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# The energy transition in Germany: state of play 2024

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Review of key developments  
and outlook for 2025

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Berlin, 10 January 2025

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# Agenda

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- Overview of German greenhouse gas emissions
  - Focus on the energy industry
  - Buildings, transport and industry
  - Outlook
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- **Overview of German greenhouse gas emissions**
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# Germany's GHG emissions fell by approx 3% in 2024 compared to the previous year: from 18 to 656 MtCO<sub>2</sub>eq

Development of GHG emissions since 1990 and comparison with the 2024 sector targets of the Climate Protection Act

[Million t CO<sub>2</sub>eq]

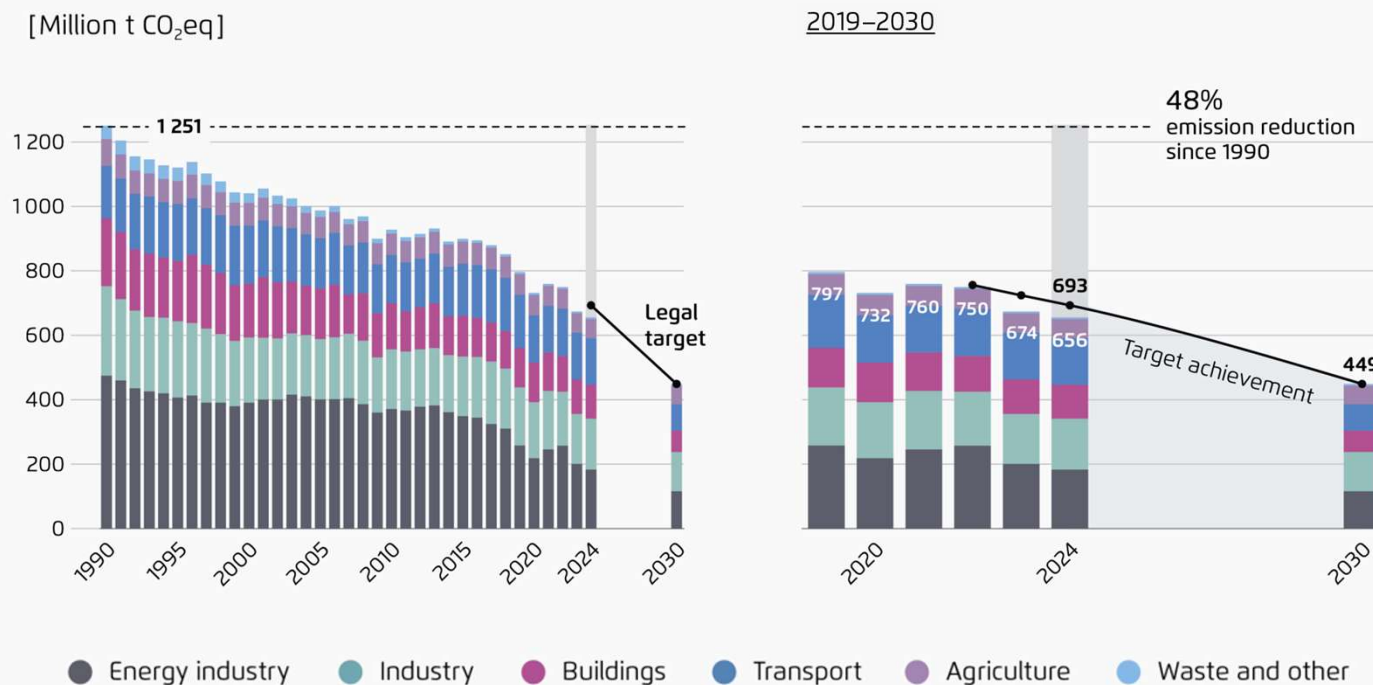


- Compared to 1990, emissions have fallen by a total of 48%.
- Over 80% of the reductions come from the energy sector.
- The 2024 indicative climate target set by the new *Climate Protection Act (KSG)* will be exceeded by around 36 MtCO<sub>2</sub>eq.
- However, the requirements of the *EU Effort Sharing Regulation* are not being met, as emissions from buildings and transport continue to stagnate.

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## Development of GHG emissions by sector, 1990-2024

[Million t CO<sub>2</sub>eq]

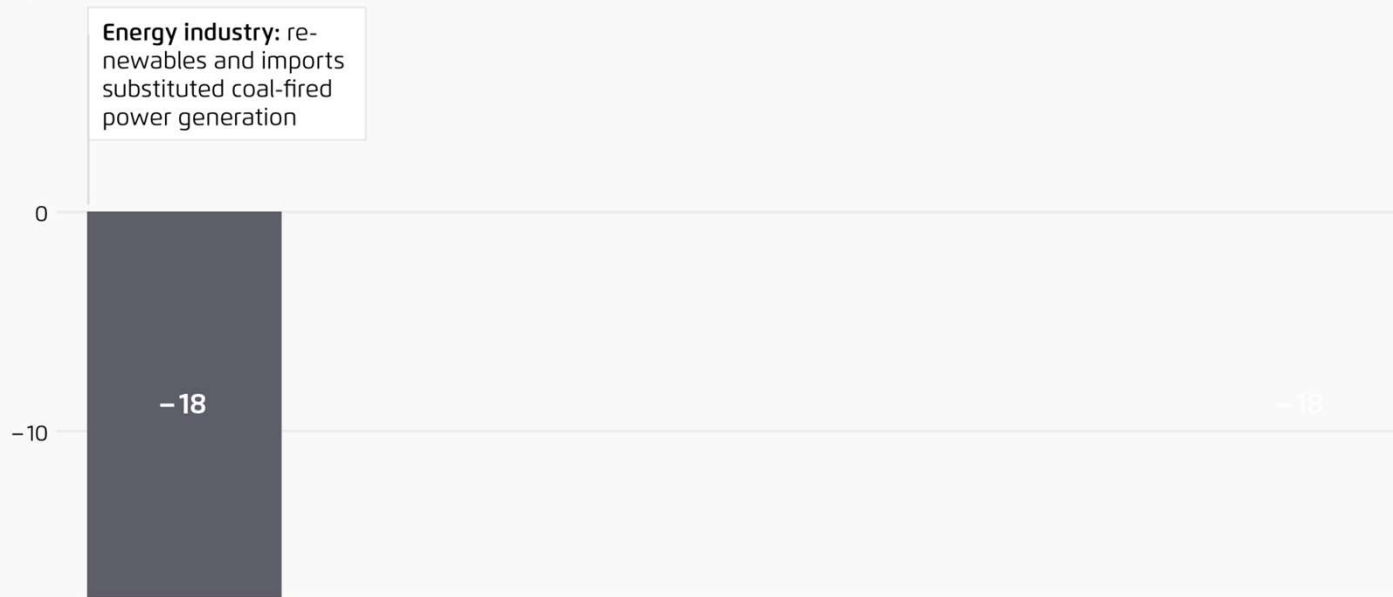


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## Development of GHG emissions in 2024 compared to 2023

[Million t CO<sub>2</sub>eq]

