The global energy transition to stem harmful man-made climate change is gaining momentum. As part of this, Germany aims to be greenhouse gas neutral by 2050. The country’s decades-long effort to fundamentally shift its energy supply and to run the world’s fourth-largest economy without fuelling global warming provides valuable lessons on weaning a major economy off fossil fuels.

The repercussions of the Energiewende (energy transition) are felt across society and the business sector, offering journalists a wealth of exciting and important stories. But researching this massive event from outside the country is no easy task, even for the most seasoned reporter. The huge complexity of the technology and economics behind energy policy make things harder. Yet strong fact-based and critical journalism is essential to inform the international debate on ways to decarbonise the global economy.

This is why Clean Energy Wire (CLEW) supports journalists in their work. Fully funded by two non-profit foundations – Stiftung Mercator and the European Climate Foundation – we enjoy independence from any business or political interests. Rather, we share our funders’ commitment to work towards a climate-neutral economy in order to limit the impact of man-made climate change.

CLEW’s “A Reporter’s Guide to the Energy Transition”, now in its eighth edition, offers journalists a useful starting point by outlining the main story lines of the energy transition, providing contact details for experts, as well as links to key literature and articles.

Our website, cleanenergywire.org, offers lots more in-depth information and contacts. Our daily newsletter and our Twitter feed @cleanenergywire keep readers in the loop about Energiewende-related debates and events.

Our growing CLEW Journalism Network (@ClewNetwork) allows 200 journalists around the world to find colleagues work-
ing on energy transition and climate stories, to collaborate on cross-border stories, exchange tips and views or collect background information from other countries. We invite all reporters and editors with an interest in the energy transition and climate policy to join.

We also organise workshops for journalists, offering a first-hand account of the Energiewende. But, most importantly, we provide assistance, answer your questions, and put you in touch with experts and fellow journalists across the globe – so don’t hesitate to ask CLEW.

Sven Egenter and the Clean Energy Wire team

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Energiewende in Germany: Timeline

1973-1975
“Nuclear power? No thanks!” Birth of Germany’s anti-nuclear movement as protests force plans for a nuclear power plant in Wyhl to be aborted

1979/1980
Enter the Greens
Germany’s Green Party is founded, with an exit from nuclear energy and a renewable future as key demands
Activists first use the term “Energiewende”
What is the Energiewende? And where did it come from?

The energy transition, known in Germany as the Energiewende, is the country’s planned transformation into a greenhouse gas-neutral, nuclear-free economy.

The process involves:

- phasing out nuclear power by 2022 and coal by 2038; and reaching climate neutrality by 2050
- the phase-in of renewable energy and low-carbon technologies
- increased energy efficiency

Since the introduction of financial support for renewable energy in the 1990s, the Energiewende has been radically reshaping Germany's energy system as a whole. The traditional model of generating electricity in large power plants is being replaced by a system dominated by millions of renewable power installations dependent on the weather. But the project’s influence now goes well beyond the electricity system, because creating a decarbonised economy also entails using renewable energy.

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### Energiewende in Germany: Timeline

<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>1986</td>
<td>Chernobyl disaster solidifies Germans’ resistance to nuclear energy</td>
</tr>
<tr>
<td>1991</td>
<td>Climate change enters the discourse – a magazine story leads parliament to establish an advisory council</td>
</tr>
</tbody>
</table>
| 1997/2005 | Kick-starting renewables  
New legislation introduces feed-in tariffs for renewable power |
| 1997/2005 | Kyoto Protocol  
Germany, the world’s sixth largest emitter at the time, has to reduce CO₂ emissions under the agreement |
| 2000   | Renewable Energy Act  
Renewables granted feed-in tariffs and grid priority  
Nuclear phase-out #1  
SPD-Green government and utilities agree to phase out nuclear by 2022 |
| 2007   | EU targets  
EU sets 2020 climate targets: 20% renewables share, 20% GHG reduction, 20% more efficiency |
| 2010   | Extending nuclear  
The nuclear consensus is reversed by a conservative government  
Energy concept  
Govt. sets out renewables and climate targets for 2020 and 2050 |
| 2011   | Nuclear phase-out #2  
Merkel government formulates new nuclear phase-out by 2022 with large parliamentary majority after Fukushima disaster |
to replace coal, oil, and gas wherever they are burned – be it in industry, heating, transport, or other sectors.

