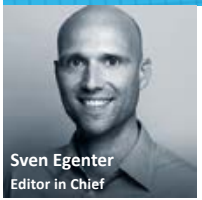
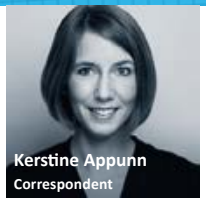
A Reporter's Guide to the Energiewende*

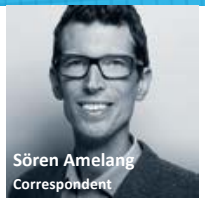
*German energy transition

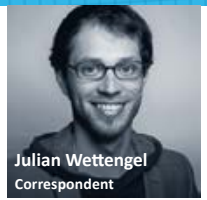
5th edition 2018
Context. Contacts. Access.

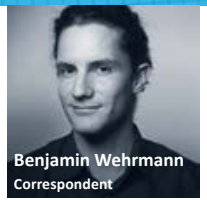
CLEAN ENERGY WIRE

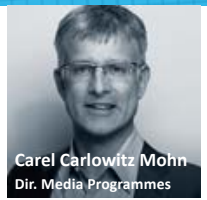












A Note from CLEW

The Paris Climate Agreement heralds a global shift to a low-carbon future to get climate change under control. As Germany tries to follow this path, its energy transition provides valuable lessons on weaning a major economy off fossil fuels.

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The repercussions of the country's Energiewende are felt all across society and the business sector, offering journalists a wealth of exciting and important stories.

Yet, researching this massive undertaking in a foreign country is arguably a difficult job, even for the most seasoned reporter. This is compounded by the immense complexity of the technology and economics behind energy policy. At the same time, strong fact-based and critical journalism is essential to inform the international debate about how to decarbonise the global economy.

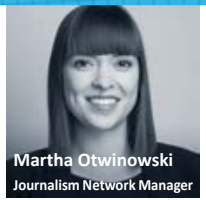
This is why the Clean Energy Wire (CLEW) has set out to support journalists in their work. Fully funded by two non-profit foundations – Stiftung Mercator and the European Climate Foundation – we enjoy independence from any business or political interests. We share our funders' commitment to work towards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

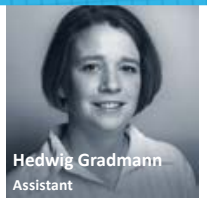
The CLEW's **"A Reporter's Guide to the Energiewende"**, now in its fifth edition, gives journalists a starting point for their work by highlighting the main storylines of the energy transition, providing lists of experts, and links to key readings.

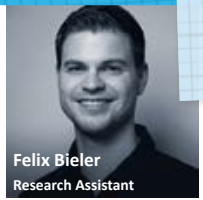
Our website, **cleanenergywire.org**, offers plenty more in-depth information and contacts.

Our daily news digest and our Twitter feed **@cleanenergywire** keep readers in the loop about Energiewende-related debates and events.

Our team of journalists and media professionals in Berlin is available to support journalists in their work.


Martha Otwinowski
Journalism Network Manager


Hedwig Gradmann
Assistant


Felix Bieler
Research Assistant

We also organise workshops for journalists, offering a first-hand account of the transformation. We invite reporters and editors to join our growing CLEW network of journalists covering energy transition and climate policy in order to exchange views or team up on big cross border stories.

But, most importantly, we provide assistance, answer your questions, and put you in touch with experts – so don't hesitate to **ask CLEW**.

Sven Egenter and
the Clean Energy Wire team

Contents

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 to a low-carbon, nuclear free economy.

The process has two key elements:

- the phase-out of nuclear power (by 2022)
- the development of renewable energy technologies

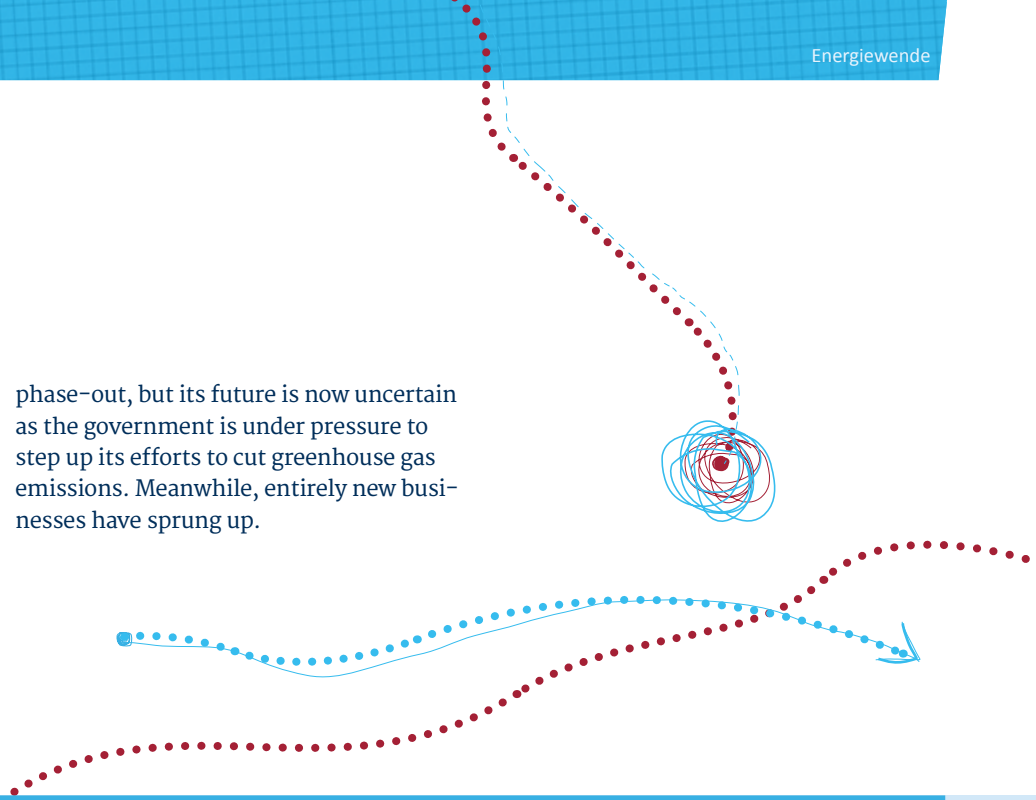
However, since the introduction of feed-in tariffs for renewable energies in the 1990s, the project has been radically reshaping the energy system as a whole. As the traditional model of centralised power generation is being replaced by diverse sources of energy that fluctuate with the weather, the project's influence goes beyond the grid and the power market. While for now mainly focused on electricity, the Energiewende is also expected to transform other sectors like industry, housing, construction, heating, and transport as

Energiewende in Germany: Timeline

1973-1975	1979/1980	1986	1991	1997/2005	2000	2007
"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	**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"**	**Chernobyl disaster** solidifies Germans' resistance to nuclear energy **Climate change** enters the discourse – a magazine story leads parliament to establish an advisory council	**Kick-starting renewables** New legislation introduces feed-in tariffs for renewable power	**Kyoto Protocol** Germany, the world's sixth largest emitter at the time, has to reduce CO_2 emissions under the agreement	**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	**EU targets** EU sets 2020 climate targets: 20% renewables share, 20% GHG reduction, 20% more efficiency

all stakeholders are looking for ways to shape Germany's "all-electric" future. *For Germany's specific energy transition targets, see pages 6 – 7.*

Already, there are winners and losers. The big utilities' traditional business models have been hit hard, while consumers and some businesses are concerned about higher electricity costs. The coal industry was the first to benefit from the nuclear phase-out, but its future is now uncertain as the government is under pressure to step up its efforts to cut greenhouse gas emissions. Meanwhile, entirely new businesses have sprung up.



