

Ambitious Climate Protection in the Energy Sector in Germany until 2020

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- Why have to act?
- What we have to achieve?
- What we have to do?
 - Adoption to the climate change
 - Reduction of the green house gas emissions



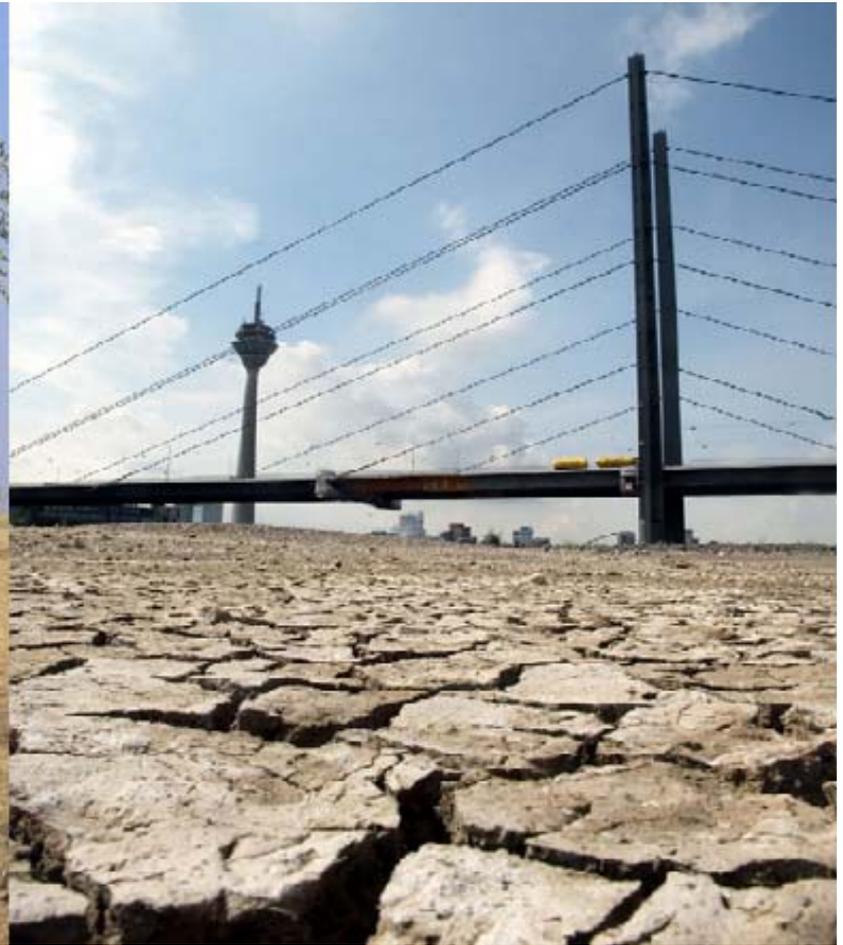
The climate change is already reality!

