



Measures to reduce CO₂ Emissions in the German Freight Sector

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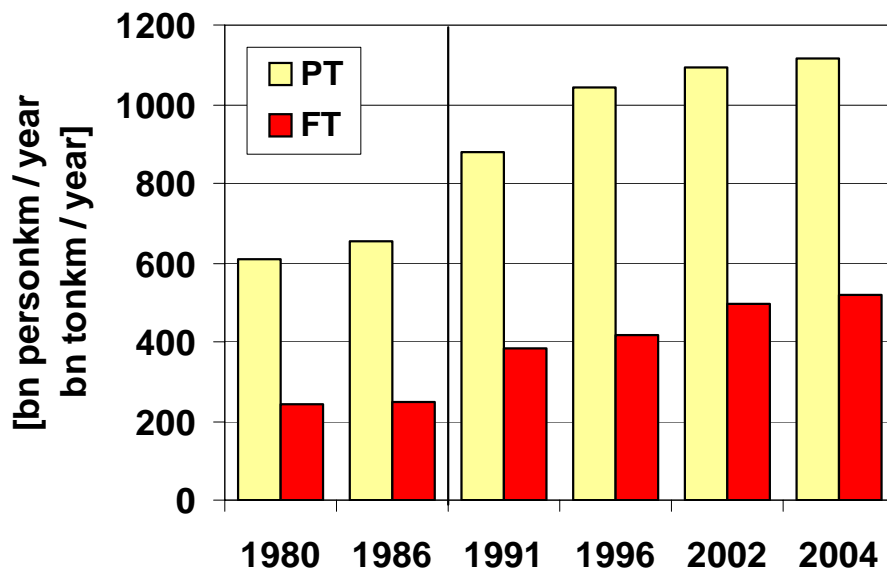


Overview:

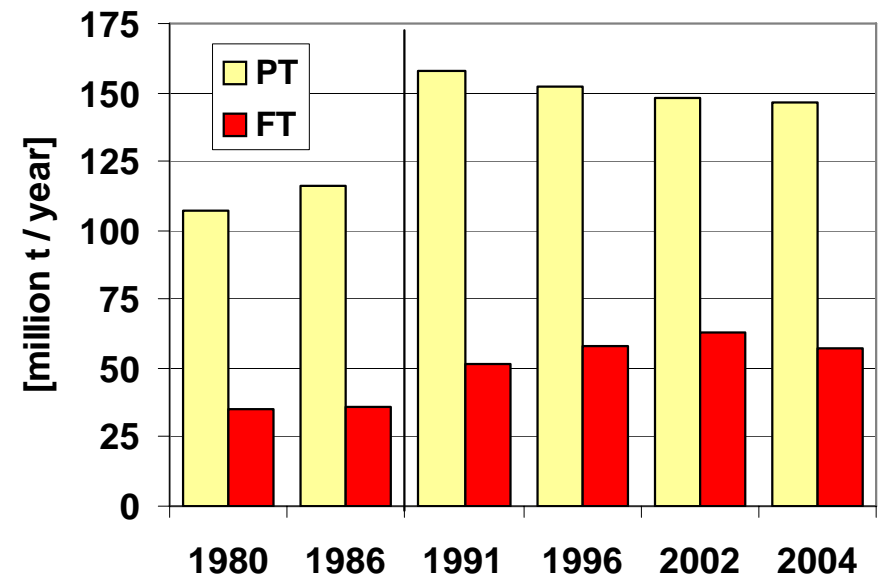
Transport Performance and CO₂ Emissions

- CO₂ emissions from passenger transport are still dominating
- freight transport in Germany is still increasing (+36 % from 1991 to 2004)
- CO₂ emissions have not risen as much as performance did (1991 to 2004: +11%)

