

A decade of national climate action: Stocktake and the Road Ahead

GERMANY

INSIGHTS ON CLIMATE ACTION TEN YEARS AFTER THE PARIS CLIMATE AGREEMENT

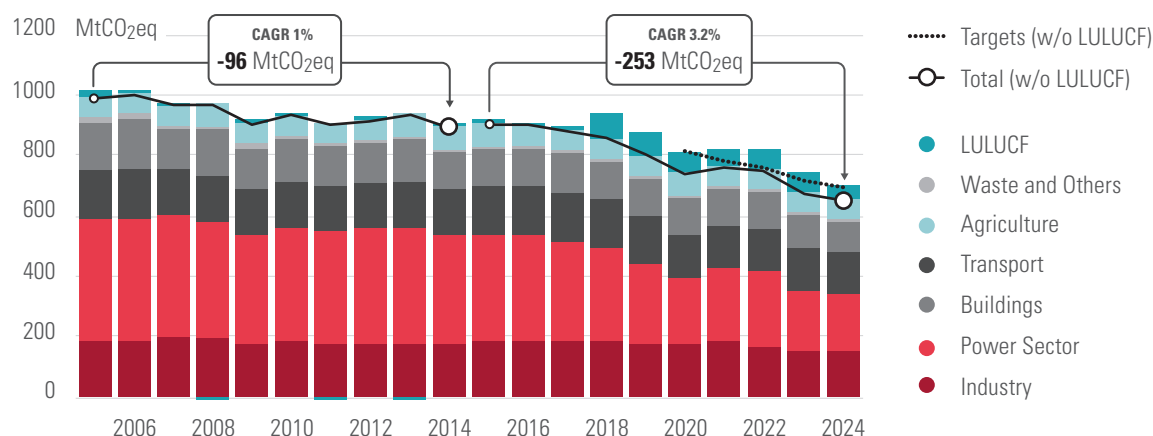
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DEVELOPMENT OF GHG EMISSIONS IN GERMANY BEFORE AND AFTER THE PARIS CLIMATE AGREEMENT

The look at the development of greenhouse gas (GHG) emissions in Germany shows a clear shift between the years before and after the 2015 Paris Climate Agreement. Between 2005 and 2014, the average annual emission reduction was 1% per year, equating to a total reduction of 96 million tons of CO₂ equivalents (MtCO₂eq). However, this rate increased in the following decade. From 2015 to 2024, the average annual reduction reached 3.2%, corresponding to a total decrease of 253 MtCO₂eq – a threefold increase compared to the previous decade. **Figure 1** illustrates the historical development of greenhouse gas emissions (GHG emissions) in Germany from 2005 to 2024, broken down by sector.

Examining the sectoral distribution of emission reductions shows that the energy sector made by far the largest contribution both before and after the Paris Agreement. In the decade before the Paris Agreement, the total reduction in this sector was 40 MtCO₂eq, averaging 1% per year. After Paris, it reached a total of 166 MtCO₂eq, with an annual reduction of 6.2% per year. The energy sector alone thus accounts for

Figure 1. Development of GHG emissions in Germany since 2005 according to UBA (2025)

CAGR: Compound Annual Growth Rate

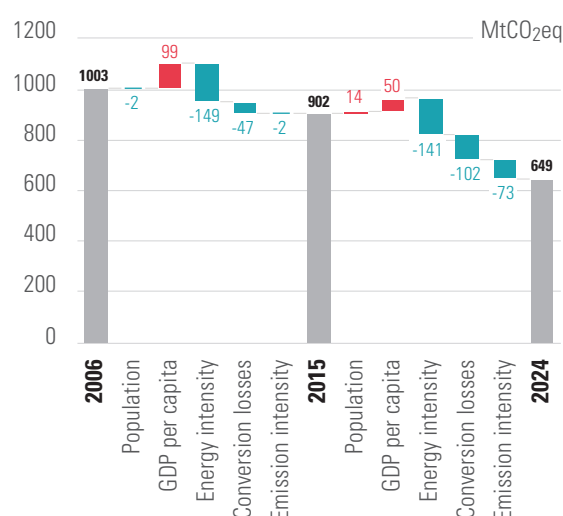
approximately 66% of the total emission reductions between 2015 and 2024. Additional contributions came from industry with 12%, buildings with 10%, transport with 7%, agriculture with 4%, and waste management and others with 1%. Particularly noticeable is the comparatively low reduction rate in the transport sector, which improved only slightly from 0.1% per year before Paris (2 Mt over ten years) to 1.2% per year after the Paris Agreement (19 Mt over ten years). Agriculture also shows a relatively low average annual reduction rate of 1.3%.

Another key development is that the Land Use, Land-Use Change and Forestry (LULUCF) sector has gone from being a net greenhouse gas sink to a net source since 2018. In the year 2024, the sector accounted for net GHG emissions of 51 MtCO₂eq. This shift is primarily attributed to extensive forest damage caused by the drought of 2018 (ERK, 2025). However, the LULUCF sector is not included in the achievement of national climate targets until 2040 (ERK, 2025).

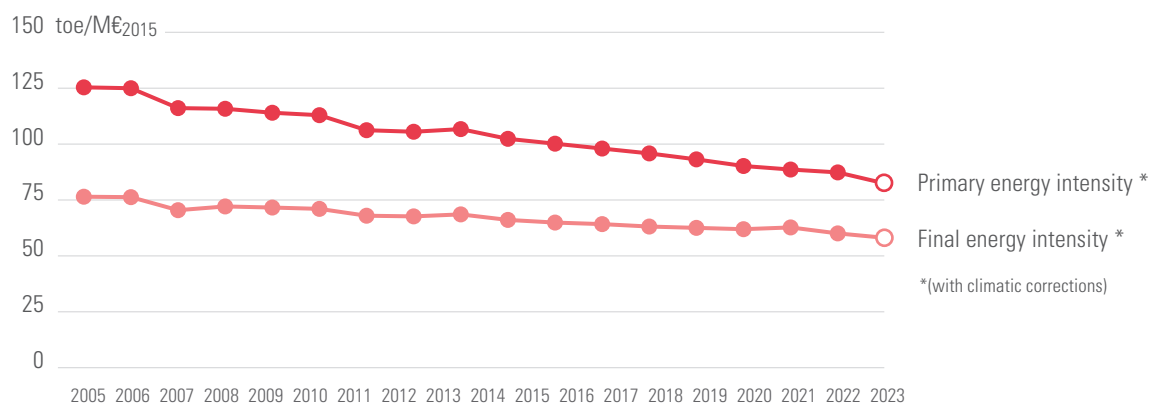
The reduction in GHG emissions cannot be attributed solely to successful climate policy measures. Exceptional, non-structural factors have made a non-negligible contribution to the observed emission reductions as indicated in in-depth analysis of the GHG emissions data in Germany for the period 2020 to 2024. These include the COVID-19 pandemic, the war of

aggression against Ukraine and the resulting gas supply crisis, as well as the associated economic downturn. (ERK, 2021b, 2022b, 2023b, 2024a, 2025; Shammugam, Schleich, Schlomann, & Montrone, 2022)

Figure 2 presents a quantitative decomposition of GHG emissions between the pre-Paris Agreement period (2006–2015) and the post-Paris Agreement period (2015–2024). A significant

Figure 2. Decomposition of GHG emissions in Germany in the decade before and after the Paris Agreement.

