Germany's energy transition (and implications for Australia)

Prof. Dr. Andreas Löschel
Westfälische Wilhelms-University Münster

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The German Energy Transition

- end 1990s: fundamental decision for renewable energy system
- 2010: Energy Concept of German Government “Securing a reliable, economically viable and environmentally sound energy supply is one of the great challenges of the 21st century. […]
- 2011: Fukushima and decision to phase out nuclear by 2022
- Energiewende needs monitoring

Monitoring the Energy Transition

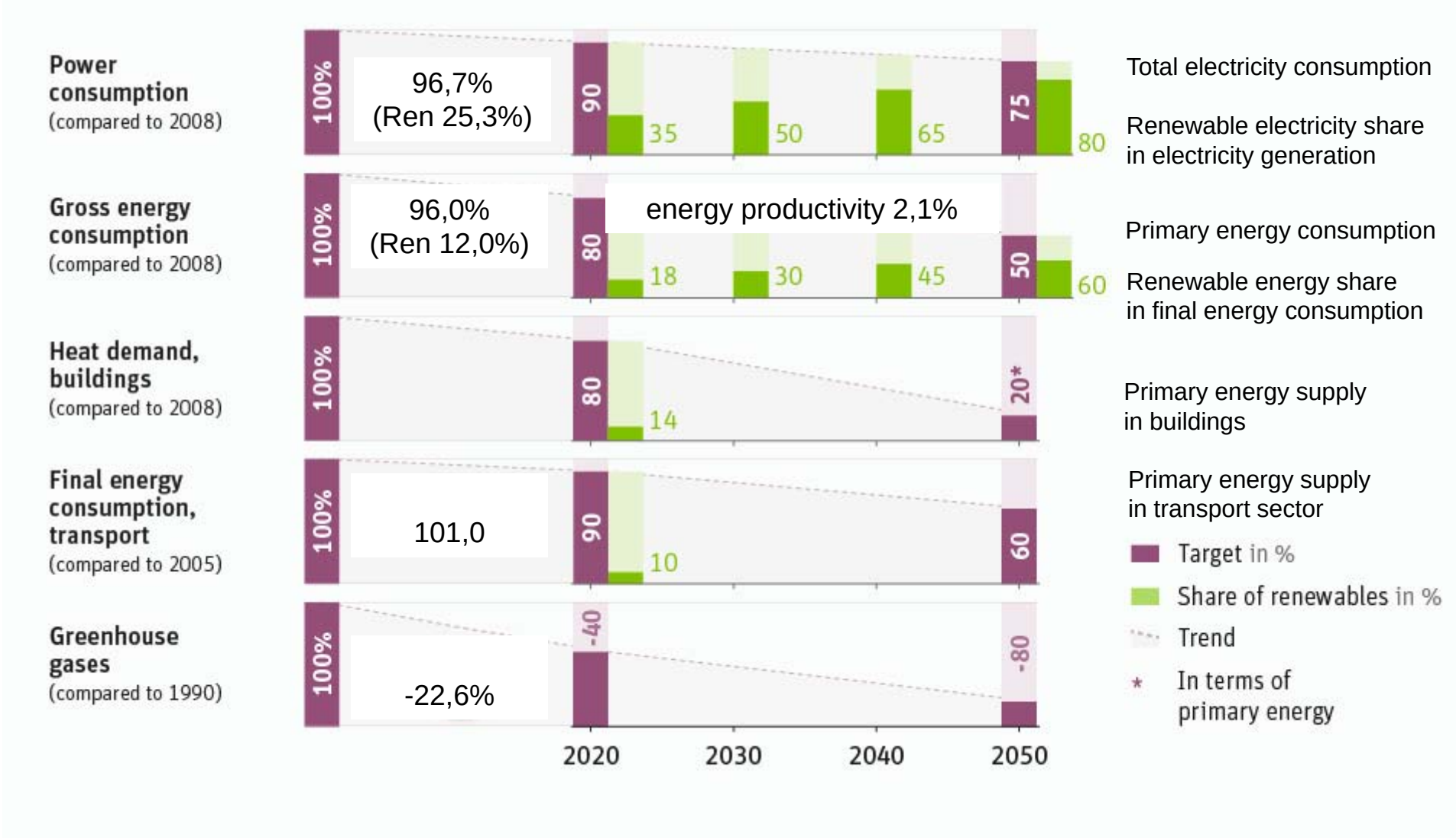
http://www.bmwi.de/EN/Topics/Energy/Energy-Transition/monitoring.html