The transformation unleashed by the energy transition has already produced many winners and losers. Electricity costs have risen for most consumers, but have fallen for many energy-intensive companies, thanks to industry rebates. While traditional power companies have been hit hard and Germany’s mighty car industry struggles to shift gears, many innovative businesses have turned the upheaval to their advantage. Since the energy transition turned into a truly global enterprise with the Paris Climate Agreement and the European Commission’s Green Deal, new markets have opened up for low-emission technologies – and many made in Germany brands see opportunities for growth.
Targets of the Energiewende

The overall objectives of the Energiewende are to phase out nuclear power and eliminate Germany’s greenhouse gas emissions.

The nuclear exit is proceeding according to schedule and Germany will switch off its last nuclear power plant in 2022. Dealing with radioactive waste will, however, take many decades. As regards emissions reductions, the picture is more complex. Germany plans to cut CO₂ output by at least 55 percent by 2030 compared to 1990 levels. By 2050, the country aims for greenhouse gas neutrality, in line with the new EU goal. The government has translated the national targets into annual emissions budgets for individual sectors, such as transport and industry, to make progress more measurable.

The most important tools for reaching the targets are the roll-out of renewable energies, reducing energy consumption, and ending the use of fossil fuels in all sectors of the economy. Germany has already exceeded its 2020 target of covering 35 percent of power use with renewables, as their share rose to above 40 percent in 2019, and is now taking aim at 65 percent by 2030. However, renewables’ share of total energy use, currently at around 17 percent, remains comparatively low.

Germany’s first Climate Action Law made emissions reduction legally binding as part of a comprehensive climate action package that forms the bedrock of Germany’s long-term policy. The strategy includes a coal exit by 2038 at the latest, support for electric vehicles, and a CO₂ price for transport and heating to complement the EU emissions trading system covering industry and the power sector.

Progress toward the climate targets was initially slow. Emissions remained stubbornly high for years, suggesting the country would miss its original 2020 target of cutting emissions by 40 percent by a wide margin, and threatening the entire project’s credibility. But significant reductions in 2018 and 2019 pushed the country closer to the target than expected – and an economic slump caused by the coronavirus now makes it look extremely likely that Germany will meet the 2020 goal.

The country is still struggling to cut emissions in the transport and heating sectors, however, and is facing a slow-down in the roll-out of renewable energy. These trends indicate that it will require continued efforts to meet Germany’s future climate targets, even in the event of a severe recession caused by the coronavirus pandemic and consequent steep drop in emissions.

<table>
<thead>
<tr>
<th>Sector</th>
<th>2019 status cut from 1990 levels</th>
<th>2030 target cut from 1990 levels</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy</td>
<td>45.5%</td>
<td>62.5%</td>
</tr>
<tr>
<td>Buildings</td>
<td>41.9%</td>
<td>66.7%</td>
</tr>
<tr>
<td>Transport</td>
<td>0.6%</td>
<td>42%</td>
</tr>
<tr>
<td>Industry</td>
<td>33.8%</td>
<td>50.7%</td>
</tr>
<tr>
<td>Agriculture</td>
<td>24.4%</td>
<td>35.6%</td>
</tr>
<tr>
<td>Other</td>
<td>76.3%</td>
<td>86.5%</td>
</tr>
<tr>
<td>Total</td>
<td>35.7% &quot;at least&quot; 55%</td>
<td></td>
</tr>
</tbody>
</table>

Source: UBA (2020), Climate Action Law
1 Targets as stated in Climate Action Law.
2 The German government abandoned its original 2020 target with the introduction of the Climate Action Law in 2019.