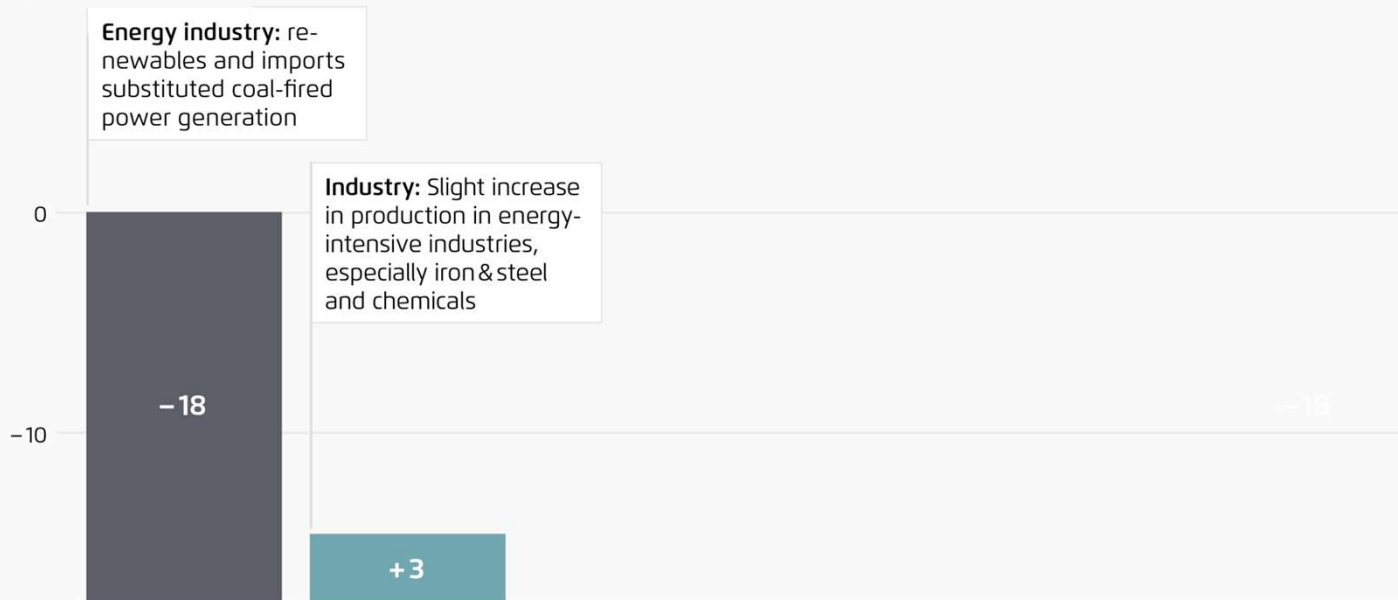


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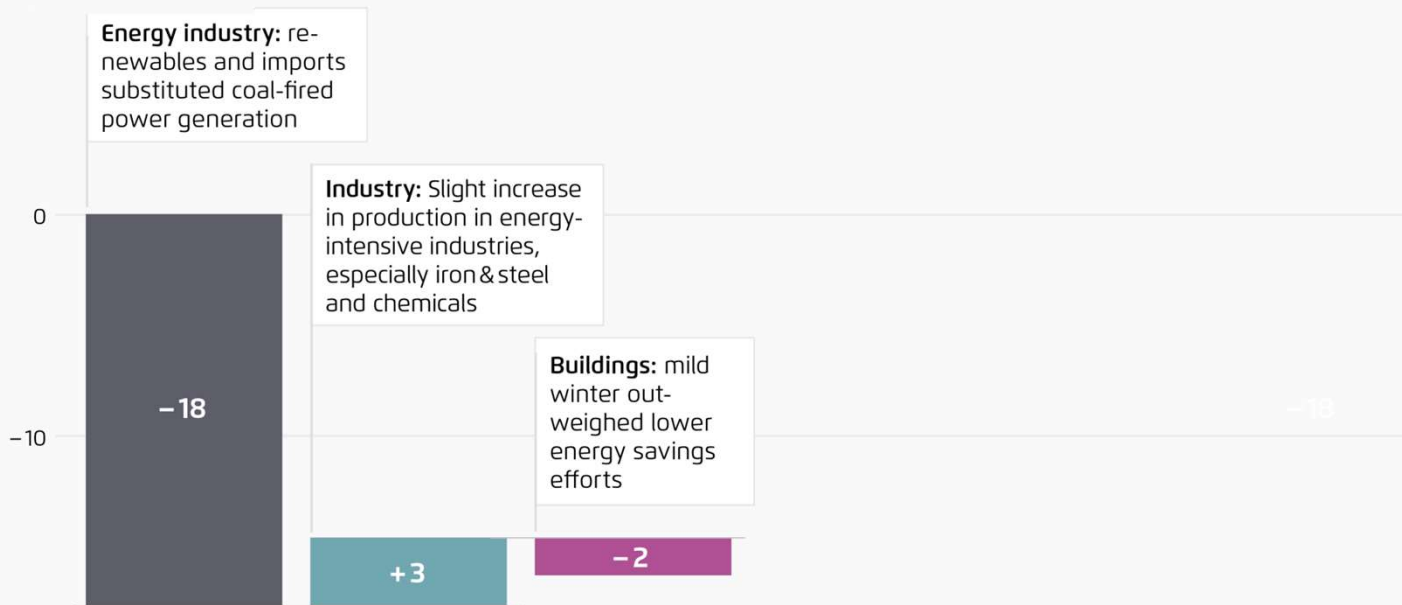


- With the exception of the **energy industry**, no significant structural reductions: opposing factors partially canceled each other out.
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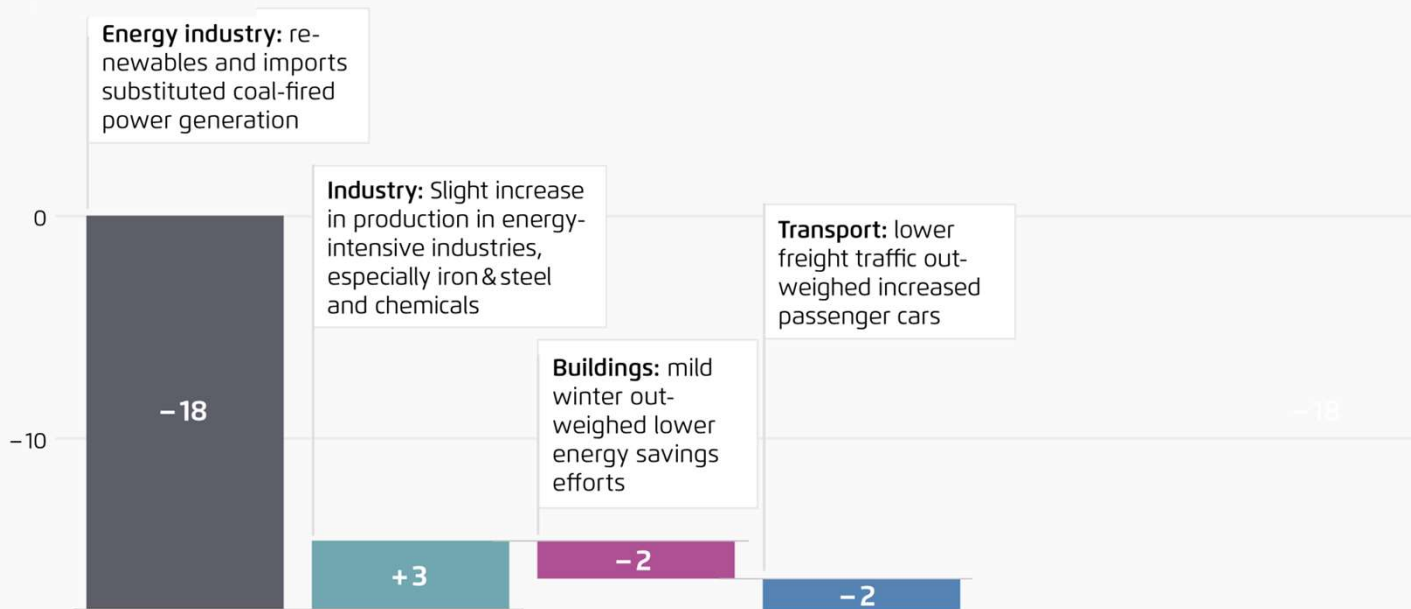
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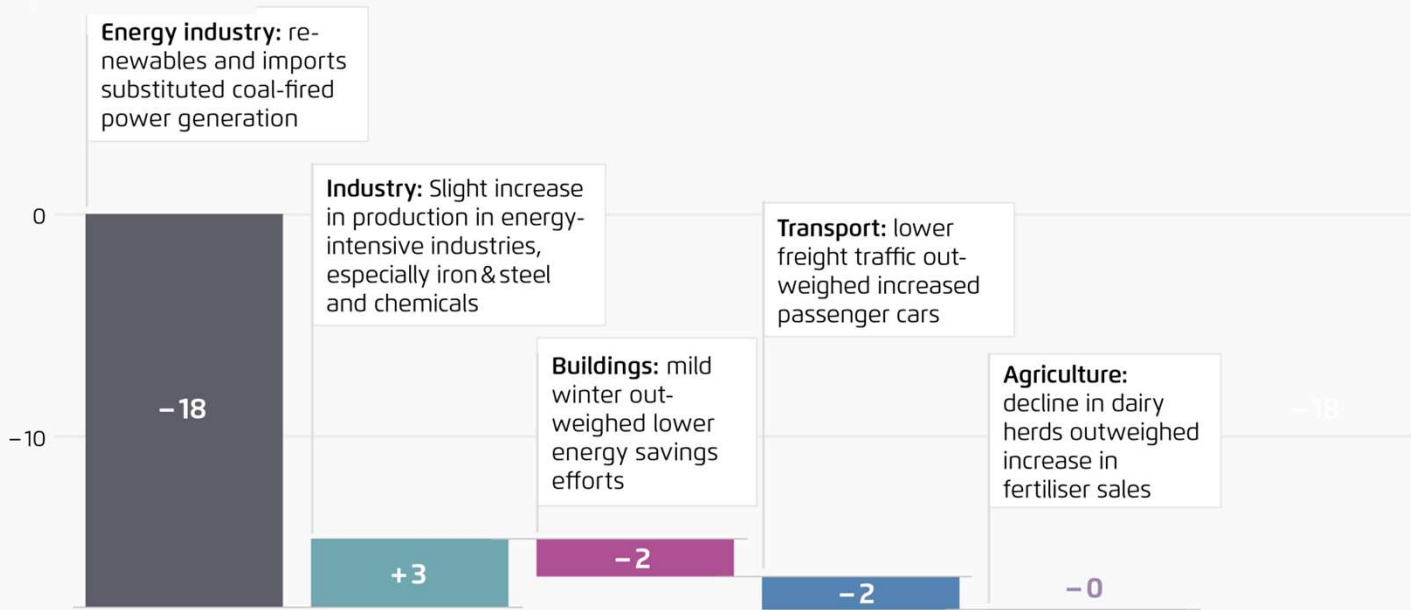


