

ENERGIEWENDE

The Energy Transformation in Germany

Background briefing for the IPCC WG3 report in Berlin, 7-11 April 2014

Germany is on its way to revolutionize its energy system. This transition, known as the Energiewende, will enable a rapid reduction in coal-fired power generation while nuclear power is also being phased out.

- The growth in renewable energy between 2010 and 2013 more than made up for the post-Fukushima nuclear closures in Germany, adding output equivalent to over 8 large nuclear reactors in just 3 years, and leading to an overall reduction in power generation from fossil fuels.
- The increase in coal-fired generation was entirely due to coal replacing gas as a result of the failure of the European Emissions Trading System (ETS).
- In 2013 wind power capacities of more than 32 GW have been installed and more than 35 GW of solar power is installed in Germany right now. Electricity produced by Renewables in Germany was 146.2 TWh in 2013 which is more than any other single energy source in the German energy mix like coal or nukes.
- The Energiewende enjoys strong and widespread social and political support, and has multiple economic benefits including job creation, stimulation of local economies and energy self-sufficiency.

Today, more than 1 million photovoltaic (PV) systems are on the rooftops of German private houses, farms or small companies. The energy transition has made a huge contribution to the global fight against climate change by commercialising wind and solar power – two key renewable energy technologies that are now being deployed globally from China to the US.

How did the Energiewende start?

At the core of Germany's energy transition lies the nuclear phase-out. This started long before the disaster of Fukushima. A first step was taken in the year 2000, when the German government decided to quit nuclear and introduced the Renewable Energy Act (EEG). Subsequent governing coalitions stuck to this decision – until, in 2009, the Conservatives (CDU) and Liberal Democrats (FDP) came into power, and extended the retention period of nuclear power plants. This was seen at the time as the final victory of the nuclear lobby against the declared wish of the German population. In 2011 the disaster in Fukushima made the share of the population in favour of a nuclear phase-out rise above 90%. German chancellor Angela Merkel accepted the wish of this vast majority: eight of Germany's oldest and most dangerous nuclear power plants were shut down immediately, and a nuclear phase-out by 2022 was decided.

What is it all about?

Getting rid of carbon. When, in 2010, the government presented its goals for renewable energies and for the reduction of CO₂ emissions, the goal was for Germany to become one of the first industrialised countries to base its electricity production, mobility, industries and private households on sustainable and renewable energy. The engine for this ambitious programme is the Renewable Energy Act (EEG).

The EEG guarantees a Feed-In-Tariff (FIT)¹ for renewable energies for 20 years, as well as priority access to the national grid². This provides investment security irrespective of market prices of electricity. It also places the Energiewende on new shoulders: by 2011, more than half of the investments in renewables were made by private households, farmers and small-scale investors. Local communities, regions and energy-cooperatives were empowered to play a significant role in the transition. Thus the energy system is no longer reliant on a handful of huge corporations, but is becoming increasingly decentralised – both in terms of scale and in geography.

Where does the transformation stand today and where is it headed?

So far, the EEG has proven extremely successful: by the end of 2013 the share of renewables in Germany's energy mix has grown to a fourth and is now up to 25 percent of the electricity mix and gain share rapidly. This is bound to increase further and consequently reduce the share of fossil energies. Renewable energy has reached a market share where it can no longer be called a niche. It has become a real challenge to fossil-fuel power plants. This is one of the reasons why the Energiewende is under attack. Fossil utilities and huge industrial players are actively lobbying against the Feed-In-Tariff and for exceptions that spare many industries from funding the transition (the Energiewende is being paid for by all electricity users).

The German vice chancellor, Sigmar Gabriel (SPD), is doing his best to have the costs of the transition carried solely by private households and small-scale companies. Many industries would have to add hardly anything to the funding of the project. Gabriel is also trying to establish a cap on renewables, and he is planning to replace the Feed-In-Tariffs with a system of auctioning for specific capacities. Such a system has clear disadvantages for small-scale investors, such as communities and cooperatives, which are providing the main part of the investments in renewables in Germany. The Feed-In-Tariff, however, is the key success factor of the EEG. The investment security guarantees economic survival for different technologies and a broader mix of renewables in the electricity mix. Without Feed-In-Tariff, there would be a slower growth for renewables and fewer technologies.

