

CO₂ Emissions in Germany: Still Not on the Target Trajectory

At the Kyoto Conference in December 1997 the EU committed itself to reducing the emissions of a total of six greenhouse gases by 8% by the year 2012 at the latest (generally with respect to 1990 levels). According to the 'burden sharing' system agreed by the Council of EU environment ministers on 17 June 1998, Germany is to reduce its emissions by 21% by this date. Independently of this, the new German government has reaffirmed – in the agreement between the coalition partners – the more ambitious target proclaimed by the previous government, namely to reduce German emissions of the most important greenhouse gas, carbon dioxide (CO₂), by 25% compared with 1990 levels by the year 2005.

So far during the 1990s energy-related CO₂ emissions have indeed been significantly reduced. According to preliminary estimates, in 1998 they amounted to less than 860 million tonnes. This represents a reduction of 13% compared with 1990; allowing for the influence of the annual temperature, the reduction was as much as 14½%. However, since 1993 – when the developments specific to eastern Germany following unification largely came to an end – emissions have declined only slightly. As a result, Germany is currently not on the reduction path required to achieve the target by 2005. Compared with 1998, CO₂ emissions would have to be cut by a further 14%, or by around 120 million tonnes. This target will become increasingly difficult to meet if measures to reduce emissions that exert an impact in the short term are not initiated at all levels in the very near future.

Only slight decline in CO₂ emissions in 1998

In 1998 energy-related CO₂ emissions in Germany fell by just 1.2%, broadly in line with the only slight fall in primary energy consumption (–1.3%).¹ In absolute terms emissions fell from just under 868 million tonnes

¹ Only energy-related CO₂ emissions are considered here. Those resulting from industrial processes (an estimated 25 million tonnes) are not included in the analysis. The data base for the following calculations is provided by the energy balances for Germany published by the *Arbeitsgemeinschaft Energiebilanzen* and estimations of primary energy consumption in 1998.

in 1997 to just over 857 million tonnes. Due to the slight shift in energy-source structure towards high-emission energy sources, the average CO₂ content of total primary energy consumption rose marginally (to just under 60 tonnes of CO₂ per terajoule).

With the exception of gases, all of the fossil sources of energy contributed to the reduction in CO₂ emissions in 1998. Once again the sharpest decline in emissions was recorded in the consumption of lignite (–5.2% or more than 9 million tonnes of CO₂). However, ranked according to energy sources, the CO₂ emission rankings have changed only slightly.² Petroleum products still account for the largest share of total CO₂ emissions, at 37%, followed by gases (23%) and coal and lignite, each accounting for around 20% (cf. table 1).

CO₂ emission trends depend directly on changes in the level and structure of primary energy consumption, and these are influenced by the prevailing weather conditions. Such influences must be allowed for, particularly in short-term analyses of energy consumption and CO₂ emissions, in order to avoid distorted interpretations of the original data.³ The comparison between 1997 and 1998 was influenced significantly by the temperature effect. In terms of degree-days, namely, the climate in 1998 was significantly warmer than a year earlier, namely by around 3%. Adjusting for this temperature-related influence, primary energy consumption fell in 1998 by 0.7% (compared with 1.3% in terms of the original values). Correspondingly, allowing for the temperature effects, the reduction in CO₂ emissions, at 0.5% or just under five million tonnes, was significantly weaker than suggested by the unadjusted data (cf. figure 1).

Pace of in the decline in CO₂ emissions has fallen during the 1990s

In 1998 the total energy-related CO₂ emissions in Germany were 13% lower than in 1990 (cf. table 2). Yet 94 million tonnes of CO₂, almost three-quarters of the overall reduction during the observation period (1990 to

² It is to be noted that, alongside natural gases, the term 'gases' includes liquid gas and refinery gas, coking gas, town gas and top gas. Quite apart from data revisions as new information has become available, this means that the emission figures given for the various fossil fuels deviate from those published in earlier work by the DIW in which emissions resulting from the combustion of liquid gas and refinery gas were classified under petroleum, while emissions of coking gas, town gas and top gas came under coal.

³ The temperature adjustment procedure for energy consumption is described in a DIW report to the Federal Ministry of the Economy, September 1995 (available in German as a manuscript).