Energy intensity = final energy consumption per GDP;
Conversion losses = primary energy consumption per final energy consumption;
Emission intensity = CO₂eq per primary energy consumption

Figure 3. Development of primary and final energy intensities in Germany between 2005 and 2023

Source: Enerdata, 2025b.

increase in the emission-reducing effect can be observed in the improvement of emission intensity during the post-Paris period. Additionally, the reduction of conversion losses contributed substantially to emission reductions after 2015. In both periods, however, the largest contribution to emission reduction stems from the reduction in energy intensity. Increases in per capita GDP led to rising GHG emissions, but these were more than offset in both periods.

Taking a closer look at the intensity component reveals that, since 2005, primary energy intensity – defined as the ratio of primary energy consumption to GDP – has decreased by around 40% (see **Figure 3**). This was strongly driven by the increasing share of wind and solar power as replacements for less efficient energy conversion technologies, such as thermal or nuclear power, during that period. In contrast, the reduction in final energy intensity only amounted to 28% during that period. As with GHG emissions, the decline in the period before Paris was significantly lower at 2.2% per year for primary and 1.6% for final energy intensity respectively, than in the years after, at 3.7% and 2.0% per year.

GERMANY'S LONG-TERM CLIMATE TARGETS AND THE WAY TO GET THERE

Since the mid-1990s, Germany has been committed to reducing its GHG emissions. To this end, successive federal governments have adopted climate action programmes and plans at regular intervals since 2000, which usually contain both reduction targets and measures to achieve the targets. However, the starting point for long-term energy and climate targets until the year 2050 was the “Energy Concept” of September 2010 and the decisions of summer 2011 on the phase-out of nuclear energy (Federal Government of Germany, 2012). With this, Germany initiated a far-reaching transformation of its energy system, known as the “Energiewende” meaning “**Energy Transition**”. At that time the reduction target for greenhouse gas (GHG) emissions was 40% in 2020 and 80-95% in 2050 (both compared to the base year of the Kyoto target, 1990). The energy transition was accompanied by regular monitoring of target achievement by the government and independent experts, a process that continues to this day (Bundesnetzagentur, 2025). However, in the early years, the main focus was on achieving the short-term energy and climate targets by 2020 rather than the long-term targets for 2050.

This only changed with the **Climate Action Plan 2050** (BMUB, 2016), which was adopted by the

Federal Government in November 2016. It also served as the National Long-Term Strategy (LTS), which was submitted under the EU Governance Regulation (EU/2018/1999)¹. With this plan, Germany reaffirmed its long-term GHG reduction target from 2010 and made it more specific by formulating guiding principles and transformative pathways. These serve as the basis for all areas of action by 2050, as well as medium-term milestones and strategic measures by 2030. The guiding principles and milestones were formulated on the basis of an evaluation of the climate action scenarios and further sectoral analyses available at the time of its creation. Notably, this was the first time that the German government had agreed on interim GHG emission reduction targets at the sectoral level up to 2030. The main sectors covered were energy, buildings, transport, industry and agriculture. A key driver for drafting this plan was to make an appropriate contribution to the implementation of the commitment made at the 2015 Climate Change Conference Paris, also with a view to the goal set out in the Paris Agreement of achieving global greenhouse gas neutrality in the second half of the century. The preparation of the Climate Action Plan 2050 was embedded in a broad dialogue and participation process with the federal states and local authorities, as well as the private sector, stakeholder organisations (churches, associations and trade unions), and, for the first time, also direct public participation by citizens (BMUB, 2017). However, from a governance perspective, the issue with all previous targets was that they lacked a legal basis and were therefore non-binding. It took a further three years after the Climate Action Plan was adopted before the sectoral and overall climate targets for 2030 and 2050 set out in it were put on a legal footing. Since 18th December 2019, Germany has had legally binding climate targets in place under the **Federal Climate Action Act** (Klimaschutzgesetz, KSG). The Act was amended twice since then, for the first time in 2021, following a judgement of the Federal Constitutional Court. The target year for achieving greenhouse gas neutrality was brought

forward from 2050 to 2045, the 2030 reduction target was increased from -55% to -65%, and additional annual reduction pathways up to 2040 were introduced to achieve an 88% reduction compared to 1990 levels. Upon its entry into force, the Climate Action Act included a sector-specific control mechanism (§ 8 KSG) with an ex-post perspective: if a sector exceeded the permitted annual emissions based on the previous year's data, the responsible ministry was required to present an immediate action programme. The second amendment of the Climate Change Act, adopted in 2024, fundamentally revised this mechanism in favour of a cross-sectoral and forward-looking approach. Under the new provision, the federal government is only obliged to implement corrective measures if total national emissions exceed the allocated emissions budget for the 2021–2030 period in two consecutive years.

Climate Neutrality Scenarios

As a result of the long-term strategy until 2050, a wide range of normative scenario studies explored how national climate targets can be met. These studies typically model cost-optimized transformation pathways and outline a broad spectrum of possible developments. A comprehensive comparison of key scenario studies was conducted in 2022 (see Stiftung Klimaneutralität et al., 2022). Despite methodological differences, the scenarios deliver similar results: electrification is the dominant decarbonization lever and accounts for the largest share of final energy demand across all pathways. However, notable differences exist in the extent and specific application of hydrogen and its derivatives. Overall, final energy demand declines significantly in all scenarios - driven by improvements in energy efficiency and shifts to low-emission energy carriers. Photovoltaic (PV) and wind energy form the backbone of the future energy supply, complemented by flexible power plants and storages. In the buildings sector, heat pumps, district heating, and increased renovation rates play a central role. In the transport sector, fossil-fuel-based vehicles are largely replaced by

¹ https://ec.europa.eu/clima/sites/lts/lts_de_en.pdf

battery-electric passenger cars. In the heavy-duty segment, alongside direct electrification, some scenarios also foresee a role for hydrogen fuel cells. In the industrial sector, both direct electrification and the use of hydrogen and its derivatives - both as an energy carrier and as a feedstock- are key drivers of decarbonization. Recent scenario studies (Aurora, 2025; BCG, 2025) are proposing a somewhat modified strategy with relevant shares of decarbonised natural gas (blue hydrogen, CCS) and lower increases of renewable power (sun, wind).