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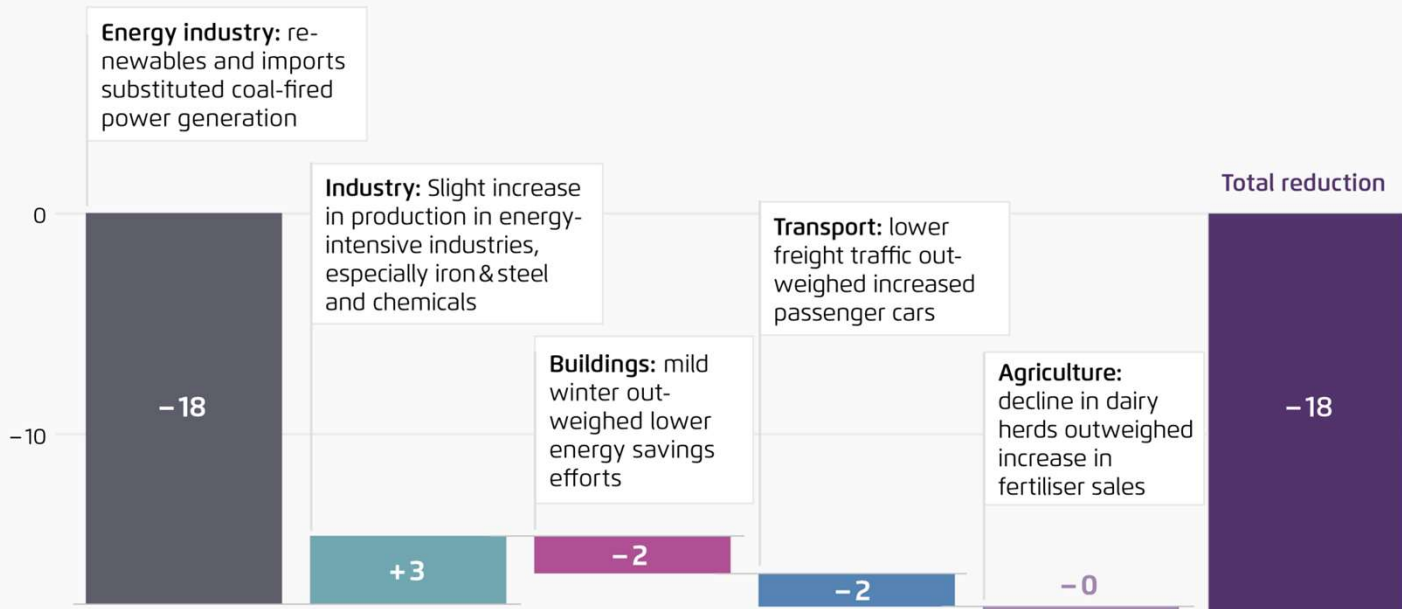


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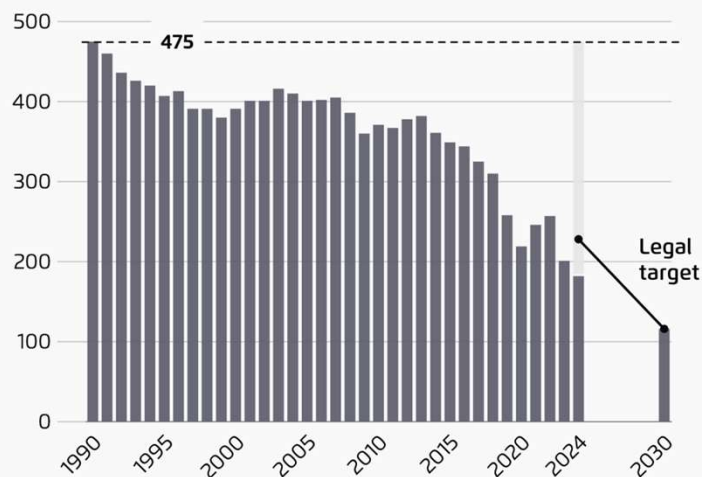
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- Overview of German greenhouse gas emissions
  - **Focus on the energy industry**
  - Buildings, transport and industry
  - Future outlook
-

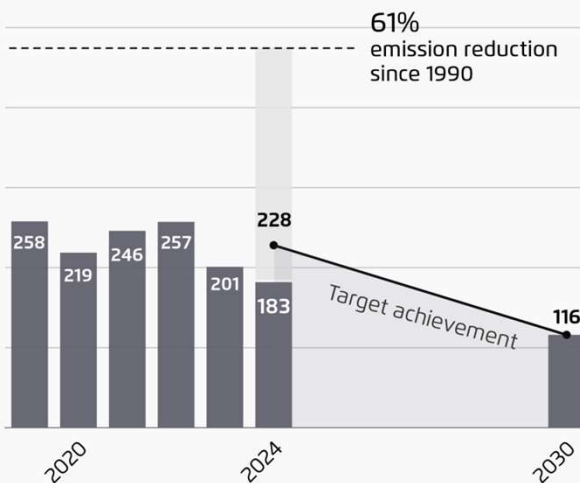
# 19 TWh less coal-fired electricity reduced energy industry emissions by 9%; renewable energy (+12 TWh) and imports (+12 TWh) filled the gap

## Development of GHG emissions in the energy industry, 1990-2024

[Million t CO<sub>2</sub>eq]



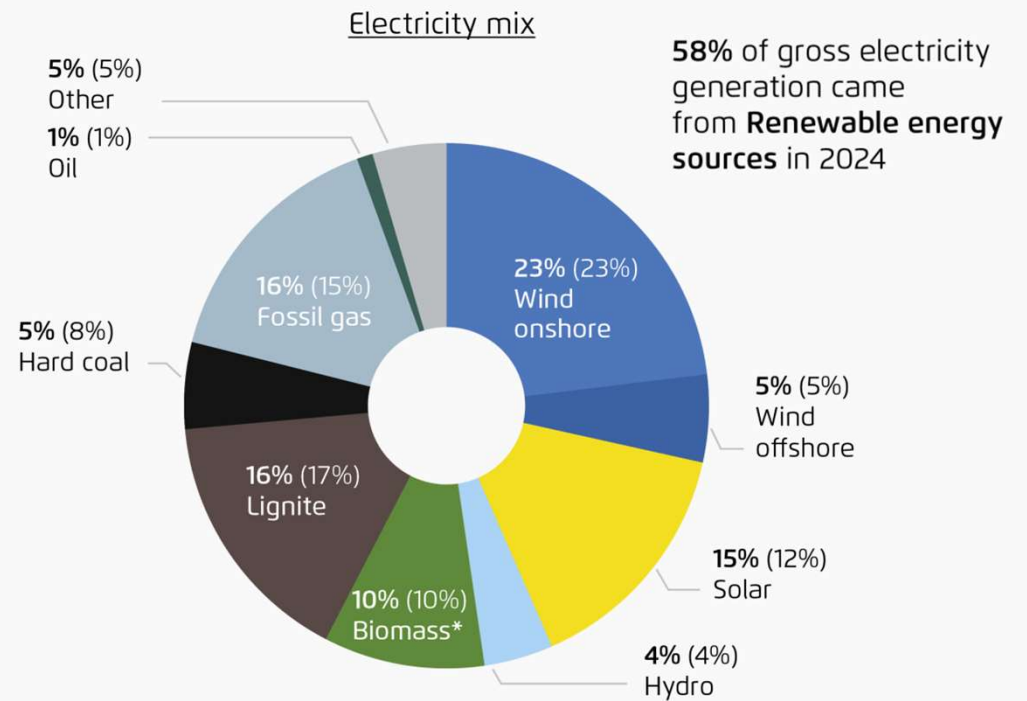
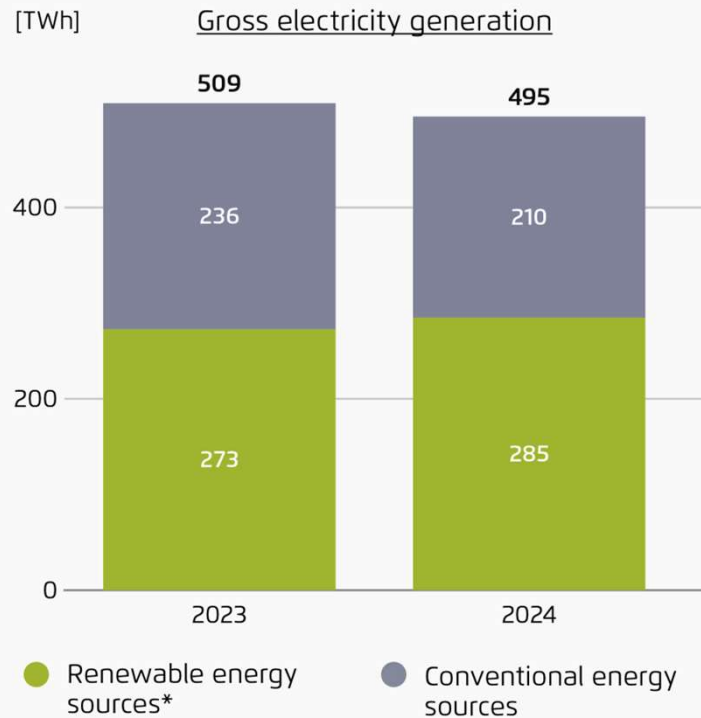
2019-2030



- 6 GW of coal-fired power plants (16% of installed capacity) were decommissioned.
- Coal-fired power generation fell to a historic low of 10 TWh.
- Renewable energy achieved a record year with 285 TWh.
- Natural gas electricity generation remained the same compared to 2023, nuclear energy falls by 7 TWh.
- Net electricity imports rose to 5% of electricity demand in 2024; in 2023 it was just 2%.

