the agricultural crop land is used for growing energy crops with canola used for bio-fuel being the most significant crop. The share of agricultural crop land used for biomass production is expected to double by 2020. Other materials contributing to biomass production include biological waste, dung and sludge.

Electricity generated from Biomass in Germany



Source: http://www.kwh-preis.de/oekostrom/strom-aus-bioenergie

Left axis: installed capacity in Gigawatt
Right axis: electricity generation in TWh/year

- sewage gas
- liquid biomass
- biogenic waste
- solid biomass
- biogas
- power generation (TWh/year)

Biogas makes up the largest part of electricity produced through biomass today and is expected to increase. The increase in biomass production is supported by government incentives. In addition to set feed-in tariffs for each of the bio-energies and KfW low interest loans, the Federal Office of Economics and Export Control offers programs supporting investors.

	2012 EEG FIT for					
	Biogas plant (except bio-waste) and solid fuel plants				Bio-waste fermentation plants	Small semi liquid manure plants
Power rating	Basic compensation	Raw material classification I	Raw material classification II	Gas-processing bonus		
kW_{el}	Eurocent/kilowatt-hour					
≤ 75	14.3	6	8	≤ 700 Nm^3/h: 3	16	25
≤ 150						-
≤ 500	12.3			≤ 1000 Nm^3/h: 2		
≤ 750	11	5	8/6		14	
≤ 5.000	11	4		≤ 1400 Nm^3/h: 1		
≤ 20.000	6	-		-		

Source: Federal Environment Ministry

While the tariffs for bio-waste fermentation plants and small semi liquid manure plants are final, biogas plant operators need to add up their respective applicable tariffs. Basic compensation is paid to all biogas plant operators while the additional compensation depends on the material and the volume of processed gas, the plant size, etc. The raw material classification I-fees apply to renewable materials while classification II-fees mainly apply to semi liquid manure and dung. The complete list of the raw material classification in German language can be found here:

http://www.erneuerbare-energien.de/files/pdfs/allgemein/application/pdf/ biomasseverordnung _ kon_bf.pdf

The feed-in tariffs illustrated above are guaranteed for 20 years of operation and apply only for plants installed in 2012. Thereafter, tariffs decrease by 2% each year.

For More Information
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