Long-term scenarios and Policy Development

The System Development Strategy is a central political instrument. It is based on the so-called "Long-Term Scenarios", which are also the main scientific basis for long-term policy strategies and decisions in the field of energy and climate policy. Its objective is to formulate a cross-sectoral vision and a robust strategy for the transformation of the energy system. The process is designed to be iterative and adaptive, allowing for regular updates and learning. However, Germany currently lacks scenario studies that link long-term climate targets to specific, implementable policy measures. In other words, there is an absence of model-based analyses that, similar to the official projection reports, explicitly demon-

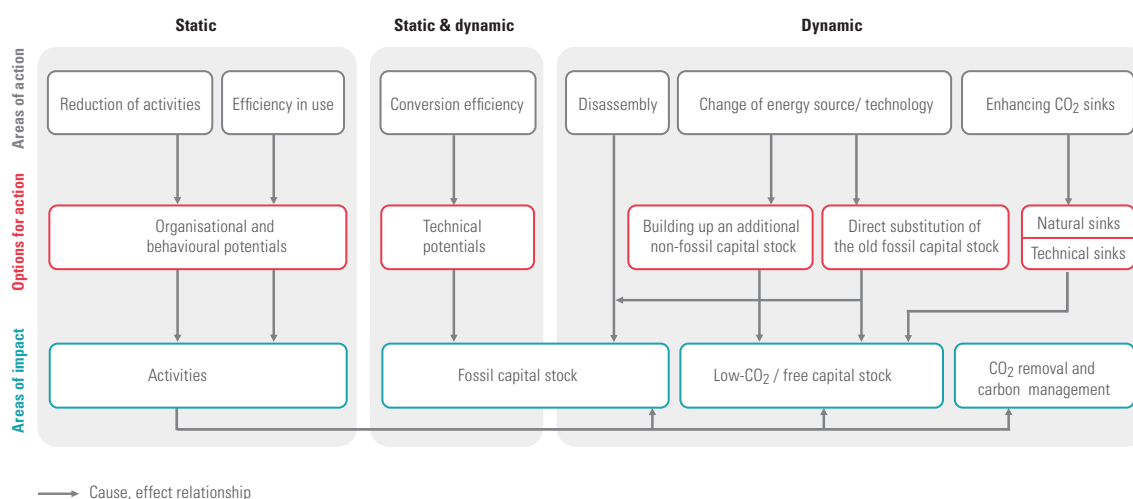
strate pathways to achieve GHG neutrality by 2045 through defined political instruments. To date, such a modeling approach has only been undertaken up to the year 2030, for instance in the KIS scenario (Repenning, Harthan, Blanck, & et. al, 2023). In some cases, political targets are derived from scenario analyses, such as expansion figures for photovoltaics, heat pumps, or electric mobility. However, a comprehensive set of indicators to guide political steering has not yet been officially established in Germany by the Federal Government. Policy areas were placed on the political agenda through targeted initiatives such as the Long-Term Strategy for Negative Emissions Technologies (NETs), the District Heating Summit, the Heat Pump Summit, and the Hydrogen Core Network (H₂-Kernnetz).

CONCRETE PROGRESS AND BLOCKAGES

Areas of action for the reduction of greenhouse gases

The Council of Experts on Climate Change has developed a conceptual framework that identifies key areas of GHG reduction, along with corresponding options for action and areas of impact (see **Figure 4**). These include the reduction

Figure 4. Fields of action and options for reducing GHG emissions according to ERK (2024b)



and modification of emission-relevant activities, improvements in the efficiency of energy use and conversion, the disassembly of fossil-based and emissions-intensive capital stock, the substitution of energy carriers and technologies through the build-up of a non-fossil or low-emission capital stock, and the enhancement of carbon sinks. These areas of action can be understood from both a static and a dynamic perspective within a capital stock-oriented framework. (ERK, 2024b).

EXAMPLES OF CONCRETE PROGRESS

Measurable progress has been made in the identified areas of action, particularly in the following areas: 1) the expansion of new low- or zero-carbon capital stock in the power sector, and 2) the improvement of energy efficiency in conversion and usage.

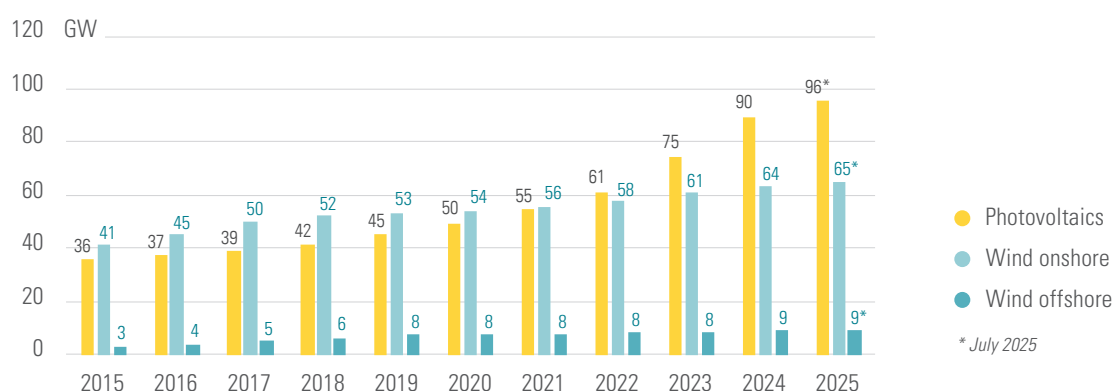
Expansion of Renewable Energy, System Integration, and Phase-Out of Coal-Fired Power Plants

The most significant progress in the transformation of Germany's energy system has been the expansion of renewable energy sources, especially PV and wind (see **Figure 5**), which have been key drivers of the sector's substantial overperformance in relation to its assigned

GHG emission reduction targets. The Renewable Energy Sources Act (Erneuerbare-Energien-Gesetz, EEG) is the central instrument for promoting renewable energy technologies in Germany and came into force in 2000. In 2017, a competitive remuneration system through auctions replaced fixed feed-in tariffs. The target of 69 GW installed onshore wind capacity by 2024 was not met. Both onshore and offshore expansion have so far progressed too slowly to meet the Renewable Energy Sources Act (EEG) targets of 115 GW onshore and 30 GW offshore by 2030. However, approvals for onshore wind energy capacity have increased. This suggests that recent political efforts to accelerate planning and permitting procedures may already be having an impact. In 2024, permits were granted for onshore wind turbines with a total capacity of 11.4 GW (ERK, 2024b). Due to increased efficiency and declining module prices, the levelized cost of electricity (LCOE) for photovoltaics has dropped significantly. Both PV and wind power have become increasingly competitive and now represent the most cost-effective forms of electricity generation comparing the LCOE of different technologies (Kost, Müller, Sepúlveda Schweiger, Fluri, & Thomsen, 2024).

