

## Brief Summary and Conclusion | Biennial Report 2022 - German Council of Experts on Climate Change

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This year, for the first time, the Council of Experts on Climate Change presents an expert report on past developments in greenhouse gas emissions, trends regarding sectoral emissions and effectiveness of measures with a view to achieving targets under the Act. The report, in accordance with the mandate in the Federal Climate Protection Act (KSG), is scheduled for every two years, beginning in 2022.

### Trends in greenhouse gas emissions

The historical analyses carried out concern the period from 2000 to 2021, during which there was a greenhouse gas emission reduction of 26.6%, or temperature-adjusted 27.3%.<sup>1</sup> Over the entire period, emissions increased primarily due to economic growth. On the other hand, reduction contributions came from improvements in energy intensity, energy efficiency in the conversion sector, and the emission intensity of the national economy – i.e. both the efficiency of energy provision and use and emissions of the energy provided.

The energy, industry, buildings, and transportation sectors together accounted for about 90% of greenhouse gas emissions in 2021, with agriculture, waste management and other accounting for the remaining 10% or so. Two or three phases of greenhouse gas development can be identified in most sectors: the phase from 2000 to 2010, the phase from 2010 to 2017 or 2019, and the remaining years until 2021, were strongly driven by the special effects associated with the Covid-19 pandemic. In terms of volume, the energy sector contributed nearly half of the total emissions reduction in the period from 2000 to 2021.

Emissions from the energy sector in 2021 were 36% lower than the 2000 level, with almost all of this reduction occurring in the second phase from 2010 to 2021. The reduction in the buildings sector is similarly high at 35%, with most of the reduction here occurring in the period from 2000 to 2010; these figures apply when using temperature-adjusted data. In the transport and industry sectors, on the other hand, the reduction is much lower (13% for industry and 18% for transport, respectively) and here, too, most of the reduction occurred in the first phase from 2000 to 2010. After that, there was relative stagnation and, in the meantime, even emission increases again until 2017.

### Trends in sectoral emissions (annual emission volumes)

While the long-term trend (derived on the basis of the development from 2000 to 2021) indicates decreasing emissions in all sectors until 2030, the trend update of the development of the last years before the Covid-19 pandemic (2010 to 2019) shows increasing emissions for industry and transport. In general, the emission reduction rates to date are far from sufficient to achieve the climate protection targets for 2030 – either in total or in the individual sectors. For total emissions, the average reduction amount per year in the period from 2022 to 2030 would have to more than double compared with the historical development in the period from 2011 to 2021. For the industrial sector, about a 10-fold increase in the

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<sup>1</sup> The following figures always refer to temperature-adjusted data. The temperature adjustment only affects the building sector.

average reduction amount per year would be required, and for transportation, as much as a 14-fold increase. Even with the policy instruments implemented by 2021, according to the German government's projection report, the sector target will not be met in any sector, nor will the overall target be met in 2030.

The necessary acceleration in emissions reduction is addressed politically in the coalition agreement. The focus here is on sharply increased expansion targets for a low-CO<sub>2</sub> capital stock,<sup>2</sup> in particular for plants using renewable energy sources and increased electricity use in buildings, transport and industry. However, the trend analysis shows that the rate of expansion of solar and wind energy systems, heat pumps and electromobility is still far from sufficient to achieve these expansion targets. Such an expansion effort would have to overcome enormous challenges. In addition, the reduction of the fossil capital stock in the building or transport sector, for example of oil and gas heating systems or the fossil car stock, is necessary to the same extent. This trend reversal toward the reduction of the fossil capital stock is currently insufficient. If it is not possible to realise the rapid transformation, it will only be possible to achieve the climate targets if other levers, such as a reduction in activities, are addressed more strongly, for example with a corresponding change in consumer behaviour.

The effects of the current energy price crisis on the development of emissions, and thus on the achievement of the 2030 target, cannot yet be reliably estimated. However, they will have different effects in the sectors.

In order to estimate trends more systematically and build government action on the basis of more comprehensive and better-validated information, better monitoring of developments in the individual sectors is needed. Here, suitable indicators (ex post and ex ante) can make an important contribution to transparency and early and targeted follow-up.

