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Electricity prices and grid infrastructure

Myths and facts

about the role of renewable energies in Germany's "Energy Transition"

Foreword

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In the wake of the disaster at the Japanese nuclear power station Fukushima, based on a broad consensus within the society, the German government resolved in 2011 to implement what is called the energy transition. At the crux of the energy transition is Germany's swift discontinuation of the risk-prone technology, nuclear power, by 2022. Back in autumn 2010, an agreement had already been reached to almost completely avoid greenhouse gas emissions by 2050, therefore marking the phasing out of the fossil fuels coal, oil and gas. This will be made possible above all by a rapid expansion of power generation using renewable energy sources and by a massive increase in energy efficiency.

But now, only a little more than a year later, the situation no longer looks so promising. Again and again, different failure scenarios for the energy transition have been put forward. In many cases, these have come from individuals who have taken issue with the energy transition and its various components right from the start or who would no longer be able to maintain their conventional business models once the energy transition was effected. They seek to secure increasingly more privileges and exemptions for an increasing number of companies. And again and again, attempts are made to shake people's confidence in the success of the energy transition and to slow down the rate of necessary change with what are alleged to be new pieces of bad news.

In recent months a debate has raged regarding an alleged explosion in the price of electricity which would supposedly be caused by the expansion of renewable energy sources and by the energy transition. The tone of the debate has sometimes been rather exaggerated, with a clear lack of basis in fact. Visions of doom and gloom are painted in which energy prices trigger the deindustrialisation of Germany or cause widespread energy poverty. It has been suggested that it is impossible to expand the infrastructure in the way needed for the energy transition and that Germany's security of supply would be seriously threatened. Many of the supposed 'solutions' that are proposed would do little to achieve the desired aims too, as they focus in particular on putting an end to the promotion of renewable energies. And above all, they jeopardise a major achievement of the path followed until now, namely the involvement of as wide sections of the population as possible, the inclusion of a wide range of relevant actors across the economy and to avoid revitalising the existing monopolies that in the past have worked strongly to revert changes to the energy system.

If we take a closer look at the facts, it becomes evident that many of the problems described are incorrect or are grossly exaggerated and that many of the supposed solutions are neither effective nor sustainable. The energy transition is a fundamental challenge and this is something we cannot afford to forget. For it to be a success, it is essential that we have long-term, robust strategies, a forward-looking energy policy and sufficient leeway to be able to adapt to unforeseen developments. The energy transition will require some considerable investment in renewable energies and in energy efficiency, and this investment will have to be financed. But it will pay off as it is an investment in a low-risk, environmentally friendly and less vulnerable future. Every kilowatt-hour of electricity generated from renewable energies plays a part in freeing us from the conflicts over dwindling resources, reduces the major negative consequences of sourcing and using oil and coal, protects the climate and reduces the risks presented by nuclear energy.

The energy transition calls for political clout and stamina. An enlightened and future-proof approach to the challenges is needed. The energy transition can be designed in such a way that it doesn't ask too much of anyone. And it will make Germany stronger and increase the competitiveness of its economy and industry.

This brochure aims to bust the myths put forward in recent weeks with data, facts and figures, and with the right contexts. In this way, we hope to make a small contribution to the success of this major, forward-looking transformation.

Eberhard Brandes
CEO, WWF Germany

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Ten guiding elements for a successful energy transition

1. Establish a CO2-free electricity system

Expanding renewable energies has to be at the heart of the energy transition. The promotion and supporting of renewable energies need to be developed in this decade in such a way that their expansion remains dynamic, efficient and integrated.

2. Make renewable energies' market entry flexible

Renewable energies need to play an increasing part in needs-based power supplies and in the cost-effective expansion of the electricity grid. To a limited extent and with the greatest possible degree of transparency, it should be possible for transmission system operators to cap the feed-in peaks of renewable energies.

3. Systematically enforce energy efficiency

The development in demand needs to be considered. The efficiency requirements made of businesses need to be substantially tightened – in their own interests. A target should be set of a 2.6 per cent increase per annum in energy productivity.

4. Guarantee security of supply

The set-up of the electricity market needs to be adapted so as to guarantee security of supply even with the planned withdrawal from nuclear energy, while still observing the climate protection targets. This market design revolves around Germany's further developed Renewable Energy Sources Act (EEG), which allows for the full integration of renewable energies in a market based fashion. The expansion and maintenance of the necessary conventional, flexible and low-carbon power plants need to be safeguarded with new instruments. One such suitable instrument is 'focused capacity markets'.

5. Strengthen and expand the grid while respecting nature

The grid needs to be expanded as the top priority. Nature conservation should not be disregarded and people affected by the expansion must be comprehensively involved. New technologies should be utilised in order to keep grid expansion to the minimum necessary level.

6. Coordinate renewable energy and grid expansion

Likewise in the interests of electricity network expansion that respects nature, the potential offered by renewable energy throughout Germany should be tapped in a targeted manner. This would at least temporarily take the strain off grid expansion.

7. Bring electricity demand into line with electricity production

Shifts in the loads caused by industry, commerce and households are needed in order to reduce consumption peaks. Electricity generation and consumption can be made more flexible. This calls for intelligent meters and appropriately adapted consumption tariffs. Combined heat and power plants should be power-led in the future and the storage potential of heat infrastructures should be tapped.

8. Make energy-intensive industry pay its way

The cost of the energy transition has to be shared as widely as possible. Substantial parts of the most productive industries benefit enormously from the energy transition, but do not currently contribute to the costs. Companies should only be exempt if they can prove on the basis of clearly defined criteria that their contributing to the costs of the energy transition would jeopardise their competitive position. And companies that make progress in terms of their energy efficiency can expect reductions in their contributions.

