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Feed-in Tariff for Renewable Energies: An Effective Stimulus Package without New Public Borrowing

Significance of renewable energies in the current economic crisis

The financial crisis is having a devastating impact on the global economy. Practically all the world's governments are attempting to support their economies with stimulus packages in order to avert high levels of unemployment and the social disruption that would accompany them. Almost everywhere, these stimulus packages are being financed from tax revenues. In the majority of cases, the financial resources required are greater than the receipts flowing into the public coffers, with the result that public borrowing is rising rapidly. This dangerous development will impose a heavy burden on future generations because they will have to pay back the debts that are being run up today.

Stimulus packages that do not require the commitment of public financial resources are hardly receiving any attention in the public debate or even the policymaking process; measures of this kind presuppose an incentive for investment from the private sector. Private capital can come either from financial funds or from civil society sources, cooperatives, for example. Both sources of funding can provide large volumes of finance and help ensure that necessary investments are made in a difficult economic situation. By taking targeted regulatory measures on the markets, governments and parliaments can incentivise private investments and so put in place stimulus packages to invigorate the economy without incurring new debts.

If these regulatory measures are seen in connection with the necessity of fighting other crises, they can simultaneously be used to address a range of different problems with which society is confronted. Important objectives that could be pursued include climate protection and the securing of energy supplies, which will both only be practicable if we make the transition to renewable energies. It would also be possible to take action in other fields, such as preventive healthcare, which could be decisively promoted with clean food from organic farming, and the production of non-toxic chemicals.

Since 2000, the Renewable Energy Sources Act (EEG) has made it possible for a new sector of the economy to be built up in Germany: a renewable energies industry that is heavily dominated by small and medium-sized enterprises. And this has been done largely without public financial support. Statutory regulation has created hun-

dreds of thousands of jobs without any new debt being incurred, as well as actively promoting climate protection and laying the foundation stone for the provision of independent, clean energy supplies from domestic sources. The statutory regulatory measures that have been implemented are centred around the principle of feed-in tariff. Similar forms of statutory regulation are also conceivable to encourage organic farming, zero-emissions mobility or a chemicals industry that is no longer dependent on fossil raw materials such as petroleum.

This brochure describes the basic principles of the Renewable Energy Sources Act and seeks, above all, to place them in the context of the policy debates that have been taking place. It is demonstrated that many of the arguments often used against feed-in tariff do not hold water. Above all, the economic arguments rooted in free market theory that are brought forward in many cases fail to stand up to closer examination. Consequently, compared to subsidies, tendering models or quota arrangements, the feed-in tariff model has been proving itself the superior model for the market introduction of renewable energies on a market characterised by free competition over what is now quite a number years.

The success of the German Renewable Energy Sources Act

The German Renewable Energy Sources Act is regarded as the world‘s most successful law for the introduction of renewable energies in the power sector. Apart from the power sector, the Act also applies to the heating sector – as a result of its use of waste heat emitted during the generation of power from bioenergies and geothermal energy. The Renewable Energy Sources Act has given Germany a large internal market and brought about a tumultuous series of innovative developments in wind energy, photovoltaics, biogas, wood-generated electricity and vegetable oil-fired district heating plants. In the years to come, similar successes are to be expected in the generation of power from deep geothermal energy, while marine energies will also have a limited impact at a later date. Traditional hydropower has also benefited from the Renewable Energy Sources Act.

The Renewable Energy Sources Act has created more than 150,000 new jobs in Germany without any commitment of taxpayer’s money. In total, more than 250,000 jobs have been created in the renewable energies industry. This is particularly significant at a time when stimulus packages are being adopted in response to the world recession. The Renewable Energy Sources Act is a stimulus package that does not involve new public borrowing! It creates incentives for private investment, above all with money from civil society, but also with money from financial investors.

The costs for the market introduction of renewable energies have been considerably lower than in other countries. For instance, the average cost for the generation of power from wind energy in Germany is approximately 8 euro cents per kilowatt hour, compared with approximately 14 euro cents per kilowatt hour in the UK, which has far more wind. At the same time, the expenditure avoided in 2008 thanks to the reduced amounts of fossil and nuclear fuels that had to be purchased and the external costs that were avoided amounted to a total of 17 billion euros – several times the additional costs for the generation of power of approximately 3.2 billion euros, according to the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety.

Many observers have been astonished by this development, which has become possible thanks to the principle of cost-covering feed-in tariff. The feed-in tariff provided for in the Renewable Energy Sources Act is oriented consistently towards the minimum economic requirements of investors in the generation of power from renewable energies. As a rule, returns of 7% are taken as the basis for the calculations. It is true that there are now a great many copies of the successful German legislation. But only a very few have been successful over the long term. The basic fact that a certain feed-in tariff is fixed by law is not by any means a guarantee for the functioning market introduction of renewable energies. There are a great many details that have to be right if the desired momentum towards the industrial development of renewable energies is to arise.

Of course, as well as functioning legislation on feed-in tariff further statutory parameters have to be laid down. They should relate, above all, to the approach taken to the approval of plants for the generation of power from renewable energies. All over the world, there are barriers of various heights to the approval of renewable energies. Lowering these barriers to approval is just as indispensable for the successful expansion of renewable energies as a functioning feed-in law.

Demand-oriented innovation policy breaking through the vicious cycle of blocks to innovation

Innovations are accurately regarded as providing opportunities to take up new economic activities and create new jobs. They therefore make an indispensable contribution to economic development.

Normally, the translation of promising research results into marketable products cannot succeed of its own accord, but requires statutory parameters. During the 1980s and 1990s, research delivered many highly promising innovations in the field of renewable energies. However, support for research alone, even with generous research budgets, is not enough to translate researchers' initial successes into marketable products. There is usually a need for very large volumes of investment in order to finance the first factories and continually improve products by optimising them technically. Ongoing high levels of capital investment are also required once market introduction has begun in order to expand the diversity of products on offer and increase the output of those products. As further investments are made, the initially high unit costs begin to fall. Every expansion of large-scale manufacturing helps to bring down the costs of generating power.

However, financial investors will only provide these large quantities of capital if they can be reasonably sure that the products from the factories that make renewable energy systems will actually find a market as well. Only then will they be able to recoup their investments.

Strong, adequate support for research is necessary in order to implement the first developments and pilot projects. However, support for research alone does not go far enough. What is decisive is the transferral of laboratory results to production. But this is only possible if the product is actually produced in large quantities as well. Nevertheless, production requires demand and demand needs a market. It is indispensable, and therefore a matter for politicians, to create the right parameters for the introduction of these products onto the market. Only then will innovations actually be translated into products, and only then can research results also invigorate the economy and create new jobs.

What is more, active measures to introduce renewable energies onto the market can support an intensification of research. If firms begin to make profits with innovations, they will then invest some of these profits in research again as they seek to establish a lead in the competition to supply the best products. For instance, German companies are now ploughing twice as much money into photovoltaics research as the public sector is making available. In consequence, the whole research budget for photovoltaics would be significantly smaller if research were solely financed by public funding. It was only when photovoltaics were introduced onto the market with the assistance of the Renewable Energy Sources Act that research in this area started to take off in Germany. A prime example of this is the Institute for Solar Energy Systems (ISE) at Freiburg, a world leader in the field that has been experiencing constant growth. It depends far more on commercial research commissions than public research funding. The extraordinary, successful growth of the ISE and other research institutions that are working on renewable energies is also a success for the Renewable Energy Sources Act.
The Renewable Energy Sources Act is therefore not just a very successful piece of legislation for the effective introduction of renewable energies onto the market, but also for the promotion of research and development in renewable energies, inseparably connected as these activities are with processes on the market.

A vicious cycle had developed over a number of decades: it was possible for the promising research results from the first wind turbines, photovoltaic plants and biogas plants to be put into practice at a few pilot plants, but the costs of generating power at these facilities were far too high in comparison with the conventional generation of power. Renewable energies have one great advantage, the avoidance of external costs caused by damage to the environment, but were unable to make the most of this on the market because the external costs of the conventional generation of power were not actually included in the price of power, but paid for out of tax revenues – if at all. This meant no purchasing market could develop. However, the absence of a purchasing market was the reason for the lack of investment in factories. So the investment costs for renewable energies did not fall. The result of this vicious cycle was that renewable energies were not introduced onto the market.

The most successful approaches used to overcome vicious cycles of this kind within a market economy can be summed up as demand-oriented innovation policies. These are understood as policy measures that create incentives for customers to purchase products that are innovative but too expensive to begin with. This is most frequently done using state subsidies. However, subsidies entail many disadvantages, which are described in greater detail elsewhere in this brochure. The introduction of cost-covering compensation resolves the problem. The law guarantees anyone who invests in the generation of power from renewable energies feed-in tariff that is set at a rate high enough to ensure that their investment can be recouped at a good rate of interest within a few years or decades.

As a result, the demand for the technologies in question rises by leaps and bounds. To the extent that the statutory parameters allow the development of a dependable purchasing market over many years, money now flows into the construction of factories as well. Consequently, the potential for cost reductions offered by large-scale manufacturing and product improvements may be continuously exploited to the full. Whenever costs fall, state support can be cut, while customer numbers increase at the same time.