At the same time, the capacity of coal power plants has declined from 50 GW in 2015 to 30 GW today (Fraunhofer ISE, 2025). The coal phase-out in Germany is legally enshrined in

Figure 5. Development of the installed capacities of Photovoltaics and Wind power plants since 2015



Source: Fraunhofer ISE, 2025.

the Coal-Fired Power Generation Termination Act (*Kohleversorgungsbeendigungsgesetz*). The nuclear phase-out was completed in 2023. As a result of these structural developments, the share of renewable energy in gross electricity demand rose from 35.3% in 2015 to 55.8% in 2024, while its share of total electricity generation increased from 32.3% to 62.3% (Fraunhofer ISE, 2025).

Energy Efficiency Improvements

Previous analyses by the Council on Experts for Climate Change (see (ERK, 2022c)) have shown that climate policy instruments in Germany have in the past – beside the developments in the power sector – focused mainly on technical improvements in energy efficiency in conversion and use. In particular, increasing the technological efficiency of the fossil capital stock through the use of efficient gas condensing boilers in buildings, more efficient technologies in industry and more efficient (diesel) engines in vehicles has made a significant contribution to reducing GHG emissions. This development is also reflected in the decline in energy intensity described above (see **Figure 3**). The policy mix addressing energy efficiency in Germany is dominated by regulatory and financial instruments (see Bagheri et al. (2025)). The key regulation for energy efficiency is the Energy Efficiency Act (EnEffG), which entered into force in November 2023. The new act creates for the first time a cross-sectoral framework for enhanced energy efficiency in Germany and also establishes efficiency targets for primary and final energy consumption for 2030, 2040, and 2045. At the sectoral level, the Energy Efficiency Act and sectoral regulation as the Building Energy Act (GEG) are accompanied by large funding programmes for efficient buildings and for energy and resource efficiency in industry.

Carbon Pricing

In addition to the policy instruments targeting energy efficiency and renewable energy, the Fuel Emissions Trading Act (*Brennstoffemissionshandelsgesetz*, BEHG) was introduced in 2019 alongside the Federal Climate Action Act (KSG) as

a cross-sectoral measure, effectively being a role model for the EU Emissions Trading System 2 (EU ETS 2). The BEHG established a national carbon pricing mechanism for sectors not covered by the EU Emissions Trading System (EU ETS 1). Until 2025, a fixed price system was established, which will be replaced by a price corridor in 2026. As a result, the majority of greenhouse gas emissions in Germany are currently subject to carbon pricing under either the EU ETS 1 or the BEHG, and in the future, under the extended framework of EU ETS 2.

Examples of concrete blockages

While measurable progress has already been made especially in the energy sector, the buildings and transport sectors show significant shortcomings. Both sectors have failed to meet their annual targets under the KSG since 2020 (buildings) and since 2021 (transport). Current projections suggest that the 2030 targets set by the European Effort Sharing Regulation (ESR) are very likely to be missed. In addition, the latest National Forest Inventory clearly indicates that the LULUCF sector will significantly fall short of its targets for 2030, 2040, and 2045, as it has shifted from acting as a net GHG source instead of a sink.

In recent years the expansion of new capital stock in the form of heat pumps and battery electric vehicles has increased steadily in recent years. However, the stock of fossil-based vehicles and fossil-fuelled heating systems, has remained at comparably high levels or even increased.

Buildings

In the buildings sector, for instance, the number of installed heat pumps has approximately tripled, rising from around 632,000 units in 2015 to nearly two million by 2024 (BWP, 2025). In newly constructed buildings, the share of gas heating systems declined significantly from 50% in 2015 to 4.5% in 2024, while heat pumps accounted for 66.3% of new installations, becoming the dominant heating technology (BDEW, 2025b). However, this shift has not yet translated into a substantial transformation of the total stock: the

share of fossil-fuel heating systems only declined slightly, from 75.5% in 2015 to 73.4% in 2024. Notably, the share of gas heating systems even increased - from 52.4% to 56.1%, over the same period (BDEW, 2025a). In the buildings sector, the implementation of the 2023 Climate Action Programme led to the adoption of key instruments aligned with the EU Buildings Directive. These include the Building Energy Act (Gebäudeenergiegesetz, GEG) in 2020 in combination with the Federal Funding for Efficient Buildings programme (Bundesförderung für effiziente Gebäude, BEG) in 2021, the Heat Planning Act (Wärmeplanungsgesetz, WPG) in 2024, and the Federal Funding Programme for Efficient Heating Networks (Bundesförderung für effiziente Wärmenetze, BEW) in 2024. In conjunction with the BEHG, Germany has implemented a comprehensive policy mix combining market-based (economic), regulatory, and fiscal instruments to advance emission reduction in the buildings sector. As part of the amended GEG, the so-called "65% rule" was introduced in 2024. This regulation stipulates that all newly installed heating systems must derive at least 65% of their energy from renewable sources. Technologies compliant with this requirement were supported through the BEG, aiming to shield households from rising carbon prices. To enhance social equity, the BEG introduced income-dependent subsidy rates. Politically and socially, however, the GEG became highly contentious. The legislative process was marked by months of internal governmental conflict, an intensified campaign by the opposition, widespread public uncertainty, a successful legal challenge by the opposition against the parliamentary vote, and finally, the law's adoption by the Bundestag in September 2023 (Jost, Mack, & Hillje, 2024). The public backlash against the GEG illustrates how insufficient communication, political fragmentation, and misinformation can undermine climate policy. The absence of a proactive communication strategy allowed populist and oppositional narratives to dominate the discourse. Over the course of the debate, the GEG was increasingly framed as the so-called "heating hammer," eroding public

trust and ultimately influencing the legislative outcome. This case underscores the critical need for timely, coherent, and fact-based communication in climate governance, especially under conditions of political polarization (Braungard, Keimeyer, & Loschke, 2024).