9. Support the lower income brackets

Private households on low incomes need energy advice and support, e.g. to buy highly efficient appliances. Needy households which are hit especially hard by rising electricity prices should be supported with subsidies. Special tariff amendments to the existing electricity price structures are not helpful.

10. Establish the energy transition throughout Europe

An important aspect is the restoration of the EU's emissions trading system, with increases in the EU's emission reduction targets to at least 30 per cent by 2020 and 55 per cent by 2030 in comparison to 1990. This will markedly increase the efficiency of the energy transition. An ambitious Europe-wide policy of energy efficiency needs to be speeded up, with the common market focused on renewable energy requirements and on the necessary power line and storage infrastructures.

Myths and facts about the role of renewable energies in the

Myth: "The energy transition will make electricity unaffordable."

Myth 1
"Renewable energies are to blame for the rise in electricity prices."

The facts
Only about a third of the hikes in electricity prices since 2000 can be attributed to the promotion of renewable energies. The far more influential factors are increases in the cost of conventional electricity generation, sales and marketing, and in the energy utilities' margins.

Myth 2
"The EEG surcharge is increasing so much because renewables are expensive."

The facts
Subsidised electricity generation from renewable energy sources has increased significantly in recent years. In particular, solar power generation has been massively expanded. This is a comparatively expensive technology, but it offers very high cost reduction potential (in the last four years alone, the generation costs fell by more than 50 per cent). At the same time, the subsidy rates have been substantially reduced, in particular those for photovoltaics. This has substantially reduced the EEG surcharge and will make renewable energies much more affordable in the future.

However, ever increasing privileges for energy-intensive industry have pushed the EEG surcharge for other consumers up sharply. The picture is further distorted by the "electricity exchange price effect", with the subsidised EEG plants reducing the wholesale price of electricity, while the EEG surcharge increases. Without these two extraordinary effects, privileges and price effect, the EEG surcharge would be more than a cent, i.e. more than a third, lower.

Myth 3
"If the promotion of renewables were brought to an end, electricity prices would not rise."

The facts
Investment in the energy system would most certainly be needed, because many of the existing power plants are now outdated. The high and rising fuel costs of coal and gas and also higher material and construction costs for new conventional power plants would cause electricity prices to increase, even without renewable energies being expanded. However, unlike conventional power plants and the fuels used in them, the specific costs of electricity from the sun and wind decrease substantially and continuously, and there are no signs of this coming to an end.

Myth: "The energy transition will lead to the deindustrialisation of Germany."

Myth 1
"Industry suffers because of the cost of promoting renewables."

The facts
Energy-intensive industry has renewable energy sources to thank for the falling wholesale prices and is largely exempt from the costs caused by the energy transition. In addition, it benefits from the economic stimuli of major investments in solar energy, wind power, etc..

Myth 2
"The energy transition only causes burdens and no economic advantages for industry."

The facts
The global market for renewable energies and energy efficiency is booming. Germany's early and systematic promotion of renewables has resulted in a well-developed industry structure, especially with regard to plant construction, which offers German industries' good business opportunities around the world.

Mythos 3
"The entire economy is suffering because of spending on renewables."

The facts
The cost of importing coal, oil and gas is lowered by every kilowatt-hour of electricity generated using renewable energy sources. The immense costs resulting from damages to the climate, the environment and people's health caused by the fossil fuel system – costs that are not covered by anybody's electricity bill – are reduced.

Evidence of data and sources can be found (in German) at wwf.de/Mythen-Fakten

Myth: "The energy transition will cause economic difficulties for many households."

Myth 1
"The energy transition will make electricity unaffordable for private households."

The facts
On average, electricity costs currently account for 2.5 per cent of a private German household's available budget. To meet the costs of promoting renewables, a four-person household will probably have to contribute around 15 euros a month as of 2013. Electricity will therefore remain affordable in the future too.

Myth 2
"Households are at the mercy of the rising electricity prices."

The facts
The majority of German households can significantly reduce their electricity costs by changing to a different tariff or choosing a different supplier. Simple steps taken to improve energy efficiency can also reduce a household's electricity consumption and therefore noticeably lower its outgoings.

Myth 3
"The energy transition will result in financial burdens for a lot of households."

The facts
Factors that are far more relevant in this respect than electricity costs are rental rates in city regions and a household's heating costs. Personal consumption advice can help lower-income households in particular. It has to be thoroughly assessed whether electricity costs, which are certain to rise in future, can be supported via the social security systems, as is already the case with rent and heating costs.

Myth: "The energy transition presents the infrastructure with insurmountable problems."

Myth 1
"The electricity grid has to be expanded at great expense, all because of renewables."

The facts
The main drivers of electricity grid expansion are deregulation of the electricity market and the European common market. Our grids are now old anyway and need to be updated. Renewable energies are being integrated as something new, but even without them conventional power plants need new grids too.

Myth 2
"We risk a blackout because grid expansion is progressing too slowly."

The facts
Grid expansion is important for security of supply and for the transportation of renewable energies. And the situation will still be manageable, even if expansion comes more slowly than expected. If it did the grid might not be able to accommodate all renewables at certain times and feed-in peaks would then have to be limited. Back-up power plants would then have to be put into operation more often.

Myth 3
"The energy transition poses a threat to security of supply because not enough power plants are being built."

The facts
The deregulated market does not provide enough stimulus for an adequate number and the right type of power plants to be built. In the medium term, there will be a need for a new market design which does not only pay for power generation, but also pays according to the capacities provided. This will be the case with or without renewables.

Myth:
The energy transition will make electricity unaffordable.

Myth 1
"Renewable energies are to blame for the rise in electricity prices."

