Monitoring the German Energy Transition

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Targets of Germany's energy and climate policy: Phasing-out Nuclear Energy and Decarbonisation of economy and society

	Base year	2020	2030	2040	2050
Nuclear power (MW)	**21517**	**8539**	**last reactors will be shut down by the end of 2022**		
Greenhouse gas emissions	**1990**	**-40%**	**-55%**	**-70%**	**-80% to -95%**
		Share of renewable energies			
Gross final consumption	xxx	**18%**	**30%**	**45%**	**60%**
Electricity generation*	xxx	**35%**	**50%**	**65%**	**80%**
		Energy consumption/-efficieny			
Primary energy	**2008**	**-20%**	**xxx**	**xxx**	**-50%**
Space heating	**2008**	**-20%**	**xxx**	**xxx**	**-80%**
Transport	**2005**	**-10%**	**xxx**	**xxx**	**-40%**
Electricity consumption	**2008**	**-10%**	**xxx**	**xxx**	**-25%**

***) According to the coalition agreement: 40-45 % in 2025 and 55-60% in 2035**

- ⇨ **CHP share in electricity generation in 2020: 25 %**
- ⇨ **Final energy productivity: Annual increase of 2.1 % from 2008 to 2050**
- ⇨ **Doubling the annual building renovation rate to 2 % of the total building stock**
- ⇨ **Building stock should bei almost climate-neutral by 2050**

Challenges of the energy transition

- The **German energy transition** is much more than phasing out nuclear energy.
- **Fundamental reconstruction** of our total energy system
- The reduction of greenhouse gas emissions by 80 to 95 % means nothing less than a widely **fossil und nuclear free economy and society** and instead of this a society **based on renewable energies**.
- **Large scale investments** necessary regarding the transformation of the infrastructure (generation facilities, grid system, storage systems and overall measures for more energy efficiency in all sectors)
- **Market forces alone will not be enough** to make the energy transition a success. It needs societal acceptance and effective as well as efficient policies and measures..
- The success of the energy transition is fundamentally dependent upon **political decisions.**

Energy Concept

Federal Ministry of Economics and Technology

Federal Ministry for the Environment, Nature Conservation and Nuclear Safety

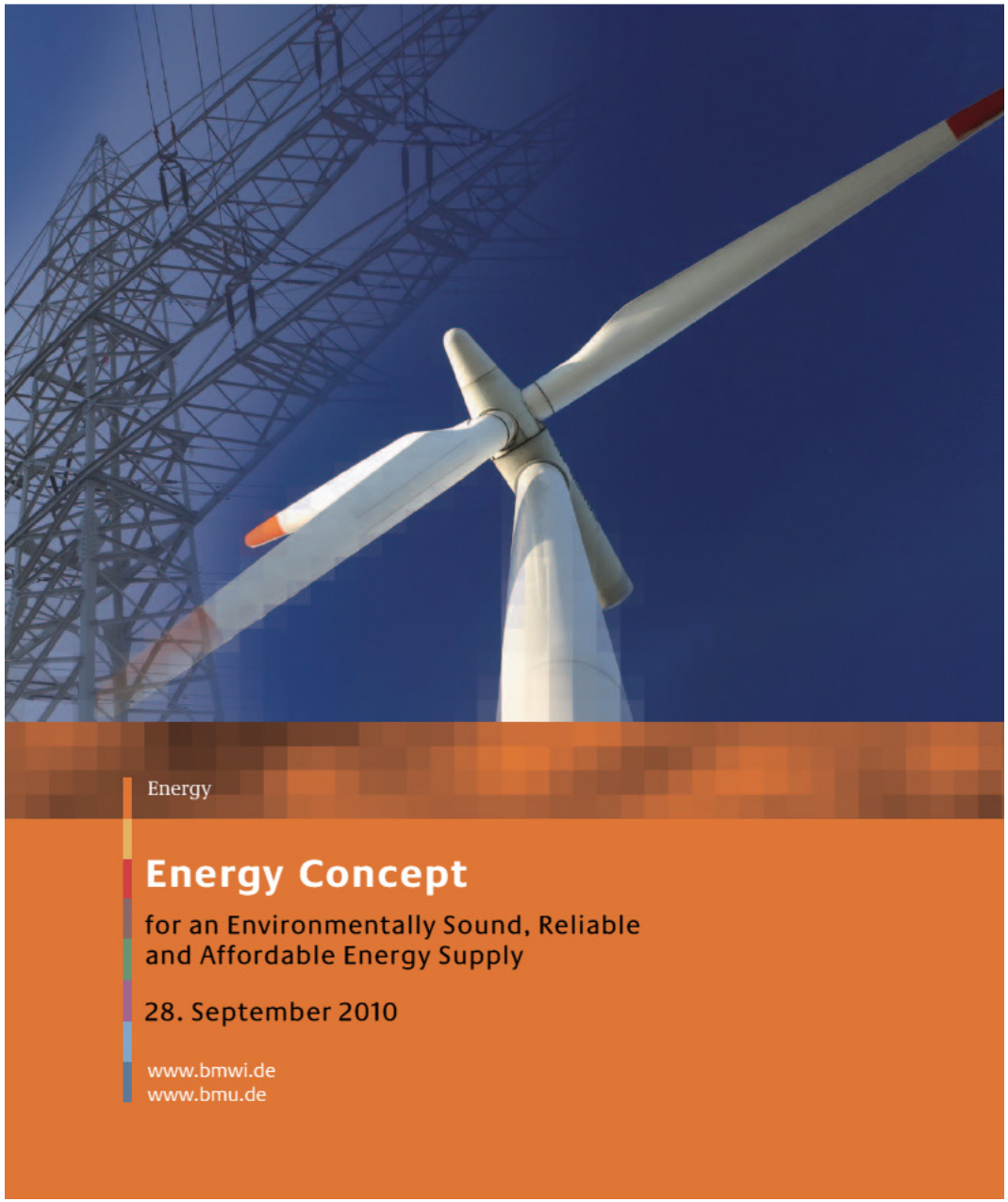
Liberty Unity Democracy

Energy Concept

as of 28 September 2010:

„Securing a reliable, economically viable and environmentally sound energy supply is one of the great challenges of the 21st century. […]

The German government will use scientifically tested monitoring to determine whether actual progress is within the corridor marked out by the above development path and to what extent action needs to be taken.



Task and Objective

The aim of the monitoring process is to continuously review to what extent the implementation of the energy policy decisions taken is in line with the objective of environmentally friendly, reliable and affordable energy supply, and make adjustments if necessary.

The Monitoring Process „Energy of the Future“

- Cabinet decision of October 19, 2011 to establish the “Energy for the Future” monitoring process.
- Two kinds of reports:
  - An annually monitoring report based on facts and figures.
  - A progress report every three years.
- To support the monitoring process an independent four member expert commission was set up within the cabinet’s decision.
- The Government’s report together with the expert commission’s statement will be published and forwarded to the German Parliament and the Federal Council as well as to the public.
- The 1st annual monitoring report was published in December 2012 for the year 2011. The 2nd report followed in April 2014, and the 1st progress report shall be finished in November 2014. Each with the statements of the expert commission

The annual monitoring report shall …

- … be based on facts
- … include an assessment of the progress made towards achieving the goals of the energy concept
- … be elaborated by comparing current and target values
- … include a tabular overview of policies and measures
- … use official data provided by the StBA, BAFA, UBA, BNetzA, BKartA, AGEB, AGEE-Stat and others.
- … concentrate on facts as well as on policies and measures

The three-yearly progress report shall …

- … contain a detailed comparison of the present status-quo and the long-term targets
- … evaluate the status of the implementation of the policies and measures on the base of thorough analyses and specific surveys if necessary
- … analyse the effectiveness and efficiency of policies and measures which had been implemented
- examine the causes and barriers and propose effective policies and measures

Organisation of the Monitoring Process

- The **Government report** is prepared by the Federal Ministry for Economic Affairs and Energy (BMWi) and has to be coordinated with the other ministries before the report is submitted to the Cabinet.
- Ideally, the government report should be available and thus the basis of the **Expert Commission's statement or comments.** . In reality this is only partly the case due to time restrictions.
- The **Federal Cabinet** adopted the first monitoring report on December 19, 2012 and the second one on April 8, 2014.
- Parallel to this the **statements of the Expert Commission** were delivered to the Cabinet and to the German Parliament.
- The **Federal Network Agency** acts as the head office and supports the monitoring process

Members of the Expert Commission

- Prof. Dr. Andreas Löschel (chair)
  Münster University and Centre for European Economic Research (ZEW), Karlsruhe
- Prof. Dr. Georg Erdmann
  Berlin University of Technology, Dept. for Energy Systems, Berlin
- Prof. Dr. Frithjof Staiß
  Centre for Solar Energy and Hydrogen Research Baden-Württemberg (ZSW), Stuttgart
- Dr. Hans-Joachim Ziesing
  Working Group on Energy Balances (AGEB), Berlin