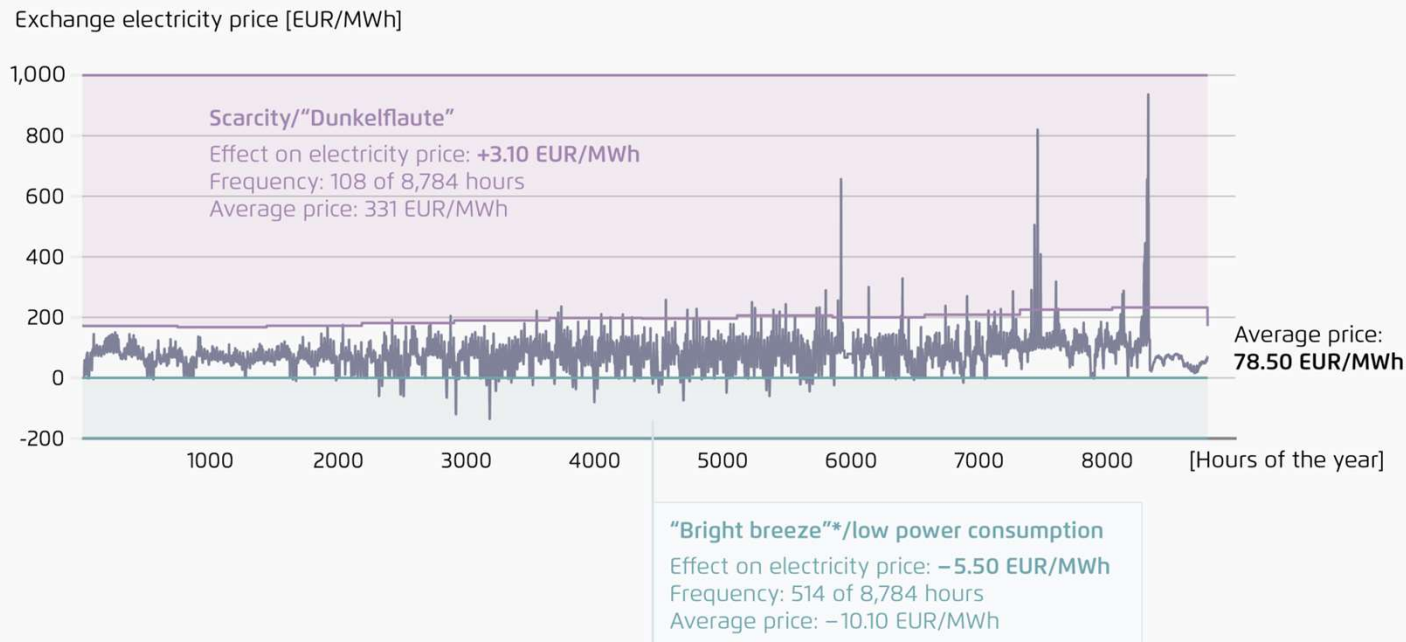
# Renewable energy sources achieved a new power generation record of 285 TWh

Electricity mix 2024, values for 2023 in brackets (right)



# The price-reducing effect in phases with high levels of renewable energy outweighed phases with very high prices during *Dunkelflauten*

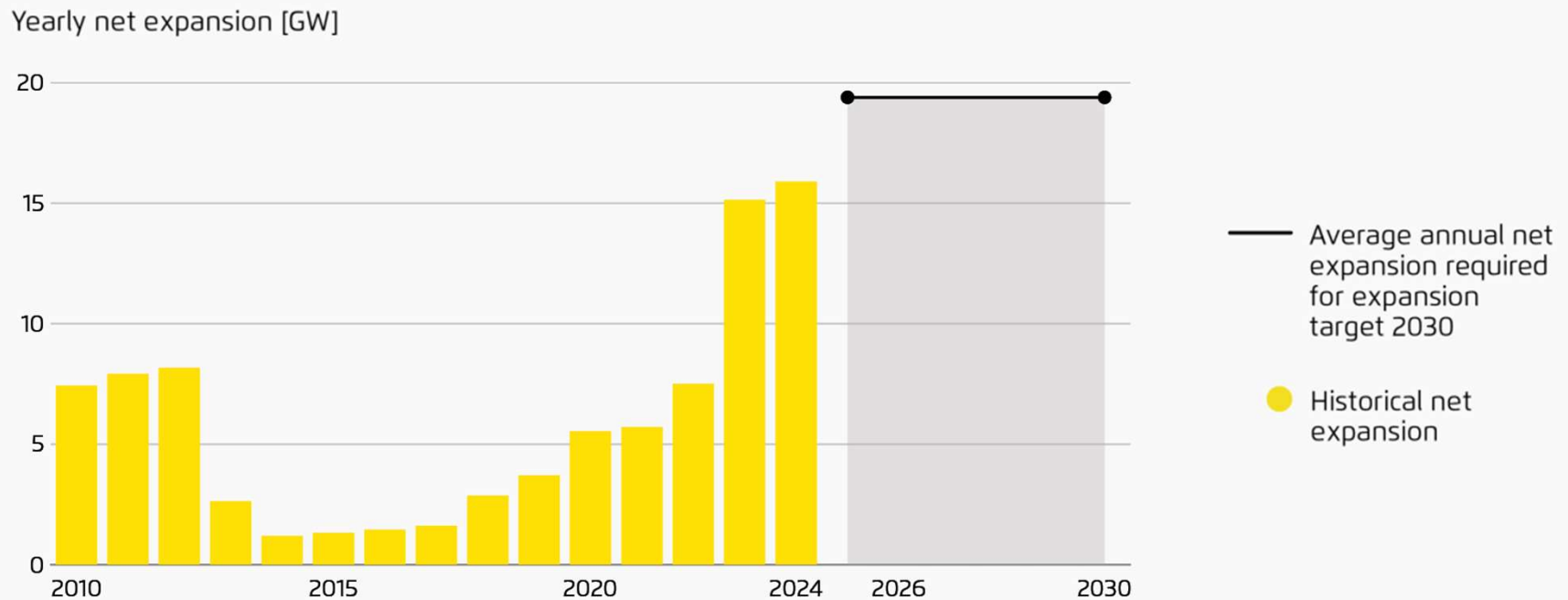
## Influence of very high and very low hourly electricity prices on the average electricity price, 2024



- In 2024, *Dunkelflauten* were observed between 5-7 November and 12 December.
- These led to an increase in electricity prices of around 3.10 EUR/MWh on an annual average.
- Phases with a very high supply of renewable energy compared to demand reduced the electricity price by an average of 5.50 EUR/MWh.

# Photovoltaics exceeded their expansion record from 2023 by over 16 GW; 10 GW were built on roofs and 6 GW were ground-mounted

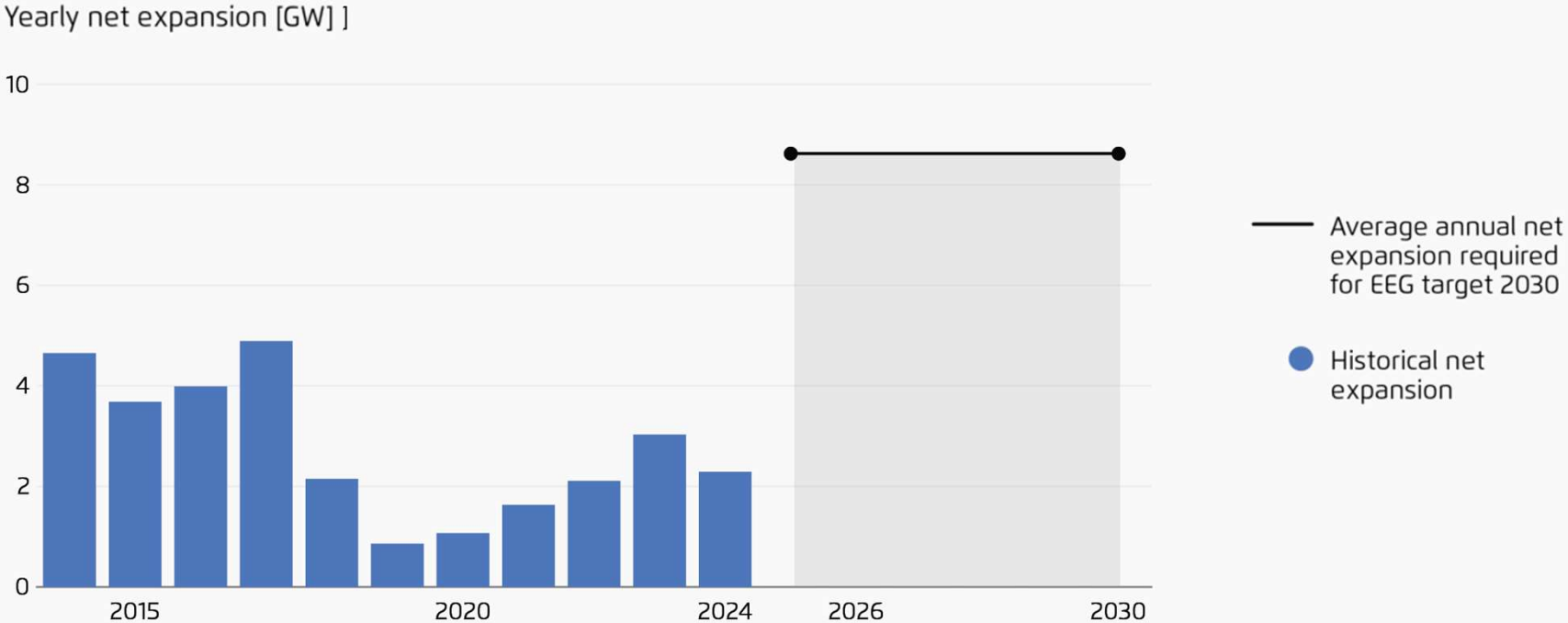
Historical and future solar expansion required for German Renewable Energy Sources Act (EEG) expansion target 2030