The facts

The price of electricity has risen by around 10 cents to 25 cents since 2000, when Germany introduced its Renewable Energy Sources Act (EEG). The promotion of renewables by means of the EEG surcharge accounts for just under 3.6 cents or about a third of this increase. The remaining two-thirds, i.e. about 6,5 cents, therefore come from other price components. In particular, there were sharp increases in the costs of procurement and sales between 2003 and 2012. This category comprises wholesale electricity procurement costs (i.e. the costs of procurement from the exchange), the cost of sales and the energy companies' margins. This is a cause of concern for Germany's Federal Network Agency (BNetzA), as indicated in its most recent monitoring report. The Federal Network Agency confirms the trend which is also underlying the illustration on page 8, on inflation adjusted figures between 2003 and 2012.

It is especially interesting to note that German electricity wholesale prices rose substantially as of 2000 for various reasons, but that they fell noticeably year on year in, for example, 2011. The end customer prices should therefore have fallen correspondingly, but they didn't. The Federal Network Agency has established that the 'company-based price components' have actually continued to rise and are still above the absolute highs of 2008 and 2009. In other words, the energy companies have not passed on the price advantages of exchange-based electricity procurement.

Incidentally, EEG promotion has wholly served its purpose, with wind, water, the sun, biomass, etc. already accounting for 20 per cent of electricity generation in 2011. And this preliminarily rose to 25 per cent in the first six months of 2012.

Myth 2
"The EEG surcharge is increasing so much because renewables are expensive."

The facts

Converting the electricity system will come at a price. The additional cost of electricity from wind power, solar energy, biomass, etc. in comparison to the wholesale price at the electricity exchange price for conventional, fossils' based electricity is financed by the EEG surcharge. This is allocated to the end customers' kilowatt-hour price. Between 2010 and 2012, the surcharge rose from a good 2 cents to just under 3.6 cents per kilowatt-hour of electricity, taking the kilowatt-hour price for households to an average of 26 cents. And the surcharge is forecast to increase again in 2013, to around 5 cents.

Are renewable energies responsible for this? It certainly is the case that photovoltaic installations (PV) have been expanded in particular of late, resulting in more than 20 gigawatts of extra power in just two and a half years. As the electricity generated by PV systems was still relatively expensive between 2009 and 2011, half of the EEG surcharge is allocated to solar energy, even though this only accounts for 12 per cent of the renewable electricity generated. The politicians were not quick enough in bringing the payments into line with the falling costs. It is, however, also the case that in particular the promotion of solar energy in Germany resulted in major reductions in prices. Between 2009 and the end of 2012, the costs and payments were reduced by approximately 60 per cent. Additionally, when integrated into building components, PV has the unique potential to support decentralised applications.

But only taking the EEG surcharge into account is deceptive. Instead of the level of the EEG surcharge being important, it's actually more a question of how much the entire system and its components cost. If you relieve the financial burden in one area, you will increase costs elsewhere.

The industrial policy effect. The government has decided to largely exempt major, so-classified "energy-intensive" industrial enterprises from the costs of the energy transition. This is no trivial matter. The 17,000 major industrial customers with more than 2 million kilowatt-hours of consumption per annum account for 48 per cent of demand within the electricity market. Smaller industrial customers and commercial enterprises (just under 2.5 million individual electricity customers) represent 25 per cent of demand, while 44 million household customers account for fractionally more, at 27 per cent. If increasing loads have to be borne by a dwindling number of shoulders, it is individuals and household customers who will end up having to carrying more and more of the weight. In 2012, the German government markedly increased the number of privileged companies that are only obliged to pay a small EEG surcharge of between 0.05 and 0.4 cents.

The upshot of this is that these privileged companies are responsible for 18 per cent of electricity consumption, but only contribute 0.3 per cent of the EEG surcharge. In 2011, this amounted to just 37 million euros out of a total of around 13.5 billion euros. This results in additional expenses of more than 0.6 ct/kWh for small businesses, commerce and private households, as illustrated in the diagram on page 10.

The energy exchange price effect. The level of the EEG surcharge is determined by two factors. Firstly, it is determined by the total of the payments made to operators of solar arrays, wind turbines, etc. as stipulated by the law. Secondly, it depends on the proceeds from the sale of the generated power on the energy exchange. The difference between income and costs is than added to the price per kilowatt-hour of electricity for the end consumers in the form of the EEG surcharge. The marketing of EEG electricity on the exchange lowers the wholesale electricity prices there because the most expensive conventional power plants are forced out of production. On the one hand, this leads to falling wholesale prices. But it paradoxically also results in an increase in the cost difference for renewable energies. Falling prices on the exchange mean lower proceeds for the sale of EEG electricity, which results in a greater price difference, which leads to an increase in the surcharge. Renewables are punished for making electricity less expensive. The degree of the exchange price effect depends on a variety of other factors and is around 0.5 to 1.0 cent per kilowatt-hour, according to scientific analyses. This energy exchange price effect equates to between 2.4 and 4.8 billion euros in total, which, considering the overall EEG surcharge total of 13.5 billion euros, needs to be kept in sight.

Myth 3

"If the promotion of renewables were brought to an end, electricity prices would not rise."

The facts

This is incorrect – the price of electricity would rise anyway. The increase would maybe be minimally less in the first few years, but it would then be all the greater as the years go by.

