
Emission reductions in industrialized countries and their impacts on developing countries

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Structure of session

- **Success and failures in industrial country emission reduction**
 - The German example
- **Potential impacts of industrial country climate policy on developing countries**
 - Mitigation
 - Adaptation

Industrialized country action

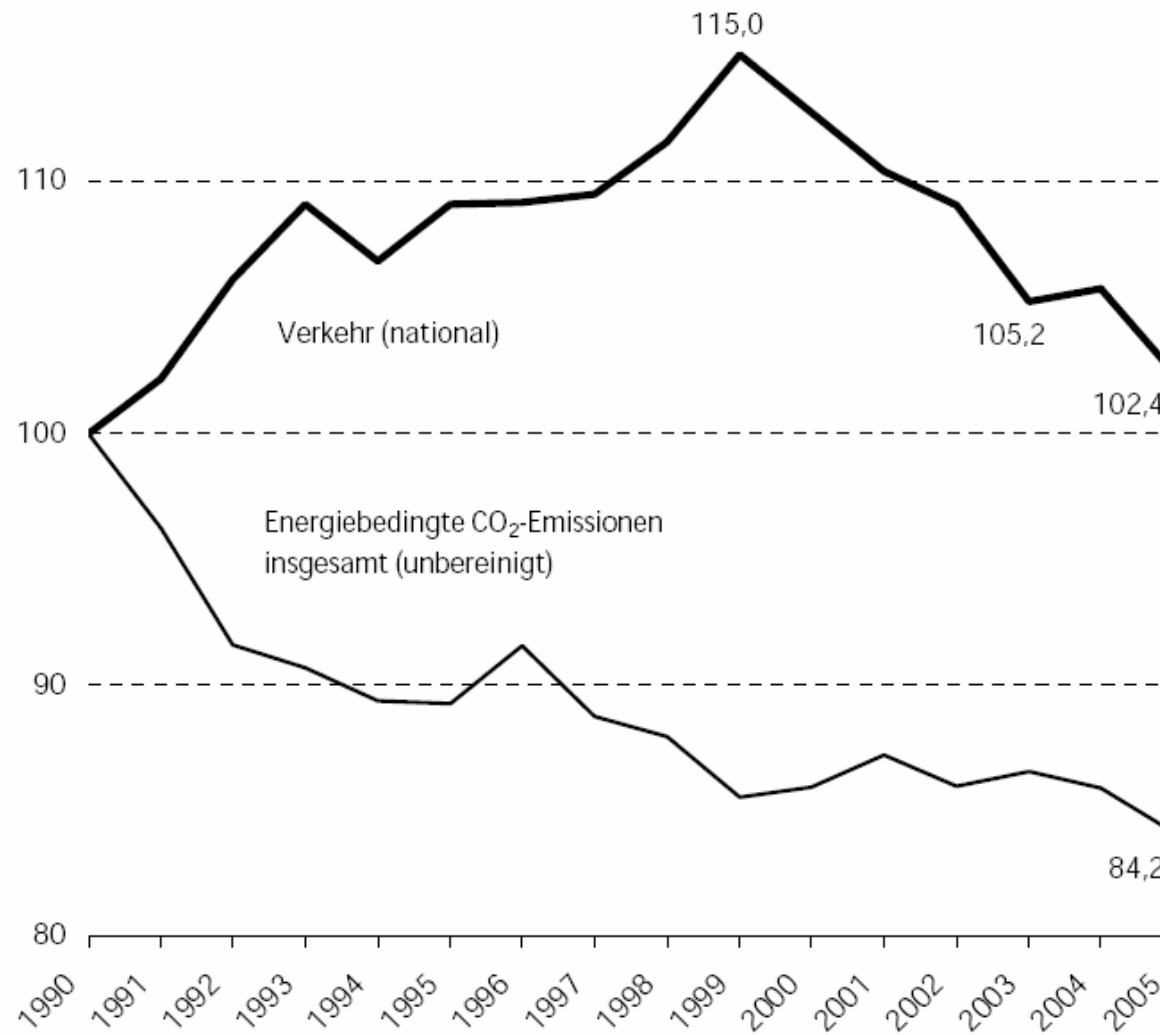
- **Industrialized countries have had a wide range of experience in greenhouse gas reduction**
- **Reductions have proved to be much more difficult to achieve than initially thought**
- **Massive reductions were**
 - **either linked to far ranging structural changes in the economy as in countries in transition**
 - **due to an increase in relative availability of low carbon fuels**
- **Improvement in energy efficiency of goods and machinery has been more than offset by an increase in numbers of those items**

