

Germany's CO₂ emissions drop to record low but reveal gaps in country's climate policies

Press Release

Germany's CO₂ emissions fell to their lowest level in 70 years in 2023. A large part of this reduction is due to an unexpectedly sharp decline in coal use. At the same time, emissions fell at the expense of energy-intensive industry as the economic situation and international crises prompted a drop in production. To achieve lasting emissions cuts, the German government must close gaps in its climate policies in 2024 – particularly in the transport and buildings sectors.

Berlin, 04. January 2024. Last year, Germany's greenhouse gas emissions fell to 673 million tonnes of CO₂.¹ Emissions thus fell by 46 percent compared to the reference year 1990 – their lowest level since the 1950s. At the same time, CO₂ emissions were about 49 million tonnes of CO₂ below the annual target of 722 million tonnes of CO₂ derived from the Climate Protection Act. These are the results of preliminary calculations by Agora Energiewende, which the think tank presented in its assessment of the energy year 2023. Two main developments were responsible for the decrease of 73 million tonnes of CO₂ compared to 2022. First, coal-fired power generation fell to its lowest level since the 1960s, saving 44 million tonnes of CO₂ alone. The reasons for this were a significant drop in electricity demand, increased electricity imports from neighbouring countries – around half of which came from renewable sources of energy – as well as a commensurate decrease in electricity exports and a slight increase in domestic green electricity generation. Second, emissions from industry fell significantly. This was largely due to the decline in production by energy-intensive companies as a result of the economic situation and international crises. While overall economic output shrank by 0.3 percent according to preliminary figures, energy-intensive production fell by 11 percent in 2023.

According to Agora's calculations, only about 15 percent of the CO₂ saved constitutes permanent emissions reductions resulting from additional renewable energy capacity, efficiency gains and the switch to fuels that produce less CO₂ or other climate friendly alternatives. About half of the emissions cuts are due to short-term effects, such as lower electricity demand, according to the analysis. The think tank therefore notes that most of the emissions cuts in 2023 are not sustainable from an industrial or climate policy perspective – for example, if emissions rise again as the economy picks up or if a share of Germany's industrial production is permanently moved abroad.

CO₂ emissions from buildings and transportation remained almost unchanged in 2023, resulting in these sectors missing their climate goals for the fourth and third successive time, respectively. By failing to reduce emissions in these two areas, Germany will likely miss its climate targets agreed under the European Union's *effort sharing regulation* as early as 2024. The German government will have to compensate this failure to reach its goals by purchasing emissions certificates from other EU member states – or face fines.

¹ For the purpose of readability, we have avoided the more precise term CO_{2-eq} in this text. The amounts given refer to all greenhouse gas emissions, including substances such as methane and nitrous oxide, that are converted into their CO₂ equivalent and added to the emissions balance.

"2023 was a two-speed year as far as climate protection in Germany is concerned: the energy sector notched up a climate policy success with its record level of new renewable power, taking us closer to the 2030 target," said Simon Müller, director of Agora Energiewende Germany. "However, we don't consider the emissions reductions seen in the industrial sector to be sustainable. The drop in production due to the energy crisis weakens Germany's industrial base. If emissions are simply shifted abroad as a result, this won't benefit the climate. The buildings and transport sectors are also lagging as far as structural climate protection measures are concerned." In order to permanently replace CO₂-intensive forms of electricity production in the electricity mix, the positive deployment trends of renewables need to be reinforced in the coming year. Industry needs adequate conditions to be able to invest in Germany – such as in the production of climate-neutral steel and the transition from gas to electricity for process heat. In the buildings sector the measures agreed need to be resolutely implemented in 2024. And transportation requires a fundamental political course correction to achieve a breakthrough for climate-friendly mobility.