The Expert Commission is supported by research associates from ZEW, Berlin University, ZSW and Ecologic

Outline of the Government's first report (125 p) = second report (138 p)

1. "Energiewende" and the three goals of energy policy
2. Quantitative targets of the "Energiewende"
3. Development of the energy supply
4. Energy efficiency
5. Renewable energies
6. Power plants
7. Existing grids and grid extension
8. Buildings and Transport
9. Greenhouse gas emissions
10. Energy prices and energy costs
11. Overall economic effects of the "Energiewende"

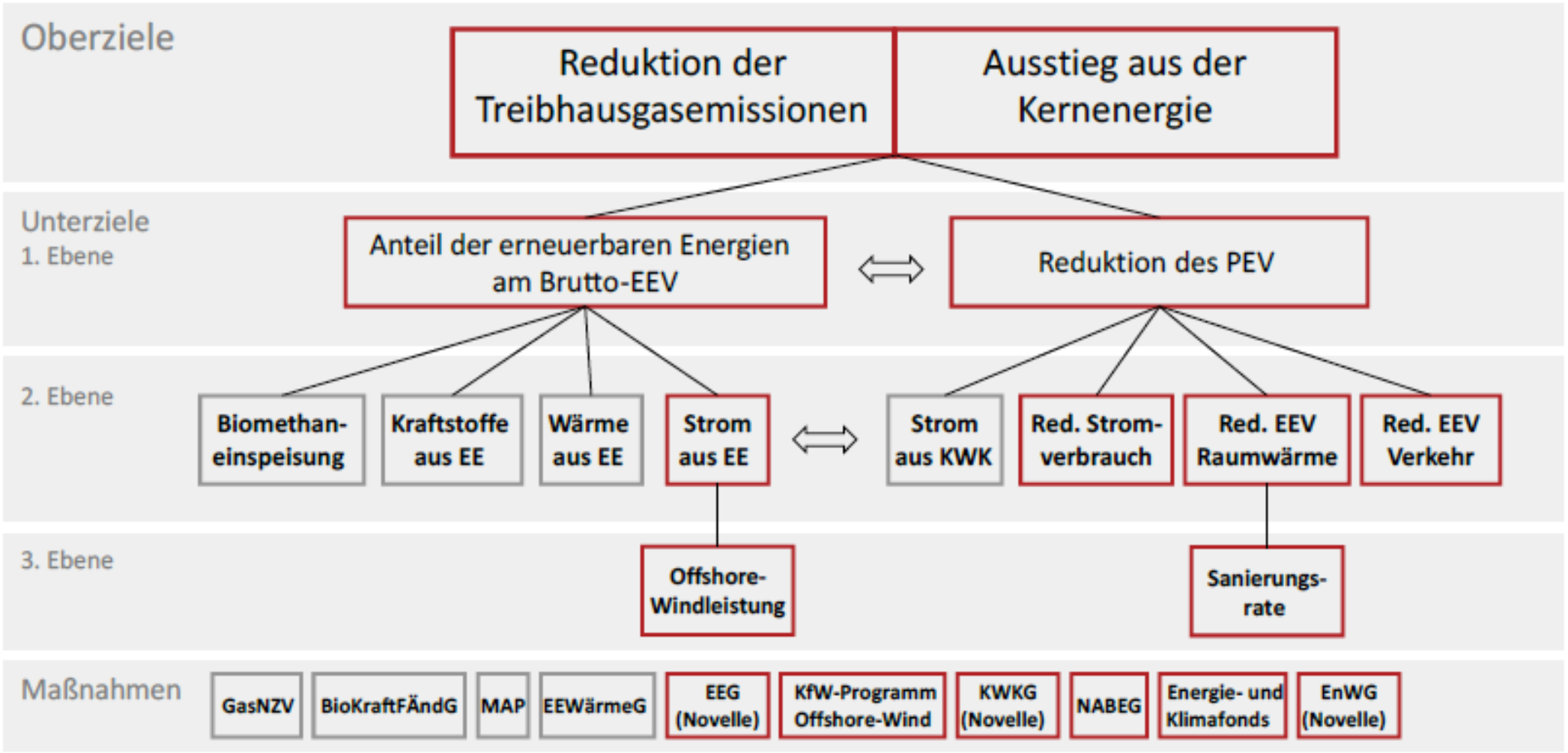
Outline of the Commission‘s first statement (138 p)

1. About target priorities
2. Monitoring process and the system of indicators
3. Initiatives concerning energy efficiency
4. Progress of renewable energies
5. Environmental impacts of the energy transition
6. Security of supply
7. Economic efficiency of the energy system
8. Macroeconomic effects
9. Coordination between the German and the European energy policy
10. Interactions between the quantitative targets of the German energy concept

Outline of the Commission‘s second statement (224 p)

1. Monitoring process as an element of the Energiewende
2. Phase-out of nuclear energy and reduction of greenhouse gas emissions
3. Initiatives in the field of energy efficiency
4. Development of renewable energy sources
5. Environmental impacts of the energy system
6. Development of supply security
7. Economic viability of the energy supply
8. Innovation impetus provided by the Energiewende.

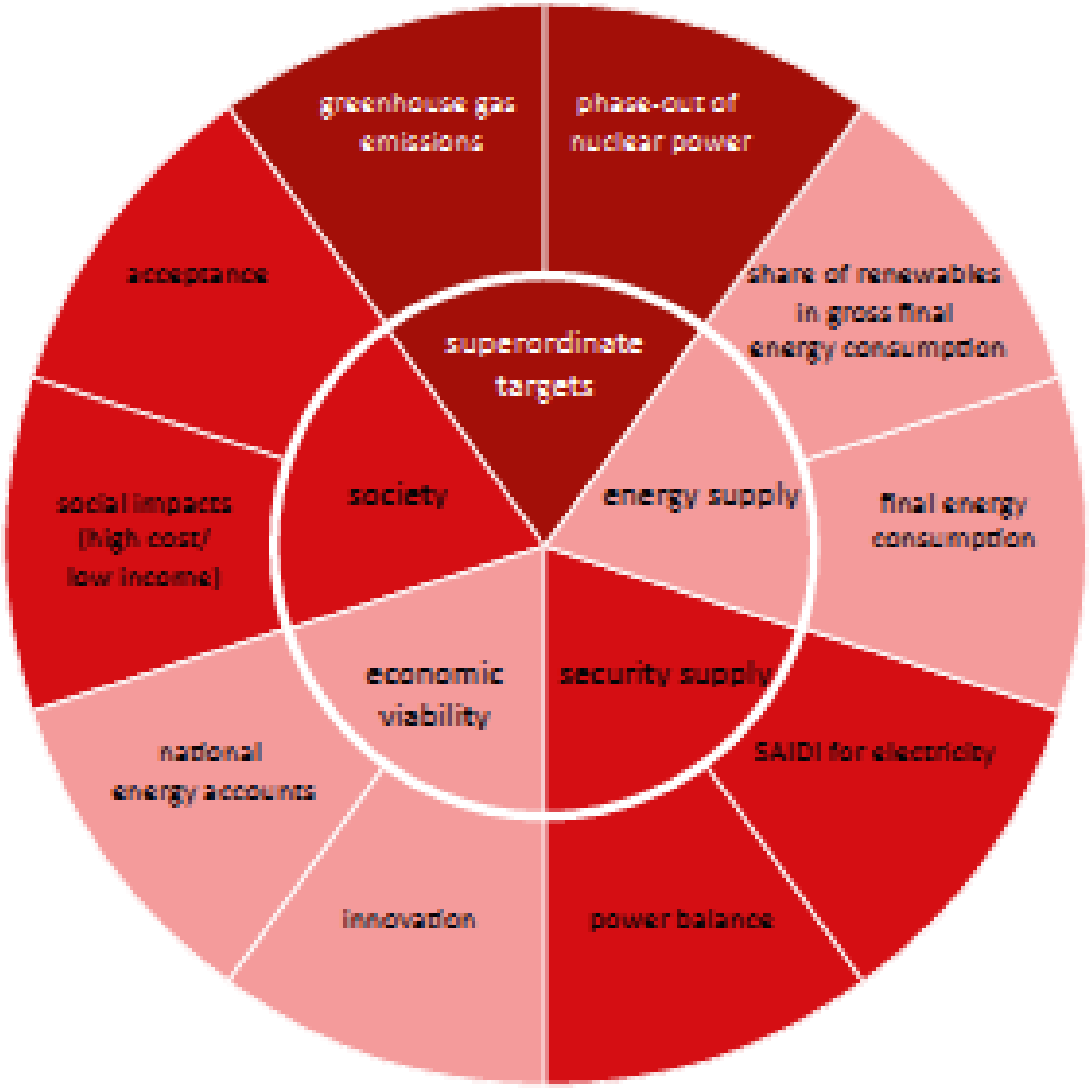
Prioritisation of objectives with regard of the energy transition