Transport performance



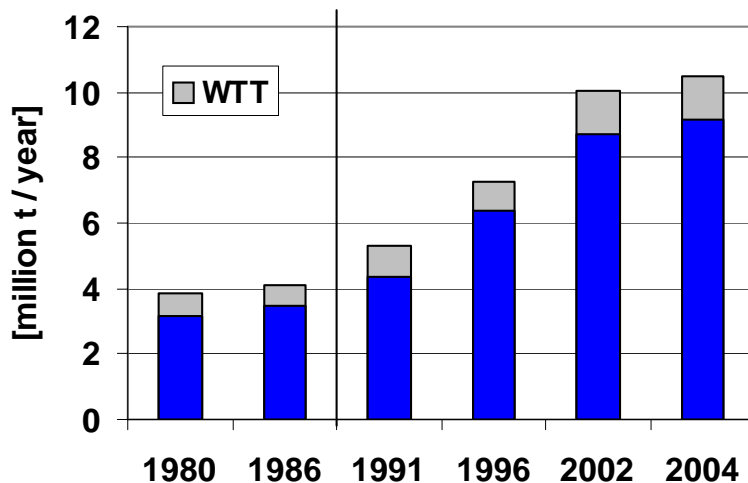
CO₂ emissions



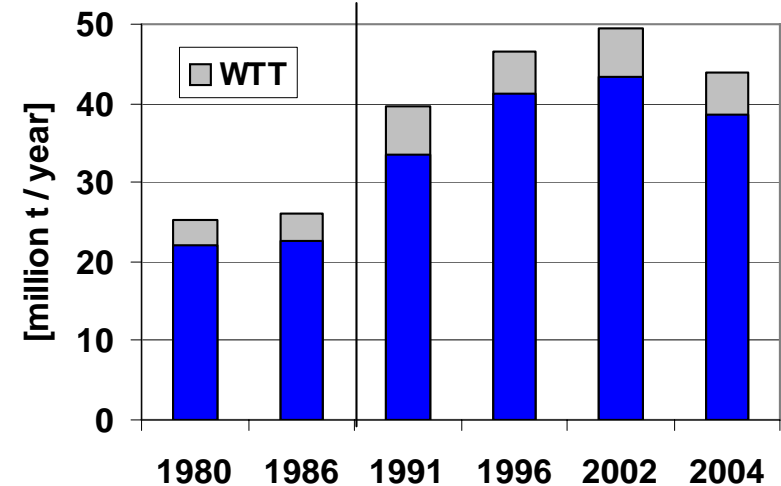
Road Overview:

CO₂ emissions of road freight transport

Light Duty Trucks < 3.5 t GVW



Heavy Duty Trucks



- According to their strongly increased mileage CO₂ emissions of light duty trucks have doubled from 1991 to 2004
- Data about performance (tkm) of LD trucks are not available
- HD trucks: performance (tkm) increased by 55% from 1991 to 2004, emissions by 10%





Overview:

Influencing CO₂ emissions in freight transport

- consumption of traditional engine
 - Reduction of fuel consumption
 - Substitution of CO₂ producing fuels by alternative fuels
- choice of the engine system
 - Use of alternative engines
- choice of infrastructures and transport modes
 - Shift of transportation to carriers with lower CO₂ emissions
- transport organization
 - Reduction of road performance
 - Logistics concepts

Road:

Fuel consumption

- use of biofuels
 - obligation to add biofuels to conventional fuels
 - Tax privilege for biofuels

- reduction of fuel consumption (support program within ERP program for environment and energy saving)
 - support of purchase of new emission reduced commercial vehicles > 3,5 t total weight and refitting of vehicles
 - support of purchase of biogas- or CNG-powered vehicles and installation of gas filling pumps
 - development of logistics centres in conjunction with emission reduced and low-emission commercial vehicles
 - location of firms within a logistics centre in conjunction with reduced-emission and low-emission commercial vehicles

Road:

Obligation to add biofuels

- law concerning proportion of biofuels in total fuels (BioKraftQuG, 1.1.2007) based on EU legislation
- obligation to increase proportion of biofuels continuously until 2015; quota is calculated of the energy *content* (not by energy mass)

