



Federal Ministry for the
Environment, Nature Conservation
and Nuclear Safety

Development of Renewable Energies in Germany in 2008

as at April 2009

Data of the Federal Environment Ministry on
the development of renewable energies in Germany in 2008
(provisional figures) based on information of the Working Group on
Renewable Energy Statistics (AGEE-Stat)



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1 Shares of renewable energies in final energy and primary energy supply; impact on climate protection

In 2008 further headway was made in the utilisation of renewable energies, with renewables supplying around 238 bn kWh (2007: approx. 234 bn kWh). However, the share of renewables in total final energy supply remained about the same in 2008 (9.7 %) as in 2007 (9.8 %). One reason for this was the higher demand for heating and consequent increase in final energy consumption (FEC) in 2008 compared to 2007, due to the colder winter. Another contributing factor was the decline in biofuel sales. Due to the mild weather, in 2007 FEC was around 8,585 PJ – significantly lower than the previous year. This led to a disproportionately high renewables share in FEC which balanced out again in 2008.

The share of renewable energies in total primary energy consumption in Germany (14,003 PJ) rose from 6.9 % (2007) to around 7.1 % (2008). This result is based on the physical energy content method. The substitution method puts the share at 9.7 %.

Table 1: Key data on renewable energies in Germany 2008 / 2007

	2007	2008	Changes
Share of RE in total final energy consumption ¹⁾	9.8 %	9.7 %	- 1 %
Share of RE in total gross electricity consumption	14.0 %	14.8 %	+ 5.7 %
Share of RE in total final energy consumption for heating ²⁾	7.5 %	7.7 %	+2.7 %
Share of RE in fuel total consumption ³⁾	7.3 %	6.1 %	-16.4 %
Share of RE in total primary energy consumption			
a) calculated acc. to physical energy content method	6.9 %	7.1 %	+ 4.3 %
b) calculated acc. to the substitution method	9.4 %	9.7%	+ 3.2 %
Emissions avoided through renewable energies ⁴⁾			
- electricity quantity generated by renewables paid for under the EEG	approx. 117 m t	approx. 112 m t	- 4.3 %
	approx. 57 m t	approx. 56 m t	- 1.8 %
Total turnover from RE	approx. 25.5 bn	approx. 28.7 bn	+ 12.5 %
Of which:			
- Turnover from construction of plants	approx. 11.0 bn	approx. 13.1 bn	+ 19.1 %
- Turnover from operation of plants	approx. 14.5 bn	approx. 15.6 bn	+ 7.6 %
Employees in RE sector	approx. 249,000	approx. 278,000	approx. + 12 %

All data is provisional. Data can change in the course of the year

RE = renewable energies

1) Final energy consumption 2008, Working Group on Energy Balances, March 2009, provisional estimate

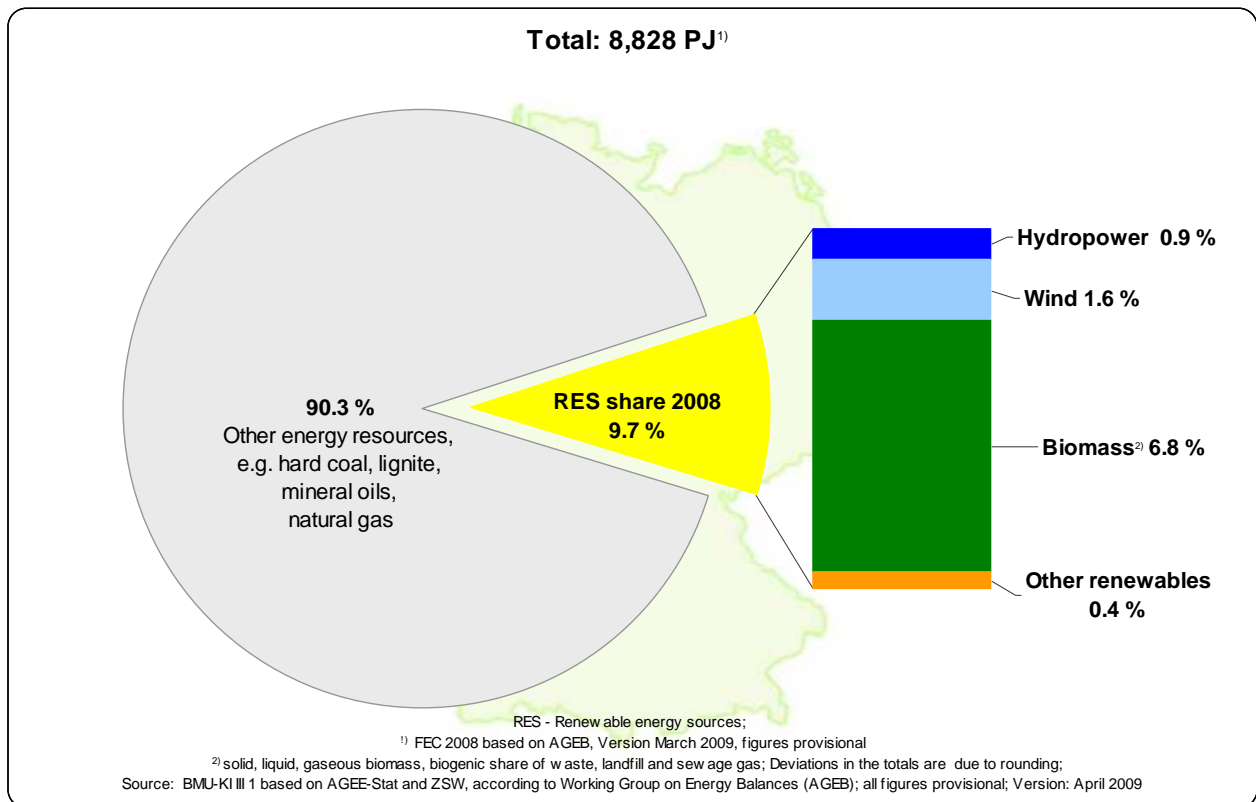
2) Final energy consumption for heat 2008 not yet available, here ZSW estimate, March 2009

3) Biofuels data 2008 based on BAFA, FNR, StaBA in coordination with BMF, provisional data

4) Calculation based on substitution of other energy sources; for 2007 according to expert opinion 2005; for 2008 according to new expert opinion 2009; source: Fhg ISI

Developments in 2008 again underline that Germany is well on the way to achieving its ambitious targets for the expansion of renewables. With 238 bn kWh, renewable energies can already cover 37 % of FEC for private households¹. Biomass continues to account for most of this, with a share of around 70 %.

¹ Final energy consumption for private households in 2007: around 644 TWh; Source: BDEW, Energie-Info "Endenergieverbrauch in Deutschland" 2007, Dec. 2008



Graph 1: Shares of renewable energy sources among total final energy consumption in Germany, 2008

Electricity generation from solar, wind, hydro, bio and geothermal sources increased again in 2008 compared to the previous year, rising by 4.6 bn kWh to 91.4 bn kWh. This electricity quantity is equivalent to more than 60 % of the electricity generated in German nuclear power plants². In 2008 the share of renewables in **total gross electricity consumption** was **14.8 %** (2007: 14.0 %).

In 2008 around 78 % (approx. 71 bn kWh; 2007: approx. 67 bn kWh) of electricity from renewables was purchased according to the tariffs under the Renewable Energy Sources Act (EEG) and fed into the grid.

The EEG has had a decisive influence on developments in the electricity sector. Under this Act, the majority of electricity from renewable sources is fed into the public electricity grid and paid for according to set tariffs. The EEG 2009 created the necessary conditions for further raising the share of renewables in electricity supply. The German government's aim is to increase the renewables share in electricity supply to at least 30 % by 2020, and to continue expanding the share after this date. The BMU lead scenario 2008 anticipates a renewables share in electricity of at least 50 % in 2030.