Table 1

Energy-related CO₂ Emissions in Germany by Energy Source, 1997, 1998

	CO ₂ emissions		Change		Shares	
	1997 ¹	1998 ¹	1997/1998 ¹		1997 ¹	1998 ¹
	Mill. t				%	
actual values						
Petroleum products	320.1	318.6	-1.5	-0.5	36.9	37.2
Gases ²	195.6	196.4	0.8	0.4	22.5	22.9
Coal	170.5	170.0	-0.5	-0.3	19.7	19.8
Lignite	177.9	168.7	-9.2	-5.2	20.5	19.7
Other ³	3.6	3.5	-0.1	-3.0	0.4	0.4
Total	867.7	857.2	-10.5	-1.2	100.0	100.0
figures adjusted for temperature						
Petroleum products	322.9	323.7	0.7	0.2	36.9	37.2
Gases ²	199.1	202.6	3.5	1.8	22.7	23.3
Coal	171.1	171.0	-0.1	-0.1	19.5	19.6
Lignite	178.5	169.7	-8.9	-5.0	20.4	19.5
Other ³	3.7	3.7	0.0	-0.5	0.4	0.4
Total	875.4	870.6	-4.8	-0.5	100.0	100.0

1 Provisional. — 2 Natural gases, liquid and refinery gas and coking/town gas and top gas. — 3 Including statistical discrepancies.
Source: DIW calculations.

1998), had already been achieved by 1993; consequently, compared with 1993, CO₂ emissions had been cut by just 36 million tonnes by 1998. This trend becomes even clearer when allowance is made for changes in annual temperature; of the total reduction in the years between 1990 and 1998, amounting to 147 million tonnes of CO₂ (-14½%), around 119 million tonnes or more than 80% occurred in the earlier period.

The rapid decline in emissions in the early 1990s was due solely to the fundamental changes occurring in eastern Germany. Here, between 1990 and 1993 alone, energy-related CO₂ emissions fell by almost 115 million tonnes, or by 38%, whereas in west Germany they increased by almost 19 million tonnes or just under 3% in the same period. As this effect, which it is safe to assume was a one-off phenomenon, has attenuated, the decline in CO₂ emissions in Germany as a whole have slowed markedly since 1993.⁴

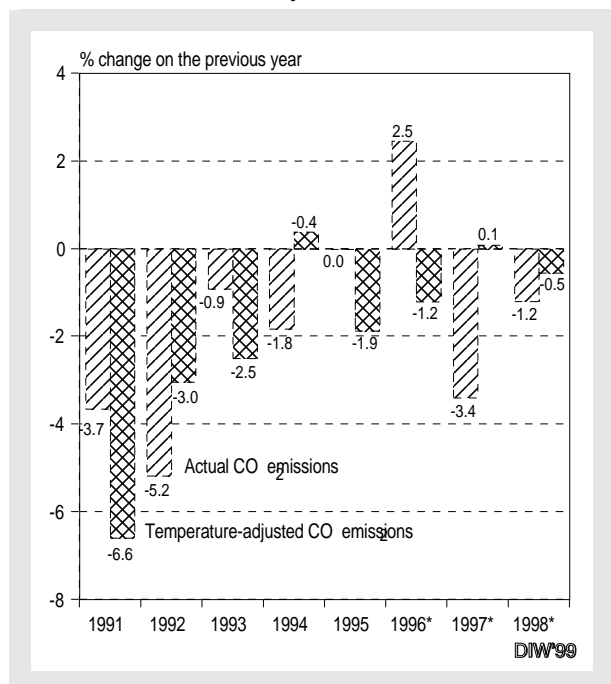
Decline in CO₂ emissions due largely to declining energy and emission intensity

To a large extent the reduction in CO₂ emissions achieved so far has been due to the decline in the macroeconomic 'emission intensity', i.e. the relationship

⁴ It is no longer possible to analyse emission trends separately for east and west Germany, as separate energy data are only available up to 1995.

between CO₂ emissions and real GDP (cf. figure 2). CO₂ emissions and macroeconomic growth have diverged

Figure 1
Actual and Temperature-adjusted CO₂ Emissions in Germany, 1991 to 1998



* Provisional.
Sources: Federal Environmental Agency; DIW calculations.

