

Making grid-connect PV cheaper

The introduction of feed-in tariffs can drastically reduce the payback time of a domestic grid-connected PV system. It can also increase and diversify our renewable energy sources. Brad Shone, Alternative Technology Association Energy Policy Manager, looks at how it has worked overseas

Towards the end of September 2006, the South Australian government announced plans to introduce a 'feed-in' rebate for solar power generation. This was closely followed by a Labor Party promise in Victoria that, if re-elected, they too would introduce a 'feed-in' law for electricity from all renewable sources. So what exactly is a 'feed-in' tariff or law? And what of other countries' experiences with them.

At present, feed-in regulations exist in over 30 countries internationally. In essence, feed-in laws require electricity utilities to purchase electricity generated by renewable sources and fed back into the power grid. The scope and implementation of these laws varies across jurisdictions, however all involve the premium payment—through a feed-in tariff—to the supplier of the electricity.

The first instance of the introduction of feed-in laws was in the United States back in 1978, under the rule of Jimmy Carter. This remained the sole example of such legislation until the early 1990s when the concept caught on in Europe whilst simultaneously the USA phased out their laws.

Countries such as Denmark, Spain, Italy, Switzerland and Greece implemented feed-in policies between 1990 and 1994, and similar measures were adopted in India, Sri Lanka, Thailand, Latvia and Slovenia towards the end of the decade. More recently we have seen places as diverse as Brazil, Indonesia, Nicaragua, Cyprus and China added to the list.



Legislation in Germany

However, possibly the most famous, comprehensive and successful instance of feed-in laws internationally would be those introduced and modified over the past 15 years in Germany. In 1991 the German government introduced the Electricity Feed Act, legally regulating the feed-in to the grid of electricity generated from renewable resources. This act required utilities to purchase electricity generated from renewable resources at set rates (feed-in tariffs).

This scheme was expanded and enhanced with the adoption of the Renewable Energy Sources Act of 2000, which has been responsible for the dramatic growth in Germany's renewable energy market and in particular the photovoltaic industry. In the five years from 2000, the quantity of electricity fed into the grid from eligible sources has more

than doubled, with a seven-fold increase in installed photovoltaic (PV) capacity to a level of 794MW by the end of 2004. By comparison, at the same time Australia had 6.8MW of grid-connected PV, or less than 1% of Germany's capacity.

How feed-in laws work

The German system guarantees a premium payment for all electricity produced by eligible generators, at designated feed-in tariff rates, for 20 years from the date of installation. One of the unique features of the feed-in law is that it offers different feed-in tariffs for different generation technologies, based on a cost-to-yield analysis for that technology. For example, in recognition of the greater up-front costs for a solar PV system compared with a micro-hydro installation of the same capacity, the tariff offered to solar PV is considerably greater. At present, 1kWh of domestic-scale

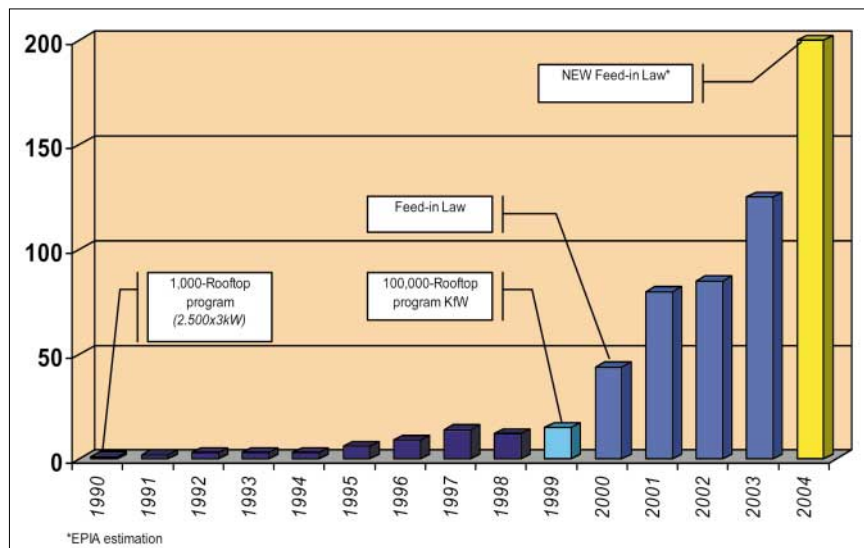
solar PV electricity is worth 57.4 Euro cents—more than three times the retail electricity price of 18.6 Euro cents.

There are approximately 40 different feed-in tariffs, allowing not only for differences in generation technology but also the scale and the positioning of the system. For example, off-shore wind attracts a higher rate than on-shore wind (due to higher up-front costs) and small-scale hydro more than large, with seven different tariffs for hydro power installations of different sizes.

Additionally, further allowances are made to account for differences in generation potential of each particular technology. Thus, sites with a better wind regime will have their tariff reduced at an earlier date than those with less favourable conditions, and biomass tariffs vary for different fuel sources; the purpose of such complexity being to not disadvantage one technology over another, or one location over another.

The range of tariffs offered is based on the ability for each renewable energy system installed to pay back the cost of investment at more-or-less the same rate. As intended, this has led to the adoption of a diverse range of technologies across all areas of the country. Such diverse energy investment ultimately creates greater energy security for the country as a whole.

In order to encourage early adoption of renewable energy technologies, and in recognition of advances in efficiencies arising from technology development, the feed-in tariffs have a built-in regression rate. This means the rate offered for subsequent installations is reduced annually, with differing regression rates for the various technologies, based on the potential for technological advances. For example, a PV installation commissioned next year would receive a 5% lower tariff for the 20 years eligible under the feed-in law than one brought online this year.



The annual PV installation (MWp) in Germany between 1990 and 2004 showing the impact of the feed-in laws.

Source: European Photovoltaic Industry Association (EPIA)

The costs

One of the attractions to government of the feed-in law is that it is cost-neutral, with the costs of paying the tariffs apportioned to electricity consumers (excluding railways and electricity-intensive industry). This has led to claims that the costs of feed-in tariffs place an unmanageable burden on the economy—claims not borne out by available data.

Since 1998 there have been significant fluctuations in the cost of electricity to consumers in Germany; however these fluctuations were largely driven by external factors related to generation, transmission and marketing. Indeed, in real terms, electricity prices actually fell in the seven years from 1998 to 2005. For all the additional investment and capacity resulting from the feed-in law, the final cost to consumers is presently around 3% of the total retail cost of electricity.

Driving force

The driving force behind Germany's policies has been to improve long-term energy security, reduce greenhouse gas emissions, ensure sustainable development of the energy supply, increase the

proportion of renewable energy in the electricity market, and stimulate technological development in renewables.

To date, the feed-in laws adopted have gone a considerable way to achieving these goals. In 2005, 10.2% of electricity came from renewable resources, and with grid-connected PV capacity alone nearly doubling annually, the government's 12.5% target set for 2010 will need to be upwardly adjusted just to keep ahead of growth. Germany now accounts for more than one third of the world's installed grid-connected photovoltaic capacity.

In an environment where Australia's state politicians are falling over themselves to set renewable energy targets, and even the federal government acknowledging the dangers of climate change and looking at alternatives to fossil fuels, they would do well to look at the German experience with feed-in tariffs.

It has proven to be a cost-effective and simple method of creating a diversified renewable energy market, aiding long-term energy security and achieving targets for renewable energy—and it shows no signs of abating. ★