



# 7

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## 7A

### The German Energiewende is an ambitious, but feasible undertaking.

Many people outside Germany, including environmentalists, are skeptical about Germany's Energiewende. However, even the skeptics should like Germany's ambition 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 six percent in 2000 to some 32 percent in 2016. 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.

## 7B

### The German energy transition is driven by citizens and communities.

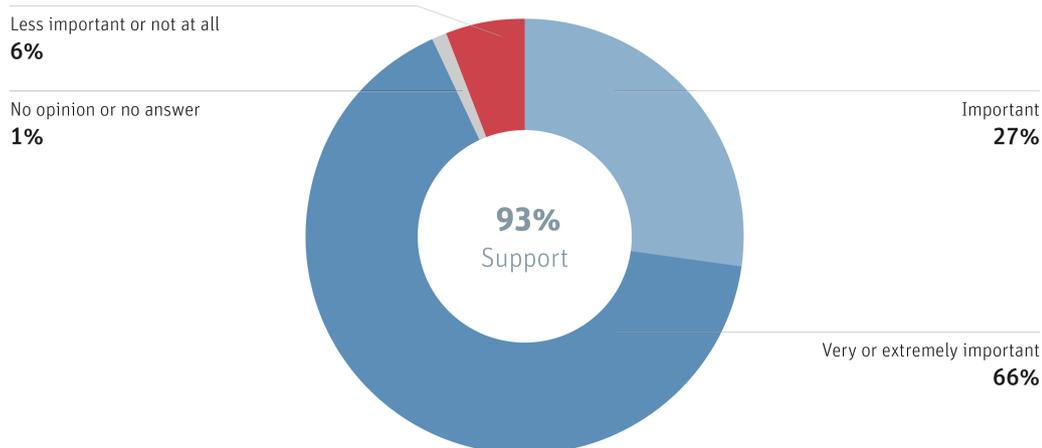
Germans want clean energy, and a lot of them want to produce it themselves. The Renewable Energy Act (EEG), which is the legal basis for the Energiewende, has historically guaranteed priority grid access to all electricity generated from renewables and is designed to produce reasonable profits. By 2013, nearly half of investments in renewables had been made by small investors and citizens. Yet large corporations have now also begun to invest. The switch to renewables has greatly strengthened small and mid-size 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.

## 93 percent of Germans support further growth of renewables

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"The use and growth of renewable energy is ...", survey from September 2016

Source: [www.unendlich-viel-energie.de](http://www.unendlich-viel-energie.de)



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## 7C

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. Already, global investments in renewables amount to at least 300 billion US\$ despite falling wind and solar equipment prices. Renewables seem to cost more than conventional energy,

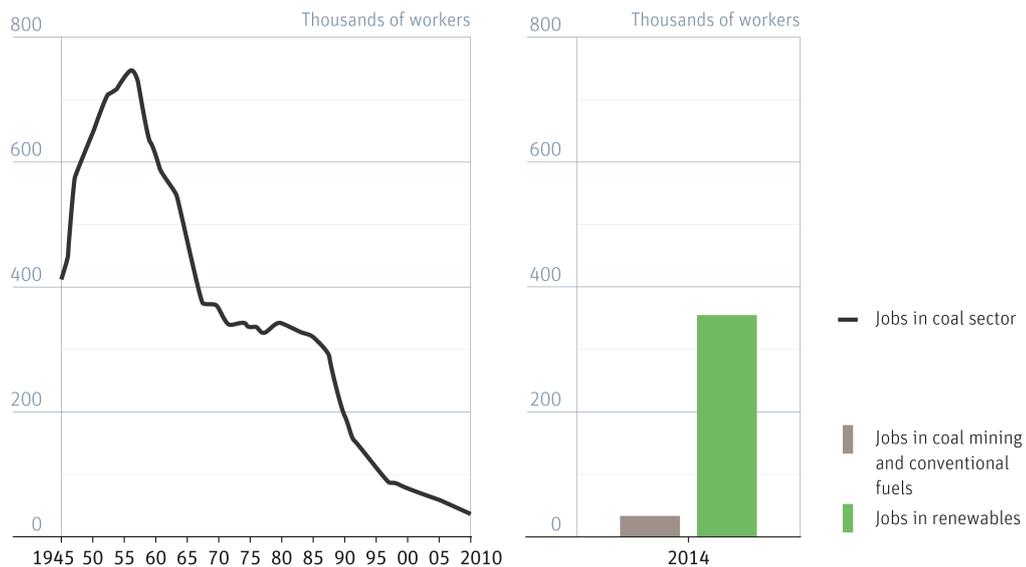
but they are getting cheaper, making even coal power increasingly uncompetitive. Furthermore, fossil fuel remains highly subsidized, and the price of fossil fuel does not include any negative environmental impacts. By replacing energy imports with renewables, Germany's trade balance will improve and its energy security will strengthen. Roughly 334,000 Germans already work in the renewables sector – far more than in the conventional energy sector. In the past few years, unemployment has reached an all-time low since German reunification in 1990. While some of these are manufacturing jobs, many others are in installing and maintenance. These jobs for technicians, installers, and architects were created locally and cannot be outsourced.