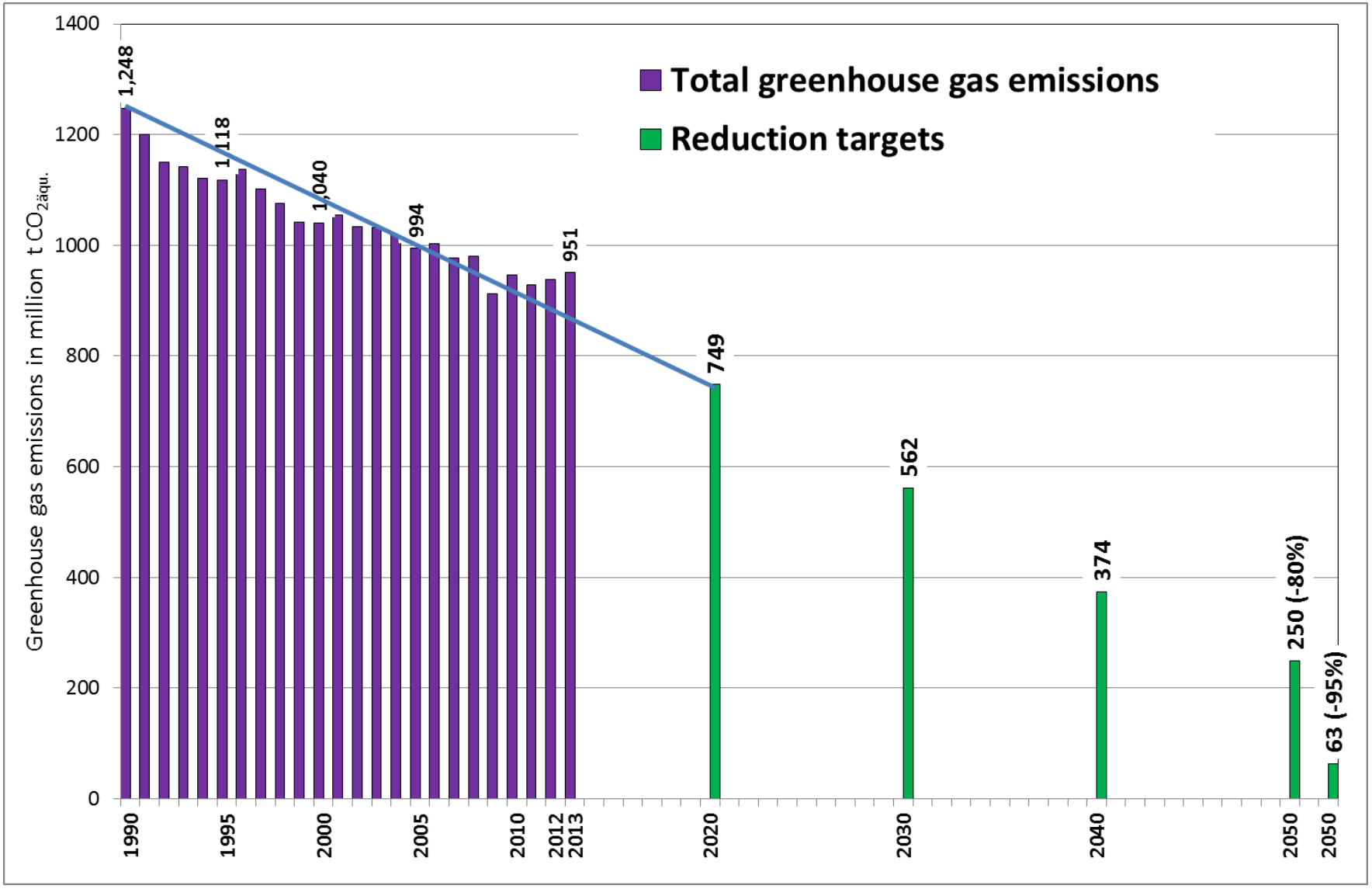
Problems regarding the monitoring

- choice of indicators
- data availability, timeliness, transparency, resilience
- qualified description of policies and measures
- cause-and-effect-relationship
- focussing targets – conflicts of goals – hierarchy of objectives
- ex-post versus ex-ante analysis

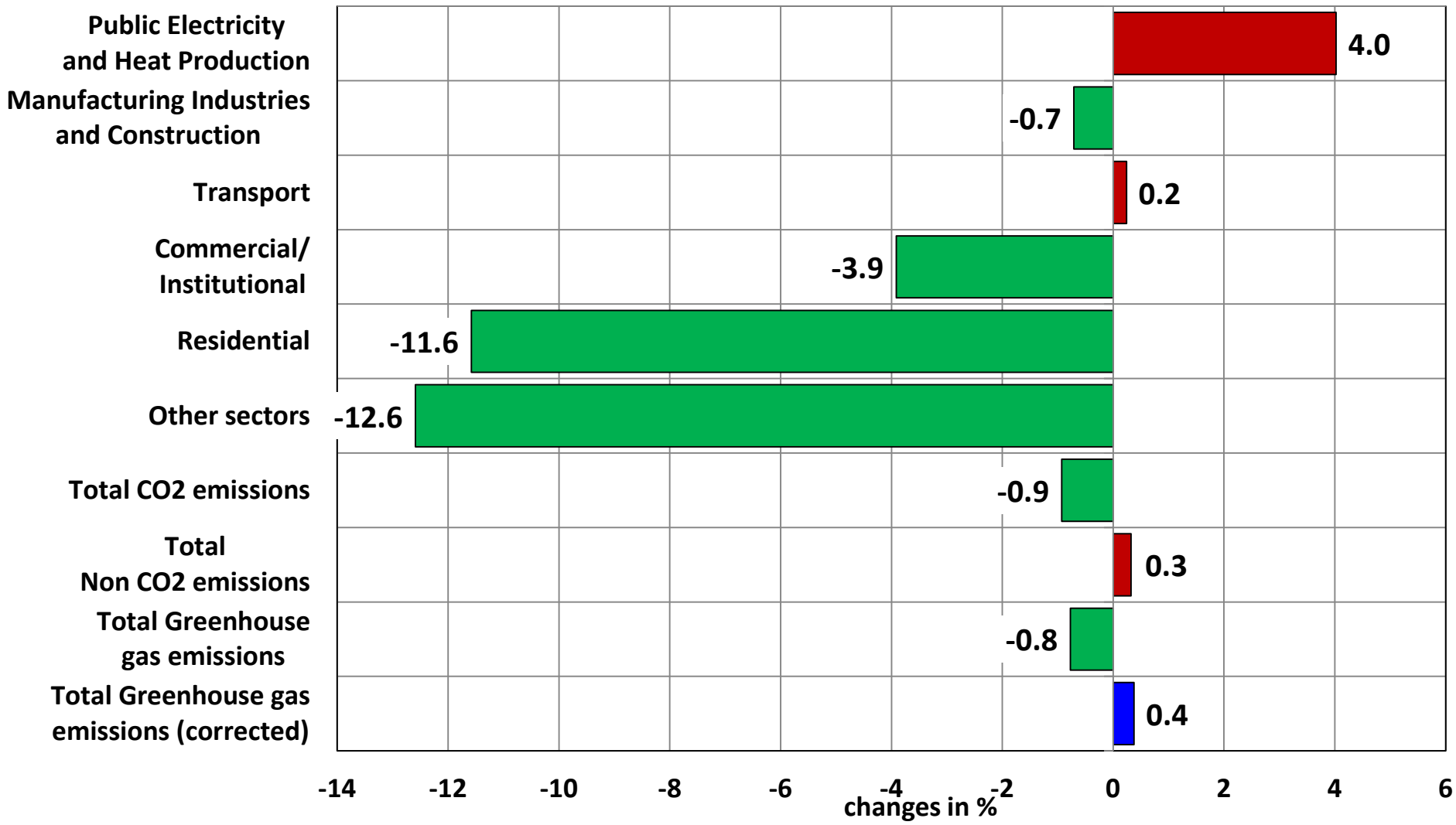
Lead indicators for the ”Energy for the future” monitoring process



Greenhouse gas emissions in Germany 1990 – 2013 and targets for 2020, 2030, 2040 and 2050