Progress Report 2014
A lot achieved, a lot ahead

http://www.bmwi.de/EN/Topics/Energy/Energy-Transition/progress-report,did=690530.html

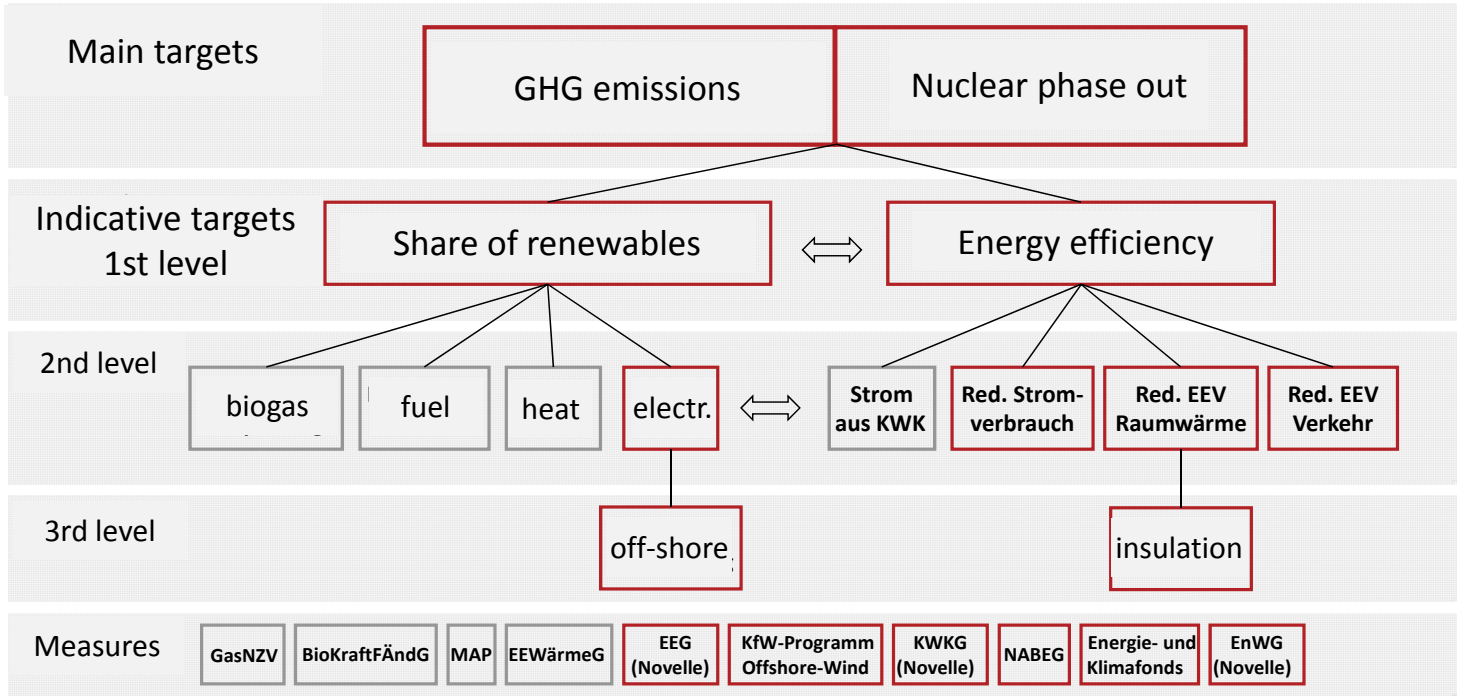


Long Term Targets of the Energy Transition



Develop pathways and consistent targets

- Develop hierarchy of targets – not all have the same importance
- What has to be strictly achieved, what is indicative and adjusted if enconomic, social, environmental costs turn out to be too high?



