Feed In Tariffs
oosting Energy for our Future

A guide to one of the world s best environmental policies

World Future Council

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World Future Council
P.O. Box 11 01 53
D-20401 Hamburg
Germany
Tel: +49(0)40.3070914-0
Fax: +49(0)40.3070914-14
info@worldfuturecouncil.org

For more information:
www.worldfuturecouncil.org

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8, 12: Maja Göpel
11: Corey Arnolds

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Climate Change "is the greatest market failure the world has seen". This analysis from Nicholas Stern has stimulated decision makers in many countries to consider new approaches to energy policy. Energy is the most important factor in human development, but our present dependence on fossil fuels is in danger of causing untold harm to future generations. Renewable energy (RE) is the best overall solution to climate, energy and economic security.

The unpredictable and sometimes explosive nature of the global energy market is not only negatively impacting on the climate, but also on economic and geopolitical matters. Fossil fuels and uranium are becoming increasingly scarce while worldwide consumption of these resources is steadily increasing. As a result, prices are rising and the risk of conflict over the diminishing supply of these finite resources is increasing. In most countries, energy supply is heavily reliant on coal, oil, gas and uranium.

The EU's dependency on imports of these resources already exceeds 50% and is certain to rise. In the US, fossil fuel supply is becoming a matter of national security.

This threat of energy shortages, in conjunction with the fact that there are still more than two billion people without access to any form of modern energy, shows that we urgently need to implement solutions that will help us change direction. Politicians are obliged, ethically, politically and economically, to create the conditions necessary for a flourishing renewables industry. It is crucial to accelerate the replacement of fossil fuels with renewable energies, to place real caps on emissions, and to make energy efficiency an integral part of our work and private lives. This is the route to avoid climate chaos and energy dependency, to develop sustainable employment, and to foster economic growth in your country.

Renewable energy for the future

The big challenge for the renewable energy industry has been to make the cost of clean energy competitive with heavily-subsidised conventional energy. Householders or energy companies who wanted to install wind turbines or solar panels have been faced with lengthy pay-back times. They have been forced to make a choice based on ethics rather than economics. If in the 1950s and 1960s, the manufacturers of coal or nuclear power plants had been faced with the same barriers that the renewables industry is now confronted with, they may not have built a single power plant. Without increased consumer demand and political measures to facilitate access to the market, manufacturers of, for example, wind turbines and solar photovoltaic (PV) panels, cannot produce the unit volumes needed to bring prices down and drive technological innovation.

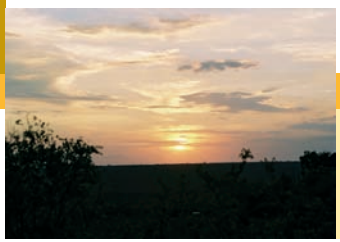
The Feed-In Tariff (FIT) has proven to be the most effective policy instrument in overcoming these barriers. This simple, low-cost mechanism has turned several European countries into world leaders in the renewables sector. The following general points address several key issues related to the expansion of the renewables industry.

a. Prospects for renewables

The price of fossil fuels is rising steadily while the price of renewables is coming down. When will the cost curves meet? The view among many experts is that wind power would already be competitive in most places if conventional energy had not had the benefit of subsidies. In fact, if the costs of fossil fuels reflected the environmental damage they cause, they would actually be much more expensive.

b. Can renewables meet our energy needs?

The figures for global renewable energy resources suggest that they could theoretically supply about 3000 times our current global energy needs (Greenpeace/EREC, p 60)! It may not be practical to exploit this in its entirety, but with a support scheme that is already a proven success, and the needs and opportunities there, the only thing lacking is the political will to switch to unlimited, green energy sources. With this we could create an energy system that helps to protect the health of the planet's systems on which we are utterly dependent.