Table 2

Energy-related CO₂ Emissions in Germany by Energy Source, 1990 to 1998

	1990	1991	1992	1993	1994	1995	1996 ¹⁾	1997 ¹⁾	1998 ¹⁾
actual CO ₂ emissions in million tonnes									
Petroleum products	299.7	320.2	322.7	330.4	320.0	320.5	328.8	320.1	318.6
Gases ²⁾	158.1	164.9	161.4	166.7	173.0	182.6	202.3	195.6	196.4
Coal	181.7	188.2	175.9	174.9	175.3	177.5	177.0	170.5	170.0
Lignite	343.2	274.8	239.1	218.8	205.9	192.8	186.6	177.9	168.7
Other ³⁾	4.0	2.6	2.4	2.3	2.6	3.4	3.5	3.6	3.5
Total	986.6	950.6	901.4	893.1	876.8	876.7	898.2	867.7	857.2
changes in actual total CO ₂ emissions in % compared with ...									
1990	.	-3.7	-8.6	-9.5	-11.1	-11.1	-9.0	-12.1	-13.1
Previous year	.	-3.7	-5.2	-0.9	-1.8	0.0	2.5	-3.4	-1.2
structure of actual CO ₂ emissions in %									
Petroleum products	30.4	33.7	35.8	37.0	36.5	36.6	36.6	36.9	37.2
Gases ²⁾	16.0	17.4	17.9	18.7	19.7	20.8	22.5	22.5	22.9
Coal	18.4	19.8	19.5	19.6	20.0	20.2	19.7	19.7	19.8
Lignite	34.8	28.9	26.5	24.5	23.5	22.0	20.8	20.5	19.7
Other ³⁾	0.4	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.4
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
temperature-adjusted CO ₂ emissions in million tonnes									
Petroleum products	308.0	320.3	330.0	332.5	328.9	323.5	320.2	322.9	323.7
Gases ²⁾	167.1	165.0	168.2	168.7	182.9	186.1	191.5	199.1	202.6
Coal	186.6	188.2	178.5	175.6	178.5	178.7	175.1	171.1	171.0
Lignite	352.0	274.8	242.7	219.7	209.3	193.7	184.7	178.5	169.7
Other ³⁾	4.2	2.6	2.5	2.4	2.7	3.4	3.2	3.7	3.7
Total	1 018	950.9	921.9	898.9	902.3	885.4	874.7	875.4	870.6
changes in temperature-adjusted total CO ₂ emissions in % compared with ...									
1990	.	-6.6	-9.4	-11.7	-11.4	-13.0	-14.1	-14.0	-14.5
Previous year	.	-6.6	-3.0	-2.5	0.4	-1.9	-1.2	0.1	-0.5
structure of temperature-adjusted CO ₂ emissions in %									
Petroleum products	30.3	33.7	35.8	37.0	36.4	36.5	36.6	36.9	37.2
Gases ²⁾	16.4	17.4	18.2	18.8	20.3	21.0	21.9	22.7	23.3
Coal	18.3	19.8	19.4	19.5	19.8	20.2	20.0	19.5	19.6
Lignite	34.6	28.9	26.3	24.4	23.2	21.9	21.1	20.4	19.5
Other ³⁾	0.4	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.4
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

1 Provisional. — 2 Natural gases, liquid and refinery gas and coking/town gas and top gas. — 3 Including statistical discrepancies.
Sources: Federal Environmental Agency; DIW calculations.

significantly. Per unit of real GDP, around 25% less CO₂ was emitted in 1998 than in 1990; this implies an annual average decline of 3.5%.

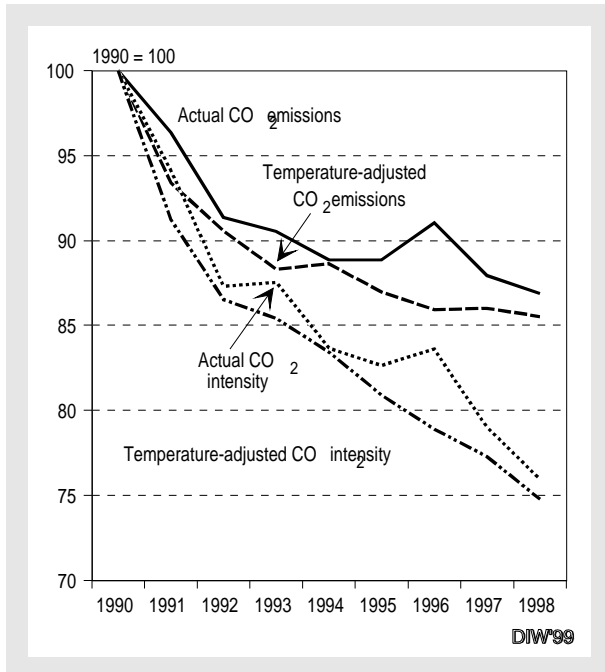
In order to gain a more highly differentiated impression of the influence of the various determining factors, the various components were disaggregated, enabling us to estimate to what extent the changes in CO₂ emissions can be traced back to changes in (cf. table 3):

- population,
- GDP per inhabitant (per capita income),
- overall energy intensity (primary energy consumption to GDP),
- the CO₂ content of fossil energy sources.