Source: Löschel et al. (2012)

- Monitoring: Is actual progress as expected and to what extent are additional actions needed

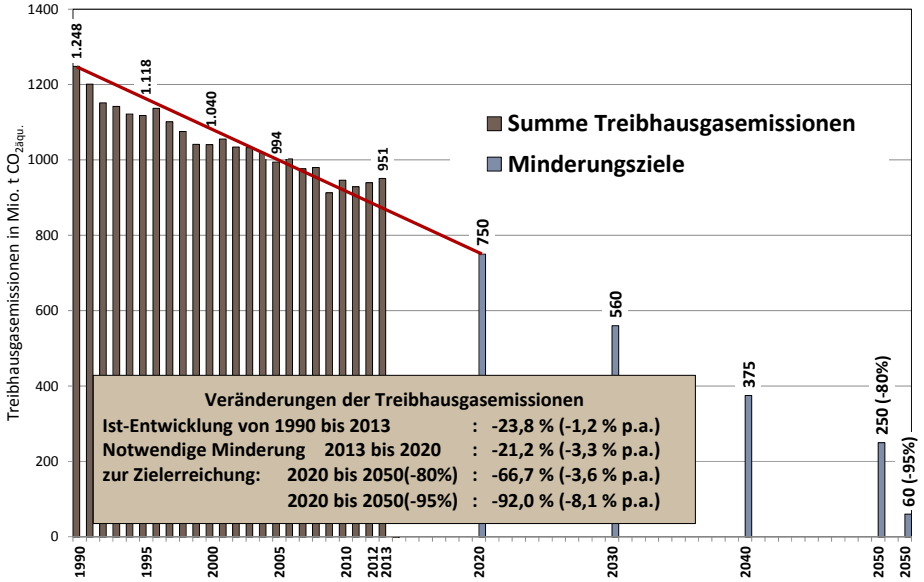
Where are we: changes and targets

	Historical change		Necessary change to reach target	
	1990-2012 bzw. 1990-2013	2008-2012 bzw. 2008-2013	2012-2020 bzw. 2013-2020	2020-2050
	Average yearly change in %			
GHG emissions [1)]	-1,3	-1,1	-2,8	-3,6/-7,9 [3)]
Primary energy consumption [2)]	-0,2	-1,3	-2,6	-1,6
Primary energy productivity [2)]	1,9	1,7	3,0	2,5
Gross electricity consumption [2)]	0,3	-0,7	-1,0	-0,6
Electricity consumption productivity [2)]	1,1	1,4	1,6	1,5
Final energy productivity [1)]	1,8	1,1	2,6	2,1
Final energy use (heating) (households) [1)]	-0,7	-2,9	-1,3	-4,5
Final energy use in transport [1)]	0,3	-0,1 [4)]	-1,2	-1,3
CHP-electricity [1)]	2,3-3,2 [5)]	1,6-3,1	3,6-4,5	

[1)] Bezugsjahr 2012 [2)] Bezugsjahr 2013 [3)] Emissionsminderung -80%/-95% [4)] 2005-2012 [5)] 2003-2012