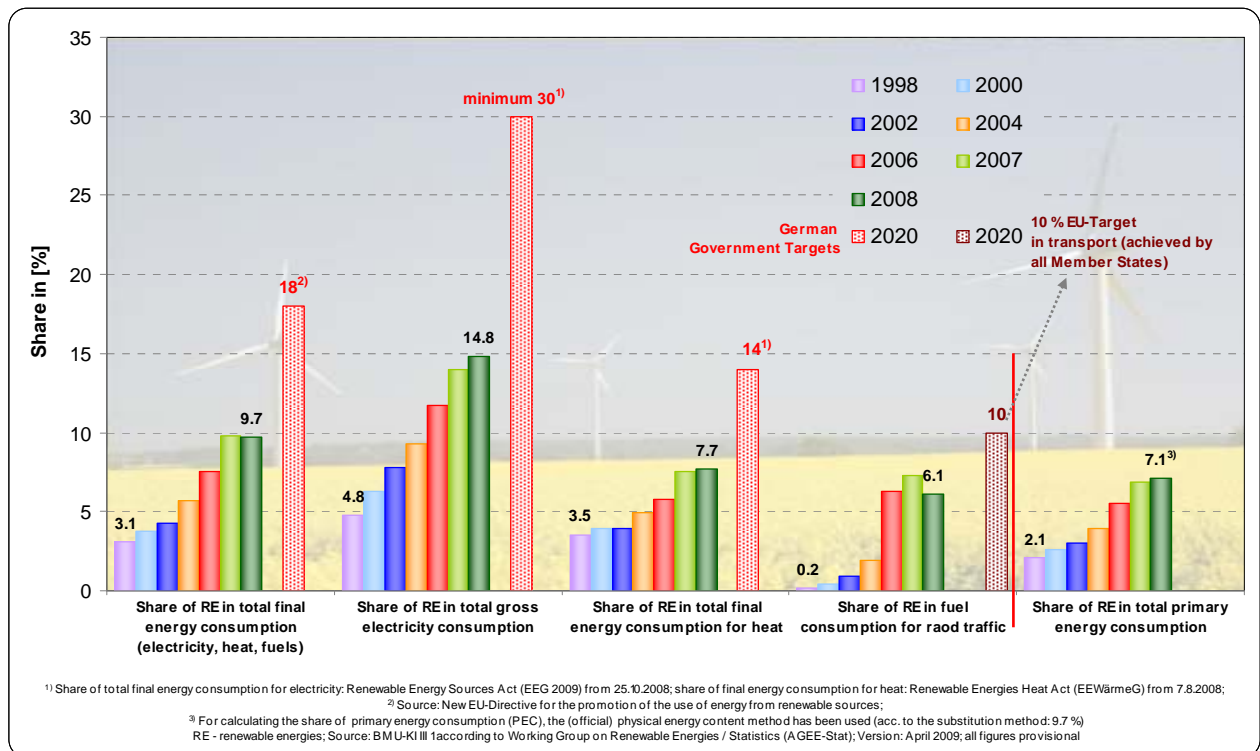
The use of renewable energies for **heating** rose from around 100 bn kWh in 2007 to around 109 bn kWh in 2008. Due to the significantly higher total heat consumption because of the cold weather in 2008, this increase is not reflected in the renewables share in total FEC for heat, which at around 7.7 % was the same as the previous year.

In contrast, changes on the biofuels market could be noted in 2008, with current data indicating an appreciable decline in the **biofuels share** in total fuel consumption, from

² Electricity generation in German nuclear power plants in 2008: 148.8 TWh; source: Working Group on Energy Balances (AGEb)

7.3 % in 2007 to 6.1 % in 2008. This information is still provisional, however, and may deviate from the final statistics.

This trend is not expected to continue, due to the legally specified overall quota for the biofuels share of fuel sales, which takes effect for the first time in 2009.

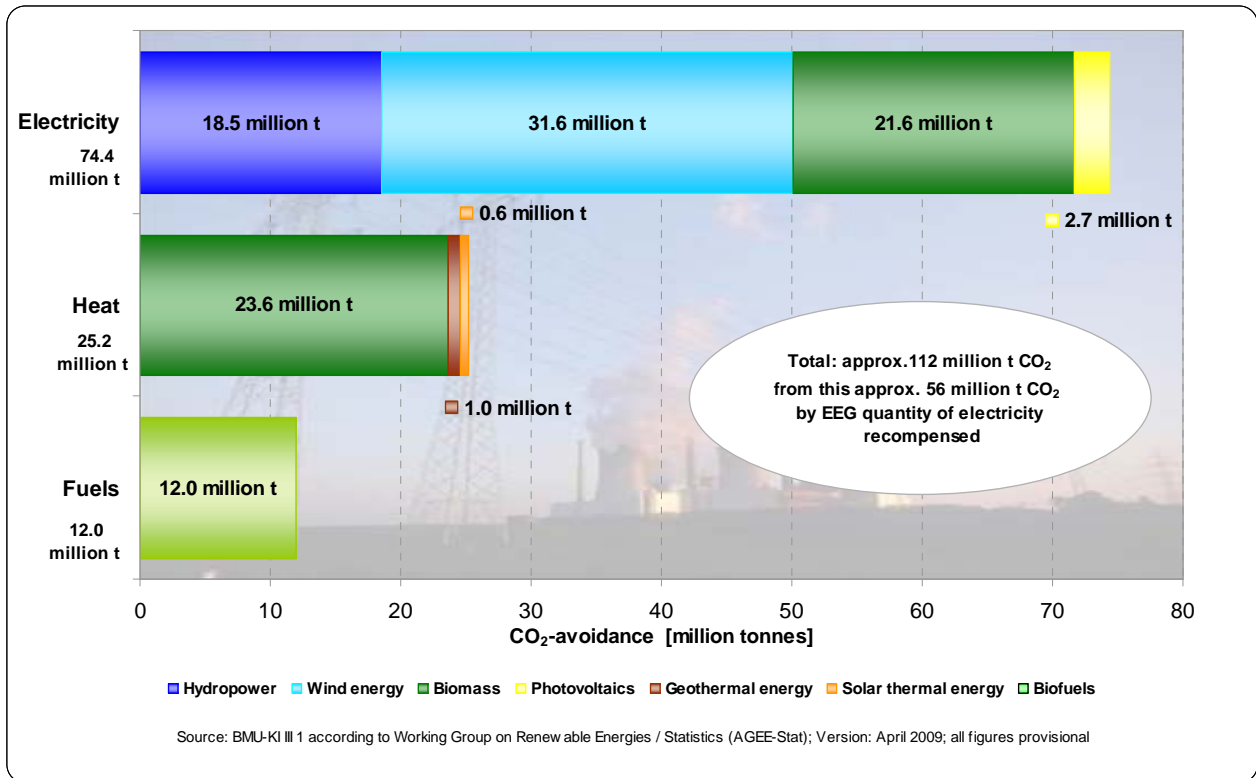


Graph 2: Renewable energy sources as a share of energy supply in Germany

1.1 Renewable energies secure our climate protection target

In 2008 the use of renewable energies (as a replacement for energy sources in the electricity, heat and fuel sectors) facilitated CO₂ reductions totalling around 112 million tonnes. As much as 56 million t of this can be attributed to the electricity quantity paid for under the fixed tariffs of the EEG.

The amount of CO₂ avoided through the use of renewable energies in the electricity sector is calculated on the basis of scientific studies commissioned by the working group on renewable energy statistics (AGEE-Stat) and conducted by the Fraunhofer Institute for Systems and Innovation Research. A recent expert opinion has calculated the amount of electricity generated in conventional power plants that was replaced, together with the corresponding CO₂ emissions, and allocated them to the different renewable energy sources (wind, hydro, solar etc). The CO₂ reduction factors identified were then used to determine CO₂ reduction in the electricity sector for 2008. The new methodology puts the reduction figure slightly lower. Even so, in 2008 renewables again played a vital role in climate protection: without renewable energies, CO₂ emissions in Germany would have been around 112 million t higher.



Graph 3: Total CO₂ avoidance via the use of renewable energy sources in Germany, 2008

2 Contributions by individual branches of renewables

2.1 Electricity market

In 2008, the German **wind energy market** stabilised at the previous year's level with new installed capacity of 1,665 MW (2007: 1,667 MW). A total of 40.4 bn kWh was generated in 2008, compared to 39.7 bn kWh in 2007. This means that in 2008 wind energy held on to its lead among renewables in the electricity sector. The quantity of electricity from wind is equal to more than half the amount generated in Baden-Württemberg's fossil and nuclear power plants³ in 2007.

In 2008 electricity generated from wind had a 6.6 % share in total gross electricity consumption in Germany. An additional 866 wind turbines were erected (2007: 883 turbines). Thus at the end of last year 20,287 wind turbines with an electrical capacity of 23,894 MW⁴ were available for electricity generation. The more favourable conditions for wind energy laid down in the EEG 2009 are expected to give an additional boost to the expansion of wind energy, despite the financial crisis.

In 2008, electricity generation from **hydropower** declined slightly (by 0.3 bn kWh), from 21.2 bn kWh in 2007 to 20.9 bn kWh. Furthermore, 2008 saw little new build or modernisation, and thus there was little improvement in the capacity of existing hydropower plants.