The costs relating to the shift to renewable energies are often compared to the current situation. But this, too, is incorrect – even in a world where there was no promotion of renewables, investments would still be needed sooner, rather than later. And these investments in conventional, fossil fluel based power plants would, of course, likewise have to be financed by means of the price of electricity, which would then rise sharply. And new conventional power plants would naturally cause more Greenhouse Gases with the resulting effect on the climate or, in the case of nuclear power plants, excessive risks, both of which would ultimately once again result in (unacceptably high) costs. What's more, the cost of importing fossil fuels such as hard coal, gas and oil has increased over the past ten years by a factor of 2.26 for coal, 2.68 for gas and 2.77 for oil. These costs are currently stagnating, but there are already signs of a further increase to come. The cost of constructing a new power plant also increased by between 70 and 100 per cent in some cases between 2000 and 2011, in particular because of rising steel and cement prices. Then there is the fact that companies

emitting harmful carbon dioxide have to purchase carbon certificates. These are currently very (or more precisely, too) cheap, but will increase in price sharply in the next few years and decades. Meanwhile, renewables will become even cheaper. A kilowatt-hour of electricity from a new wind turbine costs between 6 and 8 cents to produce in 2012, which is already on a par with the price of electricity generated by coal-fired power stations. The cost of photovoltaic electricity was still 50 cents per kilowatt-hour in 2007. Nowadays, solar energy generated at good locations in Germany only costs between 13 and 16 cents, depending on the size of the solar array. This is a cost reduction that nobody thought was possible and that is expected to be more or less replicated in the future. We should, not least, bear in mind the fact that the German model for financing renewable energies is instigating substantial investments – a wave of investments that other European countries have yet to experience, making corresponding refinancing there necessary, ultimately having to be borne by the customers there too and differing only marginally from the German situation in terms of the costs involved. Germany is experiencing this wave of investment first and is giving it a clear direction, and, from an overall perspective, is therefore in with an excellent chance of enjoying an especially beneficial outcome of this wave of modernisation.

The quota model is frequently put forward as an alternative to the Renewable Energy Sources Act. But in practice, it has proved to be much more inefficient when it comes to the expansion of renewable energies, and is more expensive to boot. Let's take the UK as an example: the targets of the quota models were not ambitious enough, were not met, and the specific promotion costs for most of the technologies were higher than in the German support model. Calls for quota models to be introduced in Germany are a disguised way of getting the expansion and promotion of renewables to be reduced to an absolute minimum.

Development of electricity prices between 2003 and 2012 (prices adjusted for inflation; 2012 current estimate) and the price components
Source: Öko-Institut, 2012

VAT
Concession fee
Electricity tax
§19 surcharge
CHP surcharge
EEG surcharge
Sales and margins
Grid utilisation charges
Wholesale procurement

Myth:
The energy transition will lead to the deindustrialisation of Germany.

Myth 1
"Industry suffers because of the cost of promoting renewables."

The facts

The energy-intensive industrial enterprises in particular are much more beneficiaries of renewable energies than they are victims. As already explained, renewables lower the price of electricity on the exchange. And when the wholesale prices fall, major industrial enterprises with professional purchasing processes for electricity have an excellent chance of lowering their procurement costs in the short to medium term. In terms of figures, this exchange price effect currently gives the industrial electricity consumers a cost reduction of 1 to 2 billion euros a year.

At the same time, energy-intensive industry is largely exempt from the costs of the energy transition. For example, the electricity generated in an industrial company's own power plant for its own use is entirely exempt from the EEG surcharge. This accounts for some 20 per cent of total industrial electricity consumption. And the EEG surcharge is capped for nearly 50 per cent of the remaining industrial electricity consumption, with the major consumers paying 0.05 cents per kilowatt-hour (see diagram on page 10 for more details).

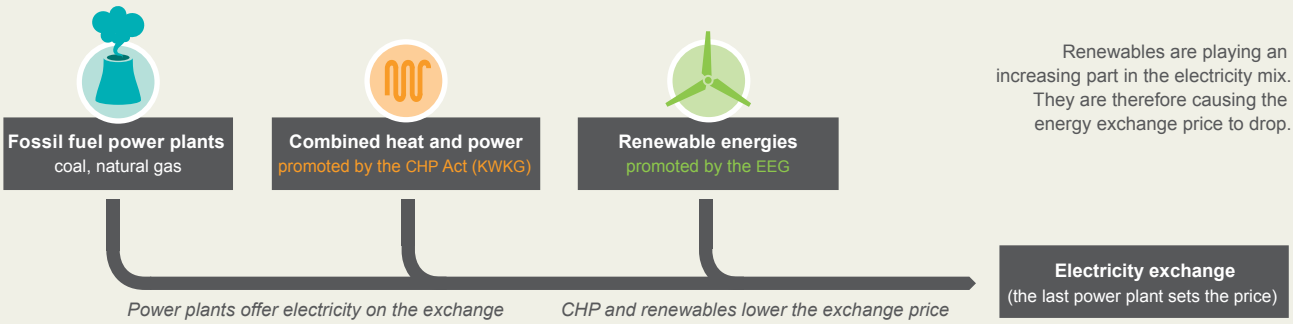
In addition, there are reductions in the electricity grid charges and in the electricity tax, and, as of 2013, also subsidies from the federal government's energy and climate fund. Studies have estimated that the privileges for industry currently amount to 9 billion euros. The components of the price of electricity are systematically shared out and borne unevenly.

It is a fact that Germany has had some of the highest industrial electricity prices in Europe for a number of years. Between 2007 and 2010, prices developed far more dynamically across the board in Europe, but in Germany the prices remained essentially unchanged. The ability of major industry in Germany to compete in Europe therefore increased. Electricity is procured for industrial purposes on the basis of long-term agreements. Current price levels are therefore not directly relevant in the case of professional energy procurement.

Incidentally, averaged over all industrial enterprises, energy costs account for a mere 2 per cent of a company's gross production value. This percentage is only substantially higher in the case of energy-intensive industries. But not all energy-intensive industries are in competition with countries with low energy prices.

