

Success story:

Feed-In Tariffs Support renewable energy in Germany

This document will show how this success story has been brought about and is made up of the following sections:

1. What is a Feed-In Tariff?
2. What are the benefits of a Feed-In law?
3. The German success story
4. Key elements of the legislation
5. Contacts for advice on replicating this idea

1. What is a Feed-In Tariff?

Feed-in Tariffs (FITs) aim to support the market development of renewable energy technologies, specifically for electricity generation.

FITs put a legal obligation on utilities and energy companies to purchase electricity from renewable energy producers at a favourable price per unit, and this price is usually guaranteed over a certain time period. The most effective schemes are guaranteed for a period of around 20 years.

Tariff rates are usually determined for each renewable technology in order to take account of their differing generation costs, and to ensure profitability. Therefore, the FIT rate set by a particular government for solar, wind or geothermal generated electricity may vary depending on the costs associated with each of these technologies.

The guaranteed access to the grid, favourable rate per unit and the tariff term guarantee, mean that FITs make the installation of renewable energy systems a worthwhile and secure investment for the producers, manufacturers, investors and suppliers.

The extra cost of the favourable tariff rate is usually passed on from suppliers to consumers, and shared among all energy consumers by way of a premium on the per-kWh end user-price. The result of financing an FIT by spreading the cost between all end-users in this way is that the increase in price per household is very small.

2. What are the benefits of a Feed-In Law?

The big challenge for the renewable energy industry is to make the cost of clean energy competitive with conventional energy, which do not internalize the costs of pollution and are, furthermore, often heavily subsidised. Without political measures to increase consumer demand and facilitate access to the market, manufacturers of



renewable technologies cannot produce the unit volumes needed to bring prices down and drive technological innovation forward.

The Feed-In Tariff (FIT) has proven to be one of the most effective policy instruments in overcoming the cost barriers to introducing renewable energy and making it economically viable. The simple guarantees that FITs provide – including access to the grid, a set price per Kilowatt Hour (kWh) that will cover the costs associated with electricity production, and a guaranteed term for which they will receive that rate has turned several European countries into world leaders in the renewables sector. This is the case for Denmark on wind energy and for Germany – as explained below – on solar energy.

Some of the benefits of a well designed FIT law are:

- ***A reduction in CO2 emissions.*** Well designed FIT laws can greatly increase the market share of renewable energy, thereby replacing fossil fuel based power with clean electricity generated from renewable sources.
- ***The creation of jobs.*** The growth of the renewable energy industry will create jobs for thousands of workers. In Germany, for example, the renewable energy industry now employs about 234,000 people – almost 60% of whom were employed as a direct result of the German FIT law.
- ***A more secure domestic energy supply.*** By expanding the market share of renewable energy produced domestically, countries will rely less on imported fossil fuels.
- ***An increased drive for technological innovation.*** Good FIT rates for renewable technologies increase the drive for innovation, and encourage investment in technologies such as wind, photovoltaic solar energy, or Concentrating Solar Power (CSP) that all have huge potential.
- ***The creation of fair market conditions for renewable technologies.*** Renewable technologies have been unable, in the past, to compete with conventional energy sources that do not internalise environmental costs and are frequently heavily subsidised. FIT laws help to level the playing field, and enable renewables to compete.

3. The German Success story

The German FIT has been a huge success – and is generally regarded as the best example of an effective FIT law. The German FIT law has been in development since 1979, and has enjoyed sustained support from the German Bundestag, and from the wider population – a fact that has contributed considerably to its success.

The first real Feed-In Law in Germany was the **Stromeinspeisungsgesetz (StrEG) introduced in 1990**, otherwise known as the Electricity Feed-In-Law. This took the form of a simple one-page bill for assisting producers of electricity from small hydro



stations and wind energy installations. This bill required utilities to connect renewable energy generators to the grid, and to buy the electricity produced at a rate of 65-90% of the average tariff charged per unit to end-users.

This tariff rate ensured a profitable business for wind power generators situated at very good locations, but was not high enough to allow Photovoltaic (PV) plants to be operated profitably. Also, the StrEG did not include guaranteed tariffs for other renewable sources, such as for biomass. Having tariffs based on a percentage system also meant that when deregulation in 1998 brought electricity prices down, it simultaneously reduced incomes for renewable energy producers.

The StrEG was modified in several ways in April 1998 with the adoption of the **Energy Supply Industry Act**, and in 2000, the **Erneuerbare-Energien-Gesetz (EEG)**, otherwise known as the 2000 Renewable Energy Sources Act, was introduced in response to deregulation of the German electricity market in 1998, and a number of other problems with the StrEG. The EEG represented an update, refinement and replacement of German renewable energy policy.

The EEG introduced a number of changes, including a differentiation in tariff rates depending on the renewable energy type, size and site. It also extended the range of technologies to be covered, and replaced the StrEG's percentage-based rates with fixed rates over fixed periods - 20 years from the start of operation of each new qualifying plant. The tariff rates were determined by scientific studies, which determined the tariff figure that would allow profitability and the use of state-of-the-art technology. For example, PV systems were to be paid the highest reimbursement, i.e. 99 pfennig per kWh, due to the high costs of PV electricity at the time. The Act also provided that adjustments in rates could be proposed every two years, and in this way keep up with technological progress and market developments.