Note: Without emissions from land use, land-use change and forestry (LULUCF), 2019 data preliminary.
I think they’re doing sector coupling.
The Energiewende in Figures

- **3.6%** Renewables’ share in gross German power generation in 1990
- **40.1%** Renewables’ share in gross power generation in 2019

**14 minutes**
Average power outage in Germany 2018
USA: 470 mins (2017)
GB: 47 mins (2016)
Poland: 192 mins (2016)

- **89%** of Germans believe increased use and expansion of renewables is very important or important (2019)
- **47.7 million** passenger cars registered in Germany (01/2020)
- **136,617** pure electric cars registered = 0.3% (01/2020)

**42%** Renewables’ share in gross power consumption in 2019 (up from 3.4% in 1990)

- **73.8%** of homes heated with oil and gas in 2019
- **96%** of natural gas used in Germany is imported (2018)
- **97%** of crude oil is imported (2018)
- **14%** fall in primary energy consumption since 1990 (2019)

**54%** rise in GDP since 1990 (2019)

**15%** Renewables’ share in primary energy consumption in 2019 (up from 1.3% in 1990)

**23.7 → 31.4 ct/kWh**
Average household power price 2010 and 2020 – thereof 6.8 ct/kWh renewable surcharge in 2020

**5.1 → 3.7 ct/kWh**
Average electricity spot market price in 2010 and 2019

**€ 62 billion** Volume of German government’s climate package (2020-2023)
**€ 25 per tonne** CO₂ price in building and transport sector starting from 2021

**17th rank** for Germany in the overall “Energy Transition Index” (WEF, 2019)

**1st rank** for Germany in energy efficiency policy and performance scorecard (ACEEE, 2018)

**316,700** people employed in the renewables sector (2017)
**20,336** people employed in the lignite industry (12/2019)

**€ 22.9 billion** Renewable surcharge paid by power consumers in 2019

**2018**
USA: 470 mins (2017)
GB: 47 mins (2016)
Poland: 192 mins (2016)

**14 minutes**
Average power outage in Germany 2018
USA: 470 mins (2017)
GB: 47 mins (2016)
Poland: 192 mins (2016)
Development of gross power production in Germany 1990-2019

Germany's power export balance 1990-2019

Share of energy sources in primary energy consumption 2019

Germany remains net electricity exporter

renewables share has overtaken coal
Energiewende Dates 2020/2021*

**2020**

- **20–21 April**: Global Solutions Summit, BERLIN. ONLINE
- **27–28 April**: 11th Petersberg Climate Dialogue, BERLIN. ONLINE
- **4–6 May**: Berliner Energietage 2020, BERLIN. MOVED TO SUMMER – ONLINE
- **17–18 June**: BDEW Kongress, energy conference by German Association of Energy and Water Industries (BDEW), BERLIN.
- **17–19 June**: Intersolar Europe, trade fair, MUNICH. CANCELLED
- **13 – 15 September**: EU-China Summit, LEIPZIG.
- **28 September**: European Sustainable Finance Summit, FRANKFURT.

**2021**

- **9 – 19 November**: 2020 UN Climate Change Conference (COP26), Glasgow, UK. POSTPONED
- **16 – 17 November**: dena Kongress, conference by German Energy Agency (dena), BERLIN.
- **13 – 15 January**: Handelsblatt Energy Conference 2021, BERLIN.
- **9 – 11 February**: E-World energy & water trade fair, ESSEN.
- **14 March**: State elections in Rhineland-Palatinate and Baden-Württemberg.
- **6 June**: State elections in Saxony-Anhalt.

* Many events may yet be cancelled due to the coronavirus.
Contacts

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German Institute for Economic Research (DIW), DIW’s energy, transportation and environment, and climate policy departments study the economics and politics of climate change and energy. Petra Jasper, +49 30 89789-152, pjasper@diw.de, www.diw.de/en

Fraunhofer ISE, solar energy research institute and publisher of electricity production data. Also see their data and graphs at www.energy-charts.de, +49 761 4588-5147, www.ise.fraunhofer.de

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German Renewable Energy Federation (BEE) +49 30 275 81 70-16, presse@bee-ev.de, www.bee-ev.de

... for a list of over 250 experts and institutions with insights into the Energiewende see: www.cleanenergywire.org/experts or find energy transition hotspots on the CLEW Research Map
Reading in English

cleanenergywire.org Our website provides in-depth analyses (dossiers), factsheets, news articles, an expert database, and more.


Agora Verkehrswende (2017) Transforming Transport to Ensure Tomorrow’s Mobility.