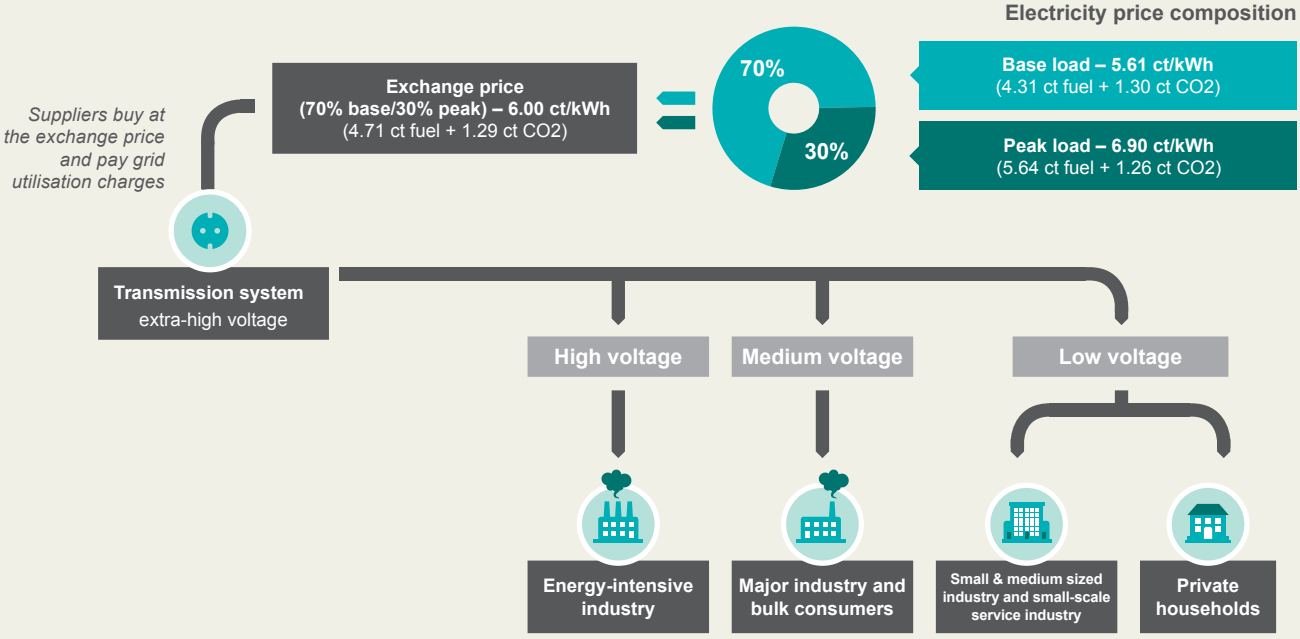
A Roland Berger study shows that the energy-intensive industrial enterprises could still tap considerable savings potential too: even in the medium term up to 2020, 8 to 16 per cent of energy consumption can be saved. And the savings outstrip the investments, which is good in terms of costs and good for the environment. But it's high time this potential was actually leveraged or incentives were given for companies to do so.

Electricity prices – who? pays what? and why?

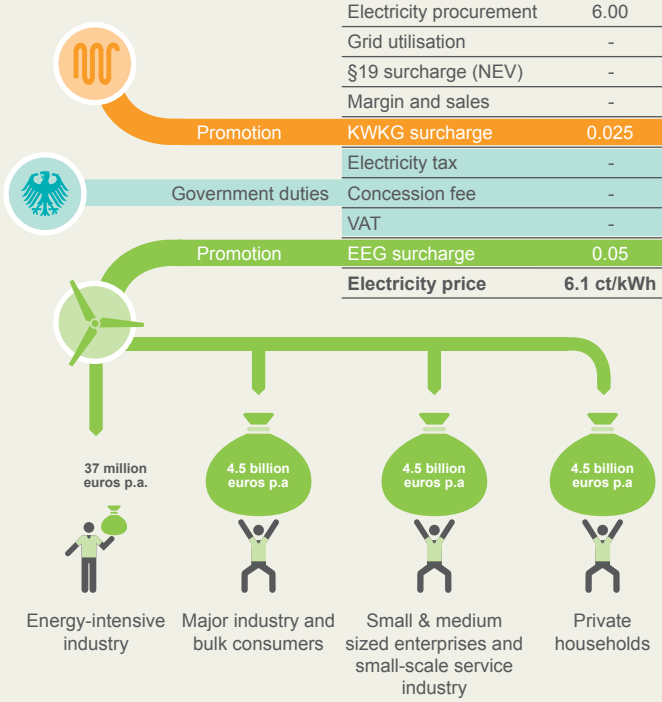


Renewables are playing an increasing part in the electricity mix. They are therefore causing the energy exchange price to drop.

Electricity price composition



		Energy-intensive industry	Major industry and bulk consumers	Small & medium sized industry and small-scale service industry	Private households
	Electricity procurement	6.00	6.00	6.00	6.00
	Grid utilisation	-	1.46	4.89	5.75
	§19 surcharge (NEV)	-	0.025/0.05	0.15	0.15
	Margin and sales	-	0.50	1.00	2.23
Promotion	KWKG surcharge	0.025	0.025/0.05	0.002	0.002
	Electricity tax	-	-	2.05	2.05
Government duties	Concession fee	-	0.11	1.79	1.79
	VAT	-	-	-	4.10
Promotion	EEG surcharge	0.05	0.05/3.59	3.59	3.59
	Electricity price	**6.1 ct/kWh**	**8.2–11.8 ct/kWh**	**19.5 ct/kWh**	**25.7 ct/kWh**



Electricity doesn't cost the same for all the consumers, with some requiring fewer system services. Energy-intensive industry and sections of major industry are as good as entirely exempt from many of the price components (and there is no adequately differentiated means testing). Energy-intensive industry contributes next to nothing to the EEG surcharge (<0.1%, 37 million euros). The end customer and commerce/service providers also have to pay government duties on top.

