The German Power Market

State of Affairs in 2019

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Dear reader,

In 2019 surveys have shown that climate protection and the energy transition is the number one concern. Climate change becomes more visible every year. Right at this moment, wildfires have wrought destruction across land the size of Ireland and Switzerland combined. The *FridaysForFuture* movement has succeeded in raising public awareness for the scientific findings and putting pressure on politics to act. The political response however, has been tepid.

At the same time, the energy transition has moved forward in many fields: Electricity generation from coal has declined substantially leading to a fall of 50 million tonnes in CO_2 emissions, a record low. This decline was only exceeded in 2009 during the great financial crisis. Meanwhile, generation from renewables has increased considerably. As a result, wind and solar provided more electricity than lignite and hard coal combined. Unfortunately, such advanced cannot be said of the other sectors. Indeed, emissions in the transport sector even increased in 2019 compared to 2018 levels. Furthermore, the lack of newly installed onshore wind power plants will lead to a decline in their growth rate in the coming years meaning the increase in renewable energy generation will slow down in the future.
This document contains the key findings, the press release, the ten most important take-aways as well as the graphics of the report. You can find the full report in German free of charge on the website.
I wish you an interesting read!

Patrick Graichen
Director Agora Energiewende

Key Findings:

1. In 2019 greenhouse gas emissions in Germany fell by over 50 million tonnes of CO_2 thanks to a sharp drop in lignite and hard coal generation which are now around 35% lower than in 1990. Meanwhile, CO_2 emissions from the buildings and transport sectors have risen due to an increase in oil and gas consumption. The decline in CO_2 emissions can be attributed to the higher CO_2 prices in the EU ETS, a significant increase in renewable generation and lower electricity consumption.

2. Renewable energy broke a new record, reaching almost 43 percent of gross electricity consumption. Unfortunately, the collapse in wind capacity expansions to less than one gigawatt per year means the energy transition is entering the 2020s with a heavy burden. Whilst annual growth in renewables has been consistently in the 15 terawatt hours in recent years, the lack of available space and permits for wind capacity puts its continuation in jeopardy.

3. When it comes to the costs of renewable energy, the peak is in sight: the EEG levy will rise again in 2020 to 6.77 cents per kilowatt hour, but is expected to fall in 2022 at the latest, thanks to the lower costs of renewable energy. Older, more expensive power plants will then increasingly fall out of the support scheme. In addition, from 2021, part of the revenue from the Fuel Emission Trading Act (BEHG) will be used to reduce the EEG levy. As a result, the price of electricity is likely to fall slightly in the 2020s rather than rise.

4. Surveys have shown that climate protection and the energy transition are the number one concern amongst German society in 2019, far ahead of immigration and pensions. This fact is not reflected in the country's climate politics.
Indeed, the climate package adopted by the German government in September is not sufficient to achieve the 2030 climate protection targets. There is a considerable need for improvement, particularly in the areas of transport, buildings and industry.

Press release:

Emission certificate prices push greenhouse gas emissions and coal-fired power generation to record lows in 2019

The share of renewables in electricity consumption rose to almost 43 per cent in 2019. However, progress in the power sector is offset by rising greenhouse gas emissions in the building and transport sectors. Public awareness for the importance of climate protection continues to rise: since May 2019, it has consistently been the most pressing political issue in the eyes of the German population. These and other findings are contained in a review of 2019 conducted by Agora Energiewende.

Greenhouse gas emissions in Germany fell by more than 50 million tonnes in 2019; emissions now stand at 35 per cent below their 1990 levels. Germany's goal of achieving a 40 per cent emissions reduction by 2020 is thus within reach. The power sector is solely responsible for this decline in emissions, as significantly less electricity was generated using hard coal and lignite, while generation from renewables rose to cover 42.6 per cent of electricity demand, a nearly five percentage point increase over 2018. These are just some of the findings presented in the annual review released this week by the Berlin-based energy think tank Agora Energiewende, titled "Die Energiewende im Stromsektor: Stand der Dinge 2019" ("The Energy Transition in the Power Sector – State of Affairs 2019"). Notably, last year marked the first year in which generation from wind, hydro, solar and biogas plants exceeded the total generation from coal and nuclear.

Higher certificate prices in the EU emissions trading system have been the major driver of lower power sector emissions. In combination with increased electricity production from renewables and lower electricity consumption, higher emissions prices led fossil-fuel power plants to significantly reduce their electricity production during many hours in 2019, as their generation was not price competitive. Power generation by hard coal-fired power plants dropped by 31 per cent, and that of lignite-fired power plants by 22 per cent. Lower coal-based generation also benefited natural gas-fired power plants, which require fewer emission certificates to generate power; natural gas-based generation increased by 11 per cent.

In sharp contrast to the progress made in the power sector, emissions in the building and transport sectors increased in 2019. These sectors consumed more natural gas, heating oil, petrol and diesel than in the previous year. Lower emissions in the power sector were thus partially offset by higher emissions in the building and transport sectors. In the transport sector, higher emissions were driven first and foremost by an increasing share of heavy vehicles with large combustion engines, such as SUVs.

The expansion of PV capacity and beneficial climatic conditions for wind generation were the primary factors encouraging a higher share of generation from renewables. "Nevertheless, the energy transition is entering the 2020s with a heavy burden," says Dr. Patrick Graichen, Director of Agora Energiewende. "The expansion of wind energy has collapsed by more than 80 per cent over the last two years and has thus nearly ground to a halt. Furthermore, as bids from industry to construct wind farms did not fully exploit the capacity budget in 2019, we will not see robust expansion figures for wind energy in the coming years either. It is now up to the federal government to make policy adjustments so that wind power capacity continues to expand. Wind is the workhorse of the energy transition, and without wind power, we cannot succeed in phasing out coal or meeting our climate protection targets."

However, climate-protection progress in the power sector stands is undermined by a general lack of further ambition in energy and climate policy, especially in the heating and transport sectors.

"Following the declines of the past two years, there is a danger that emissions will rise again in 2020 to 2022," warns Graichen. "We need to build more renewables to offset the phase-out of nuclear power up to 2022 and also generate enough electricity for electric vehicles and heat pumps." Graichen's desire for ambitious action is shared by the German population: according to public opinion surveys, since May 2019 voters have considered "the climate and energy system transformation" the most important problem facing the country, ahead of immigration/integration (2nd) and pensions (3rd).

The annual review also shows that the cost of supporting renewable energy will soon fall. After twenty years, old and expensive plants are no longer eligible for subsidies under the Renewable Energy Act, but can still offer electricity at low prices. New wind and solar power plants, on the other hand, now produce electricity more cheaply than all other types of power and, with an increasing share of renewable energy, are increasingly leading to falling wholesale prices. In 2019, Germany and Luxembourg were the European countries with the lowest wholesale electricity prices. Furthermore, upward and downward price fluctuations on the wholesale market (including negative electricity prices) were less frequent in 2019, and there were no supply shortages. "This is a sign that security of supply in Germany was consistently high last year," says Graichen.

The significant reduction in electricity consumption witnessed last year helped to bolster the share of demand covered by renewable energy. Total demand in 2019 fell to 569 terawatt hours, the lowest level registered in the past 20 years – even lower than that of 2009, during the economic crisis. Lower demand is being driven by slower economic growth, lower consumption by the energy-intensive basic materials industry, and lower on-site consumption by conventional power plants, which are being increasingly supplanted by renewable energy systems.

In 2020, Agora Energiewende predicts that electricity generation from nuclear energy will continue to decline, as the Philippsburg 2 nuclear power plant was decommissioned at the end of December 2019. However, the situation for onshore wind energy is unlikely to improve. As in 2019, the experts expect a 1 gigawatt increase in onshore wind energy and a 4 gigawatt increase in solar. Offshore wind capacity is growing faster thanks to the commissioning of new wind farms in second half of 2019 and first half of 2020. The 2020 trends that will be seen for lignite, hard coal and natural gas – thus for carbon emissions – remain uncertain, as they depend crucially on coal, gas and CO2 prices, as well as on wind conditions. Accordingly, no reliable predictions can be offered at the present time. However, the prospect of compensation for operators as part of the coal phase-out is likely to prevent any coal-fired power plants from being decommissioned in 2020.

The 2019 power market in ten points

1. Renewable energy: 2019 saw a new record high in the generation of electricity from renewables in Germany. Generation increased by 17.8 terawatt hours to cover 42.6 per cent of gross electricity consumption. For the first time, generation from renewables was thus roughly as high as total generation from nuclear, lignite and hard coal. The record high was primarily attributable to very good meteorological conditions for wind and solar power, rather renewable capacity expansion. Onshore wind capacity growth fell dramatically, and photovoltaic growth is also below the level required to reach the government's target for 2030 (namely, a 65 per cent share of renewables in gross electricity demand). The share of renewables in the heating and transport sectors once again trended sideways in 2019. The share of renewable energy in primary energy consumption grew only slightly, reaching 14.7 per cent.

2. Conventional generation: Hard coal utilisation rates continued their downward trend, falling by 31 per cent in 2018–19. A higher CO_2 price compared to previous years, in combination with a favorable price for natural gas, caused natural gas to displace hard coal in the power-plant merit order. The use of natural gas in power generation increased by 11 per cent in 2019. In contrast to previous years, lignite-based generation also fell by more than 30 terawatt hours (22 per cent) in 2019, reaching the lowest level witnessed since 1990. Accordingly, lignite is increasingly competing not only with renewable energy but also with gas-fired power plants (due to the higher costs that older lignite plants have for flexible operation). While electricity generation from nuclear was constant in 2019, it declined at the start of 2020, as the Philippsburg 2 nuclear power plant with a capacity of 1.4 gigawatts went off the grid on 31 December 2019, in accordance with the Nuclear Phase-out Act.