The goal is to make the regulation of prices by the state superfluous. As soon as their technical costs are so low that renewable energy technologies are able to hold their own unaided on the energy market, the regulation of prices by the state is no longer necessary. This can be done all the more rapidly, the more external costs are factored into the price of conventionally generated power as well. The process can be accelerated with an ecotax on conventional power from which ecopower also has to be exempted.

Since not all types of renewable energy have seen the same amounts of innovation, there must be variations in the levels of feed-in tariff. It is also likely to be necessary for the legislation to apply to different parts of the market for varying lengths of time. Today, photovoltaics require higher levels of compensation than wind power, which was introduced onto the German market about ten years earlier, and statutory compensation will probably have to be paid for photovoltaics longer than for other kinds of facility.

First tentative beginnings of feed-in tariff in Germany

It first became possible for the principle that feed-in tariff should cover investors' costs to be applied in Germany when the Electricity Feed-In Act (STREG) provided for this in relation to coastal wind power in 1990. Together with the tax subsidies available under the 500 MW Wind Programme, the compensation of 90% of the average price of power laid down in the Electricity Feed-In Act allowed profits to be made from coastal wind power, as well as small-scale hydropower plants. Inland wind power and photovoltaics also received the same compensation, but it was too low for economic investment, which was why the Electricity Feed-In Act of 1990 was unable to initiate any momentum in these fields. The same applied for biogas, which actually received just 65% of the average price of power as compensation. Geothermal heat was not even mentioned in the Electricity Feed-In Act.

Cost-covering compensation for photovoltaics was offered for the first time in 1993 as a result of local decisions at Hammelburg, Freising and Aachen. In the years that followed, the brave example of these three local authorities was copied by many German towns and cities and led to the evolution of a successful model for the market introduction of photovoltaics. In Germany, initiatives for feed-in models therefore sprang up first at the municipal and regional levels before the corresponding legislation was ultimately enacted at the federal level.
Then, in 2001, the European Renewables Directive opened up a free choice of funding instruments, so making it possible for the fundamental principle of feed-in tariff to be applied within the framework of European legislation.

In 1999, the Bundestag office of Hans-Josef Fell moulded the successful model of cost-covering compensation for solar power that had been implemented at the municipal level into a draft bill intended to cover all the renewable energies used to generate power. The successful negotiations between the Social Democratic Party of Germany (SPD) and Alliance 90/THE GREENS parliamentary groups were led by four Members of the German Bundestag, Hermann Scheer and Dietmar Schütz for the SPD, and Michaele Hustedt and Hans-Josef Fell for the Greens. In April 2000, the Renewable Energy Sources Act was then passed by the German Bundestag with an SPD and Alliance 90/THE GREENS majority.

What is provided for in the Renewable Energy Sources Act?

Regulation of the interactions between private market participants
With the Renewable Energy Sources Act, the legislature regulates business relations between the generators of power from renewable energies, the operators of the power grid and power customers. The Renewable Energy Sources Act creates a basis for generators of ecopower to achieve economic profitability on the power 'market' and actually gain access to the grid in the first place.
The Renewable Energy Sources Act is therefore a regulatory measure that gives generators of ecopower an opportunity to make investments. It is neither a guarantee of profits from ecopower nor an inadmissible intervention in a competitive market.

The power market, as it is constituted in Germany and many other countries, is not really a market, but a monopolistic industry dominated by a few power groups with identical interests. At the same time, the grid operators, at least at the ultra high voltage level, possess almost 90% of Germany's power generating capacity. The power groups have no interest in seeing competition from other generators grow. In many cases, they are using their dominance of the market to block access to the grid for other power generators, while themselves hardly investing in new ways of generating power from renewable energies.

The grid operators' attempts to block new power generators may be understandable from their point of view as private businesses, but are not acceptable from the perspective of the economy as a whole. Viewed with the interests of society in mind, functioning competition and the expansion of renewable energies for reasons of climate protection are essential to the provision of services of general interest. This is why the legislature must act in order to prevent the grid operators from blocking feed-in arrangements.
The privileged grid access provided for in the Renewable Energy Sources Act has successfully weakened the blocks to grid access. Nevertheless, despite the privileged grid access for ecopower generators provided for in the act, many grid operators continue to find plenty of bogus or real arguments to obstruct access to the grid. The clearing centre established under the Renewable Energy Sources Act therefore has the task of mediating disputes that arise between the grid operators and ecopower generators.

The big power groups have, as has already been mentioned, no interest in generating large volumes of power from renewable energies themselves. Firstly, the generation of power from conventional power plants would rapidly become uneconomic for them because the new power generation capacities would cause old, written-down plants to cut output or even be decommissioned. This might serve climate protection and ecology, but not the economic interests of the big power generators.
Secondly, if they were to support an increasingly decentralised expansion of the generation of ecopower, they would run the risk of destroying their own natural monopolistic structure, in which power is produced solely by large generating units. Both considerations have led the big power groups to only make marginal investments in renewable energies.
In order to remove these blocks, the state has to intervene with regulatory measures, for otherwise it will not be possible to meet climate protection targets or implement the phasing out of nuclear energy, an aim that is desired by German society and has been enshrined in legislation. State regulation for ecopower – as put in place under

the Renewable Energy Sources Act – is therefore indispensable in order to achieve socially desirable objectives and provide services of general interest.

The superiority of the Renewable Energy Sources Act on the power market

State regulation versus the 'free market'

One argument frequently put forward against feed-in tariff is that guaranteed feed-in tariff is incompatible with the market processes of a competitive market. This point of view is frequently articulated by economists, who often give the fundamental concepts of the free market precedence over all other necessities, such as climate protection. In this respect, these economists overlook that the power market is usually not a free market at all but, as in Germany, a quasi-monopoly that essentially benefits the interests of the major power groups. In other countries too, the power sector is mostly dominated by a few concerns or even state monopolies. Generally, as already set out above, feed-in tariff merely helps to ensure that new actors get the opportunity to find their feet on the power market. A functioning competitive market thrives on a diversity of suppliers. The fact is that there is nowhere in the world where such diversity is to be found in this field. The Renewable Energy Sources Act has created conditions that are enabling new actors in the generation business to actually establish themselves in the face of the economic power of the oligopoly. Furthermore, elements of price regulation have a long tradition on various power markets and do not conflict with competition as a matter of principle. It makes no difference whether the legislature sets the price and the market regulates the volume (feed-in model), or the legislature sets the volume and the market regulates the price (quota model). In both cases, there is an intervention in the market, and in both cases this is compatible with market principles. However, there are considerable differences in the effectiveness of these instruments. Feed-in models have proved their superiority to quota models.

So anyone who is striving to achieve the aim of a competitive market in the power sector must start by bringing in new actors in order to break the anti-competitive dominance of the market by the major groups. State regulation of the kind provided for by the Renewable Energy Sources Act is laying the foundations for the competitive market of the future. Most people who reject state regulation of this kind today because it interferes with a supposedly free power market are not really concerned with competition, but with protecting the position of power groups that act as monopolists.

Exclusion of external costs from the price of conventional power

There are also other reasons why the current 'power market' is not a functioning market. The external costs of the damage to the environment done by the conventional generation of power are not reflected in the price of power, but are paid for from general tax revenues, if at all. Many of these external costs are not even quantifiable and therefore cannot be paid for as such. Examples include the potential damage that would be caused by the accidental melt down of a nuclear reactor core or the huge amounts of damage that are to be expected or are already occurring as a result of global warming, driven as it is by the use of fossil raw materials. The 40 billion euros of research subsidies for nuclear energy paid in Germany from tax revenues have also helped to cushion the expense of nuclear power.

The additional costs to power customers caused by the feed-in tariff for renewable energies are far below the external costs of the conventional generation of power. They are necessary purely in order to balance out the external costs that are incurred in economic terms. It is therefore essential for the additional costs of renewable energies to be passed on to end customers if a functioning market is to be established.

Originally, the idea of a system in which costs would be passed on to customers was motivated by the need to comply with the EU's requirements with regard to state aid, as funding from taxation could have led to conflicts with the EU legislation on this topic. Furthermore, in a test case judgement delivered in 2001, the European Court of Justice stated clearly that well structured feed-in tariff do not represent state aid, but are justified as a means to balance out the external costs that are not factored into pricing. Feed-in tariff is therefore not a subsidy.