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

2014

New EEG & climate action
Govt. lowers feed-in tariffs, starts PV auctions and introduces plan to achieve 2020 climate targets

2015

Slow progress
The Energiewende monitoring report shows climate targets are "in serious danger"

2016

Spin-off
Utilities E.ON and RWE split to separate renewables from fossil plants

Climate Action Plan
Govt. adopts ambitious 2030 emission targets for individual economic sectors

2017

Renewables Reform
Auctions determine renewables payments

G20 & COP23
Germany tries to maintain climate leadership, but emissions stagnate

2018

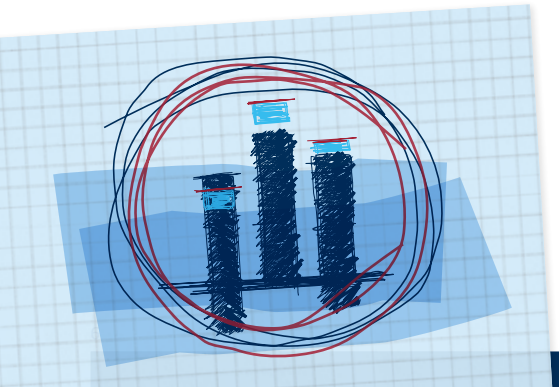
New government
Wants to focus on grid expansion and sector coupling

Utilities shakeup
RWE and E.ON split up utility innogy, separating grids from generation

#Energiewende – Targets

The overall objective of the Energiewende is to reduce Germany's greenhouse gas emissions and phase out nuclear power, making the economy more environmentally sustainable.

On a national level, Germany aims to cut greenhouse gas emissions by 40 percent by 2020, by 55 percent by 2030, and by up to 95 percent by 2050. The share of renewables in final energy consumption is to rise to 60 percent (from 14.8 percent in 2017) by 2050. By the middle of the century, renewables are to cover at least 80 percent of the country's gross power consumption (36.2 percent in 2017).



In November 2016, Germany's government agreed on a basic framework – the Climate Action Plan 2050 – for largely decarbonising the country's economy by the middle of this century. In accordance with the Paris Climate Agreement, the plan fine-tunes Germany's climate goals. It includes target corridors for reducing greenhouse gas emissions in the individual economic sectors as interim goals for the year 2030. The energy sector will have to cut its emissions roughly by half compared to 2014 levels.

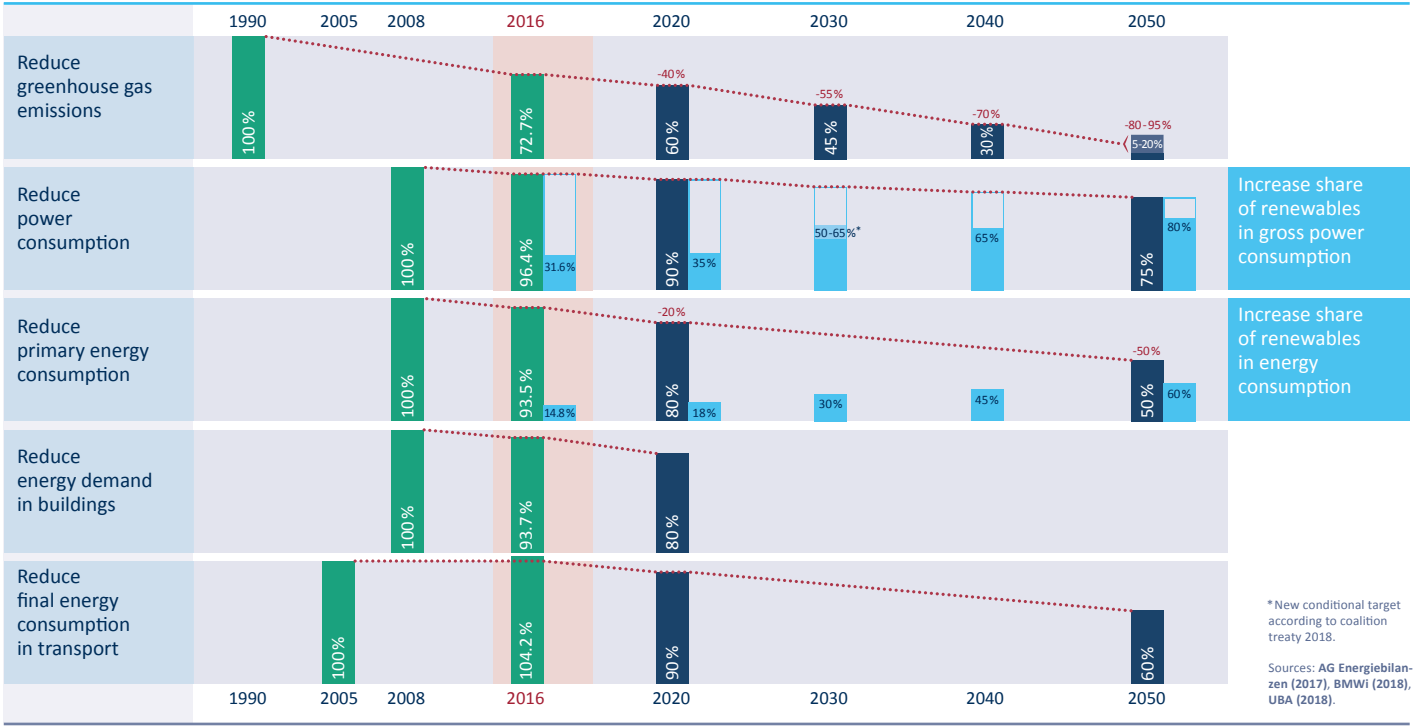
As for the progress made on these targets: In autumn 2017, the environment ministry warned that Germany was set to widely miss its 2020 emission targets, thereby threatening the entire project's credibility. The economy ministry's 2014 Climate Action Programme detailing additional measures and identifying CO_2 saving potential, is likely to be less effective than predicted. And the Energiewende Monitoring Report, which usually gives a progress update every year, has not been published in 2017 or 2018 because of the drawn-out process of forming a new government.

Sector targets for greenhouse gas reductions

Sector	2014 status cut from 1990 levels	2030 target cut from 1990 levels
Energy	23%	61-62%
Buildings	43%	66-67%
Transport	2%	40-42%
Industry	36%	49-51%
Agriculture	18%	31-34%
Other	69%	87%
Total	**28%**	**55-56%**

Source: Climate Action Plan 2050, BMUB (2016).

Quantitative targets of the energy transition



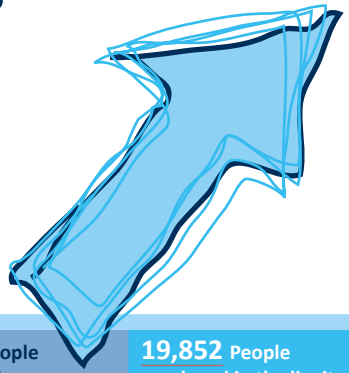
*New conditional target according to coalition treaty 2018.

Sources: **AG Energiebilanzen (2017), BMWi (2018), UBA (2018)**.

