8

Key Findings

German Energiewende - Arguments for a renewable energy future

8A

The German Energiewende is an ambitious, but feasible undertaking.

A lot of people outside Germany, including environmentalists, are skeptical. But even the skeptics like Germany's goal of demonstrating that a thriving industrial economy can switch from nuclear and fossil energy to renewables and efficiency. The German can-do attitude is based on the experience over the last two decades, when renewables matured much more quickly, become more reliable and much cheaper than expected. The share of renewable electricity in Germany rose from 6 percent to nearly 25 percent in only ten years. On sunny and windy days, solar panels and wind turbines now increasingly supply up to half the country's electricity demand, which no one expected just a few years ago. Recent estimates suggest that Germany will once again surpass its renewable electricity target and have more than 40 percent of its power from renewables by 2020. Furthermore, many German research institutes and the government and its agencies have run the numbers and developed sound scenarios for a renewable economy.

8B

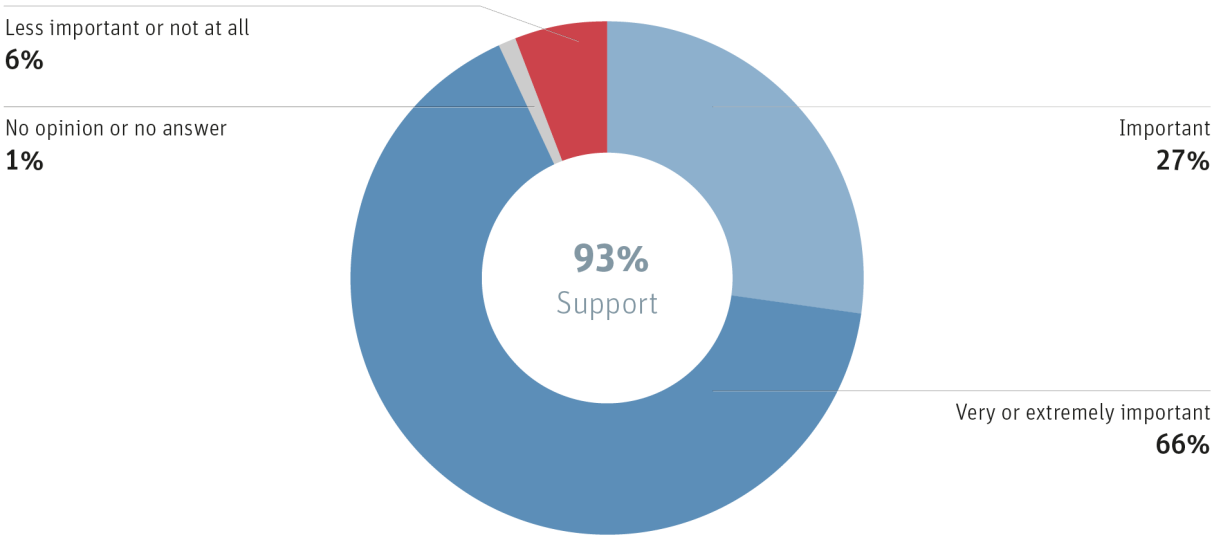
The German energy transition is driven by citizens and communities.

Germans want clean energy, and a lot of them want to produce it themselves. The Renewable Energy Act guarantees priority grid access to all electricity generated from renewables and is designed to produce reasonable profits. By 2013, nearly half of investments in renewables had been made by small investors. Large corporations, on the other hand, are only now beginning to invest. The switch to renewables has greatly strengthened small and midsize businesses, and it has empowered local communities and their citizens to generate their own renewable energy. Across Germany, a rural energy revolution is underway. Communities are benefiting from new jobs and increasing tax revenues, which has become even more important after the debt crisis in the euro zone.