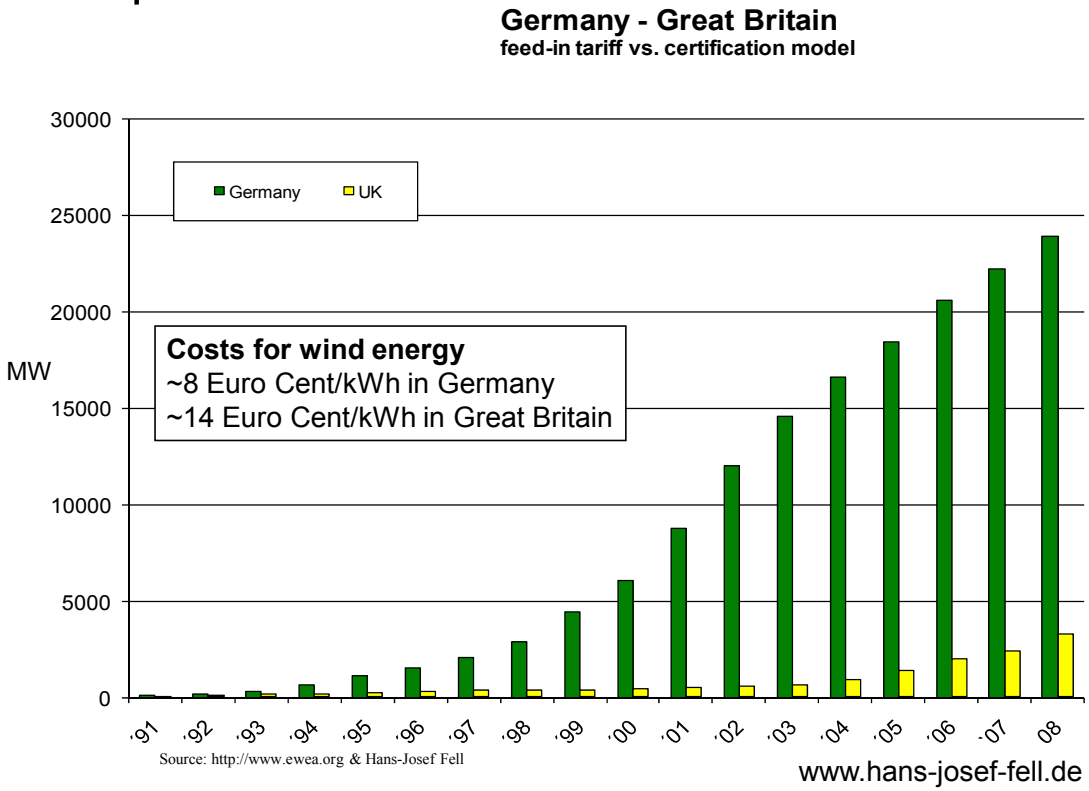
Nicholas Stern has described climate change as the greatest market failure the world has seen. The compensation rates for renewable energies offer an indispensable opportunity to counter this very market failure. They therefore also form the basis on which Germany can move closer to a functioning competitive power market.

Quota and tendering models

Advocates of markets oriented towards competition frequently reject feed-in tariffs with the argument that it is better to define precisely the volumes of ecopower that should be generated by means of tendering or quota models. In tendering processes, the providers with the lowest costs win contracts to produce power. Under quota models, the level of compensation depends on the price of power and the price of the certificates producers have to purchase. However, exactly this creates a great deal of economic insecurity for the generators. Quota and tendering models are introduced above all when the state sets an upper limit on the expansion of renewable energies. It is then a question of how these volumes are to be produced at the lowest possible cost.

Experience shows that such models achieve the complete opposite. For instance, the UK has been operating a quota model since 2002, with the result that a kilowatt hour of wind power costs roughly 0.14 euros in the UK, whereas in Germany it only costs about 0.08 euros per kilowatt hour. Despite its fundamentally better wind conditions, the UK has only succeeded in expanding its production of wind energy approximately one tenth of the amount achieved by the German wind energy industry. The British quota model is therefore less efficient and less successful than the German Renewable Energy Sources Act.

Wind power – Increase & Costs



The failure of the British model indicates that feed-in tariffs are not just more successful and more cost effective, but also make more market possible than quota systems.

Tendering processes, state decisions

Tendering processes are regarded as good methods of reducing costs through competition. This was the rationale behind the tendering processes organised by the state level in the UK up until 2002 in order to lower the costs of investing in renewable energies. Such state tendering processes are frequently described as more in keeping with market requirements and more efficient than guaranteed feed-in tariffs. But the complete opposite is the case.

To be precise, it is overlooked that tendering processes also take place under the Renewable Energy Sources Act in Germany – although they are not administered by the public sector, but by the project operators responsible for ecopower plants. Feed-in tariffs only limits the pressure of competition at the level of power retailing. Competition continues to take place at all other levels, for instance between planners and plant producers. Unlike civil servants, they bear commercial risk, which is why they generally issue calls for tenders and select bids with greater care. They use their tendering processes and purchasing decisions to find the provider that offers the best cost-benefit ratio. This is therefore a decisive factor in innovation. It fosters competition between the suppliers of ecopower systems as they seek to offer the best technologies. Poor suppliers fall by the wayside, whereas innovative technology manufacturers enjoy business success.

The large number of tendering processes conducted on a competition-oriented market founded on feed-in tariff is the basis for the success of the Renewable Energy Sources Act and explains the high degree of innovativeness this legislation has inspired.

By contrast, the monopolistic tendering process administered by state actors and monopolistic corporations in a quota or tendering system is anti-competitive. The results are bureacratic nannying and criteria decided by the state instead of the free play of market forces.

Diversity of actors and not just conventional groups

It is typical that only a few companies were able to take part in the state tendering processes in the UK – and what is more that they were mostly large concerns. Consequently, it has not been possible for the UK to develop a diverse structure of small and medium-sized enterprises of the kind that is the driving force for the development of innovations in Germany. As a result, the Renewable Energy Sources Act has also brought about the development of a highly diverse set of actors. Many new businesses have been founded. This is due, in particular, to the fact that all the participants on the market have been able to obtain the loans needed to finance their projects on account of the high degree of security for investors offered by rates of compensation that are set for 20 years. The catalyst has often been an exciting technological idea, which has then prompted more and more new innovations. It is indicative that hardly any of these innovations have come from the concerns involved in established energy technologies, but from a large number of newly established small and medium-sized enterprises. Since 2000, Siemens, a leading player in energy technologies, has contributed almost nothing to the development of innovations in renewable energies off its own bat.

A functioning, innovative competitive market for technology providers can therefore develop best where there is functioning feed-in tariff and not under tendering or quota models.

Red tape

Quota and tendering models are associated with a great deal of red tape. If funding comes from state subsidies, it has to be demonstrated to the taxpayer that their money is being spent sensibly and effectively. This results in the imposition of a large number of technical and economic conditions, which have to be first specified, then checked once the construction work is complete. In consequence, enormous ring binders fill up with documents on the requirements to be met and the checks that are carried out to ensure this happens. In addition to this, there is the bureaucracy of planning permission.

Under the Renewable Energy Sources Act, the state leaves the action taken up to the participants in the market, thus reducing bureaucracy to the requirements of planning permission and technical safety. In order to ensure that, for their part, the grid operators do not cause too much expenditure on bureaucracy, the legislature has even determined in the Renewable Energy Sources Act that a feed-in contract is not a compulsory requirement. The grid operators must pay the compensation that is due as soon as power from renewable energies is fed into the power grid. The removal of the necessity of a feed-in contract has prevented the grid operators from being able to build up inappropriately high bureacratic hurdles. Since the German grid operators and power generators belong to the same corporations, many grid operators have attempted to prevent investment in renewable energies by wrapping up feed-in contracts in a tremendous amount of red tape. In consequence, the lean bureaucracy of the Renewable Energy Sources Act has also been an important driving force for the rapid expansion of renewable energies in Germany.

Compensation secures unbureaucratic CO2-free power production over 20 years

Anyone who builds a plant to generate power under the Renewable Energy Sources Act will always be anxious to make sure that power is being produced optimally. An operator that fails to feed in power or only supplies small quantities from poorly running systems will either have no compensation paid out to them at all or only receive a reduced level of revenue. This cuts or wipes out the return they can expect to make. The operator of the plant therefore tends to be anxious that their system should be in excellent condition and produces power.

Where plants have been subsidised with public tax revenues, the state has to go to great bureacratic lengths to check that these plants actually produce CO2-free power in subsequent years. Once the subsidy has been received, the operator of a plant no longer has any economic incentive to maintain and constantly optimise their facility. There are enough examples of photovoltaic plants or wind parks that had been built with expensive public money but were no longer producing any power a few years later. Once the subsidy had been received, no one devoted enough attention to these facilities. Only statutorily guaranteed feed-in tariff offers any assurance that a plant will be operated for many years. This means feed-in models are usually superior to other price-based funding mechanisms, such as investment grants.

Apart from this, statutorily guaranteed feed-in tarrif is not automatically to be equated with guaranteed returns, as is often mistakenly claimed. A return is only assured if a sufficient commitment is made to the business. In spite of the guaranteed feed-in tariff, it is still necessary to manage normal commercial risks. Anyone who purchases a poor-quality plant at too high a price will hardly be able to expect a return, and the same goes for anyone who does not maintain their own plant properly.

Statutorily guaranteed feed-in tariff offers only the basis, but not by any means a guarantee, for a return.

Maximum targets and quotas as brakes on expansion

The setting of quotas or maximum targets for a particular period is a popular policy instrument that is supposed to promote activities in the renewable energies sector. However, maximum targets are usually set in order to restrict the expansion of renewable energies and ensure the prospects for investments in conventional energies continue to be bright. In reality, maximum targets, above all if they are set at low levels, are mechanisms that protect investments made in fossil and nuclear energy generation and certainly not an effective instrument for the expansion of renewable energies.

