



Federal Ministry for the
Environment, Nature Conservation
and Nuclear Safety

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WHAT ELECTRICITY FROM RENEWABLE ENERGIES COSTS

Abridged version

DEVELOPMENT OF THE RENEWABLE ENERGY SOURCES ACT

In 1991, the feed-in of electricity from renewable energies to the grid was legally regulated for the first time in Germany with the Electricity Feed Act (Stromeinspeisungsgesetz). The central elements of this were an obligation on the part of the competent grid system operator to purchase the electricity generated and payment of a fee per kilowatt-hour in accordance with fixed rates (so-called feed-in tariff).

The Electricity Feed Act was replaced by the Renewable Energy Sources Act (Erneuerbare-Energien-Gesetz - EEG) in 2000, with its significantly broader scope. A review and where necessary adaptation of the Act every 4 years within the framework of a progress report is prescribed.

The German government's fundamental goals in the area of renewable energies are:

- Sustainable development of energy supply, climate, nature and environmental protection
- Increasing the share of renewable energies in gross electricity consumption to at least 12.5% by 2010 and at least 20% by 2020. The share of renewables in primary energy consumption should total 4.2% in 2010 and 10% in 2020
- Reduced external costs of energy supply
- Increased supply security by means of reduced dependence on energy imports, at the same time contributing to the prevention of conflicts over fossil energy resources
- Technological development in the field of renewable energies

The Renewable Energy Sources Act plays a key role here as it obliges grid system operators to feed in the electricity generated from renewable energies - which is not yet economically competitive - as a priority and to pay plant operators legally fixed minimum fees for this electricity. These minimum fees are based on plant-related electricity generation costs and are degressively structured, in other words they take account of progress in productivity and resulting cost reductions over time. The fees paid in accordance with the Renewable Energy Sources Act are apportioned to the electricity consumers. This apportionment is based on a user-pays principle: those with high electricity consumption pay more than those with low consumption.

IMPACTS

The Renewable Energy Sources Act has proven - also by international comparison - to be the most successful instrument for the market introduction of technologies for renewables use. In 2005, 62 billion kWh (TWh) or 10.2% of electricity generation in Germany came from renewables, of which 43 TWh/year was covered by the Renewable Energy Sources Act. This Act is, along with the eco-tax, also by far the most successful instrument for reducing climate-damaging carbon dioxide emissions. In 2005, for example, a saving of around 58 million tonnes of CO₂ was possible as a result of renewable energies in electricity generation, of which around 38 million tonnes were due to the Renewable Energy Sources Act. According to studies by the Federal Environment Ministry (BMU), CO₂ savings of around 52 million tonnes due to the Renewable Energy Sources Act alone can be expected in 2010, rising to around 89 million tonnes by 2020. Together with electricity not covered by the Renewable Energy Sources Act, renewable energies will therefore account for a CO₂ saving of 72 (2010) and 111 million tonnes (2020). The renewables share in Germany's total electricity supply could rise to around 25% by 2020.

The *fee payments* to plant operators totalled almost 4.1 billion euro in 2005. The resulting *additional cost* (so-called *differential cost*) as compared with the costs for electricity generated from conventional energy forms equalled around 2.4 billion euro. This *differential cost* (see below) triggered investments of approximately 5 billion euro in 2005. Total turnover in the field of electricity provision from renewable energies amounted to 8.7 billion euro.

COST DEVELOPMENT

Electricity providers in Germany have regularly placed the blame for rises in electricity prices in recent years on increased burdens as a result of the Renewable Energy Sources Act.

However, there are no figures to back up this claim as the table below illustrates. It shows the development of monthly electricity costs for an average private household with an electricity consumption of 3,500 kWh per year. The electricity bill is broken down according to the key cost components: In addition to the field “electricity generation, transmission and marketing”, these are the apportionments for the Renewable Energy Sources Act, the Heat-Power Cogeneration Act (promoting the use of heat-power cogeneration), the electricity tax (direct energy tax) and the concession charge (user charges for public roads by cities and municipalities). In addition to this is the value-added tax on all the above-mentioned components.

	1998	1999	2000	2001	2002	2003	2004	2005*
Electricity bill (EUR/month)	49,95	48,2	40,66	41,76	46,99	50,14	52,38	54,11
Renewable Energy Sources Act	0,23	0,28	0,58	0,7	1,02	1,23	1,58	1,63
Heat-Power Cogeneration Act	0	0	0,38	0,58	0,76	0,90	0,85	0,93
Electricity tax (eco-tax)	0	2,25	3,73	4,46	5,22	5,97	5,97	5,97
Concession charge	5,22	5,22	5,22	5,22	5,22	5,22	5,22	5,22
Generation, transmission, marketing	37,6	33,8	25,15	25,05	28,29	29,9	31,52	32,90
Value-added tax	6,90	6,65	5,60	5,75	6,48	6,92	7,24	7,46
per kWh	0,171	0,165	0,139	0,143	0,161	0,172	0,180	0,186
Electricity bill in prices from 2000	50,97	48,88	40,66	40,94	45,44	47,98	49,32	49,97