Elbe-Flood 2002

Road between Bitterfeld and
Eilenburg

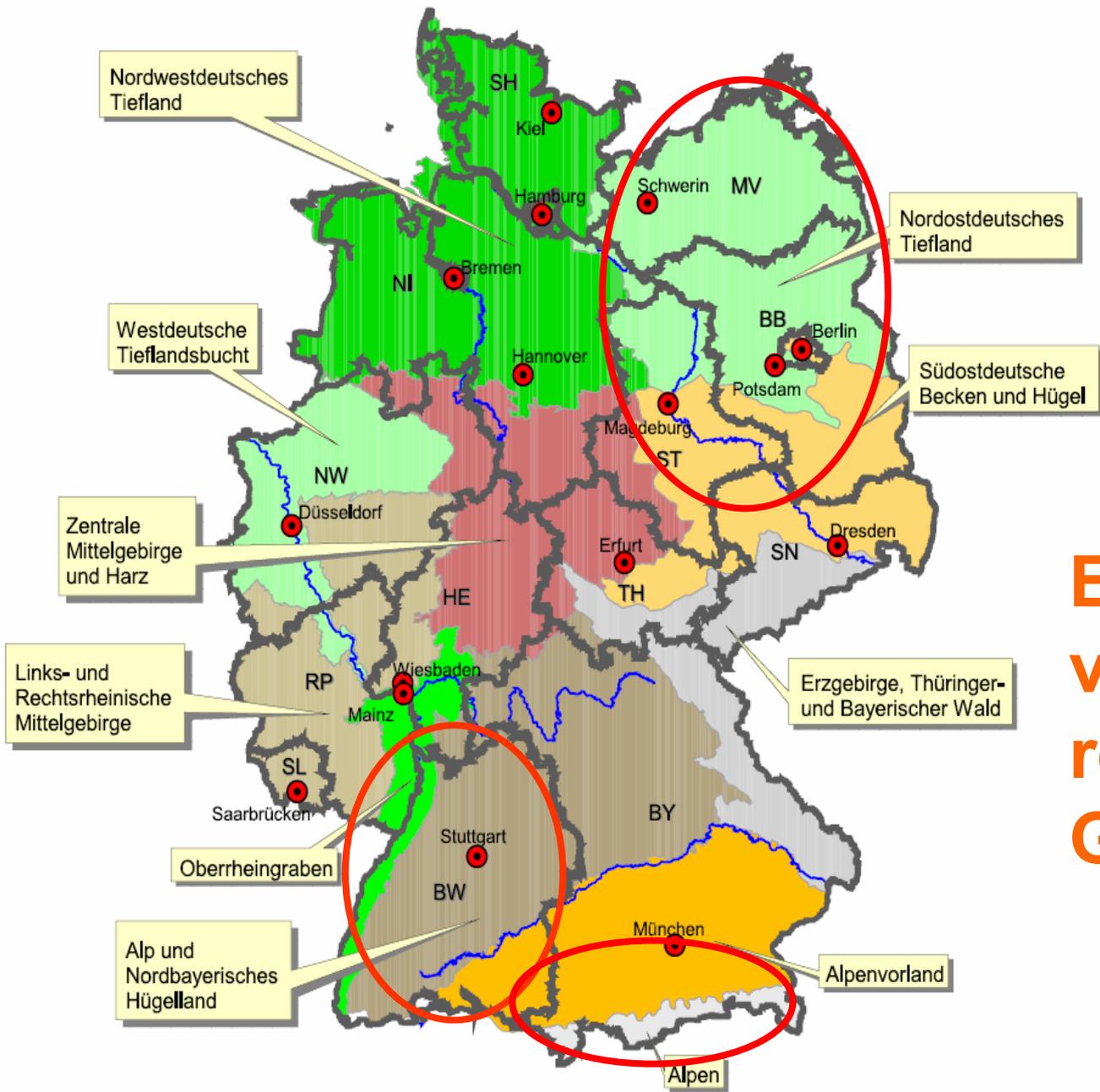


Heat Summer in Germany 2003



Climate Change does exist already in Germany

- **Increase of the average yearly temperature by 0,8°C between 1901 - 2005**
- **Temperature increase mainly in winter time**
- **Reduction of cold and increase of warm extreme events**
- **Change of the precipitation structure with reduced summer and increased winter rain fall**
- **Increase of the extent and frequency of heavy precipitations**



Especially high vulnerable regions in Germany

**„Business as Usual“ would have
severe Consequences**

Reference Prognosis

EWI/Prognos 2005 (BAU)

<i>in mill. t CO₂-equiv.</i>	2002	prognosis 2010	Prognosis 2020	Reduction 2002-2020	Reduction 2002-2020 in%
Energy producer	357	342	335	-22	-6%
Industry	132	126	118	-14	-11%
Transport	176	171	155	-21	-12%
Households	176	178	158	-18	-10%
Small enterprises					
Energy related CO ₂	841	817	766	-75	-9%

Goals

- In order to keep the temperature increase lower than 2°C, it is necessary to stabilize the concentration of green house gases in the atmosphere to 400 parts per million.
- To reach this goal it is required to reduce the total greenhouse gas emission to less than half of the current level until 2050. The industrialized countries have to reduce their emissions by about 80% compared with the emissions from 1990.
- For Germany this means a reduction from 12 t CO₂-equiv. per capita to 2,5 t CO₂-equiv. in the year 2050.

Goals

- Interim emission reduction goals are needed. The UBA has proposed to reduce the German green house gas emission by until 2020 by 40% compared with the level of 1990.
- Germany agreed in the Kyoto- Protocol to reduce its green house gas emissions by 21% from 1990 to the period 2008-2012.
- In 2005 a reduction of 18% was achieved. In the next 15 years an additional reduction of 22% is required.

The goal to reduce the energy related CO₂ emissions by 40% until 2020 compared to 1990 means to reduce the yearly emissions to 569 Mill. t CO₂ in 2020 (2005 795 Mill. t CO₂).

This relates to a CO₂ emission reduction 226 mill. t of compared to 2005.

Emission Trading

Important Instrument to achieve Climate Protection Goals

- Started in January 2005
- Each ton of CO₂ gets a price – reduction where is cheapest (at least in theory)
- Covers only energy production and industry (=large emitters)
- Until 2020 reduction of the issued certificates by 30 %
- Actual allocation plan for 2008-2012: additional emission reduction in all sectors
- Change of the power generation structure by fostering similar rules for new coal and natural gas power plants