GHG emission reductions

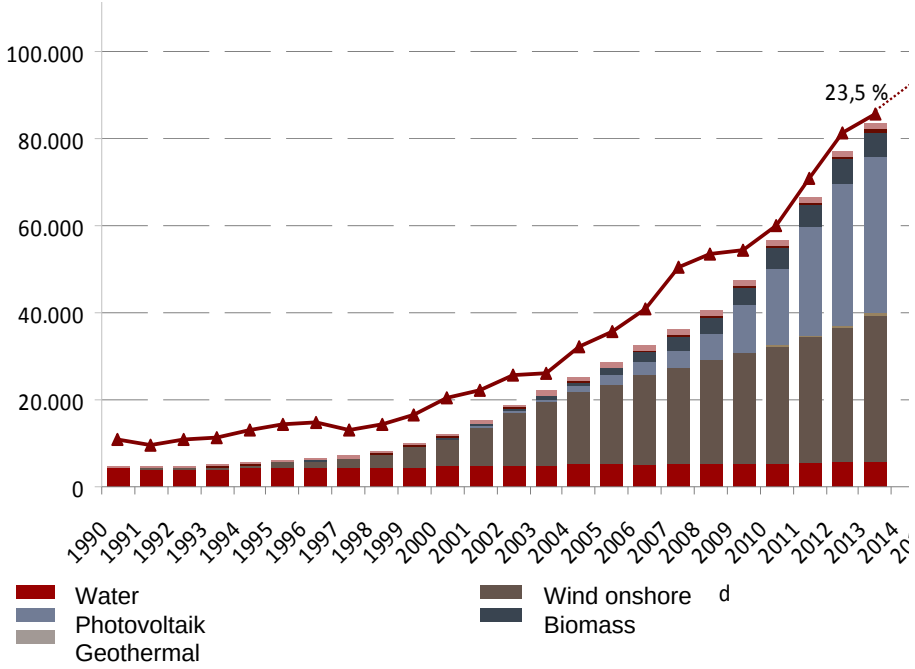
- Government determined to reach 40% GHG reduction target
- CO_2 from electricity sector:
  lignite (159 Mt), hard coal (87Mt), gas etc (66 Mt)
- Possibilities
  - Measures outside ETS (buidings, transport)
  - Strengthen ETS (MSR, retirement)
  - Retire EUAs
  - Measures in electricity sector
  - National CO_2-tax
- Proposal after Climate Action Programm: lignite in cap reserve



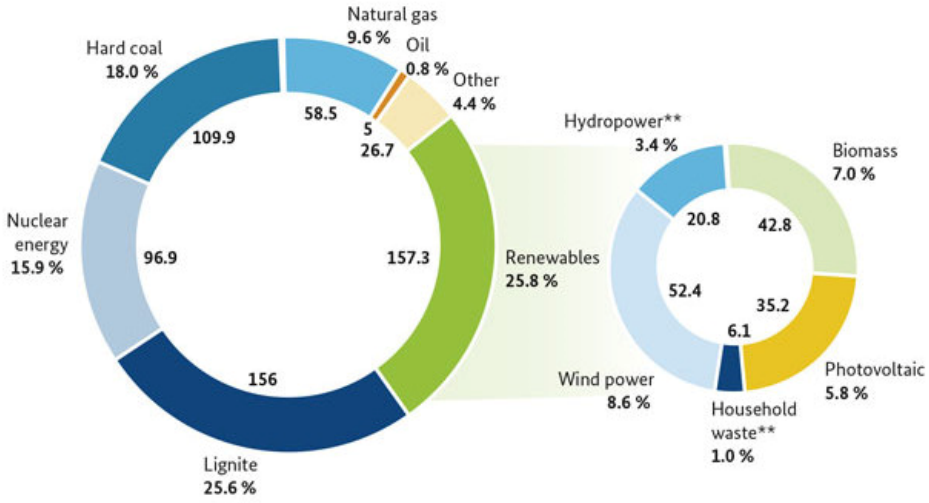
Renewable support effective, but not efficient

- Renewable Energy Sources Act (EEG): long term fixed technology specific feed-in tariffs with privileged access to market and obligation for network connection: 20,5 GW (‘04) to > 80 GW (‘14)
- EEG 2014: reduction in feed in tariffs, targets for annual increase in installations
- New support scheme after 2017 (market integration, grid development)