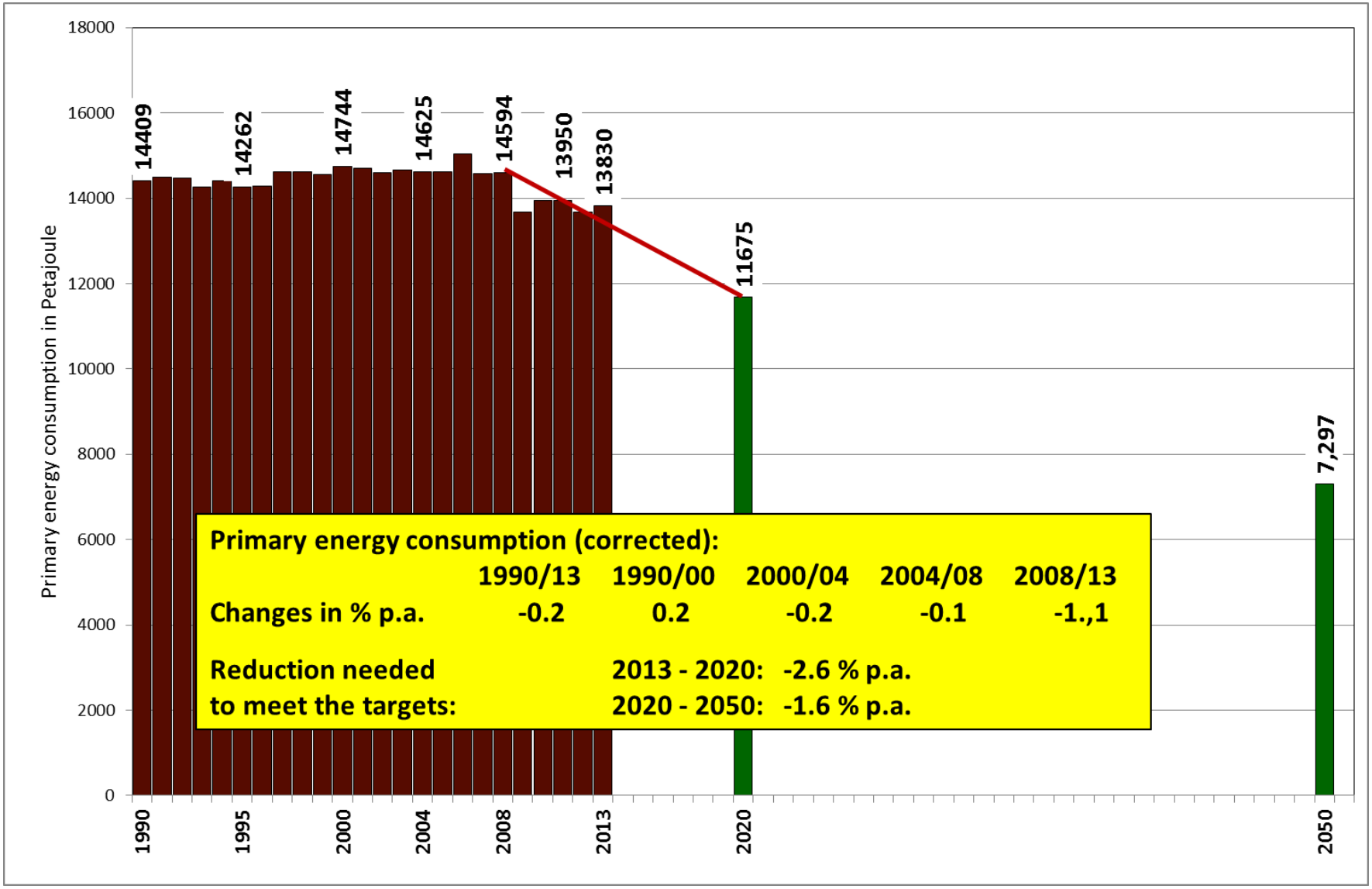


Changes of Greenhouse Gas Emissions in Germany 2012 versus 2010 by sectors

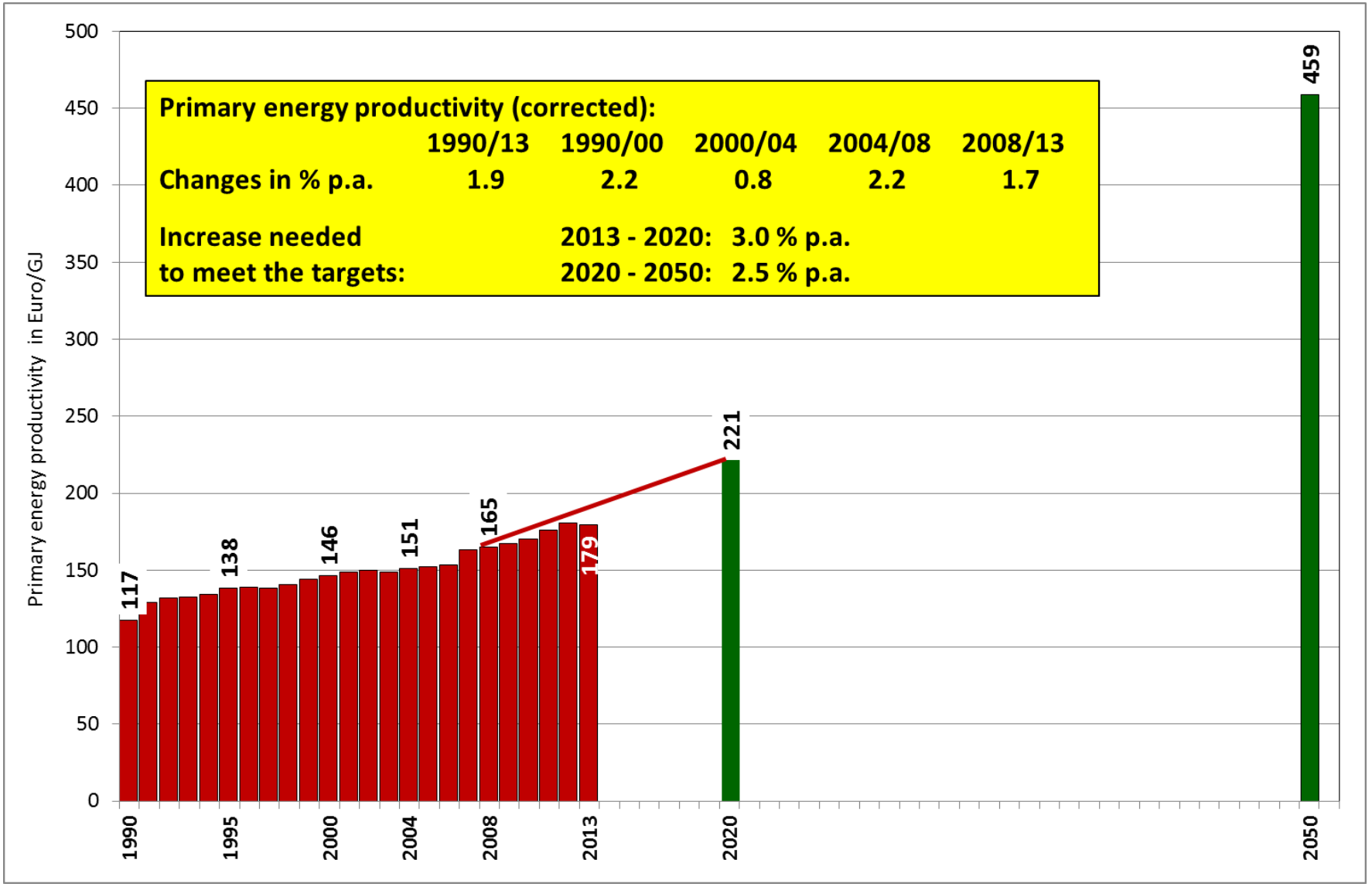


sources: National emissions inventory..