The Federal Ministry for Economic Affairs and Energy (BMWi) website offers a wide range of publications in English, including the newsletter ‘Energiewende direkt’.


energytransition.org A website/blog, funded by the Green Party-affiliated Heinrich Böll Foundation, explaining what the energy transition is, how it works, and what challenges lie ahead.


Energy Research and Social Science (2016) Putting an energy system transformation into practice: The case of the German Energiewende.


Centre on Regulation in Europe (2015) The energy transition in Europe: initial lessons from Germany, the UK and France.

Green pioneer Germany adds carbon price and coal exit to climate policy push

Thanks to its early embracing of renewable energy, Germany is considered a pioneer in the fight against man-made climate change. Despite a rapid rise in power generation from wind, solar, and bioenergy, the country’s track record on cutting greenhouse gas emissions is, however, mixed. Germany expected to miss its original 2020 climate target and instead presented a longer-term strategy to reach the country’s 2030 goals and achieve climate neutrality by 2050. Ironically, the impacts of the coronavirus mean the country is almost certain to reach the 2020 target after all. Germany has decided to cut its reliance on burning coal for power production by 2038 at the
very latest, is about to introduce a price on carbon to clean up transport and heating, and has started to devise a strategy to wean industry off fossil fuels. But a slow-down in the renewables roll-out and recurring squabbles over policy suggest it will be a bumpy ride to turn Germany’s climate ambition into practice over the long run.

“Now it’s perfectly clear: all sectors are well advised to prepare in time for the post-fossil age.”

Svenja Schulze, Environment Minister (SPD party)
Hard-fought coal exit to set economy on course for climate neutrality

Germany, following the example of other advanced economies in Europe, has decided to end coal-fired power production for good and gradually remodel its power sector to become fully decarbonised over the next decades. While a large majority of citizens welcomed the decision to exit coal, Germany faces the dual challenge of simultaneously phasing out nuclear power and providing an economic perspective for mining regions that still rely heavily on the coal industry. A compromise found by a government-appointed commission paved the way for an official phase-
“The planned phase-out roadmap will probably be up for debate after the next election.” Patrick Graichen, head of energy policy think tank Agora Energiewende

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Barbara Praetorius, co-chair of coal exit commission, +49 30 5019-2532, barbara.praetorius@htw-berlin.de

Reading

German government (2020) Draft Law for Reducing and Ending Coal-Fired Power Production (in German)
Commission on Growth, Structural Change and Employment (2019) Final report (in German)
Ecologic et al. (2019) Phasing out coal in the German energy sector
Aurora Energy Research (2019) Coal exit auctions: Design options, opportunity costs and clearing prices for Germany's hard coal phase-out


WWF Germany (2020) Just transition to climate neutrality – doing right by the regions


On cleanenergywire.org

Dossiers:
Germany’s coal phase-out
Climate cabinet to put Germany back on track for 2030 targets

Articles:
German government adopts coal exit, fixes hard coal compensation
"Historic compromise" or "pact of unreason"? – media reactions to Germany’s coal exit deal
Former coal commission members say German government breached landmark exit compromise

Factsheets:
Spelling out the coal exit – Germany’s phase-out plan
German commission proposes coal exit by 2038
Germany's three lignite mining regions

out plan that includes billions of euros in support payments for coal regions and compensation for plant operators. However, it is uncertain whether the plan, which was announced in early 2020, will put the country’s coal debate to a rest. Many of the former commission members are not satisfied with the government’s planning, arguing that it postpones plant closures to the latest possible date and lacks provisions for ensuring that decommissioned coal power capacity is substituted with the renewable energy sources needed as the bedrock of a climate-neutral economy.
For many observers, the energy transition in Germany began with Chancellor Angela Merkel’s decision to phase out nuclear power, following the accident at the Fukushima nuclear plant in Japan in 2011. But the societal project started decades before, in the 1970s. A long process, deeply rooted in German history and society, led to policies that boosted renewable energy in Germany, which are now at the heart of the move to a climate-neutral economy. The Energiewende – a full-scale transformation
“The renewable energy act sparked a real grassroots citizens’ movement. Germans turned the Energiewende into their own project.” Nina Scheer, Social Democratic Party MP

of society and the economy – arose out of enduring grassroots movements, evidence-based discourse, concern about climate change, and key technological advances, as well as hands-on experience garnered along the way in Germany and elsewhere.