The analysis of the data, after allowing for temperature effects, shows that the decline in CO₂ emissions in Germany between 1990 and 1998 reflects contradictory influences (cf. figure 3). The emission-raising effects of rising GDP per inhabitant (+100 million tonnes of CO₂) and of population growth (+27 million tonnes) were far more than offset by the emission-reducing effects of the substantial decline in energy intensity (-178 million tonnes) and the reduced CO₂ content of total primary energy consumption (-97 million tonnes).

Looking at the orders of magnitude of the various effects considered, it is clearly the reduction in energy intensity – which, at the risk of over simplification, can

Figure 2
CO₂ Emissions and Macroeconomic CO₂ Intensity in Germany, 1990 to 1998



* Provisional. — 1 CO₂ emissions per unit of GDP (at 1991 prices).
Sources: Federal Environmental Agency; DIW calculations.

be interpreted as an improvement in the macroeconomic 'productivity' of energy – that plays the predominant role for the overall decline in emissions. Also, the substantial contribution to reducing emissions made by the declining average CO₂ content of total energy consumption reflects the sustained shift in the structure of energy sources in the course of the 1990s. It is important to note that the various fossil energy sources exhibit very different specific (i.e. with respect to their energy content) CO₂ emissions. Compared with natural gas, they are almost twice as high for lignite, around two-thirds higher for coal, and around one-third higher for heating oil.

In the course of the 1990s the greatest quantitative contribution was made by the sharp fall in the use of lignite in eastern Germany. Back in 1990 lignite accounted for more than one-fifth of primary energy consumption in Germany; by 1998 the relative contribution to energy supply had been halved. As a result of this the contribution made by lignite to total CO₂ emissions fell from just over one-third to around one-fifth; the consumption of coal also fell slightly, and along with it the associated CO₂ emissions. On the other hand, the consumption of natural gas, which of all the fossil fuels has the lowest specific emissions of carbon dioxide, expanded very strongly; in 1998 CO₂ emissions resulting from the combustion of all gases were around 38% higher than in

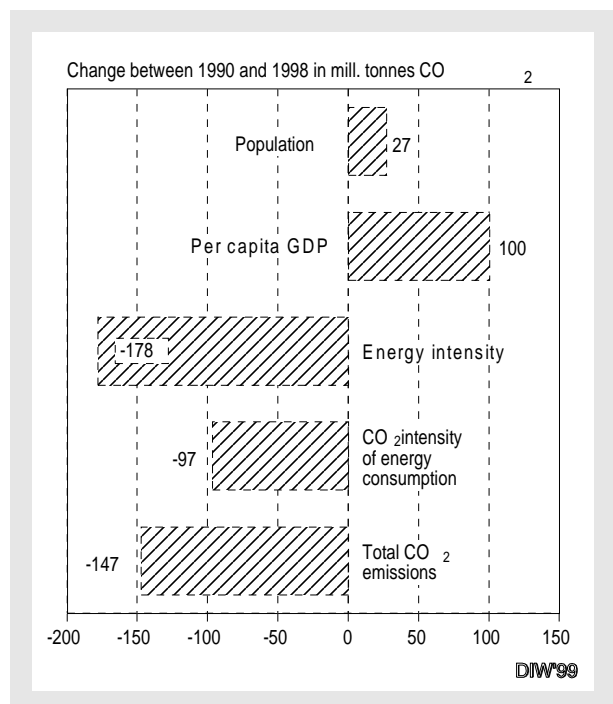
1990. At almost one-fifth, CO₂ emissions resulting from oil consumption also increased markedly, although since 1993 the figure has more or less stagnated.

