Germany's Policy Schemes to Reduce Emissions of Greenhouse Gases through Improvements in Energy Efficiency

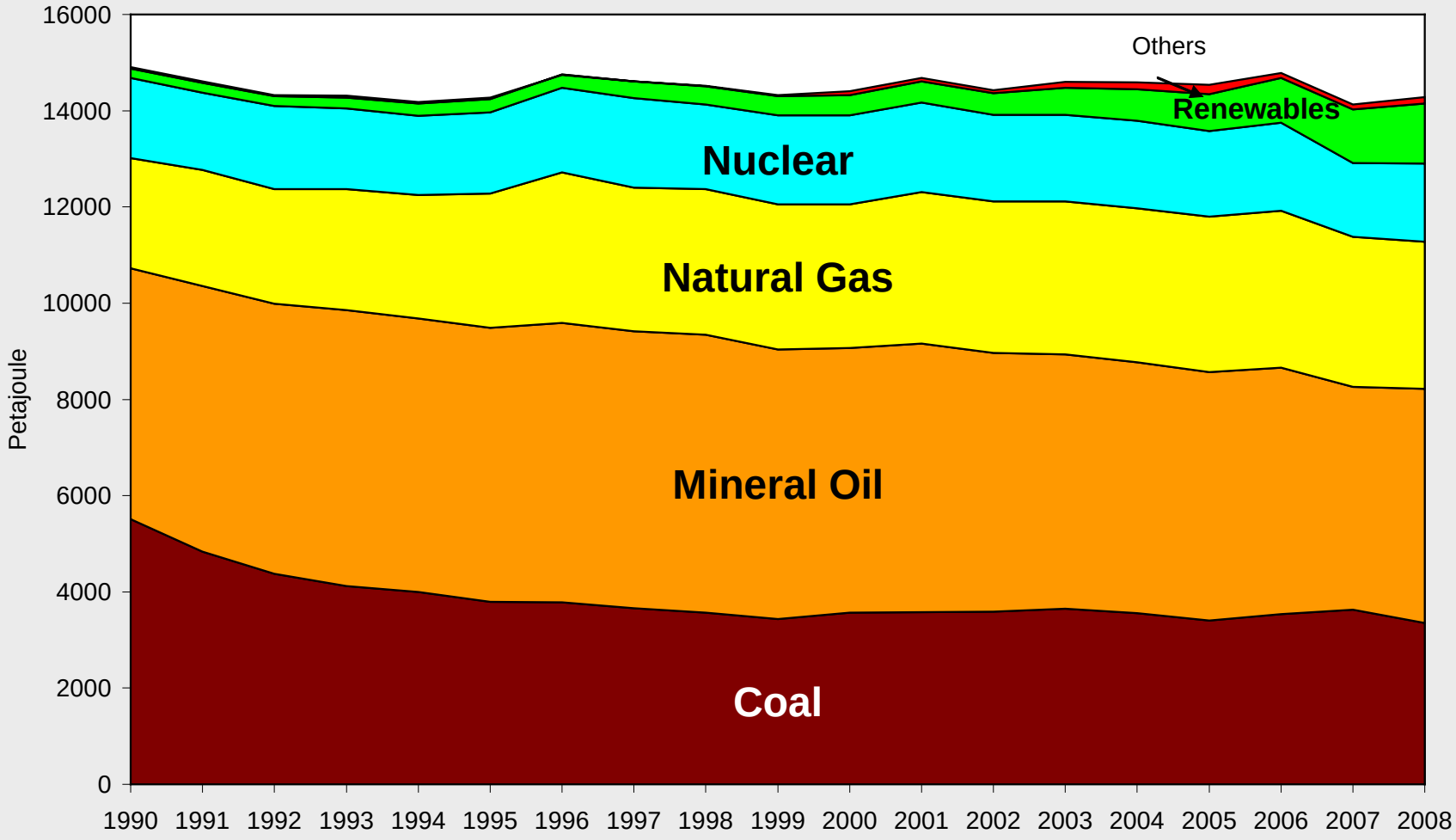
Dr. Hans-Joachim Ziesing
Senior Research Associate
Environmental Policy Research Centre (FFU)
Freie Universität Berlin

2009 EWC/KEEI International Conference on
"Fossil Fuels to Green Energy"
Honolulu, August 21, 2009

Overview

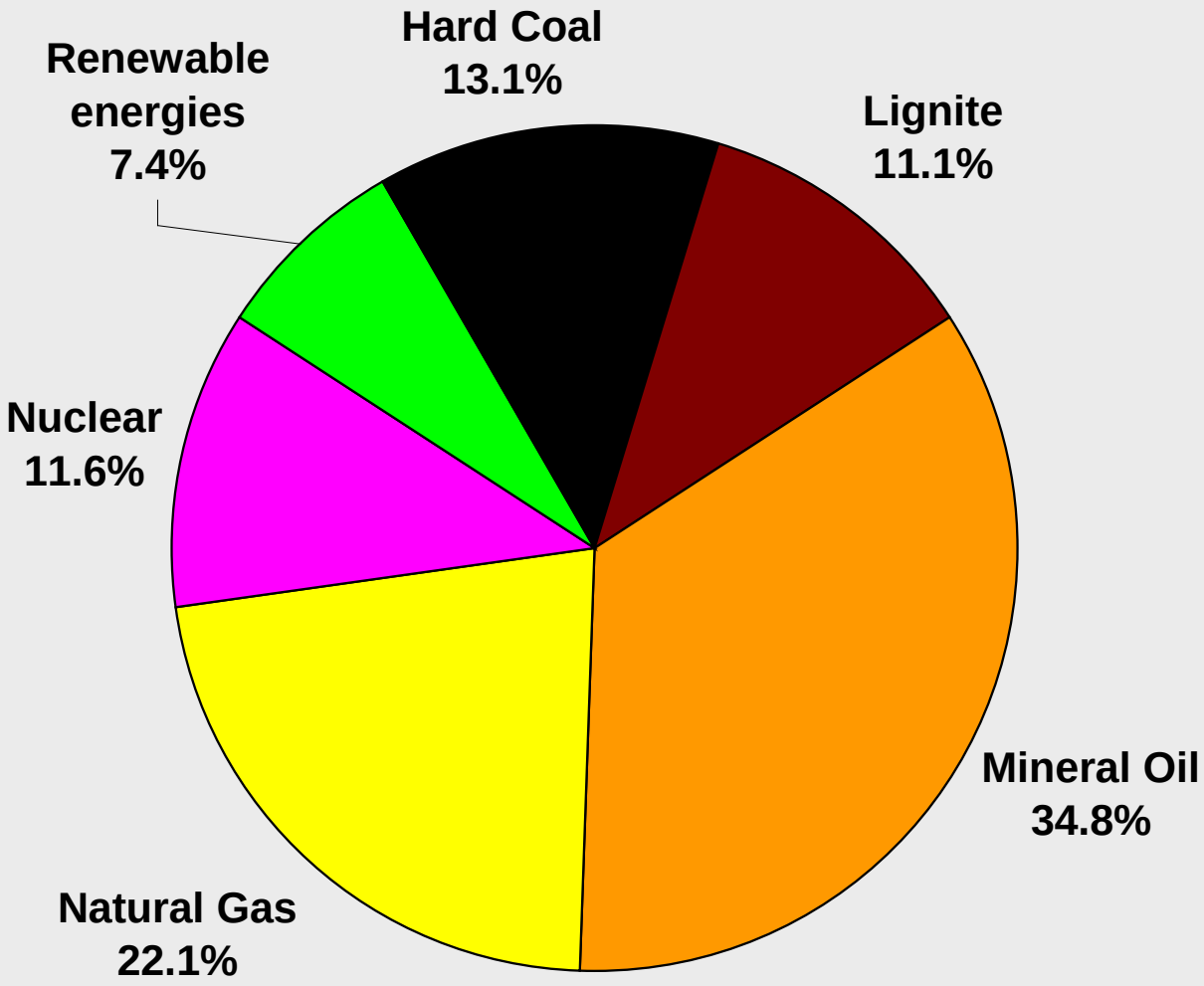
- Some background figures for Germany
- Influence of European Policy
- Quantitative targets on European and German level
- Policies and Measures in Support of Energy Efficiency
- Conclusions