³ Gross electricity generation in 2007: 63.7 bn kWh; source: Environment Ministry of Baden-Württemberg "Erneuerbare Energien in Baden-Württemberg 2007", as at November 2008

⁴ German Wind Energy Institute (DEWI GmbH) DEWI Magazin No. 34, February 2009

Table 2: Share of renewable energies in total final energy consumption in Germany, 2007/2008

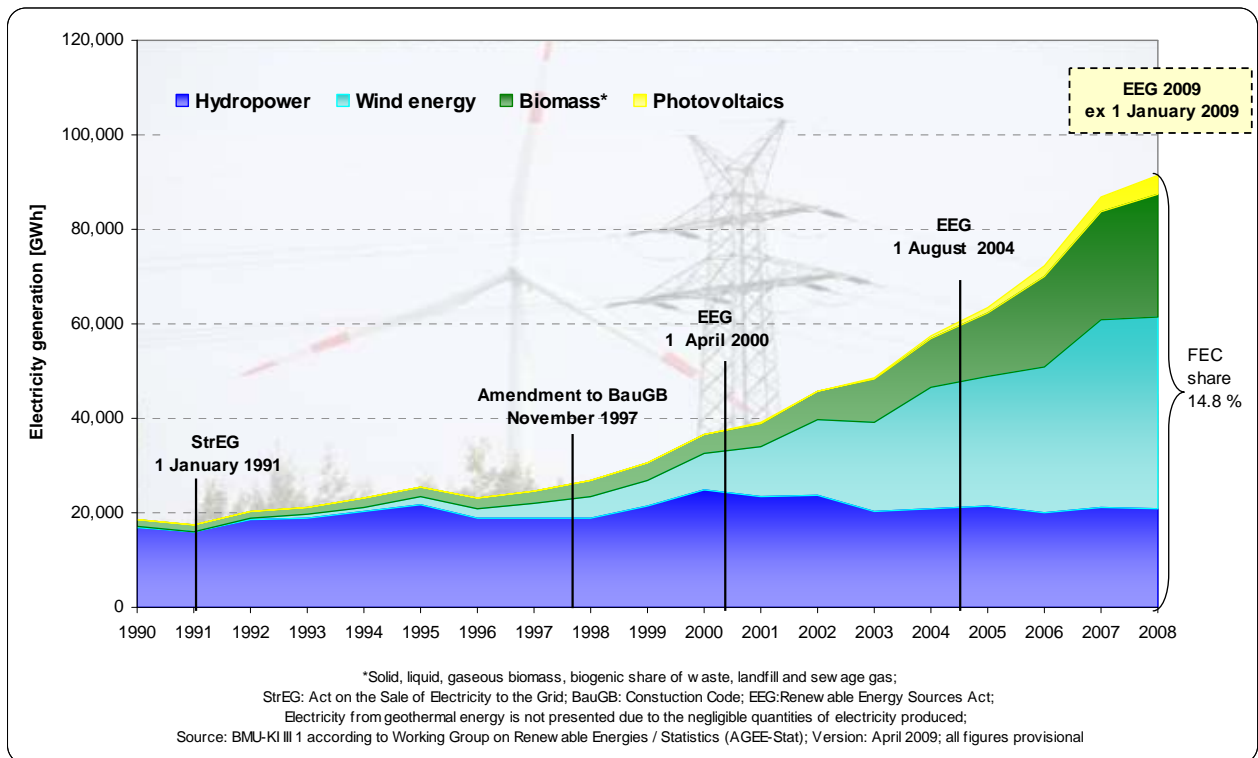
	Electricity		Heat		Fuel		Total		Changes 2007/2008
	2007	2008	2007	2008	2007	2008	2007	2008	
[bn kWh]									[%]
Hydropower	21.2	20.9	-	-			21.2	20.9	- 1.4
Wind energy	39.7	40.4	-	-			39.7	40.4	+ 1.8
Biomass*	22.8	26.0	94.3	102.0	46.4	37.7	163.5	165.7	+ 1.3
Photovoltaics	3.1	4.0	-	-			3.1	4.0	+ 29.0
Solar thermal energy	-	-	3.7	4.1			3.7	4.1	+ 10.8
Geothermal energy	< 0.1	< 0.1	2.3	2.5			2.3	2.5	+ 8.7
Total	86.8	91.4	100.3	108.7	46.4	37.7	233.5	237.6	+ 1.8

Version: April 2009; all figures provisional

Deviations in the totals are due to rounding.

* solid, liquid, gaseous biomass, biogenic share of waste, landfill and sewage gas

Solid biomass (e.g. wood) and **biogas** experienced growth in the electricity sector in 2008. Electricity production from solid biomass and biogas rose to 17.5 bn kWh (2007: approx. 15.2 bn kWh). In 2008 biomass thus had a share in total gross electricity consumption of nearly 3 % (2007: approx. 2.4 %).

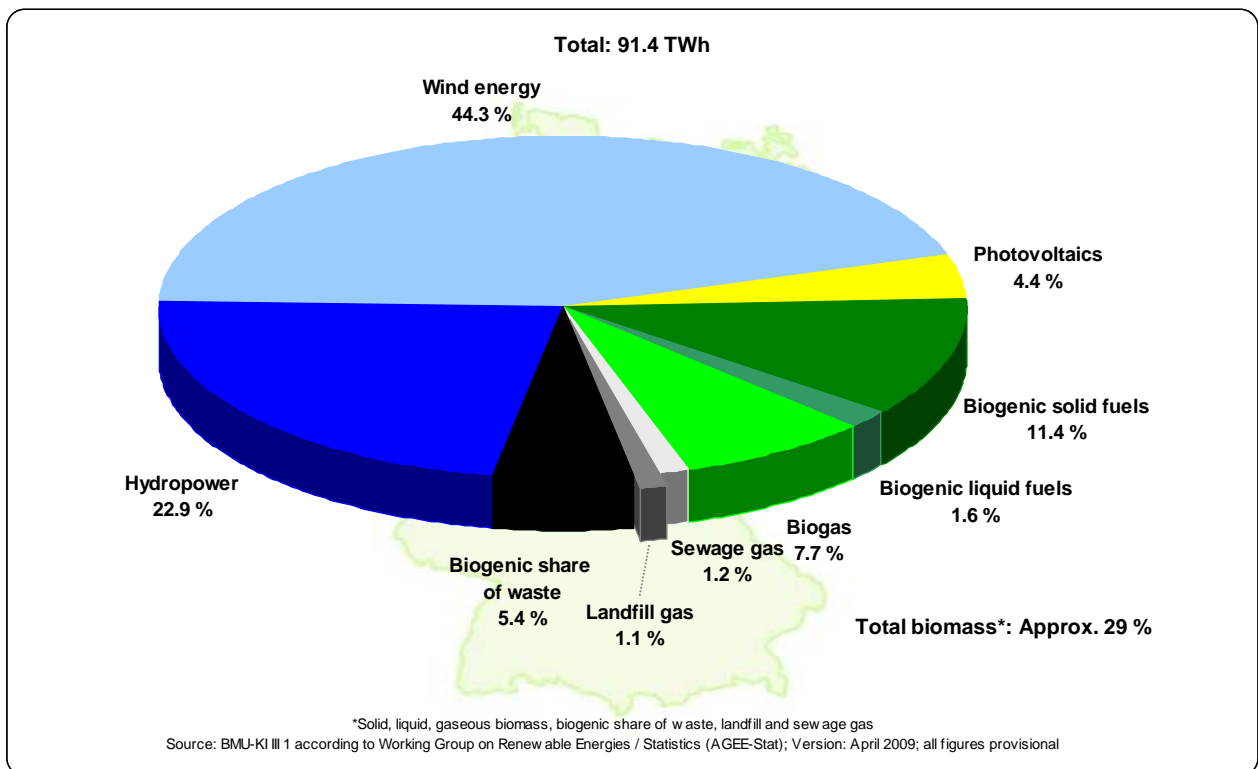


Graph 4: Development of electricity generation from renewable energies in Germany, 1990 - 2008

Altogether, biogenic sources – solid biomass and bioliquids, biogas, landfill and sewage gas and the biogenic share of waste – contributed around 26 bn kWh to electricity generation (2007: 22.8 bn kWh). This puts the biogenic share in total gross electricity consumption for 2008 at 4.2 % (2007: 3.7 %) and thus higher than the hydropower share in electricity generation (3.4 %).

There was particularly strong **growth** in the **solar** sector (photovoltaics) in 2008, with **electricity generation** rising to 4.0 bn kWh (2007: 3.1 bn kWh). Solar power thus contributed 0.6 % to total gross electricity consumption.

There were also new developments in 2008 regarding electricity from **geothermal plants**. After the start of operations in the second German geothermal power plant in Landau in 2007, the plant in Unterhaching also began producing electricity towards the end of 2008. This plant already started generating heat in 2007. In 2008 the three plants fed nearly 0.02 billion kWh into the grid. More geothermal plants will start operating in the coming years, particularly in southern Germany.



Graph 5: Structure of electricity supply from renewable energy sources in Germany, 2008

2.2 Heat market

On the heat market, the contribution of total **biomass**⁵ rose to around 102 bn kWh (2007: 94.3 bn kWh). With a share of 94 %, biomass has the largest renewable share in heat supply. Reasons for the increase include high energy costs, the rise in firewood consumption (around 10 %) in private households and new build of small-scale biomass installations.