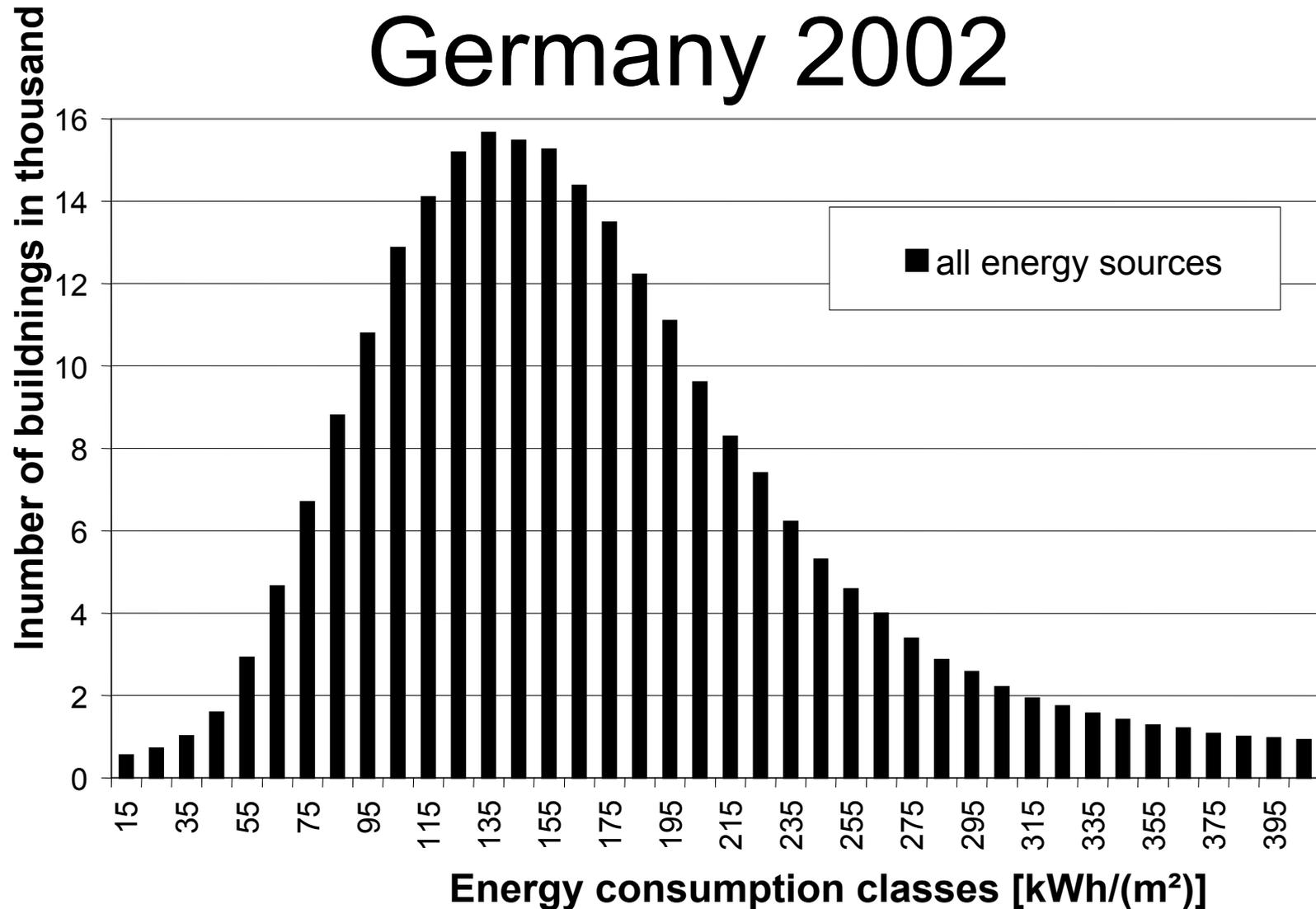
Price for EU-Emission Certificates

Euro per Emission Certificate (for one ton CO₂)



Quelle: EEX Leipzig

Heat Energy Consumption in Germany 2002



ca. 250.000 Gebäude, GdW (Bundesverband deutscher Wohnungs- und Immobilienunternehmen)

jt2

Wahrscheinlich zu kompliziert zum Erklären?
Kandidat zum Weglassen
tambke, 1/25/2007

Reduction of the Energy Consumption in Households

- **Building Refurbishment**

- Today: energy refurbishment rate is 1,5% annually
- Government goal is 5% refurbishment rate annually.
This should be achieved by an increase of the subsidies to 1,5 billion per year (KfW-Program)
- Stricter minimum standards and change of the rent law

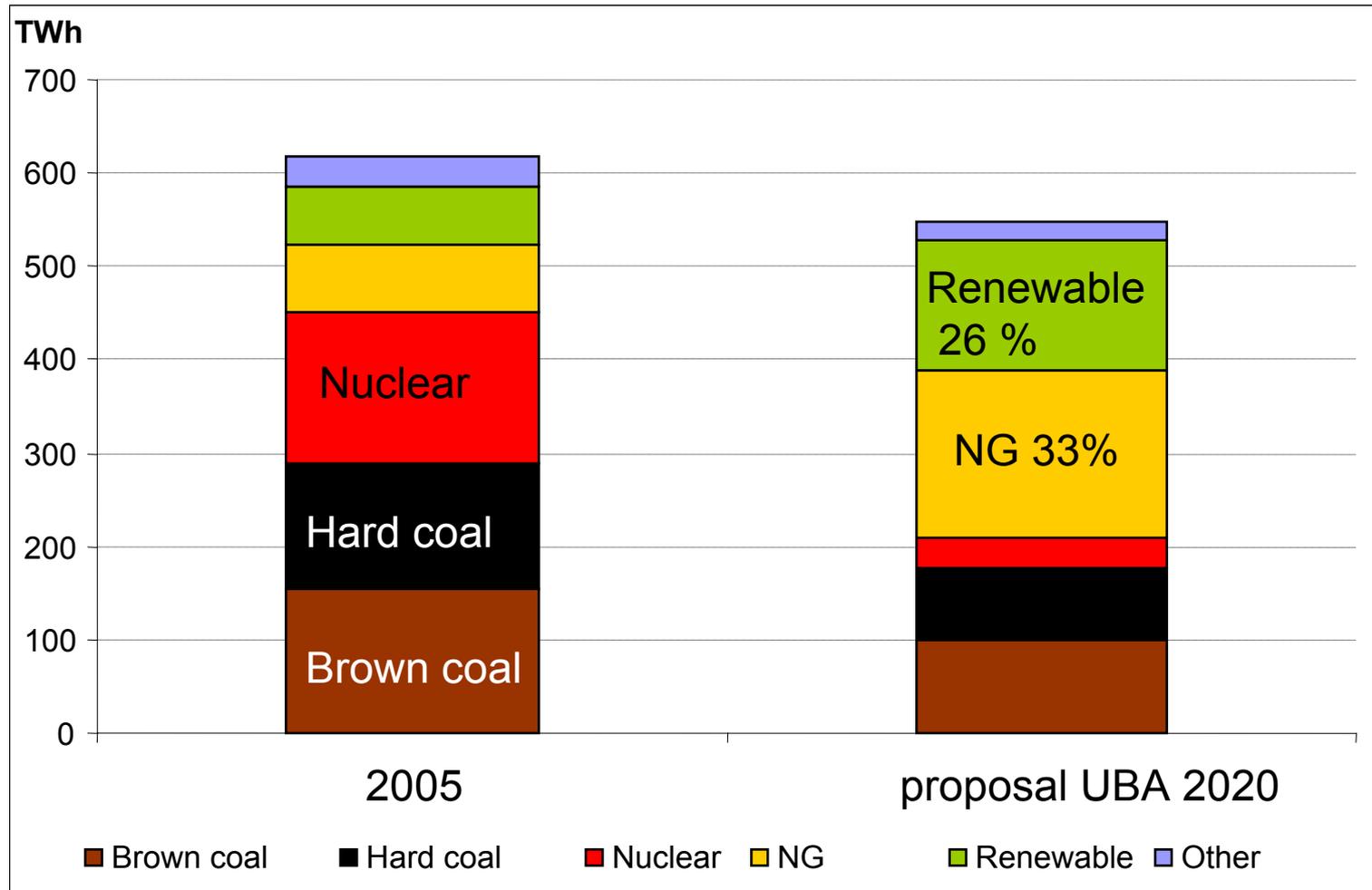
- **Reduce power requirements:**

- Household electronic and appliance: minimize idle losses and increase efficiency: new EU directive

Replacement of existing Power Plants

- Replacement of the existing fossil capacities by renewable energies (20-25% until 2020) and energy conservation
- Replacement of the rest by modern Natural gas power plants:
 - Efficiency improvements
 - Lower specific CO₂- emissions
- CO₂- capture and storage (**CCS**) supplies until 2020 no significant reductions.
- Promotion of cogeneration of power and heat by a new law.