The situation appears more differentiated when it comes to minimum targets. At present, the most significant and best known target is probably that of ensuring 20% of the EU's power comes from renewable energies by 2020. This target is praised as ambitious in all official statements. Yet hardly anyone has examined whether it really is ambitious, e.g. in comparison with what could be done by a renewable energies industry that were able to develop under optimal, rather than restrictive, policy conditions. There is much to suggest that considerably more than 20% of the EU's power needs will be met from renewable energies by 2020, firstly because the rising prices and increasingly short supplies of conventional energy resources will accelerate the expansion of renewable energies. Secondly, the costs of renewable energy technologies are falling, which is also boosting their expansion. Anyone who has ever looked at the speed with which sales of personal computers, mobile telephones and flat-screens have grown will not find it difficult to recognise that 20% renewable energies by 2020 is a very unambitious target. Why should manufacturers of photovoltaic

systems, wind turbines or biogas plants not be able to write success stories similar to those of Nokia and Dell? Examples from other branches of industry suggest it is not very ambitious to aim at a 20% market share for renewable energies in the EU by 2020. This target will be exceeded with ease.

However, since most political office-holders in the EU regard 20% renewable energies by 2020 as very ambitious, their work in the energy sector is focussed, above all, on securing energy supplies with conventional energies, and they are consequently neglecting the political options for the expansion of renewable energies. In so far as this is the case, the EU target is acting as an obstacle to expansion, although it is of course a target that could actually be exceeded. If targets are not to inhibit, they must be very ambitious minimum targets. The most ambitious target would be 100% renewable energies. The EU's 20% target is not an ambitious target and consequently supports investment in fossil and nuclear energies more than investment in renewable energies.

It is well known that there are only a few countries in the EU that have created good policy conditions for the expansion of renewables. Even if many EU countries have feed-in laws, this does not mean by a long way that they are effective. Individual details of the laws can be drafted in such a way as to make them ineffective. There are also many problems in the legislation on approval procedures that hinder the expansion of renewable energies. If we continue to accept these blocks, it may indeed appear ambitious to achieve 20% renewable energies by 2020. Above all, such targets will be branded ambitious by anyone who does not want to eliminate the political restrictions on renewable energies because they wish to protect the position of conventional energies.
Furthermore, in this respect emphasis is often placed on the argument that if just 20% of our power consumption comes from renewable energies we will still need to meet 80% or our needs with fossil and nuclear energies, which then helps to legitimate decisions that continue to leave the focus of energy policy on conventional energies. The numerous forms of support for nuclear energy provided through EURATOM, for the petroleum and natural gas industries, and for new pipelines and diversification schemes are proof of this, just as much as the sudden, rapid rises in levels of support for new coal power plants.

Quotas set in legislation and tendering processes act as brakes on expansion even more than dysfunctional political targets. Since the supports for investment only apply to the volume of power produced from renewable energies below the quota, it is clear that no momentum can be built up to exceed the quota. once the target associated with the quota is achieved, the price of certificates falls to zero and any investment is halted. Setting a low quota is therefore a perfect way of protecting the position of the old energies, although the quota is actually intended to serve the expansion of renewable energies.

The advantages of independence from tax revenues

Freedom from subsidies

One decisive factor in the success of the German Renewable Energy Sources Act is the fact that no taxpayers' money of any kind is spent to finance investments. The compensation provided for in the Renewable Energy Sources Act therefore does not represent a form of subsidy, even if this is often mistakenly claimed. The feed-in tariff

is funded by a modest increase in the power tariffs for all power customers. In exchange, as a *quid pro quo*, power customers know that a proportion of the power they purchase equivalent to the average share of production under the Federal German Renewable Energy Sources Act comes from CO2-free renewable energies. Since no taxpayers' money is involved, this avoids the risk of changes to funding conditions in difficult times for the economy, for instance when efforts are made to reduce the pressures on the public budget.

In a much noted judgement, the European Court of Justice ruled in 2001 that feed-in tariff is not state aid in the sense of the European state aid directives. At the European level, subsidies from taxpayers' money are deemed to be state aid. This made it clear that the feed-in tariff paid in Germany under the Renewable Energy Sources Act is not a form of subsidy, although the legislature has stipulated it as a compulsory requirement. Furthermore, the definition of *Subvention* ('subsidy') in *Duden*, the most authoritative German dictionary, makes it clear that feed-in models are not subsidies: according to *Duden*, a subsidy is a '(financial) support from public funds provided for a specific purpose; state grant'. Nor does the German Federal Government's *Subsidy Report* feature the passing on of costs provided for by the Renewable Energy Sources Act – another piece of evidence that this is not actually a subsidy.

Independence from annual budgetary decisions

Independence from tax revenues is indispensable to the success of a feed-in law. Feed-in tariff that is paid out of taxpayers' money is subject to annual budgetary decisions. Above all, if the feed-in law is successful, the financial resources it requires increase. Every finance minister will then attempt to slow down the rise in expenditure, either by reducing the feed-in tariff or setting an upper limit on the number of plants to be installed. This means manufacturers are unable to make any reliable calculations about their sales markets over a period of several years. They have to reckon with 'stop-and-go' changes in demand every year, which drastically diminishes their willingness to invest in new manufacturing facilities.

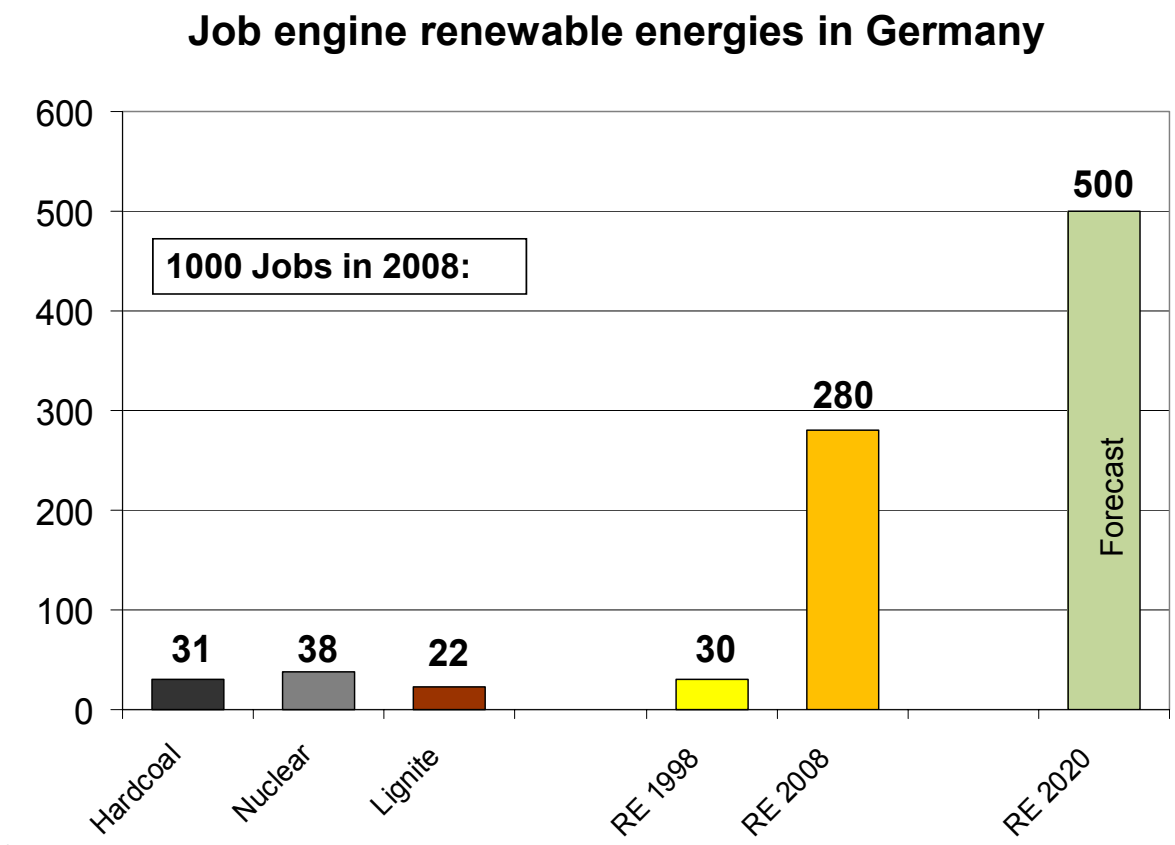
This has just happened in Spain, where feed-in tariff has been partially financed from tax revenues. The great success of the Spanish solar market in 2008 led to high public expenditure and a change in the law at the end of 2008 that drastically restricted the volume of the market. The Spanish photovoltaics market has collapsed dramatically as a result of this. It has not been possible for any large-scale industrial production of photovoltaic systems to develop in Spain on account of the fear and expectation that precisely this would happen.

The situation has been quite different in Germany, where feed-in tariff that does not require payments from tax revenues has facilitated the dependable development of the market over the years and therefore fostered the expansion of industrial manufacturing facilities.