Transport Sector

In the transport sector, the number of battery electric vehicles (BEVs) amounts to 1.6 million in 2024 (BMDV, 2025; KBA, 2025). Nevertheless, the total number of passenger cars rose from approximately 45 million in 2015 to 49 million in 2024 (BMDV, 2025; KBA, 2025). As a result, the share of BEVs in the overall vehicle fleet remains marginal at around 3% and, from an emissions perspective, still plays a negligible role. The declining energy intensity in the transport sector since 2000 (i.e. reduced fuel consumption per kilometre) is primarily attributable to the shift towards diesel vehicles as well as improvements in engine and fuel efficiency. At the same time, this trend has been offset by increasing motorisation rates and the growing size and weight of vehicles. As a result, emission reductions stemming from technical efficiency gains have been largely undermined by countervailing developments in vehicle characteristics, particularly increases in vehicle mass and engine power. (ERK, 2022c)

Key national instruments in the transport sector have included the environmental bonus (*Umweltbonus*), introduced in 2016 to encourage the uptake of electric vehicles. The programme was discontinued at the end of 2023, due the fact that the Federal Constitutional Court ruled on November 15, 2023 that the supplementary budget for 2021 was unconstitutional. In addition evidence showed that the *Umweltbonus* disproportionately benefited higher-income households and incurred high public costs per ton of CO₂-equivalent avoided (ERK, 2024b). In contrast, 2023 also saw the introduction of the *Deutschlandticket*, a nationwide public transport pass aimed at promoting low-emission mobility. However, certain existing policy incentives, such as the diesel tax subsidy and the taxation bene-

fits of private use of a company car, continue to undermine the emission reduction efforts required in the transport sector.

Blockages linked to behavioural changes

Another important field of action that can either reduce or increase emissions, is the level and pattern of activity itself. An analysis by the Council of Experts on Climate Change found that, in purely mathematical terms, GHG emissions in the buildings sector could have been reduced by 40% between 2000 and 2020 if per capita residential floor area and GDP had remained constant. In practice, however, emissions declined by only 25%. This shortfall illustrates how rebound effects and prosperity-driven changes in user behaviour can fully negate the benefits of technical efficiency improvements. In the transport sector as well, changes in consumption patterns, driven in part by rebound effects and prosperity-induced shifts in user behaviour, have led to an increase in transport intensity. (ERK, 2022c)

On the other hand, a reduction in emissions due to a reduction in activity levels has been observed in recent years. Particularly in the industrial sector, where elevated energy prices, structural and cyclical factors, and the EU Emissions Trading System (EU ETS) contributed to declines in production. In the buildings sector, gas consumption dropped significantly during the energy crisis, although it increased again in 2024. In the transport sector, both passenger and freight traffic rebounded following Covid-19 related declines. The agricultural sector has seen some reductions in livestock numbers and fertilizer use, alongside a modest expansion of organic farming. While instruments such as the German national emissions trading system (BEHG), the forthcoming EU ETS 2, or the Deutschlandticket may induce limited behavior-based mitigation effects, the broader potential of the mitigation lever of activity reduction remains largely untapped. The Council of Experts on Climate Change highlighted this gap, stressing that achieving climate targets will most probably require sufficiency measures. (ERK, 2022c, 2024b)

LULUCF

Another area of concern is the LULUCF sector. By 2045, the LULUCF sector is to be included in the accounting of Germany's overall greenhouse gas neutrality target. However, since the onset of drought years in 2018, German forests have undergone severe dieback, turning the sector from a carbon sink into a significant net source of greenhouse gas emissions. This transformation has been primarily driven by the collapse of ecologically unsound spruce monocultures planted in unfavorable locations (Riedel et al., 2024). The German Climate Change Act (KSG) sets a target for the LULUCF sector to deliver a net sink of 40 million tonnes of CO₂ equivalents by 2045. Yet, the projection data 2025 show that this target will be substantially missed, with residual emissions from the sector expected to remain at approximately 35 Mt CO₂eq in 2045. The actual trajectory of emissions is highly sensitive to the occurrence of extreme weather events, with estimates suggesting that frequent extreme events could result in net emissions of over 60 Mt CO₂eq. There is no scientific consensus on whether the LULUCF sink targets are still realistically achievable. Depending on the magnitude of residual emissions in the LULUCF sector and the remaining hard-to-abate emissions in other sectors, there may be an increased need for negative emissions to meet the climate neutrality target. (ERK, 2025)

LINK WITH NON-CLIMATE QUESTIONS

There are numerous interdependencies between climate policy and other policy domains, including economic, social, fiscal, labour market, environmental, and security policy (ERK, 2024b). In cases of conflicting objectives, political negotiation and coordination processes are necessary. Ultimately, it is a matter of political prioritisation how such trade-offs are addressed. This includes, for instance, the allocation of public financial resources or the management of environmentally harmful subsidies, which often serve other

purposes such as economic or social policy. A key example of such political trade-offs was the planned reform of agricultural diesel subsidies in Germany: in 2024, it triggered widespread farmer protests, prompting the federal government to reverse its decision and maintain the subsidy in the new federal budget.

Investment Needs and Fiscal Challenges

Fiscal policy plays a pivotal role in shaping the effectiveness of climate action and often poses significant challenges. The transformation of the energy system towards climate neutrality requires substantial investment. A comparative analysis of scenario studies conducted by the Council of Experts on Climate Change (ERK, 2024b) estimates total annual investment needs in the range of €135 to €255 billion. Additional investment, compared to a reference scenario without enhanced climate policy, is estimated at €51 to €150 billion per year, corresponding to approximately 1.2% to 3.6% of Germany's GDP in 2023. While a portion of these investments will be financed by the private sector, the public sector plays a critical role both through direct investment and through subsidies. These subsidies are primarily disbursed via the Climate and Transformation Fund (Klima- und Transformationsfonds, KTF). Shortly before the change in government, the constitutional "debt brake" was temporarily relaxed, enabling the creation of a special fund for infrastructure and climate neutrality. This special fund now provides an additional €10 billion annually in revenues for the KTF (Wiedemann, 2025). In total, the new federal budget allocates €36.7 billion to the KTF.

Social Impacts

From a social equity perspective, several of the climate policy instruments reveal regressive distributional effects. Fiscal support measures in the buildings and transport sectors, such as the purchase subsidy for electric vehicles and the initial design of the Federal Funding for Efficient Buildings (BEG) tended to favour higher-income households. The 2023 reform of the funding program included measures aimed at

improving social targeting. Nevertheless, energy poverty remains insufficiently integrated into the broader climate policy framework in Germany (ERK, 2024b).