#Energiewende – Key Figures

46.5 m Passenger cars registered in Germany (01/2018)

53,861 Pure electric cars registered = 0.12 % (01/2018)



3.6 % Renewables' share in gross German power generation in 1990

33.3 % Renewables' share in gross power generation in 2017

12.8 minutes: Average power outage in Germany 2016
USA: 128 mins
GB: 53 mins (2014)
France: 50 mins (2014)
Poland: 192 mins (2014)

95 % of Germans believe use and roll-out of renewables is very important or important (2017)

€ 24.5 bn Renewable surcharge paid by power consumers in 2017

338,500 People employed in the renewables sector (2016)

19,852 People employed in the lignite industry (12/2016)

23.7 ↗ 29.4 ct/kWh Average household power price 2010 and 2018 – thereof 6.8 ct/kWh renewable surcharge in 2018

5 ↘ 3.3 ct/kWh Average electricity spot market price in 2010 and 2017

7.8 % Drop in energy demand for heating houses 2008 – 2016

€ 17 bn the government pays to energy efficiency measures in housing (by 2020)

13.1 % Renewables' share in primary energy consumption in 2017 (up from 1.3 % in 1990)

36.2 % Renewables' share in gross power consuption in 2017 (up from 3.1 % in 1991)

90.6 % of natural gas used in Germany is imported (2016)

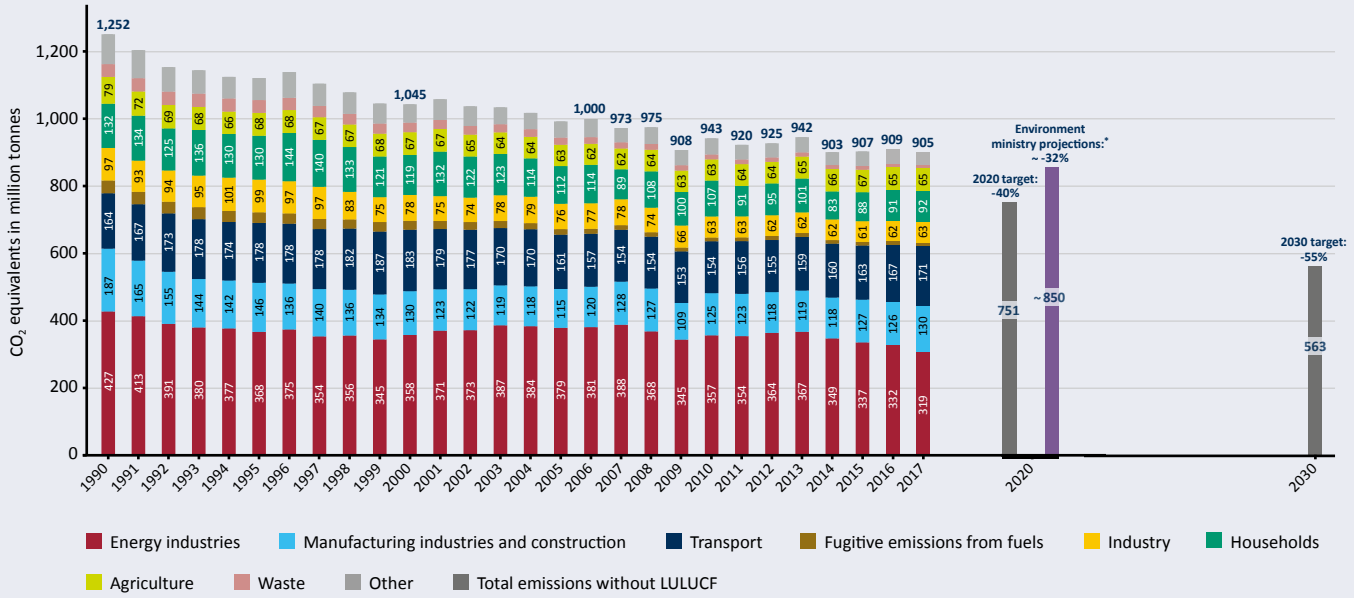
98 % of crude oil is imported (2016)

905 m tonnes CO_2 equivalents greenhouse gas emissions in 2017

27.7 % Fall in greenhouse gas emissions 1990 – 2017

27.7 % greenhouse gas reduction since 1990

Emission trends for Germany by sector 1990-2017



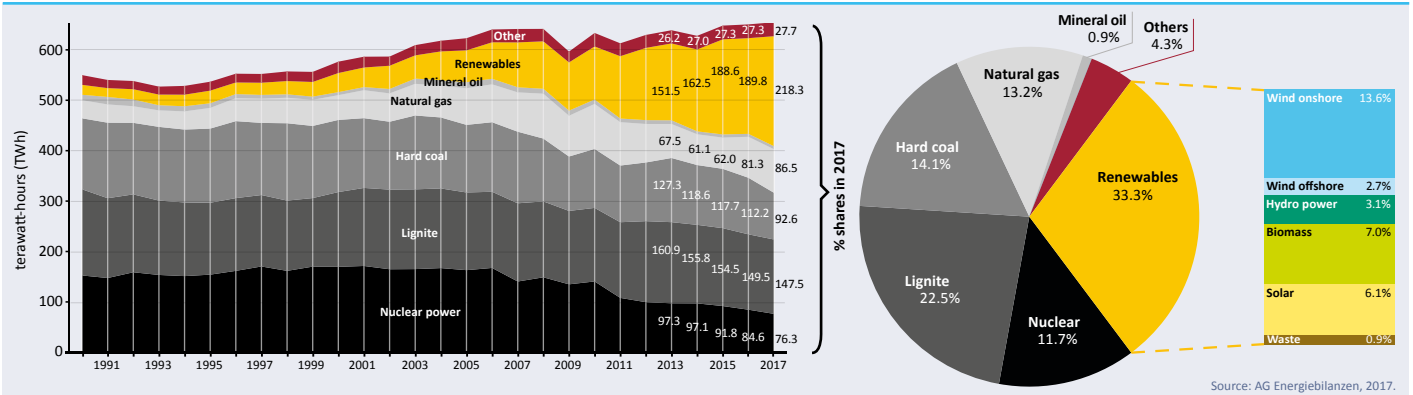
Without emissions from land use, land-use change and forestry (LULUCF)

*According to federal environment ministry calculations from October 2017, Germany is set to widely miss its goal to reduce greenhouse gas emissions by 40 percent by 2020.

Source: UBA, 2018.

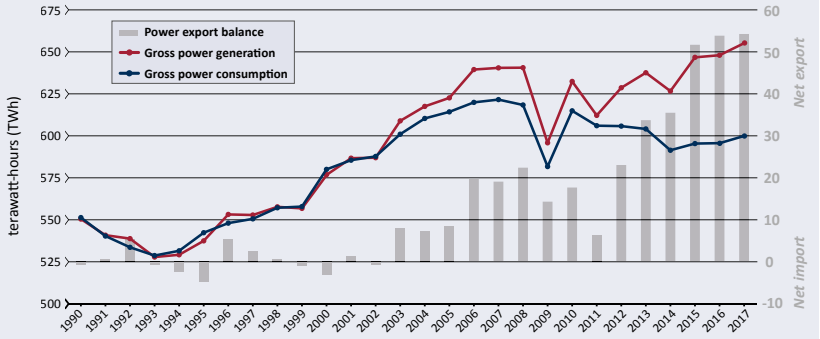
gross power production

Development of gross power production in Germany 1990-2017



Source: AG Energiebilanzen, 2017.

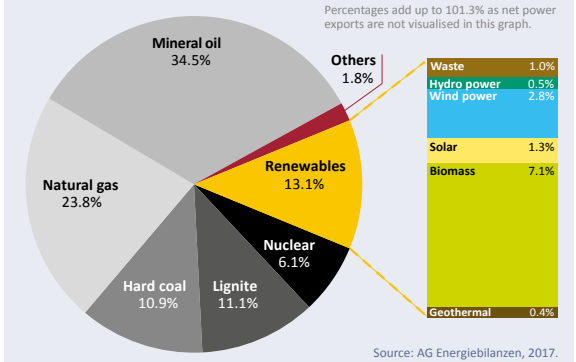
Germany's power export balance 1990-2017



Source: BMWi 2018.

power export balance

Share of energy sources in primary energy consumption 2017



Source: AG Energiebilanzen, 2017.

#Energiewende – Dates 2018/2019

2018

4 – 5 June: 4th annual Handelsblatt conference "Digital Energy Industry 2018", BONN.

13 – 14 June: BDEW Congress, energy conference by German Association of Energy and Water Industries (BDEW), BERLIN.

17 – 19 June: 9th Petersberg Climate Dialogue, informal international government conference, BERLIN.