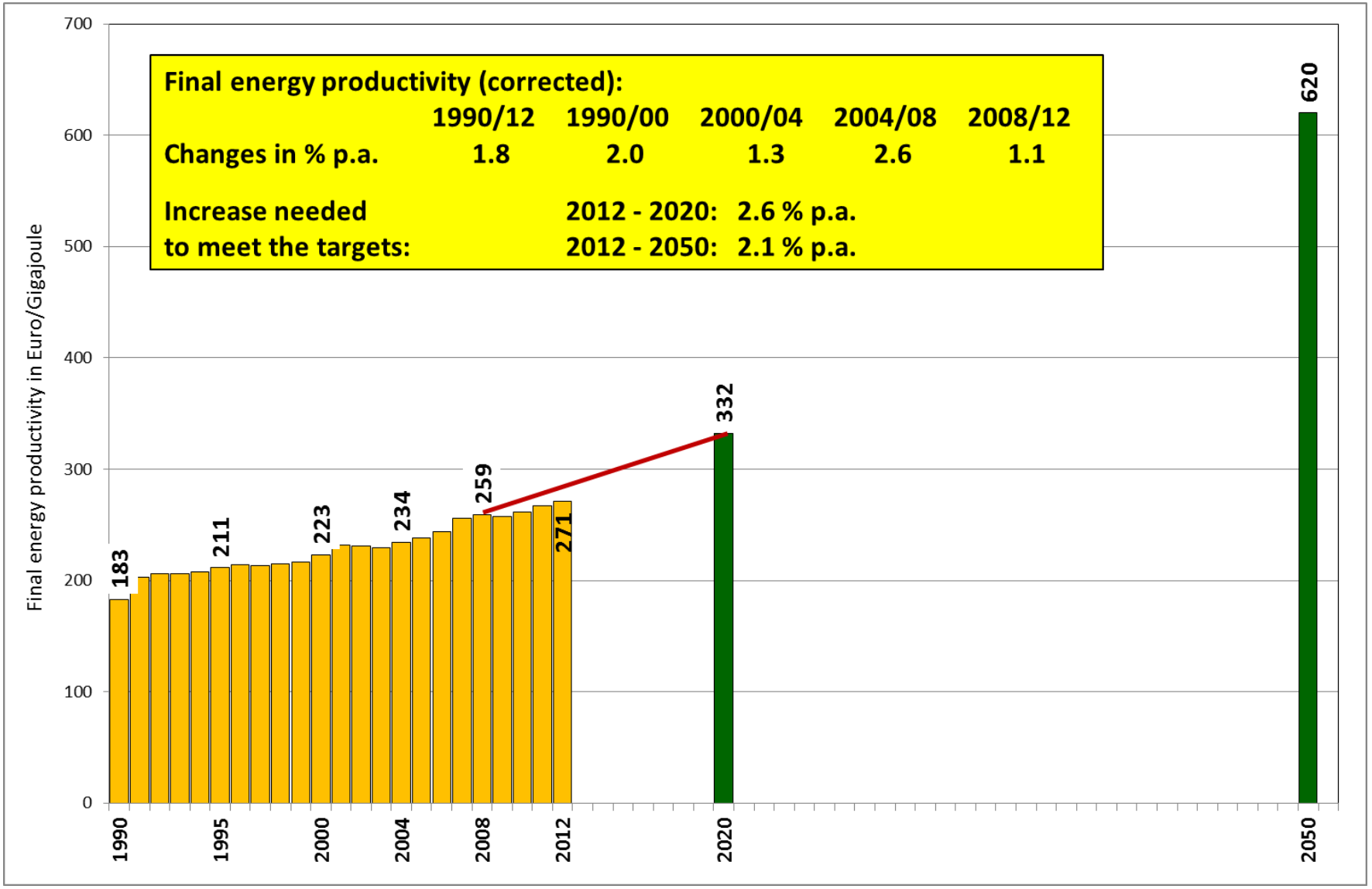
Primary energy consumption in Germany 1990 – 2013 and targets for 2020 and 2050



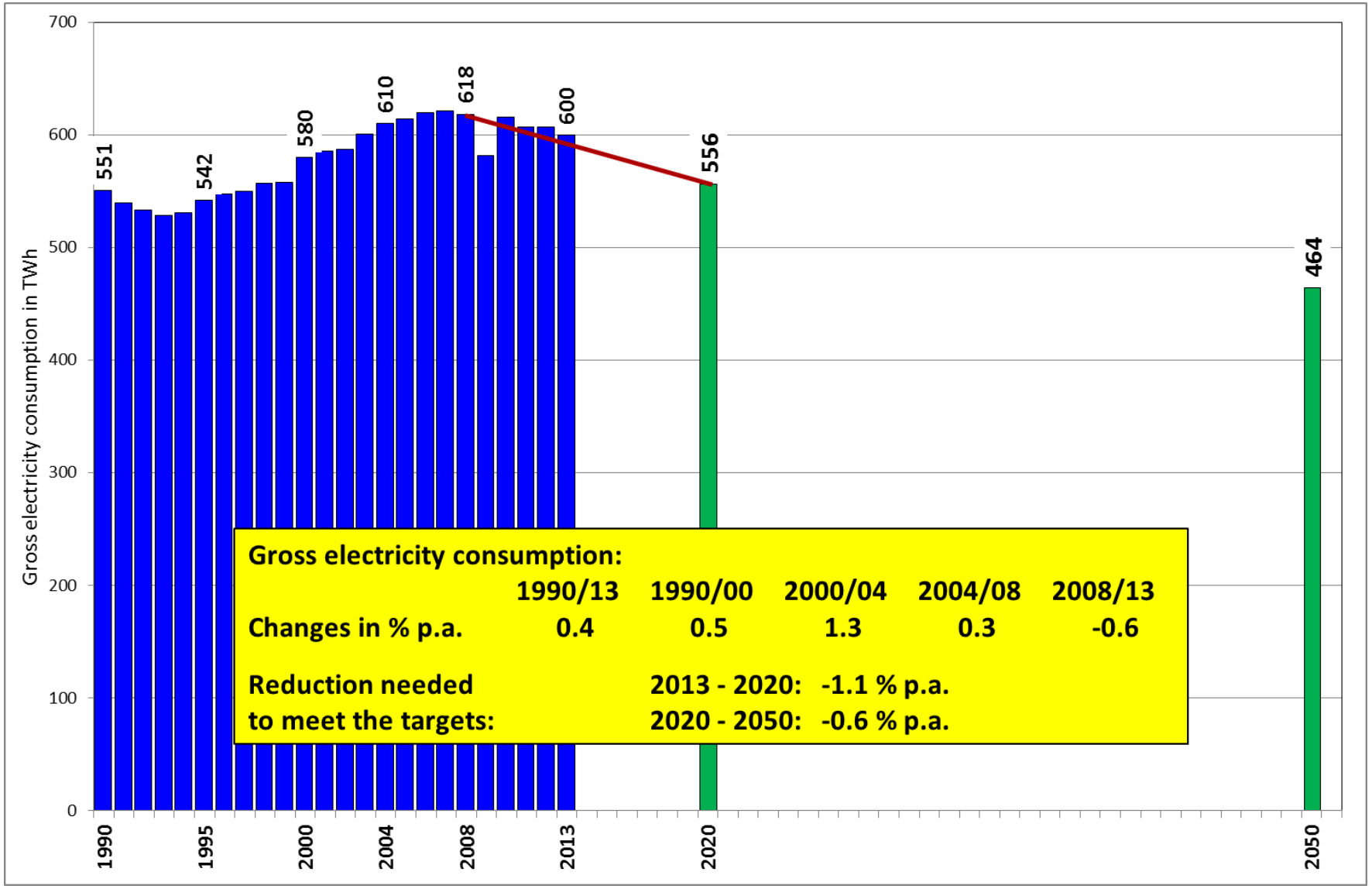
Primary energy productivity in Germany 1990 – 2013 and targets for 2020 and 2050



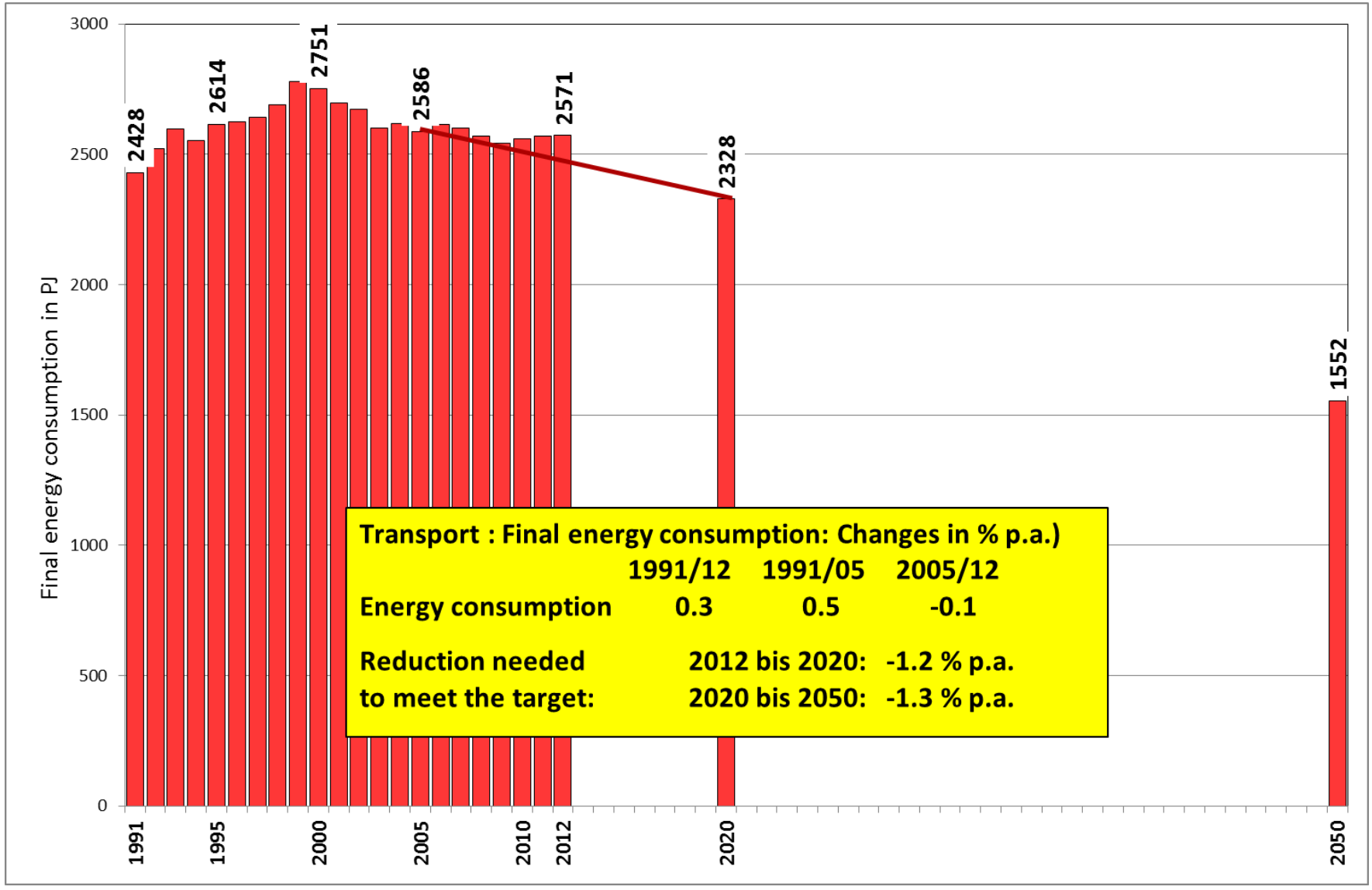
Final energy productivity in Germany 1990-2012 and targets 2008 to 2050