German emissions path 1990 - 2004

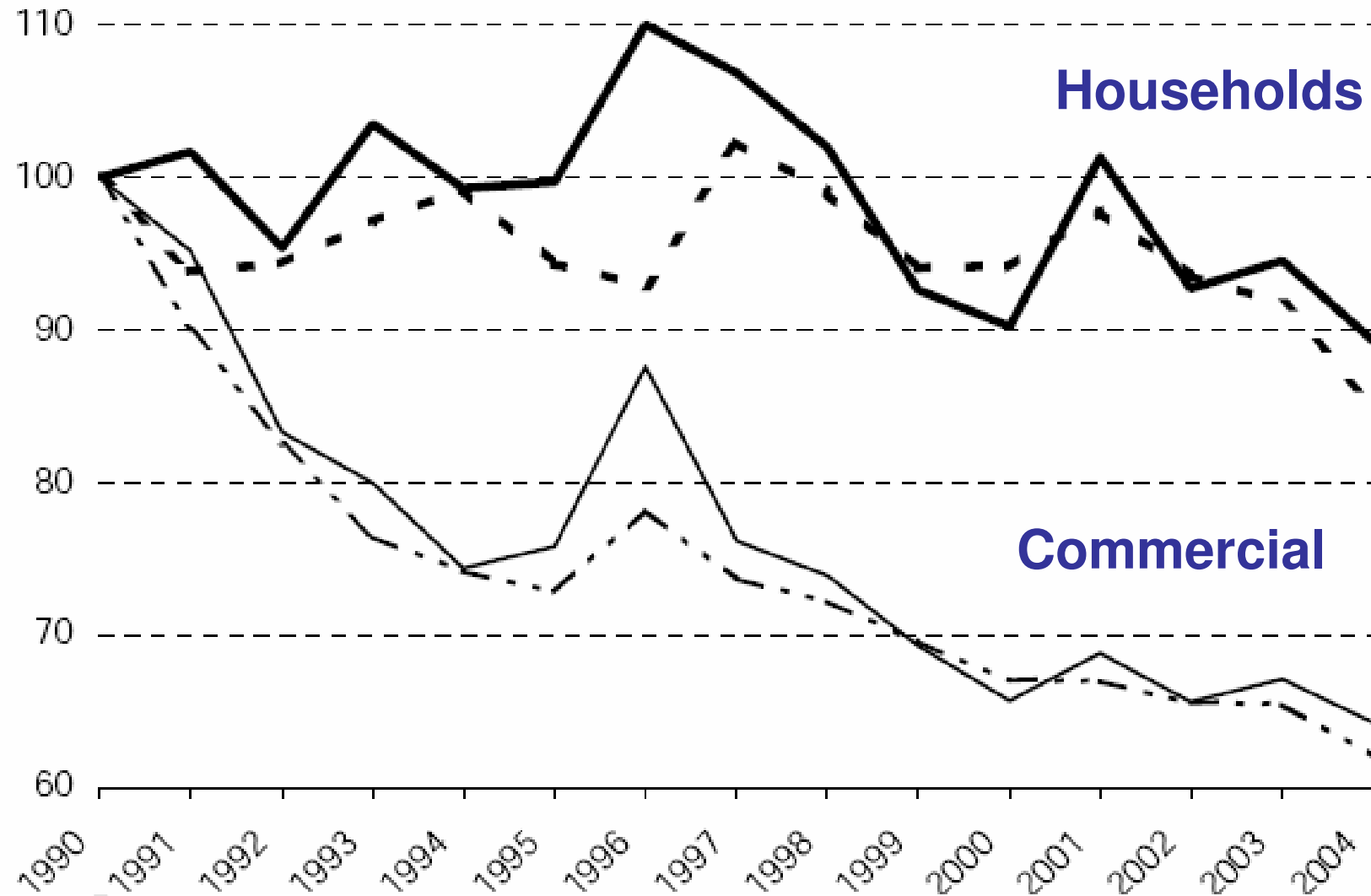
Gas	Base year emission (Mt CO ₂ eq.)	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
CO ₂	1029.2	-3.8	-8.5	-9.5	-10.9	-10.8	-8.4	-11.3	-12.0	-14.7	-14.0	-12.8	-14.0	-13.4	-14.1	-15.9
CH ₄	95.3	-10.0	-16.5	-27.4	-18.8	-20.3	-23.3	-26.7	-31.8	-33.2	-36.9	-39.9	-41.2	-43.6	-48.2	NA
N ₂ O	84.5	-2.3	+0.5	-3.7	-3.3	-8.5	-9.1	-12.9	-28.7	-32.4	-30.0	-31.1	-31.7	-28.7	-26.5	NA
HFC	6.6						-17.5	+10.2	+10.6	+12.1	+0.0	+21.2	+30.3	+28.8	+28.8	NA
PFC	1.7						+3.7	-12.0	-3.1	-29.4	-53.0	-58.7	-53.0	-47.0	-53.0	NA
SF ₆	7.2						-1.4	-4.4	-7.0	-26.4	-29.2	-32.1	-41.7	-40.3	-37.5	NA
Sum	1224.6	-4.3	-8.7	-10.3	-11.0	-11.2	-10.6	-12.5	-14.6	-17.1	-17.0	-16.1	-17.3	-16.7	-17.6	NA