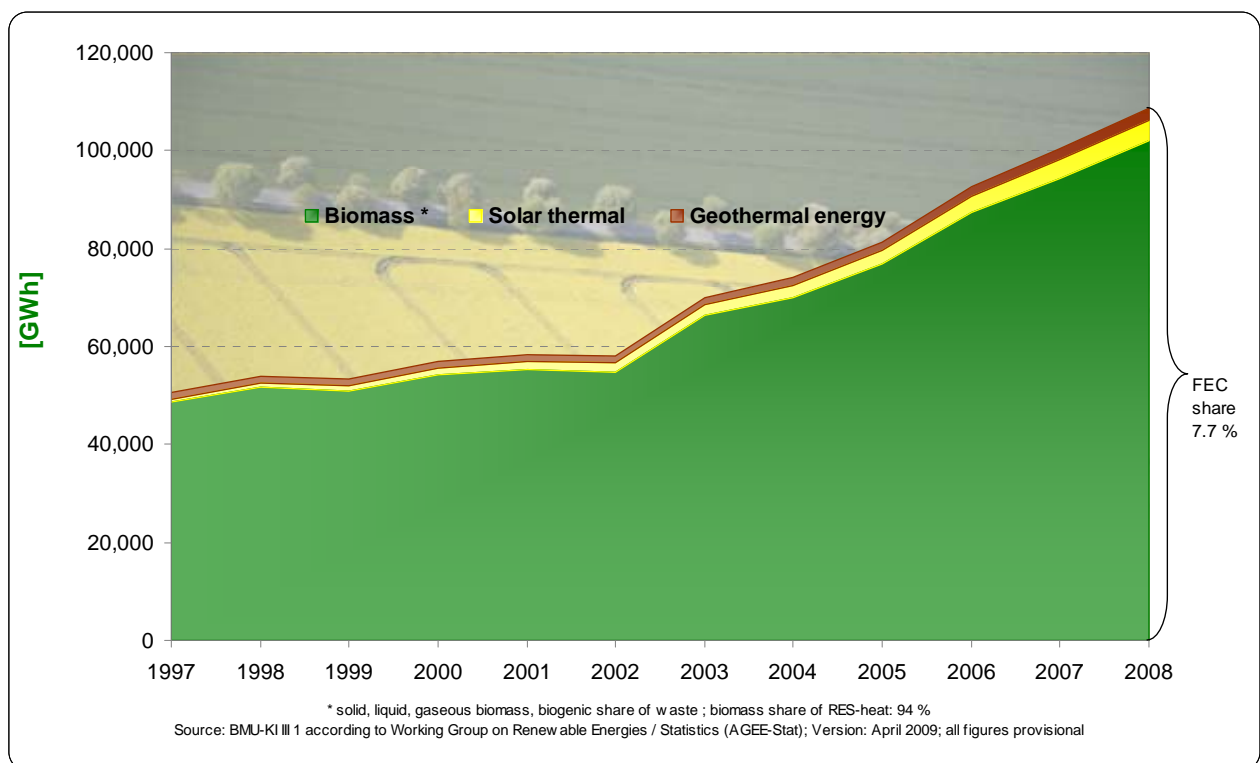
⁵ solid, liquid and gaseous biomass, sewage and landfill gas, biogenic share of waste
BMU-KI III 1 – RE Data 2008
Date: April 2009

In addition to the high demand for firewood, demand for wood pellets also rose in 2008, by 30 %. Nearly 1.5 million t of wood pellets were produced, of which around 60 % were sold in Germany. In 2008 a total of approximately 105,000 pellet heating systems in a wide range of sizes went into operation (2007: 83,000)⁶. In 2000 there were just 3,000 pellet heating systems operating in the whole of Germany.

There were very positive developments in 2008 in the use of **solar thermal installations**. Energy generation in this field rose by a good 10 %, from 3.7 bn kWh in 2007 to 4.1 bn kWh in 2008. More than 210,000 new solar collectors were installed. In 2008 the German government's Market Incentive Programme alone received a total of 170,204 applications for support for solar collectors. With approximately 1.9 million m² of new collector area, there are now around 1,220,000 installations with an area of 11 million m² operating in Germany. This new build is equivalent to about 266 football pitches, with total collector area in Germany equalling around 1,611 football pitches. Solar thermal installations account for 3.8 % of the renewables share in heat supply.

In 2008, the number of **heat pumps** sold in Germany rose to around 62,500, an increase in sales of more than one third against the previous year (2007: 44,633 heat pumps). This put the total number of heat pump systems installed in Germany at the end of 2008 at more than 350,000⁷.

Nevertheless, the share of solar thermal and geothermal energy in total heat generated from renewables is still far too low, at 3.8 % and 2.3 % respectively.

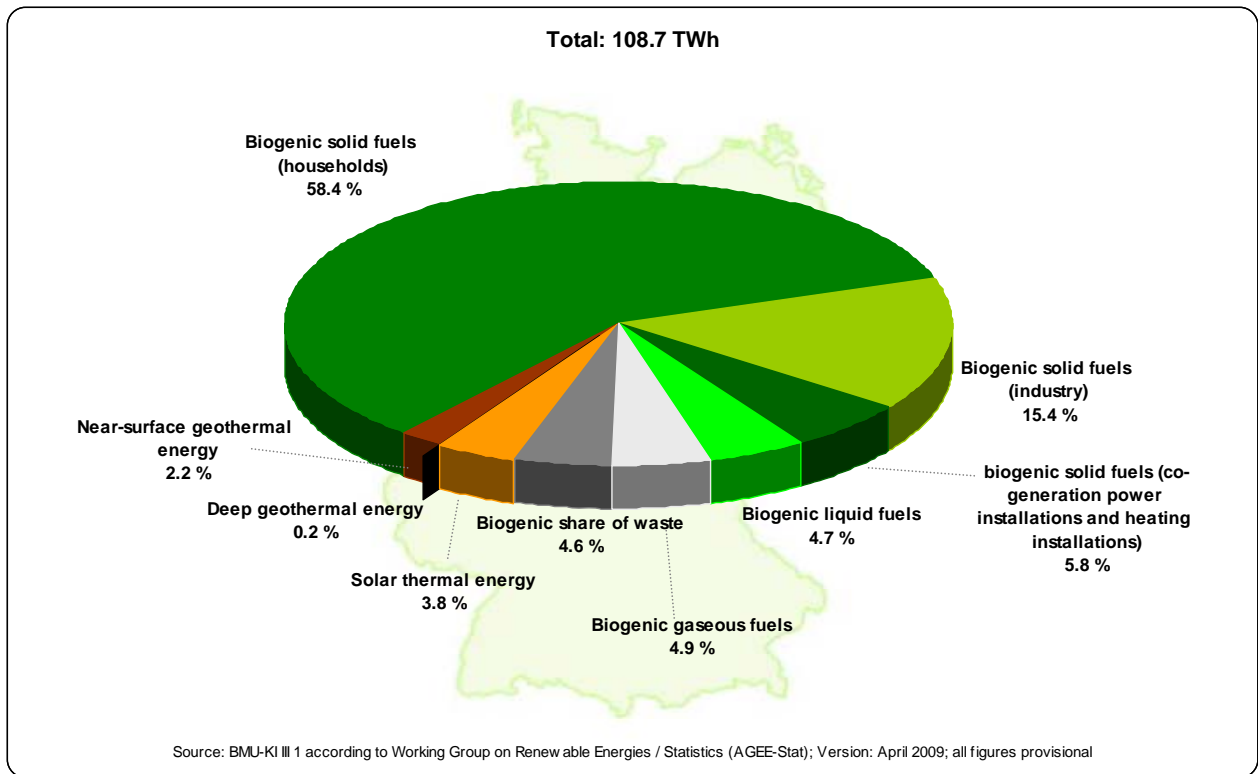


Graph 6: Contribution of renewable energy sources to heat supply in Germany, 1997 – 2008

⁶ Deutscher Energie-Pellet-Verband e.V. (German Energy Pellet Association ,DEPV) 2009

⁷ Bundesverband Wärmepumpe e.V. (German Heat Pump Association, bwp), 2009

The German government has set itself the goal of increasing the share of heat from renewables in total heat consumption to 14 % by 2020. Major efforts are still needed in this area. The provisions of the Renewable Energies Heat Act (Eneuerbare-Energien-Wärmegesetz, EEWärmeG), the Market Incentive Programme and other support instruments for the heat sector will help to achieve this target.