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On cleanenergywire.org

- Dossier: The history of the Energiewende
- Factsheets: Milestones of the German Energiewende
  The history behind Germany’s nuclear phase-out

Reading

- energytransition.de Timeline Energiewende
- Carbon Brief (2016) The history of the Energiewende
Energiewende’s success hinges on unblocking the power grid

Germany must update its electricity network to handle the fluctuating supply of power from decentralised sources, while pursuing the shift to a renewable energy system. The rapid expansion of wind power capacity in the north has supplied bountiful low-cost electricity there. But too much power can be as big a problem for the stability of the grid as too little. Bottlenecks on the network currently cause stabilisation procedures costing Germany more than a billion euros per year. Public protests against building the power lines which will carry electricity to Germany’s industrial
south mean grid expansion is lagging behind schedule. In 2019, parliament passed an ‘acceleration law’ to ensure that the necessary lines are completed swiftly, and agreed with states that long stretches should be placed underground to increase public acceptance.

“Grid expansion remains the Energiewende’s main challenge.”

Jochen Homann, head of Federal Network Agency (BNetzA)
#Transport

Automobile-proud Germany has made little headway in extending the Energiewende to transport, a crucial step in the country’s quest for a low-carbon economy, resulting in stubbornly high sector emissions. But after several driving bans were implemented to reduce local pollution in the wake of the dieselgate scandal, public and politics alike are acknowledging that the shift to a sustainable transport system will involve...
“Decarbonisation isn’t happening anywhere in the sector. Measures are expensive and interfere with our daily life. Thus, it just hasn’t been pushed by either politicians or industry.”

Peter Kasten, Institute for Applied Ecology

much more than replacing conventional cars with electric models. In a slow rethink of decades’ worth of car-centred policy, there is a new emphasis on sharing concepts, public transport, cycling and walking, as tentative discussions about phasing out conventional cars are gaining ground. Policymakers have also started to make proposals on how aviation and shipping could eventually become more climate-friendly.

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### Reading

Agora Verkehrswende (2019) Implications of the Paris Agreement for the German transport sector

Agora Verkehrswende (2017) Transforming Transport to Ensure Tomorrow’s Mobility – 12 Insights

Transport & Environment (2019) Less is more: how to go from new to sustainable mobility

Federal Ministry of Transport and Digital Infrastructure (BMVI) The future of mobility is electric


### On cleanenergywire.org

Dossiers:
The energy transition and Germany’s transport sector  
How Germany is greening its growing freight sector to meet climate targets

Article:
Renewable fuels will not solve aviation’s climate dilemma – industry experts

Factsheets:
Rail cargo emissions in Germany  
“Dieselgate“ – a timeline of Germany’s car emissions fraud scandal
In Germany, the birthplace of the automobile, three iconic carmakers – BMW, Daimler, and Volkswagen – are facing the greatest challenge in their history: the mobility revolution that is turning the transport system green. Tarnished by the dieselgate scandal and facing new and powerful competitors in Google, Tesla, Apple, and Uber, the future of Germany’s horsepower-pride carmakers is more uncertain than ever, especially in this age of decarbonisa-
The carmakers have lobbied hard – and with some success – against stricter European emissions limits, and have fallen behind in the global clean mobility competition. But spearheaded by VW, all three firms have now launched ambitious plans to expand their e-mobility offerings, and experts say it is far too early to write off these automotive powerhouses in the global race to the future of mobility.
Renewables growth way ahead of schedule but slump in wind power spells trouble

The share of wind power, solar power and other renewable energy sources has been growing much quicker than planned in Germany and stood at over 40 percent of gross power production in 2019. Since the launch of support payments in the country’s Renewable Energy Act in 2000, renewables have risen from a niche technology to become the dominant player in the power mix. On some days, they already cover about three quarters of the electricity demand of Europe’s largest economy. The country’s solar power industry had to cope with fierce price competition from Asia and only regained its busi-
“Policymakers need to support the energy industry to make sure that the success we’ve had so far is not short-lived (...) Otherwise the goal of reaching a share of 65 percent renewables in power consumption by 2030 cannot be achieved.”