Source: Öko-Institut, Dr F. Matthes, 2012

Myth 2

"The energy transition only causes burdens and not economic advantages for industry."

The facts

The systematic and early promotion of renewable energies has resulted in the creation of a diversified industry landscape in Germany. This does not merely entail the power plant developers; there is also a vast chain of supplier companies and component manufacturers. And these companies are not just successful in the German market, but in the growing international market too.

In 2011, renewable energies accounted for more than 25 per cent of capacity to produce electricity around the world (approximately 5,360 GW) and supplied a good 20 percent of globally generated electricity – the majority of this in the form of hydroelectric power generation. In 2011, the biggest investor in renewable energies was once again China, which invested 52 billion US dollars in domestic activities in this field. China was closely followed by the USA, with 51 billion US dollars of investment. In terms of regions, Europe was at the top, with 101 billion euros of investment. The developing countries were led by India, where investments rose by 62 per cent to 12 billion US dollars in 2011 due to the country's National Solar Mission.

Germany's Federal Ministry for the Environment (BMU) expects to see global investments in renewable energies rise to 600 billion euros per annum by 2030 and to 900 billion per annum by 2050 (in terms of 2005 prices and including hydroelectric power). Of these sums, 55 per cent is attributed to solar energy, followed by wind power. There are huge economic opportunities for the entire plant construction industry. However, the cost structures will have to keep pace with the global market, especially in the field of solar module manufacturers. This also needs to be taken into consideration by those responsible for Germany's industry policy parameters.

Myth 3

"The economy is suffering because of spending on renewables."

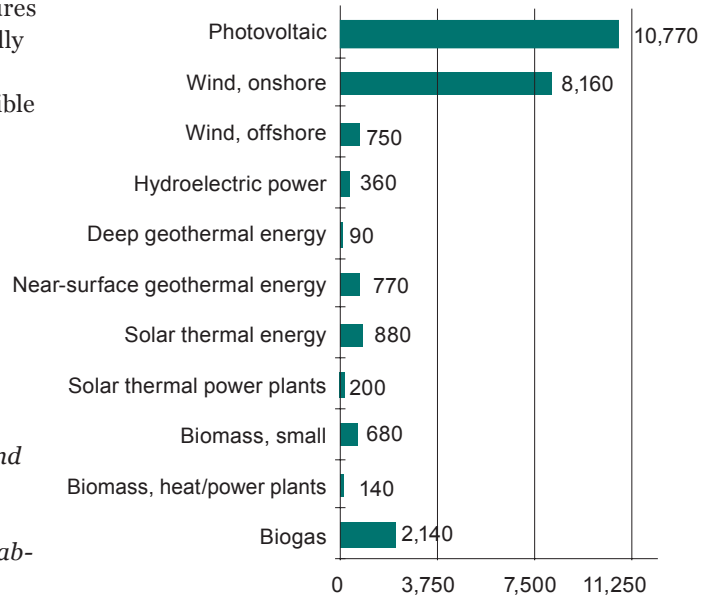
The facts

Germany spent 68 billion euros on importing fossil fuels in 2010. Using renewable energies reduced its import requirements by a net figure of 5.8 billion euros.

With renewable energies, the value added generated by production plant construction, plant assembly and plant operation is predominantly generated in Germany. German plant manufacturers alone generated domestic turnover of 25 billion euros in the field of renewable energies in 2011. This has the same effect as a government stimulus package and pays off in the form of additional jobs. In 2011, there was a gross figure of 381,600 people employed in renewable energies in Germany, the majority of whom were based, incidentally, in Bavaria.

Something which is missing in the electricity bill is external costs. There is a hidden side to the cost of generating electricity: the external costs incurred for harm to the environment and to people's health caused as a result of energy production. These costs include the extraction, mining and processing of energy raw materials and charges for emissions which are harmful to the environment and to health, to name but a few.

According to the estimates of the BMU and Fraunhofer ISI, the money spent on promoting renewables is well below the other socialised costs of fossil fuel-based electricity production.



2010 turnover of Germany-based plant developers and component manufacturers generated from the use of renewable energies, including exports, in millions of euros; Source: BMU, 'Gross employment from renewable energy in Germany in 2011'; provisional appraisal

Myth:
The energy transition will cause economic difficulties for many households.

Myth 1
"The energy transition will make electricity unaffordable for private households."

The facts

Electricity will continue to be affordable for private households (data in cents/kilowatt-hour):

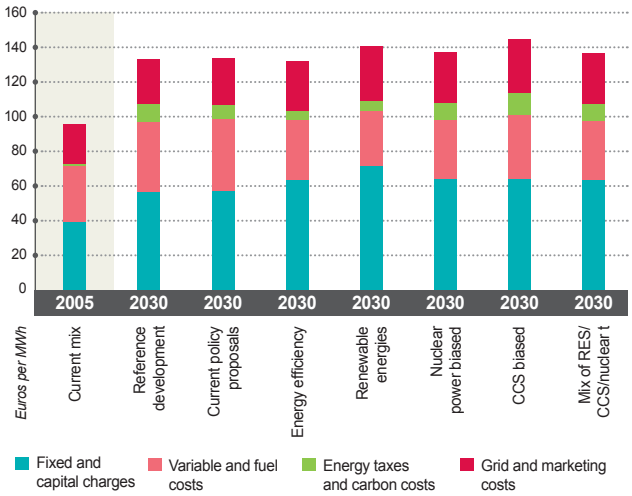
14.0 cents	End customer price for households in 2000
25.9 cents	End customer price for households in 2012
30.5 cents	End customer price for households in 2020, McKinsey forecast
29.0 cents	End customer price for households in 2020, IE Leipzig forecast

In other words, even with the energy transition, the increase in the price of electricity for households will remain within the trajectory of price developments seen in the past. What's more, even without renewables, the prices would rise between now and 2020 because investments would have to be made in the energy system come what may – the increase would simply be slightly lower to start with. This is borne out by an analysis of various scenarios conducted for the EU Commission, as shown in the graph "Scenarios for the EU electricity mix".