Power Generation in Germany



Source: BMWi (2005): Energiedaten, calculation UBA

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Mix ist aktualisiert analog OLA 40%
tambke, 1/25/2007

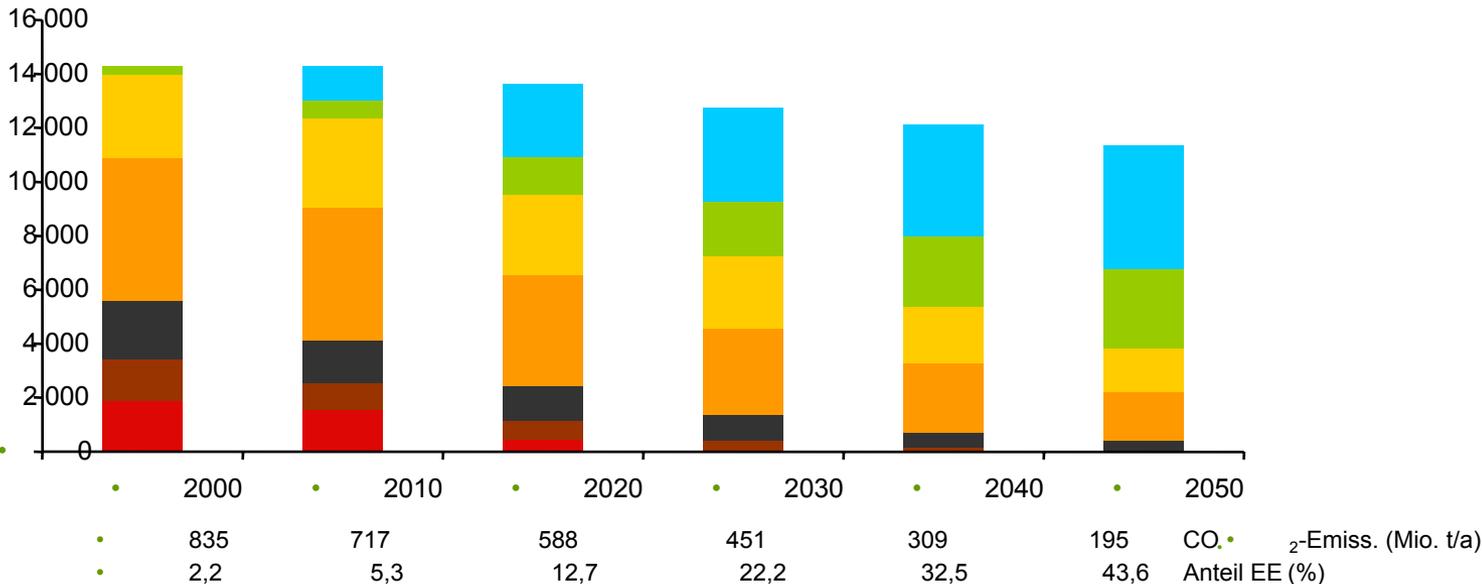
Shares of Renewable Energy

- 50 % renewable energy until 2050 of the primary energy consumption.
- Today it is more than 11% for electricity and more than 5 % for heat in Germany
- Bio mass has the highest contribution (especially heat), for electricity it is wind power
- Development strategy:
 - until 2020 Wind power units onshore and offshore, bio mass and solar thermal
 - After 2020 geo thermal and solar power generation (market introduction is already needed today)
- Improved promotion of heat generation from renewable sources are needed.

Renewable Energy until 2050

Structure of the primary energy consumption in the extension scenario

Primary energy, (PJ/a)



- Nuclear
- Brown coal
- Hard coal
- Mineral oil
- NG
- Renewable
- Improved efficiency

Source Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit 2004 (Hrsg.) – Ökologisch optimierter Ausbau der Nutzung erneuerbarer Energien in Deutschland

Transport

Reduction of the specific consumption

- By technical measures and by the use fuel efficient driving pattern it is possible to reduce the fuel consumption until 2020 – compared with 2005 – for the PC fleet.
- For HDV a reduction of the specific CO₂- emissions, e.g. by use of low rolling resistance tires and low friction oil in combination with improved engine efficiency by 20% is possible.
- The most efficient measure to reduce the specific consumption is the driving training, in combination with technical measures. [\[1\]](#). The reduction potential is 25%. For Coach busses the reduction potential is the same as for HDV.
- For locomotive the reduction potential is only 5% due to the long life of locomotives [\[2\]](#).
- [\[1\]](#) Hybrid engine, low rolling resistance tires, low friction lube oil and use of SCR (Selective Catalytic Reduction)
- [\[2\]](#) One important measure is the use of SCR for the reduction of NO_x to achieve a higher engine efficiency.

Transport

Avoidance of Transport

- To avoid transport it is required to keep compact low traffic settlement structures following the concept „City of the short trips“ .
- To promote regional production and distribution structures.
- An improved integration of transport and settlement planning within the city institutions is required.

Change of Modal Splits

- Transfer of 5% of PC city trips to public transport
- 30% of all trips shorter than 5 km to bicycle reduces the CO₂ emissions by 3-4 Mill. t.
- To achieve this goal it is needed to implement a number of single measures. These are e.g. improvement of the infrastructure, a customer related service of the public transport companies, reduction of restrictions of to enter the system and the creation of a bicycle culture like in Netherland.

Overall it is expected that the measures for the change of modal split reduces the CO₂ emissions by 15 Mill. t/a.