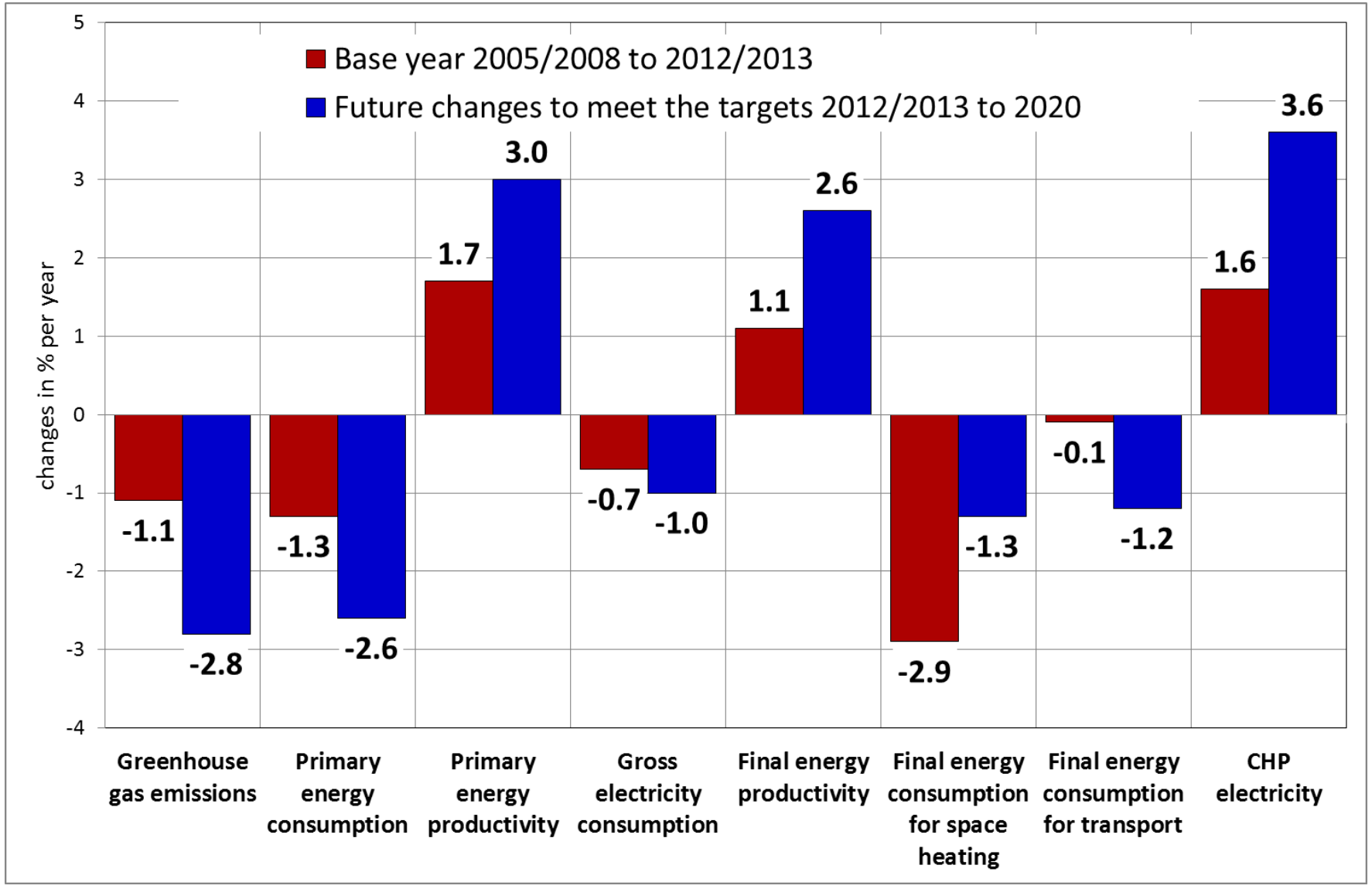
Gross electricity consumption in Germany 1990-2013 and targets for 2020 and 2050



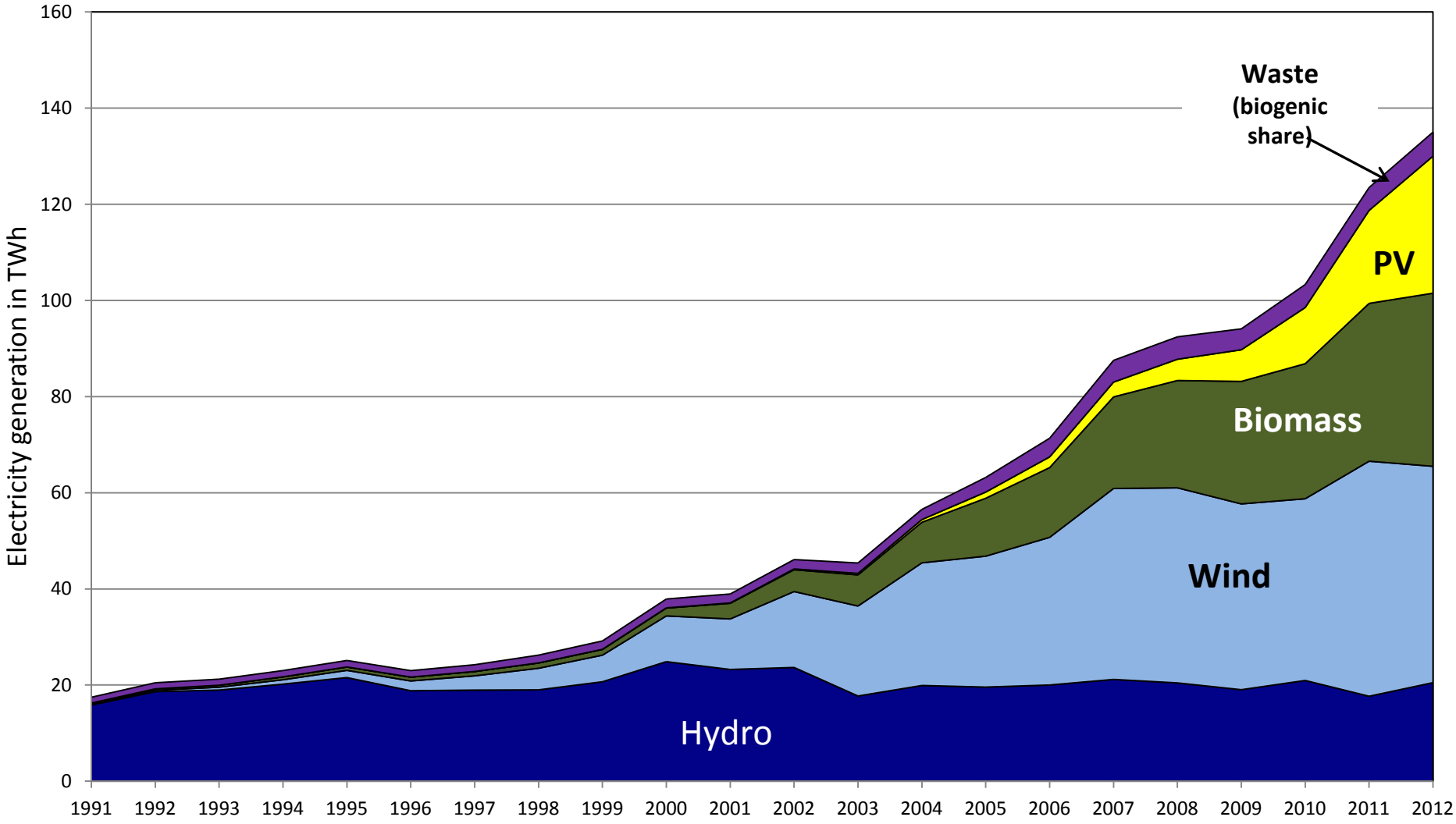
Energy consumption in transport in Germany 1991 - 2012 and targets for 2020 and 2050