The average four-person household consumes 3,500 kilowatt-hours of electricity a year and has a monthly electricity bill of around 66 euros. This figure includes the EEG surcharge, which now accounts for approximately 15 per cent of a household's electricity bill. If the EEG surcharge were to be increased from its current level of 3.59 cents per kilowatt-hour to somewhere around 5 cents, as is currently being discussed, the average household's outgoings for renewable energies would increase by 5 euros a month. If costs were to be distributed fairly, more of those businesses currently exempted from the EEG surcharge will have to contribute with their adequate share.

The EEG costs should not be disregarded, but they are currently within a tolerable range for the majority of households and income brackets. Electricity expenditure currently accounts for 2.5 per cent of a private household's consumer expenditure budget. This roughly equates to the amount the average household spends on personal care.

Scenarios for the EU electricity mix, broken down by key areas. Irrespective of the key technologies chosen, based on similar emission reductions, the costs per MWh of electricity remain roughly the same in the simulated electricity mix scenarios (up to 2030).



Source: Öko-Institut, Dr F. Matthes, in 'Energiewirtschaftliche Tagesfragen', 60th year (2012), issue 9

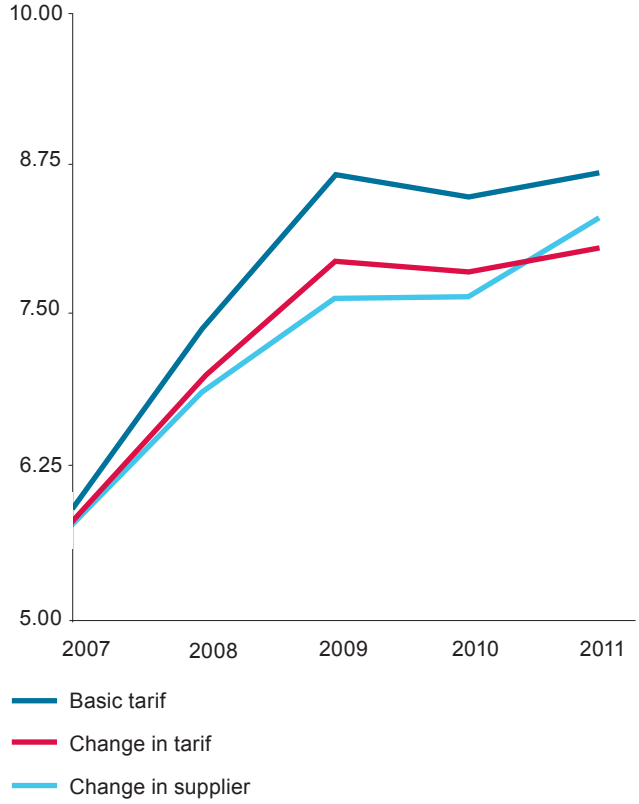
Myth 2

"Households are at the mercy of the rising electricity prices."

The facts

Just under half of Germany's electricity customers have not yet changed their electricity tariff. They still have their local energy utility's basic tariff, which happens to be the most expensive. Money can be saved by choosing a different tariff or by switching to a different supplier. And there are now also very affordable green electricity offers. When shopping around, it's important to remember the following point: what you spend on electricity is always made up of the price per kilowatt-hour and your volume of consumption. And as far as consumption is concerned, it doesn't take much to achieve big reductions compared to today's practice, as demonstrated by the 'Stromsparcheck' programme which is now available in more than 100 municipalities throughout Germany. This involves social organisations such as Caritas providing low-income households with advice given by specially trained electricity advisors.

Electricity costs can be reduced by an average of 10 per cent thanks to such advice and by using devices that save electricity, such as energy-saving lamps, fridge thermometers and sockets that can be switched off at costs on average of no more than 70 euros. These items generate one-off costs, but long-term savings. According to Caritas, in exceptional circumstances, the electricity costs of needy households in receipt of ALG II unemployment benefit can be reduced by up to 133 euros per annum in more extreme cases by participating in the programme. And there should likely to be potential to make savings in more affluent households too.



Cost change potential in ct/kWh when choosing a different electricity tariff, comparing the tariffs' mean values a) when switching from the basic to a cheaper tariff offered by the same supplier or b) when changing suppliers, 2007–2011; Source: BNetzA

Myth 3

"The energy transition will result in financial burdens for a lot of households."

The facts

The consumer organisation in the state of North Rhine-Westphalia (VZNRW) estimates that 600,000 households in Germany had their electricity cut off in 2011. Meanwhile, issue 27/2012 of the ZEIT newspaper points out that the publication Energiewirtschaftliche Tagesfragen had already reported on more than 800,000 instances of people's electricity being cut off six years ago, stating that "while the level of indignation had increased, the problem would actually appear to have diminished". The paper went on to draw an international comparison: "Then there is the fact that energy poverty is also increasing in countries where nuclear reactors are not being switched off at the same time as renewables are being promoted.

Disregarding the 1.3 billion people around the world who have absolutely no access to electricity and setting aside the approximately 3 billion who still cook and heat with wood or dung, one in four New Zealanders is classed as living in energy poverty. In the USA, it's around 16 million households. And in the UK, it's just short of a fifth of the population." This certainly doesn't make the situation in Germany any less serious, but it does but it in a real context. Incidentally, Germany's much more serious social problems are the rising rental costs in the cities and ever-increasing heating costs, which are often aptly called 'second rent'.