20 – 22 June: Intersolar Europe, trade fair, MUNICH.

3 July: 6th BDI commodity congress, by BDI, BERLIN.

11 – 12 September: 13th German Energy Congress, MUNICH.

20 – 27 September: 67th IAA Commercial Vehicles, HANOVER.

25 – 28 September: WindEnergy, trade fair, HAMBURG.

14 October: State elections in Bavaria.

28 October: State elections in Hesse.

27 – 28 November: dena Congress, by German Energy Agency (dena), BERLIN.

3 – 14 December: COP24, KATOWICE, POLAND.

11 – 12 December: new energy world 2018, trade fair for energy management, integrated systems, LEIPZIG.

2019

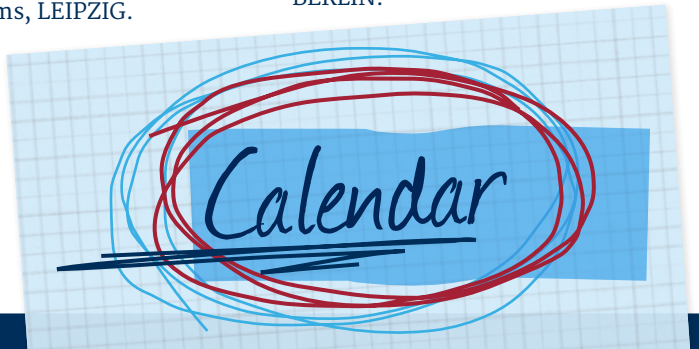
22 – 24 January: 26th Handelsblatt Annual Conference "Energy Industry 2019", BERLIN.

5 – 7 February: E-World energy & water, trade fair, ESSEN.

12 – 14 March: Energy Storage Europe, conference and trade fair, DÜSSELDORF.

1 – 5 April: Hannover Messe 2019, industry trade fair, HANOVER.

8 – 9 April: Future Mobility Summit, BERLIN.



#Energiewende – 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. Mathilde Richter, +49 30 89789-152, mrichter@diw.de, www.diw.de

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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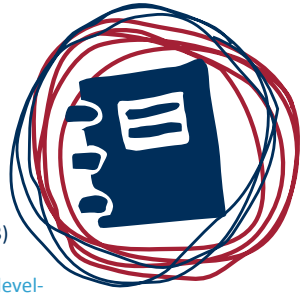
the experts

… for a list of over 250 experts and institutions with insights into the Energiewende see:

www.cleanenergywire.org/resources/experts

#Energiewende – Reading in English



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

Agora Energiewende (2018) Energy Transition in the Power Sector in Europe: State of Affairs in 2017; (2013) 12 Insights on Germany's Energiewende.

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Federal Ministry for the Environment (BMU) (2017) Climate Action in Figures. Facts, Trends and Incentives for German Climate Policy; (2016) Climate Action Plan 2050.

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Hager, Carol and Christoph H. Stefes (eds.) (2016) Germany's Energy Transition. A Comparative Perspective.

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Renewable Energy Law and Policy Review (2013) The Energiewende in Germany: background, developments and future challenges.

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PwC (2015) Energiewende Outlook: Transportation sector; Energiewende Outlook: Electricity sector; Energiewende Outlook: Heating sector.

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

#Climate and CO_2 #Fossil Fuels

Green pioneer Germany struggles to make climate protection a reality

©[hansenn] Fotolia.

As the home country of the Energiewende, Germany is considered a pioneer in the fight against man-made climate change. But despite a spectacular rise in power generation from renewables, the country's track record on cutting greenhouse gas emissions is mixed: It is set to miss its 2020 climate targets. Germany is now aiming at 2030 targets with its Climate Action Plan 2050, a roadmap to a climate neutral economy by mid century. But the protracted bat-

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tle over the details of the plan revealed it will be a bumpy ride to turn climate ambition into practice, as the country will ultimately need to kick its habit of burning coal for power production – and say goodbye to petrol and diesel cars.

Reading

Agora Energiewende (2016) Eleven Principles for a Consensus on Coal

Agora Energiewende (2017) Energy Transition in the Power Sector in Europe: State of Affairs 2016

Agora Energiewende (2014) The German Energiewende and its Climate Paradox

Fraunhofer ISE (2017) Energy Charts

Federal Ministry for the Environment (BMU) (2016) Climate Action Plan 2050

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On cleanenergywire.org

Dossier:

The energy transition and climate change

Article:

Germany gears up for official talks on coal phase-out

Factsheets:

Germany's greenhouse gas emissions and climate targets

When will Germany finally ditch coal?

Germany's Climate Action Plan 2050

Coal in Germany

Understanding the European Union's Emissions Trading System

#Government #Policy

New government wants “clean, secure and affordable” Energiewende

© Steffen Kugler, Bundesregierung.

Germany’s 2018 coalition government has laid out an adjusted vision for its climate and energy policies, and is striving to become an international “pioneer” in the field again. However, many observers have doubts as to its ability to deliver on this promise. The government has effectively scrapped its own 2020 climate target in the coalition treaty, and now focuses on the 2030 goal instead. Meanwhile, several Energiewende-related challenges - such as the future of coal, vehicle emissions, or the deficient grid infrastructure - remain

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Reading

German Bundestag (2016) Facts – The Bundestag at a glance

Wahlrecht.de (2018) Latest polls (federal & state)

Berlin Policy Journal (2018) Berlin Observer

On cleanenergywire.org

Dossiers:

The new German government and the energy transition

Preview 2018 – Outlook for Germany's Energiewende

Article:

Coalition watch – The making of a new German government

Factsheets:

Climate, energy and transport in Germany's coalition treaty

German federalism: In 16 states of mind over the Energiewende

largely unsolved. Following the unusually long coalition talks, Chancellor Angela Merkel's fourth cabinet must now appease energy transition critics at home, and at the same time live up to its climate action pledges on the international stage.

"Germany quickly has to restore its pioneering role in climate action" – Environment Minister Svenja Schulze in her inaugural speech.

#Energiewende #History

Energiewende – the first four decades

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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. But the societal project started decades before the Merkel government reinstated plans to exit nuclear power. A long process deeply rooted in German history and society led to policies that triggered a strong increase in renewable energy sources and are now at the heart of a move to a low-carbon economy. The Energiewende – a full-scale

"The renewable energy act sparked a real grassroots citizens' movement. Germans turned the Energiewende into their own project."