93 percent of Germans support further growth of renewables

"The use and growth of renewable energy is …", survey from August 2015

Source: www.unendlich-viel-energie.de



Energy Transition energytransition.org CC BY SA

www.unendlich-viel-energie.de

8C

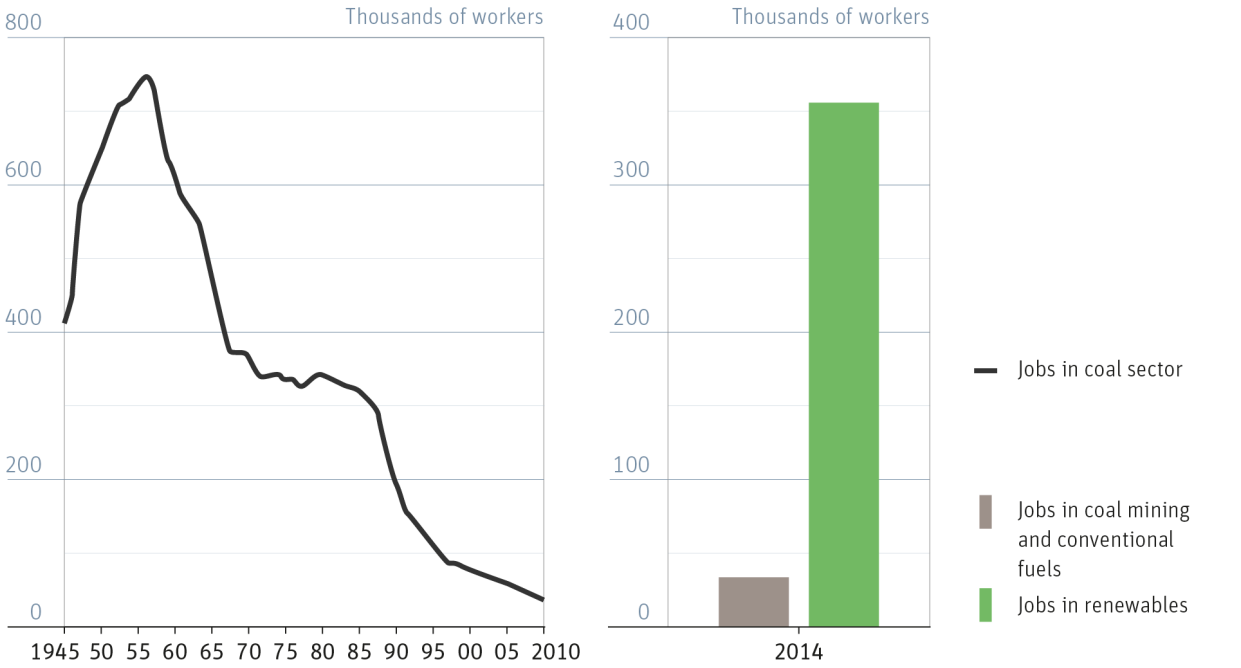
The Energiewende is Germany’s largest post-war infrastructure project. It strengthens its economy and creates new jobs.

The economic benefits of the transition already today outweigh the additional cost over "business as usual". The switch to a highly efficient renewable energy economy will require large-scale investments of up to 200 billion euros. Renewables only seem to cost more than conventional energy, but they are getting cheaper, while conventional energy is getting more expensive; furthermore, fossil fuel remains highly subsidized, and the price of fossil fuel does not include environmental impacts. By replacing energy imports with renewables, Germany’s trade balance will improve and its energy security will strengthen. Already, roughly 350,000 Germans work in the renewables sector – far more than in the conventional energy sector. Unemployment has reached an all-time low since reunification in 1990. While some of these are manufacturing jobs, many others are in installing and maintenance. These jobs for technicians, installers, and architects have been created locally and can’t be outsourced. They already have helped Germany to come through the economic and financial crisis much better than other countries.

Renewables create more jobs than coal power does

Employment in Germany in renewable and conventional energy sectors

Source: DLR, DIW, GRS, Kohlenstatistik.de. Renewables data from 2014.



> These figures represent “gross job creation,” meaning the absolute number of jobs that have been added. A thorough study of the German market estimates a net job creation of around 80,000, rising to 100,000 – 150,000 in the period from 2020 to 2030. One reason why renewables have such a positive impact on net job creation is that renewable power directly o sets power from nuclear plants, and very few people work in those sectors

DLR, DIW, GRS, Kohlenstatistik.de. Renewables data from 2014.