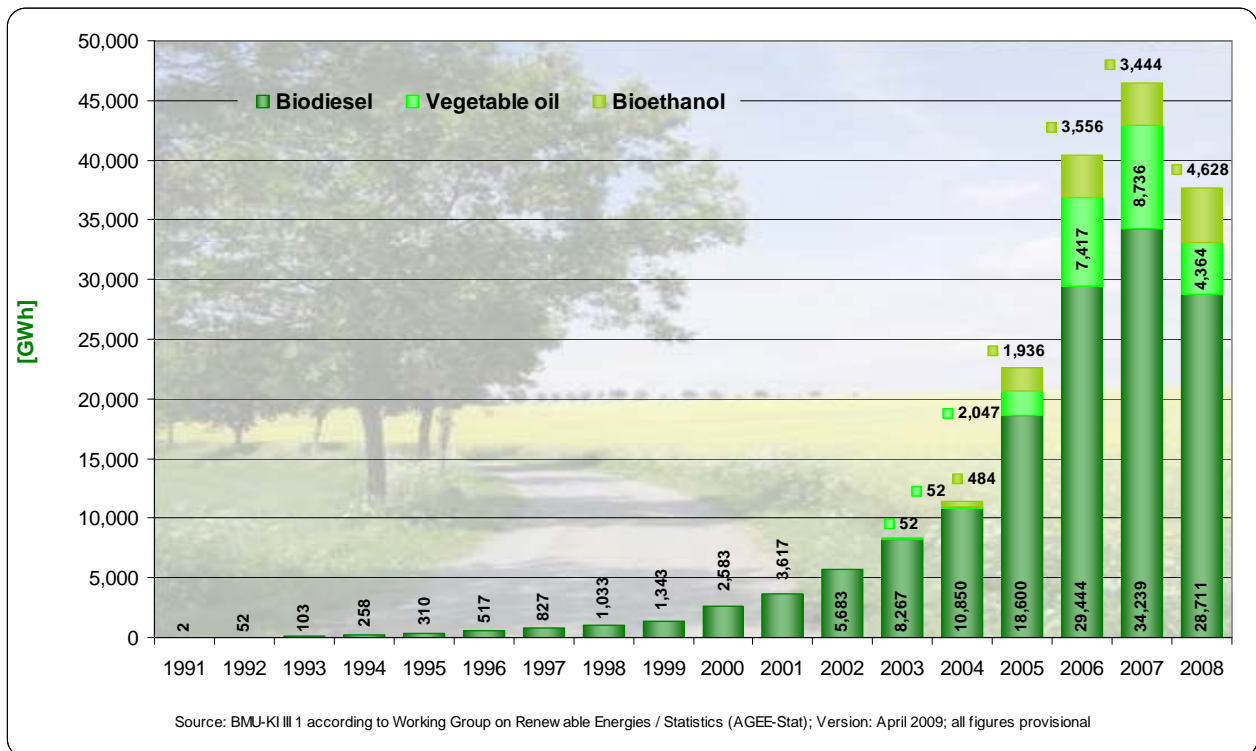


Graph 7: Structure of heat supply from renewable energy sources in Germany, 2008

2.3 Biofuels

Following leaps in developments over the preceding three years, 2008 saw a change in the biofuels market, with a marked decline in sales. Total sales of biofuels fell from 4.6 million t in 2007 to around 3.8 million t in 2008. Sales of biodiesel continued to dominate with around 2.8 million t (2007: 3.3 million t). Sales of vegetable oil fell sharply in 2008, from 838,000 t in 2007 to 418,000 t. In contrast, sales of bioethanol rose to 625,000 t (2007: 460,000 t). Biofuel statistics are still provisional, and these figures may therefore deviate from the final data.

As of 2009 a legally specified overall quota is in force for biofuels, aimed at guaranteeing a minimum level of sales. In light of this, a further fall in the biofuels share is not to be expected.



Graph 8: Contribution of renewable energy sources to fuel supply in Germany, 1991 - 2008

3 Tarif payments, differential costs and apportionment under the EEG

Alongside a further increase in the quantity of electricity subject to the EEG, last year also saw a rise in the associated tariff payments. Current assessments put these at around 8.5 bn euro in 2008, a good 10 % higher than in 2007 (7.6 bn euro).⁸ However, the decisive factors are the differential costs and apportionment.

Since the value of the conventionally generated electricity replaced by EEG electricity rose significantly last year⁹, the additional procurement costs which electricity suppliers incurred through the purchase of EEG electricity were disproportionately low in 2008. These differential costs were around 4.5 bn euro - only slightly above those of the previous year (4.3 bn euro).

If these differential costs are fully and equally apportioned, the result is an EEG-related additional cost of around 1.05 cent/kWh for 2008 (2007: 1.0 cent/(kWh)). The additional cost actually invoiced by the electricity suppliers might deviate from this depending on the calculation method and individual procurement costs. Moreover, an equalisation scheme under the EEG ensures that electricity-intensive companies and railways have considerably lower EEG costs (restricted to 0.05 cent/kWh). Without this concession the additional EEG costs for non-privileged electricity purchasers would be around 15 % lower.

In 2008, the monthly EEG costs for a reference household with an annual electricity consumption of 3,500 kWh were about 3.10 euro (2007: 2.90 euro/month). Last year the statistical mean value of the EEG cost to the average household customer (annual electricity consumption 1,700 kWh) was around 1.50 euro/month (previous year: 1.40 euro/month).

⁸ After deduction of avoided grid charges of around 300 million euro. For more details see Institut für Neue Energien, Teltow: Beschaffungsmehrkosten der Stromlieferanten durch das Erneuerbare-Energien-Gesetz 2008, expert opinion commissioned by the BMU, March 2009

⁹ Around 5.7 ct/kWh in 2008, up from 5.0 ct/kWh in 2007. Cf also footnote 8.
 BMU-KI III 1 – RE Data 2008
 Date: April 2009

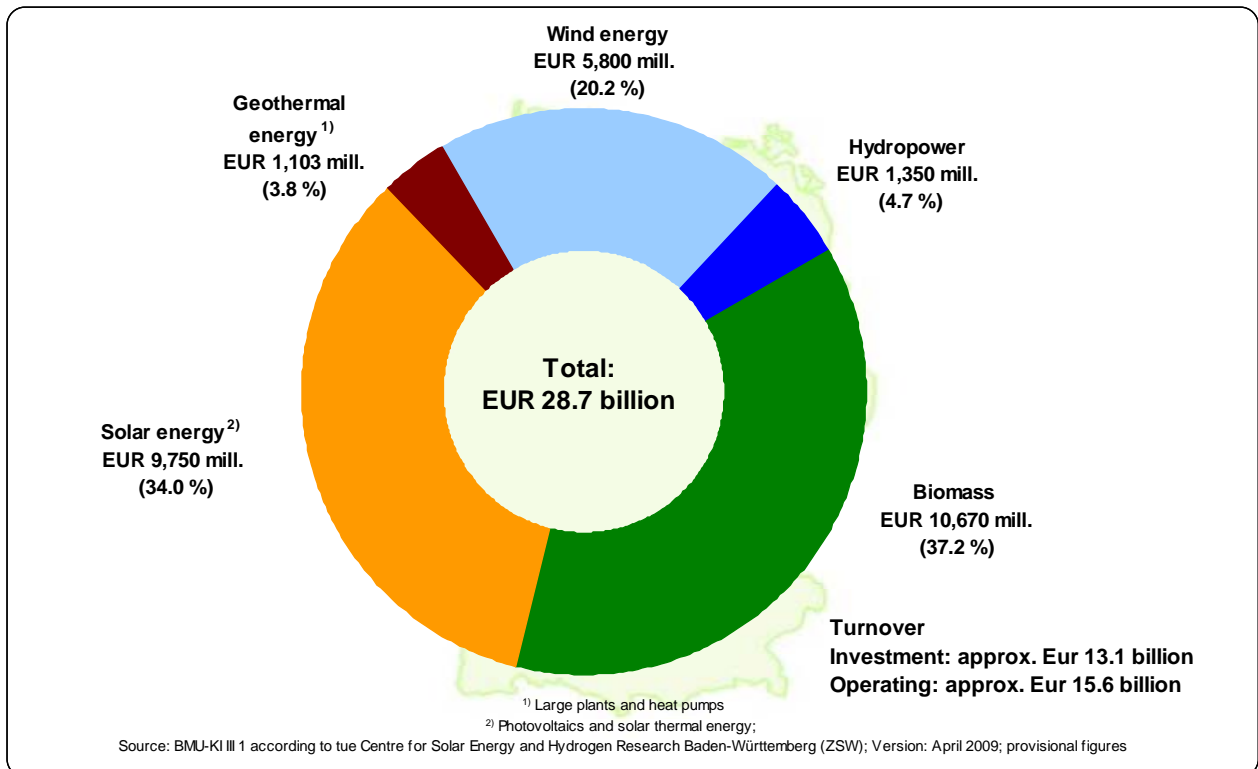
It must be pointed out, however, that a sound economic analysis of renewable energies or the EEG cannot be undertaken solely on the basis of the microeconomic cost parameters outlined above. In addition to the effects of renewables on turnover and employment described under point 4, such an analysis must also include a more detailed study of possible price-reducing effects of the EEG (merit order effect), external damages avoided by the substitution of fossil energy sources, avoided import costs and other indirect costs arising from the EEG.

4 Renewable energies as an economic factor

4.1 Turnover and employment in the renewable energy sector

In 2008 renewable energies gained further momentum in their development into an important economic factor in Germany. An estimate for the BMU shows that total turnover from renewable energies in Germany once more rose against the previous year to approximately 29 bn euro, a rise of around 12.5 %. As recently as 2000, total turnover was only around 7 bn euro.

This increase in 2008 was particularly apparent in the field of investments in new installations, with growth in photovoltaics, solar thermal power and heat pumps playing a significant role. In all, investments accounted for around 13 bn euro, and a further nearly 16 bn euro was generated by revenues from installation operation. Use of biomass for energy had the strongest turnover with 37 %, ahead of solar power (around 34 %) and wind energy (around 20 %).