* Avoided costs for electricity covered by the Renewable Energy Sources Act (Source: Study "Ausbau Erneuerbarer Energien im Stromsektor bis zum Jahr 2020")

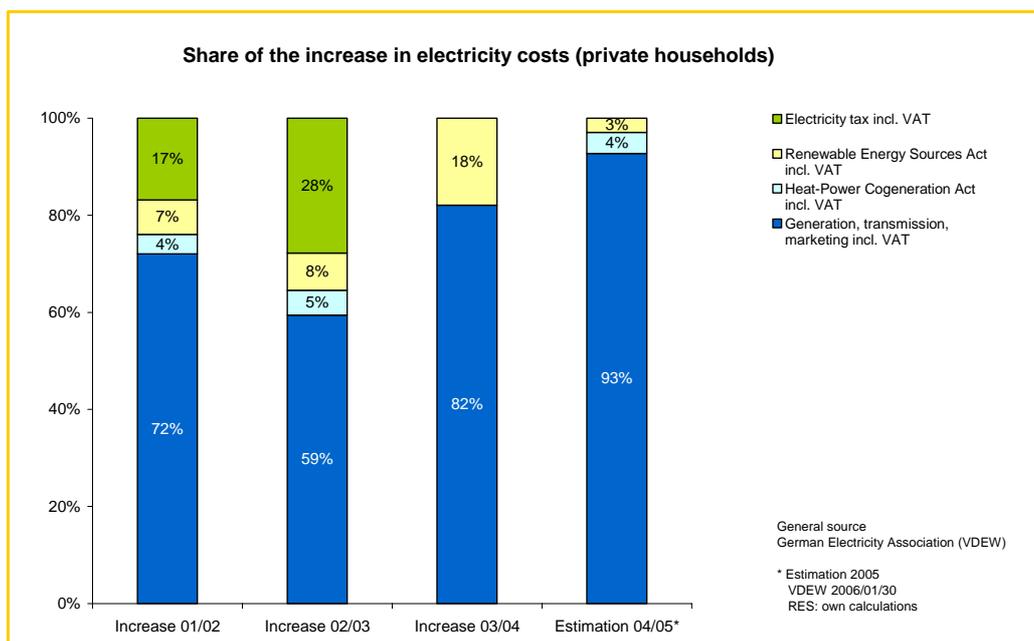
** from 2002 pursuant to the new Heat-Power Cogeneration Act (KWKG) that entered into force on 1 April 2002. Increase through reducing burden on manufacturing industry

*** varies greatly regionally: from 2002 1.32 to 2.39 cent per kilowatt-hour depending on size of municipality; some municipalities do not enforce this charge

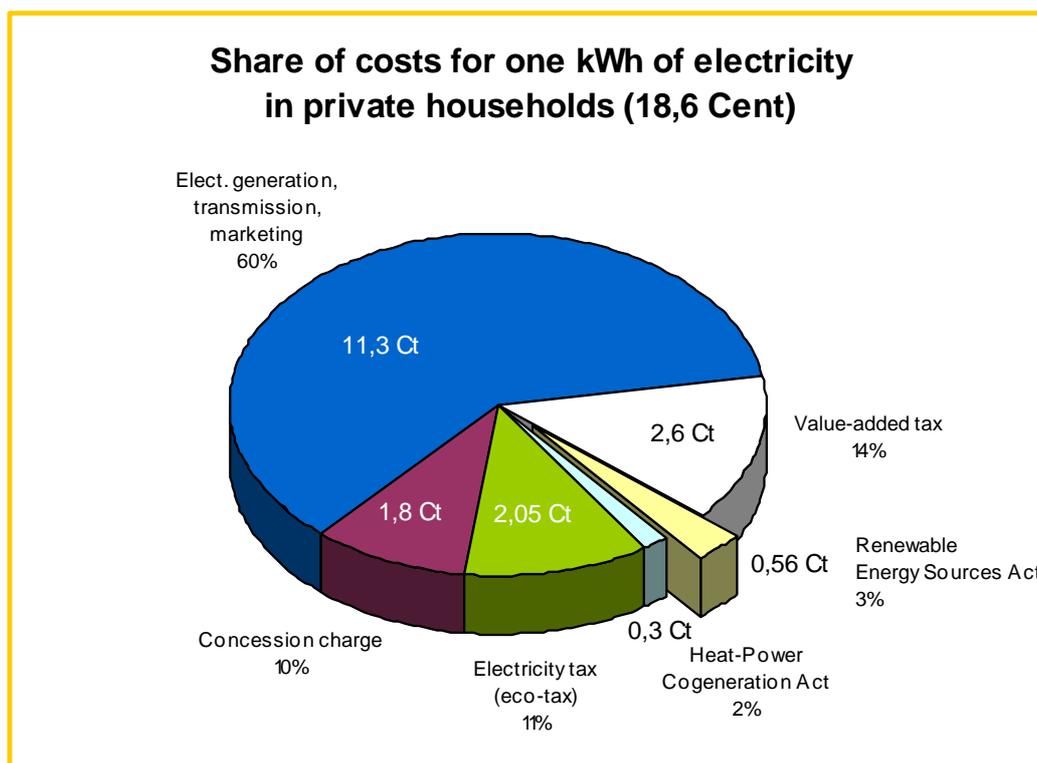
Sources: German Electricity Association (VDEW), for 2005 additionally: BMU Study "Ausbau der Erneuerbaren Energien im Stromsektor bis zum Jahr 2020"

