The Renewable Energy Act in Germany: Its basic idea and recent developments

Eberhard Waffenschmidt
TH Köln (Technische Hochschule Köln, University of Applied Sciences)
CIRE – Cologne Institute for Renewable Energy
Betzdorferstraße 2, 50679 Cologne, Germany
eberhard.waffenschmidt@th-koeln.de

ABSTRACT

The Renewable Energy Act (EEG) in Germany is the foundation for the worldwide expansion of renewable energies and its application led to their cost decay, which was anticipated only by very few experts. The basics of the EEG has been copied in more than 50 countries supporting the use of renewable energies. This contribution explains the basics features of the EEG and derives the factors for its success. Furthermore, it gives a personal view on the recent development of this law in Germany and the resulting development of renewable energies in Germany.

Keywords: Renewable energy, legislation, renewable energy act, Germany

1 INTRODUCTION

The Renewable Energy Act (Erneuerbare-Energien-Gesetz, EEG) in Germany can be considered as the base for the amazing growth of Renewable Energies in the last decade. This growth can best be visualized in a figure with logarithmic scale as shown in Figure 1 (Data sources listed in the figure). If the growth dynamic of the first decade of this millennium had continued, the electrical energy demand could be covered by 100% with renewable energies in 2020. However, the growth has been reduced meanwhile. Nevertheless, about one third of the electric demand can be supplied by renewable energies today. During some hours in the year, the electrical demand can already even be covered by 85% of renewable energies in Germany (see Figure 2) [1]. What is the reason for the success of this regulation?

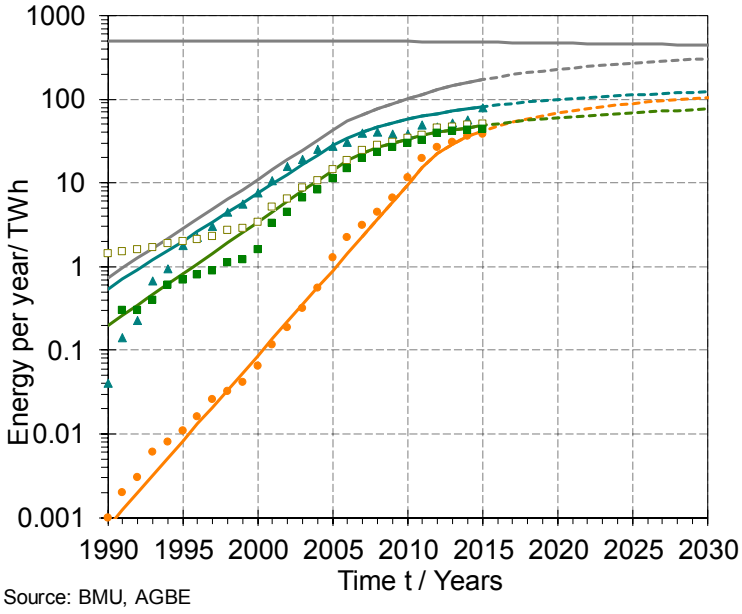

Figure 1 Development of the energy feed-in from renewable energy sources in Germany.

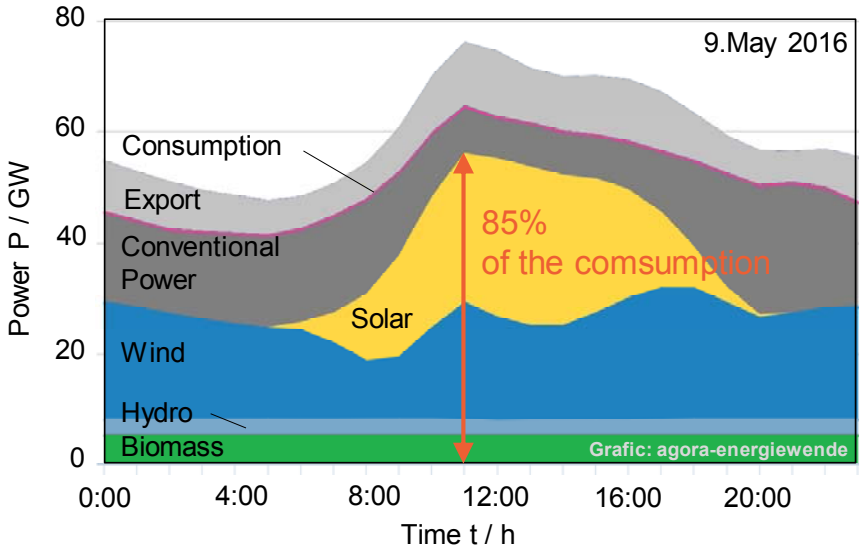

Figure 2 Example for an extreme daily feed-in of renewable energy sources and consumption of electrical power in Germany [1].