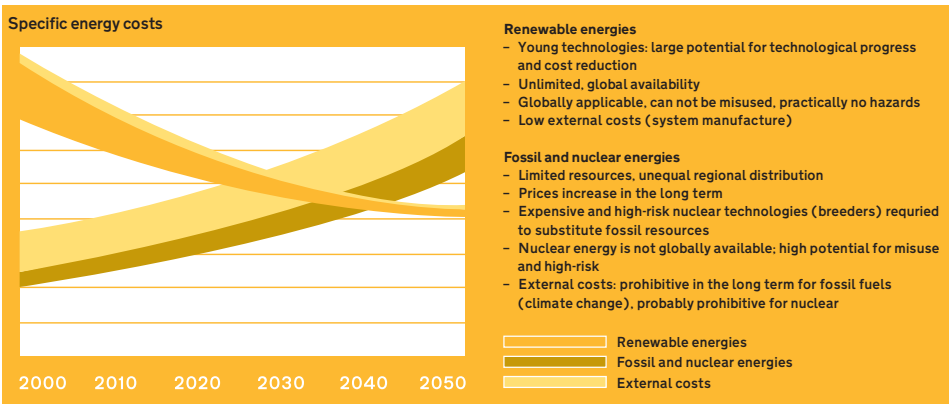
Stimulated by FITs, each country could install a mixture of renewable energy technologies reflective of its natural renewables endowment. Some countries are able to exploit geothermal, others solar, some wind and wave, and some biomass. Many have a good balance of different resources.

c. How many jobs can RE create?

The German FIT legislation has been instrumental in creating a world-beating industry in around 15 years, almost from scratch. Latest figures show that 214,000 people are now employed in the sector [BMU, 2007]. Projections for the US, if even a poor relation of the FIT were implemented, state that over 350,000 new jobs would be created [UCS, 2005]. Other sources suggest that three million jobs are possible [Apollo Alliance, 2004]. The figures would undoubtedly be higher if a Feed-In Tariff were implemented, as many smaller producers could participate in the sector, and more technologies would be supported. The Spanish renewables industry currently employs almost 100,000 people [Lungescu, 2007], and this is certain to rise as they press ahead with more investment, installations, design and manufacture.

As more and more countries are either obligated to introduce renewables, or choose the proactive path, job opportunities grow. The combination of a Feed-In Tariff with other subsidy programmes and technical cost breakthroughs will generate increasing and sustained installation of microgeneration equipment in homes and businesses. Management, sales, advice and other technical support staff will be needed, and the legions of satellite system installers and servicing personnel, who are facing a plateau or even decline in new installations and servicing needs, will have a great opportunity to benefit from this new industry.

Development of costs for renewable and conventional energy sources



Source: BMU, 2006

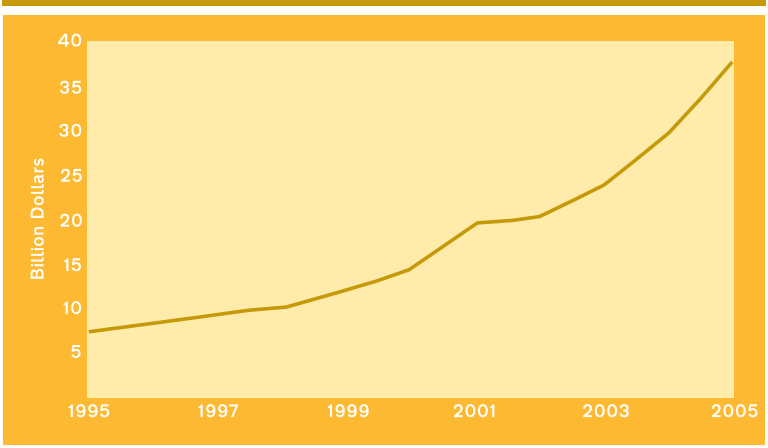
d. Is intermittency a problem for renewable energy?

All power sources suffer from some degree of intermittency and require back-up standby power. Wind and solar energy are naturally more intermittent than conventional energies, but they can be backed up with hydro-electric power, pumped-hydro storage, biomass, biofuels, or through combined heat and power (CHP) plants. Wind farms can provide forecasts of wind input to help balance the grid, and match these inputs with reserve capacity from other technologies. "100% 'back up' for individual renewable sources is unnecessary; extra capacity will be needed to keep supplies secure, but will be modest and a small part of the total cost of renewables. It is possible to work out what is needed and plan accordingly", says the UKERC Intermittency Report.

e. Uses of storage technologies

Renewable energy can be stored in a variety of ways, using both existing and developing technologies, including various battery technologies, large hydro reservoirs, pumped-hydro storage, flywheels,

The growth of investment in renewable energy



Source: REN21, 2006

compressed air, electric double-layer capacitors and hydrogen. Storage of the energy helps with balancing the grid and avoiding the need for building extra transmission infrastructure.

f. What makes a good support scheme for renewables?