- Deep reductions in methane, nitrous oxide PFC and SF₆
- Reductions in CO₂, especially until 1994 and 1996-1999 as well as 2003-2005

German transport emissions



German household emissions



Emissions targets over time

Date of target setting	Base year	Target year	Gas covered	Reduction
June 1990 (West Germany)	1987	2005	Energy-related CO ₂	25%
November 1990 (united Germany)	1987	2005	Energy-related CO ₂	25% (West Germany) “significantly more than 25%” (East Germany)
November 1991	1987	2005	Energy-related CO ₂	25 to 30%
April 1995	1990	2005	Energy-related CO ₂	25%
March 1997	1990	2008-12	CO ₂ , CH ₄ , N ₂ O	25%
June 1998	1990	2008-12	Kyoto basket	21%

Targets have been considerably watered down over the years, especially after unification

Climate policy cornerstones

- 1987: Parliamentary enquiry commission „Protection of the earth's atmosphere“
- 1990: "Interministerial Working Group CO₂ Reduction" (IMA)
- First national climate policy programme 1994: focus on EU CO₂/energy tax
- Second National Communication 1997: 143 measures
- Second national climate policy programme 2000: 75 measures, indicative sectoral targets
- Interim report on programme 2005: measures reducing 5 Mt in household and 10 Mt in transport

Umbrella instruments

- Pre 1998: waiting for Godot, i.e. the EU CO₂/energy tax
- Post 1998: “Ecotax” on energy with stepwise introduction; many exemptions:

Tax rate (%)

100

50

20

0

Households,
services,
small
companies*

Public
transport,
electrical
heating**

Manu-
facturing,
agriculture

Energy-
intensive
industry,
cogeneration,
gas-fired
power >
57.5%
electrical
efficiency

Voluntary agreements

- 1995 agreement: 10 sectors, specific “up to” 20% reduction (1987- 2005)
 - no heat use regulation
- 1996 update: 17 sectors, absolute 20% reduction (1990- 2005), external monitoring
- 2000 update: ? sectors, absolute 28% reduction (1990 - 2005)
- 2001 update electricity: “up to” 45 Mt CO₂ (1998-2010)
 - no cogeneration quota
- 2005: Voluntary agreement substituted by allocation under ETS, much weaker than 45 Mt CO₂

Industry's fight against emission trading

- **Industry feared absolute targets**

- make visible that current voluntary agreements are business as usual

- **Industry feared auctioning**

- transparency of winners and losers
- intense campaign against EU Commission draft using blunt pressure on the commission, newspaper ads, commissioning of “research” on the high costs of trading

- **Government supported mandatory “pooling”**

- pool eventually was not introduced

- **Persistent special rules for allocation**

- lignite benchmark, early action,

Renewable energy

Type of renewable energy	Feed-in-tariff (Cent/kWh)	Installed capacity end 2006 (MW)	Electricity production (TWh, % of total)
Wind	6.2- 9.1	22750	31 (4.8)
Biomass	8.7 – 10.2	1700	6 (1.2)
PV	50.6	1500	1 (0.15)
Small hydro (< 5 MW)	6.7 –7.6	1600	NA
Geothermal	7.1- 8.9	5	0

Subsidies (million €)

	1996	1997	1998	1999	2000	2001	2002
Feed-in-law/EEG	301	403	551	639	1136	1380	1680
Investment subsidy	9	9	9	102	153	102	200
100,000 roofs PV				92	113	113	113
Biofuels					3	5	10
Sum	310	412	560	833	1405	1600	2003