Kerstin Andreae, head of the German Association of Energy and Water Industries

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Meanwhile, Germany’s most important renewable power source – onshore wind – faces a severe slump in expansion after years of remarkable growth due to licensing hurdles and quarrels over minimum distances for turbines near residential areas. The government aims to bring the share of renewables in power consumption to 65 percent by 2030, but renewable energy companies, as well as other industry actors and environmental groups in the country, fear that this goal might become hard to attain if the nosedive of wind power is not stopped soon.

**Reading**

- German Wind Energy Association (BWE) Year Book Wind Power 2018

**On cleanenergywire.org**

**Dossiers:**
- Bioenergy – the troubled pillar of the Energiewende
- Offshore wind power in Germany
- Solar power in Germany

**Factsheets:**
- Solar power in Germany
- Bioenergy in Germany
- Onshore wind power in Germany
- Offshore wind power in Germany
Since 1990, Germany has made visible progress in bringing down greenhouse gas emissions in the power sector. However, its achievements in other major sectors of the economy have been much more modest. That’s why in 2019 the government took the momentous decision to introduce a price on CO₂ emissions accruing in sectors that are not yet subject to the European Union’s emissions trading system (ETS), namely transport and heating. The carbon price will take effect from 2021, and gradually increase the costs of using oil, gas or...
coal for driving cars and heating homes. While critics have said the starting price of 25 euros per tonne of CO₂ is too low to trigger meaningful effects, the government argues a slow start helps people adapt to higher prices and, moreover, will also be followed by a deeper restructuring of energy pricing systems, whereby electricity becomes cheaper. Funding the expansion of renewables, currently done with auctioned feed-in tariffs under the German Renewable Energy Act (EEG), could ultimately be aided by the proceeds from the carbon price.

“We currently fund the transformation of our energy supply only with a surcharge on the power price. This cannot go on. Our target has to be to make fossil energy sources pay for it much more in all sectors.”

Svenja Schulze, Environment Minister (SPD party)
Managing the nuclear legacy – a project into the next century

The last nuclear power plant in Germany will go offline at the end of 2022, marking the end of a decades-long dispute over the use of the technology that offers emissions-free power production but comes with unresolved challenges regarding waste storage and safety. The fight against nuclear power was one of the triggers of Germany’s environmental movement in the 1970s, and arguments over its use continued until 2011, when the Fukushima nuclear disaster in Japan led Chancellor Angela Merkel’s government to implement a phase-out plan already agreed on a decade earlier by the Social Democratic–Green government and initially postponed by Merkel. While some proponents of nuclear power today endorse it as an effective tool for climate action, the broader society still widely rejects ‘Atomkraft’ and no former nuclear plant...
operator in Germany has any intention to seek a resumption, not least due to the technology’s high generation costs. As of 2019, nuclear plants still contributed over 12 percent to Germany’s power mix, but the government says decommissioning the remaining facilities will not threaten power supply as nuclear capacity will be replaced by renewables, gas plants, and power imports from neighbour countries.

“Nuclear energy is economically dead (...) why should I build nuclear power stations, which carry an inherent risk, if I can already harvest the sun’s energy for less than half the price today?”

Rolf Martin Schmitz, CEO of energy company RWE
After balking at the Energiewende for many years, German industry is now fervently embracing the energy transition. There is no doubt that the efforts to curb climate change through a far-reaching shift to clean energy will produce winners and losers in the world’s fourth largest economy – both among companies and regions. But businesses increasingly see new opportunities and profits in the global move to a low-carbon future. Many say it is now time for Germany to ensure it remains a global economic powerhouse – not by shunning...
the Energiewende, but by harnessing its innovative momentum. This includes industries hardly involved yet, such as steelmaking, chemicals, and cement, which have all tabled proposals as to how they could become climate neutral, given the right government support.

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“The Energiewende will turn the German economy inside out.”