Primary energy consumption in Germany 1990 - 2008:
Stabilizing und slightly decreasing



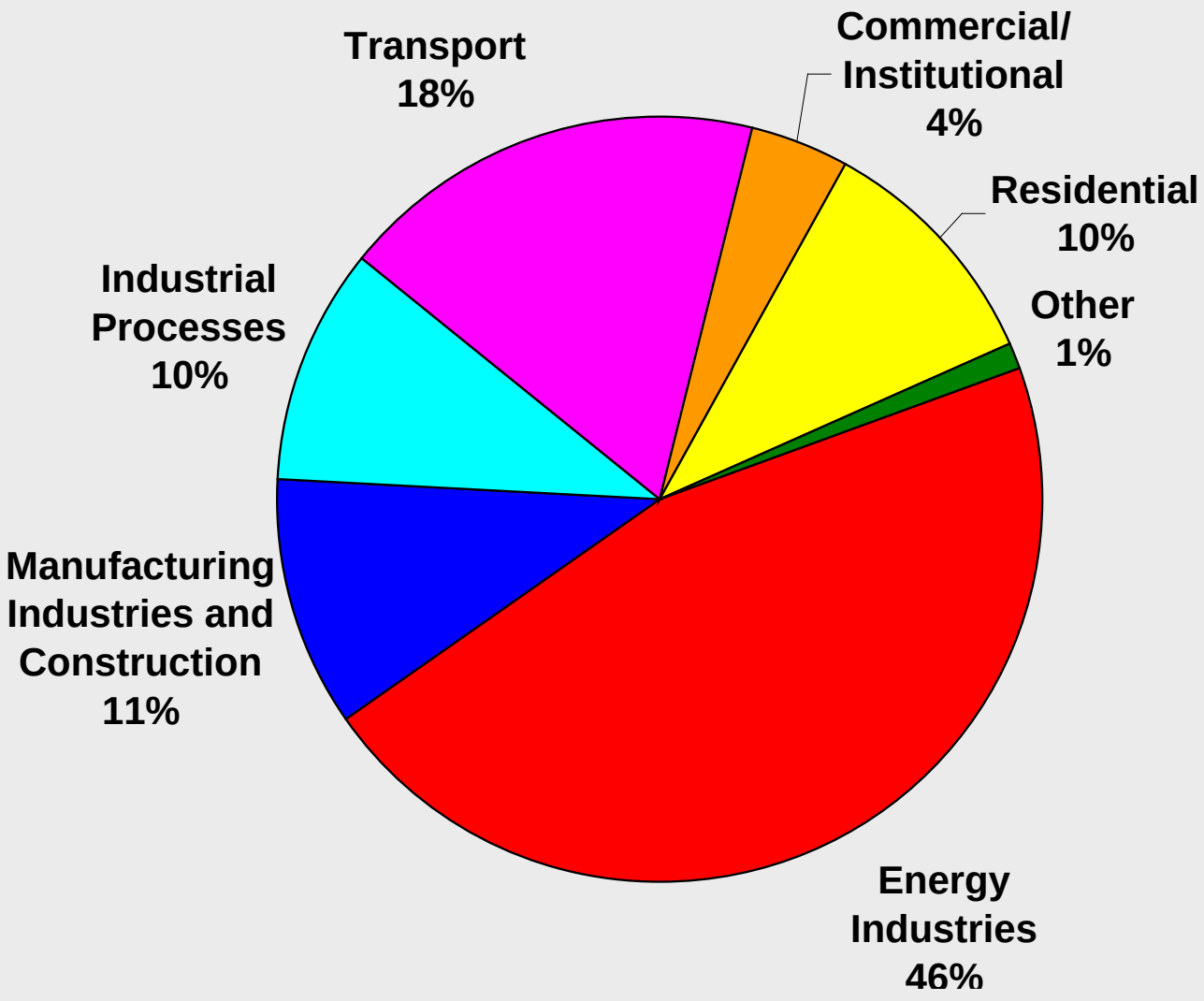
source: Working Group Energy Balances.

Structure of primary energy consumption in Germany 2008: Still dominated by fossil fuels (81 %)