Furthermore, the carbon pricing mechanism under the Fuel Emissions Trading Act (BEHG) places a disproportionate burden on low- and middle-income households. This effect is expected to intensify when carbon prices will increase under the forthcoming EU Emissions Trading System 2 (EU ETS 2). To counteract these impacts, accompanying policy instruments will be essential to buffer both social and economic disadvantages resulting from elevated carbon and energy prices (ERK, 2024b).

Beyond distributional questions, structural barriers, such as inadequate infrastructure or persistent lock-in effects, must also be addressed to enable broad and equitable participation in the transition. A comprehensive policy response should involve expanding low-emission infrastructure and essential public services, introducing socially differentiated subsidies, implementing targeted regulatory interventions, and offering direct financial compensation. When effectively combined, these measures can help ensure that the costs of decarbonisation are distributed fairly and do not fall disproportionately on vulnerable groups (ERK, 2024b).

GOVERNANCE

Climate Action Act

Climate protection is legally anchored in the Federal Climate Action Act. If the climate targets set forth in the Act are not met, the federal government is required to adopt additional measures. In such cases, the respective ministries responsible for sectors that have significantly exceeded their emission targets, must propose corrective action. Core elements of climate policy in Germany based on the current (mandatory) Climate Change Act include:

- the legally defined sectoral and annual GHG reduction targets and a budget approach for 2021-2030 and 2031-2040,

- the Climate Action Programme (Klimaschutzprogramm),
- and the corrective mechanism, which is triggered every two years if overall emissions across sectors exceed the set targets.

Based on the most recent emission projections, the **Climate Action Programme** must set out the measures through which the government plans to achieve its climate targets. However, the programme submitted by the federal government in 2023 did not meet the legal and substantive requirements associated with this planning instrument (ERK, 2023c). The new government has now the legal obligation to provide a programme that meets the targets in 2030 and 2040 within the first year of the legislative period, i.e. until March 2026. The work on the programme already started shortly after the new government was formed.

Council of Experts on Climate Change

The role of the Council of Experts on Climate Change is also anchored in the Federal Climate Action Act as an independent scientific advisory body. Its tasks include the examination of emission and projection data. The Council assesses whether the sector-specific annual targets, the emission budget for the relevant period, and the targets under the EU Effort Sharing Regulation have been met or exceeded. Furthermore, the Expert Council evaluates the plausibility of the measures proposed by the federal government in the context of required corrective action or within the framework of a Climate Action Programme. It also analyses emission trends and the effectiveness of climate policy measures. In its reports, the Council comments on the distributional impacts, economic efficiency, and effectiveness of the measures. Additionally, it can prepare independent reports on the further development of climate policy instruments, based on emissions data and projection scenarios.

Federal Ministries

In Germany, climate action is currently situated within the Federal Ministry for the Environment, Climate Action, Nature Conservation and Nuclear

Safety at the federal level. However, many areas relevant for successful GHG reductions lie outside the ministry's core climate policy portfolio and are distributed across other ministries, e.g. in the ministry for economic affairs and energy, the ministry of transport or the ministry of housing. This fragmentation and the decentralized allocation of competencies pose significant barriers to the transformation process, particularly in the absence of an overarching coordinating body endowed with clear decision-making authority. As a result, outcomes of inter-ministerial coordination processes are often reduced to minimal consensus (ERK, 2024b; Flachsland et al., 2021).

Dialogue, Consultation, and Cooperation

The German federal government conducts comprehensive consultation and participation processes on various climate-related topics. Notable examples include consultations on the Wind and PV Strategies, the System Development Strategy, and the Long-Term Strategy for Negative Emissions. In addition, several dialogue forums have been established on specific issues. The National Platform Future of Mobility served as a central forum for strategic discussions in the transport sector, but concluded at the end of the 2021 legislative period. In addition, Article 10 of the EU Governance Regulation requires Member States to give the public early and effective opportunities to participate in the preparation of their draft National Energy and Climate Plans (NECPs). These are due every 10 years, the next draft NECP by January 1st, 2028, and must also include a summary of the results of the consultation process. In addition the cooperation between the federal government and the federal states plays an important role in terms of climate action, e.g. through the Federal-State Cooperation Committee (Bund-Länder Kooperationsausschuss), which oversees the designation and planning of 2% of land for wind energy across all states.

INTERNATIONAL COOPERATION

At the end of 2023, ahead of COP28 in Dubai, the German federal government released a comprehensive strategy on international climate policy (Federal Government of Germany, 2023). The strategy identifies key instruments of Germany's international climate policy include climate diplomacy, climate finance, bilateral partnerships and dialogues, and multi-donor initiatives such as the Just Energy Transition Partnerships (JETPs), currently in place with South Africa, Indonesia, Vietnam, and Senegal. Additional instruments comprise the Climate Club and other frontrunner initiatives, such as the Forest and Climate Leaders' Partnership, the Global Methane Pledge, the Powering Past Coal Alliance, and the ENACT Partnership. Further elements include foreign trade promotion, as well as carbon pricing and emissions trading (Federal Government of Germany, 2023).

With regard to climate diplomacy, the previous federal government established a special position for international climate policy. This special position was abolished under the current government.

Climate Finance

At COP 29, the Parties to the UNFCCC agreed on a collective climate finance target of USD 300 billion per year through 2035. In 2023, Germany committed approximately EUR 5.66 billion in budgetary resources for mitigation and adaptation measures. Including other public and mobilised private flows, Germany's total climate finance contribution for 2023 amounted to EUR 9.94 billion (BMZ, 2025). Germany has repeatedly taken a leading role by making early commitments to multilateral climate funds, including contributions to the Green Climate Fund or the Fund for Responding to Loss and Damage. Through these actions, the German government has consistently been able to exert a constructive influence on other donor countries and shape the dynamics of the annual UN climate conferences (Heinrich-Böll-Stiftung, 2025).

In the new draft federal budget, Germany is expected to fall short of its international pledge. According to a preliminary analysis of the draft budget, Oxfam estimates that between €5.1 and €5.4 billion in budgetary funds will be allocated for climate finance in 2025, well below the pledged amount. According to the New Climate Institute's Climate Action Tracker, Germany performs better than most developed countries in international climate finance but is still rated as "Insufficient." To improve, Germany must triple its financial support and urgently end public funding for fossil fuels abroad (Climate Action Tracker, 2025). A study by Klima-Allianz Deutschland (2024) outlines potential avenues for significantly increasing Germany's contributions to international climate finance in the coming years.