Achim Wambach, President of the Centre for European Economic Research (ZEW)
Policy has a crucial role to play in the shift to a low-carbon future, but ultimately it is businesses that will make the energy transition happen. In Energiewende home country Germany, many start-ups take advantage of the transformation by bringing novel business ideas to market, and taking market shares from incumbents in sectors from renewables to heating, and industry to mobility. Some have referred to Germany’s lively start-up scene as a ‘Green Energy Valley’. In sectors such as storage and hydrogen, young German companies are among the world’s leaders, and could be key to cleaning up polluting industries. The country’s embattled utilities,
were far too slow to recognise the renewables revolution, now bet on start-up innovation to cut emissions. In the innovation race against agile new players, the overhaul of the former monopolies is far from over – as evidenced by the landmark asset swap of major energy companies RWE and E.ON.
Germany homes are fossil energy guzzlers – a big hurdle on the path to climate neutrality by 2050. Nearly two thirds heat with fossil fuels, and most of them also need to be modernised to lower energy demand. The government is working to extend the energy transition to buildings with a ban on new oil-fired heating, as well as tax incentives for renovations and low-emission technologies, such as heat pumps. In many other sectors too,
saving energy on a large scale – by changing behaviour and introducing many new and often expensive technologies – requires everyone’s participation, and has proven a hard sell so far.

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“It is high time for the energy transition in the building sector to pick up speed again.”

Andreas Kuhlmann, head of the German Energy Agency (dena)
Unlocking the financial sector’s vast potential for greening the economy

Finance as a means for climate action has shifted into the focus of governments around the world in recent years. Late-starter Germany now seeks to gain ground by gearing lending, investment and insurance regulation towards lower emissions. The government appointed an advisory council in 2019 whose aim is to sketch out a plan for financing the spread of low-carbon technology and decreasing investor reliance on fossil fuel extraction, a key target of the Paris Climate Agreement. Germany is also raising the profile of climate in finance due to EU efforts to establish joint standards for the financial sector which take environmental and social consequences into account. This is meant to squeeze emission-intensive
business models out of the market. The country’s finance ministry has stated that it does not want to only react to outside pressure to make its financial sector more sustainable. Instead, it strives to make the country an international leader which provides banks, investment funds, stock traders and other financial market actors with the best possible framework for marrying profit with sustainability. However, disputes with the European Central Bank over the influence climate policy may have on monetary policy, as well as the German government’s initial rejection of fossil financing bans by the European Investment Bank, suggest that becoming a green finance leader will not be a straightforward exercise.

“Basically, sustainable finance amounts to nothing less than good risk management.”
Joachim Faber, chairman of Deutsche Börse’s advisory board

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Germany's green finance key actors at a glance
Protests spur climate policy as government seeks to appease critics

The international wave of climate protests epitomised by the weekly Fridays for Future (FfF) school strikes has made itself particularly felt in Germany. Here, it fell on fertile ground prepared by decades of environmental protests that started with the anti-nuclear movement in the 1970s. Since FfF emerged in late 2018, huge crowds consisting of students, their parents, scientists, and a range of other concerned groups have constantly pressed the government to step up its game regarding climate action and to comply with the Paris Agreement. From the country’s coal exit to its seminal climate
package, protesters have helped push the government to make progress on emissions reduction, even though many still regard the steps as too unambitious. But policymakers also face a delicate balance when it comes to reassuring those voters who, for example, are against a quick rise of fuel costs or object to wind turbine construction in their neighbourhood. Economically weak coal mining regions are a case in point, but opposition to a rapid transition also exists in more affluent regions, where fears that disruption in the automotive or heavy industry could quickly turn the tide, are widespread too.

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Polls reveal citizens’ support for Energiewende

Limits to growth: Resistance against wind power in Germany

Students demand climate action with “Fridays for Future” school strikes
No matter how you look at it, people need sustenance to survive – and growing crops or raising livestock creates emissions. Germany must find a way to reduce its agricultural emissions, which make up about eight percent of total greenhouse gas emissions, to reach its goal of becoming climate neutral by 2050, and to comply with the Paris Climate Agreement. It is difficult to know which measures will be most effective, as cutting emissions in one area often creates emissions in another. Measures aimed at protecting the environment while also combatting climate change may seem like the perfect match,
but they often harbour conflicts of interest. The sector is increasingly affected by droughts during primary growing periods and must find ways to adapt. Meanwhile, calls to enforce climate action in agriculture were met with large-scale protests by farmers opposed to environmental policies in 2019.