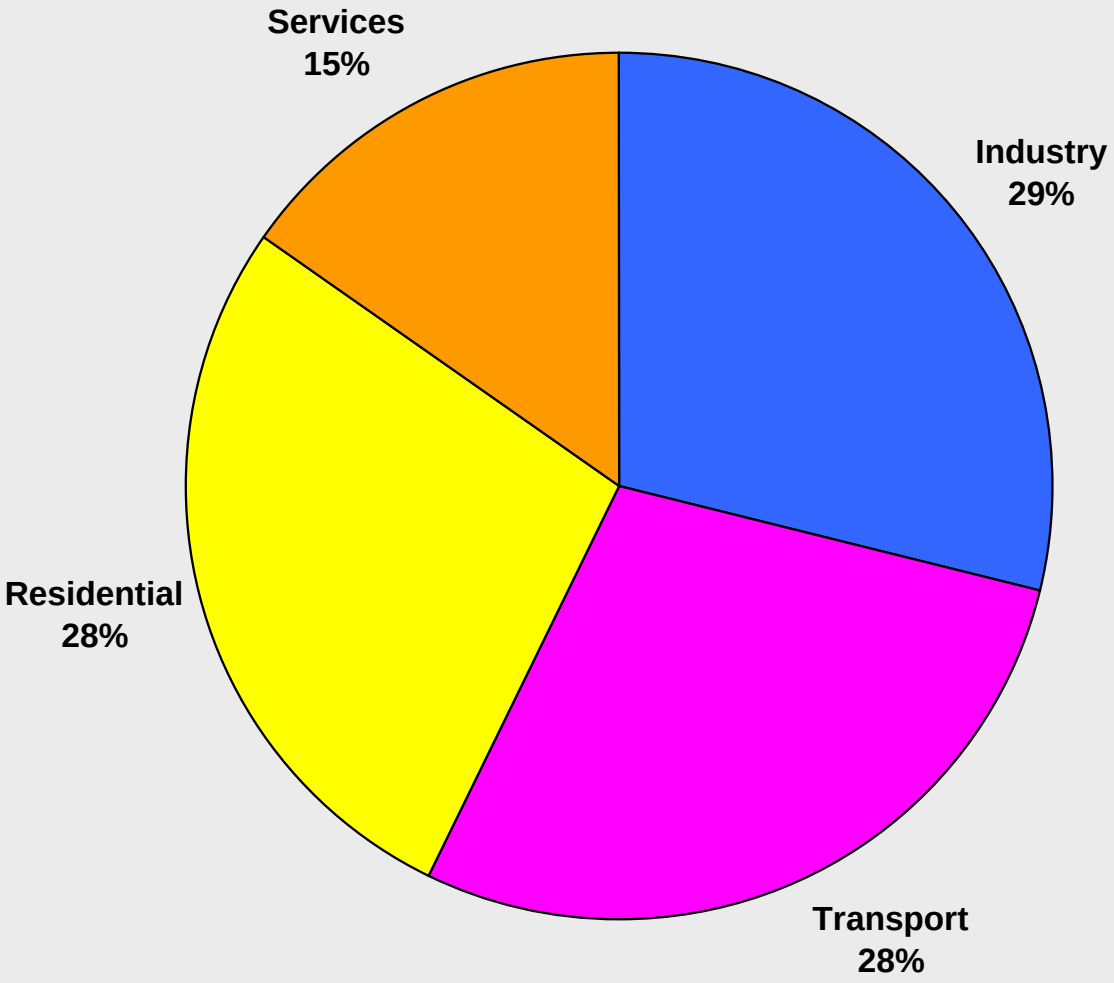


source: Working Group Energy Balances.

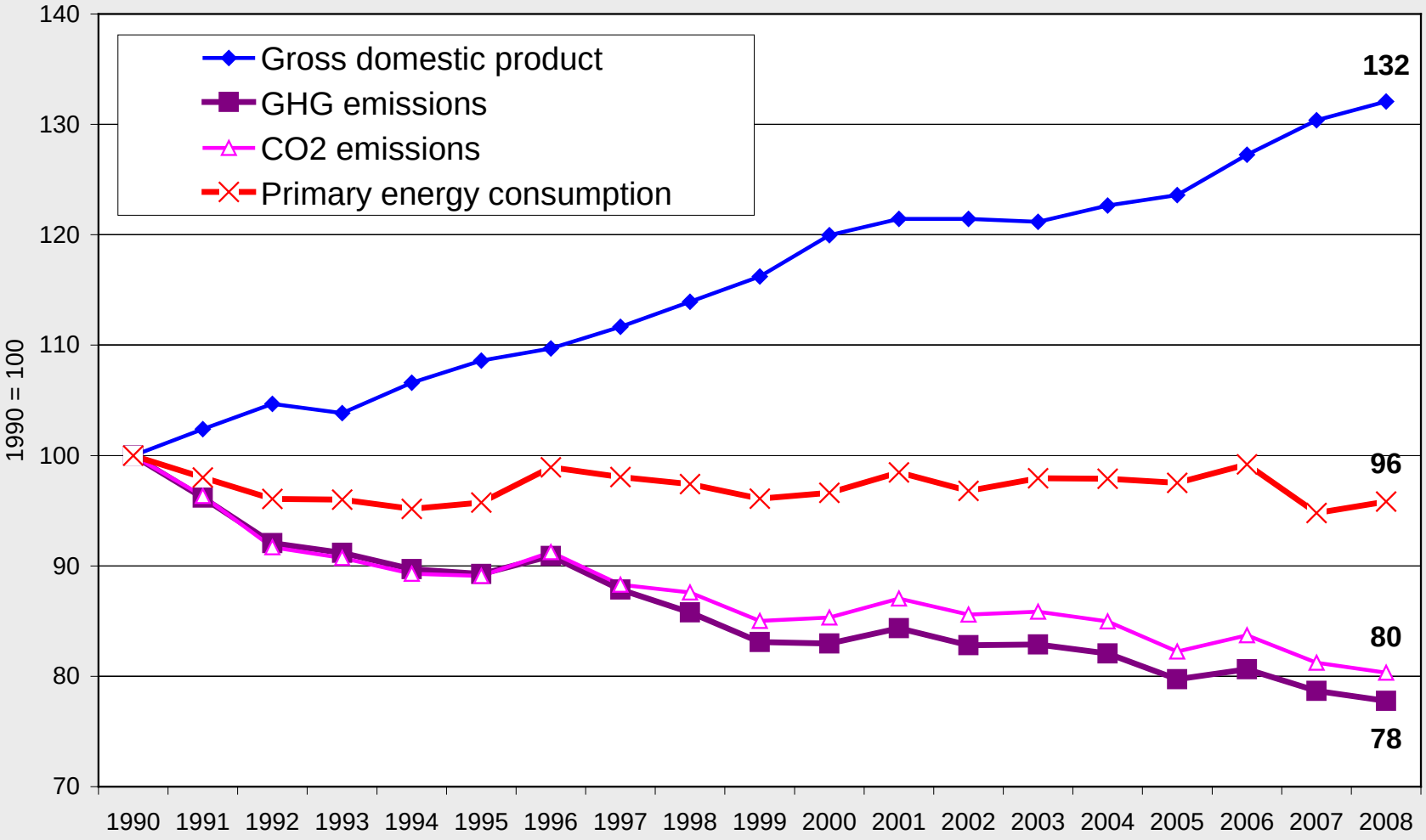
CO_2 emissions by sectors in Germany2008:
Energy and industries are dominating



Final Energy Consumption by sectors in Germany2008:
Industry, Transport and Residentials quite similar

