

Policy Brief

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Renewable Energy Sources Act in Germany

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Introduction

Germany is well known as a leader in the use of renewable energy sources. As of 2011, the shares of renewables in Germany reached 12.2% of the total final energy consumption and 20% of the total gross electricity consumption. Fig. 1 shows the development of electricity generation from renewables in Germany since 1990. In addition, various policies (*StrEG*, *EEG*) are indicated, along with their date of implementation.

There were some feed-in laws in Germany that supported the use of renewables. As of January 1, 2012, the Federal Ministry for the Environment, Nature Conservation, and Nuclear Safety updated the *Renewable Energy Sources Act* (*Erneuerbare-Energien-Gesetz: EEG*), which aims to increase the share of renewables in electricity supply to at least 80% by no later than 2050. This paper focuses on these policies and presents their features.

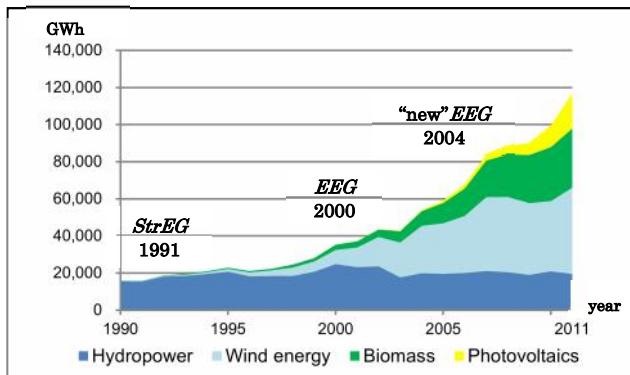


Fig. 1: Electricity generation from renewables in Germany

Background

The energy crisis in the 1970s prompted the German government to increase its support for hard coal and nuclear power. The first nuclear power plant in Germany began its operation in 1975. However, owing to the terrible accident at the Three Mile Island in the United States in 1979, nuclear power met with strong opposition from the public. Around that time, the government began to explore the possibility of a renewable energy technology, even though it continued to rely on nuclear power. At the end of the 1980s, renewable energy sources were attracting a remarkable amount of attention because of the accident at Chernobyl in the former Soviet Union in 1986. Rising concerns about climate change have also contributed to the transformation of the energy policy. The first electricity feed-in law, the *Act on Supplying Electricity from Renewables* (*Stromeinspeisegesetz: StrEG*), went into effect in 1991.

In 2000, after two amendments to *StrEG* and the implementation of the *Energy Industry Act* (*Energiewirtschaftsgesetz: EnWG*), the

goal of which was complete liberalization for all segments of the electricity sector, *EEG*, replaced *StrEG* and went into effect. After 4 years, *EEG* was completely revised and went into effect as the "new" *EEG*.

StrEG

The *Act on Supplying Electricity from Renewables* (*Stromeinspeisegesetz: StrEG*) was the first feed-in law, and it was in effect from 1991 through 2000. It consisted of 5 sections, aiming to support diffusion of renewables, and it was amended twice.

1. First version (1991)

The feature of this significant policy was to obligate a power supplier, which operates for general supply, to purchase electricity generated from renewables, hydropower, landfill gas, sewage gas, biomass (products or residues and biological waste from agriculture and forestry), solar energy, and wind energy. This version did not cover electricity from hydropower, landfill gas, sewage gas, or biomass from stations or facilities with a capacity over 5 MW. The power supplier did not have to comply with the policy if the cost of the electricity increased as a result of this obligation.

The price of electricity from renewables was determined by a certain rate of average revenue per kWh. From hydropower, landfill gas, sewage gas, and biomass, the price amounted to at least 75% (less than 500 kW) and 65% (more than 500 kW). For electricity from solar and wind energies, the cost was at least 90% of the average price of general electricity that was paid by the consumer.

2. First amendment (1994)

In this first amendment, the definition of "biomass" was expanded and the price of electricity was partially raised. First, the products or residues and biological waste from industrial handling and processing of timber were recognized as renewables. Then, the price of electricity from hydropower, landfill gas, sewage gas, or biomass increased to at least 80% (less than 500 kW) of the average revenue per kilowatt hour.

3. Second amendment (1998)

In the second amendment, the definition of "biomass" became more general, covering energy derived from both the animal and the plant materials. Some subjects were newly added. For instance, (A) if a facility of renewables is not located in the service area of an electricity supplier, then an operator who has the closest system to that area for receiving electricity is obligated to purchase electricity from renewables, and (B) if the total amount of electricity from renewables exceeds 5% of the total electricity sold by a supplier, then the supplier who has the higher voltage power system is obliged to cover the additional cost.