Summary: Previous development and future changes required to meet the targets for 2020

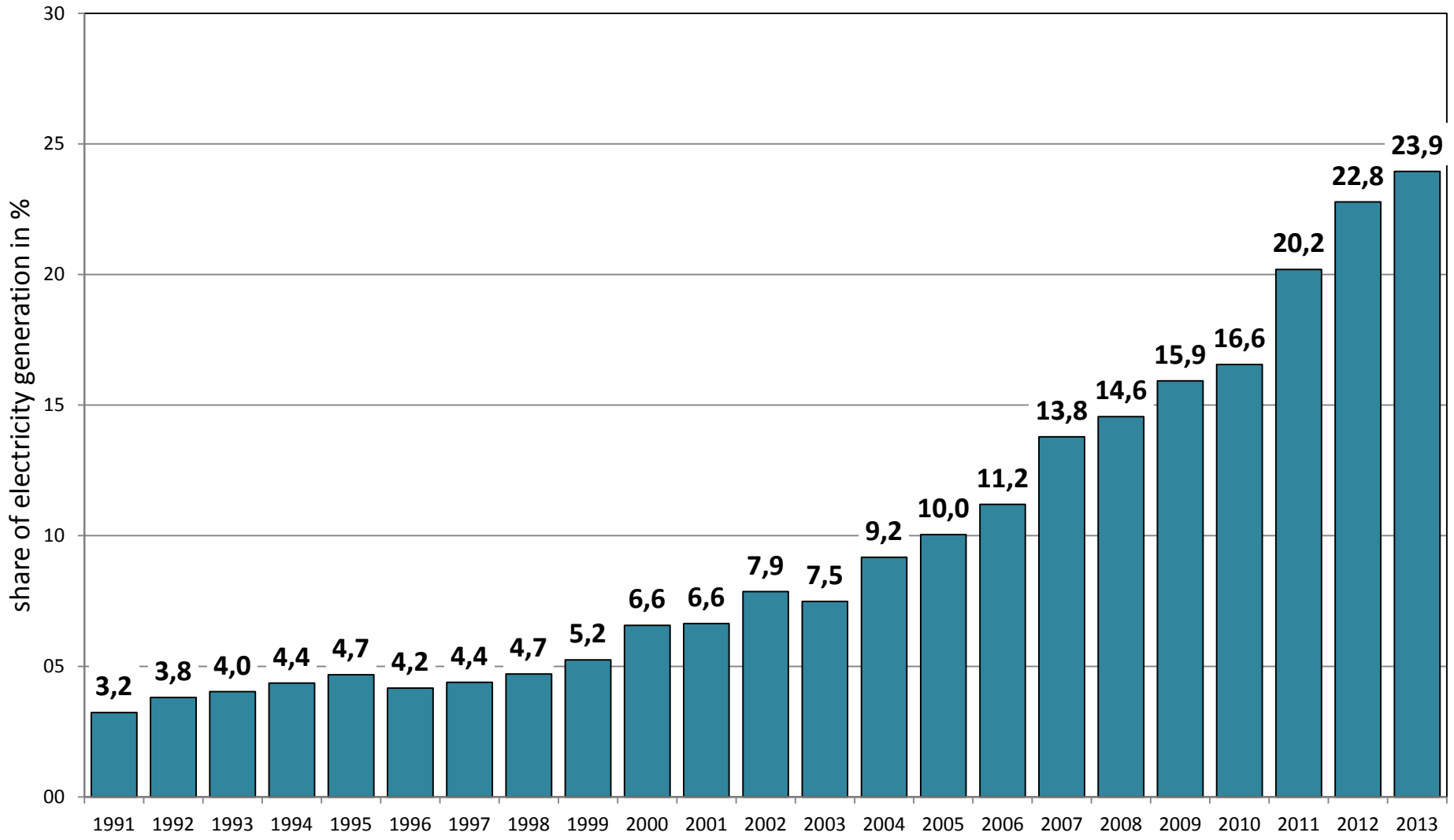


Electricity generation in Germany based on renewable energy sources 1991 to 2012



sources: BDEW; AGEEStat.

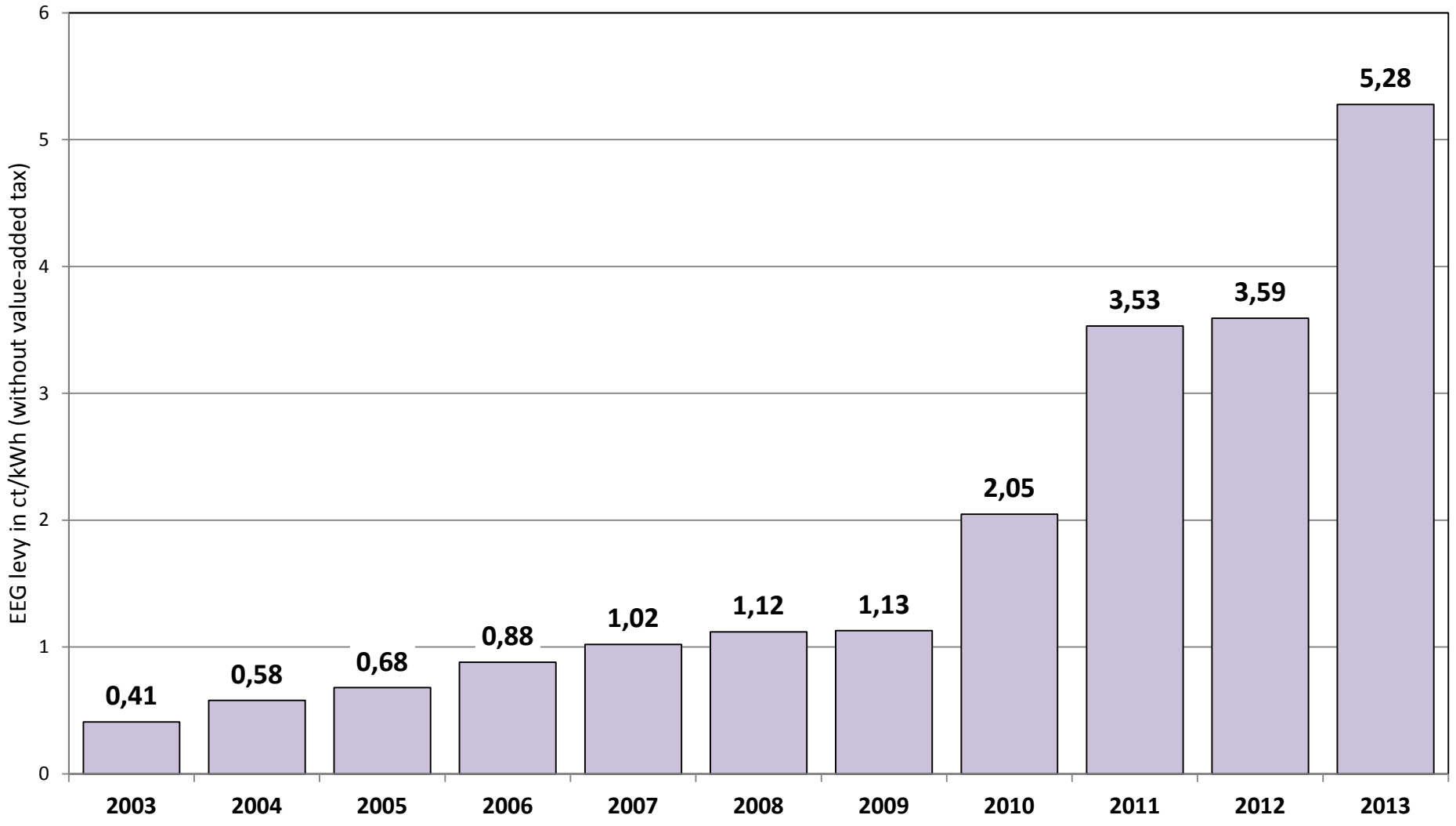
Renewable Energies – share of Electricity Generation in Germany 1991 to 2013 in %