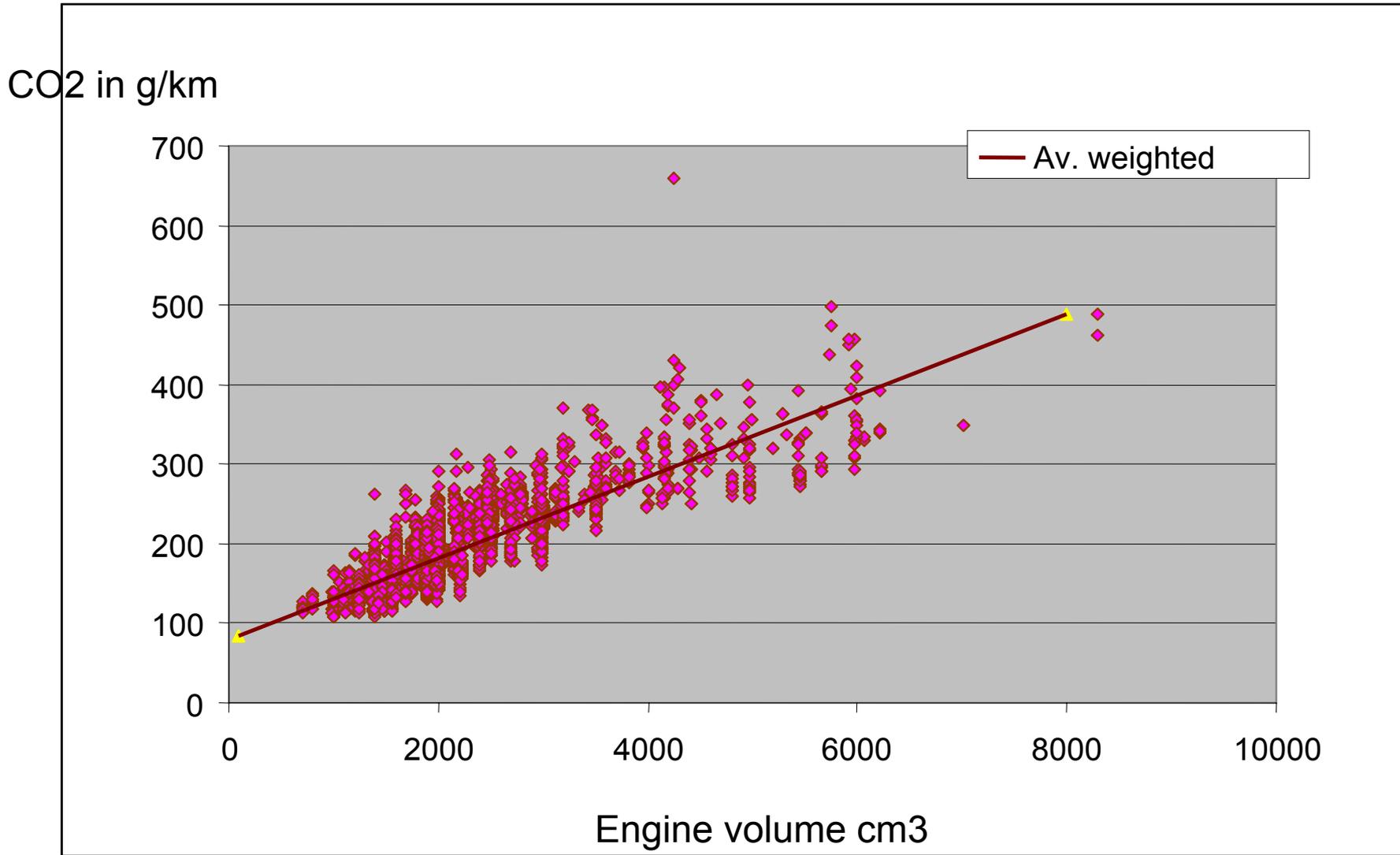
CO₂ Standards for Passenger Vehicles

One of the most important measure in the transport sector are CO₂ emission limits for passenger cars.

What Parameter for a CO₂ Limit should be used?

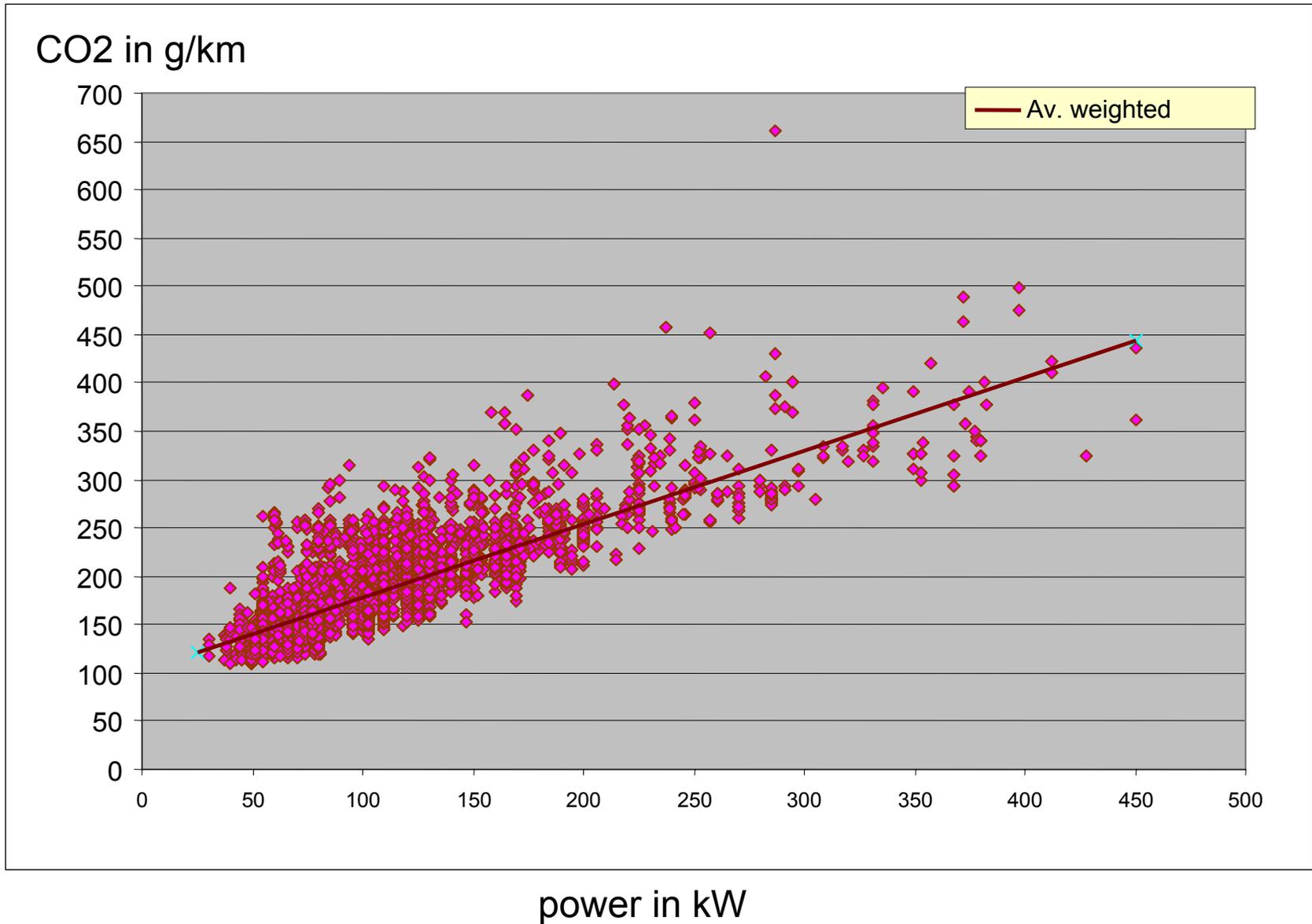
Newly registered Vehicles in Germany 2006