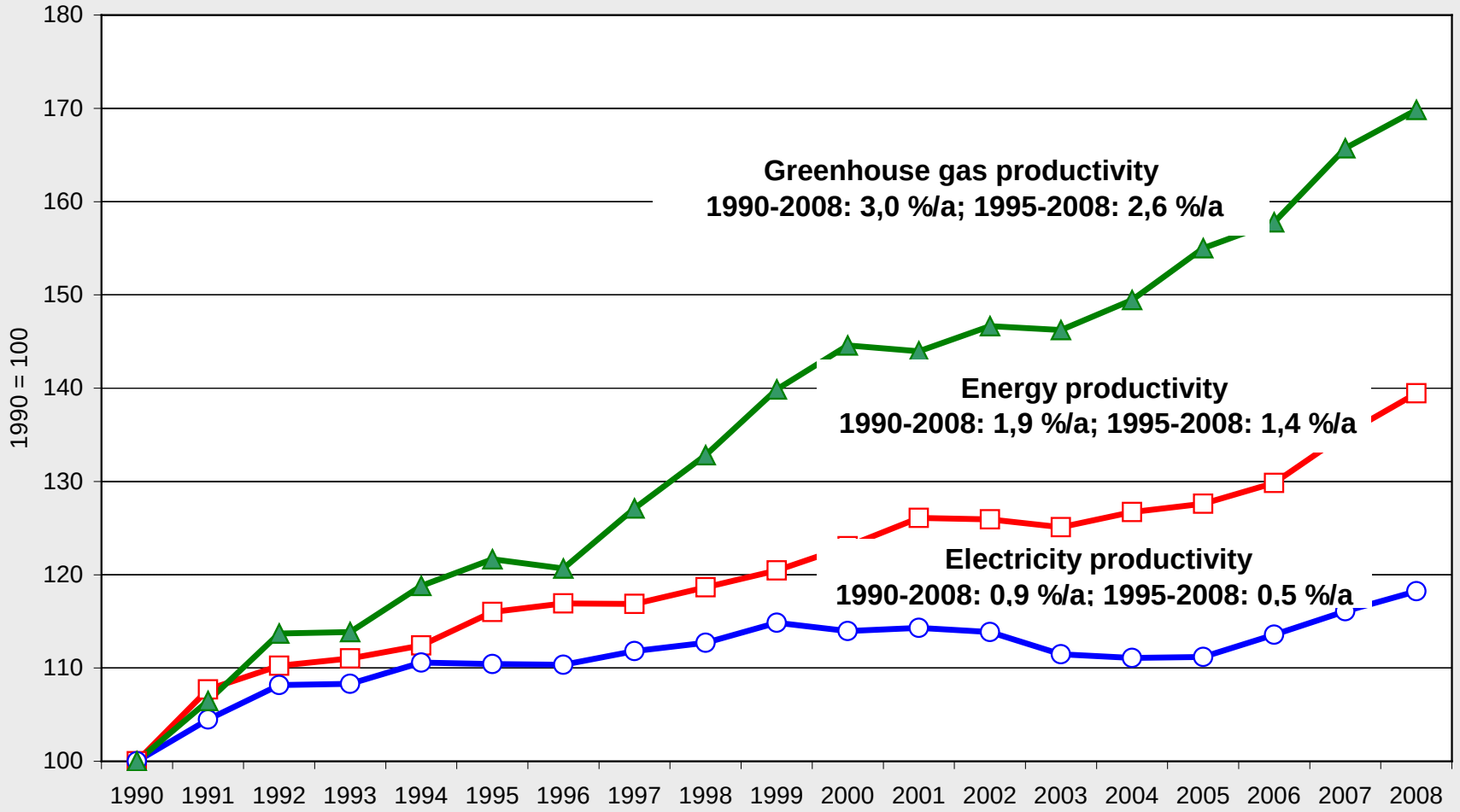


GDP, TPES and GHG Emissions in Germany 1990-2008: "Decoupling" of TPES and GHG Emissions from GDP



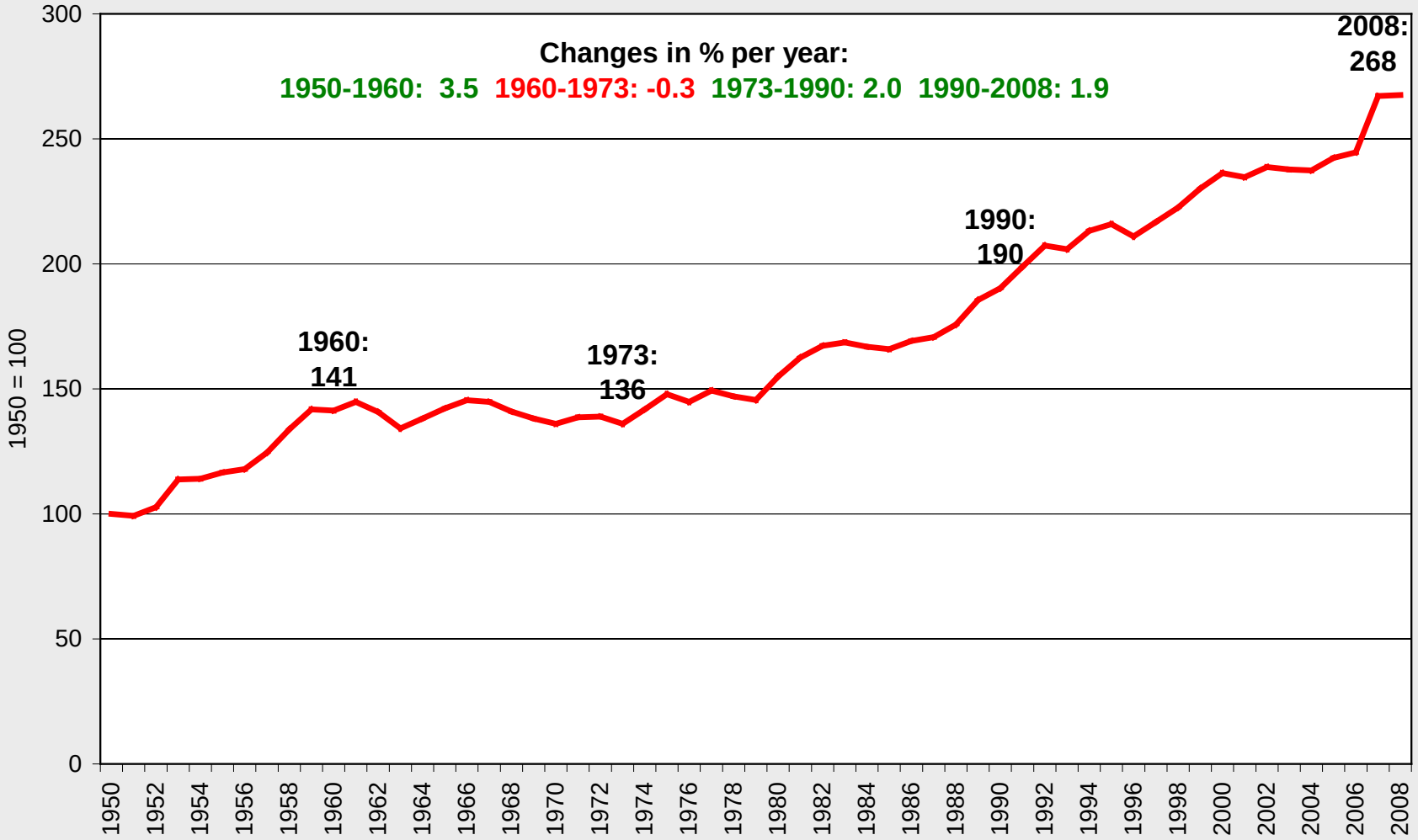
source: Federal Statistical Office; Federal Environmental Agency; Working Group Energy Balances (AGEB).

Productivity Indicators for Germany 1990 to 2008:
Improving over time with different rates