3. Energy and electricity consumption: At 569 terawatt hours, electricity consumption in 2019 fell to its lowest level in the past 20 years. 2019 consumption was even lower than that of 2009, at the height of the economic crisis. Primary energy consumption also recorded a slight decline of one per cent. While the reasons for such low electricity consumption cannot be precisely identified, the likely drivers are lacklustre industrial sector growth, abnormally warm weather, and continuous efficiency improvements.

4. Climate protection: Greenhouse gas emissions fell by over 50 million tonnes, or six per cent compared to the previous year, and now stand at 811 million tonnes $CO_{2e/annum}$, almost 35 per cent below their 1990 levels. This reduction is mainly attributable to developments in the electricity sector, as lignite and hard coal generation declined significantly. In the transport and buildings sectors, on the other hand, demand for diesel, natural gas, petrol and heating oil is on the rise, such that emissions in these sectors have increased. The gap to achieving Germany's 2020 climate protection target (minus 40 per cent compared to 1990) still stands at 65 million tonnes of CO_{2e}. The main drivers of lower emissions were the significant increase in CO_2 prices in the EU emissions trading scheme, a strong increase in renewables generation and lower electricity consumption.

5. Electricity trading: The balance of trade in the power sector extended the trend reversal that started in 2018. The export surplus in 2019 was just under 37 terawatt hours, a decline of around 14 terawatt hours compared to the previous year. Low natural gas prices, which boosted gas-fired generation in neighbouring countries, and the rising cost of emission certificates, which made coal-fired electricity generation in Germany much more expensive, were the primary drivers of this trend. Thus, the decline in exports primarily pertained to emissions-intensive coal-fired generation. The main consumer was Austria (by a clear margin), followed by Luxembourg and the Netherlands.

6. Electricity prices and flexibility: Wholesale electricity prices fell from 44.70 to 37.60 euros per megawatt hour in 2018–2019. There was an increase in the number of hours with negative prices due to high generation from renewables. At the same time, price spikes have become less common. This indicates the absence of a supply shortage in the wholesale market. 2020 forward prices stood at 47.70 euros per megawatt hour, almost 8 per cent higher than that of the previous year. Household electricity prices in 2019 averaged 30.90 cents per kilowatt hour, an increase of three per cent.

7. Renewable subsidies: Under Germany's new tender system for determining the level of government support given to renewable energy

projects, subsidy levels diverged significantly by energy type. The awarded subsidy level for PV was roughly unchanged at 4.90 cents per kilowatt hour. By contrast, there was a shortage of bidders for the awardance of onshore wind energy capacities, and submitted bids tended to hug the maximum allowable subsidy level. There were no auctions held for offshore wind energy. The EEG levy was increased 0.35 euro cents and now stands at 6.756 euro cents per kilowatt hour in 2020. However, a trend reversal is in sight, as the levy is likely to rise for the last time in 2021.

8. Grid expansion: Grid expansion continues to make slow progress: of the 7,700 kilometres of additional transmission lines that lawmakers have resolved to construct, only 1,150 km have been installed thus far. However, significant progress was made in 2019 in the awardance of permits: a further 1,000 km were approved and can now be built. In addition, a number of cross-border interconnectors are nearing completion, which will enable additional electricity exchange with neighbours, thus facilitating the integration of renewables while also augmenting security of supply.

9. Energy policy development: At the beginning of 2019, a commission tasked with assessing how Germany can best phase out coal power presented its findings. The commission's report envisages a gradual phase-out of coal by 2038, but the legal adoption of the recommendations is still pending. In September 2019, a number of measures relevant to energy policy were adopted as part of the Climate Package, including a climate protection law, which defines sectoral targets up to 2030; a national emissions trading system with fixed carbon prices for the transport and building sectors; and tax incentives for building refurbishment.

10. 2020 Outlook: Electricity generation from lignite and nuclear is expected to decline further, as two lignite-fired power plants were shut down and placed on reserve status in October 2019, and the Philippsburg 2 nuclear power plant was decommissioned at the end of December 2019. The expansion of onshore wind energy is likely to remain weak (expected increase: approx. 1 gigawatt), while PV capacity is expected to expand by the amount witnessed in 2019 (4 gigawatts). New offshore wind farms representing about 1 gigawatt of generation are to be commissioned at the end of 2019/beginning of 2020. Overall, however, renewables expansion is not sufficiently rapid to meet Germany's generation targets for 2030.

Graphics and deck of slides

The Energy Transition in the Power Sector: State of Affairs in 2019

A review of major developments of 2019, and an outlook for 2020

Patrick Graichen, Fabian Hein, Christoph Podewils

BERLIN, 6. JANUARY 2020

Key Findings

1. **In 2019 greenhouse gas emissions in Germany fell by over 50 million tonnes of CO_2 thanks to a sharp drop in lignite and hard coal generation which are now around 35% lower than in 1990**.
2. Meanwhile, CO_2 emissions from the buildings and transport sectors have risen due to an increase in oil and gas consumption. The decline in CO_2 emissions can be attributed to the higher CO_2 prices in the EU ETS, a significant increase in renewable generation and lower electricity consumption. The rising share of SUVs in the transport sector is responsible for rising emissions.
3.
4.

Key Findings

2

Renewable energy broke a new record, reaching almost 43 percent of electricity consumption. Unfortunately, the collapse in wind capacity expansions to less than one gigawatt per year means the energy transition is entering the 2020s with a heavy burden.

Whilst annual growth in renewables has been consistently around15 terawatt hours in recent years, the lack of available space and permits for wind capacity puts its continuation in jeopardy. Decisive political action is now required if the 2030 renewable energy targets are to be achieved.

Key Findings

3

When it comes to the costs of renewable energy, the peak is in sight: the EEG levy will rise again in 2020 to 6.77 cents per kilowatt hour, but is expected to fall in 2022 at the latest, thanks to the lower costs of renewable energy.

Older, more expensive power plants will then increasingly fall out of the support scheme. In addition, from 2021, part of the revenue from the Fuel Emission Trading Act (BEHG) will be used to reduce the EEG levy. As a result, the price of electricity is likely to fall slightly in the 2020s rather than rise.

Key Findings

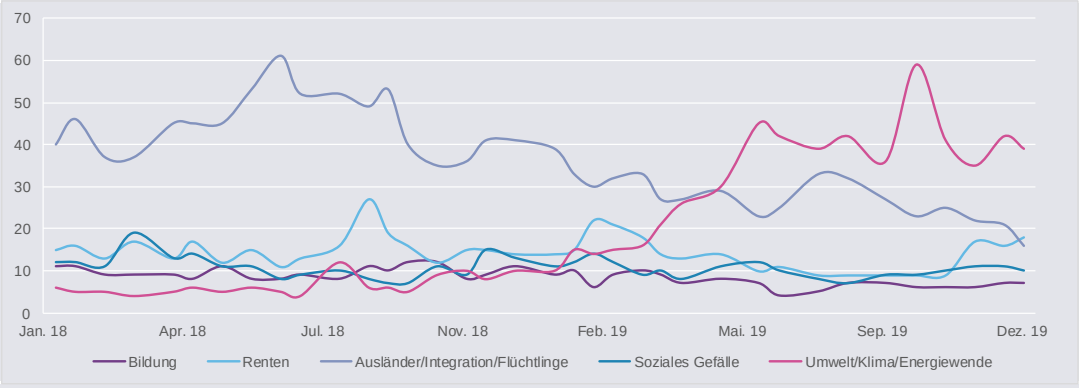
1 2 3 **4**

Surveys have shown that climate protection and the energy transition are the number one concern amongst German society in 2019, far ahead of immigration (2nd) and pensions (3rd). This fact is not reflected in the country's climate politics.

For example, the climate package adopted by the German government in September is not sufficient to achieve the 2030 climate protection targets. There is a considerable need for improvement, particularly in the areas of transport, buildings and industry.

Concerns over Climate Protection and the Energy Transition became the "most important topic" in 2019 for the first time.

The Top 5 political problems in Germany in 2018-2019

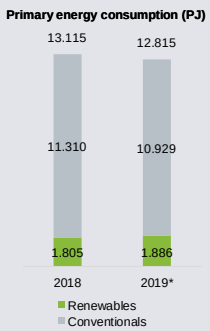


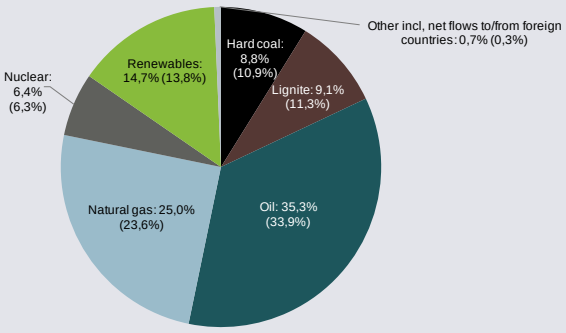
Forschungsgruppe Wahlen (2019): Politbarometer (survey period 1/2018 – 12/2019, selected were the five most-mentioned answers out of twelve possible answers).