Installed renewable capacity



Power production in 2014

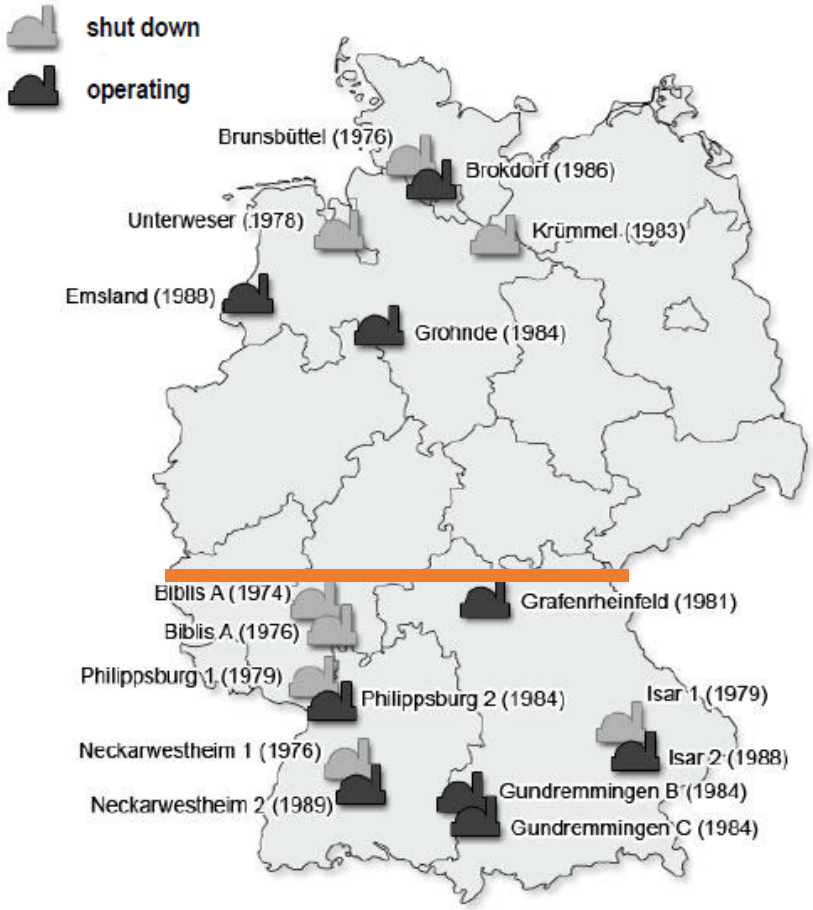


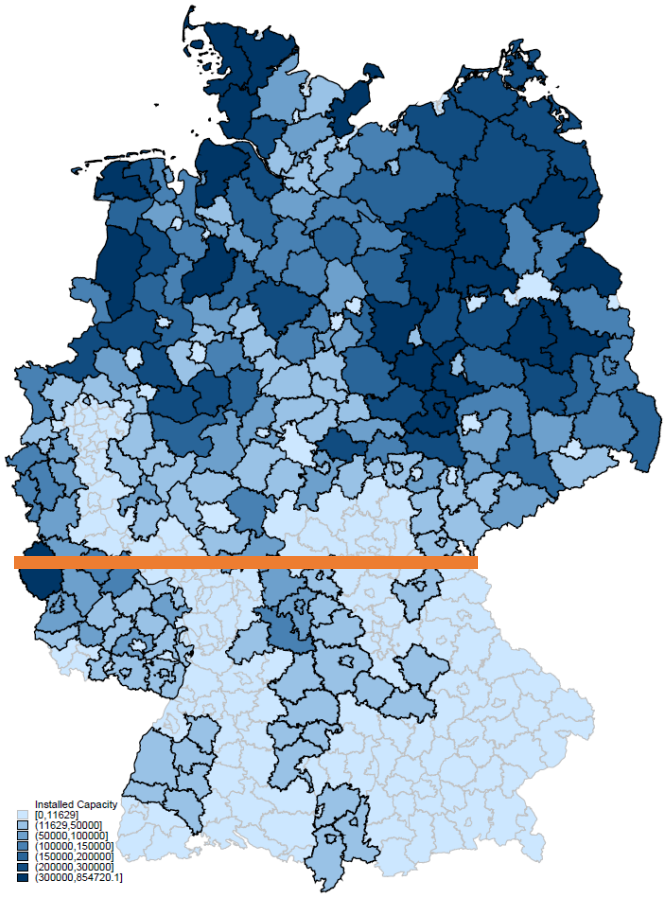
* Preliminary figures
** Regenerative part