The influences of the emission-reducing factors (energy and CO₂ intensity) on CO₂ emissions trends have tended to weaken in recent years; in 1998, however, the reduction in CO₂ emissions can be explained exclusively with reference to the marked decline in overall energy intensity (cf. figure 4). A fall in the pace of decline is also evident in energy-related CO₂ emissions per inhabitant; allowing for the temperature effect, they initially fell quickly from 12.8 tonnes of CO₂ in 1990 to 11.1 tonnes in 1993, but between then and 1998 only declined to 10.6 tonnes of CO₂. Since the middle of the 1990s there has no longer been any significant reduction due to this effect.

Sectoral emission trends

On the basis of the available data it is only possible to analyse energy-related CO₂ emissions by emitter group (sector) for the period 1990 to 1997. Considering the

Figure 3
Contributions of Various Influential Factors to the Change in Temperature-adjusted Energy-related CO₂ Emissions in Germany



Sources: Arbeitsgemeinschaft Energiebilanzen; Federal Environmental Office; Federal Statistical Office; DIW calculations.

Table 3

Indicators of Primary Energy Consumption and CO₂ Emission Trends in Germany, 1990 to 1998

	Unit	1990	1991	1992	1993	1994	1995	1996 ¹	1997 ¹	1998 ¹
Inhabitants	Mill.	79.8	80.3	81.0	81.3	81.5	81.8	82.0	82.1	82.1
GDP	DM bill. in 1991 prices	2 787	2 854	2 916	2 882	2 960	2 996	3 035	3 101	3 188
GDP per capita	DM 1000	34.9	35.5	36.0	35.4	36.3	36.6	37.0	37.8	38.8
actual values and indicators										
Primary energy consumption (PEC)	PJ	14 903	14 609	14 316	14 305	14 183	14 269	14 739	14 510	14 320
Fossil sources of energy	PJ	13 132	12 902	12 496	12 518	12 392	12 355	12 786	12 459	12 355
Zero-emission sources as % of PEC	%	11.9	11.7	12.7	12.5	12.6	13.4	13.2	14.1	13.7
CO ₂ emissions	mill. t.	986.6	950.6	901.4	893.1	876.8	876.7	898.2	867.7	857.2
PEC per capita	GJ	187	182	177	176	174	174	180	177	174
CO ₂ emissions per capita	t. CO ₂	12.4	11.8	11.1	11.0	10.8	10.7	11.0	10.6	10.4
CO ₂ content of fossil fuels	t. CO ₂ /TJ	75.1	73.7	72.1	71.3	70.8	71.0	70.2	69.6	69.4
Macroeconomic energy intensity	DM bill. of GDP TJ/	5 348	5 120	4 909	4 964	4 791	4 762	4 857	4 679	4 491
Macroeconomic CO ₂ intensity	Mill. DM BIP t CO ₂ /	354	333	309	310	296	293	296	280	269
temperature-adjusted values and indicators										
Primary energy consumption (PEC)	PJ	15 349	14 613	14 632	14 395	14 581	14 405	14 354	14 637	14 541
Fossil sources of energy	PJ	13 559	12 906	12 795	12 603	12 774	12 486	12 420	12 580	12 565
Zero-emission sources as % of PEC	%	11.7	11.7	12.6	12.4	12.4	13.3	13.5	14.1	13.6
CO ₂ emissions	mill. t.	1 018	951	922	899	902	885	875	875	871
PEC per capita	GJ	192.5	182.0	180.7	177.0	178.8	176.1	175.0	178.4	177.2
CO ₂ emissions per capita	t. CO ₂	12.8	11.8	11.4	11.1	11.1	10.8	10.7	10.7	10.6
CO ₂ content of fossil fuels	t. CO ₂ /TJ	75.1	73.7	72.1	71.3	70.6	70.9	70.4	69.6	69.3
Macroeconomic energy intensity	DM bill. of GDP TJ/	5 508	5 121	5 017	4 995	4 926	4 808	4 730	4 720	4 561
Macroeconomic CO ₂ intensity	Mill. DM BIP t CO ₂ /	365	333	316	312	305	296	288	282	273

¹ Some figures are provisional.

Sources: Arbeitsgemeinschaft Energiebilanzen; Federal Environmental Agency; Federal Statistical Office; DIW calculations.

emissions that can be ascribed directly to the various sectors,⁵ the energy sector (energy generation and conversion) clearly predominates, still accounting in 1997 for more than two-fifths of total energy-related CO₂ emissions. This was followed by transport,⁶ at 20%, private households with 16% and industry at just over 14%, with CSO (commerce, services and others) bringing up the rear, accounting for less than 8% (cf. figure 5).