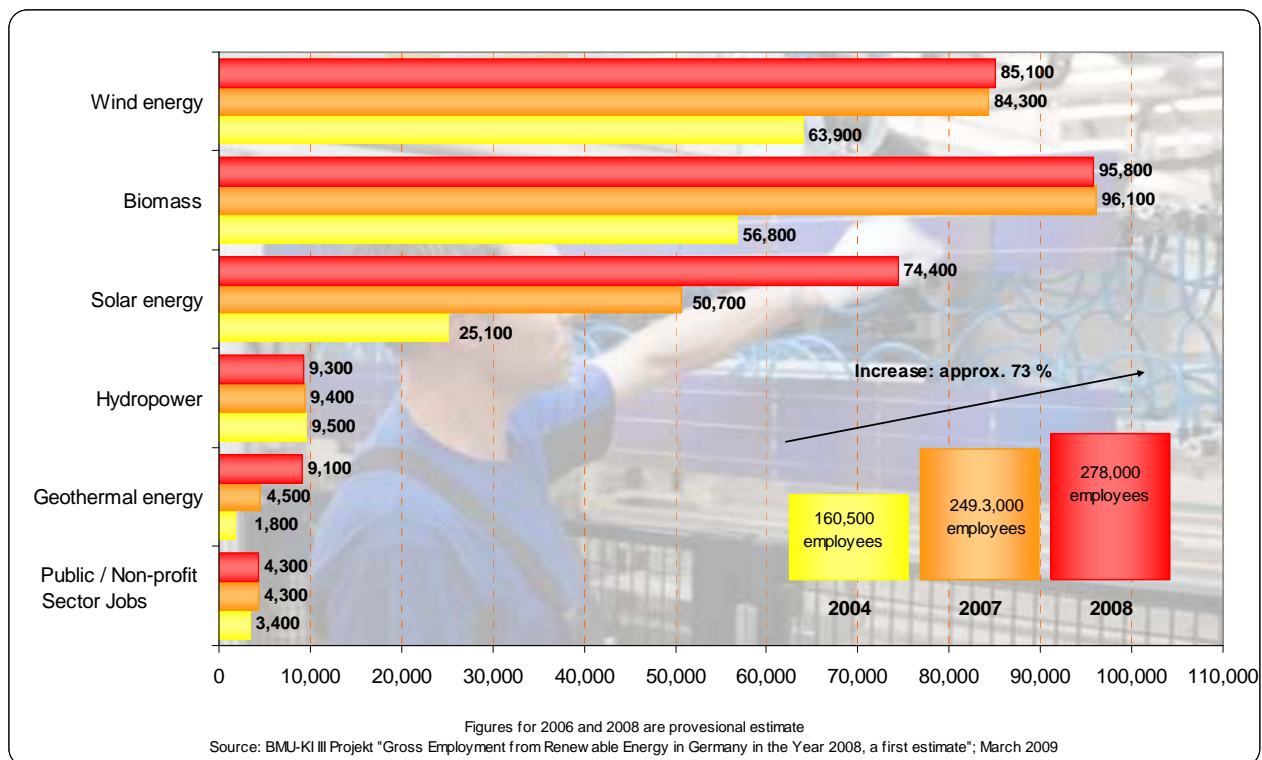


Graph 9: Total turnover from renewable energy sources in Germany (Investment and Operating), 2008

Against this background, employment in the renewables sector rose again last year. In an initial estimate for the whole renewable energies sector (including foreign trade and upstream value added stages), an ongoing research project for the BMU puts the gross figure at around 278,000 jobs¹⁰. This is a plus of nearly 12 % compared to the previous year (approx. 249,000 jobs). Thus, since 2004 (approx. 160,500 jobs) employment attributable to renewable energies has risen by about 117,500 jobs – around 73 % in just four years.

In 2008, photovoltaics showed the most growth in employment. This branch significantly increased its domestic valued added by expanding its production capacities in Germany. The positive developments in the heat market are also fostering employment, with the solar thermal and near-surface geothermal sectors especially benefiting. In contrast, employment figures in the biomass sector as a whole dropped slightly last year, a circumstance largely attributable to the sharp fall in investments in biogas plants and plants for the stationary use of bioliquids.

Overall, however, biomass continues to make the largest contribution to gross employment, with around 34 % (95,800 jobs). This is followed by wind energy with 31 % (85,100), solar energy with 27 % (74,400), hydropower with 3 % (9,300) and geothermal energy with around 3 % (9,100). According to a conservative estimate, employment arising from the provision of public and private funds for research and administration was around the same in 2008 as the previous year (approx. 4,300 personnel), and thus has nearly a 2 % share in gross employment.



Graph 10: Employees in the German renewable energy sector, 2004, 2007 and 2008

¹⁰ O'Sullivan/Edler/Ottmüller/Lehr: Gross Employment from Renewable Energy in Germany in the Year 2008 - A first estimate -, Research project of the Federal Environment Ministry; March 2009

4.2 Renewable energies – a stabilising factor in economically uncertain times.

In recent years, the steady expansion of renewable energies in Germany has been based on a variety of complementary factors. These include clear political objectives, successful support programmes such as the Market Incentive Programme and – in the electricity sector – most especially the investment security provided by the EEG (legal obligation to give priority to the purchase of electricity from renewables, fixed tariffs for a 20 year period).

The latest decisions of the German government further improve and update these successful framework conditions. For instance, the new EEG entered into force on 1 January 2009 with significantly more ambitious objectives. Further examples are the introduction of the Renewable Energies Heat Act (EEWärmeG) and substantial topping up of the Market Incentive Programme are further examples. In 2008, support funds of 236 million euro already led to over 150,000 investment projects in the field of heat production from renewables. This is equivalent to an investment volume of 1.6 bn euro. In 2009 the support volume will rise to 400 million euro, and this can be expected to trigger a corresponding increase in investments. The support of renewable energies thus stabilises economic growth - contrary to the general trend.

Against this background, in the current financial and economic crisis, the German renewables sector is in a considerably better position than many other areas of industry, some of which are also suffering from a structural crisis. It can even be expected that the renewables sector will actually benefit from the crisis, at least in the medium and long-term, as credit portfolios for renewables still have value and are likely to retain it. At present, the stable domestic market for renewable energy technologies is also bolstering ancillary industries, currently experiencing sales problems in other sectors.

At the same time, the high uncertainty in the banking sector means that at present it is harder to secure financing for renewable energy projects in Germany, even though they are in fact viable. This problem especially affects the generally small and medium-sized suppliers and installation manufacturers in the sector: in many cases, as young and growth-oriented enterprises, they do not yet have a great deal of capital at their disposal. Due to the high capital demand and greater risks entailed in the harnessing of offshore wind and geothermal energy, these sectors face particular challenges. In addition, the strategically important foreign trade of the renewables sector is currently under pressure from liquidity shortages abroad and declining demand. This is accelerating the already ongoing consolidation process within the renewables industry, for instance in photovoltaics.

The German government's programmes to stimulate the economy contain instruments which can counter these above problems experienced by the renewables sector, e.g. through improved financing and liability provisions for the funding of companies and projects.

Therefore, in spite of the present crisis it can be expected that the latest forecasts predicting annual investments due to the EEG of between 6 bn and 8 bn euro in the electricity sector alone up to 2030, will prove accurate.

**Further information on renewable energies can be found on the BMU website
www.erneuerbare-energien.de.**

Note:

The data published here are provisional and may change somewhat in the course of the year. Deviations between the figures in the tables and the corresponding column or row sums are due to rounding.

Sources:

Working Group on Renewable Energy Statistics (AGEE-Stat)

Working Group on Energy Balances (AGEB)

Federal Ministry of Finance (BMF)

Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU)

Federal Office of Economics and Export Control (BAFA)

Bundesverband der Energie- und Wasserwirtschaft e. V. (BDEW)

Bundesverband Solarwirtschaft e.V. (BSW-Solar)

Bundesverband Wärmepumpe e.V. (BWP)

German WindEnergy Association (BWE)

Deutsches Biomasse Forschungszentrum (DBFZ)

Deutscher Energie-Pellet-Verband e.V (DEPV)

German Institute for Economic Research (DIW)

Deutsches Windenergie-Institut (DEWI-GmbH)

German Aerospace Centre (DLR)

Agency for Renewable Resources (FNR)

Fraunhofer Institute for Systems and Innovation Research (ISI)

Institute of Economic Structures Research (GWS)

Global Wind Energy Council (GWEC)

Ingenieurbüro für neue Energien (IfnE)

Institut für Solare Energieversorgungstechnik (ISET Kassel)

Öko-Institut Darmstadt e.V.