What is striking is the initial relatively strong decrease in monthly electricity costs between 1998 and 2000 (by 9.29 euro as a result of competition setting in) and subsequently from 2001 a clear increase of 13.45 euro. Both price movements are primarily determined by the costs from “electricity generation, transmission and marketing”.

This is also illustrated by the following graph, which shows the factors that influence the price of electricity for private households.



All other cost components had only a minor impact on the cost increases for electricity for households. The electricity tax, introduced in 1999, rose significantly up to 2003 because of the scheduled increases in tax rates, but has remained constant since 2003. The shares of the Heat-Power Cogeneration and the Renewable Energy Sources Acts also increased in this period, but remain at a relatively low level. Between 1998 and 2005 the monthly electricity bill only increased by a total of 1.40 euro as a result of the Renewable Energy Sources Act. In kilowatt-hours this means an increase of the share of apportionment from the Act in those 7 years from 0.1 to around 0.6 cent. The share of renewable energies in the electricity price lies at only 3%.



CALCULATING APPORTIONMENT ACCORDING TO THE RENEWABLE ENERGY SOURCES ACT

The linchpin of calculating apportionment according to the Renewable Energy Sources Act is the value to be given to conventionally generated electricity that is displaced by renewable energies. The annual average value (EEX phelix base spot market) of the electricity traded on the Leipzig electricity exchange EEX can be taken as one basis for the calculations.

Now if average cost of the displaced electricity of 4.2 cent/kWh is subtracted from the average fee for electricity covered by the Renewable Energy Sources Act for 2005 - 9.53 cent/kWh - this results in a calculated additional cost of 5,33 cent/kWh for electricity generation. Multiplied by the total volume of the electricity covered by the Renewable Energy Sources Act, this amounts to the additional cost referred to earlier of around 2.4 billion euro. This corresponds to 0.56 cent/kWh shared across total electricity consumption.

If other prices are set for the displaced electricity, a deviating differential cost will of course arise. This explains why there are some very varied data regarding the costs of the Renewable Energy Sources Act. German electricity providers, for example, based their calculations in accordance with a so-called associations' agreement on purchase prices from long-term contracts, i.e. prices at the time of purchase in the previous year or year before.

INCREASED BENEFIT, RELIABLE PRICES

The Renewable Energy Sources Act has triggered a technological development that places Germany in a leading position on the global market in many areas of the renewables sector. Wind turbines and biomass plants “made in Germany” are already export hits and still have considerable potential for growth since there is a global boom on renewables markets. According to industry figures there are already around 170,000 people working in the renewables sector in Germany.

In comparison with quotas and bonus models, the Renewable Energy Sources Act with its fixed, long-term calculable feed-in fees is a significantly more efficient and cost-effective instrument for promoting renewable energies and leading them to profitability, as was recently confirmed by the EU Commission (COM (2005) 627). It promotes decentralised generation structures with significantly more public involvement than before and in doing so dismantles an unevenly distributed market power.

The monthly additional costs for an average household with an electricity consumption of 3,500 kWh per year currently total around 1.60 euro - in Germany the price of 750 grams of bread or barely one litre of fuel. While the costs of conventional electricity generation are clearly on the increase, most of the feed-in fees laid down in the Renewable Energy Sources Act are decreasing every year. Against this background, a recent scientific study by the Federal Environment Ministry predicts that despite continuously and clearly rising volumes of electricity covered by the Renewable Energy Source Act the monthly costs for a household resulting from the Act will only increase to a maximum of 2.80 euro/month by the middle of the next decade and will then decrease.

The expansion of renewable energies thus establishes the foundations and prerequisites for a sustainable technologically future-oriented energy supply that is cost-effective in the long term. The prospects for the future are good.

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A German unabridged version of the brochure “Was Strom aus erneuerbaren Energien wirklich kostet” can be ordered from the BMU or downloaded from the BMU website.