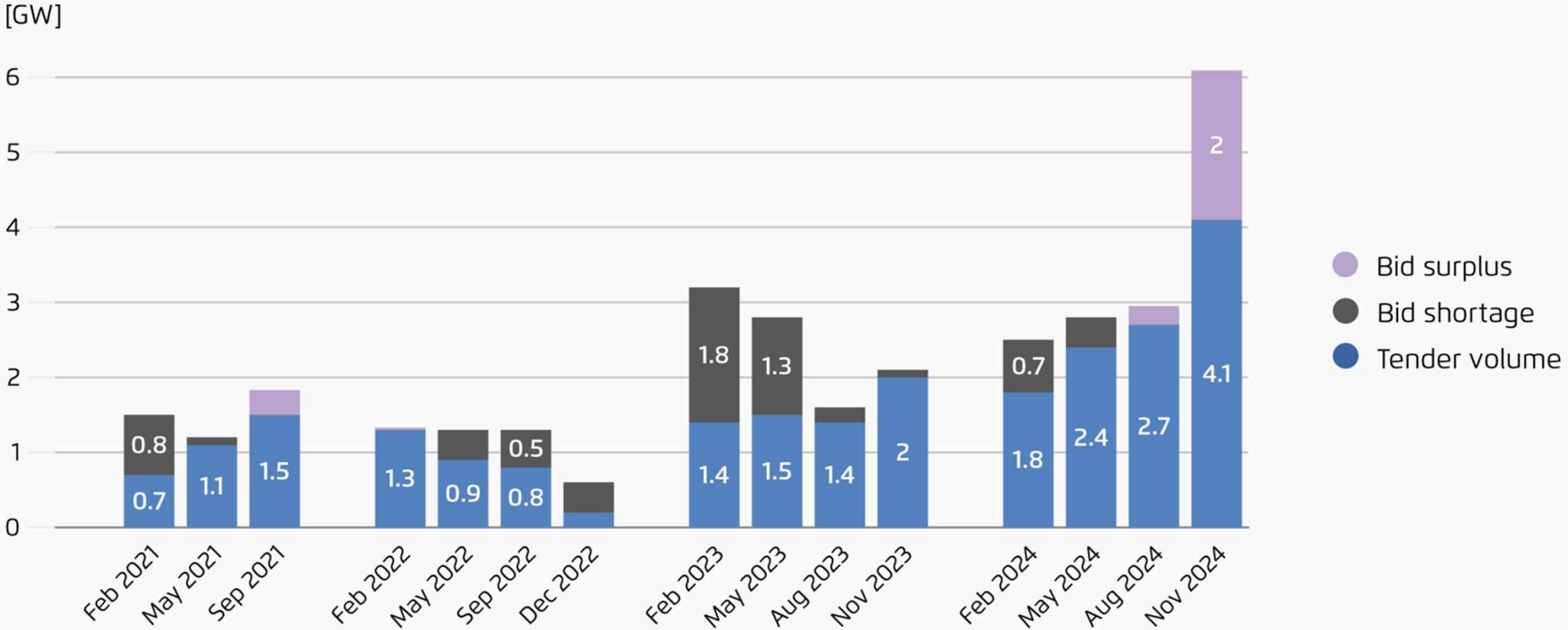
# The expansion of onshore wind power was still too low in 2024, but there are clear signs of an increase

## Historical and future onshore wind expansion required for EEG expansion target 2030



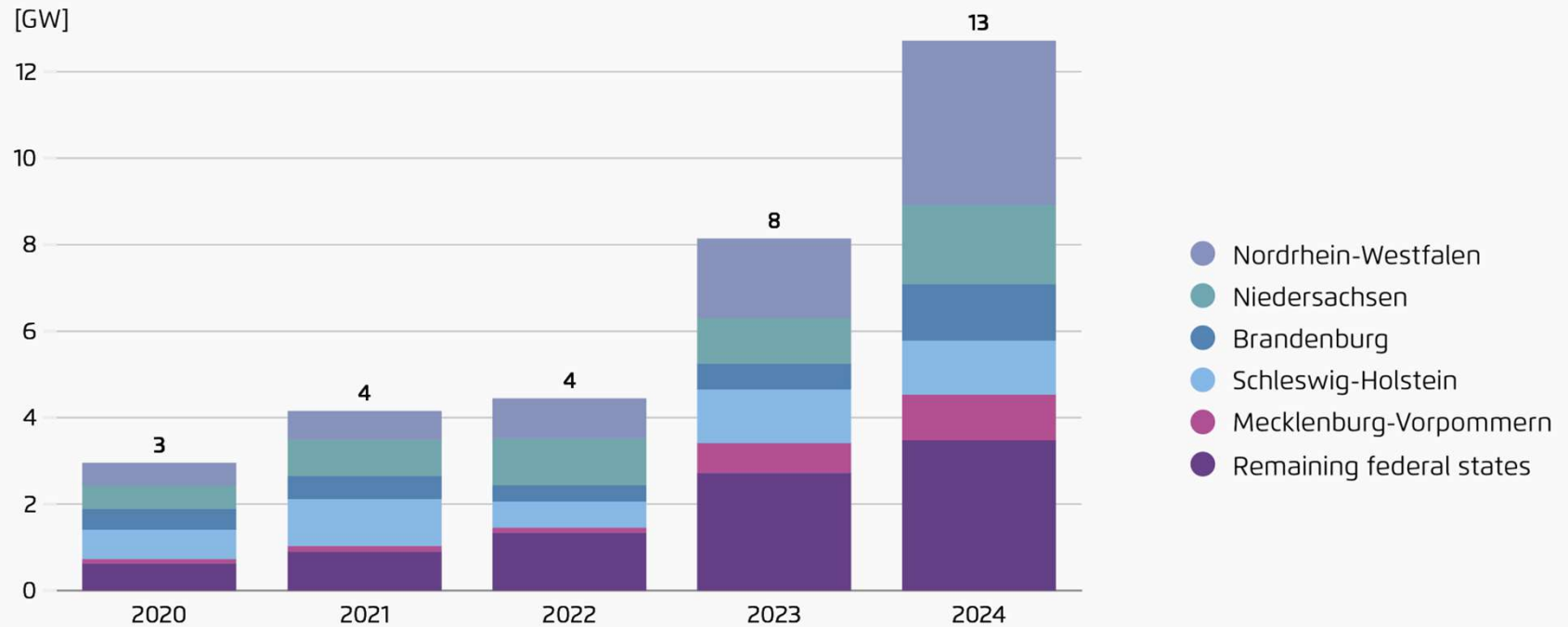
17 | Agora Energiewende (2024) according to AGEE-Stat (2024b). 2024: Forecast by Agora Energiewende based on Federal Network Agency (2024n). - Section 4.3 of the EEG sets out two-year expansion targets; the target for 2030 serves as the basis for calculation.

# Wind onshore tenders in the second half of 2024 were significantly oversubscribed for the first time in three years



# Permissions for onshore wind power tripled within two years

Permits for wind turbines by federal state, 2020-2024



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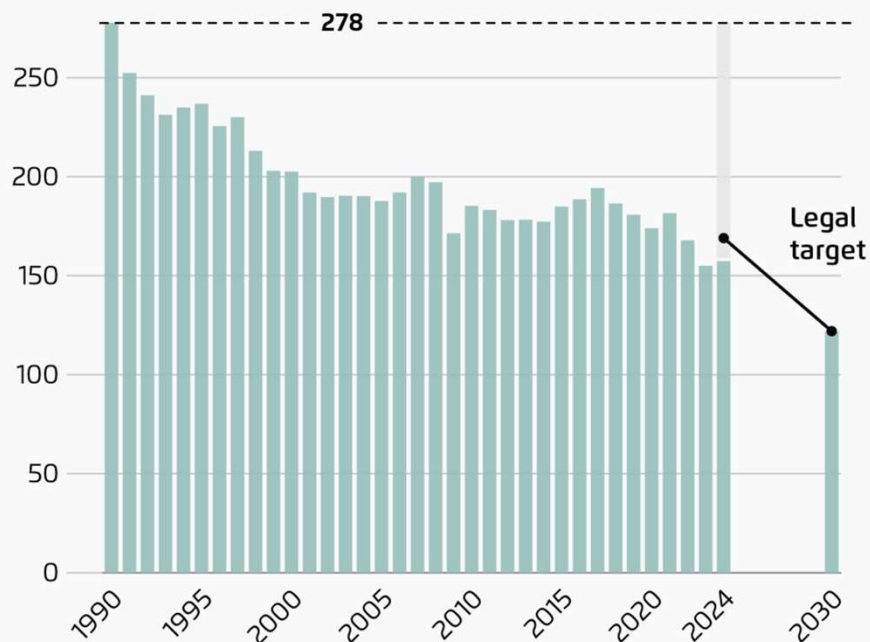
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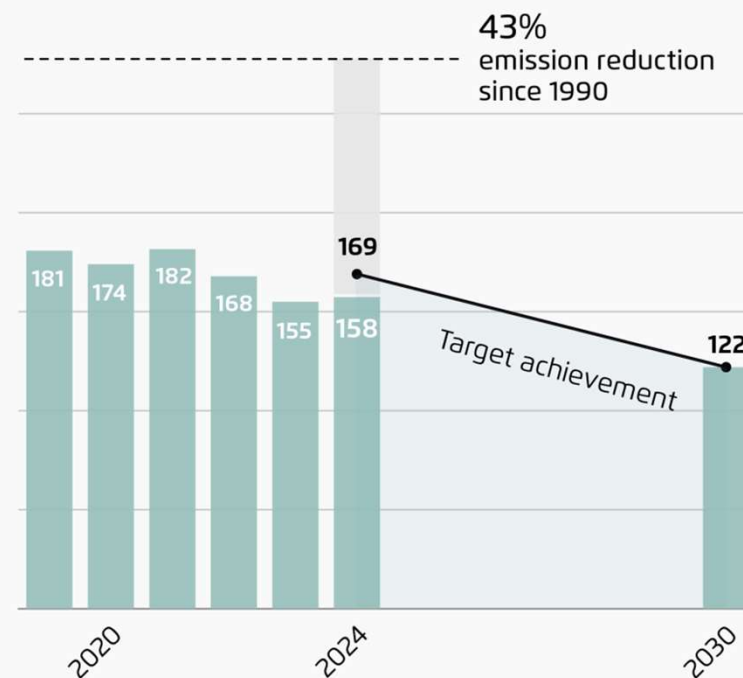
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# Industrial emissions increased by 2% in 2024, but need to fall by 23% by 2030