The public opinion in Germany is strongly in favour of renewables. More than 1 million people are involved in the Energiewende – from having photovoltaics on their rooftops to being part of an energy co-operative, from renting out fields for wind parks to working in the biomass sector. During the hottest phase of the debate about energy prices, more than 90% of Germans spoke out for continuing to invest in renewables. Two weeks ago, tens of thousands of people hit the streets to demonstrate against a slowing-down of the Energiewende.

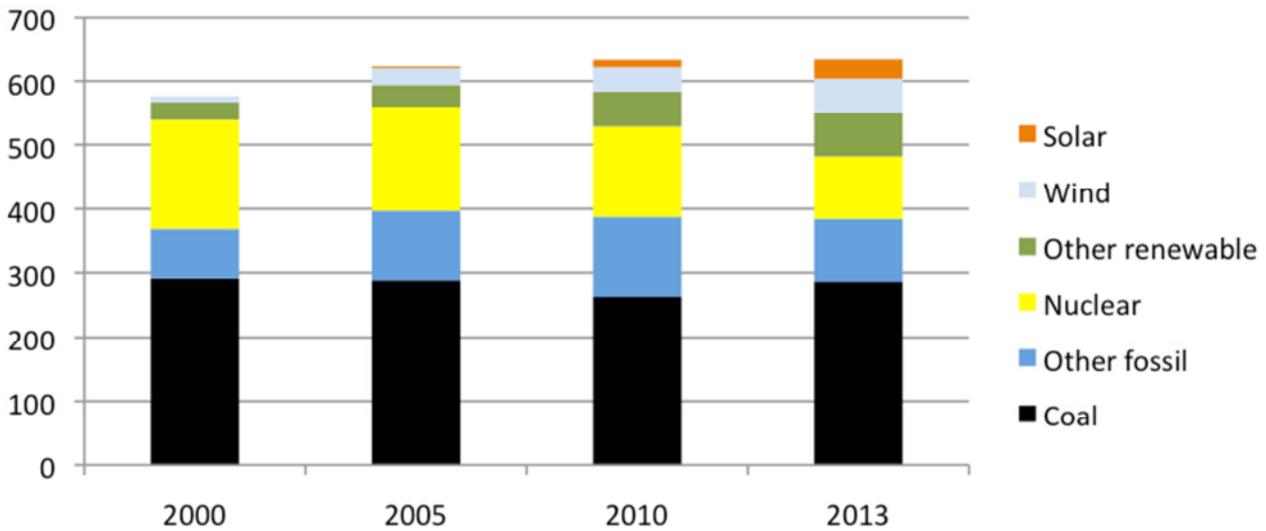
What impact does the Energiewende have on coal and CO₂?

It has been made clear by the government that the phase-out of nuclear power should not be allowed to have negative impacts on climate reduction targets (Germany wants to reduce its CO₂ emissions by 40% until 2020, and by 80-95% in 2050, compared to the year 1990). So the obvious long-term goal of the Energiewende is to also phase out coal-fired plants. Yet, over the past few years, CO₂ emissions have been rising again – caused by increasing amounts of coal-sourced electricity. This is not due to an electricity shortage, but to the collapse of the European Emission Trading System (ETS). A massive surplus of certificates in the market has made the CO₂ price drop so far below any expectations that even the dirtiest coal-plants are profitable. As a result, Germany has been exporting more and more coal-sourced electricity in recent years.

But a closer look at Germany's electricity mix shows that the fossil fuel sector is not growing. CO₂ emissions are increasing due to a shift *within* the fossil sectors. The big energy companies are now moving away from gas power plants to coal and lignite power plants. Energy companies are also confronted with slowing demand, gas and coal market shifts, and the emergence of viable renewable energy generation by private citizens. These companies are under increasing pressure from renewable energy production (and many of them have started to occur losses) – and yet: they continue to stick to their old business model.