Coal in decline, consumer prices slowly recovering

Emissions from electricity generation fell by 46 million tonnes of CO₂ to 177 million tonnes of CO₂ – less than half the level recorded in 1990. The 21 percent drop in emissions compared to 2022 is mainly due to the sharp decline in coal-fired power generation: lower electricity production from lignite saved 29 million tonnes of CO₂, while hard coal-fired power generation saved 15 million tonnes of CO₂. The Agora report cites three reasons for this development. First, the extraordinary decline in electricity consumption of 3.9 percent compared to 2022 as a result of the fossil fuel crisis. Second, the strong renewable electricity generation across Europe meant that Germany imported more electricity instead of producing it in domestic coal-fired power plants. Over the course of the year, Germany sold around 58 terawatt hours of domestically generated electricity abroad and imported 69 terawatt hours. Some 49 percent of electricity imports came from renewable sources – primarily hydro and wind power – and 24 percent came from nuclear power. Third, renewable energy production increased by 5 percent. Total emissions from the energy industry, which also includes refineries and district heating in addition to the electricity sector, amounted to 210 million tonnes of CO₂ and were therefore 46 million tonnes of CO₂, or 18 percent, below the previous year's levels.

Overall, the supply situation on the energy market eased in 2023, and both electricity and natural gas prices fell compared to the previous year. New customers, in particular, benefited from price reductions. Prices for existing customers remained high, as electricity providers generally delay passing the fall in prices on the electricity exchange to customers. Natural gas prices also fell in 2023 but remained above pre-crisis levels. "The price of electricity is more strongly affected by levies and surcharges than the prices of fossil fuels such as oil and gas. This is slowing the switch by households to climate-friendly technologies such as electric cars or heat pumps," said Müller. "A reform of the levy and surcharge system is necessary to correct the imbalance. The changes should make it possible for low electricity prices to reach consumers in times of high wind and solar power generation."

Share of renewable energy tops 50 percent for the first time thanks to solar power boom

Record levels of newly installed solar capacity contributed to the drop in electricity prices: Germany added 14.4 gigawatts of photovoltaic capacity last year, an increase of 6.2 gigawatts compared to the previous record in 2012. Although there were fewer hours of sun in 2023, solar power facilities produced 61 terawatt hours of electricity – one terawatt hour more than the previous year. Photovoltaic expansion was therefore well above the target pathway for 2030. Wind energy generation had a record year. This was due to favourable weather

conditions and a slight increase in the number of wind turbines. At 138 terawatt hours, wind remained the largest source of electricity, producing more than all of Germany's coal-fired power plants (132 terawatt hours). However, the expansion of onshore wind power was much too low at 2.9 gigawatts. To achieve the country's binding expansion targets for 2030, annual average wind capacity additions needs to rise to 7.7 gigawatts from 2024. Permits, meanwhile, increased: at 7.7 gigawatts, the output of approved wind projects rose 74 percent compared with 2022. Overall, renewable energy managed to supply more than 50 percent of total gross electricity demand for the first time in 2023.

Industry caught between crisis and a new beginning

The industrial sector also recorded a significant drop in emissions in 2023. Based on preliminary energy consumption and production data, Agora has calculated a reduction of 20 million tonnes of CO₂, or 12 percent, compared with 2022. With total emissions of 144 million tonnes of CO₂, the sector clearly beat the annual target of 173 million tonnes of CO₂. This means that industrial emissions have fallen to their lowest level since they were recorded in 1990. "The consequences of the fossil fuel crisis and the economic slowdown were especially evident in the CO₂ emissions of energy-intensive industry," said Müller. An important factor in the slump in production was the ongoing price rise in the European gas market due to the switch from cheap pipeline gas to more LNG imports.

"Companies in Germany urgently require financing and planning security to make the switch from fossil fuels to electricity-based processes if the country is to successfully compete as a business location while striving for climate neutrality," said Müller. The goal must be to secure important value chains locally and at the same time achieve long-term emission reductions across the industrial sector. Meeting the targets for expanding renewables is also essential for this. Müller welcomed that Germany and the EU set in motion important industrial policies in 2023, such as strengthening the European Union Emissions Trading System, agreeing on CO₂ compensation payments for raw material imports into the EU or climate protection agreements to finance the transformation of industry towards climate neutrality.