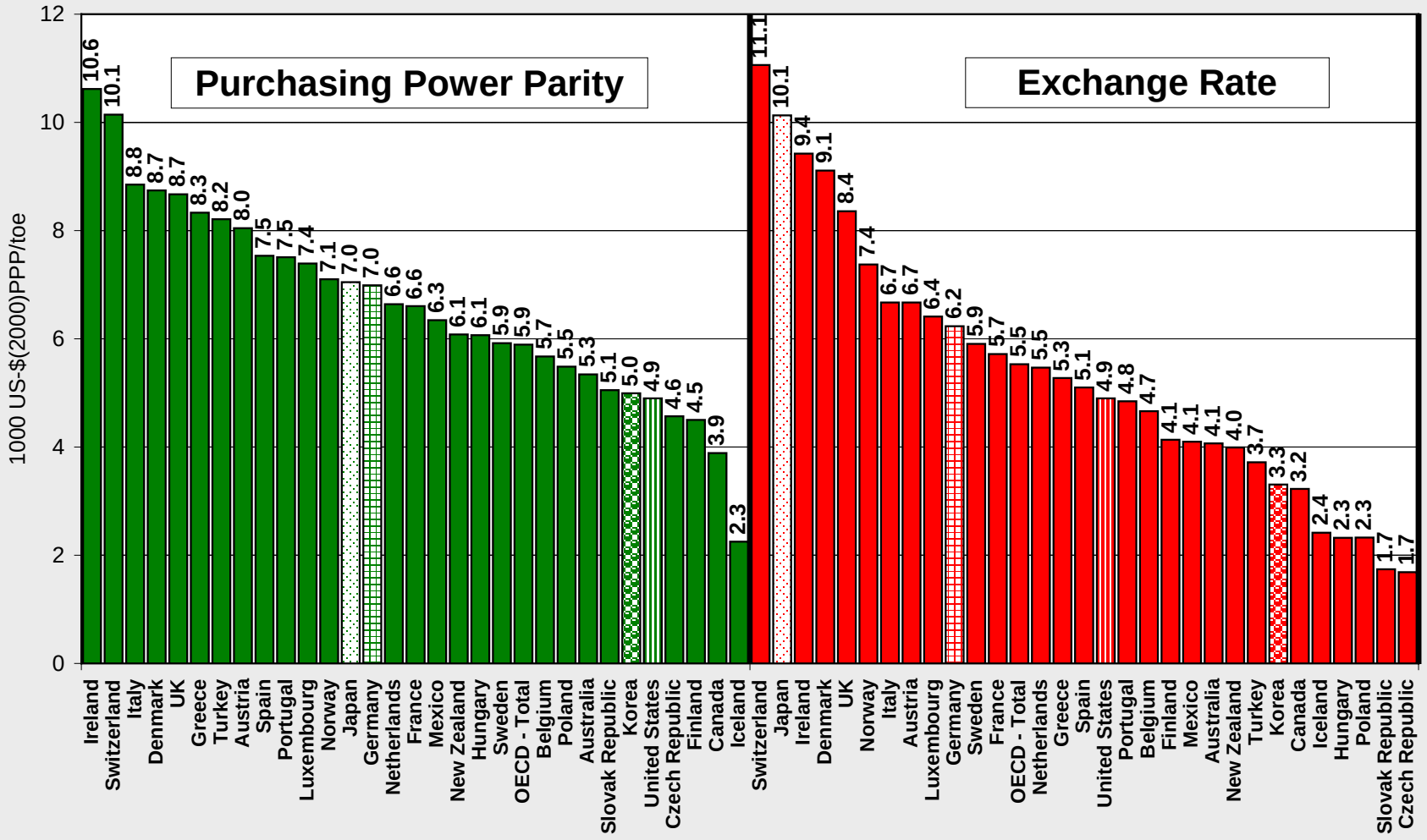
sources: Federal Statistical Office; Federal Envirnoment Agency; Working Group Energy Balances (AGEB); Federal Electricity Association (BDEW).

Energy Productivity in Germany 1950 to 2008:
Significant differences over time



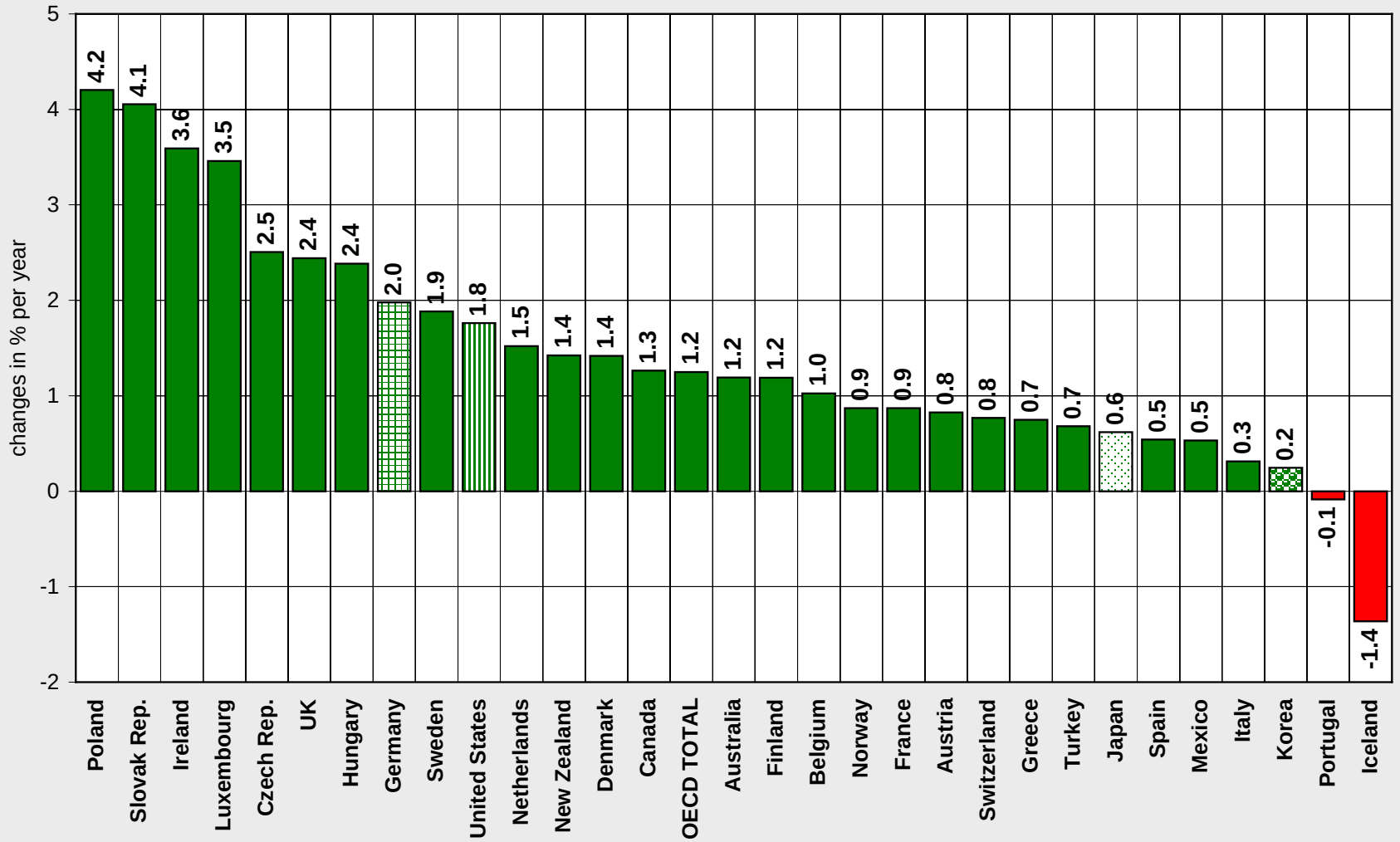
source: Federal Statistical Office; Working Group on Energy Balances.