The Renewable Energy Sources Act: a stimulus package without new public borrowing

The global economic crisis is prompting the adoption of stimulus packages in states all over the world. Wherever one looks, these packages are associated with high state spending, which is driving up levels of public borrowing alarmingly. Laws on feed-in tariff that do not require the commitment of tax revenues are the best stimulus packages and can be implemented without new public borrowing. They are financed with private capital rather than taxpayers' money. In Germany, the Renewable Energy Sources Act has created more than 150,000 jobs in just a few years. In 1998,

only approximately 30,000 people were employed in the whole German renewable energies industry, but at the beginning of 2009 the country had about 280,000 people who earn their livelihoods producing and operating renewable energy systems. By way of comparison: 30,000 people are working in German coal mining in 2009.



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Decisive details indispensable to functioning legislation for the market introduction of renewable energies in the power sector with the aid of feed-in tariffs

Functioning renewable energy sources legislation must be acceptable from the perspectives of the most diverse interest groups in society and offer investors dependable conditions for investment. We will now discuss these fundamental preconditions as they relate to the different interest groups that have to be considered:

Investors in the production of ecopower

Private capital is available in large quantities, but investors can be reluctant to commit themselves. Private capital is only invested if a return is to be expected. For this reason, the legislature must choose the parameters to be laid down by feed-in legislation in such a way that returns can be earned. The return does not have to be extremely high, but merely comparable with conventional, safe bank deposits. In the Renewable Energy Sources Act, the legislature allows for a target return of approximately 5-7%. Significantly higher returns were not desired because the extra costs to

be passed on would push up the price of power too far. If returns were too low, this would lead to investments hardly being made any more. Given a fair regulatory framework, i.e. identical levels of compensation for all, skilful businesses can certainly increase their returns above the average as well. This too is a driving force for competition and innovative developments.

The following marginal conditions must be adjusted correctly in order for private capital to be invested: The level of compensation, the length of time for which the compensation is paid, privileged grid access, and provisions concerning grid connection conditions and grid expansion.

Level of compensation
In view of the fact that there are variations between the individual renewable energy technologies as far as the costs of generating power are concerned, differentiated compensation rates must also be set by a feed-in law. They should depend on the way in which ecopower is generated, the capacity of the plant in kW and meteorological conditions. The legislature in each country should examine precisely what levels of compensation are appropriate in that part of the world. Rates may vary a great deal according to wage costs and meteorological conditions. What is important, more than anything else, is that they do not slip below the threshold at which investors start to receive a return. At the same time, the compensation rates should not be set too high, otherwise windfall gains would be earned, and the legislation would be endangered by excessively high costs.
The compensation rates are calculated using microeconomic computational models that essentially factor in the following parameters: investment costs, including the costs for the grid connection that is required, operating costs, capital costs such as interest and redemption payments, tax write-offs and certain other outgoings.

The compensation for the power fed into the public grid from renewable energy plants is described as cost-covering if such plants earn an appropriate return on the capital deployed after, for example, 20 years, assuming that they are operated rationally and efficiently from a technical point of view. It must be possible for this return to be earned after the following costs have been paid:

- Costs for the plant, its installation and its connection to the grid
- All operating costs, including metering costs, maintenance costs, repair costs, insurance costs, wage costs and the costs of raw materials where biomass is used
- Capital procurement costs (interest charges)

The return should correspond to the return that can be obtained from other forms of investment, so that investment in plants that generate power from renewable sources is worthwhile from a financial point of view.

What are known as bonuses are to be added to the level of compensation in order to offer special incentives, for example for innovations or the use of agricultural raw materials.

As far as certain renewable energies, such as bioenergy or geothermal energy plants, are concerned, it makes sense to pay a higher level of compensation for smaller plants than for large plants. This is expedient, firstly, where the costs of generating power are higher at small plants but, secondly, there are good reasons why smaller plants should be built as well.

In this case, it is important to draft the law in such a way that the larger plant also profits from the better compensation for the smaller plant – up to the limit set for the higher feed-in tariff. For example: If a 1 MW-capacity plant receives compensation of 8 euro cents under the Act while a smaller plant of up to 500 kW receives 10 euro cents compensation, the *de facto* result is a combined compensation rate for the larger plant of 50% at 8 euro cents and 50% at 10 euro cents. This gives an overall compensation rate of 9 euro cents at this specific plant. If the Act were not structured in this way, the differentials between the facilities would be too great and plant operators would become very inventive at only building small plants, which would unnecessarily drive up the costs of compensation.

A number of examples of feed-in tariffs paid in Germany in 2009 under the current Renewable Energy Sources Act are given below. These levels of compensation are broken down by method of power generation, although only a few exemplary compensation rates are picked out. The actual figures are considerably more complicated.

Wind

The following levels of compensation apply for onshore wind:
9.2 euro cents per kWh is paid for at least five years. After five to 20 years, the compensation is reduced to a basic rate of 5.02 euros, depending on the wind potential at the location of the wind power plant. At poor locations, the period of time for which the higher initial compensation applies is extended.
A considerably higher compensation rate of 13 euro cents applies for offshore plants, which is paid for 12 years and then falls to a basic compensation rate of 3.5 euro cents.

Solar energy

The compensation levels are differentiated by the size of the plant and range from 31.94 euro cents/kWh for ground-mounted plants to 43.01 euro cents/kW for smaller rooftop plants.
The tariffs paid in Germany do not differentiate between plants at locations with different levels of solar radiation or plants that use different technologies.

Bioenergy

The compensation rates set for bioenergy in the Renewable Energy Sources Act are highly complex. For instance, various bonuses are paid for renewable raw materials, for innovative technologies such as Sterling engines or microgas turbines, but also for the use of particular waste materials, such as agricultural slurry. The following bioenergies, above all, are used to generate power: biogas, wood and vegetable oil.
The basic compensation ranges from 7.79 euro cents/kWh at plants with a capacity of more than 5 MW to 11.67 euro cents/kWh for small plants up to 150 kW:
In addition to this, bonuses are paid, where applicable, for the use of renewable raw materials, the use of waste heat and the deployment of particularly innovative technologies. However, the bonus for renewable raw materials has led to particular problems of definition.

Small-scale hydropower

- Up to 500 kW: 12.67 euro cents/kWh
- 500 kW to 2 MW: 8.65 euro cents/kWh
- 2 MW to 5 MW: 7.65 euro cents/kWh

Considerably lower compensation rates apply for large-scale hydropower plants over 5 MW.

Geothermal energy

The basic compensation is 10.5 euro cents/kWh for plants up to 10 MW and 16 euro cents/kWh for larger plants.

Compensation period

Setting compensation levels alone is not enough to facilitate investments of private capital. In some laws, levels of compensation may be set at an adequate level, but the legislature leaves it open whether this level of compensation will be paid for one or several years. An investor who does not know what level of compensation their wind power plant will attract in three years time is unlikely to invest. The risk would be too great that they would end up being paid too little compensation or possibly even cease to receive compensation altogether. Their investment would then become a loss-making operation. In order to avoid this risk, the legislature must ensure that the periods of time for which compensation is paid are sufficiently long.

In Germany, the legislation stipulates that compensation be paid for most technologies over a compensation period of 20 years. Shorter compensation periods are also conceivable, but the compensation rates would then have to be higher. Otherwise, there would be a possibility of investors ceasing to gain any returns at all.

However, the guaranteed level of compensation is only paid over 20 years for plants that were constructed in the year for which this compensation rate is set in the Act. Plants that are commissioned in subsequent years receive lower compensation rates, which the legislature can set for years in advance with a clearly defined degression curve.

Degression

The reduction of the compensation rate for newly constructed plants is necessary and possible because the growth of the market is accompanied by a reduction in the costs of producing the systems with which power is generated. The faster the market is growing, the more vigorously the compensation for new plants can be cut. Under the current German Renewable Energy Sources Act, the annual degression rates for geothermal energy and onshore wind are a nominal 1%. This means that the compensation rates for wind power plants that are built in 2010 will be 1% lower than for plants that are built in 2009. However, the applicable compensation rate then remains stable for these plants over 20 years. The degression for solar energy varies from 8% to 10% a year, depending on the growth of the market. No degression has been set for hydropower because a great deal of technological progress has already been made in this area and it is no longer possible to expect any significant falls in technology costs.

What is decisive is that the degression curve to be applied is not too steep, so that the compensation rates do not fall below the threshold at which a return starts to be earned in later years. Otherwise, investors in new manufacturing facilities would fear for the future of the sales markets they intend to target, which would reduce their readiness to invest.

Incidentally, degression also takes place in real terms if no nominal degression rate is set. The rate of degression is then *de facto* equivalent to the inflation rate.

Consequently, the real rate of degression comprises the nominal degression rate plus the current inflation rate. This plays a role above all in countries with higher levels of inflation. This effect needs to be taken into consideration when nominal de-

gression rates are being set. This can be done either by assuming a certain average inflation figure for the next few years, or by integrating adjustments to take account of inflation into the nominal degression rate.