Source: AG Energiebilanzen

Nuclear phase-out and capacity

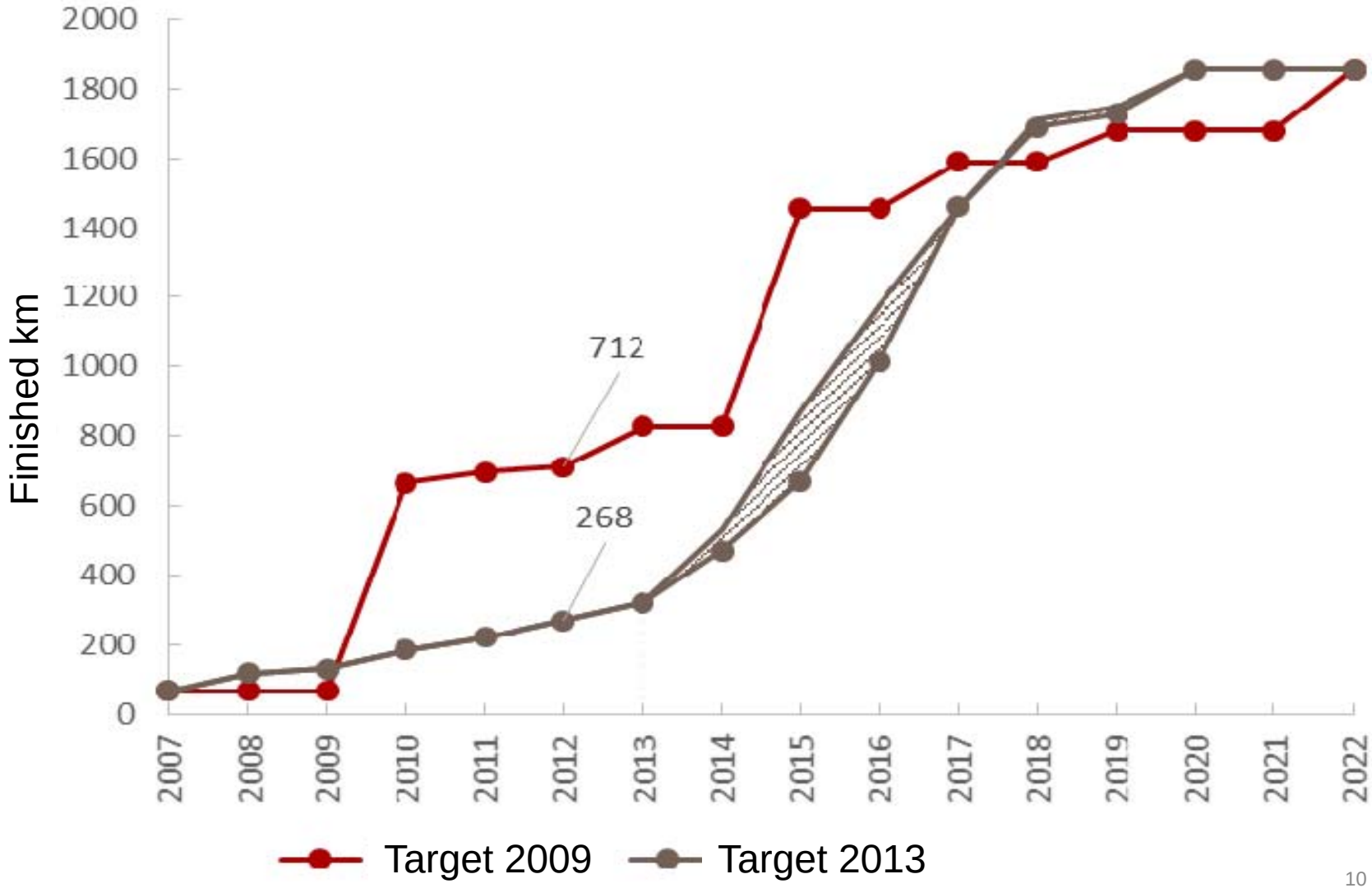
- nuclear (and fossil) production plants close to consumers