Transport and buildings fall further behind their climate targets

CO₂ emissions in the transport and buildings sectors stagnated again in 2023, meaning that the sectors continue to fall well short of their climate goals. Instead of the legally binding maximum of 101 million tonnes of CO₂, buildings caused 109 million tonnes of CO₂ emissions. This means that the buildings sector missed the annual target for the fourth time in a row. Compared with the previous year, emissions fell by 3 million tonnes of CO₂. This was mainly because households with gas heating continued to save energy, particularly in the first quarter, and heating demand was lower due to mild temperatures. Overall, households consumed four percent less natural gas in 2023 compared with the energy crisis year 2022. However, there were signs of a slight increase in household heating consumption in the fourth quarter.

"Now that the political track has been laid with Germany's new heating law and the law for municipal heat planning, it is important to stick the course. This is the only way to effectively reduce emissions in the buildings sector at long last," said Simon Müller. At the same time, heating with fossil fuels will become increasingly expensive in future, especially once the European Union Emissions Trading System applies to buildings and transport in 2027. "Even with the new budget situation, the German government must comprehensively complement its heating policy so that all income groups can afford climate-friendly heating."

For the third time in a row, the transport sector failed to meet the target set out in the Climate Protection Act. Emissions fell by just 2 percent compared to 2022. According to Agora's calculations, transportation in Germany emitted 145 million tonnes of CO₂, which corresponds to a reduction of just 11 percent compared with 1990. This means that transport emissions exceeded the legally binding limit of 133 million tonnes of CO₂ by 12 million tonnes of CO₂. The target of 15 million electric cars by 2030 remains a long way off: as in the previous year, the share of electric cars among new registrations was unchanged at just under 20 percent. According to the Agora study, a coherent overall policy is needed to put transport in Germany on course to protect the climate. This includes adjusting taxes, levies and subsidies relating to cars, safeguarding the expansion of local public transport and modernising Germany's road traffic legislation to make it easier for local authorities to implement measures that facilitate the transition to climate-friendly modes of transportation.

Emissions from agriculture amounted to about 61 million tonnes of CO₂ in 2023, beating the sector's climate target of 67 million tonnes of CO₂. One of the main reasons for this is the change in the method used to calculate nitrous oxide emissions. This leads to lower greenhouse gas emissions in the statistics, but this has not yet been reflected in an adjustment of the sectoral target. The reduction in greenhouse gas emissions by around one million tonnes of CO₂ compared with 2022 is primarily due to the decline in pig and cattle stocks and a reduction in nitrogen fertilisation.

Financing Germany's climate goals after the Constitutional Court's budget ruling requires a solid foundation

Despite the drop in emissions compared with 2022, there remains a significant gap when it comes to achieving the 2030 climate targets. The introduction of additional climate protection measures in 2024 is key to closing that gap. In addition, funding for climate protection measures has become more difficult following the Federal Constitutional Court's budget ruling. "Germany needs to ramp up investments to achieve its climate targets," said Müller. State funding is needed for climate-neutral heating systems and the transformation of industry, for example. Significant investment is also needed in the area of electricity, heating and hydrogen grids. "In 2024, the German government will finally have to reliably secure the necessary investments for climate neutrality. A smart mix of measures can ensure that we achieve more climate protection for every euro that comes out of the public purse."

The German-language study „Die Energiewende in Deutschland: Stand der Dinge 2023“ summarises the most important developments with regard to the country's energy transition and climate goals over the past year. It includes an English summary and can be downloaded for free at www.agora-energiewende.de.

About Agora Energiewende:

Agora Energiewende develops scientifically sound and politically feasible concepts for a successful pathway to climate neutrality – in Germany, Europe and internationally. The organization which is part of the Agora Think Tanks works independently of economic and partisan interests. Its only commitment is to climate action.