⁵ This means that the emissions resulting from the generation of secondary energy sources (electricity and district heat) are not credited to the final-user sectors (where their use does not lead to emissions), but rather as direct emissions to power stations and heat-power stations. The sectoral structure of emissions is based on the classification used in the energy balances. To this extent deviations from figures from other sources are possible.

Yet over recent years emission trends in the various sectors have differed significantly. Whereas by 1997 emissions had fallen in industry and CSO by around 27% and in the energy sector by almost 17% compared with 1990, CO₂ emissions in transport and by private households exceeded 1990 levels by more than 9% and 8% respectively (cf. table 4). In absolute terms, the decline in emissions of around 74 million tonnes of CO₂ in the energy sector was most significant, followed by that in industry and CSO (46 and 25 million tonnes

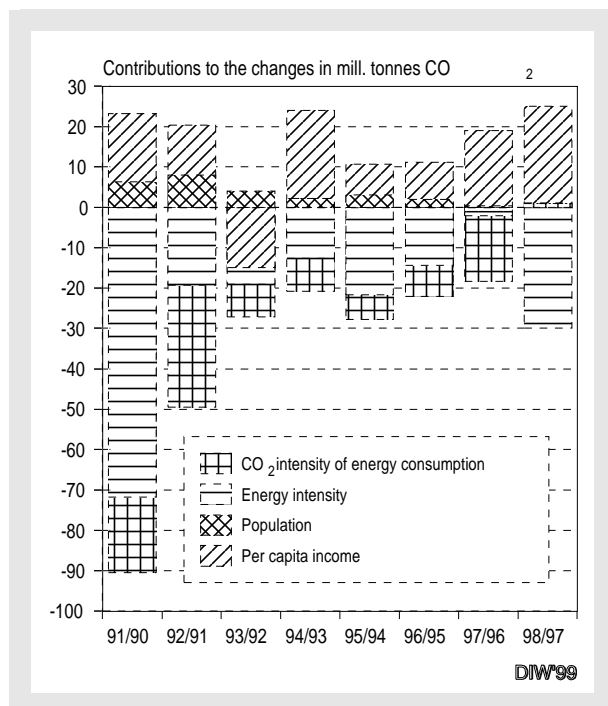
⁶ It is to be noted that, in accordance with the approach agreed at international level, the transport-related CO₂ emissions do not include those due to international air transport. For Germany it is assumed that international air travel accounts for 80% of the fuel consumption recorded in Germany for air transport.

respectively). The increase in emissions by transport amounted to 15 million tonnes and by private households to 11 million tonnes.

Comparison of the total energy-related emissions in 1997 with those in the base year (1990) conceals the very heterogeneous developments during this period. For the sectorally differentiated analysis, too, the major changes that occurred in eastern Germany in the early 1990s play an important role. For instance, around 70% of the overall sectoral reduction in emissions for the entire period from 1990 to 1997 was achieved in the three years from 1990 to 1993 in the energy sector and CSO, and as much as 92% in industry. Equally, it is striking that in road transport, at 93%, virtually the entire increase in emissions had occurred by 1993. Since 1993 road-transport emissions have stagnated at a level of around 165 million tonnes.

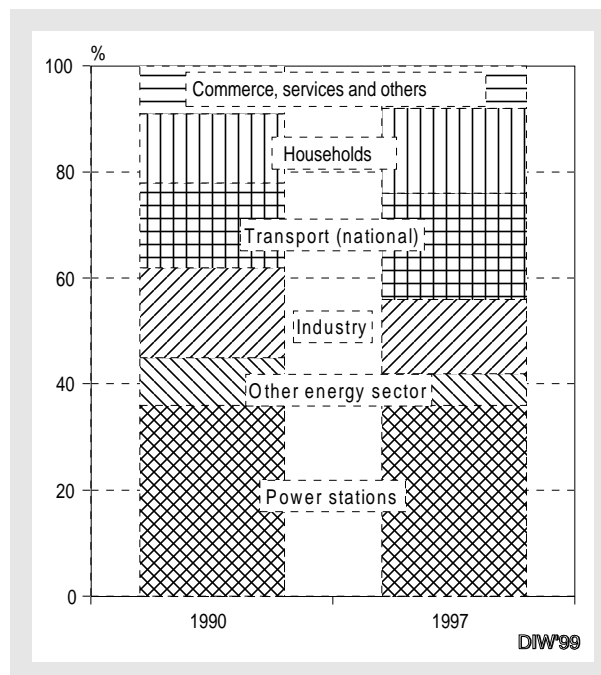
Whereas in transport the rapid increase in emissions appears to have been restrained, in the other sectors the pace of the decline in emissions appears to have weakened substantially.⁷ For instance, direct CO₂ emissions by industry fell by just 3.5 million tonnes in the four years from 1993 to 1997; indeed they even rose slightly