Energy and Electricity Consumption in 2019

Primary energy consumption in 2019: Oil remains by far the most important energy carrier. The significance of coal decreases, gas and renewables become more prominent

Primary energy consumption in 2019 (values for 2018 in brackets)

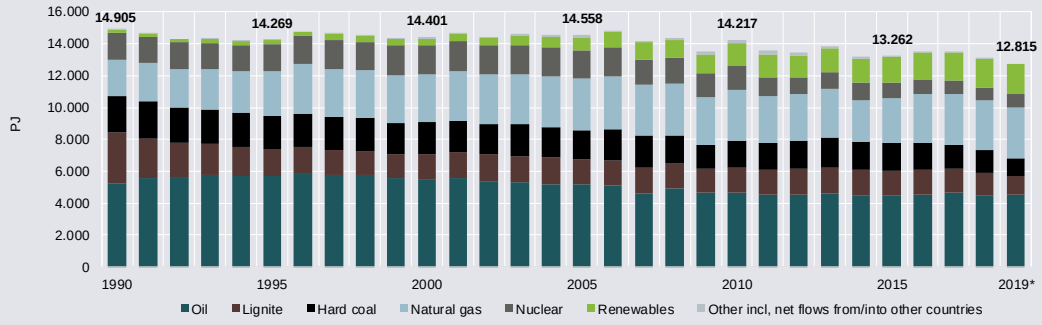




AG Energiebilanzen (2019), *preliminary results

Primary energy consumption in Germany: Decreasing energy consumption (-2.3% 2019 vs. 2018) due to weaker industry growth and mild weather

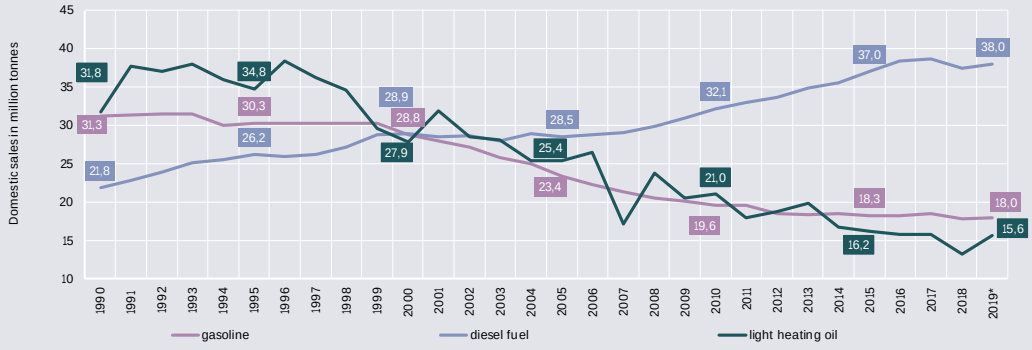
Primary energy consumption from 1990 to 2019



AG Energiebilanzen (2019), *preliminary results

The consumption of diesel and gasoline increases in 2019 – as well as the number of fuel-intensive SUVs. The increase in heating oil is partly due to inventory effects

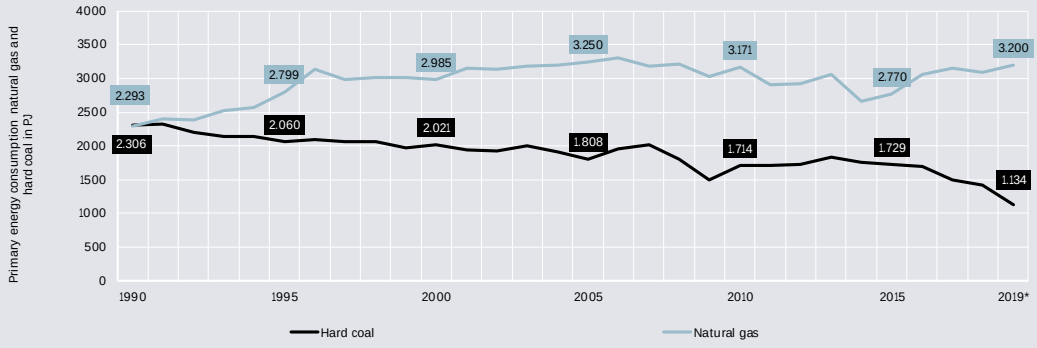
Sales of mineral oil products in Germany from 1990 to 2019



AG Energiebilanzen (2019), Ministry of economic affairs (2019), *preliminary results

A combination of gas and renewables made up for the declining share of hard coal generation which is back to 2008 levels

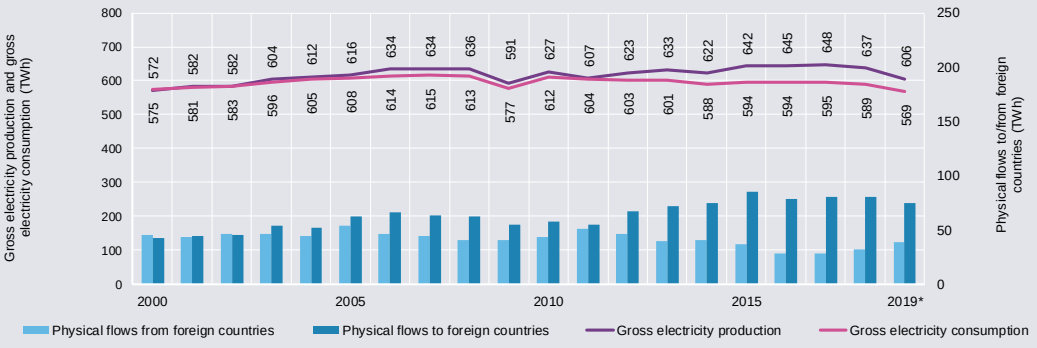
Primary energy consumption of hard coal and gas from 1990 to 2019



AG Energiebilanzen (2019), *preliminary results

Electricity consumption in 2019: Electricity consumption reaches its lowest level since 2000. Primary drivers are the weaker industry growth and a mild winter

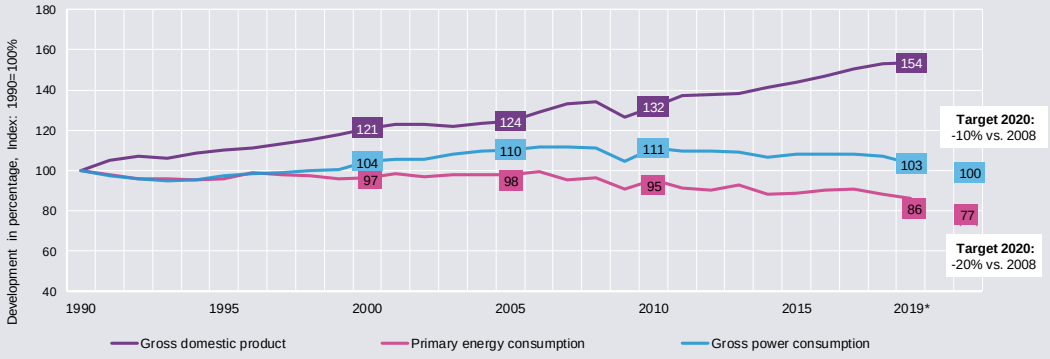
Electricity generation, electricity consumption and physical cross-border flows from 2000 to 2019



AG Energiebilanzen (2019), *preliminary results

Energy efficiency in 2019: The decoupling of economic growth and energy consumption as well as electricity consumption continues slowly

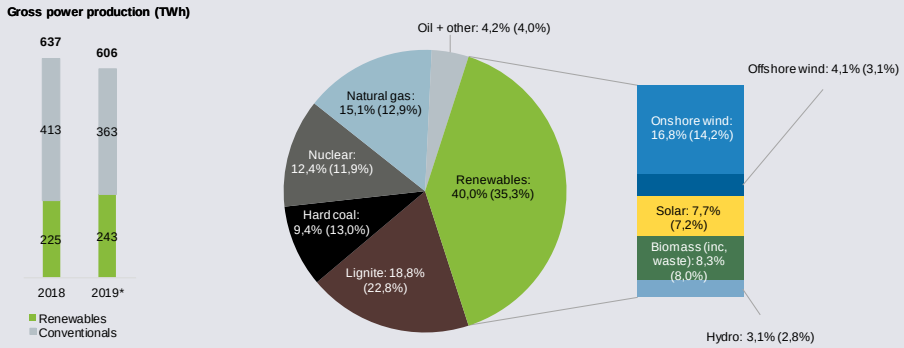
GDP, primary energy consumption, primary energy consumption and gross electricity consumption 1990-2019 (index: 1990=100)



AG Energiebilanzen (2019),Ministry of economic affairs (2019), *preliminary results/own calculations

Electricity mix in 2019: Renewables provide as much electricity as coal and nuclear combined – each around 40% of the total generation

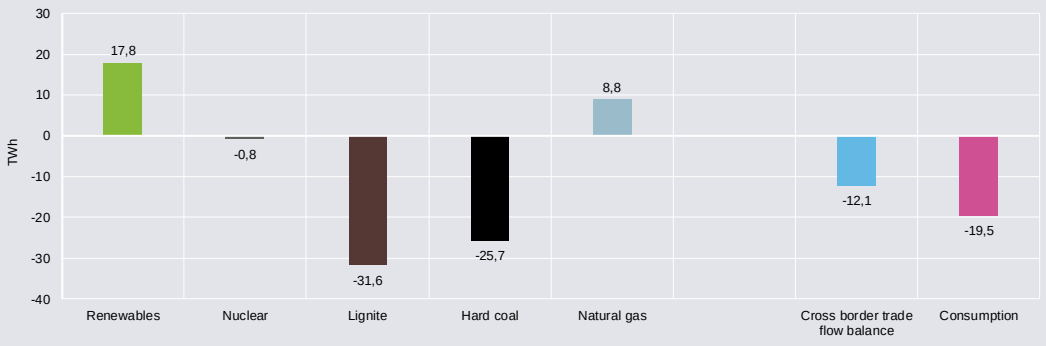
Electricity mix in 2019 (values for 2018 in brackets)