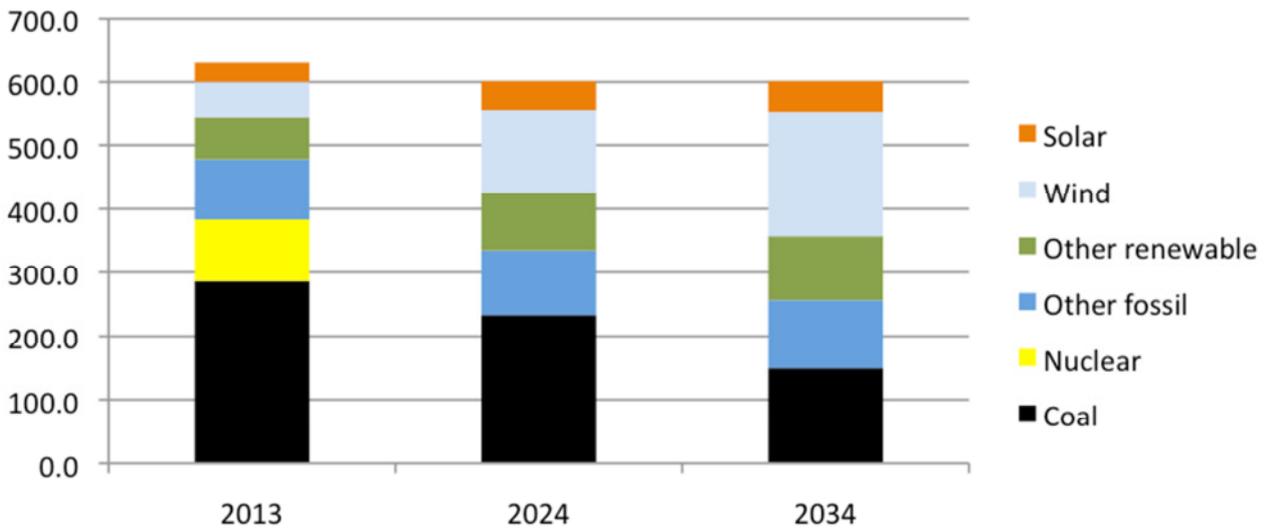
But opposition from local communities and climate groups is growing. Together with low economic incentives to build new coal-fired power plants this has resulted in the cancellation of a number of planned power plants. Having supported two competing electricity systems – one centralized and fossil fuel-based, the other renewable and decentralized – for a number of years, Germany is now about to reach the point, where it has to decide on one of these. The fossil-lobby is justly worried that it might not be theirs.

German power generation mix 2000-2013



Source: AGEB Power Generation Statistics 1990–2013.

Projected German power generation mix based on grid operator capacity plan



Expected changes in German power generation mix if the grid operator's plan for capacity development is realized. Note an extremely conservative projection for solar capacity after 2024. Calculated assuming constant capacity factors for each renewable energy technology and scaling capacity factors of fossil power plants down to match total projected generation. (Sources: Federal Network Agency 2014 Grid Development Plan; AGEB Power Generation Statistics 1990–2013.)