[Million t CO<sub>2</sub>eq]

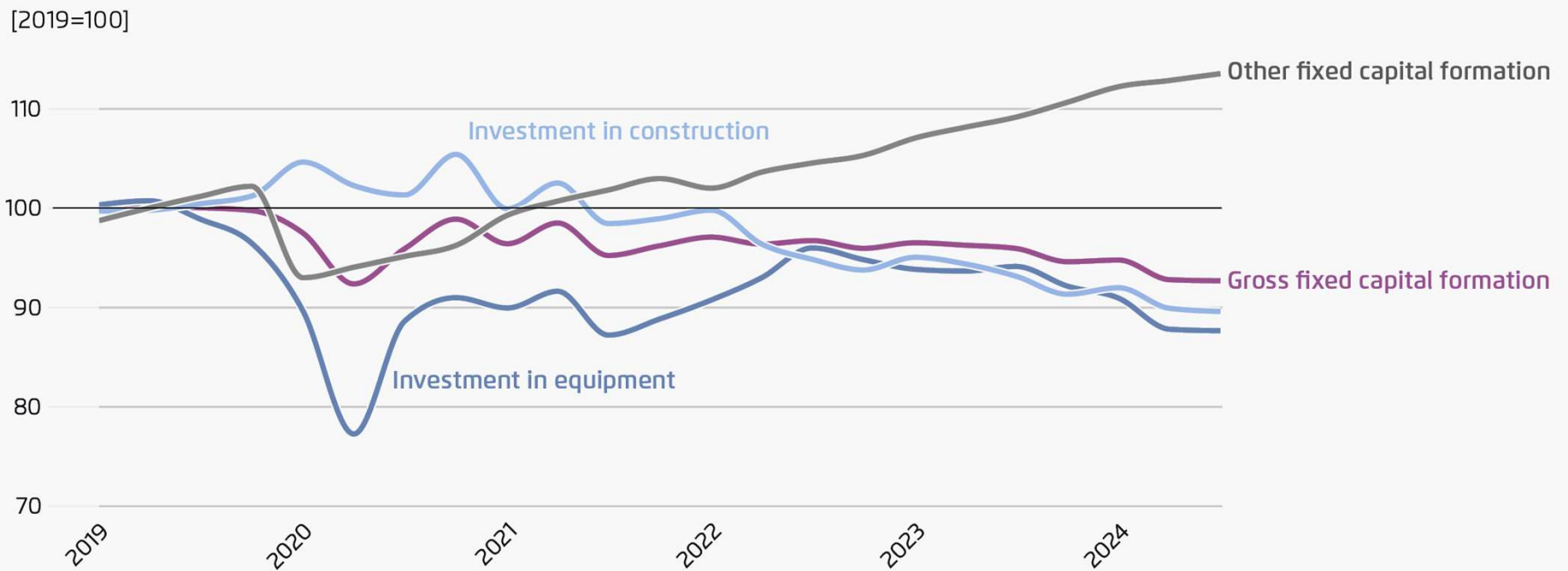


2019–2030



# Like the economy at large, investments also decreased; economic policy uncertainty exacerbated the situation

Development of gross fixed capital formation index in Germany, 2019-2024



# Industrial customers paid less on average in 2024 than in the previous year; prices normalised to pre-crisis levels for commercial customers

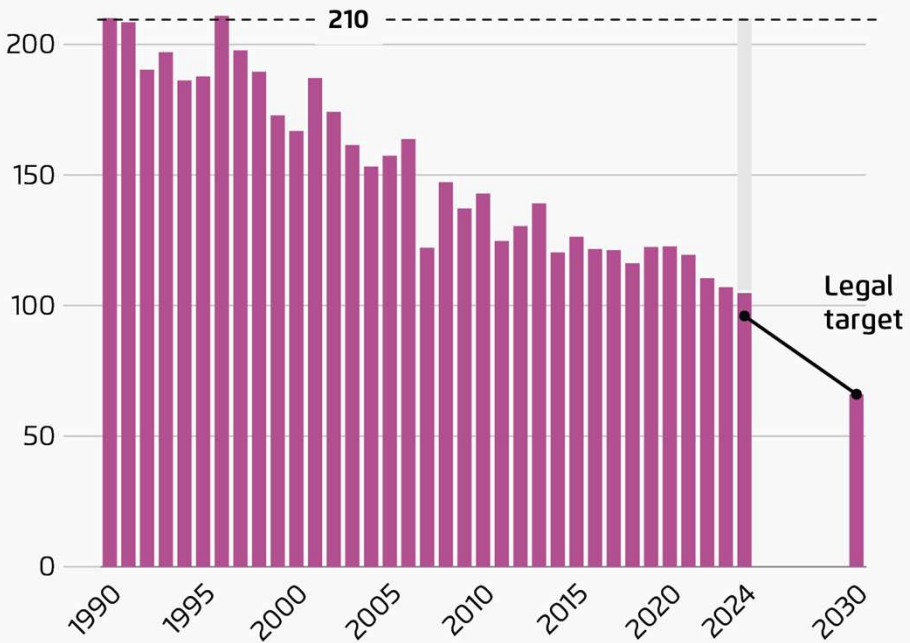
End-customer electricity price trend for industry and businesses, 2019-2024



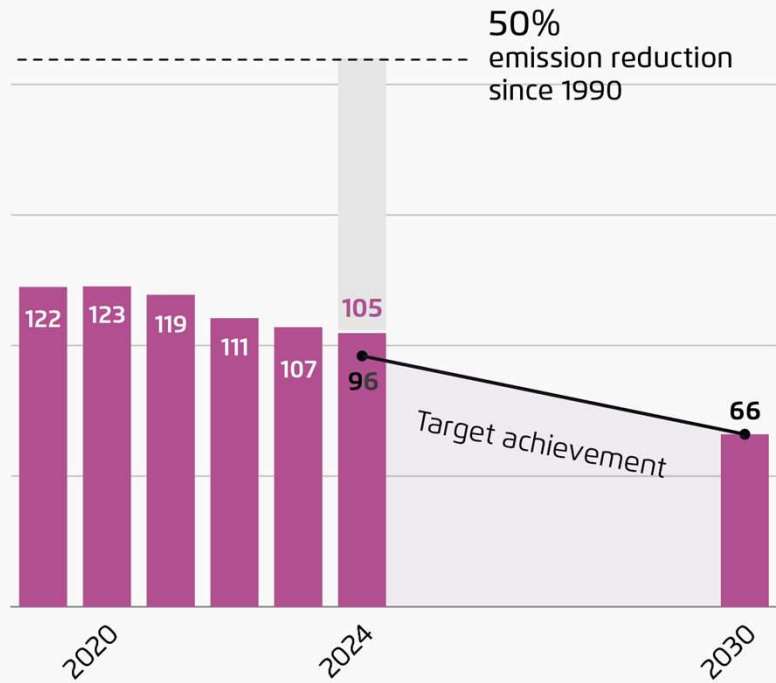
23 | Agora Think Tanks (2024), bdew (2024a) - However, the consumer price index rose by 19.6% between 2019 and 2024. Bandwidths due to short-term/long-term procurement strategy.  
 \* SPK = *Strompreiskompensation*: Electricity price compensation of 1.0, 1.4, 1.3, 2.9, 4.2 and 3.4 centst/kWh taken into account from 2019 to 2024.