Energy Productivity in OECD Countries 2007:
Germany ranking 14th (PPP) resp. 10th (Exchange rate)



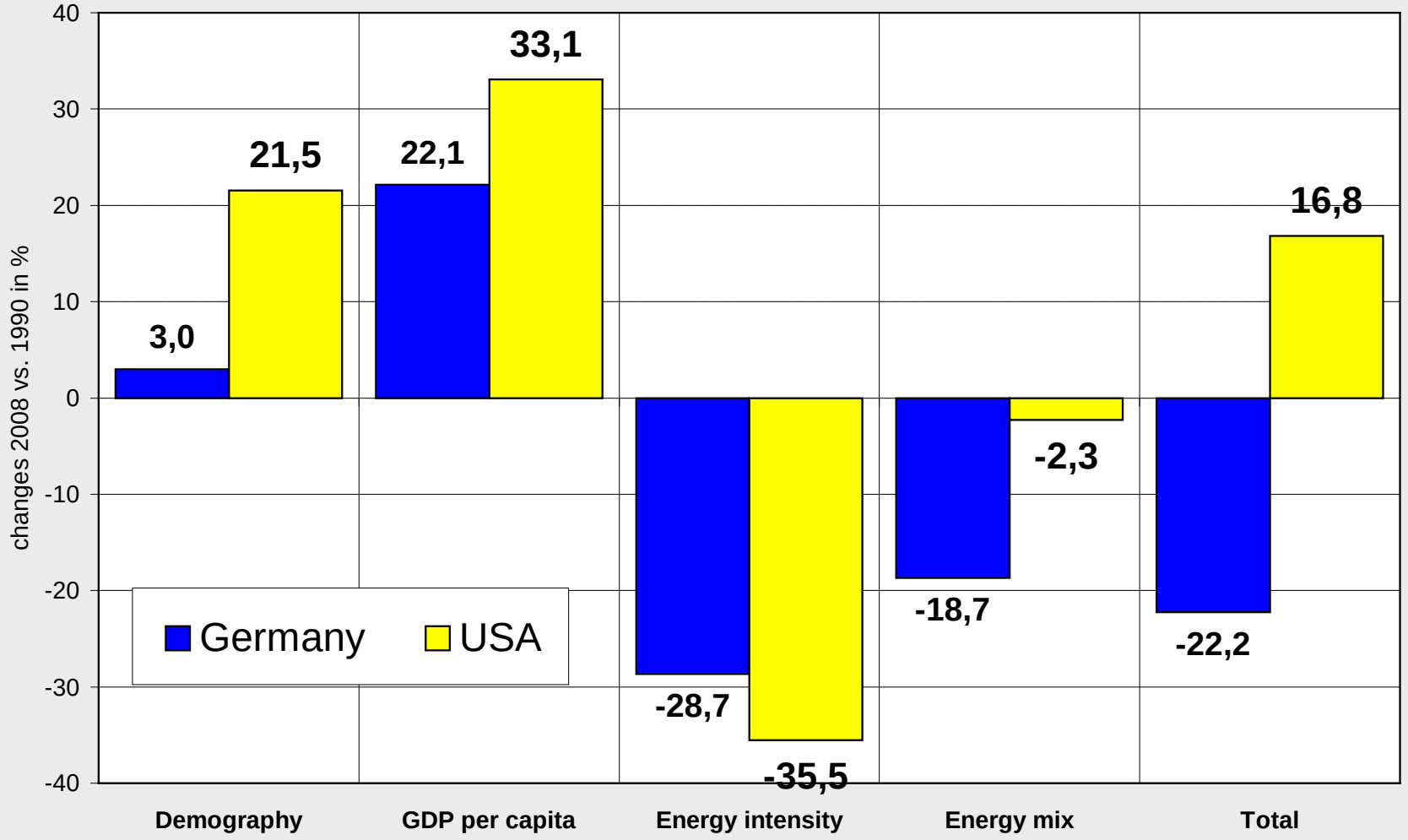
sources: OECD; IEA.

Energy Productivity in OECD Countries from 1990 to 2007:
Germany ranking at the 8th position



sources: OECD; IEA.

What influenced the GHG Emissions most from 1990-2008?
It's the Energy Efficiency in Germany like in the USA



sources: UNFCCC; IEA; BP; author's calculations.

EU Influence: Important Directives on EU Level concerning Climate Change Policies (I)

- Directive 2001/77/EC of 27 September 2001 on the promotion of electricity produced from renewable energy sources in the internal electricity market.
- Directive 2002/91/EC of 16 December 2002 on the energy performance of buildings
- Directive 2003/87/EC of 13 October 2003 establishing a scheme for greenhouse gas emission allowance trading in the EU
- Directive 2004/8/EC of 11 February 2004 on the promotion of cogeneration based on a useful heat demand
- Directive 2005/32/EC of 6 July 2005 establishing a framework for the setting of ecodesign requirements for energy-using products (approved for household refrigerators, televisions and circulators on 22 July 2009)
- Directive 2006/32/EC of 5 April 2006 on energy end-use efficiency and energy services.

EU Influence: The quantitative Targets of EU Energy and Environmental Policy

- A 20%/30% reduction in greenhouse gas emissions by 2020 compared to 1990. 30 % provided that other developed countries commit themselves to comparable emission reductions
- A binding target of a 20% share of renewable energies in overall EU energy consumption by 2020 (with different targets among the Memberstates) and a 10% binding minimum target to be achieved by all Member States for the share of biofuels in overall EU transport petrol/diesel consumption by 2020
- Increasing energy efficiency in the EU so as to achieve the objective of saving 20% of the EU's energy consumption compared to projections for 2020, as estimated by the Commission in its Green Paper on Energy Efficiency
- Enlarge the share of electricity production of combined heat and power plants (CHP) (the number still has to be fixed)

EU Influence: The EU Climate and Energy Package of 23 April 2009 coming into force on 25 June 2009

- Decision No 406/2009/EC on the effort of Member States to reduce their greenhouse gas emissions to meet the Community's greenhouse gas emission reduction commitments up to 2020
- Directive 2009/28/EC on the promotion of the use of energy from renewable sources
- Directive 2009/29/EC to improve and extend the greenhouse gas emission allowance trading scheme of the Community
- Commission Regulations of 22 July 2009 implementing Directive 2005/32/EC of the European Parliament and of the Council with regard to ecodesign requirements for household refrigerating appliances, televisions, glandless standalone circulators and glandless circulators integrated in products for electric motors.
- Directive 2009/31/EC on the geological storage of carbon dioxide (CCS).

The Steps of Climate Protection Policies in Germany

- The process of developing and implementing the Federal Government's climate protection program started in January 1990. At that time the Federal Chancellor's Office commissioned the Federal Ministry for the Environment to submit proposals for targets and measures regarding climate protection.
- At the first COP in Berlin 1995, German Chancellor Kohl declared Germany's target to reduce CO_2 emissions by 25 % until 2005 vs. 1990.
- Following the signing of the Kyoto Protocol on 29 April 1998, Germany initiated measures designed to achieve the climate protection targets, i.e. a reduction of Greenhouse Gas Emissions by 21 % until 2008/2012 vs. the base year 1990/1995.
- Climate protection programs followed in 2000, 2005, 2007/2008.
- According to the respective EU Directive Germany submitted in November 2007 the updated Version of the National Energy Efficiency Action Plan with a 9 % energy saving up to 2016.

The Elements of Germany's policy to improve Energy Efficiency are traditionally a mixture between …

- **Regulatory laws** (like Energy Saving Act, Energy Saving Ordinance, Ordinances on heat insulation, on heating installations, energy labelling, CHP-law etc)
- **Fiscal regulations** (like energy taxes, ecological tax reform)
- **Fundings** (e.g. direct subsidies, low-interest loans)
- **Research and Development** (e.g. 5th Energy Research Program of 2006 with a focus on new energy technologies).
- **Voluntary Agreements** (1995 first VA signed by 14 sectors of industry aimed at increasing energy savings and reducing CO_2)
- **Training and Education** (stimulus programs e.g for specialists in industry)
- **Information, motivation and communication** (e.g. on-site energy advice, campaigns)

A new Chapter of Climate Protection Policy opened in 2005: The European Emission Trading Scheme

1 January 2005

Starting of the European Emission Trading Scheme (ETS) based on Directive 2003/87/EC, which entered into force on 25 October 2003. (Trading Period 2005 – 2008)

1 January 2008:

Start of Trading Period 2008 – 2012 (Kyoto-Period)

1 January 2013

Start of the Trading Period 2013 – 2013
(basic principles decided, details under consideration)

ETS covers the sectors "Energy Industry" and "Industry" to a large extend (around 60 % of Germany's overall emissions); air traffic will be included in 2011.