The **EEG Amendment in 2004** committed Germany to increase the share of renewable energy in the country's total electricity supply to 12.5% by 2010, and to at least 20% by 2020. The tariff rates in the 2004 Amendment ranged from €0.0539 per kWh for electricity generated from wind, to €0.5953 for solar electricity from small facade systems.

The rates at which the guaranteed tariff would reduce each year (annual digression rates) were also set fairly high in the amendment, ranging from 1%-6.5% annually depending on the technology. The tariff rates are set to reduce annually in this way because it encourages technical innovation and cost cutting in the renewable energy sector.

The process of fine-tuning the German FIT laws has been a long one, but the laws outlined above have had a major impact on facilitating the development of Germany's supply of renewable energy. While Germany's energy use has remained relatively stable, renewables have accounted for an ever greater portion of the electricity consumed, helping to limit Germany's greenhouse gas emissions. It has been estimated that the EEG itself has directly saved more than 33 million tonnes of carbon dioxide from being released into the atmosphere.



In 2006, renewables accounted for 11.8% of total electricity consumption in Germany – up from 10.2% in 2005. From 2000 to 2004 the volume of electricity produced from renewable sources supported by the EEG increased from about 13.6 terawatt hours (1TWh = 1,000,000 kWh) to 34.9 TWh. While energy produced from wind and biomass more than doubled in this period, there was also a nine-fold increase in electricity generated from PV systems in Germany.

The solar sector in Germany has grown considerably thanks to the Feed-in Laws. Germany is the largest solar heating producer in the world with a 47% share of the global market. There are now over 40 companies in Germany that produce solar system components, and the industry employs more than 20,000 people, and has a turnover of €1.7 billion per year. The renewables industry as a whole in Germany had a turnover of €21.6 billion in 2006, up from €16.4 billion in 2005, and employed about 214,000 people – more than the nuclear and the hard and brown coal industries combined. It is expected that by 2020 the renewable energy industry will employ 500,000 people.

4. Key elements of the legislation

Some key elements that legislators must consider when introducing a FIT law are:

- **Impose a priority purchase obligation.**

Grid operators must be obliged to connect renewable energy producers to the grid, whether the producers are utilities, businesses or private households, and they must transmit the electricity they produce. This should be a priority obligation so that electricity from renewable energy sources is purchased ahead of electricity from other sources. The consequence of this obligation may well be that conventional power generation plants must reduce their production. This feature is important as it increases investment security and ensures producers that each unit of renewable energy produced can be sold.

- **Determine which technologies and plants will be covered by the law.**

A FIT law needs to state clearly what renewable energy technologies and plants are covered by it. This is basic, but very important element of any FIT legislation.

- **Determine a good tariff rate.**

The tariff rate for electricity generated from renewable sources must be set at a level that guarantees profitability, and reflects the costs associated with electricity production from that source. Getting the tariff rate right is one of the most important - and most difficult - tasks. If it's too high, windfall profits for producers will follow. If it's too low, there will be no or little investment. For this reason it is important to include a mechanism for adjusting the tariff.

- **Guarantee the tariff rate over a specific period of time.**

The price-per-unit rate should be guaranteed for a specific period of time after qualifying producers have connected to the grid. This ensures the profitability of production, and the security of investment for producers, manufacturers, investors



and suppliers. The duration can be set differently for each eligible technology. A time limit should be fixed in order to reduce the overall costs of the FIT system. Restricting payment to a certain number of years also speeds up the innovation cycle by replacing old technology with new and more efficient equipment. Experience has shown that tariffs should be guaranteed for a reasonably long period of time, otherwise, investment security may be hampered. The German FIT law guarantees the rate for a period of 20 years, which has proven effective.

- **Determine an effective way of financing the FIT law.**

There are two main options for financing the feed-in tariffs. The costs could be covered by a cost sharing mechanism for all electricity end-users, or it could also be done through a fund. Most countries with FIT laws, including Germany, have financed it through a cost sharing mechanism. Such a mechanism equally distributes the costs on to the electricity bills of all consumers. This usually ensures that the cost per consumer is very low – in Germany it comes to approximately €1.50 per month per household. The major political advantage of this financing method is that it is separate from the national budget, and therefore less vulnerable to changing political moods.

- **Reduce the tariff rate each year.**

Reducing the annual per kWh tariff rate for plants qualifying for connectivity to the grid under the FIT law encourages innovation and cost cutting. In Germany, for example, the 2005 tariff rates per kWh for PV plants connected to the grid were reduced by 6.5% in 2006. This annual digression of tariff rates has spurred on innovation and encouraged very rapid growth in the renewable energy sector.

Copy of the legislation

Renewable Energy Sources Act (in English):

<http://www.solarpaces.org/Library/Legislation/docs/EEG%20English.pdf>

5. For advice on replicating this idea in your country

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