2 DECENTRALIZED GENERATION

Renewable energy sources are by themself distributed and decentralized. Thus, physics supports an energy system owned and maintained by many individual citizens rather than large companies. Such citizen's transformation has several advantages:

- It can be faster, because private persons are satisfied with less profit that large companies. Thus, the same money can be used for more investments
- It can be faster, because additional capital can be raised from many small investors, which otherwise wouldn't have use the money.
- It can be faster, because a contribution of citizens (financial contribution and responsibility) results in faster agreement and less confrontation.
- It can be faster, because many more people can act in parallel.

If we really want to realize the results from the climate conference in Paris, we are forced to act much, much faster. Therefore, the energy transformation must be decentral and citizens owned.

3 THE THREE PILLARS OF THE RENEWABLE ENERGY ACT

The EEG supports a decentralized „Bürger-Energiewende", a transformation towards an energy system owned and maintained by citizens. The basic, original idea of the EEG is based on three pillars: cost-covering feed-in tariff, cost sharing among all customers and fed-in priority for renewable energies (see also illustration in Figure 3).

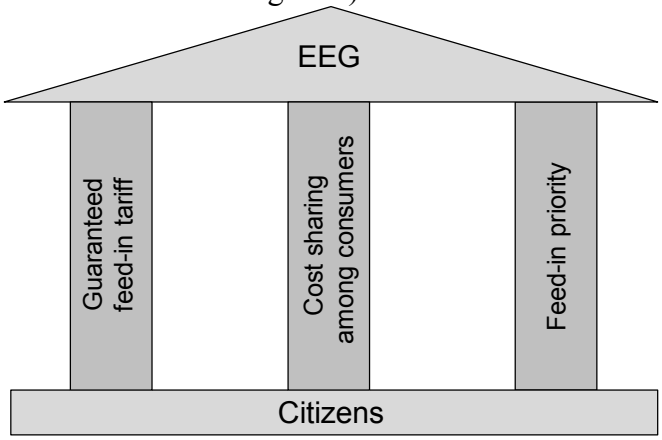

Figure 3 The tree pillar of the German Renewable Energy Act (EEG).

3.1 Cost covering guaranteed feed-in tariff

The cost-covering feed-in tariff has significantly contributed to the success of the transformation of the energy system. It is set such it allows a depreciation of the investments within the lifetime of 20 years with a reasonable profit. Contrary to a direct subsidy for the investment, this principle forces the owners to maintain the equipment. Otherwise, their financial investment would be lost.

The feed-in tariff is fixed at the time the equipment is installed and then it remains guaranteed for 20 years. This gives safety for the taken investments and readiness of the banks for giving loans. This is important to put the energy transition on a broad base. The investment into an own photovoltaic (PV) system or in other citizen energy projects must as predictable as buying a car. The height may be discussable, especially with the background of a possible self-consumption (see below). However, such a guarantee must be available also in future.

The feed-in tariff for new installed equipment reduces by time. Due to a huge production extension and corresponding learning rates the cost of renewable energy sources reduces year by year. Especially the photovoltaic costs have been decreased drastically beyond any expectations. Figure 4 shows the decrease of the feed-in tariff for home PV system smaller than 10 kW [2]. Before the year 2000 local initiatives implemented a similar remuneration scheme. At that time, a feed-in tariff of about 1 €/kWh was given to operators of the first PV systems. In addition, it has to be noted that today in sunny areas of the world PV production cost of about 3 €ct/kWh are possible for large scale systems. PV has become the cheapest energy supply of all.

Figure 4 also shows for comparison the typical price of household electricity including all tax and further fees. The data is taken from the corresponding author's personal electricity bill in Aachen, Germany. Since a few years, PV energy is significantly cheaper than electricity bought from the grid. This is becoming the main motivation for using private PV systems in Germany. The difference is even high enough to pay for first battery storages. The majority of actually built PV systems in Germany are sold with a battery storage now.

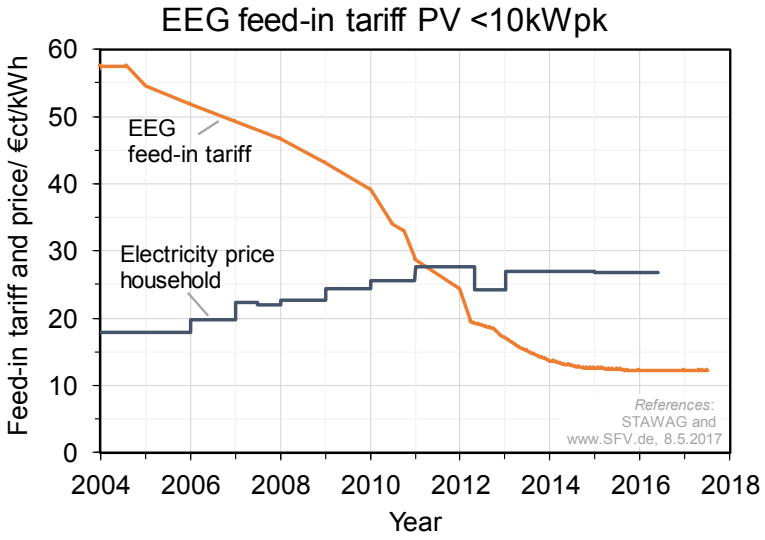

Figure 4 Development of the feed-in tariff for small PV systems (<10 kWpk) compared to the household electricity price in Germany.