Federal Statistical Office (Destatis)

Federal Environment Agency (UBA)

Centre for Solar Energy and Hydrogen Research Baden-Wuerttemberg (ZSW)

Diagrams and tables Development of Renewable Energies in Germany in 2008

Date: April 2009

Table 3: Contribution of renewable energy sources to energy supply in Germany, 2008

Share of renewable energy sources		
in total final energy consumption	[%]	9,7
in total gross electricity consumption		14,8
in total heat supply		7,7
in total fuel consumption*		6,1
in total primary energy consumption		
<i>calculated according to physical energy content method</i>		7,1
<i>calculated according to substitution method</i>		9,7
CO ₂ reduction through the use of renewable energy sources		
all renewable energy sources	[mill. t]	approx. 112
electricity quantity generated by renewables paid for under the EEG		approx. 56
Final energy supply from renewable energy sources in 2008		
Electricity		
Hydropower	[TWh] = (1 billion kWh)	20,9
Wind energy		40,4
Biomass (total)		23,9
therefrom:		
<i>solid biomass, including biogenic waste</i>		15,4
<i>biogas</i>		7,1
<i>liquid biomass</i>		1,5
Landfill and sewage gas		2,1
Photovoltaics		4,0
Geothermal energy		0,018
Total electricity	91,4	
Heat		
Biomass (total)	[TWh] = (1 billion kWh)	102,1
therefrom:		
<i>solid biomass, including biogenic waste</i>		91,6
<i>liquid biomass</i>		5,1
<i>biogenic gaseous fuel</i>		5,3
Solar thermal energy		4,1
Deep geothermal energy		0,2
Near surface geothermal energy		2,4
Total heat	108,7	
Biogenic fuels		
Biodiesel (approx. 2.8 mill.t)	[TWh] = (1 billion kWh)	28,7
Vegetable oil (approx. 0.4 mill.t)		4,4
Bioethanol (approx. 0.6 mill.t)		4,6
Biogenic fuels (total)		37,7
Total final energy from renewable energies:		237,7

Version: April 2009;
All figures provisional
Deviations in the totals are due to rounding.

* The reference variable here is the total consumption of engine fuels, excluding fuel in air traffic;
EEG: Renewable Energy Sources Act

Source: BMU-KI III 1 according to Working Group on Renewable

Table 4: Renewable energy sources as a share of energy supply in Germany, 1998 - 2008

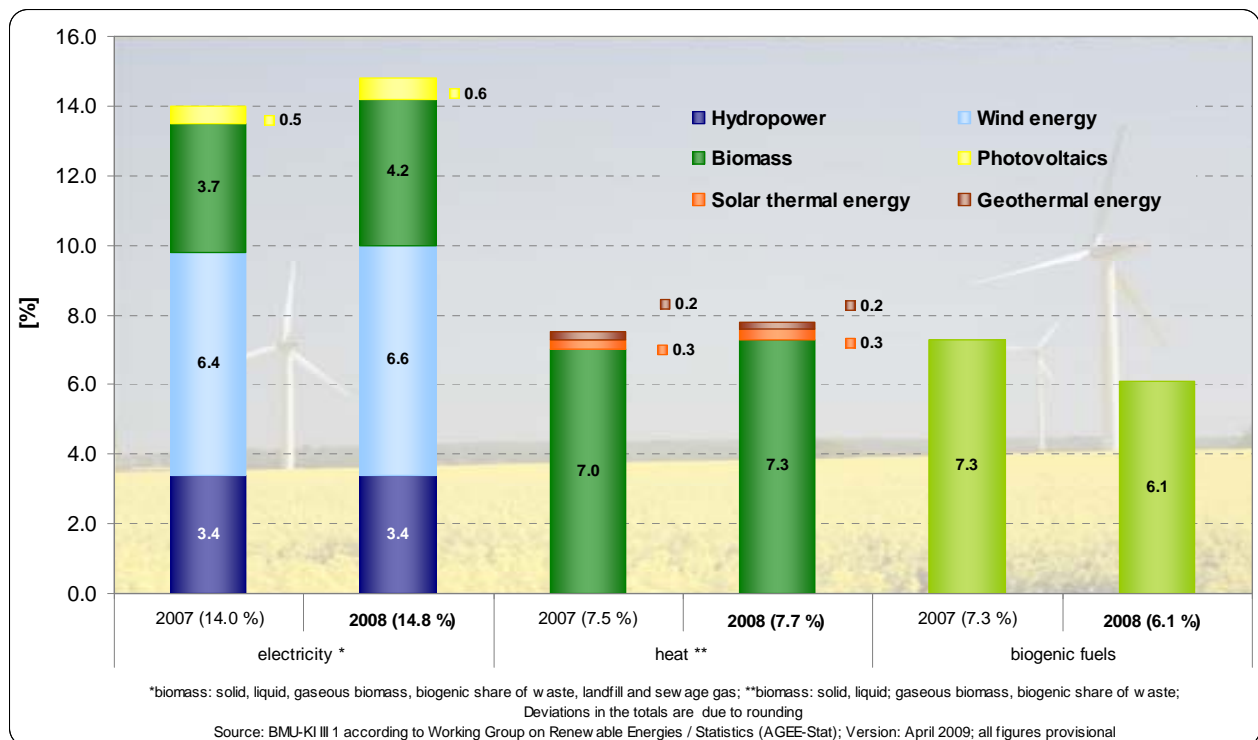
	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Renewables as a share of total Final energy consumption (FEC) [%]											
Electricity generation (in relation to total gross electricity consumption)	4.8	5.5	6.3	6.7	7.8	8.1	9.5	10.4	11.7	14.0	14.8
Heat supply (in relation to total heat supply)	3.5	3.5	3.9	3.8	3.9	4.6	4.9	5.4	6.1	7.5	7.7
Fuel consumption* (in relation to total fuel consumption)	0.2	0.2	0.4	0.6	0.9	1.4	1.8	3.8	6.3	7.3	6.1
Renewables as a share of total FEC	3.1	3.3	3.8	3.8	4.3	4.9	5.5	6.6	8.1	9.8	9.7
Renewables as a share of total Primary energy consumption (PEC) [%]											
Electricity generation (in relation to total PEC)	0.8	0.9	1.1	1.1	1.4	1.5	1.6	2.1	2.5	3.1	3.3
Heat supply (in relation to total PEC)	1.3	1.3	1.4	1.4	1.5	1.8	1.9	2.0	2.3	2.6	2.8
Fuel consumption (in relation to total PEC)	0.03	0.03	0.06	0.1	0.1	0.2	0.3	0.6	1.0	1.2	1.0
Renewables as a share of total PEC	2.1	2.2	2.6	2.7	3.0	3.5	3.9	4.7	5.7	6.9	7.1

The (official) physical energy content method has been used, according to the substitution method (2008): 9.7 %

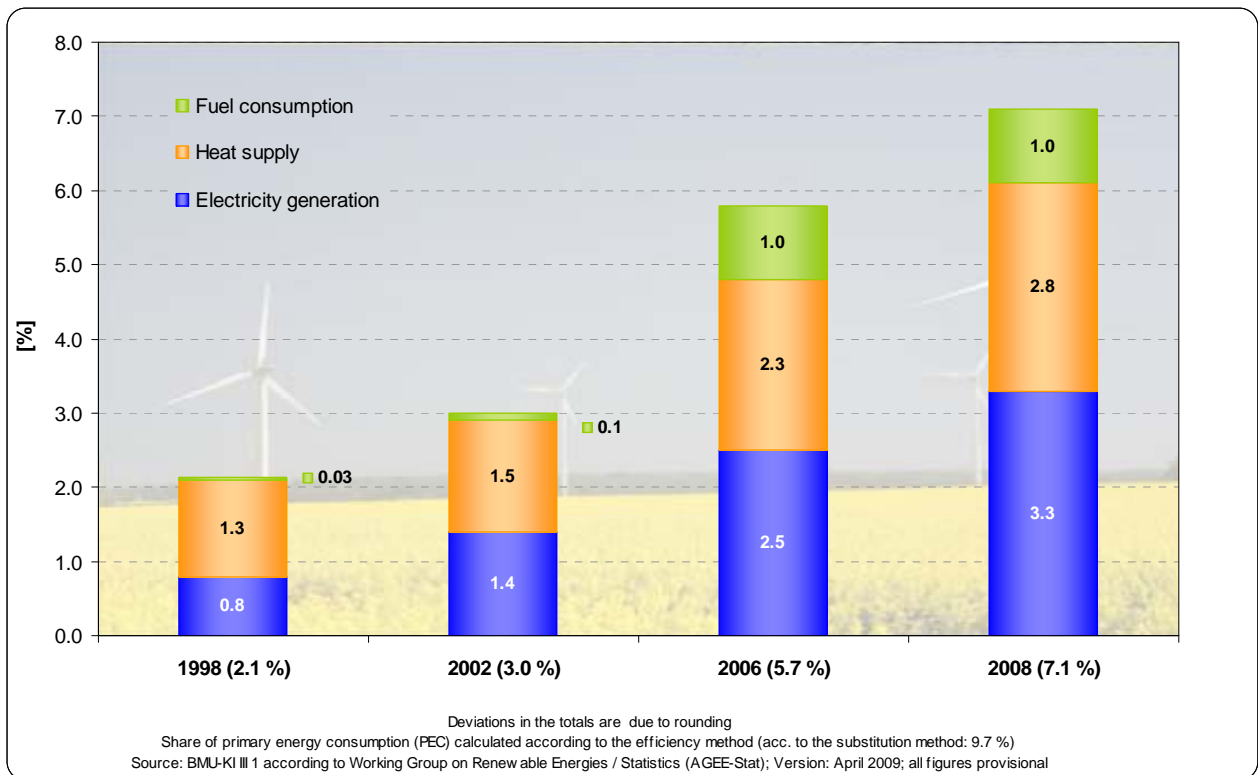
Version: April 2009; all figures provisional; Deviations in the totals are due to rounding.