## Renewables create more jobs than coal power does

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Employment in Germany in renewable and conventional energy sectors

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



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

## 7D

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 hand, 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. Prices on the wholesale power market fell by 32 percent between 2010 and 2013. Futures prices were at or below three euro cents per kWh in mid-2017. 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, experience and services for these markets.

## 7E

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 (EEG), renewable electricity has guaranteed grid access to provide investment certainty and allow family businesses and small firms to compete with large corporations. The policy enabled 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. With

the introduction of auctions, the German government has looked for new ways to keep citizens involved in energy projects. 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 percent renewable portfolio.

## 7F

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

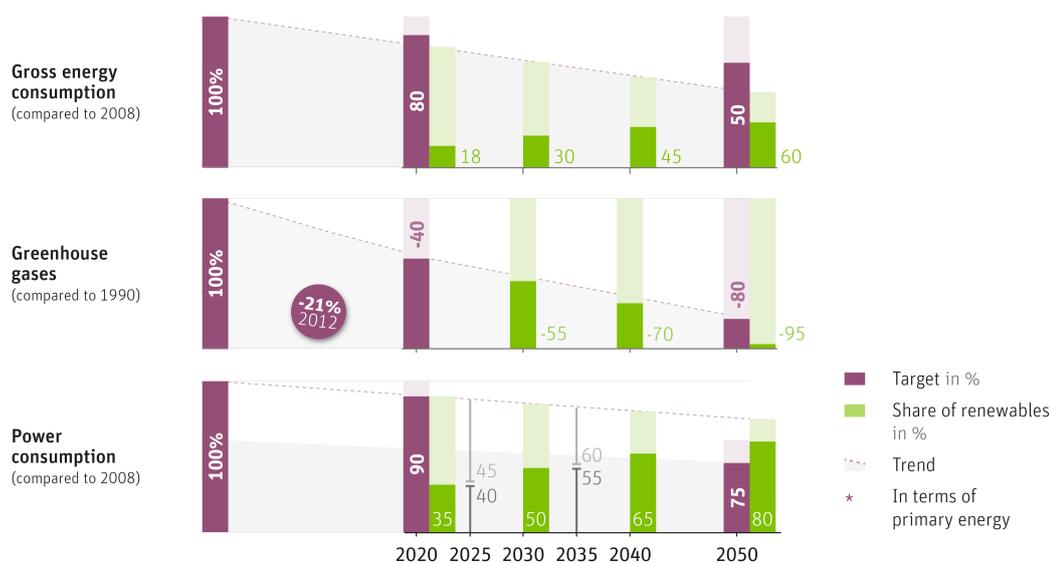
Many countries are struggling to fulfill their climate commitments. Germany's decommissioned nuclear capacity has been replaced with more renewables, conventional back-up power plants, and greater efficiency. Renewables reduced Germany's emissions by around 130 million tons in 2016. Overall, Germany overshot its Kyoto climate target of a 21 percent reduction by almost four percentage points for 2012. However, it is highly probable that Germany will miss its 2020 target of a 40 percent reduction compared to 1990 levels. In 2016, the reduction had only reached 27 percent, leaving a large gap of 13 percentage points in only five years. If coal plants are left online, progress must come in other sectors, such as by getting people to invest in building renovations and to drive less cars. Generally, these are hard sells for the German public.

## German energy transition: high certainty with long-term targets

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

Source: BMU



BMU

## 7G

## The German Energiewende is broader than often discussed.

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, the nuclear phase-out and the switch to wind power and solar power. In fact, Germany is a leader in highly efficient building technologies as well, such as "passive houses," which make heating systems in homes largely redundant, as well as efficient electrical

household appliances or industrial equipment. Unfortunately, however, housing renovation rates are too low for the tremendous efficiency gains from energetic renovation to be fully effective. Germany has not expanded its district heating networks, which generate waste heat from power generators or from large solar thermal collector fields. 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's car industry is not yet a leader in these 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.

## 7H

### 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 and EnBW) once fought hard to defend their incumbent interests by delaying the switch to renewables, but E.On and RWE have publicly announced their plans to stop building nuclear plants internationally, and EnBW is now owned by the State of Baden-Württemberg with a Green governor unlikely to instruct the company to support nuclear anymore. Industrial giant Siemens has also stepped away from nuclear in its global portfolio and now wants to focus on wind power and hydropower. The German 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 support the energy transition because the German public overwhelmingly does.

## 7I

### 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. 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 two-thirds from 2006 to 2014. It will be much cheaper for other countries to invest in renewables now that the technology costs are much 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, due to more sunshine.

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