Nina Scheer, Social Democrats MP

transformation 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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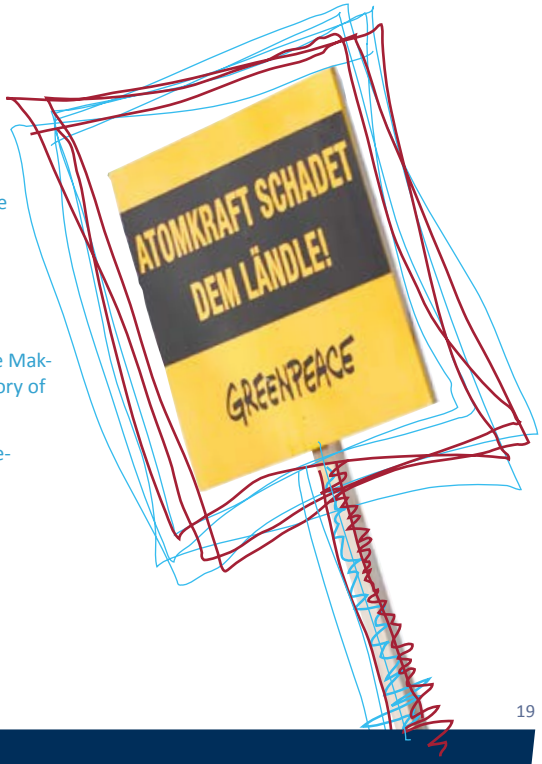
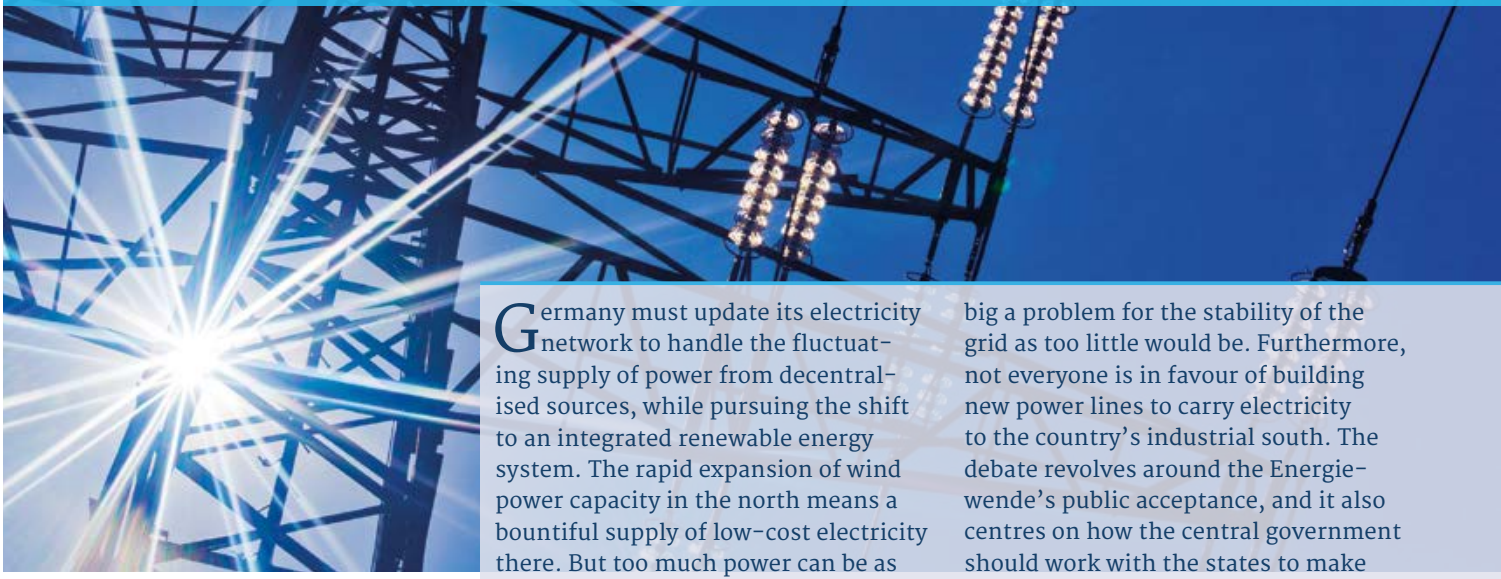


#Grid

Success of Energiewende hinges on unblocking the power grid



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Germany must update its electricity network to handle the fluctuating supply of power from decentralised sources, while pursuing the shift to an integrated renewable energy system. The rapid expansion of wind power capacity in the north means a bountiful supply of low-cost electricity there. But too much power can be as big a problem for the stability of the grid as too little would be. Furthermore, not everyone is in favour of building new power lines to carry electricity to the country's industrial south. The debate revolves around the Energiewende's public acceptance, and it also centres on how the central government should work with the states to make

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this project a success. Meanwhile, the European Commission wants Germany to address the problems of infrastructural bottlenecks, and the opponents of the grid expansion are floating alternative solutions, such as a decentralised power supply, power storage, or splitting the German power market.

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Germany's electricity grid stable amid energy transition

Power grid fees – Unfair and opaque?

How can Germany keep the lights on in a renewable energy future?

Volatile but predictable: Forecasting renewable power generation

Germany's renewable generation peaks remain shrouded in data fog

"As long as the new power lines between north and south Germany are not completed, the problem of a lopsided system will only worsen."

Andreas Jahn, Regulatory Assistance Project (RAP)

#Transport

Car giant Germany struggles to ignite Energiewende in transport

© Pixabay.

When it comes to the automobile, Germany flaunts unique gravitas. But so far, the country has made little headway in creating a strong link between its transport system and the transition to renewable energy. While it is clear that extending the Energiewende to transport will be crucial in the country's quest for a low-carbon economy, there is no consensus on how this should be done. For now, emissions from the transport sector continue to rise, and the high level of NO_x pollution in cities, linked to the dieselgate affair, has put diesel driving bans on the agenda. New mobility concepts,

"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

such as carsharing, "cycle only" lanes, and updated public transport options, have yet to stand the test of time. Consumers are also slow in their uptake of electric vehicles, making it unlikely for the government to reach its target of putting one million electric vehicles on German roads by 2020.

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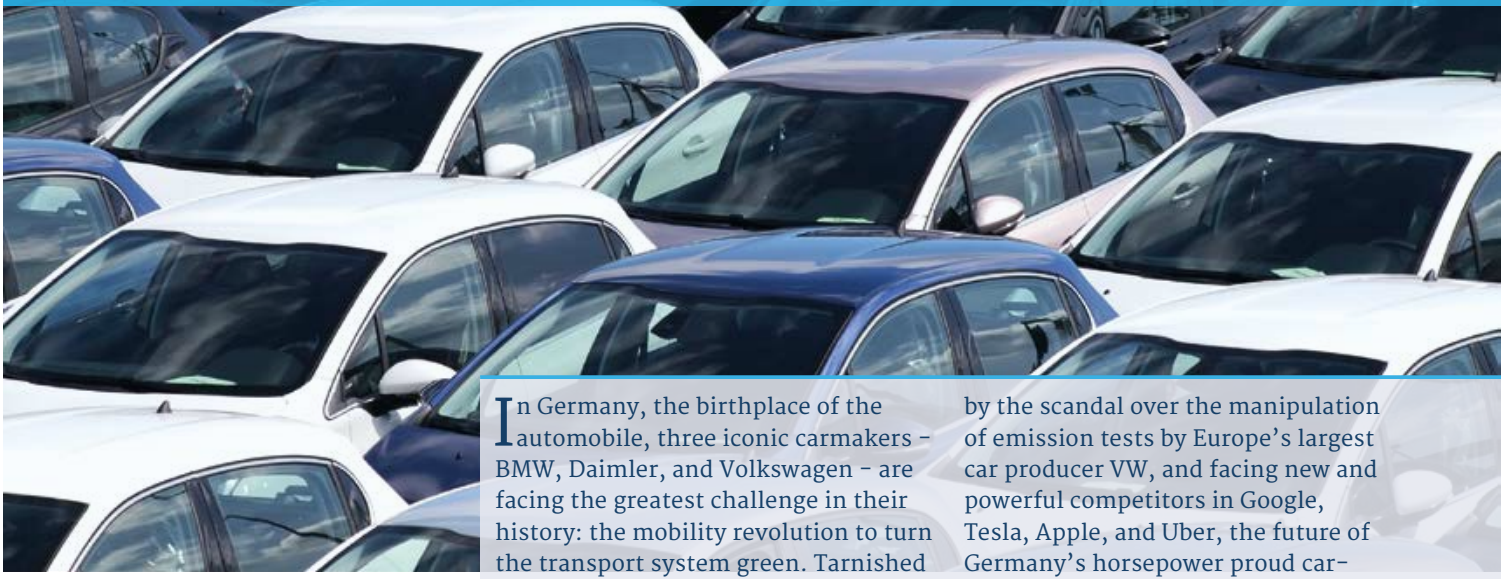
Energiewende in transportation: Vague goals, modest strides

The role of biofuel and hydrogen in Germany's transport Energiewende

#Cars

BMW, Daimler, and VW vow to fight in green transport revolution



©[mirpic] Fotolia.