An effective scheme is one that:

- provides tariffs for all levels, from domestic to large-scale developments
- takes account of the level of development of each technology
- guarantees long term investment security
- is administratively simple
- is easy to explain in order to ensure public acceptance

Energy Efficiency and Emissions Caps

Any sustainable energy strategy is incomplete without a similar commitment to smarter, more efficient energy use. World energy demand is rising rapidly, and as conventional energy sources decline we must ease the pressure on all sources. Increasing energy efficiency means that the same or greater output is achieved with less input. In electricity production, in transport, and in heating and cooling, less energy could be used if systems, machines, vehicles, appliances and other energy users were more efficient. Finally, we need to introduce stricter, enforceable caps on greenhouse gas emissions. This would mean that polluting energy consumption is legally limited and becomes increasingly expensive with growing demand.

With a combined renewables and efficiency approach, the transition to a low or no-carbon energy system can be accelerated immensely, and in the mid-term saves costs for generators, distributors and end-users. With global population rising and personal energy use growing around the world, only a combined strategy of renewable technology, consumption efficiency and emission capping allows us to respond to the reality of climate change.

How does a FIT work?

FITs are simple. They put a legal obligation on utility companies to buy electricity from renewable energy producers at a premium rate, usually over a guaranteed period, making the installation of renewable energy systems a worthwhile and secure investment for the producer. The extra cost is shared among all energy users, thereby reducing it to a barely noticeable level.

FITs are effective at overcoming the various barriers that confront market entry for renewables, which can be summarised as follows:

- costs and pricing: distorted 'playing field' through subsidies for competing energy sources; fluctuation of oil and gas prices; high initial capital costs; environmental externalities
- legal and regulatory: lack of legal framework for independent power producers; planning restrictions; grid access; liability insurance requirements
- market performance: lack of access to credit; perceived technology performance uncertainty and risk; lack of technical or commercial skills and information [Beck and Martinot, 2004]

A good feed-in law can overcome many barriers to market entry for RE producers. For example, the German Renewable Energy Sources Act:

- gives RE priority access to the grid
- obliges grid operators to purchase electricity from renewable sources
- sets the price for RE electricity for long, fixed periods
- sets no limit to amount of RE feeding into the grid

Well designed and implemented FITs can also:

- support installations of different sizes and technologies: in addition to large RE projects for wind, solar, biomass etc, householders can now get a guaranteed pay-back on a solar roof in just a few years, rather than 20–30 years
- promote innovation: annual reduction of tariffs for new installations drives technological efficiency
- drive economies of scale: investment and demand are rising, and manufacturing expansion is taking place globally in response, lowering costs further over time

- promote stability: change of government does not affect the system, as it does not cost taxpayers anything through taxes, and so cannot be cut from the national budget
- promote public support: through public participation in the scheme, no direct taxpayer costs, simple administration, and increased awareness of the benefits of RE
- create fair market participation conditions for every energy provider

All this is possible when the FIT is designed and implemented properly!

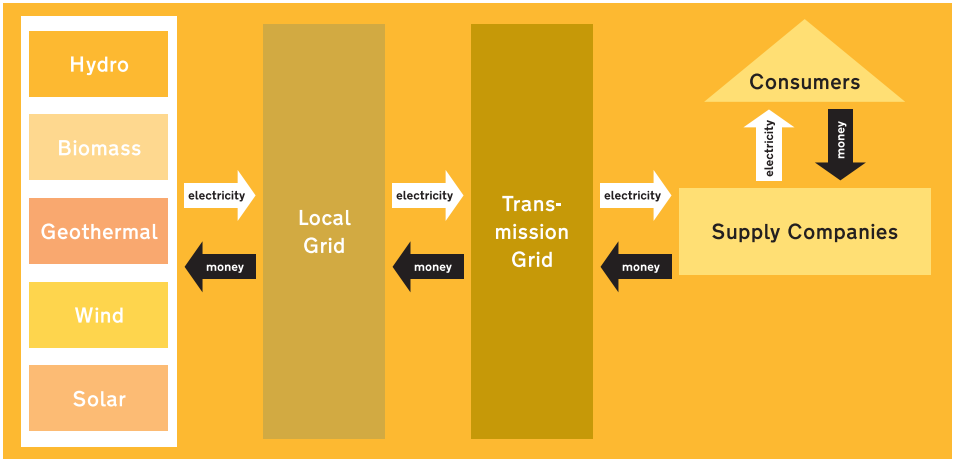
The diagram below shows the simple mechanism of the German version – the Erneuerbare-Energien-Gesetz (EEG), or Renewable Energy Sources Act 2000.

Already applied in over 40 countries, states and provinces around the world, FITs have helped to accelerate the switch from fossil fuel energy to renewable energy. They have been a highly effective tool for boosting the viability, and hence value, of the renewables industry.