REFERENCES

- ACEEE. (2025). International Energy Efficiency Scorecard. Retrieved from <https://www.aceee.org/international-scorecard>
- Aurora. (2025). *Systemkostenreduzierter Pfad zur Klimaneutralität im Stromsektor 2040*. Retrieved from https://auroraer.com/wp-content/uploads/2025/04/Aurora_EnBW_Systemkostenstudie_Apr-25_public.pdf
- Bagheri, M., Brunzema, I., Eichhammer, W., Kappler, L., Reinfandt, N., & Schlomann, B. (2025). *Energy Efficiency Trends and Policies in Germany: An Analysis Based on the ODYSSEE and MURE Databases*. Retrieved from <https://www.odyssee-mure.eu/publications/national-reports/energy-efficiency-germany.pdf>
- BCG. (2025). *Energiewende auf Kurs bringen: Impulse für eine wettbewerbsfähigere Energiepolitik*. Retrieved from <https://bdi.eu/artikel/news/transformationsspfade-studie-energiewende-auf-kurs-bringen>
- BDEW. (2025a). Beheizung des Wohnungsbestandes in Deutschland: Darstellung der Entwicklung der Beheizungsstruktur des Wohnungsbestandes nach primärer Heizenergie seit 1998. Retrieved from <https://www.bdew.de/service/daten-und-grafiken/beheizung-des-wohnungsbestandes-in-deutschland/>
- BDEW. (2025b). Entwicklung der Beheizungsstruktur im Neubau - Baugenehmigungen: Darstellung der Entwicklung in den letzten 10 Jahren sowie in den vergangenen 12 Monaten. Retrieved from <https://www.bdew.de/service/daten-und-grafiken/entwicklung-beheizungsstruktur-baugenehmigungen/>
- BMDV. (2025). *Verkehr in Zahlen 2024/2025*. Retrieved from https://www.bmv.de/SharedDocs/DE/Anlage/G/verkehr-in-zahlen24-25-pdf.pdf?__blob=publicationFile

- BMUB. (2016). *Climate Action Plan 2050: Principles and Goals of the German government's climate policy*. Retrieved from BMU website: <https://www.bundesumweltministerium.de/PU395-1>
- BMUB. (2017). *Dialog der Bundesregierung zum Klimaschutzplan 2050: Breite Beteiligung von Bundesländern, Kommunen, Verbänden sowie Bürgerinnen und Bürgern*. Berlin. Retrieved from https://www.bmuv.de/fileadmin/Daten_BMU/Pool/Broschueren/ksp_2050_dialog_bf.pdf
- BMZ. (2025). *Klimafinanzierung: Deutschland als verantwortungsvoller Partner*. Retrieved from <https://www.bmz.de/de/themen/klimawandel-und-entwicklung/klimafinanzierung>
- Braungard, S., Keimyer, F., & Loschke, C. (2024). *Is the "heating hammer" hitting energy efficiency policy? Learnings from the debate around the German Buildings Energy Act*. Retrieved from https://www.oeko.de/fileadmin/oekodoc/3-028-24_Braungardt.pdf
- Bundesnetzagentur. (2025). *Monitoring „Energie der Zukunft*. Retrieved from <https://www.bundesnetzagentur.de/DE/Fachthemen/ElektrizitaetundGas/Monitoringberichte/MonitoringEnergiederZukunft/start.html>
- BWP. (2025). *Zahlen & Daten*. Retrieved from <https://www.waermepumpe.de/presse/zahlen-daten/>
- Climate Action Tracker. (2025). *Germany: Country summary*. Retrieved from <https://climateactiontracker.org/countries/germany/>
- Enerdata. (2025a). *2024 EU Energy Efficiency scoreboard*. Retrieved from <https://www.odyssee-mure.eu/data-tools/scoring-efficiency-countries.html>
- Enerdata. (2025b). *ODYSSEE-MURE project*. Retrieved from <https://odyssee.enerdata.net/database>
- ERK. (2021a). *Bericht zum Sofortprogramm 2020 für den Gebäudesektor*. Retrieved from <https://www.expertenrat-klima.de/publikationen/page/3/>
- ERK. (2021b). *Bericht zur Vorjahresschätzung der deutschen Treibhausgasemissionen für das Jahr 2020: Prüfung und Bewertung der Emissionsdaten gemäß § 12 Abs. 1 BundesKlimaschutzgesetz*. Retrieved from <https://www.expertenrat-klima.de>
- ERK. (2022a). *Prüfbericht zu den Sofortprogrammen 2022 für den Gebäude- und Verkehrssektor*. Retrieved from <https://www.expertenrat-klima.de/>
- ERK. (2022b). *Prüfbericht zur Berechnung der deutschen Treibhausgasemissionen für das Jahr 2021*. Retrieved from <https://www.expertenrat-klima.de/>
- ERK. (2022c). *Zweijahresgutachten: Gutachten zu bisherigen Entwicklungen der Treibhausgasemissionen, Trends der Jahresemissionsgesamtmengen und Jahresemissionsmengen und Wirksamkeit von Maßnahmen (gemäß § 12 Abs. 4 Bundes-Klimaschutzgesetz)*. Retrieved from <https://www.expertenrat-klima.de>
- ERK. (2023a). *Prüfbericht 2023 für die Sektoren Gebäude und Verkehr*. Retrieved from <https://www.expertenrat-klima.de>
- ERK. (2023b). *Prüfbericht zur Berechnung der deutschen Treibhausgasemissionen für das Jahr 2022*. Retrieved from <https://www.expertenrat-klima.de/publikationen/>
- ERK. (2023c). *Stellungnahme zum Entwurf des Klimaschutzprogramms 2023: Gemäß § 12 Abs. 3 Nr. 3 Bundes-Klimaschutzgesetz*. Retrieved from www.expertenrat-klima.de
- ERK. (2024a). *Prüfbericht zur Berechnung der deutschen Treibhausgasemissionen für das Jahr 2023*. Retrieved from <https://www.expertenrat-klima.de/>
- ERK. (2024b). *Zweijahresgutachten 2024: Gutachten zu bisherigen Entwicklungen der Treibhausgasemissionen, Trends der Jahresemissionsgesamtmengen und Jahresemissionsmengen sowie Wirksamkeit von Maßnahmen (gemäß § 12 Abs. 4 Bundes-Klimaschutzgesetz)*. Retrieved from https://expertenrat-klima.de/content/uploads/2025/03/ERK2025_Zweijahresgutachten-2024.pdf
- ERK. (2025). *Prüfbericht zur Berechnung der deutschen Treibhausgasemissionen für das Jahr 2024 und zu den Projektionsdaten 2025. Prüfung und Bewertung der Emissionsdaten sowie der Projektionsdaten gemäß § 12 Abs. 1 Bundes-Klimaschutzgesetz*. Retrieved from <https://www.expertenrat-klima.de>
- Federal Government of Germany. (2012). *Progress Report 2012: Climate and Energy - Germany's Energy Concept and Transition*. Retrieved from <https://www.bundesregierung.de/breg-en/federal-government/climate-and-energy-410416>
- Federal Government of Germany. (2023). *Klimaaußenpolitikstrategie der Bundesregierung*. Berlin. Retrieved from <https://www.auswaertiges-amt.de/resource/blob/2633110/90e88ad741351a8885f478c49a1741eb/kap-strategie-data.pdf>
- Figgenger, J., Hecht, C., Haberschusz, D., Bors, J., Spreuer, K. G., Kairies, K.-P., . . . Sauer, D. U. (2023). *The development of battery storage systems in Germany: A market review (status 2023)*. Retrieved from <https://battery-charts.rwth-aachen.de/>
- Flachsland, C., dem Moore, N. aus, Müller, T., Kemmerzell, J., Edmondson, D., Görlach, B., . . . Pahle, M. (2021). *Kurzdossier: Wie die Governance der deutschen Klimapolitik gestärkt werden kann*. Retrieved from <https://ariadneprojekt.de/publikation/governance-der-deutschen-klimapolitik/>
- Fraunhofer ISE. (2025). *Energy Charts*. Retrieved from <https://www.energy-charts.info>
- Heinrich-Böll-Stiftung. (2025). *DEUTSCHE KLIMAFINANZIERUNG: Der deutsche Beitrag zur internationalen Klimafinanzierung*. Retrieved from <https://www.deutschemklimafinanzierung.de/blog/2025/05/klimafinanzierung-im-bundeshaushalt-2025-kommt-wortbruch/>
- Jost, P., Mack, M., & Hillje, J. (2024). *Aufgeheizte Debatte? Eine Analyse der Berichterstattung über das Heizungsgesetz - und was wir politisch daraus lernen können*. STUDIE. Retrieved from <https://www.progressives-zentrum.org/>