Privileged grid access
Investors in the generation of ecopower can only be paid statutorily guaranteed feed-in tariff if they actually obtain a connection to the power grid. This statement many sound obvious, but it is to be emphasised because there are certainly actors who want to hinder the connection of ecopower plants to the power grid. Resistance is coming from the companies that produce power at conventional power plants, such as coal-fired or nuclear power plants. In countries where nothing has been done to split the operation of the grid from the generation of power, the electricity generators can exploit their ownership of the grids to exercise market power and obstruct new ecopower plants. It is therefore indispensable for there to be statutorily guaranteed privileged grid access for ecopower generators. The German Renewable Energy Sources Act stipulates that grid operators must accept ecopower until the capacity of the grid is completely taken up with ecopower. This means that conventional generation plants would have to be decommissioned if they found themselves in competition with ecopower plants. This provision is a very sensible way of promoting climate protection and driving ahead the phasing-out of nuclear power. Were there to be no privileged treatment of ecopower, the coal power generators could insist on measures that protected their position and consequently maintain their current levels of CO2 emissions for years. Effective climate protection would be impossible. Privileged grid connection means that grid operators always have to connect new renewable energy plants before conventional power plants.

Grid connection conditions, clearing centre
Connecting a new plant to the power grid causes costs, as does any consolidation of the grids that may be necessary if the existing grid does not have sufficient capacity to transport the ecopower that will be fed into it. The Renewable Energy Sources Act enshrines in law the principle that the grid connection is to be paid for by the producer of ecopower, while the upgrading of the grid is to be paid for by the grid operator. The grid operator can pass on their additional costs by adding them to grid charges. Frequently, however, circumstances are complicated, provoking disputes between investors and operators about what are actually grid connection costs and what are grid upgrade costs. In order to settle these disputes, the legislature has introduced what is known as a clearing centre. This has been established by the German Federal Government and draws up clear arrangements for disputed cases to ensure that future disputes can also be settled before they even begin.

Secure environment for the planning of investments in factories

The investment required at a factory that manufactures renewable energy systems is no small thing. Often, such investments amount to hundreds of millions of euros. These investments will only be made if the market for the products from the factory is likely to develop dependably for years ahead. Important parameters have to be secured in order to make such a market possible: political stability, the length of time for which the compensation rates will apply, no limitations on the volume of the market and no funding of compensation out of taxation.

Political stability

No legislature can guarantee political stability. In a democracy, political majorities change as parliaments are re-elected again and again. Every parliament can revoke, redraft or amend any law, which is after all the primary function of a parliament. In so far as this is the case, of course, no one can give a guarantee that a feed-in law will stay on the statute book for many years. This is why political statements are particularly important. Declarations of political will and election promises concerning the retention of a feed-in law and the adoption of improvements that become necessary over time are important foundations for investment in facilities that manufacture renewable energy systems.

In Germany, the Renewable Energy Sources Act was passed by the German Bundestag in 2000 with a majority made up of Social Democrats and Greens and opposed by the votes of the conservative Christian Democratic Union (CDU) and Christian Social Union (CSU), as well as the liberal Free Democrats. Before the 2005 Bundestag elections, the conservatives and liberals were still declaring that they would revoke the Renewable Energy Sources Act. However, the grand coalition between the conservatives and Social Democrats re-enacted the Renewable Energy Sources Act in 2008 in a form that, in some respects, made it possible to improve the conditions for the expansion of ecopower production. In the mean time, with the exception of the liberal Free Democratic Party, four of the five parties represented in the German Bundestag have expressed on many occasions their political will to retain and continually improve the Renewable Energy Sources Act. Impressed by its great economic and ecological success, even the conservatives now support the legislation. This is a decisive precondition for ongoing further investment in the manufacturing of renewable energy systems in Germany.

Shelf-life of feed-in legislation

A feed-in law must stay in place until such time as investment in renewable energies is ensured on the market without guaranteed feed-in tariff. This will be the case when the generation of power from renewable energies is cheaper than the generation of power from conventional energies.

Some technologies, such as wind power at locations with lots of wind, are already more economical than the generation of power at new coal power plants and other conventional methods of producing power. Photovoltaics are only expected to become competitive at some point in the coming decade, and will initially be used to cover peaks in load. However, since it is imperative for the conventional generation of power to be superseded on grounds of climate protection, a feed-in law can only become superfluous if the generation of power from renewable energies is competitive with the existing pool of power plants. This will certainly be later for photovoltaics than for wind power or hydropower. Nevertheless, photovoltaics will eventually attain competitiveness because the costs of renewable energy technologies will fall as large-scale manufacturing increases while, with the exception of biomass, the energy carriers on which they depend are available free of charge. At the same time, the fuel costs for conventional power plants will rise ever more sharply in coming years, driven higher by resource shortages, political conflicts and the necessity of environmental protection. Nevertheless, individual aspects of the Renewable Energy Sources Act will continue to be necessary until ecopower has achieved 100% market penetration, even if it has only become competitive thanks to the current system of compensation. This is true in particular for the obligation to accept ecopower, privileged feed-in to the grid and the obligation to upgrade the grid.

The legislature should therefore examine very carefully which technologies are already competitive and can be excepted from a feed-in law. In this respect, it is deci-

sive that a self-sustaining dynamic towards the substitution of conventional energies has built up on the market for economic reasons. However, it is also necessary to ensure that there is a genuinely free power market, regardless of the interests of a small number of business monopolies. At present, there is no functioning power market in Germany and many other countries because a few groups dominate the power sector with their interests.

No limitations on market volume (no caps!)

Limitations on the volume of the market are written into feed-in laws by many legislatures. Such a cap works like a brake on the expansion of the market. It can be more or less tight, with an upper limit that is reached after several years or even just a few hours, as in the case of photovoltaics under the Austrian Eco-Power Act. The volume of funding for photovoltaics approved in Austria for 2008 was just 21 million euros, which merely corresponded to an expansion in capacity of approximately 2 gigawatts. Investors applied for all this extra capacity within a few minutes. In addition to this, no significant expansion activities are taking place. The current Austrian legislation is a perfect example of the fact that some legislatures do not really want the expansion of renewable energies, but are encouraging a semblance of activity rather than real change. A feed-in law that provides for a low volume of expansion is not, in truth, intended to expand renewable energies, but to restrict or even prevent their expansion.

Furthermore, a cap can have effects that distort the market because all generators want to be connected to the grid shortly before the cap is reached since this allows them to benefit from compensation payments. As the Spanish case study shows, no technology can be developed sustainably under these preconditions.

At any rate, a cap acts as a brake on the construction of factories to produce renewable energy systems, as the investors who would put money into these facilities cannot see any likelihood of the market growing, but know it is going to be capped, and new investments are therefore not feasible.
Certainly, any legislature that wishes technology producers to base themselves in its country must prevent any limitation of market volume.

No funding out of taxation

Where feed-in tariff is paid out of taxes, investors have no reliable parameters for their factories. No one can predict the decisions about the budget that will be taken every year in the future. As a result, the volume of the market is dependent on decisions taken by the finance minister. This does not provide a basis on which investors can make reliable calculations about manufacturing facilities, and they usually decide not to go ahead with investments. At the end of 2008, severe restrictions were placed on the expansion of photovoltaics in Spain, with additional capacity capped at merely 500 gigawatts for 2009. The background was the partial financing of the feed-in tariff out of taxation. The state no longer had enough resources to fund the massive success seen as photovoltaics expanded in Spain during 2008. Furthermore, the impact of the economic crisis and the associated desire to cut public expenditure also played a part in this decision. Excessively high levels of feed-in tariff and the announcement that the market would be capped in 2009 sparked a boom on the Spanish market as capacity exploded to 2.4 gigawatts in 2008. Funding out of taxation was therefore a cause for the Spanish cap and the drastic shrinkage of the market associated with it. In consequence, it is to be expected that investment in photovoltaics factories will practically grind to a halt in Spain in 2009.

Power customers

Power customers have to pay the increased costs of feed-in tariff. These additional costs are distributed evenly between all power customers, and the price of power has risen modestly as a result.
At the end of the 1990s, surveys carried out in Germany found that power customers were willing to pay slightly higher costs for the generation of ecopower as long as all customers had to bear an equal burden. Indeed, power customers have only relatively rarely moved to an ecopower retailer because these companies usually charge more than firms that sell conventional power. Many power customers are therefore of the opinion that, if there is no getting round the need to pay more for climate protection and the introduction of new technologies onto the market, everyone should bear these additional costs equally and not just a few customers with a particular consciousness of the significance of ecology.
Power customers have indeed had to shoulder additional costs. In Germany, these costs amounted to approximately 3.2 billion euros in 2008 according to the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety. This sum may appear high, but is a relatively small amount of money when it is passed on to the individual power customers. For instance, in 2007 a typical domestic customer in Germany was paying approximately 22 euro cents per kilowatt hour of power. The proportion of this due to the additional costs imposed by the Renewable Energy Sources Act was only 0.7 euro cents per kilowatt hour, which corresponds to a rise in the price of power of approximately 3.2%. In exchange, end customers' supplies included an average proportion of 15.1% power from renewable energies in 2008. The additional costs required by the Renewable Energy Sources Act in 2008 were roughly the same as in 2007. Even though the production of ecopower has risen markedly, the additional costs have not increased much because the costs of conventional power have gone up as well.