Thus the focus of the Climate Protection Programs shifted to policies in the sectors "Transport", "Residential" and "Services".

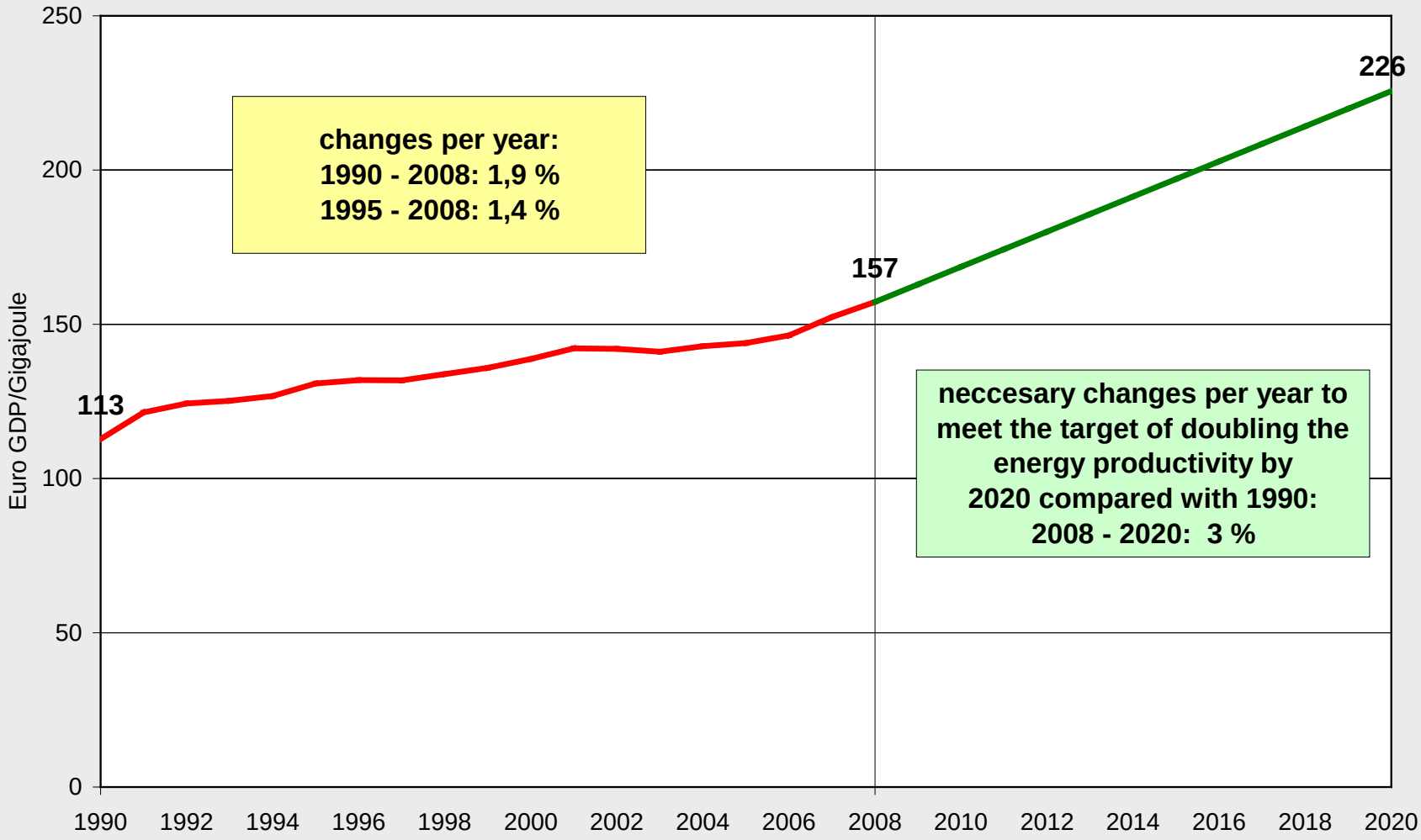
The significance of emission trading within the German climate change policy

- **Emission trading became the cornerstone of Germany's climate protection programme.**
- **The first introducing(!) trading period 2005 – 2007 showed a lot of problems (i.e. over allocation, complicated regulations, at least 95 % of the allowances had to be allocated free of charge) but made it possible to establish the required infrastructure within the Member States and the EU.**
- **Massive cut in the emissions budget in the second trading period 2008 – 2012**
- **Ambitious post-2012 climate protection targets necessitate a further drastic cut in the emissions trading budget**
- **The pricing of Greenhouse Gases resp. CO_2 in a cap and trade system creates a lot of incentives to improve energy efficiency.**

The new quantitative Targets of Germany's Energy and Environmental Policy

- Germany commits itself to reduce greenhouse gas emissions by 2020 by 40% (minus 21% by 2008/2012) .
- Massive expansion of renewable energies by 2020: In the electricity sector their share shall increase to 25-30 %. In the heat sector to 14 %, in fuel production to 17 % (by energy content) and in biogas to 10 % in 2030.
- The share of highly efficient combined heat and power plants (CHP) in electricity production will be doubled to around 25 % by 2020
- The energy efficiency in new buildings shall reduce energy consumption stepwise by 30% in each case
- Germany's energy productivity shall be doubled by 2020 compared with 1990.

Energy productivity in Germany 1990 to 2008 and target by 2020



source: Federal Statistical Office, Workings Group on Energy Balances.

The Implementation of the Meseberg Package 2007/2008 regarding Energy Efficiency (I)

- **Amendment to the Combined Heat and Power Act** **(see one of the next slides)**
- **Amendment to the Energy Industry Act (EnWG) on liberalising metering** **(Currently, meters still have to be provided by the grid operator. Therefore this field will be opened up to competition)**
- **Ordinance on electricity and gas meters** **(specifies the requirements for the introduction of smart metering)**
- **Clean power plants** **(Introduction of an obligation to use the most modern emissions-reduction systems)**
- **Guidelines on the procurement of energy-efficient products and services** **(the German Government has decided to develop environmentally friendly, in particular energy-efficient, technical guidelines that will form the basis for the procurement decisions made by the Federation)**
- **Introduction of modern energy management systems** **(agreement on the coupling of tax relief with the adoption of energy management)**

The Implementation of the Meseberg Package 2007/2008 regarding Energy Efficiency (II)

- **Amendment of Energy Conservation Act and Energy Saving Ordinance (stricter energy-related requirements for new and existing buildings: -30%)**
- **Regulations on the gradual removal of night-storage heaters used for space heating (support under the modernization program to reduce CO_2 emissions in buildings)**
- **Amendment to Heating Costs Ordinance (70% of heating costs have to split up according to consumption)**
- **Modernization Program to reduce CO_2 emissions from buildings (funding for energy-efficient modernization of residential buildings and local authorities facilities)**
- **Energy-efficient modernization of social infrastructure (a pact between the Federation, the Länder and local authorities with the goal of primary energy savings of up to 50 % per refurbished building)**
- **Program for the energy-efficient modernization of federal buildings (realization of the extensive potential for energy and cost savings, in accordance with the Government's commitment)**