# The buildings sector lags behind its target, but benefited from warm winters and halved emissions compared to 1990

[Million t CO<sub>2</sub>eq]



2019–2030



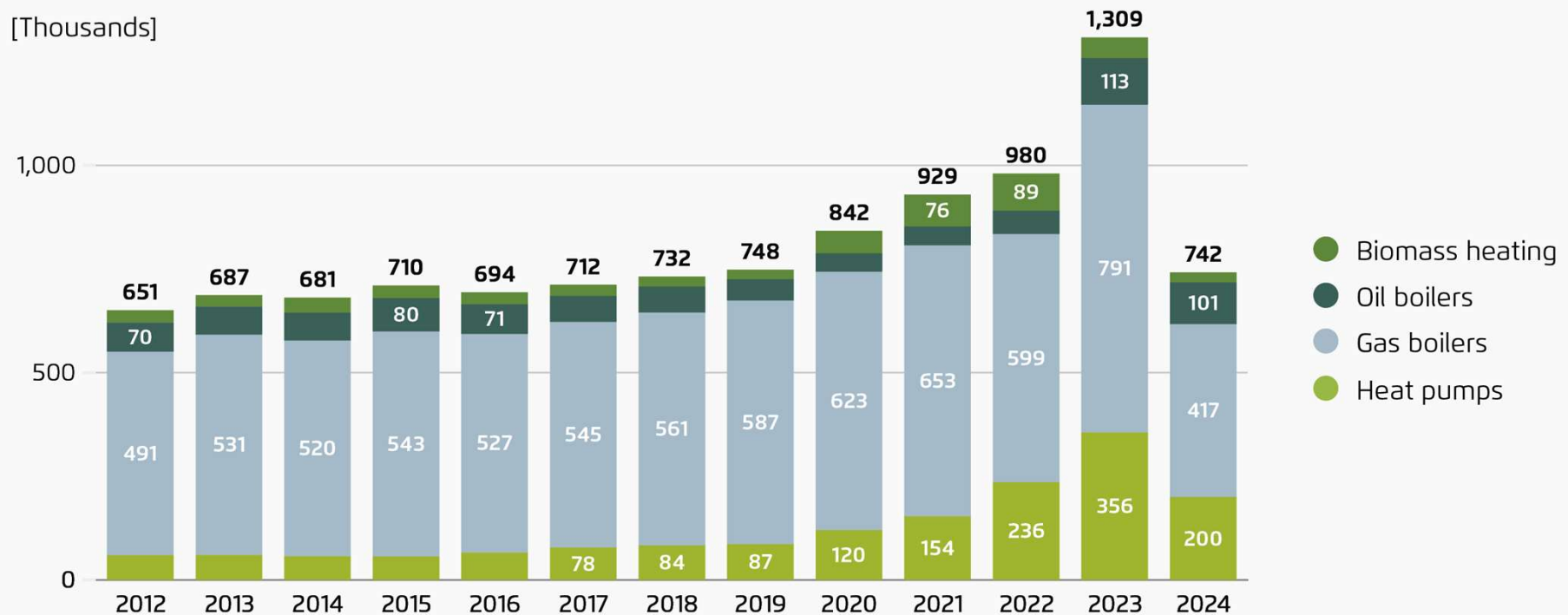
24 | Agora Energiewende (2024) according to UBA (2024a) - 2023, 2024: Agora Energiewende estimate based on AGEBA (2024d). BNetzA (2024p), bdew (2024j), DWD (2024). Target path derived from Climate Protection Act. 2023: Adjustment after data update.





# After a record year in 2023 with 356,000 heat pumps sold, the heating market dropped sharply by 43% in 2024

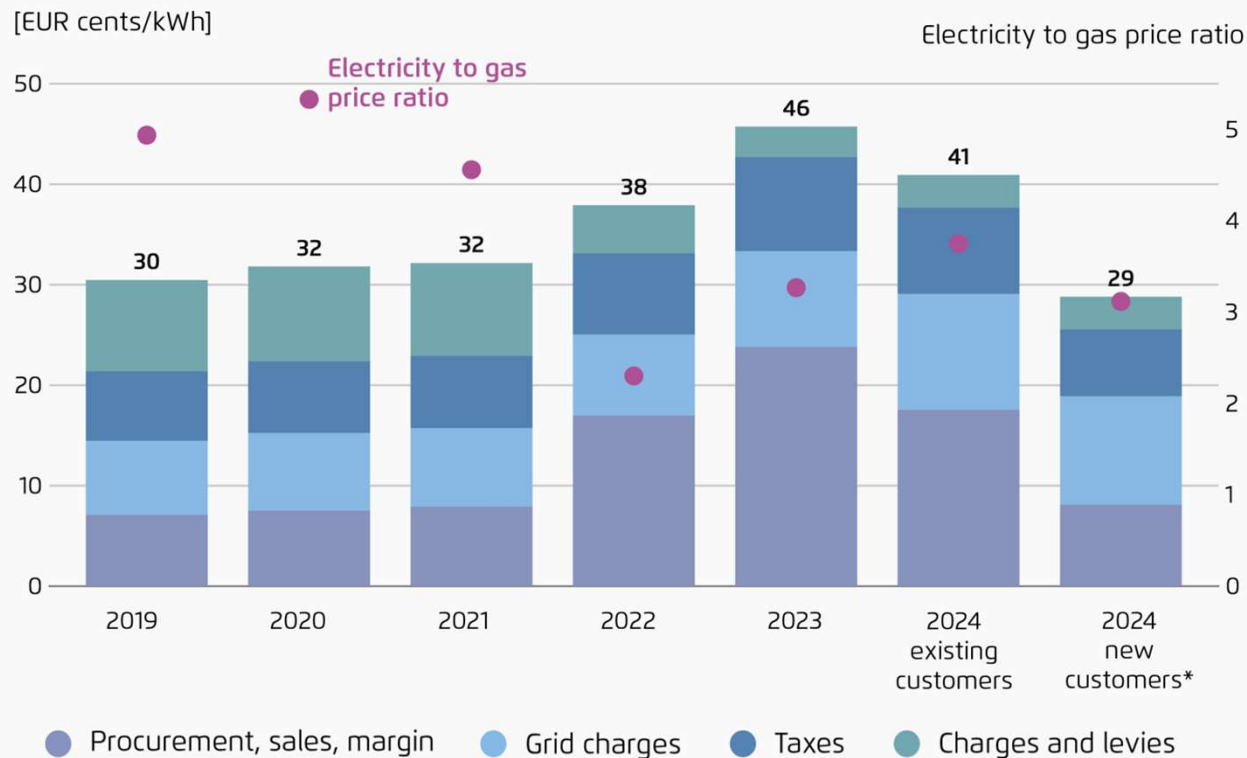
Sales structure for heat generators, 2012-2024



25 | Agora Energiewende (2024) according to BDH (2024) - 2024: Agora Energiewende forecast. Gas and oil: condensing and low-temperature boilers, biomass: logs, pellets, combination boilers, wood chips, heat pumps: air-to-water, brine-to-water, water-to-water and others

# Electricity prices fell in 2024 compared to the previous year, but the electricity:gas price ratio is still too high

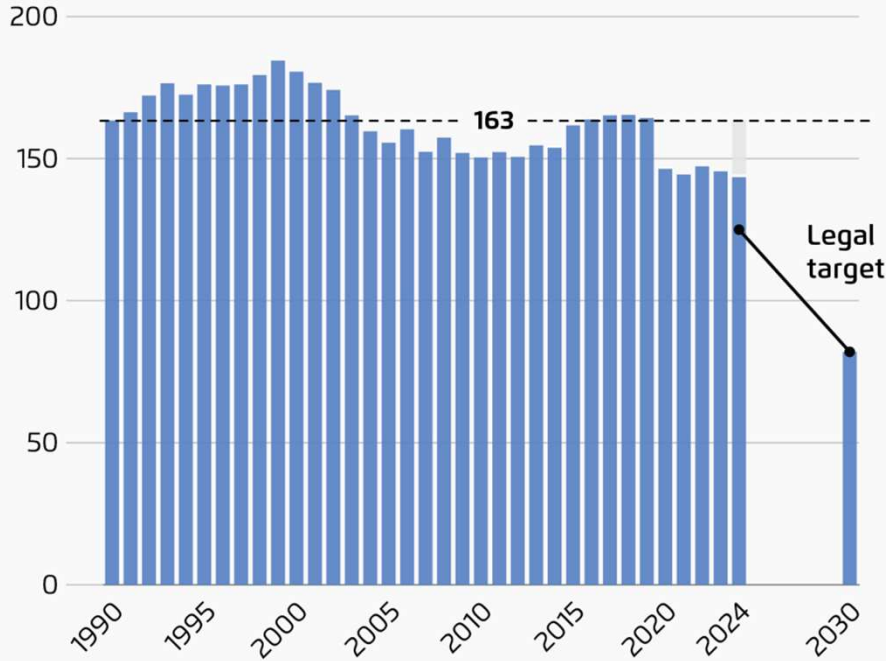
## Electricity prices for household customers, 2019-2024



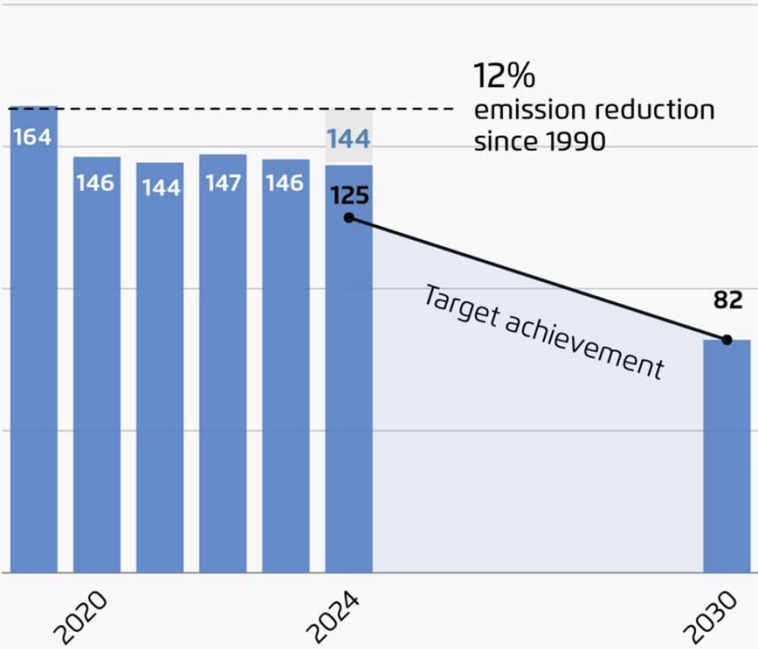
- New customer electricity prices for households were 29 cents/kWh, still below the the 2019 price level.
- Heating with heat pumps became more economically attractive for new customers compared to gas.
- For heat pumps to be perceived as more attractive, electricity should cost less than 2.5 times as much as natural gas.
- However, the 2024 ratio was still around 3 times.