8D

With the Energiewende, Germany aims to not only keep its industrial base, but make it fit for a greener future.

German climate and energy policies are designed to maintain a strong manufacturing base at home. On the one hand, industry is encouraged to improve its energy efficiency. On the other, industry benefits from exemptions to regulations (some of them probably too generous) to ease the burden on industry. Contrary to one common misconception, renewables have turned Germany into an attractive location for energy intensive industries. In 2012, wind and solar energy drove down prices on the wholesale power market by more than 10 percent. From 2010 to 2013, they were down by 32 percent. Futures prices until the end of this decade show a continued downward trend in 2016. Cheaper electricity means lower business expenses. Industries from steel to glass and cement benefit from these low energy prices. But the benefits of the energy transition extend beyond today. The demand for solar panels, wind turbines, biomass and hydro power plants, battery and storage systems, smart grid equipment, and efficiency technologies will continue to rise. Germany wants to gain a first-mover advantage and develop these high-value engineering technologies “Made in Germany”. The focus on renewables and energy conservation is part of that forward-looking approach to business investments. When the world switches to renewables, German firms will be well positioned to deliver high quality technology, skills, and services for these markets.

8E

Regulation and open markets provide investment certainty and allow small business to compete with large corporations.

Germany's energy policy is a mix of market-based instruments and regulation. Under the Renewable Energy Act, renewable electricity has guaranteed grid access to provide investment certainty and allow family businesses and small firms to compete with large corporations. The policy enables producers of green electricity to sell their power to the grid at a set rate. The rates are "degressive," meaning they decline over time to drive down future prices. Unlike coal and nuclear power, the costs for renewables are not hidden and passed on to future generations, but transparent and immediate. The government sees its role as setting targets and policies; the market decides how much is invested in renewables and how the price of electricity develops. Consumers are free to choose their power provider so they can buy cheaper electricity or switch to a provider with a 100% renewable portfolio.

8F

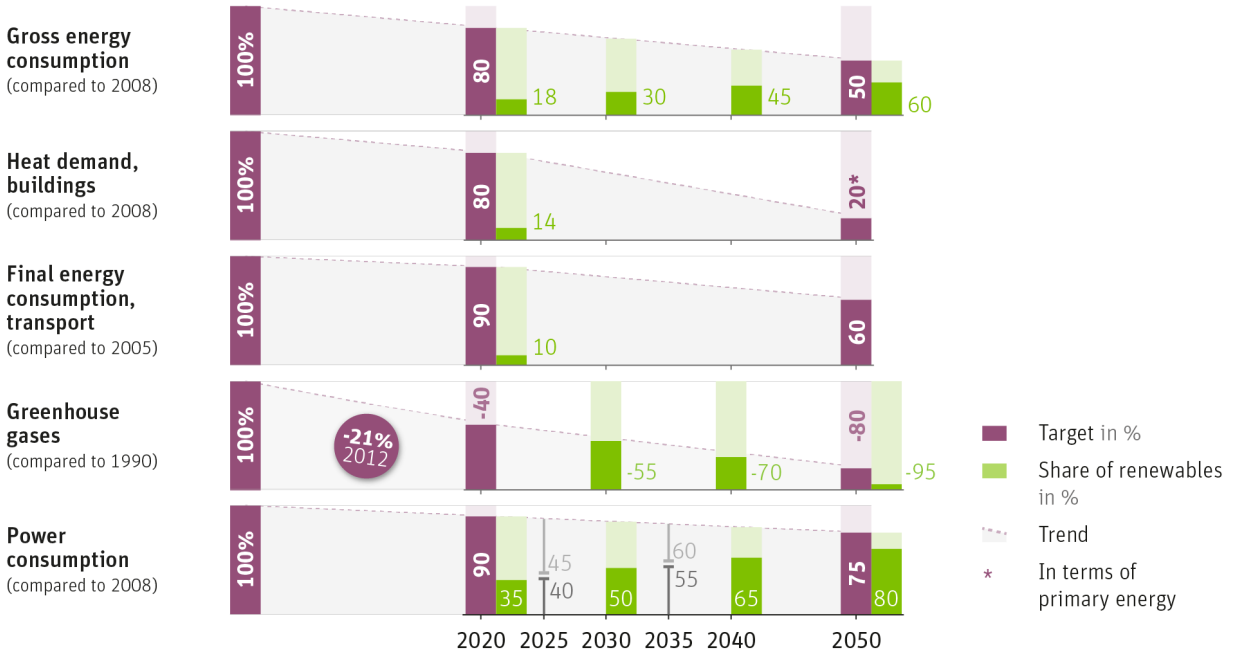
Germany demonstrates that fighting climate change and phasing out nuclear power can be two sides of the same coin.