CO2-Emissions

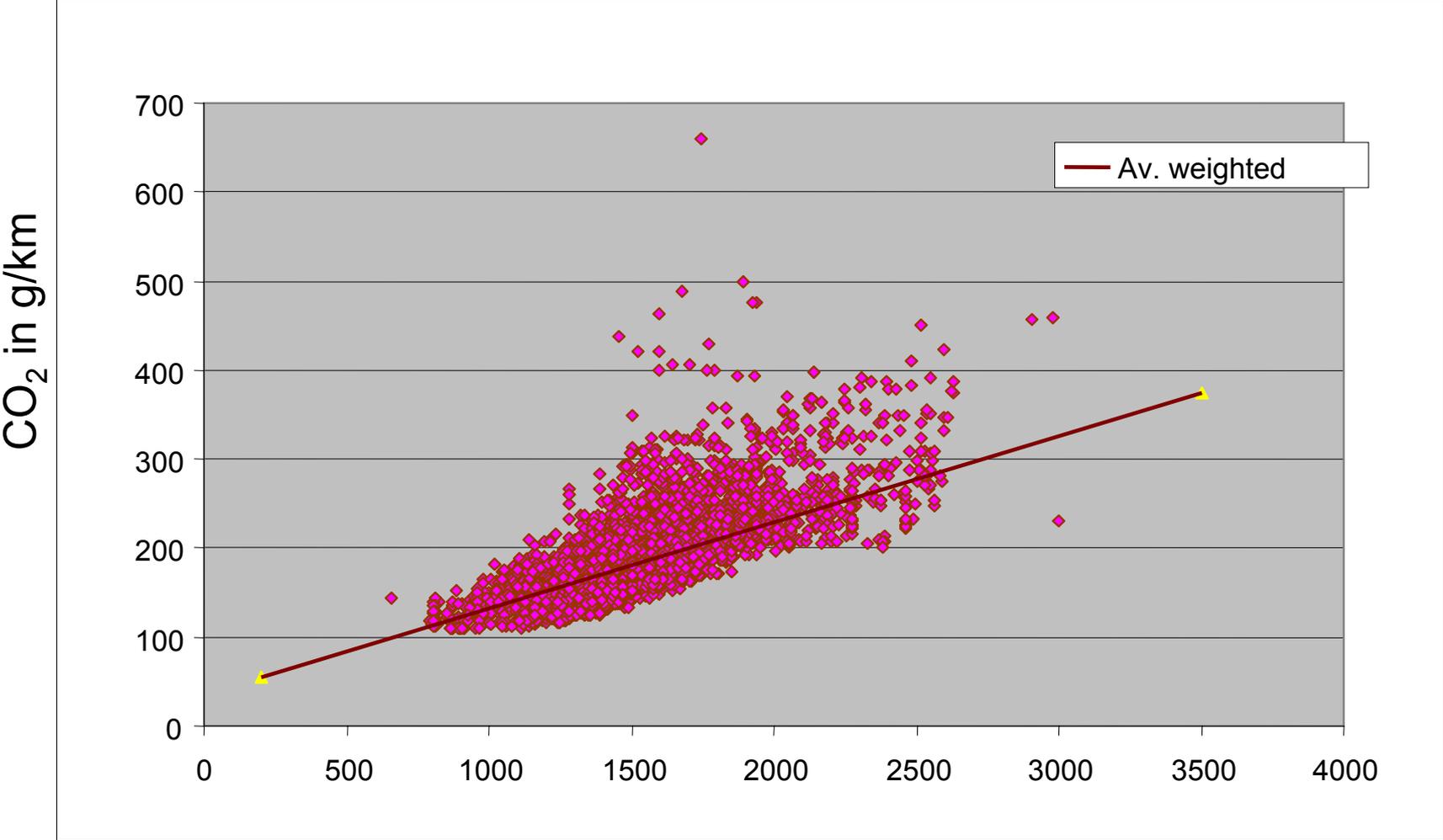


Newly registered Vehicles in Germany 2006

CO2-Emissions



Newly registered Vehicles in Germany 2006

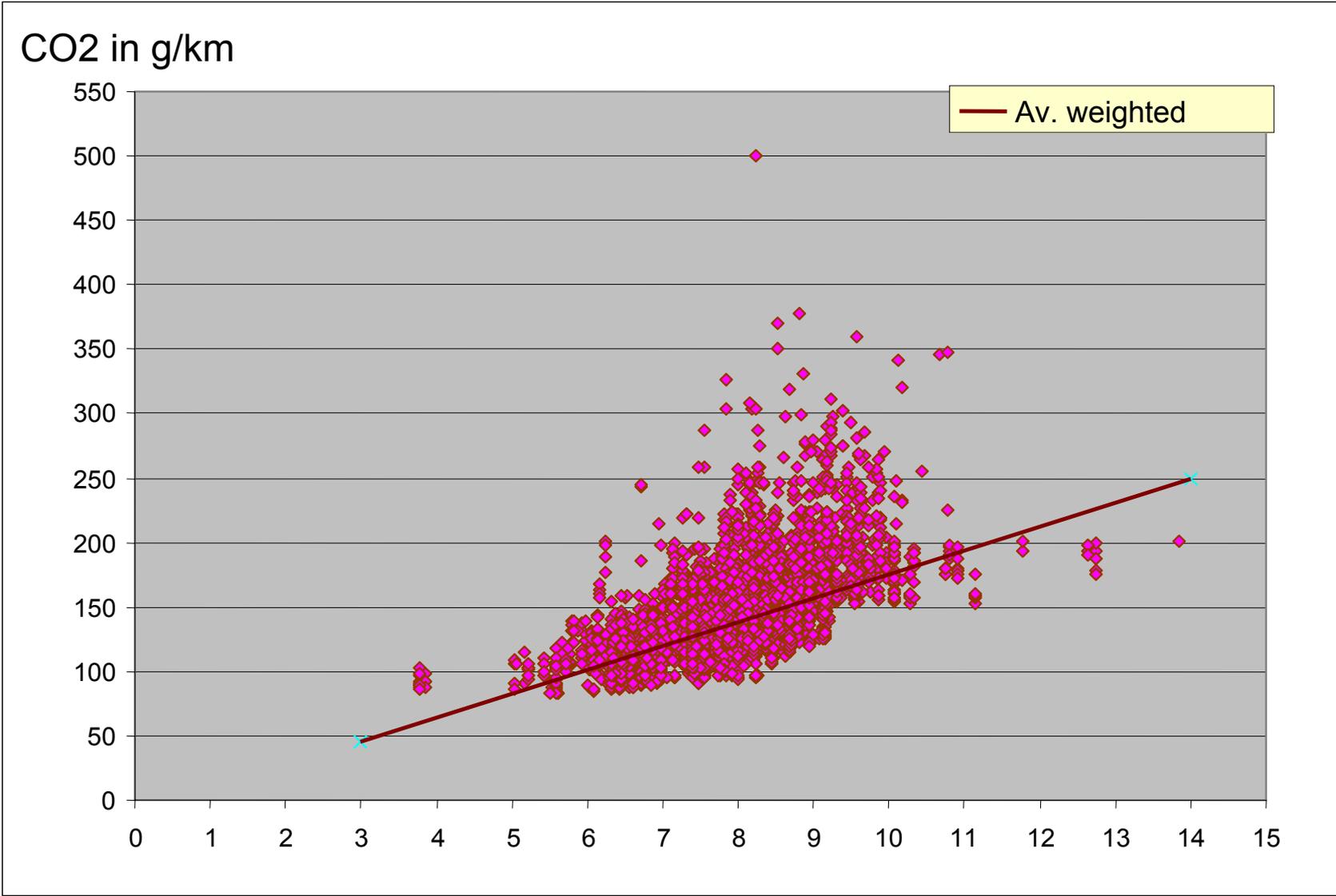


Vehicle weight in kg

Datengrundlage: KBA 2006, betrachtet: 1.677 492 Pkw