# At 144 Mt, GHG emissions were 12% instead of 23% lower than in 1990: national target exceeded, European\* obligations jeopardised

[Million t CO<sub>2</sub>eq]



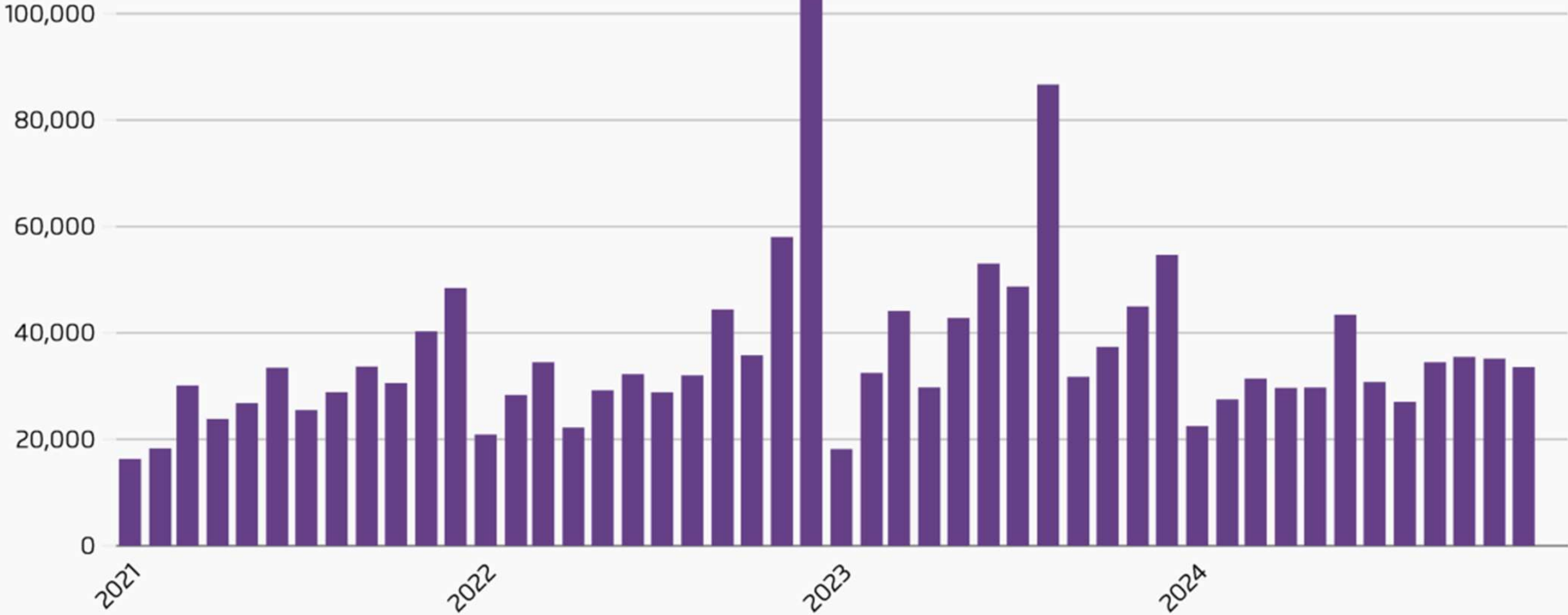
2019–2030



27 | Agora Energiewende (2024) according to UBA (2024a) - 2024: Estimate by Agora Energiewende based on AGEB (2024d), BAST (2024) and Destatis (2024c). Target path derived from the Climate Protection Act \* Effort Sharing Regulation: binding emission reduction targets for sectors that are not in the EU Emissions Trading System (ETS1), primarily **buildings and transport**.

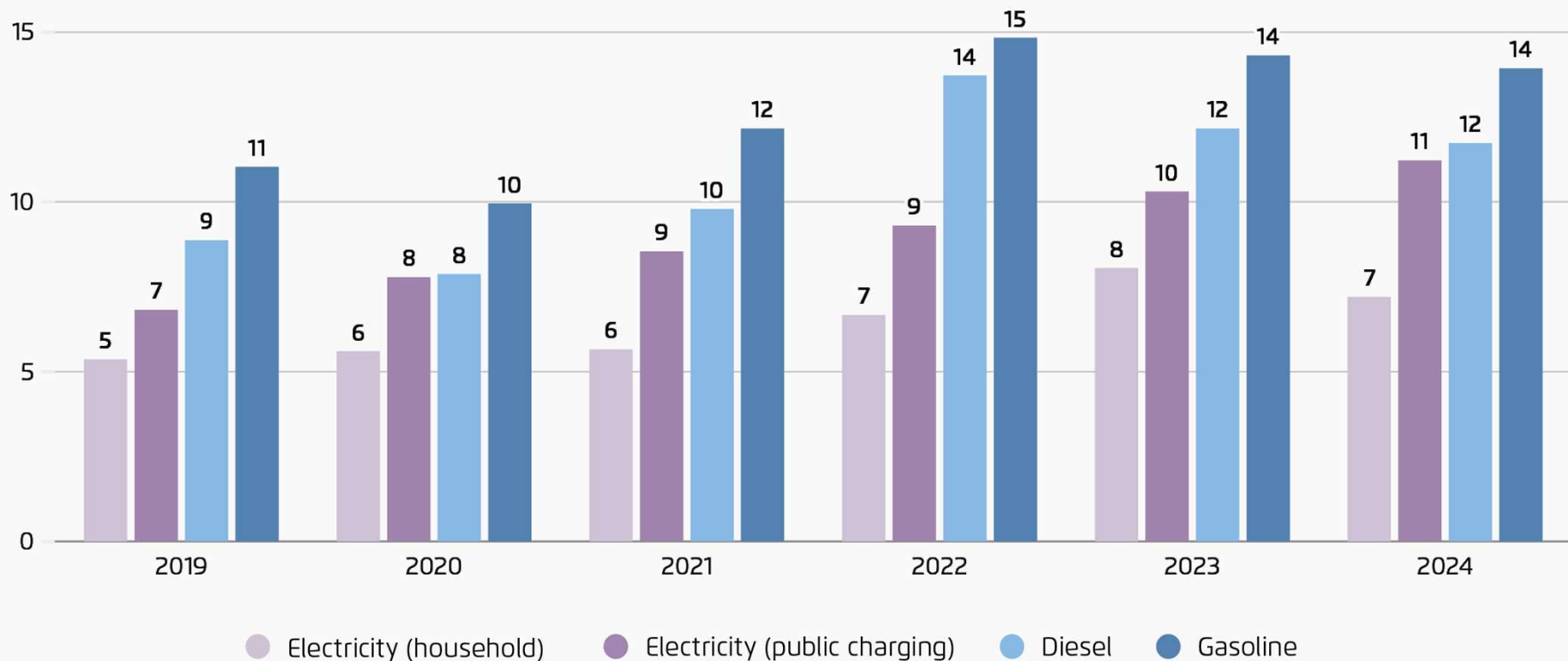
# 27% decline in new registrations of electric vehicles in 2024: while new registrations were stable overall, the e-car share shrank to 13.5%

Monthly new registrations of battery-electric vehicles, 2021-2024



# Driving a car using household electricity cost half as much as using gasoline and slightly less than using diesel with normal public charging

Fuel/charging cost [EUR/100 km]



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# Outlook

- Power sector as driving force:  
The expansion of renewable energy and electricity grids has gained significant momentum.
- This means that rapidly increasing quantities of renewable electricity will be available in the foreseeable future – and the rising supply will cause electricity exchange prices to fall.
- This electricity is the key to finally generating the necessary momentum in the demand sectors and structurally reducing emissions in buildings, industry and transport.
- However, if the switch in the demand sectors from fossil fuels to electricity-based solutions such as electric vehicles, heat pumps and electric boilers continues to stall, electricity costs will rise. The reason: the larger electricity grid would then not be well utilised, resulting in rising grid charges.
- The central tasks of the coming legislative period are therefore:
  1. Create planning certainty, incentivise private investment in climate-friendly technologies and thus finally give momentum to the transformation in the buildings, transport and industrial sectors.
  2. Sustainably reduce electricity costs and enable flexible electricity procurement.

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# Thank you for your attention

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Do you have any questions or comments?

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