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 to turn the transport system green. Tarnished by the scandal over the manipulation of emission tests by Europe's largest car producer VW, and facing new and powerful competitors in Google, Tesla, Apple, and Uber, the future of Germany's horsepower proud car-

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Dieselgate forces VW to embrace green mobility

“Dieselgate” – a timeline of Germany's car emissions fraud scandal

The debate over an end to combustion engines in Germany

makers in an age of decarbonisation, self-driving vehicles, and carsharing is less certain than ever. Carmakers have lobbied hard – and with some success – against stricter emissions limits, and they risk falling behind in the global competition in the field of battery technologies. But experts say it is far too early to write off these powerhouses of automotive innovation in the global race to master the future of mobility.

#Renewables #Wind #Solar #Bioenergy

Renewables prepare for competition as rapid roll-out brings prices down

© E.ON.

On the very first day of 2018, Germany crossed an important threshold in its drive to boost the use of renewable energy. According to preliminary data, the world's fourth largest economy generated enough renewable power to briefly cover 100 percent of its electricity needs. As prices dwindle, wind, solar, and other renewable sources have seen remarkable capacity growth in the country in recent years, and the government has

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Volatile but predictable: Forecasting renewable power generation

High hopes and concerns over onshore wind power auctions

German onshore wind power – output, business and perspectives

German offshore wind power – output, business and perspectives

Environmental concerns accompany German offshore wind expansion

ramped up its expansion goal to 65 percent of power consumption by 2030. But while renewables have become Germany's dominant source of energy, the country's power grid struggles to keep up and absorb the large quantities of intermittent power. Against the backdrop of fierce international competition, the country's renewables industry is busy addressing the challenges in transmission grid expansion and energy storage.

"Renewables are no longer just the better choice from an ecologic perspective but also from an economic point of view."
Economy and Energy Minister Peter Altmaier

#EEG/Law

Revamp of Energiewende law stirs controversy over speed and participation

©[Giso Bammel] Fotolia.

The German Renewable Energy Act (EEG), which established feed-in tariffs, is the mechanism that has made the energy transition possible. It guaranteed renewable energy producers high returns on investment, which in turn helped to bring down the costs of installing renewable generation capacity. In 2016, lawmakers deemed the sector to be mature enough to take the training wheels off and expose it to market forces: they introduced tenders to determine

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"Economic logic and all experiences from other countries show: In tenders, the largest bidders have an advantage."

Lars Holstenkamp, Leuphana University

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High hopes and concerns over onshore wind power auctions

Germany ponders how to finance renewable expansion in the future

EEG reform 2016 – switching to auctions for renewables

Reactions to the Renewable Energy Act reform 2016

Defining features of the Renewable Energy Act (EEG)

payments to new renewable installations. And they put a cap on the new renewable capacity that can be added each year. The auctions have indeed lowered payments to large new installations, but the process remains controversial. While the big energy companies see it as a step in the right direction, the renewable energy lobby and citizens' energy groups say it will result in Germany missing its climate targets, and betray the very spirit of the Energiewende.

#Nuclear phase-out

Managing the nuclear legacy – a project into the next century

©[Thomas Lehmann] iStock.

The question is no longer whether Germany's future will be nuclear-free – or even when, since the government is committed to completing the phase-out by 2022. But the logistics of pulling the plug on what was until recently one of the country's primary sources of power are proving an immense challenge. Legal hurdles, decommissioning technicalities, and above all, the question of where to store the radioactive waste, are the main issues at hand. In 2016, an agreement between plant operators and the state

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at least established financial clarity: In addition to paying for the decommissioning of their plants, operators will fund the disposal of nuclear waste with up to 23.6 billion euros. The rest of the yet unknown bill will be footed by taxpayers.

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What to do with the nuclear waste – the storage question

Nuclear clean-up costs

Securing utility payments for the nuclear clean-up

Legal disputes over the nuclear phase-out

"In 2050, when the final repository is ready, I will be 98 years old. So I am not sure I will live to see it happen, but I certainly feel that it is my responsibility to organise this now."

Barbara Hendricks, Former Environment Minister

#Industry #Jobs #Cost & Prices

German industry embraces transformation challenge

© Siemens AG, München/Berlin.

After balking at the Energiewende for many years, German industry has changed its position significantly by embracing the energy transition with a new fervour. 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. Industry and the regions will both be affected. But businesses increasingly see money to be made in the move to a low-carbon future, and they also believe

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that the process benefits the economy as a whole. Many say that now is the time for Germany to ensure that it remains a global economic powerhouse – not by shunning the Energiewende, but by harnessing its innovative momentum.

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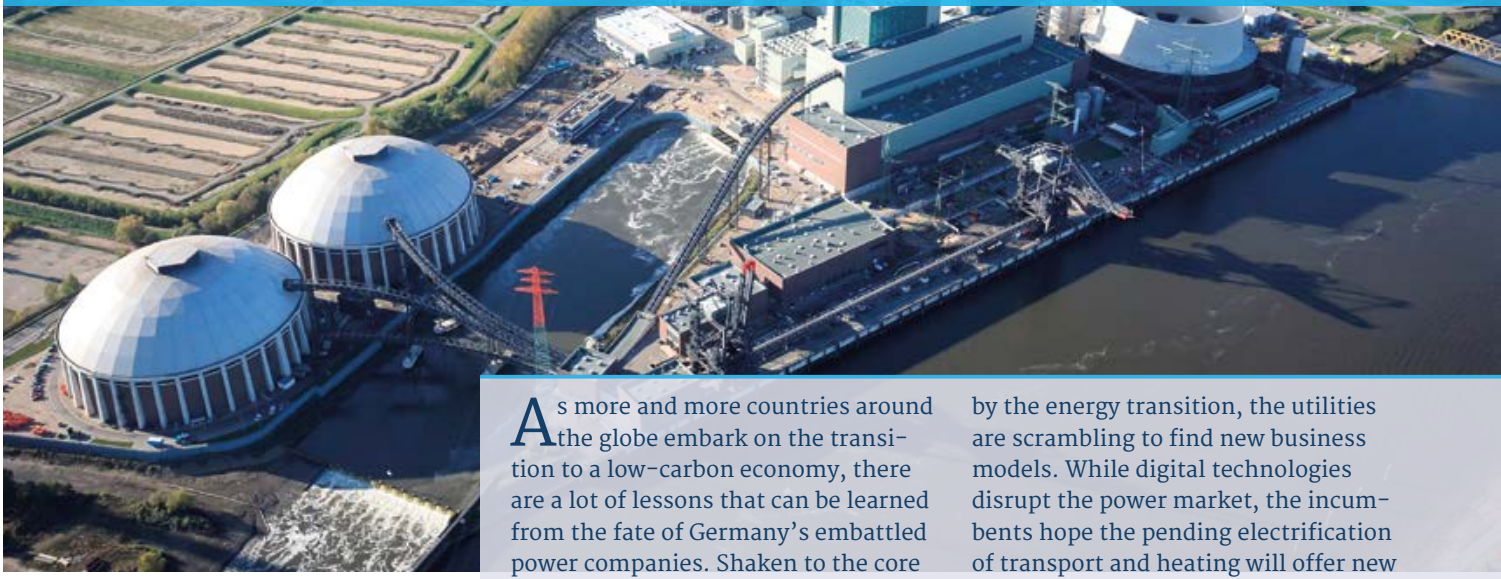
What German households pay for power

"The Energiewende will turn the German economy inside out"
Achim Wambach, President of the Centre for European Economic Research (ZEW)

#Utilities

Battered utilities take on startups in innovation race



©[Bengt Lange] Moorburg Power Plant 11, Vattenfall.

As more and more countries around the globe embark on the transition to a low-carbon economy, there are a lot of lessons that can be learned from the fate of Germany's embattled power companies. Shaken to the core by the energy transition, the utilities are scrambling to find new business models. While digital technologies disrupt the power market, the incumbents hope the pending electrification of transport and heating will offer new

"Traditional power companies have become obsolete."