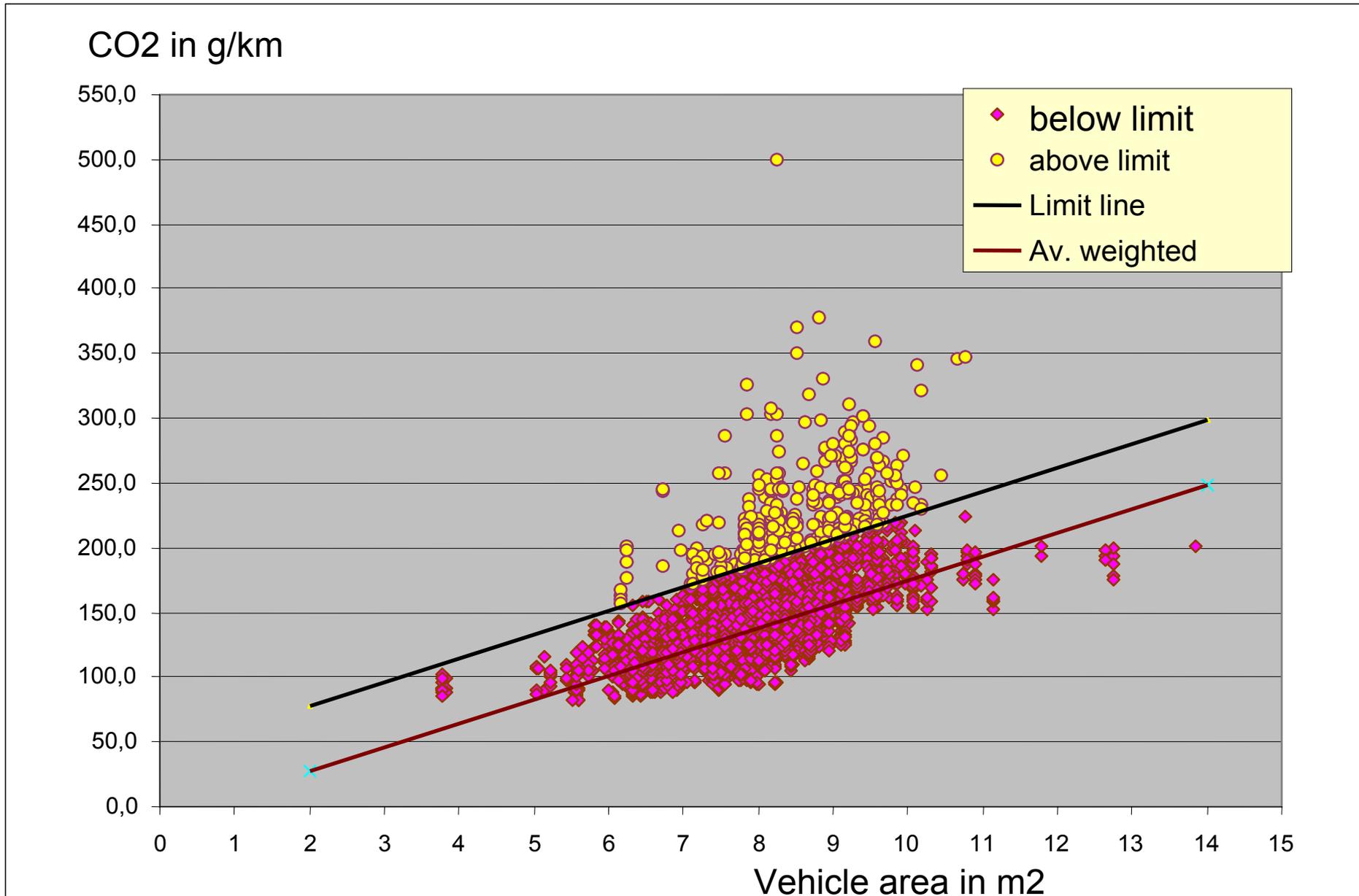
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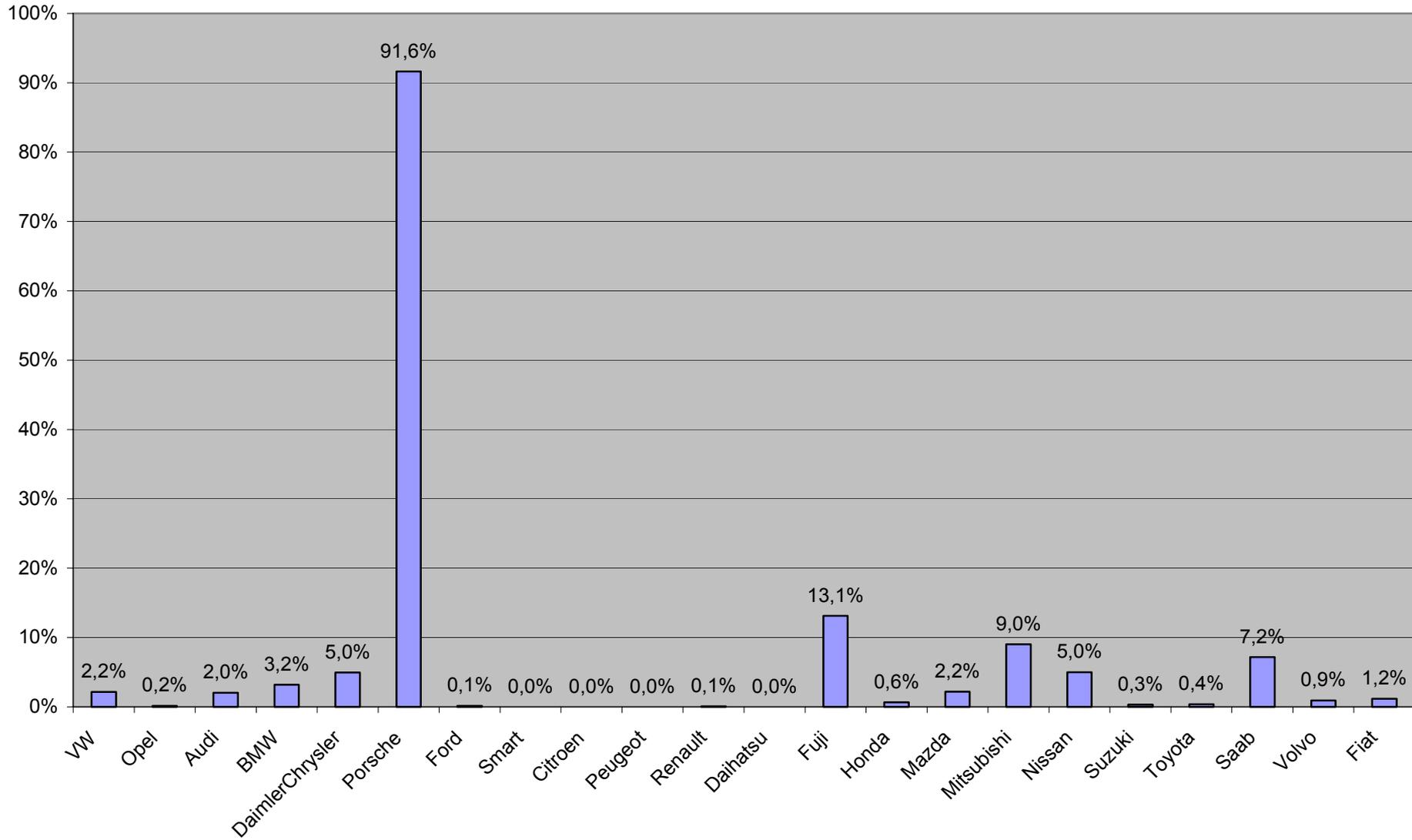


Vehicle area in m2

Proposal for a CO₂ Limit



Share of Vehicles above the Limit Line



Conclusions

- The climate change has started and get more and more expensive.
- Measures have to be implemented as soon as possible.
- Measures for a 80% reduction until 2050 are technically possible and economically feasible.
- Three pillars are needed:
 - Efficiency
 - Energy saving
 - Renewable energy

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Integrated Approach