	2007	2008	2009	2010	2015
Benzin	1,2 %	2,0 %	2,8 %	3,6 %	3,6 %
Diesel	4,4 %	4,4 %	4,4 %	4,4 %	4,4 %
total	-	-	6,25 %	6,75 %	8,0 %

- suggestion of EU-Commission (01.2007) to achieve a quota of 10 % until 2020

Road:

Tax privilege for biofuels

➤ tax privilege for the 2nd generation of biofuels („Advanced Bio-fuels“) e.g. BTL (bio-mass-to-liquid) and alcohol based of lignite cellulose, reduced until 2015 to zero

➤ lowering of the tax privilege for bio-diesel since 2006

	8.2006	1.2008	1.2009
Tax	9 ct/l	15 ct/l	21 ct/l

⇒ the more expensive production costs of bio-diesel are increasingly absorbed by the tax privilege

Road:

Engine Systems in Road Freight Transport

- Diesel engine is standard engine in road freight transport
- vehicles with CNG engine are used in the group of light commercial vehicles
 - decreasing efficiency by rising total weight of the vehicle
 - as HDV only used as Low-Emission-Vehicle in sensitive exhaust city-zones
- new registrations of commercial vehicles 2005 in Germany

2005	< 1 t payload	1 - < 2 t payload	2 t payload and more	tractor
Diesel	90.356	77.079	47.375	32.426
gasoline	4.936	355	76	15
gas	2.078	492	83	5
electric	17	3	13	0
hybrid	3	1	1	0

Source: KBA, VDA

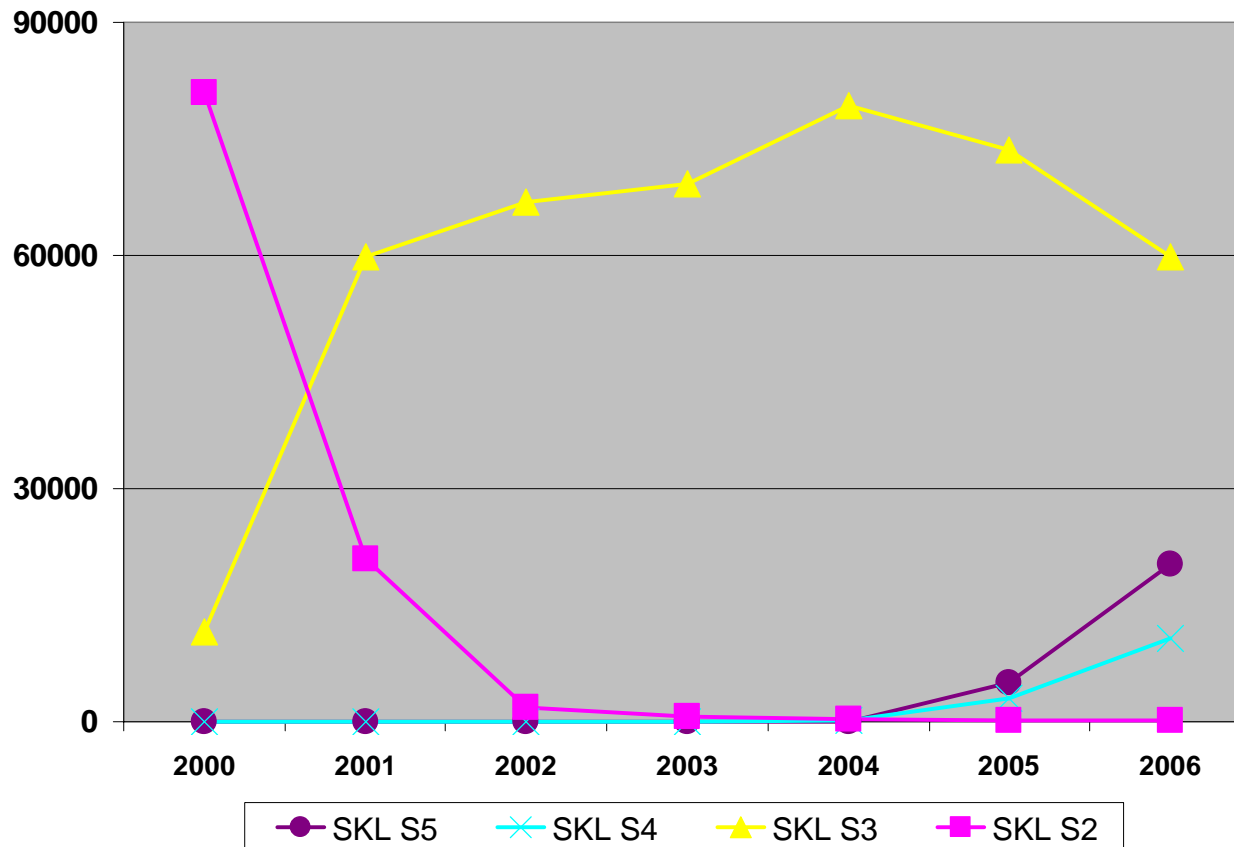
Road:

Support program for commercial vehicles (01.2007-12.2008)

- no explicit reference to CO₂ emissions
 - but: technical progress in the past reduced the fuel consumption
 - but: NO_x-reduction versus CO₂-reduction (e.g. Euro 4-Transporter)
- purchase of new emission reduced commercial vehicles > 3,5 t total weight and refitting
- volume: 100 Mio € p.a.
- standard: Euro 5 or European emission standard EEV (Enhanced Environmentally Friendly Vehicle)
- credits in the amount of 50 % of the additional investment costs compared to common vehicles (Regional- and KMU-additional fee)
- additional costs of EEV or Euro 5: approx. 8500 €/vehicle

Road:

New registrations of HGV > 3,5 t total weight and tractions by emissions class , 2000-2006



SKL =
„Schadstoffklassen“
or
„pollutant categories“

Road:

Maut system

➤ diversification of toll

- involvement of vehicles 3,5 - 12 t total weight until 2012 (EU-target)
- temporal differentiation and zone pricing (included in “Masterplan Logistik” of BMVBS, German Ministry for Transport)

➤ increase in toll charges

- increase in charges by 1,1 ct (12,4 ct to 13,5 ct per km) on average
- but: Intended measures should be implemented not before facilitation of German HGV is defined (e.g. reducing motor-vehicle-tax)
- current toll for vehicles >12 t total weight:

Emission category	< 3 axes	> 4 axes
Category A (Euro 5, EEV)	0,09 €	0,10 €
Category B (Euro 3, Euro 4)	0,11 €	0,12 €
Category C (Euro 1, Euro 2)	0,13 €	0,14 €

Road:

Impact of toll

- toll is without reference to CO2 emission (but with reference to pollutant categories)
- toll = promoter of efficient transport organisation?

Rate of loaded distance of German HDV (Mio km), 2000-2006

Year	2000	2001	2002	2003	2004	2005	2006
Loaded distance [km]	21.449	21.981	21.456	21.579	22.549	22.885	24.225
Unloaded distance [km]	7.045	6.777	6.289	6.060	5.931	5.628	6.017
Rate of loaded km [%]	75,3	76,4	77,3	78,1	79,2	80,3	80,1

Source: Stat. Mitteilungen des BAG und des KBA, Reihe 8



introduction of Maut system

Road:

Support programm logistics centres & vehicles

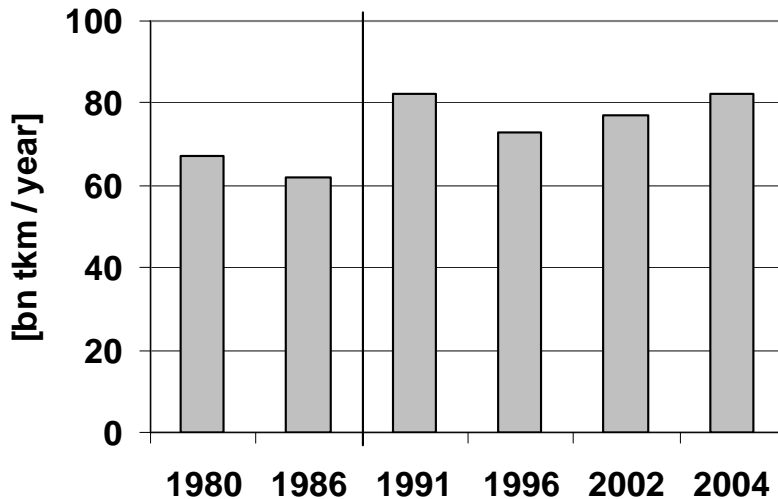
- funding of „development and extension or initial construction of logistic centres including the use of low emission (air and noise) vehicles
 - logistics centre (GVZ = Güterverkehrszentrum), e.g. investments for buildings or technical infrastructures in the buildings
 - location on the GVZ area, e.g. investments in the construction of buildings, technical infrastructures
 - purchase of low emission vehicles (air and noise) > 3,5 t
 - construction of gas station infrastructure for natural gas / bio-methane fuels

- objective: achieve a higher level of environmental protection than requested by EU legislation
 - European norm on emissions EEV (Enhanced Environmentally Friendly Vehicle) or Euro 5-Norm
 - *additional* investment costs compared to conventional vehicles
 - funding of up to 50 % of *additional* investment costs (with extensions by regions and size of firm)
 - additional funding on credit costs up to 1 % of credit costs p.a.

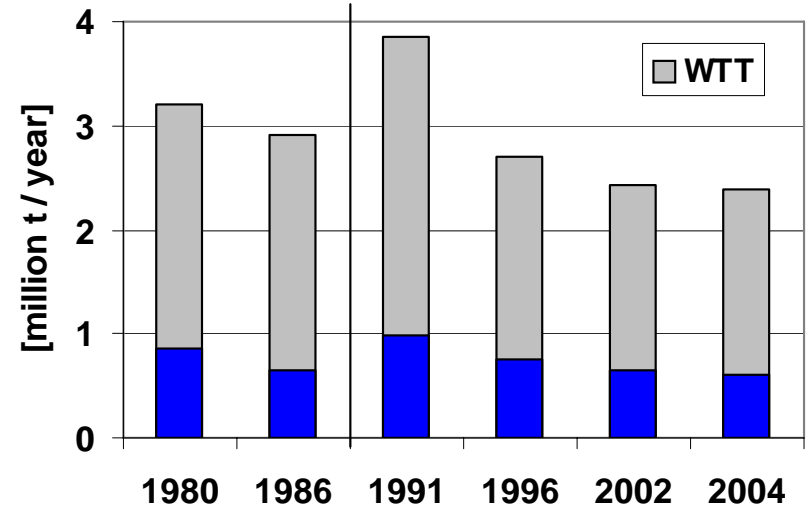
Rail Overview:

Freight Transport by Rail

Transport performance



CO₂ emissions



- Increasing transport performance since the middle of the 1990s
- CO₂ is declining due to higher efficiency in general and less shunting
- Amount of CO₂ emissions is determined mainly by energy *production*

Rail Overview:

Measures in Rail Freight Transport

- Environmental program 2004-2008 / Climate program 2020 of DB AG
 - CO2 emissions of DB AG should be reduced by 15 % until 2020
- emission trading for power exchange by power stations (01.2005)
- support for “combined traffic”
 - Special business conditions as compensation of competitive disadvantage
 - Program to support new traffic on rail and waterways (05.2005)
 - Program to support handling equipment (04.2006)
- Support for private rail sidings
 - Program to support the building, development and reactivation of private rail sidings (01.2005)

Rail: Environmental Program 2004-2008 / Climate Program 2020 of DB AG

- 25 % reduction of specific CO₂ emissions of traction between 1990-2002
- further 15 % reduction of CO₂ emissions until 2020
 - energy efficient vehicles and power stations
 - 90 % electric-, 10 % diesel locomotives
 - upgrading of infrastructure
 - increase of quota of regenerative energy
 - 10 % of power produced by water, wind and solar plants
 - bio diesel for diesel locomotives
 - Increase of load per train
 - Energy saving by driving characteristics
 - Driver training (TEMA-Box – “Traktionsenergie-Messung und Abrechnung”: Measuring energy use for traction and energy billing), based on experiences made in passenger transport: reduction of 140.000 t CO₂ emission between 2002-2006