Philipp Schröder, CEO Sonnen

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growth opportunities in the Energiewende's next phase. But in the innovation race against agile new players, the former monopolies are weighed down by a heavy burden – their dependency on fossil and nuclear electricity generation.

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RWE's plans for new renewable subsidiary

Securing utility payments for the nuclear clean-up

#Electricity market

Power market between competition, flexibility, supply security

© [NicoElNino] Fotolia.

How will Germany organise the market around the ever-increasing share of renewable energy? What happens to energy security when the sun doesn't shine and the wind doesn't blow? Fluctuating electricity production with near zero operational costs poses a challenge to the grid and to market design. In its most recent power market overhaul, the German government opted to stick with the generation cost-oriented 'energy-only' market, and avoided a full-on capacity market. As a result, many experts predict that there will be little or

"We don't believe that there will be incentives for investors to build new, flexible power plants that will be needed in Germany to accompany the expansion of renewable energy."

Frank Brachvogel, BDEW

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no investment in fossil power plants in the future, as wholesale power prices will remain low at most times. How the government will incorporate other actors, such as storage and flexibility providers, into the power market is another decision with long-lasting implications.

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German draft power market law sticks to lignite reserve

Capacity markets around the world

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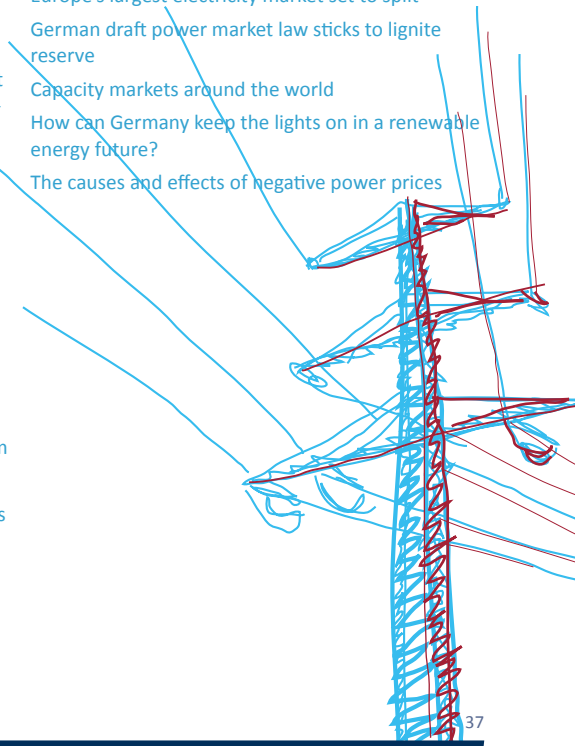
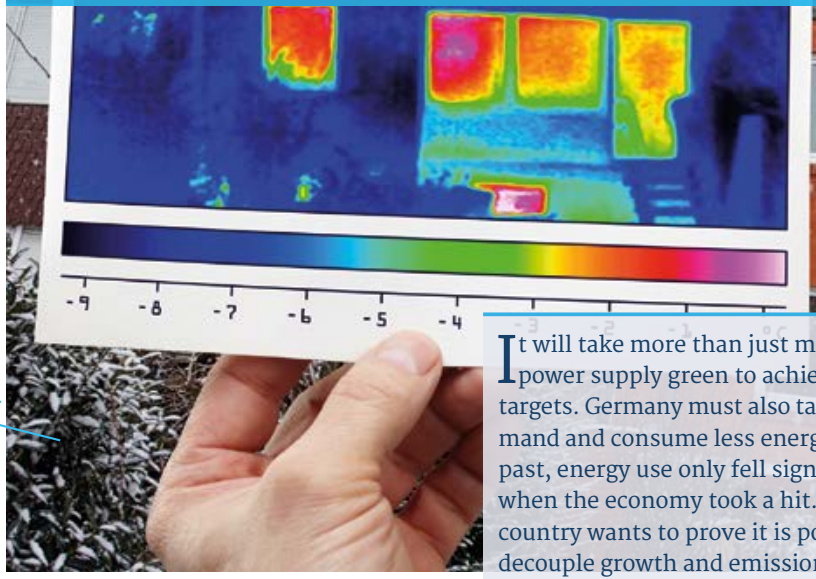
The causes and effects of negative power prices



#Efficiency

Taming the appetite for energy



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It will take more than just making the power supply green to achieve climate targets. Germany must also tackle demand and consume less energy. In the past, energy use only fell significantly when the economy took a hit. Now the country wants to prove it is possible to decouple growth and emissions permanently by dramatically increasing efficiency. The potential is huge and so far largely untapped, which is why efficiency has been dubbed the "sleeping giant" of the Energiewende. The government's Climate Action Programme, designed to get Germany back on track for its 2020 climate goals, suggests that increasing

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energy efficiency can bring more emissions cuts – 25 to 30 million tonnes per year – than any other measure. But saving energy on a large scale – by insulating buildings, 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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Homes for the Energiewende

Germany's greenhouse gas emissions and climate targets

Combined heat and power – an Energiewende cornerstone?

"Germany can achieve its emission targets much faster if energy is used more efficiently."

Robert Pörschmann, BUND

#Finance

Financing the future of energy

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Financing the Energiewende: Germany has mobilised over 200 billion euros for renewable energy projects over the last 10 years, most of it from local and national investors. Relatively high yields, a stable cash flow and a reliable public framework have made the Energiewende a very attractive green investment opportunity. Now, institutional financiers are replacing some small-scale investors. Larger projects such as offshore wind play a more important role as banks, insurance firms and investment funds increasingly look

Relatively high yields, a stable cash flow and a reliable public framework have made the Energiewende a very attractive green investment opportunity.

for carbon-free investment. Funding by the public banking system is also playing an increasingly important role. The Energiewende will continue to be financed by a broad mix of investors; it is part of a global financing trend, rather than a Germany singularity.

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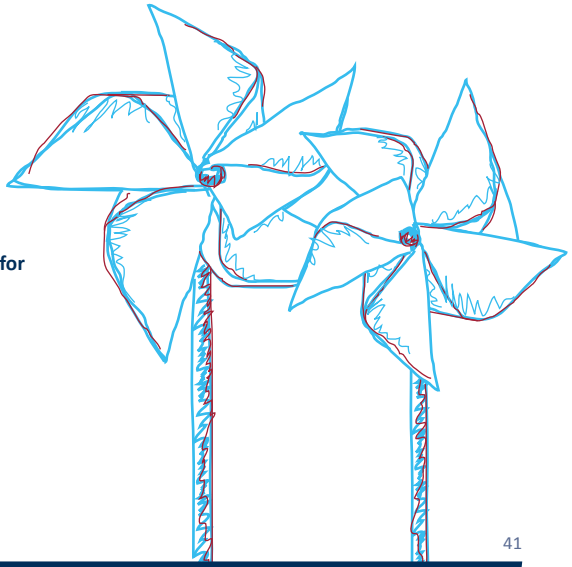

#Citizens' Energy #Society

Citizens' energy versus NIMBYism

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Since the launch of the energy transition process in 2000, millions of Germans have become energy producers, investing in solar panels on their houses and buying shares in wind parks. Citizen engagement has been key to maintaining a high level of public support for the energy transition despite rising power prices. The changes and their knock-on effects don't please everybody though: inevitably there are winners and losers when a society and economy undergo such sweeping changes. While some readily jump aboard and transform their homes into small solar power stations, others take

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The social impact of Germany's energy transition

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Polls reveal citizens' support for Energiewende

Fighting windmills: When growth hits resistance

What German households pay for power

the NIMBY ('not in my backyard') approach and gripe about the "ugliness" of wind turbines and photovoltaic panels. Important Energiewende projects – such as the extension of the grid and the installation of wind parks – have run into resistance, requiring new ways to keep the public on board.