Conclusions on German policy

- **Seemingly successful emission reduction**
 - 50% “hot air”
 - Build up of East German infrastructure
 - Business as usual voluntary agreements
- **Complex maze of hundreds of measures**
 - Caters interest groups
- **Policies have focused on expensive measures**
- **Concerning cost-effective measures and market instruments, Germany is a laggard**
 - Only semi-hearted implementation of emissions trading

Outlook: 2010 and beyond

Nuclear phase-out

- 5- 15% emissions increase until 2025

Transport sector: unclear tendency

- Trend towards SUVs?
- High fuel efficient cars, fuel cell?

Households: growth trends

- growth in dwelling space per capita
- “intelligent house” uses more electricity
- labelling of consumer goods

Renewables

- reach full competitiveness?

Use of Kyoto Mechanisms limits risk

Impacts of mitigation on developing countries

- **Any mitigation action in the energy sector will lead to a reduced demand for fossil fuels**
 - heavy impact on fuels with a high carbon content.
 - reduced world market prices for these fuels
 - reduced revenues of fossil fuel exporting countries
 - Countries importing fossil fuels will unambiguously profit from the lower prices
- **Mitigation policies can lead to increased competitiveness of energy-intensive production, if the latter is based on domestic fossil fuel sources**

Impacts of mitigation II

- In the short term, availability of renewable energy technology can be impacted by mitigation measures
- Lower availability and higher price of such technologies for developing countries is possible, if supply cannot cope with demand in the short term
 - PV module prices have not fallen in the last years in the highly subsidized markets of Germany and Japan.
 - German wind turbine producers shunned export markets for a long time due to the high demand in their home market

Impacts of mitigation III

- Subsidies for renewables surpass projected market prices by several orders of magnitude
- Investment at rates derived from market prices will not lead to diversion of renewable technology exports
- Long term availability of renewable energy technologies will be enhanced due to economies of scale that lead to lower prices.
- Sequestration projects can enhance timber supply and reduce revenues from timber sales of other countries
- Climate policy measures will not only generate losses but also benefits, often in the same countries that experience losses

Carbostan and Aeolia

- **Conversion of the electricity generation system from coal to wind in Annex B country Aeolia**
- **Coal exports from developing country Carbostan to Aeolia drop from 10 million t per annum to zero**
- **Coal market price falls from 20 to 10 € per t.**
- **Overall coal exports from Carbostan only fall from 50 to 40 million t**
- **Carbostan claims a loss of 600 million € (1000 million € previous coal export revenues compared to 400 million € after Aeolia's action) due to mitigation**

Tempesto and Aeolia

- Due to a new 10,000 MW wind programme in Annex B country Aeolia, all Aeolian wind turbine manufacturers operate at full capacity
- The developing country Tempesto cannot place an order for 100 MW wind turbines with a producer in Aeolia
- It thus has to switch to a turbine producer in Breezia which charges a price of 1200 € per kW installed instead of Aeolia's producers' list price of 1000 € per kW
- Tempesto claims a loss of 20 million € (200,000 €/MW times 100 MW) due to Aeolia's mitigation

Arboria and Verdura

- In 2005, the developing country Arboria approved a CDM afforestation project on 100,000 ha whose first harvest occurs in 2020
- In 2020, the country Verdura logs 10,000 ha and harvests 1 million t of timber
- Due to Arboria's timber supply, timber prices fall from 50 €/t to 45 €/t
- Verdura claims a loss of 5 million € (5 €/t times 1 million t) due to Arboria's sequestration

Neptunia and Montania

- In 2010, the developing country Neptunia builds a seawall on 500 km of coastline
- Due to the high demand for building material, export prices for 1 million t of cement to neighbouring Montania increase from 55 to 65 €/t
- Montania claims a loss of 10 million € (10 €/t times 1 million t) due to Neptunia's adaptation

Fluvia and Desertum

- In 2010, the developing country Fluvia introduces a new operation plan for its irrigation system to be able to withstand more severe droughts due to projected climate change
- Due to the much lower cost of irrigation farmers expand irrigation and the amount of water discharged to neighbouring Desertum declines by 10%
- Desertum argues that it has to reduce its irrigated area by 100,000 ha and claims a loss of 10 million € (100 €/ha times 100,000 ha) due to Fluvia's adaptation.