AG Energiebilanzen (2019), *preliminary results, **including biological shares of household waste

Overview of the development 2019 vs. 2018: coal generation collapses – due to a rise in renewables and gas as well as a reduction in consumption and exports

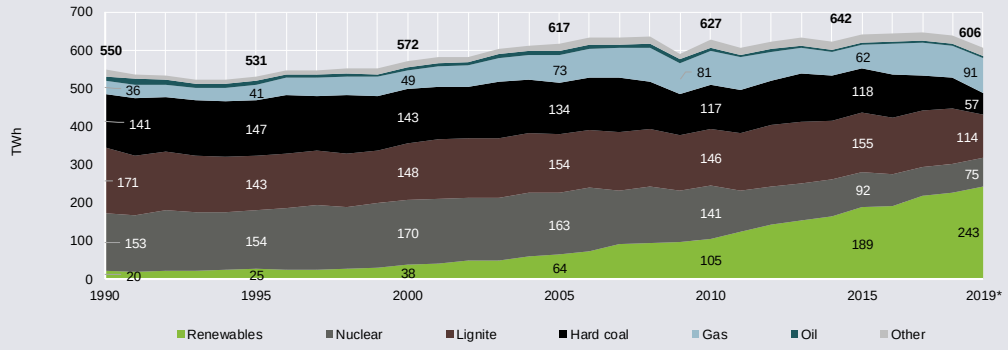
Changes in the electricity sector 2019 vs. 2018



AG Energiebilanzen (2019), preliminary results

Electricity generation in 2019: A new record for renewables while coal drops to an all time low since the 1970s

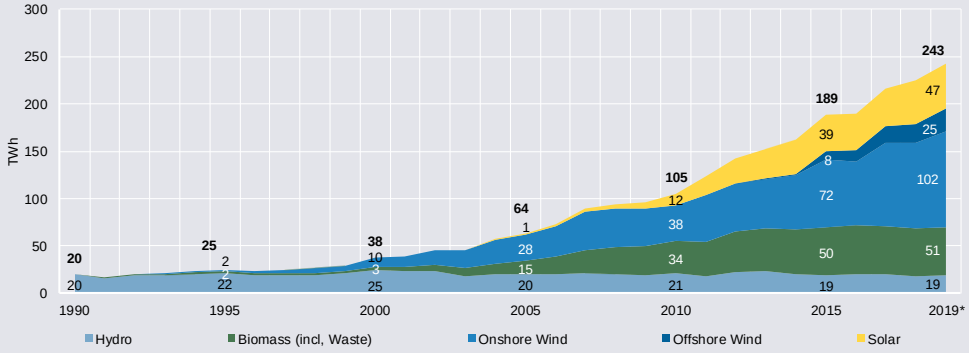
Development of the gross electricity generation from 1990 to 2019



AG Energiebilanzen (2019), *preliminary results

Renewable energy in 2019: Good wind conditions lead to a record in electricity generation from renewables

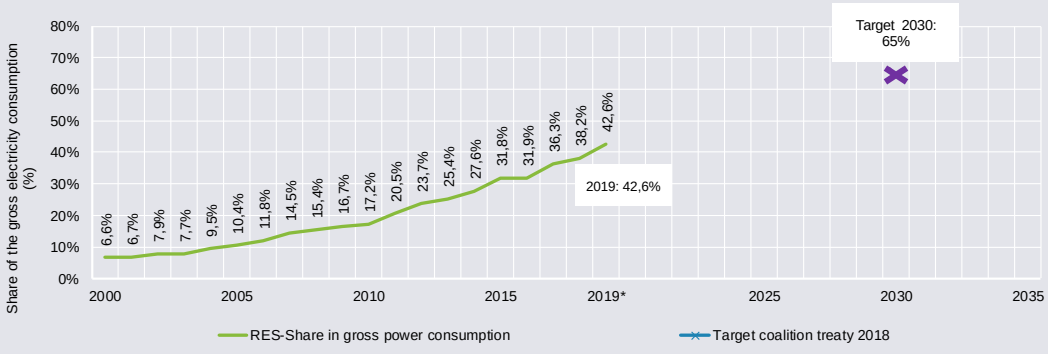
Electricity generation from renewable energies,1990–2019



AG Energiebilanzen (2019), *preliminary results

Renewable energy in 2019: renewables make up 42.6% of the domestic gross consumption. In order to reach the 65% target in 2030, a 2%-points increase is necessary.

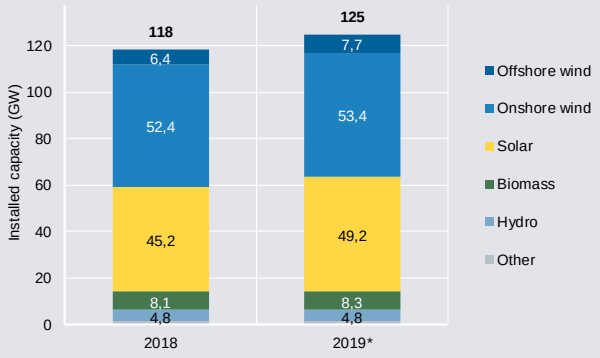
Share of renewable energy of the gross electricity consumption from 2000 to 2019 as well as the target for 2030



AG Energiebilanzen (2019), *preliminary results

Renewable energy capacities in 2019: solar energy increases by 4 gigawatts while onshore wind only increases by 700 megawatts.

Renewable capacity at the end of the years 2018 and 2019



BNetzA (2019), *own calculations/estimates based on BNetzA (2019, as of 11.11.2019), medium-term-forecast of transmission grid operators (2019) Fachagentur Wind (2019)

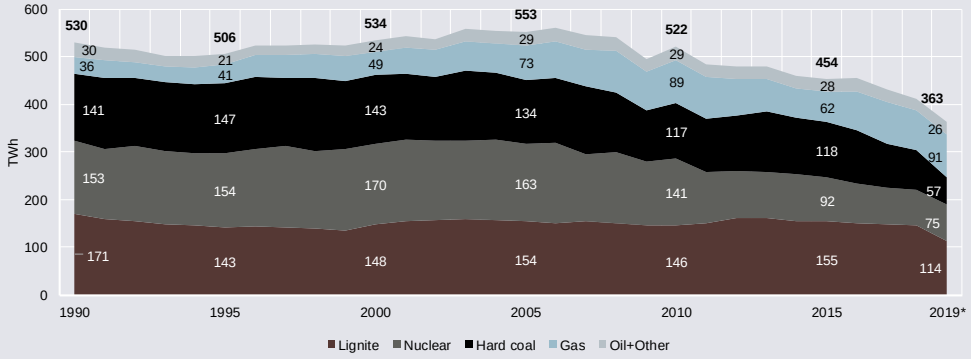
Renewable capacity as of January 1st, 2019:
- 118 Gigawatt

Expansion in 2019 (estimated):
- Onshore Wind: 0.7 Gigawatt
- Offshore Wind: 1.3 Gigawatt
- Photovoltaic: 4 Gigawatt
- Biomass: 0.2 Gigawatt

Renewable capacity as of December 31st, 2019 (estimated):
- 125 Gigawatt

Conventional power generation in 2019: Drastic decline of hard coal (-31%), and for the first time ever we also see a substantial fall in lignite (-22%) and a record high for gas

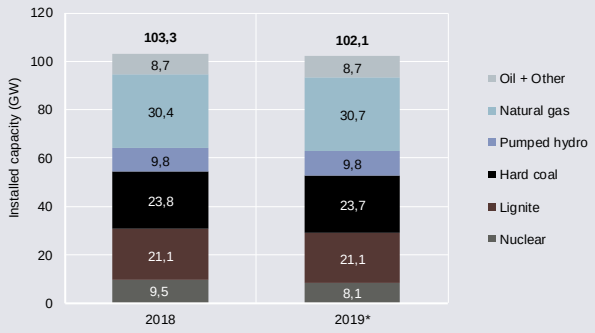
Gross power production from conventional energy sources,1990–2019



AG Energiebilanzen (2019), *preliminary results

Conventional power capacity in 2019: The coal compromise has yet to be implemented. The delay slows down the decommissioning of coal power plants as well as the construction of new gas plants

Conventional capacity at the end of 2018 and 2019



BNetzA (2019), *own calculations/estimates based on expansion and decommissioning numbers released by the Bundesnetzagentur (2019, as of 11.11.2019)

Conventional power capacity as of January 1st, 2019:
- 103 Gigawatt

Decommissioning in 2019:
- Hard coal: 0.1 Gigawatt
- Lignite: 0 Gigawatt (around 750 Megawatt security reserve)
- Oil and other: 0 Gigawatt
- Nuclear: 1.4 Gigawatt