"I am convinced that our farmers can achieve a lot if they are compensated or paid for it. They are partners in environmental and climate policy."

Julia Klöckner, Minister of Food and Agriculture (CDU party)
Germany’s energy transition anticipates a vastly more efficient and interconnected energy system in the future, transforming the country into a testbed for innovation. Batteries that can help to regulate the electricity network within seconds, smart grids, flexibility, and the integration of different power sources are key to an electricity system based on millions of wind and solar installations that will also have to power cars, provide heating, and assist in de-
”There is no doubt that digitalisation will take the energy transition to an entirely new level.”

Robert Spanheimer, bitkom

Carbonising industry. Digitalisation will be crucial for this next step of the Energiewende. The technology shift will upend many existing business models and inevitably raise concerns about data privacy and the risk of cyberattacks.

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How can Germany keep the lights on in a renewable energy future?
Sector coupling – shaping an integrated renewable energy system

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The long-term future of natural gas in Germany seems all but sealed, as Europe’s biggest economy will have to virtually phase out all fossil fuels to reach its goal of becoming climate neutral by 2050. However, as Germany exits nuclear and coal power, the government says natural gas will continue to make a significant contribution to the energy supply for many years. The fuel emits less CO₂ than oil and coal when burned and the gas industry promotes flexible gas-fired electricity generation as the perfect partner for fluctuating renewables. Germany, whose gas supply is almost exclusively...
covered by imports, continues to back the controversial Nord Stream 2 pipeline, which could come online in early 2021. The government also welcomes plans to build the country’s first liquefied natural gas (LNG) import terminal and has offered potential state support. In the longer run, experts believe the sector will only have a future with renewables-based hydrogen, on which the government is set to present a strategy in 2020. While the gas industry pushes for extensive use in all sectors, many researchers see hydrogen as the ultimate solution to long-term renewable energy storage needs.

“Our goal is clear. We want Germany to be the global number one in hydrogen technology.”

Peter Altmaier, Economy Minister (CDU party)

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Liquefied gas – does LNG have a place in Germany’s energy future?
Gas pipeline Nord Stream 2 links Germany to Russia, but splits Europe
Sector coupling – shaping an integrated renewable energy system
German cities, counties and municipalities all have their role to play in the Energiewende – and nearly 70 of them have by now declared their own ‘climate emergency’. With the shift to a decentralised energy system, renewable power is increasingly generated in, and often owned by, local communities. Urban centres are where much of the country’s energy is distributed and consumed. And as the energy transition expands its focus from the power sector to heating, buildings and mobility, population centres will be where crucial changes take place.
Germany will only meet its climate targets if municipalities implement their own energy transitions – which can also bring economic benefits. They have opportunities to take different paths but must also overcome local challenges. Germany’s municipalities, many of which are chronically underfunded, must negotiate the complex interplay between EU, federal, and state structures that set overarching goals and provide funding, in order to apply their own ideas, agency, and expertise to shape their own green future.
The Green Deal – a joint European project shapes German foreign policy

In 2019, the EU announced a new joint European project: the Green Deal aimed at making the continent climate neutral by 2050. Germany, as the bloc’s largest economy and biggest emitter of CO₂, is set to play a key role. But the country’s ties to the ambitious climate plan go even deeper: EU Commission President Ursula von der Leyen, whose new administration presented the deal, is a former German defence minister and close ally of Chancellor Angela Merkel. Germany will also hold the EU council presidency in the second half of 2020, when an EU-China summit and the COP26 UN climate conference could present critical decision points for international climate policy. Some no longer see Germany as the international climate leader it once
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Germany’s dependence on imported fossil fuels
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Liquefied gas – Does LNG have a place in Germany’s energy future?
Understanding the European Union’s Emissions Trading System

was, since the country has struggled to reduce emissions in key sectors during the past years. But Europe’s climate ambitions will continue to hinge on Germany’s performance – and the country’s decisions will have a profound impact in areas such as power grids, emissions trading, green finance and energy research across the continent.
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