Figure 4
Contributions of Various Influential Factors to the Annual Changes in Temperature-adjusted Energy-related CO₂ Emissions in Germany 1990 to 1998



Sources: Arbeitsgemeinschaft Energiebilanzen; Federal Environmental Agency; Federal Statistical Office; DIW calculations.

Figure 5
Sectoral Structure of Energy-related CO₂ Emissions in Germany, 1990 and 1997



Sources: Federal Environmental Agency; Arbeitsgemeinschaft Energiebilanzen; DIW calculations.

in 1997. On the basis of the energy consumption volumes in the manufacturing sector recorded by the Federal Statistical Office, the increase in CO₂ emissions was highest in the production of metal products (+5.2%), metal working (+4.6%) and the chemical industry (+3.2%).⁸ It is against this background that the statements by German industry's voluntary commitment to significantly reduce their (specific or absolute) CO₂ emissions must be seen. While it is correct that the specific

⁷ In this context the apparently sharp fall in CO₂ emissions in 1997 compared with the previous year should not be over-interpreted, because it largely reflects – as can be seen from figure 1 – the very cold weather in 1996 on the one hand and the very mild climate in 1997 on the other. Indeed, allowing for the temperature effect, emissions in 1997 would actually have been higher than in 1996. This statement does not apply to all sectors, however, as this effect is likely to have been most pronounced in the private household and CSO sectors, where room heating plays an important role. Even so, the impact of the higher temperature will not have been negligible even in the other sectors.

⁸ The official statistics cover the following fuels: electricity, coal, lignite, light and heavy heating oil, town/coking gas and natural gas, whereby no account is taken of the use to which they are put; thus the figures cover the use of fuels as a raw material and own electricity generation. Consequently, energy consumption according to this definition is not strictly comparable to final energy consumption as classified in the energy balances. The CO₂ emissions are calculated on the basis of the specific emission factors used by the Federal Environmental Office.