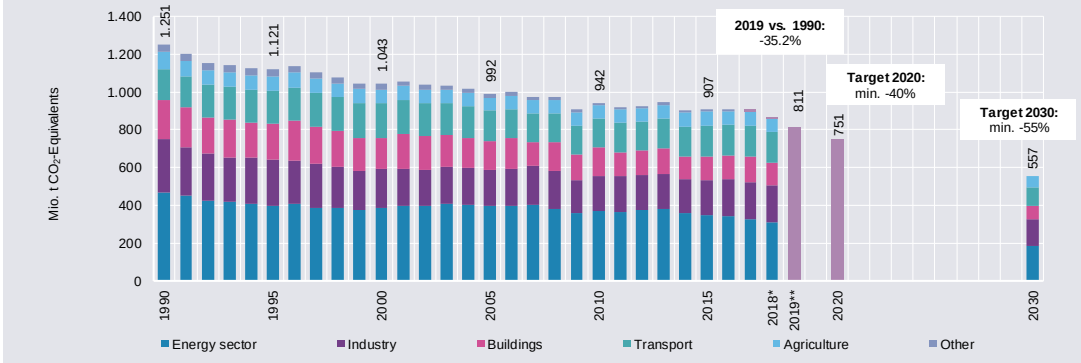
Expansion in 2019:
- Gas: 0.3 Gigawatt

Conventional power capacity as of December 31st, 2019:
- 102 Gigawatt (estimated)

Greenhouse Gas Emissions in 2019

Climate protection 2019: Greenhouse gas emissions have fallen over 50 million tonnes this year, a decline of 35 percent compared to 1990

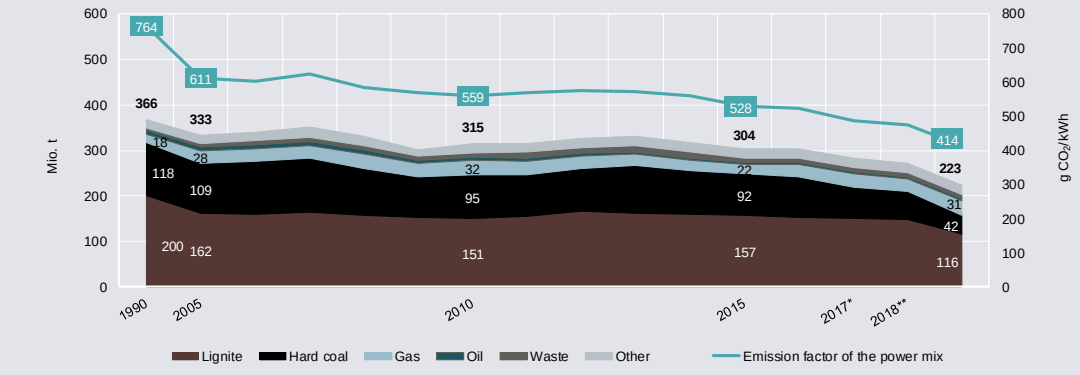
Greenhouse gas emissions by sector 1990 – 2019 as well as 2020 and 2030 climate targets



Umweltbundesamt (2019), own calculations, *preliminary results, **own estimates

Climate protection in the electricity sector 2019: Decline in coal generation pushes down the CO_2-emissions to the lowest level since 1990

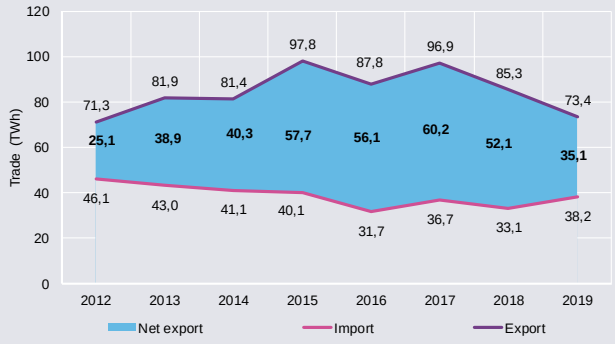
CO_2 emissions from electricity generation 1990 - 2019



Umweltbundesamt (2019), *preliminary results, **estimates Umweltbundesamt, ***own calculations

Germany remains an electricity exporter, albeit at a lower level than in previous years

Cross-border electricity trade in Germany 2012 to 2019



Own calculations based on ENTSO-E (2019, as of 30.12.19); commercial electricity trade flows are shown

- Electricity exports fell significantly by 12 terawatt hours, while electricity imports increased by a good five terawatt hours.
- As a result, the export surplus was reduced by 17 terawatt hours.
- Austria remains the largest net recipient of German electricity, followed by Luxembourg and the Netherlands.
- The biggest net suppliers were Sweden and the Switzerland.
- The trade balances with Switzerland, the Czech Republic and Denmark have reversed: In 2019, Germany exported to the Czech Republic and Denmark on balance, while importing from Switzerland.

Germany's electricity trade with its neighbours: The structure of trade flows remains similar, but the dimensions are changing

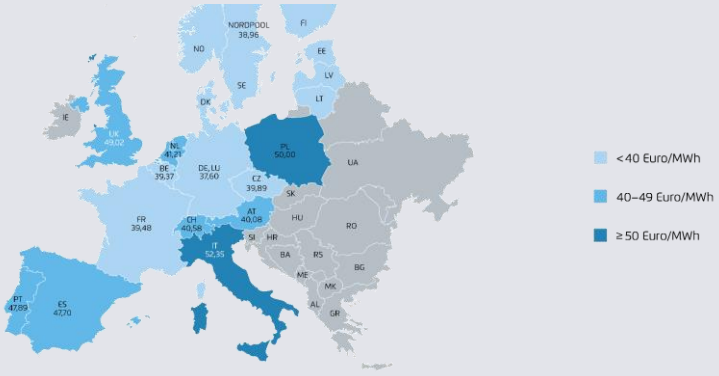
Comparison of electricity trade with neighboring countries in 2018 and 2019

	TWh 2018			Twh 2019		
	Import from	Export to	Balance	Import from	Export to	Balance
Sweden	1,2	0,3	-0,9	1,3	0,6	-0,7
Austria	10,1	35,0	25,0	1,7	21,3	19,6
Switzerland	4,8	8,8	4,0	7,9	7,3	-0,6
Czech Rep.	6,5	4,9	-1,5	5,7	7,6	1,9
Denmark	5,6	5,2	-0,4	6,0	7,9	1,9
France	3,8	12,7	8,9	11,5	14,0	2,4
Netherlands	0,4	13,0	12,5	3,7	7,7	4,0
Poland	0,6	1,4	0,9	0,2	2,6	2,3
Luxembourg	0,2	3,8	3,7	0,2	4,4	4,2
Sum	**33,1**	**85,3**	**52,1**	**38,2**	**73,4**	**35,1**

Own calculations based on ENTSO-E (2019, as of 30.12.19); commercial electricity trade flows are shown

Wholesale power prices: Germany has the lowest day ahead prices in Europe

Comparison of wholesale power prices in selected European neighbouring countries

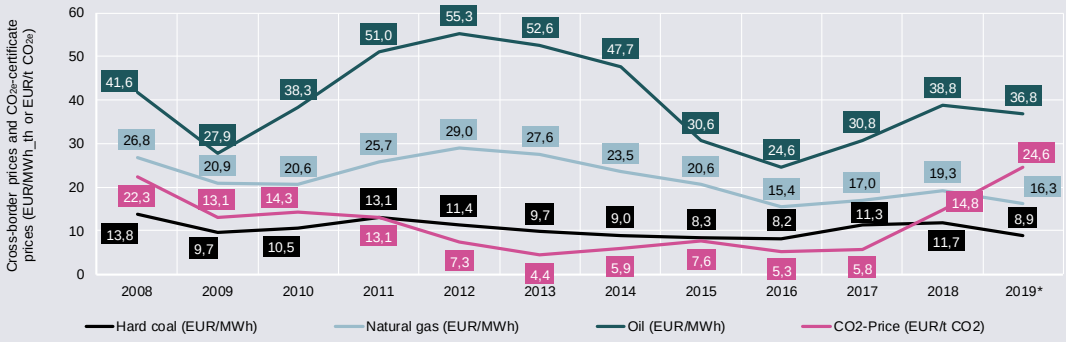


Own calculations based on ENTSO-E (2019), Mercato Elettrico (2019), Nordpool (2019), TGE (2019), OTE (2019), 30.12.19

Electricity and Fuel Price Trends in Germany in 2019

Commodity prices in 2019: Prices of coal, oil and gas decrease, the price of CO_2 certificates reached the highest level seen in the past 10 years

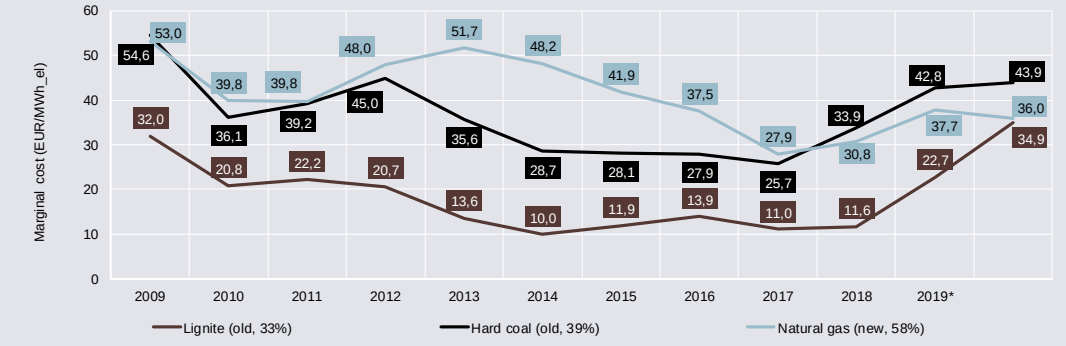
Import prices for natural gas, hard coal, and oil, as well as CO_2 certificate prices



Federal Office for Economic Affairs and Export Control (2019), Deutsche Emissionshandelsstelle (2019), own calculations, *preliminary results

2018 electricity generation costs: Due to higher CO_2 prices gas plants become as profitable as hard coal and even old lignite plants