FITs have been empirically proven to generate the fastest, lowest-cost deployment of renewable energy, and with this as a priority for climate protection and security of energy supply, not to mention job creation and competitiveness, FITs are the best vehicle for delivering these benefits.

"A frequent criticism of the Feed-in Tariff is that it does not generate sufficient competition. However, our analysis revealed stronger competition among turbine producers and constructors under the feed-in tariff than under either of the UK schemes." [Butler and Neuhoff, p 31]

How does the EEG work?



Source: Viertl, 2004

Three steps to a FIT

1. Evaluate your domestic conditions in terms of: renewable energy resources, political environment, economic environment, geographical conditions, and technological preconditions; determine the desirable and possible rates of increase in RE in terms of capacity and share in the energy mix; assess the state of the national electricity grid and the level of connection across the country. Identifying comparable conditions in other countries where a feed-in law has already been implemented will be helpful. It is critical to ensure that the public is backing the uptake of renewables, so practice effective communication of the benefits and opportunities of RE.

2. Find partners to help push the political process. They should be independent from the conventional energy industry, and must be ready to argue against it if necessary. Ensure that Parliament and Government are ready for such a system – and are not unduly influenced by the traditional energy industry.

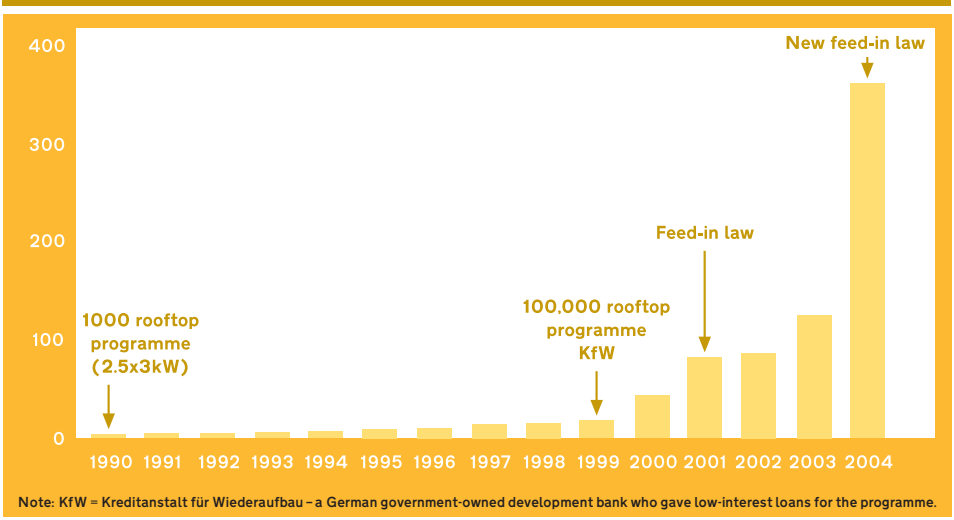
3. Start with a comparatively simple regulation and improve it over time. Therefore, there should be a monitoring process within the regulation in order to check if the goals and targets are being met. Tariff rates should also be monitored and adjusted in order to control expansion rates and ensure correct payments for each technology as it matures.

For more detailed information, see the WFC book on FITs (details below).

Some countries have opted for other instruments, such as government grants schemes for microgeneration (domestic-scale wind and solar), funded by the tax-payer. In the UK and elsewhere, these grant schemes have been massively over-subscribed and have done comparatively little to stimulate the introduction of renewable energy at the domestic level.

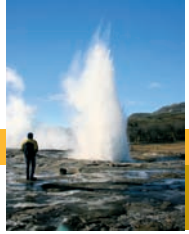
FITs, on the other hand, can kick-start the domestic renewable energy market without requiring large government subsidies. And yet, they do not create a notable burden on anyone else either. It amounts to around an extra €1.50 per household per month in Germany. By contrast, the UK's 'Renewables Obligation' system, which uses another mechanism known as a 'quota' system to promote large-scale renewables deployment, costs a similar amount, yet has produced only a small fraction of the renewables expansion, job creation, market development and CO2 savings.

Influence of Feed-In Tariff on an annual PV installation in Germany (MW)



Note: KfW = Kreditanstalt für Wiederaufbau – a German government-owned development bank who gave low-interest loans for the programme.