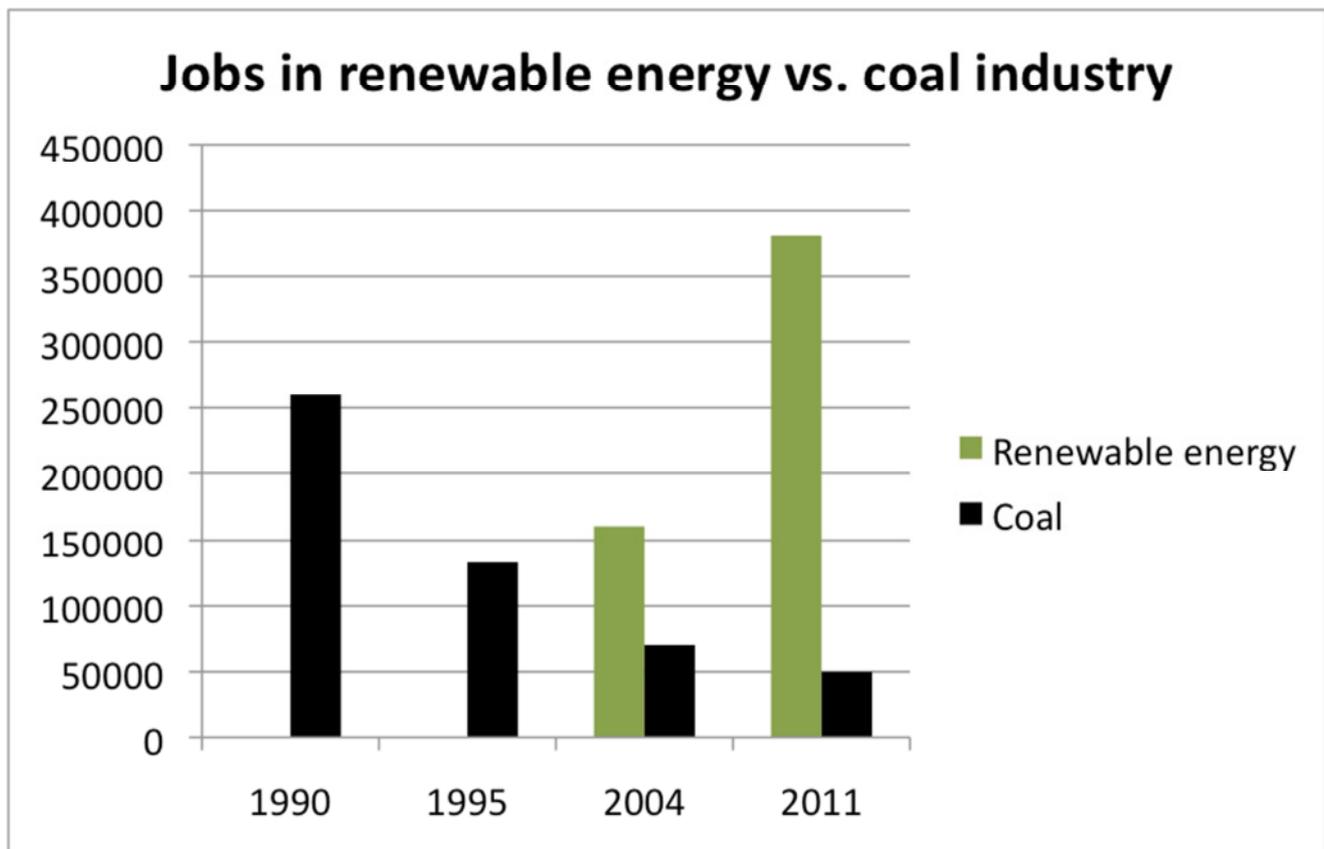
1. Feed-In-Tariffs (FIT) are long-term contracts acting as incentives for producers of renewable energy. In case of the German model, FIT guarantee for the period of 20 years a fixed price, depending on which technology is being used.
2. Priority access can be thought of as a right-of-way for renewable energies: even if there is a surplus of energy, the producers of renewable energy are still being compensated, while those of fossil energies are not.

What economic impacts does the Energiewende have?

The Energiewende is like a stimulus package for rural areas: it creates earnings for local corporations, income for employees of the industry, and rising communal tax revenues. The impact is considerable:

The **direct value added by renewable energies in Germany in 2012** adds up to **16.9 billion EUR** with a municipal value added of around 11.1 billion EUR. Therefore 66% of the total value added in the Federal Republic benefit local communities. Photovoltaics made up for 53% of that amount, followed by wind energy with about 30%. In addition to that, nearly 380.000 jobs were created in 2012 by renewable energy in Germany.

It is true that the transition to a sustainable energy supply requires substantial investments. However, Germany's energy system would have needed costly modernisation even without a single windmill or solar panel being installed. After the liberalisation of the national energy market, corporations reduced their own investments in grids and plants drastically. It is a cynical communicative twist that the fossil lobby managed to label their own lack of investments as the price sticker for an oh-so-costly energy transition.



Sources: BMU 2012: Gross employment from renewable energy in Germany in 2011. http://www.erneuerbare-energien.de/files/english/pdf/application/pdf/ee_bruttobeschaefigung_en_bf.pdf

Kohlenwirtschaft 2012: <http://www.kohlenstatistik.de/>

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