### **Effectiveness of measures in terms of target achievement**

The national climate protection policy of the past two decades was characterised by a great variety and growing number of instruments used, and a high dynamic of their further development. In the first decade, the introduction of economic and regulatory instruments tended to be in the foreground, while the second decade saw the addition of subsidy programmes in particular. The latter instruments were (and are) aimed in particular at improving technical efficiency at the supply and utilisation levels. Throughout the period, the Renewable Energy Sources Act was effective as a central element in building a new, non-fossil capital stock; this law was also continuously developed. Following the "Greening of the Tax System Reform" introduced in 1999, the Fuel Emissions Trading Act in 2021 is, for the first time, an instrument at national level that directly addresses energy prices as a management tool. The national framework was overlaid by European instruments, in particular the EU Emission Trading System (ETS), and after 2007 also increasingly by regulatory requirements, resulting in mutual, often unintended, interactions. In addition, there have repeatedly been policy incentives that have tended to promote emissions.

The analysis shows that i) practically no measures have been implemented to date that were aimed directly (and not via economic quantity or price controls) at reducing activities and avoiding rebound effects, such as changes in consumer behaviour, ii) instruments aimed at building up the new capital stock did not in

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<sup>2</sup> In this report, the capital stock generally refers to all those fixed assets and consumer goods that contribute to greenhouse gas emissions and their reduction in the course of their use (i.e. including the emission-relevant assets not shown in the gross fixed assets).

many cases offer any guarantee that old capital stock would be reduced accordingly, and iii) the effects of many measures were regularly below the intended reduction targets.

## Conclusion

Three main findings of this report are crucial for the future direction of German climate policy: i) There have been substantial emission reductions in the period from 2000 to 2021, but the realised climate policy impacts were in many cases lower than the intended targets addressed by policy instruments. This is demonstrated by the very different trajectories of reductions in different sectors through periods when emissions did not continue to decline, or even rebounded. ii) An almost continuous growth of activities in all sectors, including rebound effects, counteracted a possible stronger reduction of emissions. iii) Past observed trends in GHG emissions as well as the extrapolation of trends in recent years before the Covid-19 pandemic indicate for all sectors, and overall a significant compliance gap with respect to the 2030 targets.

These observations lead to the question of whether meeting future climate targets can succeed without a paradigm shift in the direction of German climate policy. While today the political focus is primarily on the impact area of building up new capital stock, a substantial change would consist of consistently addressing all available impact areas in the future. This includes, in particular, the reduction of the fossil capital stock and the reduction of relevant activity variables. One possibility for addressing all impact areas holistically would be to impose hard limits on permissible emission volumes. Political control would then no longer have the primary task of controlling emissions, but the even greater challenge of shaping change in such a way that it is economically and distributively sustainable for the economy and society. Climate policy would then no longer be predominantly emissions reduction policy, but increasingly economic and social policy under the new framework conditions of the hard limit on quantities, which would at the same time banish the danger of rebound effects.

Without a hard cap on emissions, addressing the impact areas holistically means that, in addition to promoting the accelerated expansion of a new capital stock, political measures must also address the dismantling of the fossil capital stock and greater exploitation of behaviour-related efficiency potential<sup>3</sup> to a much greater extent than has been the case to date, in order to improve the prospect of achieving the climate targets. In this context, the guiding principle of the hard quantitative limit and climate policy as economic and social policy can significantly broaden the perspective of German greenhouse gas reduction. This is because it could create the socio-political preconditions for enabling the introduction of a hard quantitative limit. Irrespective of the fundamental change of paradigm described above, it would also appear to make sense in any case to consistently dismantle counterproductive and complexity-increasing elements in the current mix of instruments.

<sup>3</sup> Examples are: Incentives to reduce heating temperatures in private and public buildings; to consume less CO<sub>2</sub>; to accelerate the switch to modes of transport with less or no CO<sub>2</sub> emissions; and to reduce the demands on transport services in private transport or to reduce the speed in road traffic

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