A lot of countries are struggling to fulfill their climate commitments. The decommissioned nuclear capacity was replaced with more renewables, conventional back-up power plants, and greater efficiency. Renewables reduce Germany's emissions by around 130 million tons annually. Overall, Germany overshot its Kyoto target of a 21 percent reduction for 2012. By the end of 2012, Germany had reduced its emissions by 24.7 percent and is now moving towards its 2020 target of 40 percent reductions (relative to 1990). It is not yet clear, however, whether the 2020 target can be met; in 2015, the reduction had only reached 27 percent, leaving a large gap of 13 percentage points in only five years.

German energy transition: high certainty with long-term targets

Long-term, comprehensive energy and climate targets set by the German government

Source: BMU



BMU

8G

The German Energiewende is broader than often discussed. It not only includes renewable electricity, but also changes to energy use in the transportation and housing sectors.

Germany's *Energiewende* is not only about switching from nuclear and coal to renewables in the electricity sector. Electricity only makes up roughly 20 percent of German energy demand, with roughly 40 percent devoted to heat and 40 percent to transportation. Most public attention has focused on the power sector, with the nuclear phase-out and the switch to wind power and solar power making headlines. But in fact, Germany is a leader in highly efficient building technologies, such as "passive houses," which make heating systems in homes largely redundant, as well as efficient electrical household appliances or industrial equipment. Unfortunately, however, renovation rates are too low for the tremendous efficiency gains from energetic renovation to be fully effective. In addition, Germany has not expanded its district heating networks, which allow waste heat from power generators or from large solar thermal collector fields to be used productively, as fast as its neighbors in Austria and Denmark. But perhaps the greatest challenges lie in the transportation sector, where a number of options are being

looked into worldwide – from electric mobility to hybrid vehicles. Germany is not a leader in such technologies. But the greatest efficiency gains will come about when we switch from individual mobility to public transport – and from large cars to small vehicles, such as electric bicycles, when we have to resort to individual transportation.

8H

The German Energiewende is here to stay.

It is very unlikely that Germany will reverse its course. The transition away from nuclear power has been long in the making. Of course the Big Four utilities (E.ON, RWE, Vattenfall, EnBW) once fought hard to defend their incumbent interests by delaying the switch to renewables, but Eon and RWE have publicly announced their plans to stop building nuclear plants internationally, and EnBW is now owned by the State of Baden-Württemberg, which has a Green governor who is unlikely to instruct the company to support nuclear more. Industrial giant Siemens has also stepped away from nuclear in its global portfolio and now wants to focus on wind power and hydropower. The public strongly supports extending renewables, even in light of rising retail power rates. Germans expect their political leaders to take on the challenge of the energy transition. There are disagreements across the political spectrum about which strategies are the best, but in general all German political parties today support the energy transition because the German public overwhelmingly does.

8I

The energy transition is affordable for Germany, and it will likely be even more affordable for other countries.

Germany has benefited economically from its international leadership role in going renewable – similar to Denmark and other pioneers moving to renewables. Germany has created the world's largest domestic solar PV market. German commitment and Chinese mass scale production has helped to drive down the cost of renewables worldwide. In Germany, installed system prices for solar PV plummeted by 66% from 2006 to mid-2012. It will be much cheaper for other countries to invest in renewables now that the costs are lower. On top of that, many countries have much better solar resources than Germany; some of them with the capability of producing up to twice as much power from the same solar panel, because of more sunshine.