Myth:
The energy transition presents the infrastructure with insurmountable problems.

Myth 1
"The electricity networks have to be expanded at great expense, all because of renewables."

The facts

There are all sorts of reasons why the electricity networks should be expanded. For a start, there's the single European electricity market which is being created. This can only function if electricity can be freely traded across national borders. This calls for the expansion of the cross-border interconnections between the national electricity grids and of the necessary 'feeder' routes.

New power plants are not necessarily built where the electricity is needed; rather, they are built where the electricity can be generated as cheaply as possible. In 2009, ten coal-fired power stations were being built in Germany and a further 25 were in the planning stages. A large proportion of these were planned along the coast and in north Germany, close to ports so that the shipping costs of the coal to be imported could be kept low. Renewable energies have made most of these coal-fired power stations unprofitable. And had they been built as planned, they would equally have caused the north-south grids to be expanded.

The grids also need upgrading. According to the Federal Network Agency, in 2008, the average age of the extra-high-voltage pylons in Germany was 32 at the 380 kV level (extra-high-voltage networks) and 50 at the 220 kV level (high-voltage networks). Then there is the fact that grid investments slumped sharply during the period of deregulation in the electricity market. Taking all the grid levels into account, annual investments fell from 4 billion euros in 1993 to 1.7 billion euros in 2003. They then started to rise again and were approximately at the level of 1995 by 2011.

The Federal Network Agency compared the cost of implementing the ongoing grid development plan with the costs that would have been incurred if there had been no energy transition. It determined that the energy transition will cause 2 billion euros of investment per year up to 2020. Without the energy transition, the investments would have amounted to 1.2 billion euros. With amortisation periods of 40 years, this very much puts the debate about cost burdens into perspective. According to the German Association of Energy and Water Industries (BDEW), in 2008, the grid charges payable by all customer groups amounted to approximately 20 billion euros.

Myth 2

"We risk a blackout because grid expansion is progressing too slowly."

The facts

Grid expansion will be necessary and advantageous, whatever happens. It will increase cost efficiency and security of supply. Delaying this expansion is therefore not desirable, but would nevertheless be manageable. It has two major consequences: renewable energy production plants would have to be limited in their output more often and could therefore not feed their electricity into the grids. And secondly, back-up power plants would have to be put into operation more often because the electricity generated by wind turbines in particular cannot be transported to where it is needed the most. According to the Federal Network Agency, 127 gigawatt-hours (i.e. millions of kilowatt-hours) were limited in this way in 2010 ('feed-in management'), which amounts to around 0.02 per cent of the volume of electricity supplied to customers. The operators were paid compensation totalling 10.2 million euros as a result. This is a small sum, considering the EEG electricity cost difference of 7.85 billion euros in 2010. The Federal Network Agency expects to see the compensation paid increase to 240 million euros by 2022. But even then, the volume of affected and cut off electricity would still be well under 1 per cent of the total sales volume. On the other hand, it doesn't make sense to expand the networks in such a way that they can accommodate all the electricity produced, down to the very last kilowatt-hour. The networks would have to be disproportionately expanded because the peak loads are very high and are hit quickly, especially in the case of wind energy. In contrast, with the volume of renewable electricity generated, it would matter very little if the very last percentages of electricity were not fed into the grid, i.e. if the peak loads were capped.

For grid expansion to be kept in check, the production and consumption flexibility reserves have to be fully utilised. For example, combined heat and power plants should be power-led in the future, in order to create more capacity in the power lines when it is needed. This would entail heat storage facilities being built. In addition, consumption can be made to match the electricity supply more flexibly, especially when, in the future, renewable electricity is used more in the heating and transport sector. In industry too, there is potential for shifting electricity loads to more favourable times. Economically attractive tariff offers need to be developed in order to exploit this potential.

Myth 3

"The energy transition poses a threat to security of supply because not enough power plants are being built."

The facts

Even with the immediate decommissioning of just under 8,500 megawatts of capacity as part of the withdrawal from nuclear energy, the power plants can still offer sufficient capacity. Germany's annual peak load, i.e. the highest level of consumption in the calendar year, is approximately 80 gigawatts. This is compared to a guaranteed production output of 93 gigawatts. Guaranteed output is the production capacities that are available with a probability of 99 per cent. According to the Federal Network Agency, between now and 2015, a further 7.8 GW of conventional power plant capacities will be withdrawn from the grid due to age reasons and inefficiency, and a nuclear power station generating 1.3 GW will also be decommissioned. In comparison, there will be capacity increases of 12.6 GW over the same period, meaning there will be around 3.5 GW more conventional capacity by 2015.

It was possible to resolve temporary regional shortages in southern Germany with the help of back-up power plants that were brought back out of 'cold reserve' for a limited period.

Even with the expansion of renewable energies, new power plants will be needed in the medium term (i.e. from 2020). Instead of inflexible baseload power plants, what's needed is flexible power plants which accurately complement the production from renewable sources. Gas-fired power stations fit the bill the best and are the only type of fossil fuil based power plant which is acceptable from a climate protection perspective.

However, the meagre figures of new builts in recent years indicate that the deregulation of the electricity market does not send out sufficient and reliable signals to investors that new power plants should be built. Renewable energies speed up this development, because fossil fuel power plants are used less and less, and therefore find it increasingly difficult to be refinanced in the market. A new market design is therefore needed, irrespective of the energy transition. In the future, it will no longer be possible to finance new power plants on the basis of electricity sales alone. Instead, the capacity they make available likewise needs to be paid for. It's high time some suitable market models were developed for this. WWF will be publishing a concept in October 2012.

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Why we are here

To stop the degradation of the planet’s natural environment and to build a future in which humans live in harmony with nature.

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