- [wp-content/uploads/2024/04/240418_DPZ_Studie_Aufgeheizte-Debatte.pdf](#)
- KBA. (2025). Bestand nach ausgewählten Merkmalen (FZ 27): Bestand an Kraftfahrzeugen und Kraftfahrzeuganhängern nach ausgewählten Merkmalen (Bundesländern und Fahrzeugklassen), vierteljährlich (FZ 27). Retrieved from https://www.kba.de/DE/Statistik/Produktkatalog/produkte/Fahrzeuge/fz27_b_uebersicht.html
 - Klima-Allianz Deutschland. (2024). Studie: Deutschlands Handlungsoptionen bei der internationalen Klimafinanzierung.
 - Kost, C., Müller, P., Sepúlveda Schweiger, J., Fluri, V., & Thomsen, J. (2024). *Stromgestehungskosten Erneuerbare Energien*. Retrieved from file:///C:/Users/tim16870/Downloads/DE2024_ISE_Studie_Stromgestehungskosten_Erneuerbare_Energien.pdf
 - Lexikon der Nachhaltigkeit. (2015a). IEKP: Energie und Klimaprogramm. Retrieved from https://www.nachhaltigkeit.info/artikel/bmvbs_das_integrierte_energie_und_klimaprogramm_1273.htm
 - Lexikon der Nachhaltigkeit. (2015b). Nationales Klimaschutzprogramm 2000, 2005. Retrieved from https://www.nachhaltigkeit.info/artikel/nationales_klimaschutzprogramm_2000_2005_1742.htm
 - Merkel, A. (2021). Regierungserklärung von Bundeskanzlerin Dr. Angela Merkel: zum Europäischen Rat am 24. und 25. Juni 2021 vor dem Deutschen Bundestag am 24. Juni 2021 in Berlin: Bulletin 91-1. Retrieved from <https://www.bundesregierung.de/breg-de/service/newsletter-und-abos/bulletin/regierungserklaerung-von-bundeskanzlerin-dr-angela-merkel-1937362>
 - Pettinotti, L., Kamninga, T., & Colenbrander, S. (2024). *A fair share of climate finance? The collective aspects of the New Collective Quantified Goal*. ODI Working Paper. Retrieved from <https://odi.org/en/publications/a-fair-share-of-climate-finance-the-collective-aspects-of-the-ncqg>
 - Repenning, J., Harthan, R., Blanck, R., & et. al. (2023). *Klimaschutzinstrumente-Szenario 2030 (KIS-2030) zur Erreichung der Klimaschutzziele 2030*. Retrieved from https://www.umweltbundesamt.de/sites/default/files/medien/11740/publikationen/2023_06_15_climate_change_30_2023_klimaschutzinstrumente_0.pdf
 - Riedel, T., Bender, S., Hennig, P., Kroiher, F., Schnell, S., Schwitzgebel, F., . . . Kühling, M. (2024). *Der Wald in Deutschland: Ausgewählte Ergebnisse der vierten Bundeswaldinventur*. Retrieved from https://www.bundeswaldinventur.de/fileadmin/Projekte/2024/bundeswaldinventur/Downloads/BWI-2022_Broschuere_bf-neu_01.pdf
 - Shammugam, S., Schleich, J., Schlomann, B., & Montrone, L. (2022). Did Germany reach its 2020 climate targets thanks to the COVID-19 pandemic? *Climate Policy*, 22. <https://doi.org/10.1080/14693062.2022.2063247>
 - Stiftung Klimaneutralität, Agora Verkehrswende, Agora Energiewende, Bundesverband der Deutschen Industrie e.V., Deutsche Netzagentur, Bundesministerium für Wirtschaft und Klimaschutz, & KopernikusAriadne. (2022). *Vergleich der „Big 5“ Klimaneutralitätsszenarien*. Retrieved from https://ariadneprojekt.de/media/2022/03/2022-03-16-Big5-Szenarienvergleich_final.pdf
 - Table Media GmbH. (2025). +++ Alert +++ Klimafinanzierung im Bundeshaushalt: KTF stabil, international gekürzt. Retrieved from <https://table.media/climate/professional-briefing/alert-klimafinanzierung-im-bundeshaushalt-ktf-stabil-international-gekuertzt#2936217>
 - UBA (Umweltbundesamt) (2025). *Emissionsübersichten KSG-Sektoren 1990-2024 (MS Excel)*. Retrieved from https://www.umweltbundesamt.de/sites/default/files/medien/11867/dokumente/datentabelle_zu_den_treibhausgas-emissionen_2024.xlsx
 - Wiedemann, K. (2025). Haushaltsplan mit kleinen Überraschungen. Retrieved from <https://background.tagesspiegel.de/energie-und-klima/briefing/haushaltsplan-mit-kleinen-ueberraschungen>