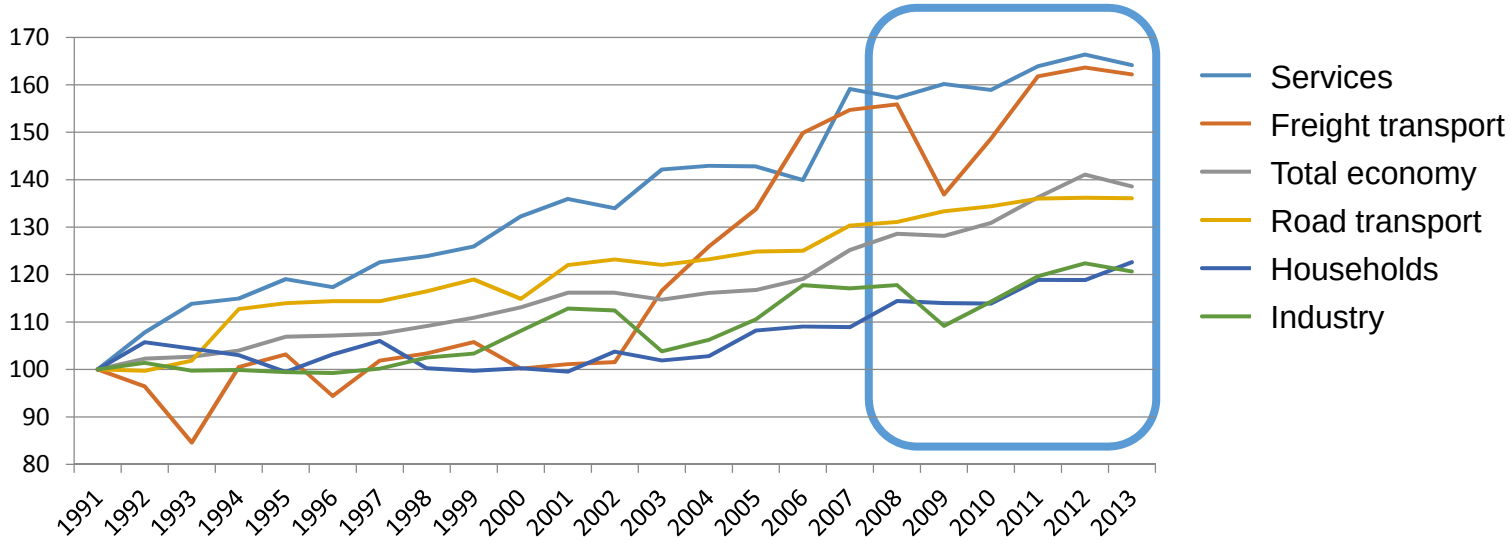
Source: BNetzA

Transmission grid extension lacks behins



Energy consumption and energy efficiency

- Final energy efficiency improved since 1991, but improvements slower after 2008, 0,9 %/year (2008-2013)
- Lowest improvement in industry and transport (2008-2013)
- National Action Plan for Energy Efficiency (NAPE) adopted December 2014