The additional costs for spending on energy due to the introduction of renewable energies are also easy for commercial power customers to afford. In Germany, the average share of production costs attributable to energy is approximately 5%. If the price of power goes up by approximately 3%, the increase in production costs will therefore be well under 0.15%. These modest additional costs are not of relevance in day-to-day business and could easily be more than recouped by means of appropriate power conservation measures.

However, even minor rises in the price of power can impose an economic burden that has to be taken seriously by energy-intensive industries, such as aluminium works. The hardship clause included in the Renewable Energy Sources Act therefore provides for the burden on certain energy-intensive industries to be clearly reduced when additional costs are passed on. In 2009, for instance, they only have to pay approximately 0.05 euro cents per kWh.
Energy-intensive industries consequently benefit in several ways from the Renewable Energy Sources Act. Firstly, thanks to what is known as a merit-order effect, the electricity exchange prices in Germany are already lower than they otherwise would be on account of the amounts of power from renewable energies being fed into the grid. This merit-order effect arises primarily as a result of the fact that a great deal of power is generated when winds are strong with no fuel costs being incurred. Consequently, German industry already has a competitive advantage over companies in other countries. Despite this effect, German firms have to pay markedly lower passed-on costs than domestic customers. A third advantage that is often underesti-

mated is that the rise of renewable energies has clearly increased the turnover of the energy-intensive industries. For instance, the wind power industry is already the second largest purchaser of steel in Germany after the automotive industry.

Power groups

The interests of the big power groups usually run contrary to the feed-in of renewable energies. In Germany, the big power groups are bitter enemies of the feed-in of renewable energies to the power grid, something that may not be expressed in their official pronouncements, but is nevertheless evident from much of the action they are taking. The explanation for this is obvious: More than 80% of the power generation capacity in Germany is in the hands of four large groups, E.ON, RWE, Vattenfall and EnBW. For the most part, they operate climate-unfriendly coal power plants, as well as environmentally damaging nuclear power plants. If renewable energies' share in the generation of power were to rise, to 50% for example, a large proportion of these big, environmentally damaging power plants would then have to be decommissioned. This would reduce the groups' sales revenues and cut their profits or even push them into the red. This is why they are working with various methods to stop strong growth in the generation of power from renewable energies.
Incidentally, this is true not just for Germany, but is the main hindrance to climate protection and security of supply with renewable energies all over the world. The managers of the big energy groups have excellent access to the highest levels of politics and are therefore often able to assert their interests. Where persuasion alone does not bear fruit, corruption is also used to help things along from time to time behind the scenes.
Things are even more problematic where conventional power generators are actually in state ownership. The returns from these power generators flow into the public budget. For this reason, finance ministers are often opposed to the expansion of renewable energies – rapid growth in this area would also drastically reduce the state's revenues from the conventional generation of power.
In order to at least open up opportunities in the face of this resistance, it is indispensable for the energy supply companies too to have a stake in feed-in tariff with their own investments in renewable energies. They will therefore be able to at least make up for some of the power generation capacities their businesses will lose, while making a profit by generating their own power from renewable energies.
Although the German Renewable Energy Sources Act has allowed the big power groups to do this since 2000, they have invested very little in renewable energies. The reason is probably the rate of return of approximately 5%. The large power groups are used to earning returns of 15% to 20% and more. It is therefore no wonder that the lion's share of investment in Germany has not been made by the big groups, but above all by private individuals who have invested private capital in the numerous citizen-owned systems. However, financial companies and smaller energy suppliers, such as forward-thinking municipal utilities, have also supported the boom in renewable energies.
Allowing energy supply companies to profit from power feed-in tariff as well has proved to be a sensible measure in Germany. This was ruled out before 2000. In the mean time, even the big energy groups have acknowledged that they cannot simply leave the strongly growing renewable energies market to their small and medium-sized competitors. As a consequence, they have now set up their own operations, which are investing in renewable energies.

Legislature

It is of course necessary for the legislature that prepares a feed-in law to reconcile and optimise all the various criteria, targets and interests. The legislature's objectives must be guided by the interests of the common good and not the interests of a few power groups. The following objectives can be identified as important for the common good in the context of a feed-in law: Economic development with new commercial activities and the securing of energy supplies; the creation of new jobs; support for innovations and their translation into marketable products; the reduction of dependence on energy imports; the securing of future energy supplies; the development of cost-free energy carriers; climate protection with the avoidance of CO2 emissions; the improvement of local environmental protection.

All these positive objectives conflict with the interests of the conventional power generators, who generally have excellent access to decision-makers in parliaments and governments. Frequently, parliamentarians are less constrained by the interests of the lobby than members of the government. One of the constitutional principles accepted by democratic societies is that parliament makes laws, not the government. It is indicative that the German Renewable Energy Sources Act was introduced from the floor of parliament without a government draft. Indeed, it was even pushed through by the German Bundestag against the bitter resistance of the Federal Economics Minister responsible for this field at that time, Werner Müller. This example may give other parliaments the courage to assert themselves in the face of lobbying from the energy industry, even when, as so often, its interests find a receptive audience within government.

However, parliament should also be guided by other criteria. These include, for example, the reduction of public spending, at least if it is only to be afforded with new debt. It is therefore in a parliament's own best interests to ensure that the advantage of independence from tax revenues, which has already been touched on at several points, is realised in such legislation.
Furthermore, it is important that parliaments ensure the laws they adopt are able to unfold their effects over a number of years. Renewable energy plants can only achieve positive impacts for climate protection if they generate power over the long term. This has been achieved in a highly efficient manner by means of the 20-year guarantee for the payment of feed-in tariff. The alternative of state subsidies would, firstly, be a drain on public budgets and, secondly, offers no assurance that subsidised renewable energy plants would actually be operated for 20 years. These are all important considerations that are often overlooked from the perspective of the legislature.

Conservationists

Conservation groups campaign for an unspoilt environment. They strive to check global warming, as well as implementing local nature conservation and environmental protection schemes. Conservation groups therefore have an exceedingly strong interest in the introduction and implementation of feed-in laws, as they represent the most successful option for effective climate protection. At the same time, conservation groups rightly pay attention to compliance with the classic goals of nature conservation. Justice must be done to species protection, just as much as the preservation of air quality, and the protection of soils and waters. Normally, renewable energy

plants automatically help to achieve these goals. But there are also conflicts between different goals, although these can be resolved. For instance, large-scale hydropower plants should be avoided if they would involve flooding great expanses of land. At small-scale hydropower plants, it is necessary to take account of the requirements of species protection, e.g. by fitting fish passes. The preservation of air quality is an important objective at plants where bioenergies undergo incineration processes. Emissions of health-damaging fine particulates are to be ruled out just as much as emissions of nitrogen oxides and other classic air pollutants. The methods used to cultivate crops for energy plants should accord with social and ecological criteria – just as should be the case in food production. Monocultures dependent on the use of pesticides, genetic engineering and climate-damaging mineral fertilisers, which are sometimes used with disregard for international workplace safety standards, should be avoided. Sustainability criteria for the use of bioenergies are indispensable to feed-in laws.

Problems with approval

It is not enough to lay good statutory foundations for economic investments – with regard to both the returns to be expected and privileged feed-in to the power grids. It is also necessary to eliminate further barriers that can hinder investment in renewable energies. Above all, insurmountable barriers can be built up by the approaches taken to the approval of renewable energy plants.
It is necessary to distinguish between various types of approval:

- Approval for the granting of compensation;
- Approval for grid connections;
- Approval for the construction of plants.

Approval for compensation

Under the Renewable Energy Sources Act, public bodies do not issue any approvals for the granting of compensation. Nor is there any reason for them to do so because the Act makes it compulsory for grid operators to pay compensation. Many grid operators demand the conclusion of a feed-in contract as the precondition for the payment of compensation. However, this is contrary to the law because the Renewable Energy Sources Act stipulates that the conclusion of a feed-in contract is not necessary. The legislature adopted this provision in the 2004 re-enactment of the Renewable Energy Sources Act because many grid operators had abused feed-in contracts in order to impose conditions that served their interests but took away the rights statutorily vested in those who wished to feed ecopower into the grid.
Approval for compensation is therefore not necessary, as the legislature has made it obligatory for compensation to be paid.
Nor should approval for compensation be put within the discretion of the grid operator as otherwise they might abuse their power, for example to protect the position of the conventional generation of power. Disputed cases have to be decided by the courts on the basis of the law.

Approval for grid connections

Furthermore, there is no requirement for approval to be given by the authorities before a plant can be connected to the grid because the Renewable Energy Sources Act expressly stipulates that grid connections for renewable energies are to be given privileged treatment. Nevertheless, grid operators come up with all sorts of argu-

ments as they attempt again and again to prevent renewable energy plants being connected. The clearing centre mentioned above has been set up under the auspices of the German Federal Government in order to help clarify disputes. It often resolves disputed cases successfully without having to resort to the courts and draws up consensus-based arrangements for particular cases with the involvement of the grid operators and ecopower generators.
Here too, it is vital that approval for grid connections should not be put within the discretion of the grid operator as otherwise they might abuse their power, for example to protect the position of the conventional generation of power. If the clearing centre does not find a solution for the parties concerned, the courts have to decide on the basis of the law.