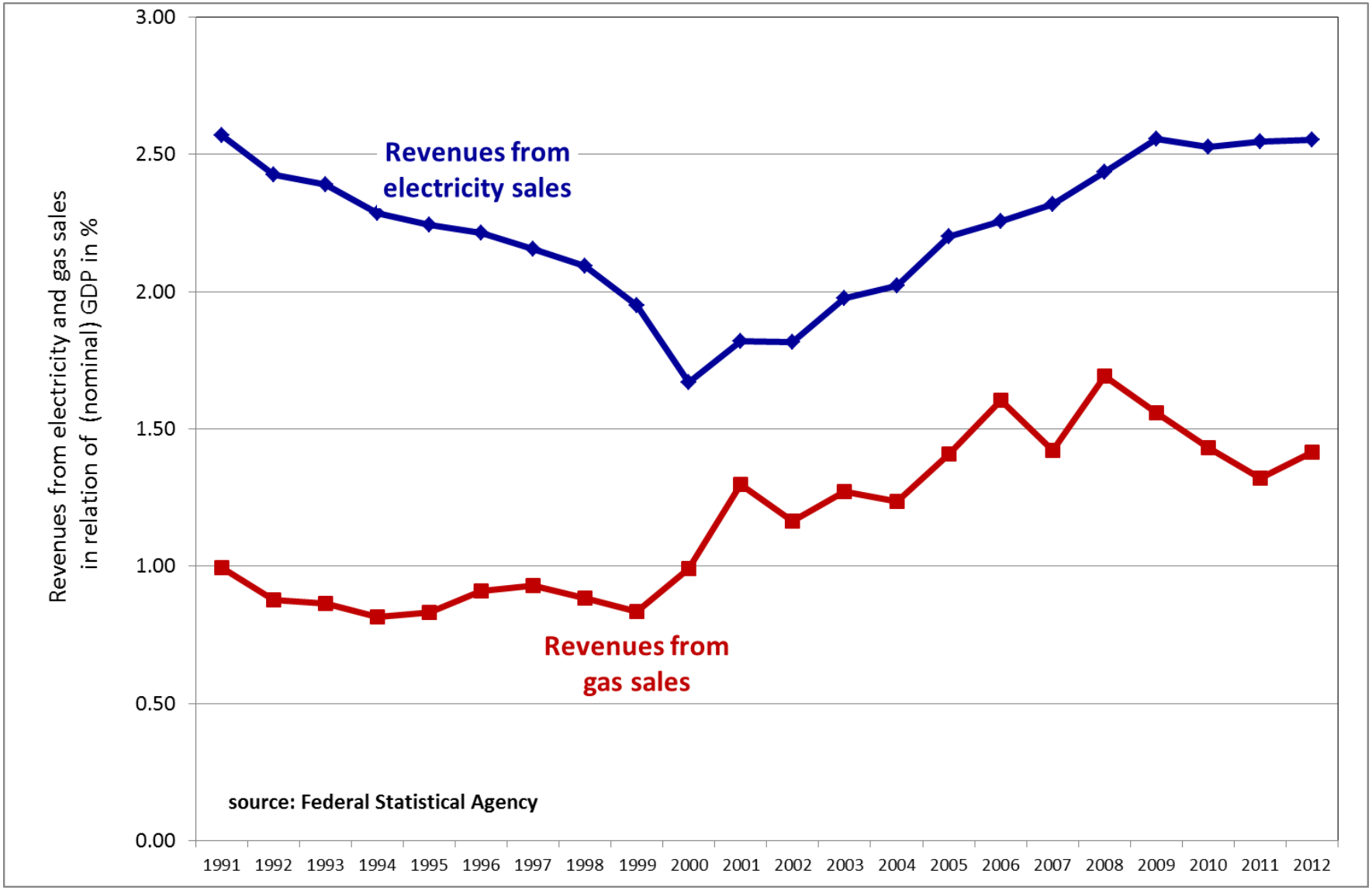
sources: BDEW; AGEEStat.

Development gross final energy in Germany supplied by renewable energies 2004 to 2012

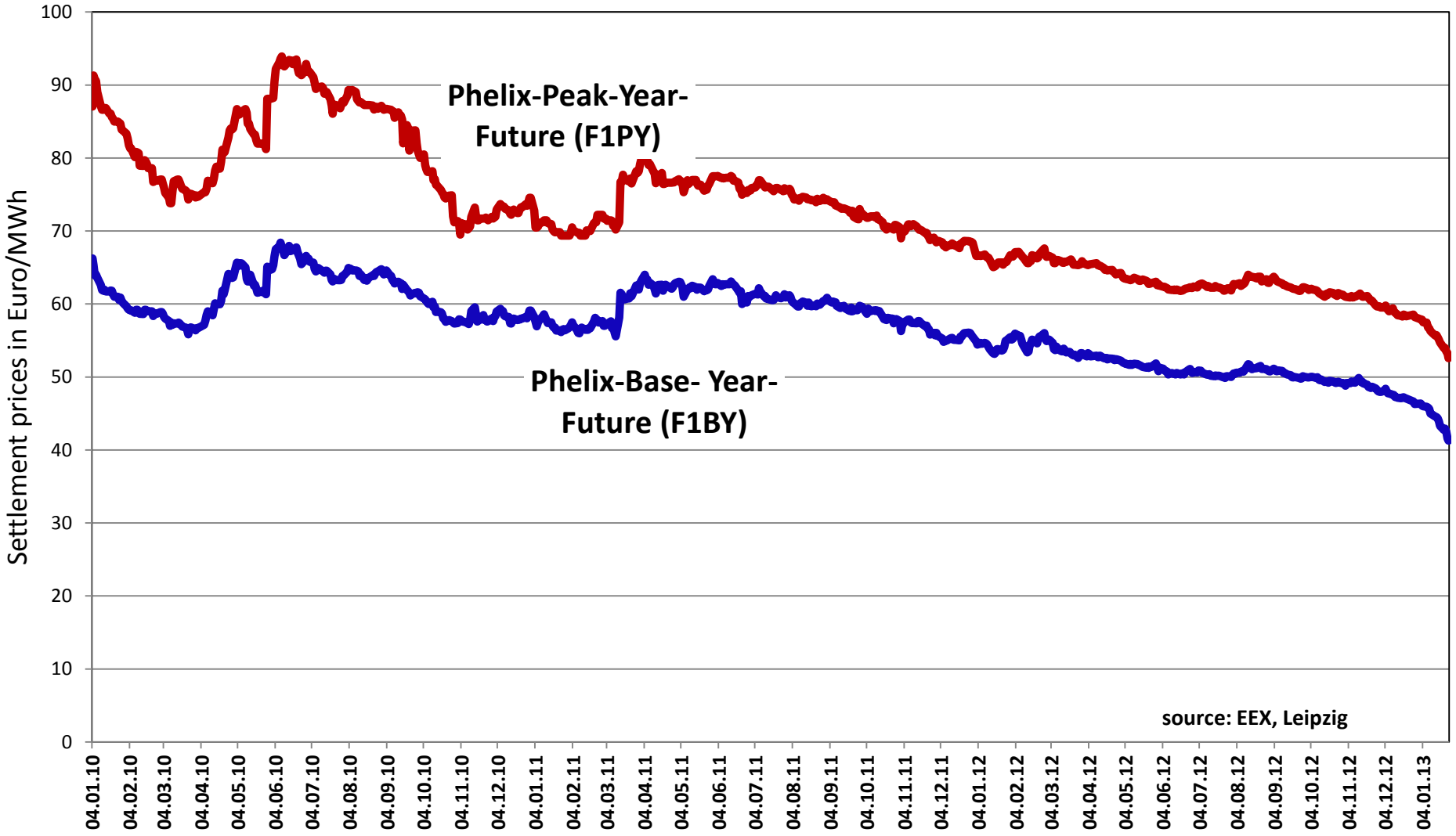
Development of the EEG levy for renewable based electricity generation in Germany 2003 to 2013



Revenues from electricity and gas sales in relation of the nominal GDP in Germany 1991-2011



EEX Power Derivatives: Phelix-Base-Year- and Peak-Year-Future 2010 to 2013: Delivery Period: Jan 2016



The first results of the monitoring process „Energy of the Future“*)

Germany **is largely on track** especially in terms of …

- expanding renewable energy for electricity generation and for
- making more use of renewable energy for thermal purposes

Germany **is not yet on track** especially in terms of …

- reducing greenhouse gas emissions
- improving the sectoral energy efficiency
- extending the transmission and distribution grids
- reforming the market design
- increasing the share of fuel based on renewable energy
- stabilising the EEG remuneration

*) personal opinion based on the Expert Commission’s statements

Areas for actions addressed by the expert commission

- In need of particularly urgent action: improving energy efficiency in all sectors, especially in the building and transport sector
- Improving the efficiency of electricity uses to reduce ("conventional") electricity consumption
- Stepping up efforts to introduce renewable energy particularly for thermal purposes
- Development of a new market-design in the electricity sector ("capacity markets")
- Clear definitions what is meant by "competitive prices", "economic viability" or "affordability"
- Urgent need for improvements regarding the data base ("energy statistic law")

Thanks for listening

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For downloading the monitoring reports see::
http://www.bundesnetzagentur.de/cln_1422/DE/Sachgebiete/ElektrizitaetundGas/Unternehmen_Institutionen/MonitoringEnergiederZukunft/monitoringenergiederzukunft-node.html