* Until 2002 the reference variable was fuel consumption in road traffic, from 2003, the reference variable here is the total consumption of engine fuels, excluding fuel in air traffic

Source: BMU-KI III 1 according to Working Group on Renewable Energies-Statistics (AGEE-Stat)



Graph 11: Share of renewable energy sources in total final energy consumption in Germany, 2007 / 2008



Graph 12: Renewable energy sources as a share of energy supply in Germany

Table 5: Contribution of renewable energy sources to electricity generation in Germany, 1990 - 2008

	Hydro-power ¹⁾	Wind power	Biomass ²⁾	Biogenic share of waste ³⁾	Photo-voltaics	Geothermal energy	Total electricity generation	Share of gross electricity consumption
	[GWh]	[GWh]	[GWh]	[GWh]	[GWh]	[GWh]	[GWh]	[%]
1990	17,000	40	222	1,200	1	0	18,463	3.4
1991	15,900	140	250	1,200	2	0	17,492	3.2
1992	18,600	230	295	1,250	3	0	20,378	3.8
1993	19,000	670	370	1,200	6	0	21,246	4.0
1994	20,200	940	570	1,300	8	0	23,018	4.3
1995	21,600	1,800	670	1,350	11	0	25,431	4.7
1996	18,800	2,200	853	1,350	16	0	23,219	4.2
1997	19,000	3,000	1,079	1,400	26	0	24,505	4.5
1998	19,000	4,489	1,642	1,750	32	0	26,913	4.8
1999	21,300	5,528	1,791	1,850	42	0	30,511	5.5
2000	24,936	7,550	2,279	1,850	64	0	36,679	6.3
2001	23,383	10,509	3,206	1,859	116	0	39,073	6.7
2002	23,824	15,786	4,017	1,945	188	0	45,760	7.8
2003	20,350	18,859	6,970	2,162	313	0	48,654	8.1
2004	21,000	25,509	8,347	2,116	557	0.2	57,529	9.5
2005	21,524	27,229	10,495	3,039	1,282	0.2	63,569	10.4
2006	20,042	30,710	15,593	3,675	2,220	0.4	72,240	11.7
2007	21,249	39,713	18,645	4,130	3,075	0.4	86,811	14.0
2008	20,900	40,400	21,084	4,950	4,000	18.0	91,352	14.8

¹ in the case of pump storage power plants, electricity generated from natural inflow only,
² solid, liquid, gaseous biomass, landfill and sewage; Until 1998 only feed-in the general supply grid
³ Share of biogenic waste in incineration plants estimated at 50 %
 Version: April 2009; All figures provisional; Deviations in the totals are due to rounding.
 Source: BMU-KI III 1 according to Working Group on Renewable Energies-Statistics (AGEE-Stat)

Table 6: Installed capacity for electricity generation from renewable energy sources in Germany, 1990 - 2008

	Hydro-power	Wind energy	Biomass*	Photovoltaics	Geothermal energy	Total capacity
	[MW]	[MW]	[MW]	[MW _p]	[MW]	[MW]
1990	4,403	56	190	2	0	4,651
1991	4,403	98	N/A	3	0	4,504
1992	4,374	167	227	6	0	4,774
1993	4,520	310	N/A	9	0	4,839
1994	4,529	605	276	12	0	5,422
1995	4,521	1,094	N/A	16	0	5,631
1996	4,563	1,547	358	24	0	6,492
1997	4,578	2,082	400	36	0	7,096
1998	4,601	2,875	409	45	0	7,930
1999	4,547	4,444	604	58	0	9,653
2000	4,572	6,112	664	100	0	11,448
2001	4,600	8,754	790	178	0	14,322
2002	4,620	11,965	952	258	0	17,795
2003	4,640	14,609	1,137	408	0	20,794
2004	4,660	16,629	1,550	1,018	0.2	23,857
2005	4,680	18,428	2,192	1,881	0.2	27,181
2006	4,700	20,622	2,740	2,711	0.2	30,773
2007	4,720	22,247	3,238	3,811	3.2	34,019
2008	4,740	23,894	3,295	5,311	6.6	37,247

* 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); Version: April 2009;
All figures provisional

Table 7: Contribution of renewable energy sources to heat supply in Germany, 1990 - 2008

	Biomass	Biogenic share of waste *	Solar thermal energy	Geothermal energy	Total heat generation	Share of heat consumption
	[GWh]	[GWh]	[GWh]	[GWh]	[GWh]	[%]
1990	N/A	N/A	130	N/A	N/A	N/A
1991	N/A	N/A	166	N/A	N/A	N/A
1992	N/A	N/A	218	N/A	N/A	N/A
1993	N/A	N/A	279	N/A	N/A	N/A
1994	N/A	N/A	351	N/A	N/A	N/A
1995	N/A	N/A	440	1,425	N/A	N/A
1996	N/A	N/A	550	1,383	N/A	N/A
1997	45,646	2,900	695	1,335	50,576	N/A
1998	48,625	2,988	857	1,384	53,854	3.5
1999	47,811	3,140	1,037	1,429	53,417	3.5
2000	51,036	3,278	1,279	1,433	57,026	3.9
2001	52,043	3,283	1,612	1,447	58,385	3.8
2002	51,302	3,324	1,919	1,483	58,028	3.9
2003	62,555	3,806	2,183	1,532	70,076	4.6
2004	66,251	3,694	2,487	1,558	73,990	4.9
2005	72,190	4,692	2,828	1,601	81,311	5.4
2006	82,558	4,911	3,274	1,934	92,677	6.1
2007	89,552	4,783	3,704	2,299	100,337	7.5
2008	97,031	5,020	4,126	2,516	108,693	7.7

* Biogenic waste share in waste incineration plants estimated at 50 %
Source: BMU-KI III 1 according to Working Group on Renewable Energies-Statistics (AGEE-Stat); Version: April 2009;
All figures provisional

Table 8: Contribution of renewable energy sources to fuel supply in Germany, 1991 - 2008

	Biodiesel	Vegetable oil	Bioethanol	Total biofuels generation	Share of biofuels consumption
	[GWh]	[GWh]	[GWh]	[GWh]	[%]
1991	2	0	0	2	0.00
1992	52	0	0	52	0.01
1993	103	0	0	103	0.02
1994	258	0	0	258	0.04
1995	310	0	0	310	0.05
1996	517	0	0	517	0.1
1997	827	0	0	827	0.1
1998	1,033	0	0	1,033	0.2
1999	1,343	0	0	1,343	0.2
2000	2,583	0	0	2,583	0.4
2001	3,617	0	0	3,617	0.6
2002	5,683	0	0	5,683	0.9
2003	8,267	52	0	8,319	1.4
2004	10,850	52	484	11,386	1.8
2005	18,600	2,047	1,936	22,583	3.8
2006	29,444	7,417	3,556	40,417	6.3
2007	34,239	8,736	3,444	46,419	7.3
2008	28,711	4,364	4,628	37,703	6.1

Source: BMU-KI III 1 according to Working Group on Renewable Energies-Statistics (AGEE-Stat);
Version: April 2009; All figures provisional

Table 9: Turnover from renewable energy sources in Germany, 2008

Investment 2008 (Euro mill.)			Operating 2008 (Euro mill.)		
Wind energy	2,300	17.5%	Wind energy	3,500	22.5%
Hydropower	70	0.5%	Hydropower	1,280	8.2%
Biomass electricity	500	3.8%	Biomass electricity	3,000	19.3%
Biomass heat	1,500	11.4%	Biomass heat	2,100	13.5%
Photovoltaics	6,200	47.3%	Photovoltaics	3,570	23.0%
Solar thermal energy	1,450	11.1%	Solar thermal energy	2,100	13.5%
Geothermal energy	1,100	8.4%	Geothermal energy	3	0.0%
Total	13,120	100.0%	Total	15,553	100.0%
Total turnover 2008 (Euro mill.)					
Wind energy	5,800	20.2%			
Hydropower	1,350	4.7%			
Biomass	10,670	37.2%			
Solar energy	9,750	34.0%			
Geothermal energy	1,103	3.8%			
Total	28,673	100.0%			

Source: Centre for Solar Energy and Hydrogen Research Baden-Württemberg (ZSW), Stuttgart
Version: April 2009; all figures provisional

**Further information on renewable energies can be found on the BMU website
www.erneuerbare-energien.de**