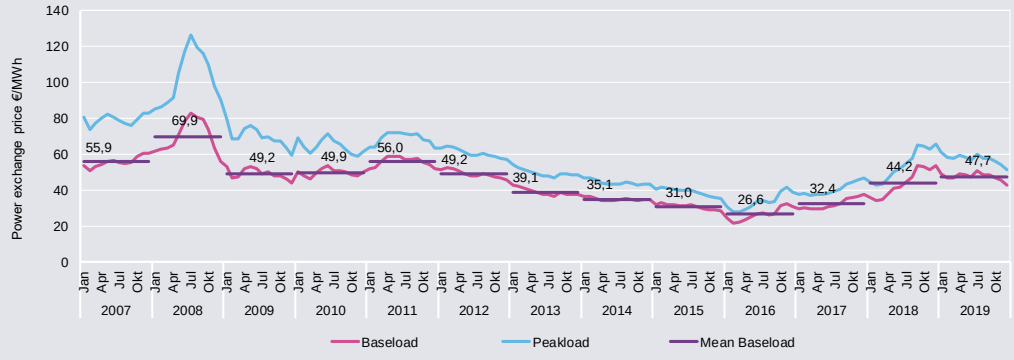
Marginal costs for new natural-gas power plants and old power plants fired with lignite and hard coal



Federal Office for Economic Affairs and Export Control (2019), Deutsche Emissionshandelsstelle (2019/2006), Öko-Institut (2017), efficiency factor in brackets, *own calculations/preliminary data

Energy exchange electricity prices 2019: Price increase in energy exchange due to higher CO_2 prices. Yet, Germany still shows one of the lowest wholesale prices in Europe

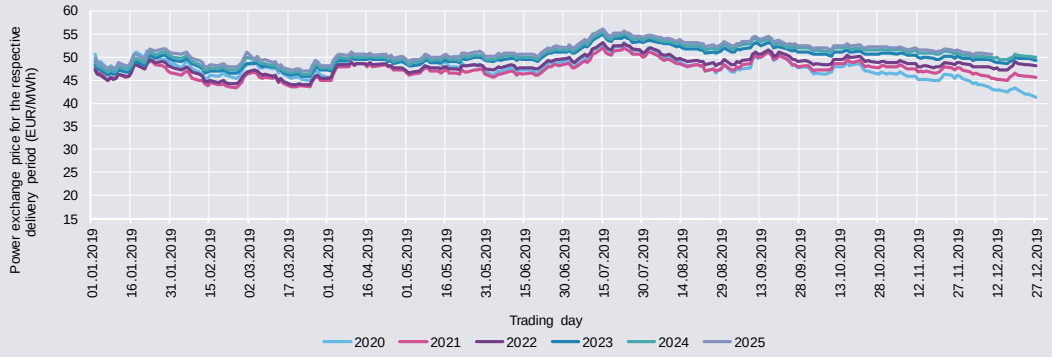
Rolling annual future prices 2007 to 2019



Own calculations based on EEX (2019, as of 30.12.19)

Power future prices 2020-2024: In the future, electricity prices of around 50 to 55 Euros per megawatt hour are expected

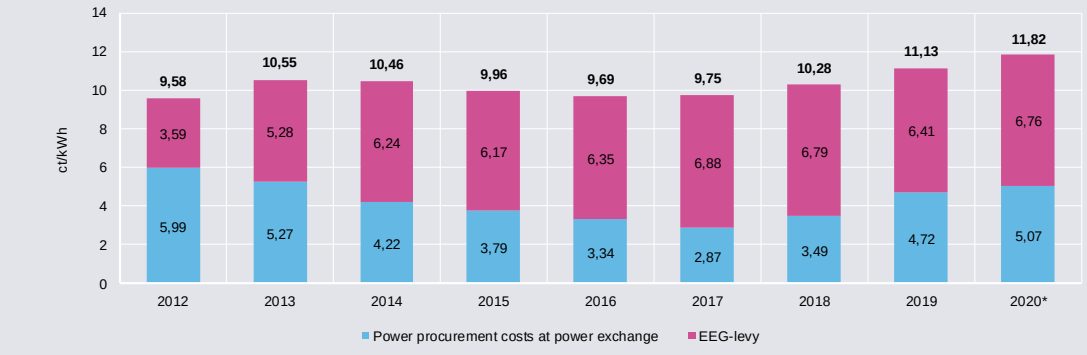
2019 future prices for power delivery in 2020–2024



EEX (2019, as of 30.12.19)

Electricity costs in 2020: Increase in procurement costs and EEG levy makes electricity slightly more expensive

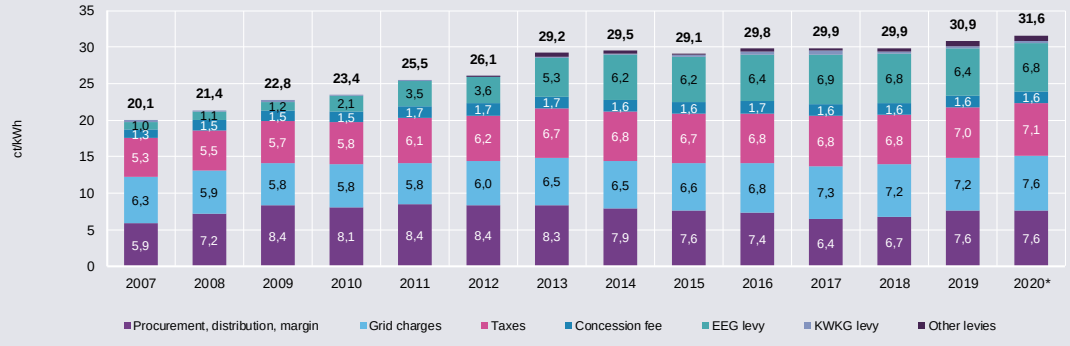
Electricity procurement costs and EEG levy from 2012 to 2019



EEX (2019), Bundesnetzagentur (2019), *Estimate: 70 percent one-year future (base), 30 percent one-year future (peak) (as of 30.12.19)

Electricity costs in 2020: Household electricity prices increase by 2.6 percent

Household electricity prices 2007 bis 2020

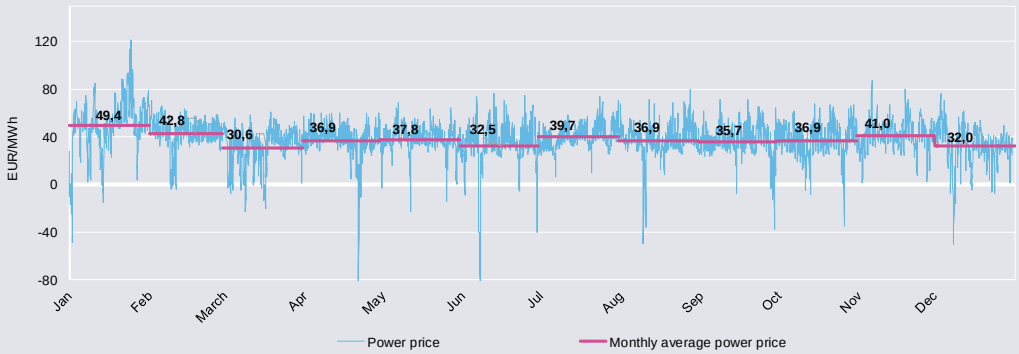


Bundesnetzagentur (2019), *own estimates based on Netztransparenz (2019)

Negative Electricity Prices and Power Market Flexibility in 2019

Hourly wholesale electricity prices over the course of 2019: High shares of renewable energy result in a significantly lower wholesale power price on the day-ahead market

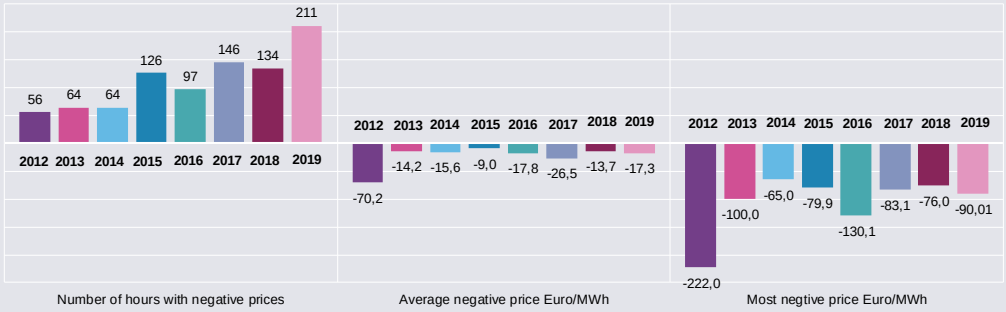
Hourly wholesale power prices (Day-ahead) for 2019



ENTSO-E (2019, as of 30.12.2019)

Negative electricity prices in 2019: High shares of renewables increase the number of hours with negative prices and show the potential for flexibility

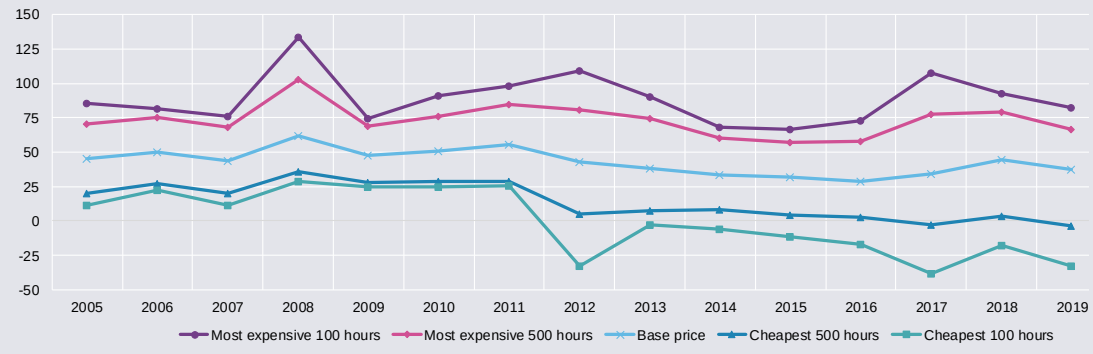
Number of hours with negative electricity prices in 2019