Rail:

Emission Trading (01.2005)

- being transport operators, railway companies cannot participate independently in emission trade
- other competitors of rail are not concerned by the emission trading





Rail:

Special Business Conditions in Combined Traffic ("Kombinierter Verkehr" = KV)

- special business conditions as compensation of competitive disadvantage
 - Reduction of motor vehicle tax for vehicles of the combined traffic
 - Higher total weight of 44 t allowed for vehicles of KV
 - Exception from no-driving rule on Sundays, official holidays and public / religious holidays



Rail:

Support program new traffic on rail and waterway by combined traffic (05.2005-2008)

- 15 Mio. Euro p.a., waterways / road and rail / road
- funding with no re-funding or as proportional funding
 - max. 30 % of (investment) costs within the first three years
 - “start up” support
 - reduction of economic risks linked to the introduction of new services
 - costs for intermodal loading units, railway vehicles, inland water and coastal ships
 - costs for infrastructure or operation
- support of investments
 - procurement of specific equipment
 - transshipment technologies
 - waterway vehicles
 - innovative systems of information processing



Rail:

Support program for transshipment terminals (04.2006)

- support for transshipment terminals of combined transport (04.2006) in its new version
 - replacement of support for former rules to support combined transport (11.2002)
 - construction and extension of transshipment infrastructure for combined transport (bimodal and trimodal)
- support of projects
- max. 85 % of costs as non-repayable



Rail:

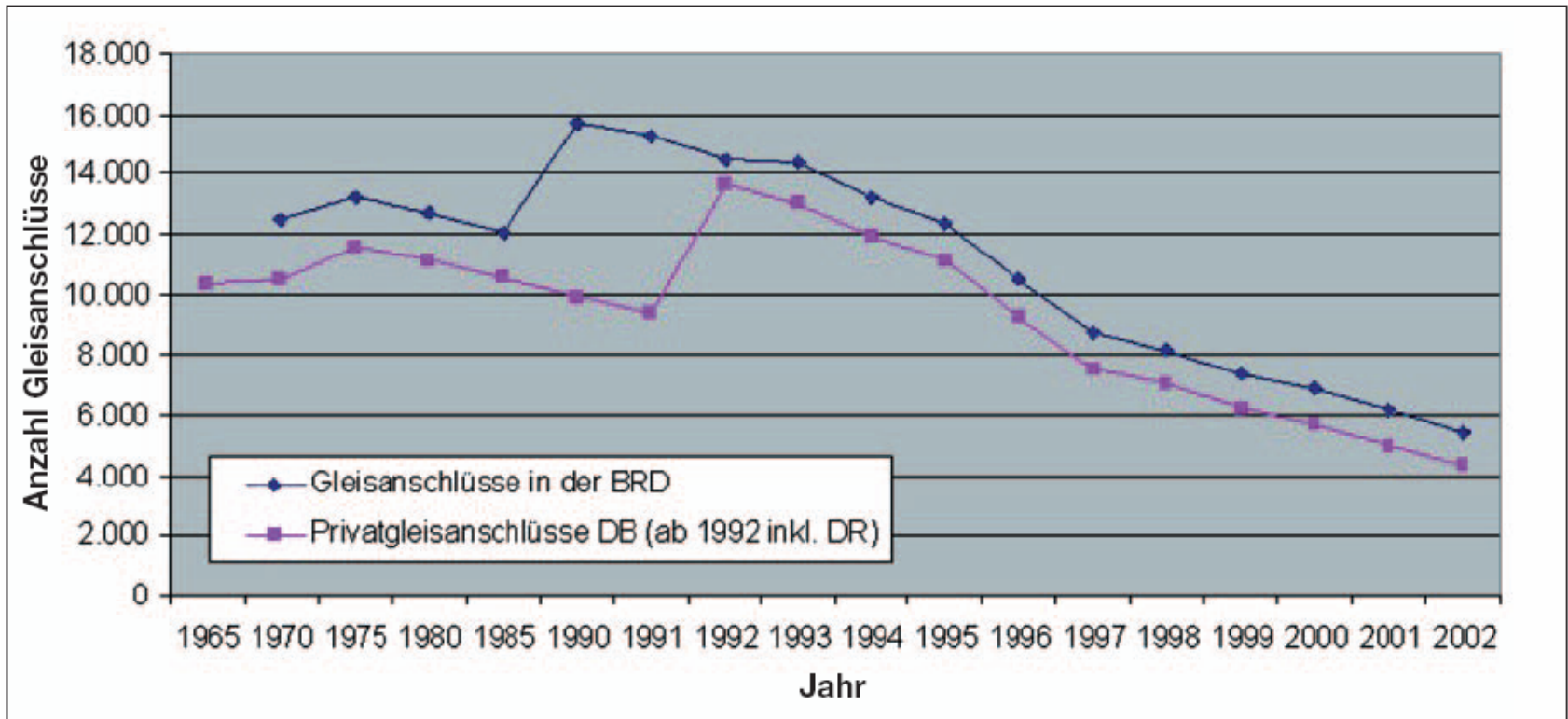
Support Program of Private Sidings (01.2005-2010)