The Implementation of the Meseberg Package 2007/2008 regarding Energy Efficiency (III)

- **Agreement on key elements for changing basis of vehicle tax (in order to ensure that the vehicle tax can be based on CO_2 emissions from 1 January 2010)**
- **CO_2 strategy for passenger cars (binding CO_2 values, which must be anchored legally at the EU leve)**
- **Energy labeling of passenger cars (clear labelling that also selectively incorporates the EU targets for CO2 emissions and provides information about the energy efficiency of vehicles on sale.**
- **Reinforcing the influence of the HGV toll (broader spread and greater differentiation of toll rates by emissions classes, toll rates that recognise the retrofitting of particle-filtering systems. greater coverage of roads below motorway level etc)**

CHP - a Way to improve Energy Efficiency: The New CHP Act 2008 in Germany

- **Target: doubling CHP share in electricity production to 25% in 2020**
- **Focus on new installations being brought into operation by the end of 2014/2016**
- **Bonus system again; paid by electricity consumers**
- **Bonus on electricity fed into the public grid or directly used**
  > 2 MW_{elt} -> 1,5 ct/kWh over 6 years or max. 30.000 h, industry 4 years only
  50 kW to 2 MW -> 2,1 ct/kWh over 6 years or max. 30.000 h
  ≤ 50 kW -> 5,11 ct/kWh over 10 years
- **Max. 600 million €/a for CHP plants**
- **Max. 150 million €/a for district heating investments (20% subsidy if at least 50% CHP heat)**
- **Monitoring in 2011**
- **Starts 1.1.2009**

The expected Reduction of CO_2 emissions as a result of the Meseberg Package

	million tonnes
Modernising fossil power plants	-15.0
Electricity from renewable energies	-54.4
Combined heat and power	-14.3
Modernisation of buildings and heating systems	-31.0
Heat from renewable energies	-9.2
Savings in electricity	-25.5
Transport	-33.6
Other greenhouse gases	-36.4
Total	-219.4
In percent compared with base year (1990)	-36.6%

Some conclusions
Lessons learnt

Conclusions (I)

- Regarding the past developments and the “business-as-usual” scenarios for the future it is clear that the targets of energy and environmental policy, and especially the targets of climate protection policies **can not be realised by market forces only**.
- It needs an effective policy, which provides the necessary **framework requirements** for the different agents in economy and society.
- And it is a widely common understanding in Germany that policy should **make use of the market forces as much as possible**, and therefore to use mainly market based instruments.

Conclusions (II)

- There are sufficient technical and other options available to meet the targets
- To use all the given options we need to change our energy and environmental policies significantly
- Appropriate policies and measures are available for immediate implementation
- First of all we need a common understanding regarding the problems to be solved, the targets which should be followed and the policies which has to be implemented.
- A successful policy needs the acceptance of the people and their willingness to follow the way for a sustainable development.

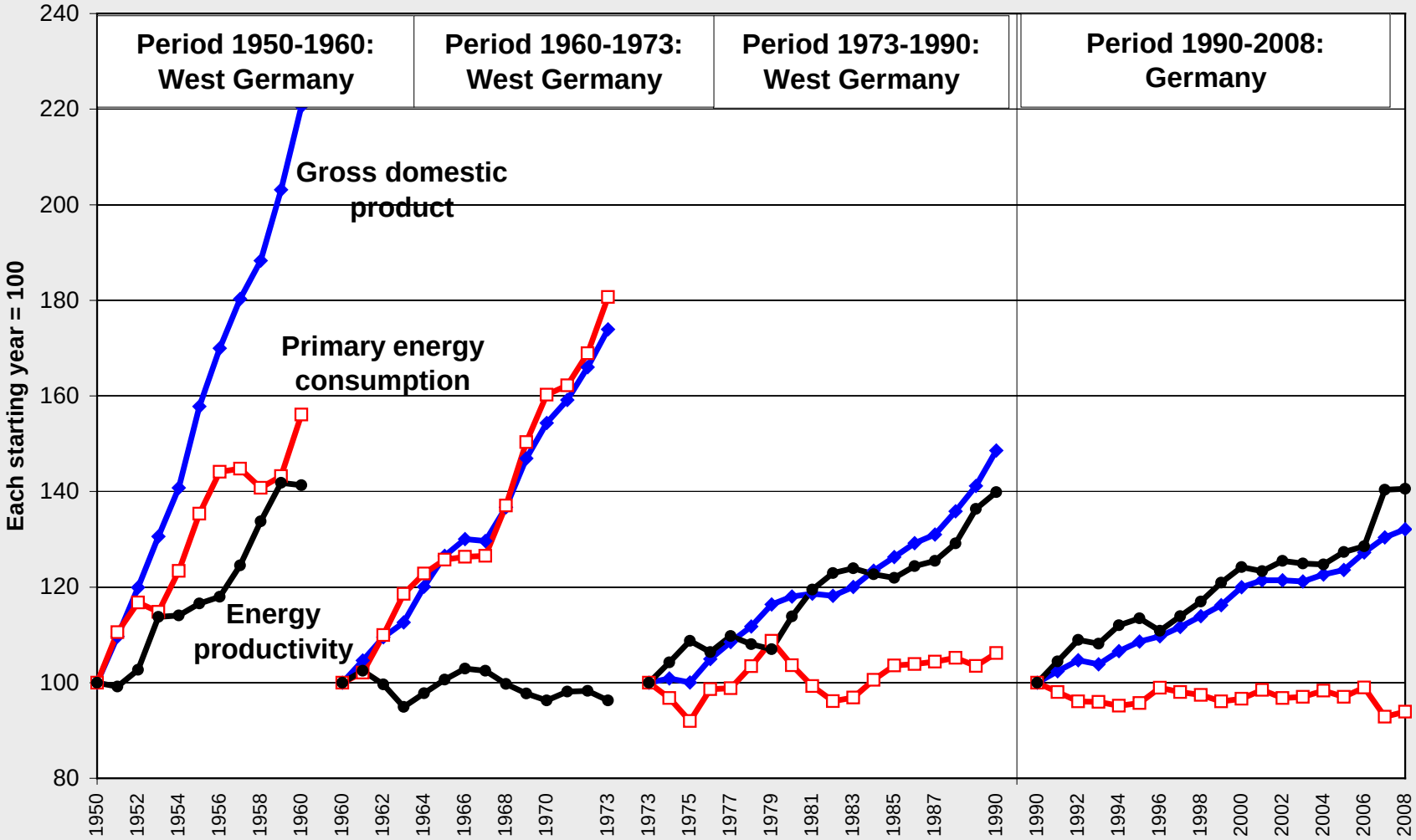
Conclusions (III)

- **To meet our targets we need …**
  - **not only one single instrument but we should use the full range of policy instruments,**
  - **not only one sector but cover all sectors on the supply and the demand side,**
  - **not only one actor but all relevant groups in our society (policy makers, business people, scientists, NGO's, different associations and private people)**

- **And we learnt:**
  - **There is no "golden way" and no one single element of the policy which provide all the answers – they must be taken together as a whole.**
  - **Energy policy must be addressed by many different (if not all) policy areas.**


Thank you for listening
hziesing@t-online.de

Gross domestic product, primary energy consumption and energy productivity in Germany 1950 to 2008



sources: Federal Statistical Office; Working Group Energy Balances (AGEB).