EEG

StrEG was revised significantly and became the *Renewable Energy Sources Act (Erneuerbare-Energien-Gesetz: EEG)*. It continued the approach of *StrEG* and went into effect in 2000. The aim of this policy was basically the same as *StrEG*, i.e., to facilitate the development of renewable energy supplies, with the goal of protecting the environment, and to achieve a substantial increase in the renewables in order to double the share of such energy sources by 2010.

EEG consisted of 12 sections. There were four major changes in terms of coverage of renewables and the related rules. First, geothermal energy and gas from mining were newly categorized as renewables, in addition to hydropower, wind energy, solar radiation energy, landfill gas, sewage gas, and biomass. The second major change was the price and period of electricity sold by operators. The price became fixed and was organized into detailed categories. The purchase period was also fixed as 20 years. Third, it was defined that the cost associated with connecting renewables to a grid should be borne by the installation operators, and the cost associated with upgrading the grid to connect new installations should be paid by the grid operator. The fourth major change was the "Nationwide equalization scheme." This scheme allows grid operators who have purchased a larger amount of electricity from renewables than the average amount to sell energy and to receive compensation from other grid operators until these other operators have purchased an amount of electricity equal to the average share.

EEG was also partly revised in 2003. The changes were related to the obligation and pricing structure of electricity from solar energy. The amendments permitted companies that used more than 100 GWh of electricity in the closest fiscal year and whose ratio of electricity cost to the gross value added was more than 20% to pay less than 0.05 cents per kilowatt hour for the share of electricity exceeding 100 GWh.

"New" EEG

EEG was revised substantially in 2004. The latest amendment was conducted and went into effect on January 1, 2012. It is composed of 66 sections. The seven main parts are (1) general provisions; (2) connection, purchase, transmission, and distribution; (3) feed-in tariffs; (4) equalization scheme; (5) transparency; (6) legal protection and official procedure; and (7) authorization to issue ordinances, progress reports, and transitional provisions.

The purpose of the new *EEG* is to facilitate a sustainable development of energy supply, to promote the further development of technologies, to conserve fossil fuels, and to reduce the costs of energy supply. The target share of renewable energies is at least 35% of electricity supply as of 2012 and 18% of the total gross final consumption of energy by 2020.

Conclusion

Without a doubt, the renewable energy source acts *StrEG* and *EEG* have strongly supported and promoted the remarkable diffusion of renewable energy in Germany. The factors of this success could be summarized into two key points: (a) detailed system design and (b) equalization scheme. *StrEG* and *EEG* were amended many times over a short period of time to adapt to rapid changes in the industrial environment for the sustainable diffusion of renewables. The price structure of renewables was classified in detail, which also led to the continued diffusion of various types of renewables. While the costs associated with purchasing electricity generated from renewables shall be borne by the grid operators, those costs are eventually paid by consumers. In this respect, the equalization scheme, which has aimed to avoid the unfair sharing of incurred costs among different areas in the country, also plays another important role in the successful diffusion of renewables.

In Japan, a feed-in tariff was started in July 2012, and the continued diffusion of renewable energies is strongly expected. This Japanese policy could become the key for the subsequent success of diffusion, as performed effectively by *StrEG* and *EEG* in Germany. As the next step, we must consider integrating rapidly increasing shares of renewables in the market in order to realize a sustainable and reliable electricity market.

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Table 1: Price of electricity generated from renewables with rough classification (cent/kWh)

Renewables	Category	StrEG 1991	EEG 2000	"New" EEG 2004	EEG as of 2012
Hydropower	- 500 kW	7.08	7.67	9.67	12.70
	500 kW -	6.13	6.65	3.70–7.67	3.4–10.31
Gas (landfill, sewage)	- 500 kW	7.08	7.67	7.67	6.79–8.60
	500 kW -	6.13	6.65	6.65	3.98–6.84
Biomass	- 500 kW	7.08	10.23	9.90–11.50	12.30–14.30
	500 kW -	6.13	8.7/9.21	8.40–8.90	6.00–11.00
Geothermal	- 500 kW	-	8.95	8.95 – 15.00	25.00
	500 kW -	-	7.16	7.16	
Wind energy	Onshore	8.49	6.19/ 9.1	8.7	4.87–8.93
Solar energy	-	8.49	50.62	45.7–62.4	21.11–28.74

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