Table 4

Energy-related CO₂ Emission Trends in Germany by Sector, 1990 to 1997¹

	1990	1991	1992	1993	1994	1995	1996 ²	1997 ²
CO ₂ emissions in million tonnes								
Energy generation/conversion	439.4	426.6	400.8	387.7	384.1	380.0	382.4	365.8
of which: power stations	353.6	349.8	332.8	323.6	322.6	320.1	322.3	309.8
power-heat/district heat stations	42.9	39.7	36.2	33.0	31.2	29.4	29.7	26.7
other energy conversion areas	43.0	37.1	31.8	31.1	30.2	30.4	30.4	29.3
Industry	169.7	147.1	135.5	127.0	128.4	127.1	121.7	123.5
Transport (national) ³	158.7	162.1	168.3	172.5	168.8	172.5	172.4	173.4
of which: road transport	150.8	154.6	160.5	164.4	160.9	165.0	165.0	165.5
Households	128.4	130.7	123.1	133.5	128.3	128.9	146.4	139.3
Commerce, services and others ⁴	90.4	84.1	73.7	72.5	67.1	68.3	75.3	65.7
Total energy-related emissions	986.6	950.6	901.4	893.1	876.8	876.7	898.2	867.7
structure of CO ₂ emissions in %								
Energy generation/conversion	44.5	44.9	44.5	43.4	43.8	43.3	42.6	42.2
of which: power stations	35.8	36.8	36.9	36.2	36.8	36.5	35.9	35.7
power-heat/district heat stations	4.3	4.2	4.0	3.7	3.6	3.4	3.3	3.1
other energy conversion areas	4.4	3.9	3.5	3.5	3.4	3.5	3.4	3.4
Industry	17.2	15.5	15.0	14.2	14.6	14.5	13.5	14.2
Transport (national) ³	16.1	17.1	18.7	19.3	19.3	19.7	19.2	20.0
of which: road transport	15.3	16.3	17.8	18.4	18.4	18.8	18.4	19.1
Households	13.0	13.8	13.7	14.9	14.6	14.7	16.3	16.1
Commerce, services and others ⁴	9.2	8.8	8.2	8.1	7.7	7.8	8.4	7.6
Total energy-related emissions	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
changes in CO ₂ emissions on previous year in %								
Energy generation/conversion	.	-2.9	-6.1	-3.3	-0.9	-1.1	0.6	-4.3
of which: power stations	.	-1.1	-4.9	-2.8	-0.3	-0.8	0.7	-3.9
power-heat/district heat stations	.	-7.4	-8.9	-8.8	-5.4	-5.8	0.8	-10.0
other energy conversion areas	.	-13.7	-14.2	-2.2	-2.8	0.7	0.0	-3.6
Industry	.	-13.4	-7.9	-6.3	1.2	-1.1	-4.2	1.5
Transport (national) ³	.	2.2	3.8	2.5	-2.1	2.2	0.0	0.5
of which: road transport	.	2.5	3.8	2.5	-2.1	2.5	0.0	0.3
Households	.	1.8	-5.9	8.4	-3.8	0.4	13.6	-4.9
Commerce, services and others ⁴	.	-7.0	-12.3	-1.6	-7.4	1.7	10.2	-12.7
Total energy-related emissions	.	-3.7	-5.2	-0.9	-1.8	0.0	2.5	-3.4
changes in CO ₂ emissions compared with 1990 in %								
Energy generation/conversion	.	-2.9	-8.8	-11.8	-12.6	-13.5	-13.0	-16.8
of which: power stations	.	-1.1	-5.9	-8.5	-8.8	-9.5	-8.8	-12.4
power-heat/district heat stations	.	-7.4	-15.6	-23.0	-27.2	-31.4	-30.8	-37.7
other energy conversion areas	.	-13.7	-26.0	-27.6	-29.7	-29.2	-29.2	-31.8
Industry	.	-13.4	-20.2	-25.2	-24.3	-25.2	-28.3	-27.3
Transport (national) ³	.	2.2	6.1	8.7	6.4	8.7	8.7	9.3
of which: road transport	.	2.5	6.4	9.0	6.7	9.4	9.4	9.7
Households	.	1.8	-4.2	3.9	-0.1	0.4	14.0	8.5
Commerce, services and others ⁴	.	-7.0	-18.4	-19.8	-25.7	-24.4	-16.7	-27.3
Total energy-related emissions	.	-3.7	-8.6	-9.5	-11.1	-11.1	-9.0	-12.1

1 Sectoral classification as in the energy balances for Germany. — 2 Provisional. — 3 Excluding international air transport (80% of the fuel consumption recorded in Germany for air transport). — 4 Including military establishments.
Sources: Federal Environmental Office; DIW calculations.

CO₂ emissions by industry, given an increase in output of 3.5% in 1997, have again fallen (by around 2%), what is important in terms of the goal of climate protection is the absolute reduction in emissions. There is still an urgent need for action here, although this need is not restricted to industry, and is perhaps even more pressing in transport and housing.

Conclusion

The new German government has adopted its predecessor's target of reducing CO₂ emissions in Germany by 25% on their 1990 level by the year 2005. A substantial reduction was achieved between 1990 and 1998, amounting to 14½% (allowing for the effect of temperature changes). However, now that the one-off influences in eastern Germany have come to an end, the decline in emissions has slowed significantly. There is no sign that Germany is moving over to the reduction trajectory considered necessary. One year ago we expressed doubts as to whether the targets set could still be met. All the cur-

rent prognoses suggest the contrary. These doubts have grown, all the more so as the energy and environmental policy of the new German government, the outlines of which are now becoming evident, do not raise great expectations.

Moreover, the policy aim of abandoning nuclear energy throws down a major challenge to climate protection policy, and makes it necessary to initiate effective compensatory measures to reduce emissions in all areas of energy supply.

Independently of this, if the emission target for 2005 is still to be met, substantial additional efforts will be required to reduce CO₂ emissions in the just seven years remaining by a total of 14%, or by around 120 million tonnes. A large number of studies have pointed to the ways in which this can be done. What is now needed is that these recommendations be taken up and implemented by policy makers, and also by companies and private households, in the form of a broadly based and targeted bundle of measures. Action is urgently required if the federal government still intends to meet the reduction target it has set itself.

Hans-Joachim Ziesing