Approval for the construction of plants
The construction of plants is subject to a large number of provisions under building law, so planning applications can only be approved by public bodies.
Planning decisions must take account of many statutory instruments. These include, for example, emissions law, which prescribes air and water emissions standards at plants where bioenergies undergo incineration processes. Noise control measures also have to be reviewed, at wind power plants, for example. Nature conservation assessments are required, for example with regard to species protection for fish at hydropower plants or the sustainable use of woodland where it is exploited to source wood as a raw material.
Projects given planning permission must also comply with general planning law. For example, no large wind power plant can be constructed in the middle of a built-up area. This is why privileged treatment is given to wind power plants at locations outside built-up areas, where very restrictive building laws usually apply in Germany.

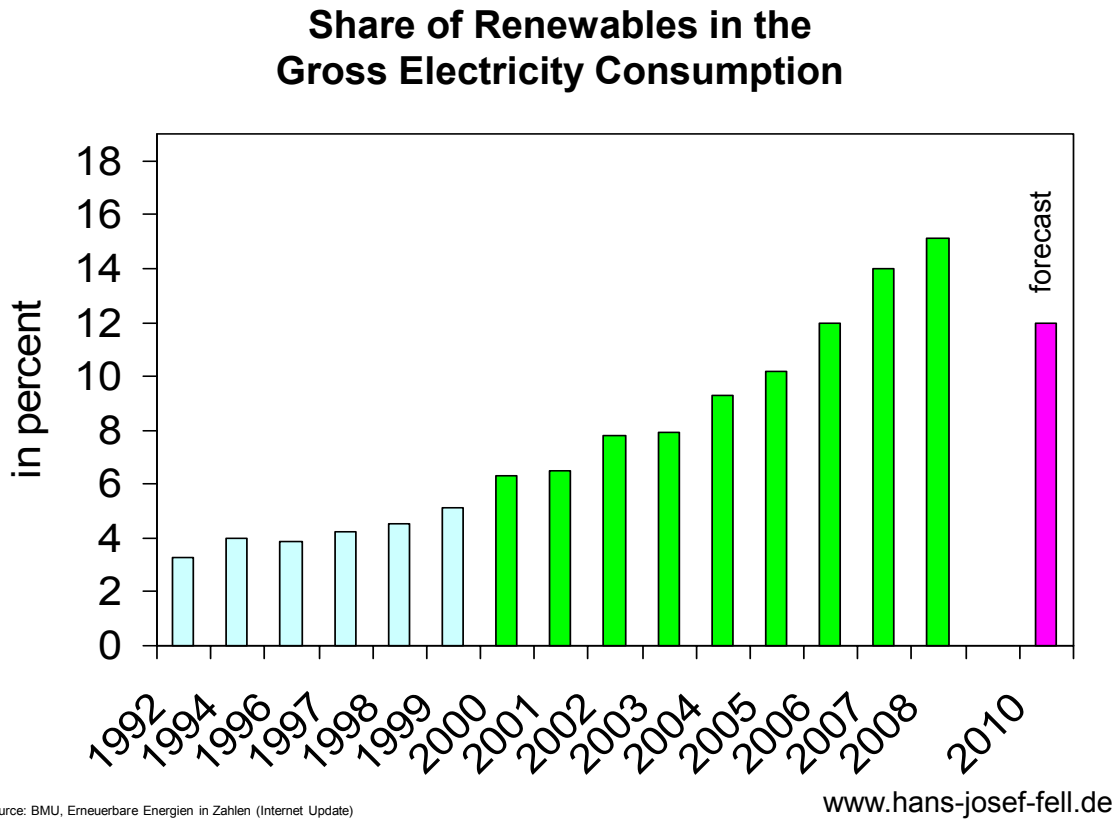
Spatial planning and the planning system are absolutely essential in order to prevent uncontrolled development. However, planning procedures can also be abused to protect the position of the conventional generation of power. Often, the authorities anticipate the wishes of conventional generators, following the power groups' interests and attaching excessively restrictive criteria to their approvals so that planning permission criteria seem to be used more to prevent the expansion of renewable energies than to promote it.
A perfect example is bird conservation at wind power plants. Of course, it is necessary to prevent a wind power plant from being located in a bird conservation area. However, it is hardly necessary to reckon with any risk of birds being hit away from bird conservation areas, as extensive scientific studies have proven. Nevertheless, this argument is often used as a pretext to refuse wind power plants approval. Such negative decisions are sometimes motivated by a desire to protect the conventional generation of power against unwanted competition from renewable energies. A plethora of other arguments that are correct in principle, such as landscape conservation or protection against the sealing of soil surfaces, can be misused for obstructive purposes. For instance, there are planning authorities that refuse wind turbines planning permission, citing arguments that relate to landscape conservation, but grant planning permission for opencast lignite mines without a moment's hesitation even though this means whole villages being swallowed up by the excavations and the destruction of wide tracts of countryside.

Some governments and their subordinate authorities use the planning system as a tool to hinder renewable energies if their political aim is to support nuclear and fossil power generators. Planning procedures come as welcome obstructive instruments for

this purpose. It is the function of responsible climate protection policy to put a stop to the exploitation of planning processes by authorities in this way.

The successes of the Renewable Energy Sources Act in Germany and global prospects

The German Renewable Energy Sources Act has been significantly more successful than anyone would have predicted.



In 2000, for instance, the Act included the aim of doubling the share of power demand met by renewable energies to 12.5% by 2010. This target was regarded as unrealistic and unattainable. But by the end of 2008, renewables had gained a market share of 15.1% in Germany. Thanks to the dynamic growth that has been achieved, it is now possible to press ahead with the complete conversion of German power supplies to renewable energies by 2030. Anyone who has any doubts about this should consider the industrial success stories of the personal computer, the mobile telephone and flat screens. All these industries have swept the world market across the board with their products in less than two decades. The conversion of global power supplies to renewable energies within about three decades would require wind power, photovoltaics, bioenergies, geothermal energy and marine energy to sustain growth rates lower than those posted by these industries.

In this respect, the wind sector is already seeing dynamic rates of expansion that have been completely underestimated. For instance, as late as 2002 the Paris-based International Energy Agency (IEA) was forecasting that worldwide wind power capacity would expand to approximately 100 GW by 2020. By contrast, 120 GW had al-

ready been installed by the end of 2008, with evidence of a steeply rising upward trend in growth.

Some accuse renewable energies of being too much of a drain on national economies. In Germany, however, it is already possible to furnish the evidence that renewable energies can effectively reduce the burden of economic costs a society has to shoulder. In many cases, renewable energies are already having a positive impact on microeconomic results as well.
In 2008, as already mentioned above, the additional costs for the generation of power under the Renewable Energy Sources Act amounted to approximately 3.2 billion euros according to the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety. In exchange, billions of euros are already being saved thanks to the merit-order effect.
The use of renewable energies has already allowed significantly greater economies to be achieved.
In 2008, for instance, approximately 7.8 billion euros were saved thanks to the reduced amounts of fossil and nuclear fuels that had to be purchased in Germany. The avoidance of external costs even saved 9.2 billion euros. These two items alone are worth 17 billion euros, which means that all the expenditure on renewable energies has more than paid for itself. Other effects, such as increased revenues as new businesses pay local trade tax or costs avoided by social security schemes as new employment opportunities open up are not even factored into these calculations.
The German Renewable Energy Sources Act proves that the use of renewable energies to pursue climate protection is not a necessarily a drain on resources, but is already benefiting national economies today. Anyone who seeks to protect the climate by promoting renewable energies will incidentally reap many other positive economic effects, such as domestic energy supplies that are independent of expensive imports and new jobs in a new growth industry.

Summary

The expansion of renewable energies is a crucial task that is indispensable for the survival of humanity.
Legislation that creates the economic foundations for investments using feed-in tariff delivers many advantages for society:
Active climate protection, the securing of energy supplies with domestic resources, the defusing of conflicts and wars over raw materials, local environmental protection and nature conservation, the reduction of poverty with many new jobs and action to fight the economic crisis.

Criteria that have to be fulfilled if a power feed-in system is to be successful:

- The feed-in of power from renewable energy plants must have priority over the feed-in of power from other sources;
- The levels of compensation and the lengths of time it is paid for must ensure the economic operation of power plants – no more and, above all, no less;
- Realistic degression rates must offer incentives to reduce costs and prevent windfall profits;
- The costs of the system must be borne by power customers, tax revenues must remain untapped;

- Bureacratic rules and regulations must be kept to a minimum, in principle not even power feed-in contracts are required.

Advantages of power feed-in systems compared to other funding arrangements:

- Highly secure environment for planning, even at times of crisis;
- High degree of efficiency (lower costs – lower transaction costs and security premiums);
- Highly effective (rapid expansion of renewable energies and comprehensive saving of CO2);
- Strong incentives for innovation;
- No burden on public budgets;
- Many new jobs;
- Good opportunities for small and medium-sized enterprises, in particular.

Important accompanying measures:

- Expansion and consolidation of power grids;
- Far-reaching cuts to bureaucracy, in particular a supportive approach to planning applications;
- Credit and guarantee programmes that make it easier to obtain outside capital.

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