ENTSO-E (2019, as of 30.12.2019)

Cheapest and most expensive hours on wholesale markets in 2019: Very few situations with scarcity in the electricity market, price peaks have decreased

Cheapest and most expensive hours on wholesale markets in 2019

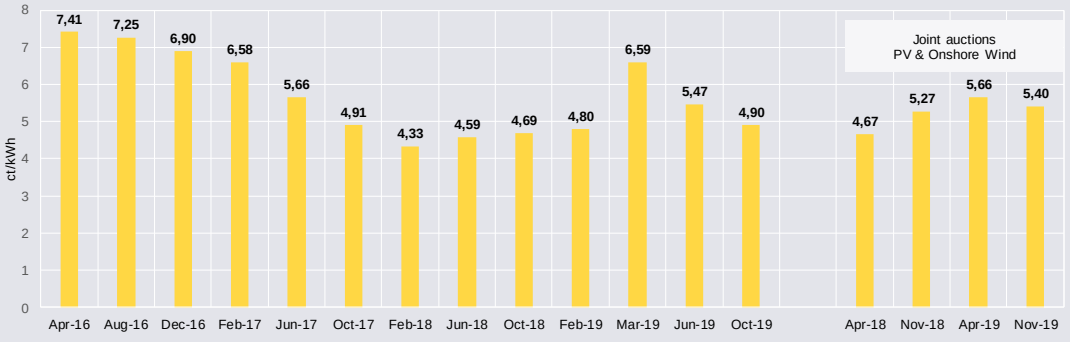


ENTSO-E (2019, as of 30.12.2019)

Renewable Auctions and EEG levy costs in 2019

Solar power auctions in 2019: After a peak in March the auction results declined to the level of 2018

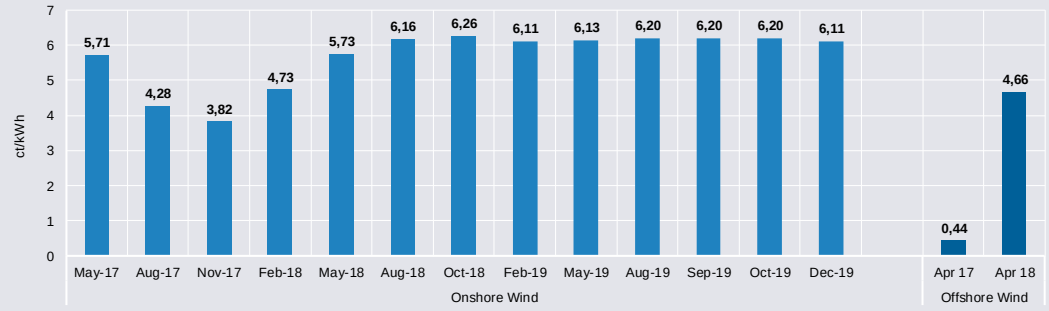
Average auction results for PV, 2016 - 2019



Bundesnetzagentur (2019)

Average results of wind power auctions 2017 to 2019: Maximum values in the auction results reflect the lack of new projects in the market

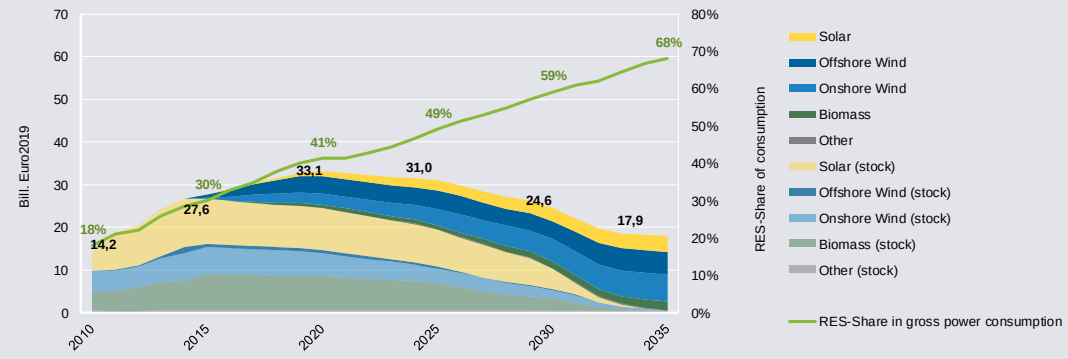
Average auction results for wind power, 2017 - 2019



Bundesnetzagentur (2019), * excluding grid connection costs (about 3 ct/kWh)

Costs of promoting renewables: The peak is within sight, costs for the remuneration of renewable energy will decline in the beginning of the 2020s

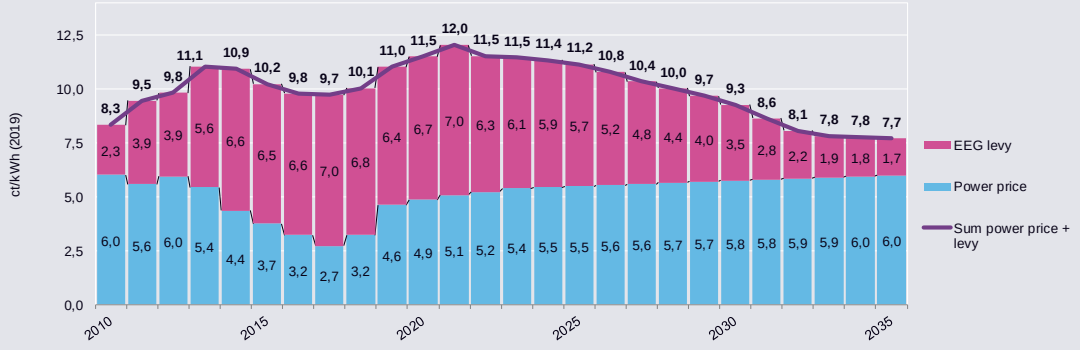
Guaranteed remuneration for renewable power plant owners, 2010–2035



Own projection based on Öko-Institut (2019)

Electricity costs: The sum of wholesale electricity price and EEG levy should decline by 2022 at the latest

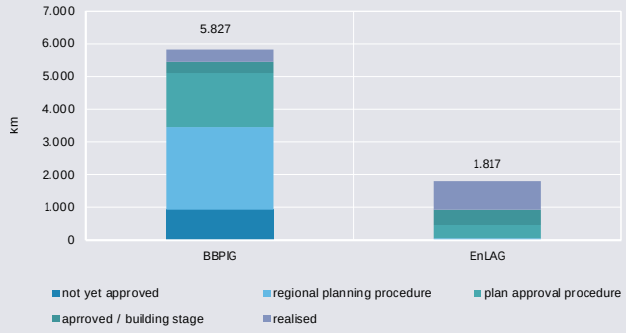
Electricity price (rolling annual future price for base load) and EEG levy, 2010 - 2035



Own projection based on Öko-Institut (2019)

Despite few newly built grid lines in 2019, there was positive news in the acceleration of approval procedures

Status of grid expansion in the third quarter of 2019



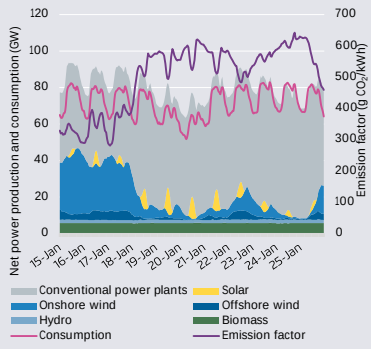
Bundesnetzagentur (2019)

- The Amendment of the Network Expansion Acceleration Act (NABEG) took effect.
- The central projects of the Federal Requirements Plan Act (BBPIG) reached some milestones (application conferences, planning documents, etc.).
- Progress has also been made in the expansion of cross-border electricity trading. Notably, the Nord-Link submarine cable to Norway will be completed on schedule in 2020.
- Despite weak construction progress, it's been a good year for transmission system expansion in Germany.
- In the future, due to the e-vehicle fleet and prosumers, distribution networks will move up on the agenda.