Source: EPIA, 2005

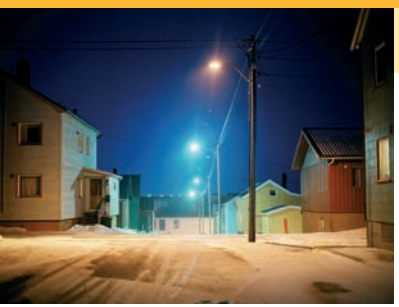


The FIT system means that the pay-back time for PV is no longer several decades but several years instead. In countries such as Germany and Spain the demand for renewable energy systems has risen dramatically and the installation costs are coming down fast. This financing model has now been taken up widely around the world, as the table below shows:

Countries, states and provinces that have adopted FITs

Year	Cumulative number	Countries/states/provinces added that year
1978	1	United States
1990	2	Germany
1991	3	Switzerland
1992	4	Italy
1993	6	Denmark, India
1994	8	Spain, Greece
1997	9	Sri Lanka
1998	10	Sweden
1999	13	Portugal, Norway, Slovenia
2000	14	Thailand
2001	16	France, Latvia
2002	20	Austria, Brazil, Czech Republic, Indonesia, Lithuania
2003	27	Cyprus, Estonia, Hungary, Korea, Slovak Republic, Maharashtra (India)
2004	33	Italy, Israel, Nicaragua, Prince Edward Island (Canada) Andhra Pradesh and Madhya Pradesh (India)
2005	40	Turkey, Washington (US), Ireland, China, India (Karnataka, Uttaranchal, Uttar Pradesh)
2006	41	Ontario (Canada)

Source: REN21, 2006



FITs can be shaped according to a country's RE resources, its electricity distribution system and its RE targets. There are many design options to help take account of these variables, including some which make the system more compatible with liberalised energy markets (but carry higher investment risk). The important thing is that each technology is supported if viable. Some innovative technologies which are still at the demonstration phase of development may require a different type of government support, such as tax incentives or soft loans.

Proof of the effectiveness of the FIT model can be found in the following figures from Germany.

German achievements in figures:

- 214,000 jobs created
- 97 million tonnes of CO2 emissions avoided in 2006 through renewables
- 11.8 % share of total gross electricity consumption from RES in 2006
- 5.3 % share of total primary energy consumption from RE in 2006
- € 21.6 billion total turnover in 2006 through RE (building and operation)
- € 8.7 billion investment per year
- reduction of around € 5.40 worth of environmental damage per household per month
- All this, at a cost of only around € 1.50 per household per month!

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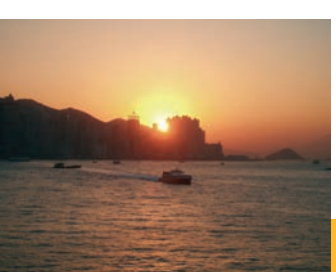
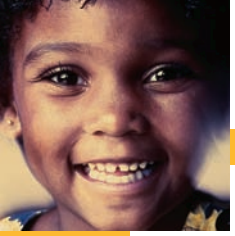
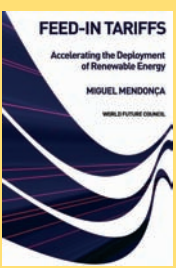




Feed-in Tariffs – Accelerating the Deployment of Renewable Energy



This concise introduction to Feed-In Tariffs demonstrates, by drawing on empirical studies, why these laws produce the fastest, lowest-cost, most technologically-diverse deployment of renewable energy. It includes comparisons with other policy instruments, and the performance of countries that have opted for these alternatives. The current variety of FIT design options are shown and the key points of effective systems highlighted.

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The World Future Council

The World Future Council (WFC) is a new voice in the political arena – one that draws on our shared human values to champion the rights of future generations, and which seeks to ensure that humanity acts now for a sustainable future.

The Council unites fifty highly respected figures from across the globe, and from all walks of life to create a reliable global institution that works to close the gaps between what is considered politically feasible and what is actually necessary to secure our common future.

In order to bring about such major changes we have to build movements. This means that we have to work in partnership with others, rather than working in parallel; and build on existing knowledge and expertise, rather than trying to reinvent the wheel.

The WFC acts as a catalyst for change: working closely with parliamentarians, civil society groups and experts worldwide, it identifies best practices and policies and spreads this knowledge through global campaigns involving parliamentary hearings, legislative assistance, tailored mailings, and events. The website will become a multimedia clearinghouse on policies and strategies to change the world: www.worldfuturecouncil.org

A Policy to Change the World

Feed In Tariffs

- Reduce CO2 emissions
- Create jobs
- Ensure energy supply
- Guarantee investment security
- Drive technological innovation
- Provide fair market conditions