- volume: 32 Mio Euro p.a.
- support of new building, development and reactivation of private sidings
 - 50 % financing of the costs
 - amount:

new building	8 €/ t / a	32 €/ 1000 tkm / a
development	4 €/ t / a	16 €/ 1000 tkm / a
reactivation	4 €/ t / a	16 €/ 1000 tkm / a
 - track construction, switch, contact line
 - infrastructure for loading and unloading the goods
- transport mass of 3,1 Mio. t p.a. until 2006 are supported (equivalent to approx. 100.000 HDV-tours)
- program is not yet well accepted (until now only 15,5 Mio € are allocated)

Rail:

Trend of Private Sidings in Germany, 1965-2002



Source: Martin, Ullrich: Braucht die moderne Bahn noch Anschlussbahnen? in: Eisenbahntechnische Rundschau, 52. Jg. (2004), Heft 3, S. 133-142.

Inland Water Transport:

CO2 Emissions in Inland Water Transport

- ratio of transport performance (tkm) of inland water transport should increase to 14 % until 2015 (now 11 %) (“Sustainability Strategy” of the Federal Government)
- age structure of vessels

	Average age in years	
	1992	2001
Freight motor boat	ca. 47	ca. 52
Tank motor boat	ca. 26	ca. 31
Pulling tug	unknown	ca. 32

source: (BTD 14/9872)

- lifecycle of motorboats
 - long lifetime of approx. 65 years
 - two general overhaul and change of the engine
- emission standards of vessels since 2002 (RheinSchUO)
 - 01.2002 Standard I, 07.2007 Standard II

Inland Water Transport:

Support program for low emission engines (-12.2008)

- support of low emission engines
 - support of construction and operation of “river friendly” infrastructures
 - purchase of new vessels
 - credits up to 50 % of *additional* investment costs
 - additional support of credit costs up to 1 % p.a.

- definition of low emission engines by emission by sulfur and CO
 - EU rule 2004/26 EG – (5,0 g CO/kWh) or chap. 8a of “Central Commission for ship transport on the Rhine” (3,5-5,5 g CO/kWh)

- incentives for purchase of low emission engines

Conclusions

- There is a large bundle of measures having influence on CO₂ emissions.
- Explicit political measures to address the reduction of CO₂-emissions do not exist for the German freight sector.
- A majority of measures leads to a CO₂ reduction only indirectly as other targets are primarily addressed.
- The most effective CO₂ reductions occur by increases in efficiency, in particular by the reduction of fuel consumption.
- Figures about the effects of CO₂ emission reduction by the measures listed above do not exist.