3.2 Cost sharing among all customers

The cost of the feed-in tariff is shared among all customers using electrical energy. Every user has to pay a certain amount for each spent kWh, the "EEG allocation", which is about 6.9 €ct/kWh in 2017. This is a very fair principle: Those who use more energy have to pay more. In Germany, this is organized by the grid operators, not by the government. Therefore, the cost does not put any burden on the public tax system. In addition, this avoids unsuitable influences by politics. If the cost were organized by a public tax system, criticism on spending "public money" could easily raise.

However, additional burdens are put on this EEG allocation, as illustrated in Figure 5. The figure shows the development of the EEG allocation [3] in comparison to the payments to the operators of renewable energy systems [3]. At the beginning until 2009 the two curves follow each other, as expected. After 2009, the EEG allocation increased over-proportional compared to the expenses for the system. This results from two reasons. First, politics changed the mechanism for calculating the EEG allocation then. The allocation only includes the "additional cost" for renewable energies, with the cost for conventional electricity as a reference. From that time on, the price at the stock exchange was taken as the reference. But this price is heavily reduced due to renewable energies. Therefore, the difference increased and the EEG allocation as well. Furthermore, energy intensive industry was exempted from the EEG allocation in order to keep that industry in Germany. However, the cost had to be shared by less customers, leading to an increase of the EEG allocation for the remaining electricity users.

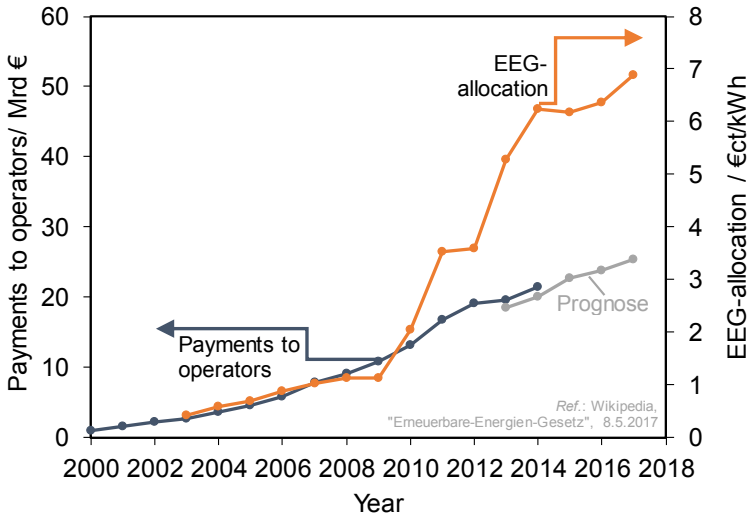

Figure 5 Development of the EEG allocation compared to the payments to operators of renewable energy generators in Germany.

3.3 Feed-in priority

The third pillar is the feed-in priority for renewable energies. Conventional power sources are supposed to reduce or even shut down their generation before any renewable energy sources are cut. If the power cannot be distributed due to grid constraints, the operators are obliged to extend their grid "immediately".

This is not to be confused with a feed-in guarantee. We need to maintain the balance between generation and consumption. When in the near future the generation with renewable energy sources exceeds 100% of the power need for some hours, it will be necessary to limit the feed-in. Also the possibility to store energy can be used to relieve the grid. However, in any case, first fossil and nuclear power has to be shut down in such a case.

However, the EU commission is going to abandon the priority dispatch for renewable energies in Germany and other countries leading in Renewable Energies. As soon as more than 15% of the electricity is generated from renewable energy sources, the priority dispatch for renewable energies shall no longer be applied [4]. As a consequence, feed-in of Renewable Energy could be cut not only by technical reasons, but by commercial reasons to give priority to energy delivered with dumping prices from lignite or nuclear power plants.

4 CONCLUSION

Concluding, I consider the German renewable energy act (EEG) as the base and one of the best legislatives for a decentralized and distributed energy transition to renewable energies. The guaranteed feed-in tariff reduces the risks and stimulates investments also by ordinary people. The share of the cost among all customers is fair and relieves the public tax system from additional burdens. And the feed-in priority forces the grid operators to adapt and extend the power grid.

5 REFERENCES

[1] „Agorameter“, Agora Energiewende, download 1.5.2017, https://www.agora-energiewende.de/de/themen/-agothem-/Produkt/produkt/76/Agorameter/

[2] “Solarstrom-Vergütungen im Überblick“, Solarenergie-Förderverein Deutschland e.V. (SFV), download 1.5.2017, http://www.sfv.de/lokal/mails/sj/verguetu.htm

[3] „Erneuerbare-Energien-Gesetz“, Wikipedia, download 1.5.2017, https://de.wikipedia.org/wiki/Erneuerbare-Energien-Gesetz

[4] “Proposal for a Regulation of The European Parliament and of The Council on The Internal Market for Electricity”, download from 1.5.2017, http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52016PC0861R%2801%29