Notable Events in 2019

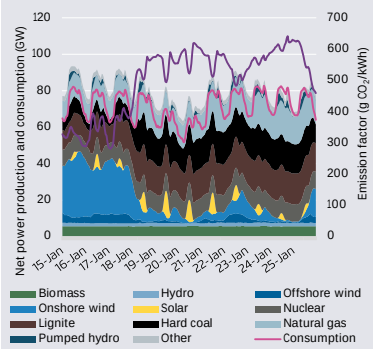
January 2019: The smallest hourly share of renewable generation in 2019 was 11 percent. Nevertheless, Germany still exported electricity

Net electricity generation and consumption and emission factor (15-25 January)



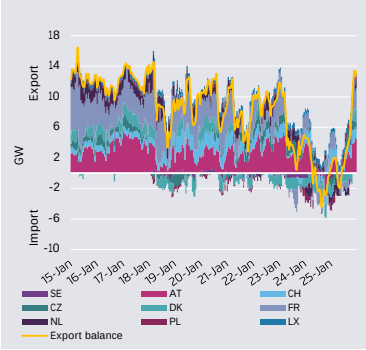
Agora Energiewende (2019)

Net electricity generation and consumption (15-25 January)



Agora Energiewende (2019)

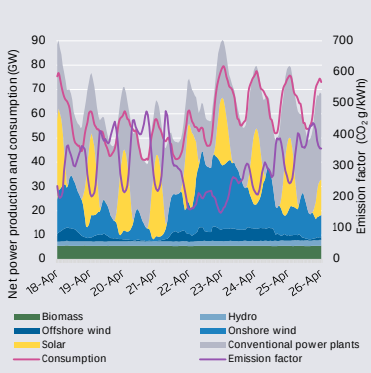
Trade flows and export balance (15-25 January)



Agora Energiewende (2019)

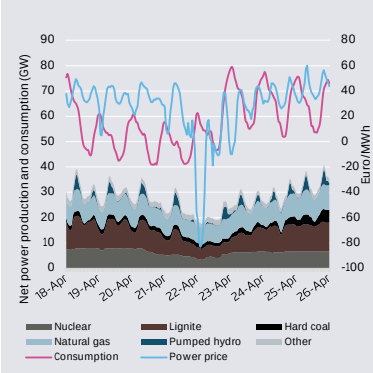
Mid April 2019: Renewable share of generation rises to 80-90% whilst Gas-CHP-plants keep running due to a lack of flexibility

Net electricity generation and consumption and emission factor (18-26 April)



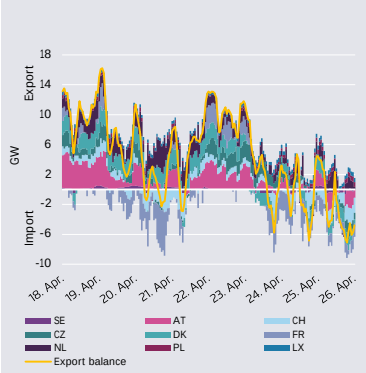
Agora Energiewende (2019)

Net electricity generation and consumption and power price (18-26 April)



Agora Energiewende (2019)

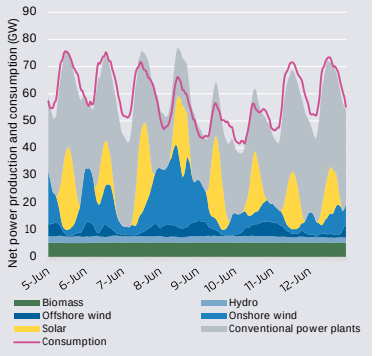
Trade flows and export balance (18-26 April)



Agora Energiewende (2019)

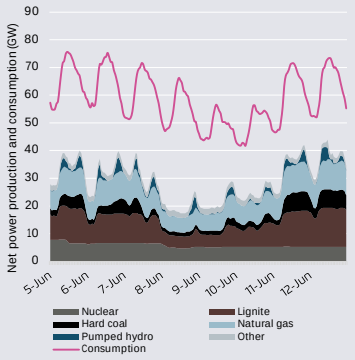
June 8th 2019: The combination of high renewable generation and low consumption result in a negative price of minus 42 Euros per megawatt hour (daily average)

Net electricity generation and consumption and emission factor (05-12 June)



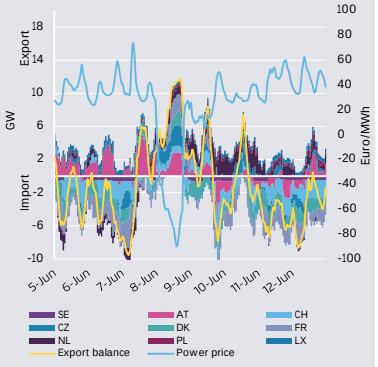
Agora Energiewende (2019)

Net electricity generation and consumption (05-12 June)



Agora Energiewende (2019)

Trade flows, wholesale power price and export balance (05-12 June)



Agora Energiewende (2019)

Political developments and outlook 2020

Political developments and outlook in 2020 (1)

- **Coal exit:** The Coal Commission presented its final report in January. In it, a compromise was struck which provides for a gradual phase-out of coal by 2038, 40 billion euros in structural aid for the regions affected as well as compensation for power plant operators. Despite having passed the Structural Aid Act in Cabinet in August 2019 and the ongoing discussions taking place in the Bundestag and Bundesrat, the legal implementation of the coal phase-out is still missing.
- **Climate Protection Act:** The Bundestag passed the Climate Protection Act as part of its climate package in November 2019. The act sets annual sectoral climate protection targets from 2020 onwards, obliges the responsible ministries to develop appropriate measures in their respective areas and puts in place greenhouse gas neutrality by 2050 as a long-term goal.
- **CO_2 pricing for buildings and transport:** The Fuel Emissions Trading Act (BEHG) was passed by the Bundestag in November. It includes national emissions trading schemes for the building and transport sectors starting in 2021. The CO_2 price will be fixed until 2025 (no trading). According to the results of the mediation committee in December, the price will start at 25 euro/tCO_2 in 2021 and increase to 55 euro/tCO_2 by 2025.

Political developments and outlook in 2020 (2)

- **Renewable energy:** Contradictory policies were included in the climate package: On the one hand, the expansion targets for renewables are to be increased so that the goal of reaching a 65% share of total generation by 2030 will be made possible. Whilst on the other hand, new regulation limiting the distance of onshore wind turbines to a 1000-metre distance from residential buildings is planned to be implemented. The amendment of the Renewable Energy Sources Act due in 2020 is therefore likely to give rise to heated energy policy debates.
- **Combined heat and power/green district heating:** An amendment to the Combined Heat and Power Act has been planned for 2020 in order to promote the switch from coal-fired CHP plants to gas and the conversion of district heating networks to green district heating.
- **Tax incentives for building retrofitting and energy standards:** Tax incentives for house renovations were put in place in December 2019 and are now in force - home owners can take advantage of the tax credit instead of the KfW subsidy. The Building Energy Act presented by the Federal Ministry of Economics has not yet been approved by the Federal Cabinet. In its current draft version, it does not contain any tightening of building standards and therefore does not contribute to climate protection and energy system transformation.

Political developments and outlook in 2020 (3)

- **Climate and energy policy in Europe:** In December, EU heads of state decided that Europe should become climate neutral by 2050. The new EU Commission President von der Leyen presented a "European Green Deal" in December, which is intended to steer Europe towards climate protection and energy system transformation in the coming years. The EU's climate target for 2030 is to be increased from minus 40 to minus 50-55 percent reduction compared to 1990. Between March 2020 and mid-2021, the European Commission will also submit amendments to all relevant EU directives and regulations to bring them into line with the higher targets.
- **International Climate Conference in Glasgow in November 2020:** The Paris Agreement of 2015 stipulated a review and increase in the Nationally Determined Contributions (NDCs) of the signatory states every five years in order to achieve the 2-degree target. For the first time, such an increase in commitments can be expected at the climate conference in Glasgow next year. The EU, as host, has a crucial responsibility for the success of the conference – highlighting the importance of its own target increase. The German Federal Government will play a decisive role in this as it will hold the EU Council Presidency in the second half of 2020.

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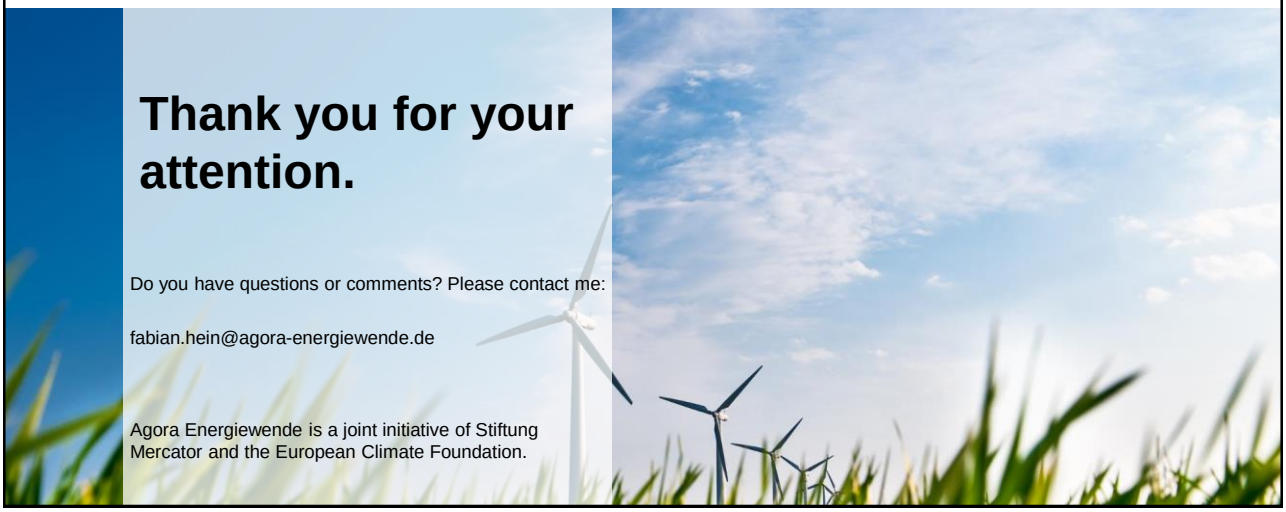

Thank you for your attention.

Do you have questions or comments? Please contact me:

fabian.hein@agora-energiewende.de

Agora Energiewende is a joint initiative of Stiftung Mercator and the European Climate Foundation.

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