"If people participate with their own money, for example in a wind or solar power plant in their area, they will also support it." Manfred Fischedick, Wuppertal Institute

#COP24

COP in Katowice, Poland: Another 'coal country' to host UN climate talks

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The 2017 UN climate summit (COP23) under Fijian presidency delivered what was needed to stay on schedule for the decisions expected to be made at COP24 in Katowice at the end of 2018, the German delegation said after the COP23 talks in Bonn, Germany. Negotiators will be busy ironing out the finer points of the Paris rulebook – the guidelines implementing the agreement to keep global

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warming well below 2°C. Just like Bonn, Katowice is located in a traditional coal mining region (Poland's Upper Silesia). Although Poland and Germany both rely heavily on coal power, their approaches to finding climate-friendly solutions often differ. Will the Polish COP presidency put its weight behind an ambitious Paris rulebook, or will the host country try to safeguard its ailing coal industry?

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Factsheets:

Climate finance: A brief overview of Germany's contributions

Germany's greenhouse gas emissions and climate targets

#Technology & Storage

Technology to transform the energy system – made in Germany

©[WEMAG AG] Batteriespeicher Schwerin Akkuhalle.

Germany's energy transition anticipates a vastly more efficient and interconnected energy system in the future. It also poses huge technological challenges – and challenges for legislation and business models to keep pace. German scientists say their work has already made important contributions to the global goal of decarbonisation.

Batteries that can store power and help to regulate the grid within seconds with high accuracy, smart grids

"The energy transition in Germany is entering a new phase. While the first phase was dominated by technology development in the renewables sector, the second step will focus on the energy system as a whole."

Tobias Sontheimer, Chief Research Manager for Energy at the head office of the Helmholtz Association of German Research Centres

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and other solutions for flexibility and integration of different power sources are key to adapting the power system to a high level of renewables. Germany has doubled research and development funds in under a decade.

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How can Germany keep the lights on in a renewable energy future?

Sector coupling – Shaping an integrated renewable energy system

#Gas

Natural gas – fossil bridge to a renewable energy future?

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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 the burning of all fossil fuels to accomplish its goal of becoming largely greenhouse gas neutral by 2050, in line with the Paris Climate Agreement. Meanwhile, the gas companies advocate flexible gas-fired electricity generation as the perfect partner for fluctuating renewables – a bridging technology for the energy transition. With campaigns like "Greener than you think," the gas

"By transforming renewable power into gas, peak power supply by renewables can be transported and stored easily in today's pipelines and gas stores. The existing gas infrastructure could therefore become the battery of the Energiewende."

Timm Kehler, Executive Director of gas industry initiative Zukunft ERDGAS

industry positions its fossil resource – responsible for more than a fifth of Germany's total emissions – against the even more CO_2-intensive oil and coal, and highlights its immediate gains in terms of climate change mitigation in heating, power production, industry, and transport. In the longer run, experts believe that the sector's future can only lie in the power-to-gas technology, which many think could be the ultimate solution to the long-term renewable energy storage needs when there is too little wind or sun.

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Germany's energy consumption and power mix in charts

#Cities #Urban planning

Energy transition to transform German cities

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German cities, counties and municipalities all have their role to play in the Energiewende. 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 localities implement their own energy transitions – which can also bring economic benefits. They have opportunities to take different paths but must

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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.

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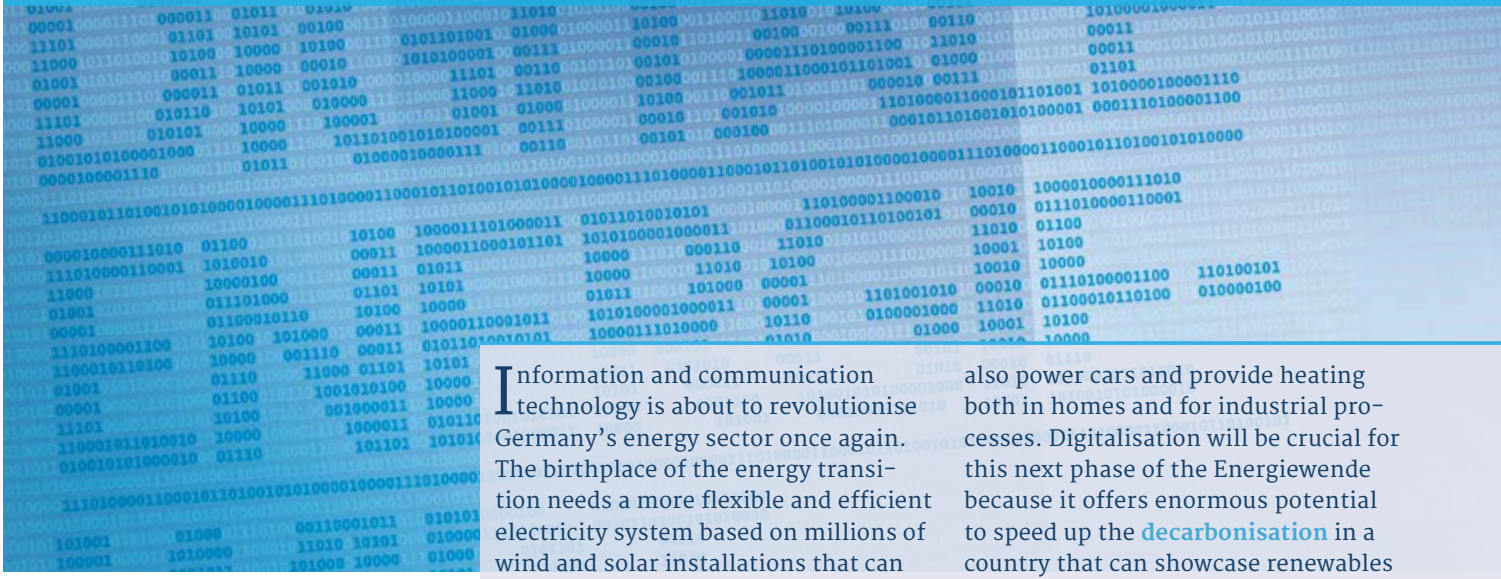
Efficiency gains make eastern German city Energiewende frontrunner

#Digitalisation

Digitalisation ignites new phase in energy transition



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Information and communication technology is about to revolutionise Germany's energy sector once again. The birthplace of the energy transition needs a more flexible and efficient electricity system based on millions of wind and solar installations that can also power cars and provide heating both in homes and for industrial processes. Digitalisation will be crucial for this next phase of the Energiewende because it offers enormous potential to speed up the **decarbonisation** in a country that can showcase renewables

"There is no doubt that digitalisation will take the energy transition to an entirely new level."

Robert Spanheimer, bitkom

growth as a success story but lags behind in cutting emissions from the transport and industry sectors. But the technology shift will upend many existing business models, and it will inevitably raise concerns about data privacy and the risk of cyberattacks.

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The digitalisation of the Energiewende

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#International #Energy Union #Security

Energiewende impacts EU neighbours and shapes foreign policy

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Germany's energy transition began as an isolated expedition, but rapidly impacted markets in neighbouring countries. The country had to learn it cannot reach its goals independently and needs to cooperate in areas such as power grids, trade, and research.

Energy is also inseparable from German foreign policy beyond the EU, as the country still relies heavily on imports to feed its energy appetite. Germany's shift to renewables will loosen these ties, with uncertain consequences for international security.

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Germany's energy consumption and power mix in charts

Capacity markets around the world

Loop flows: Why is wind power from northern Germany putting east European grids under pressure?

Germany's dependence on imported fossil fuels

The implications of a low-carbon future reach well beyond questions of supply security. If Germany is to make its energy transition a success, it could have profound geopolitical repercussions across the globe.

Clean Energy Wire is a joint initiative of Stiftung Mercator and the European Climate Foundation.

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