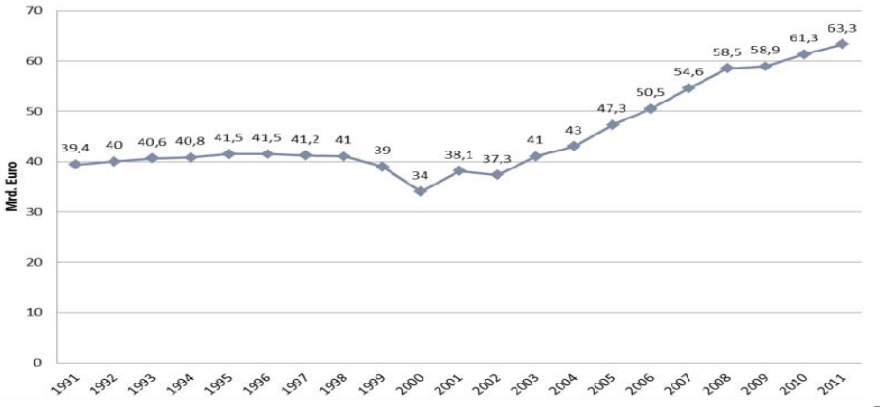


Source: Expert commission on the "Energy of the future" monitoring process, Statement on the first progress report by the German government, December 2014

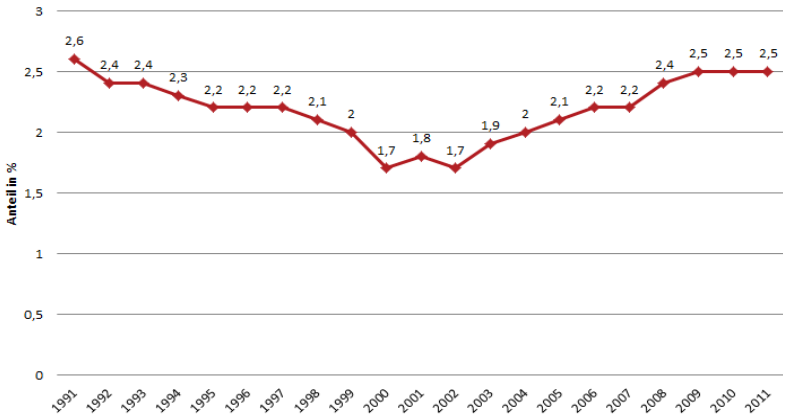
Costs play a crucial role, distribution matters

- Energy costs increase sharply due to support for renewable capacities, transmission and distribution grid investment, investments in backup capacities and storage
- total amount FiT increased from €2 bn (2002) to about €20 bn (2012) - on average 19 ct/kWh FiT
- renewable costs per household with 3500 kWh/year up from 55 EUR in 2010 to 220 EUR 2014

Total electricity costs for final consumers (bn EUR)



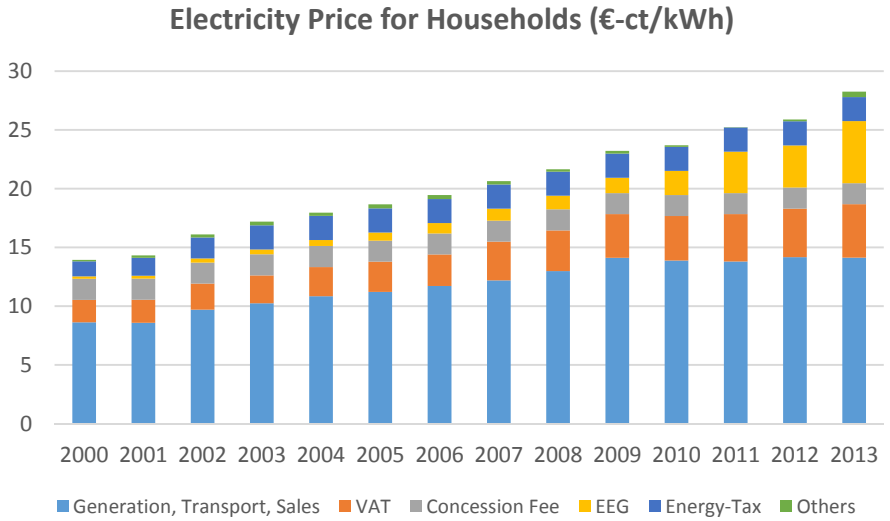
Total electricity costs relative to GDP



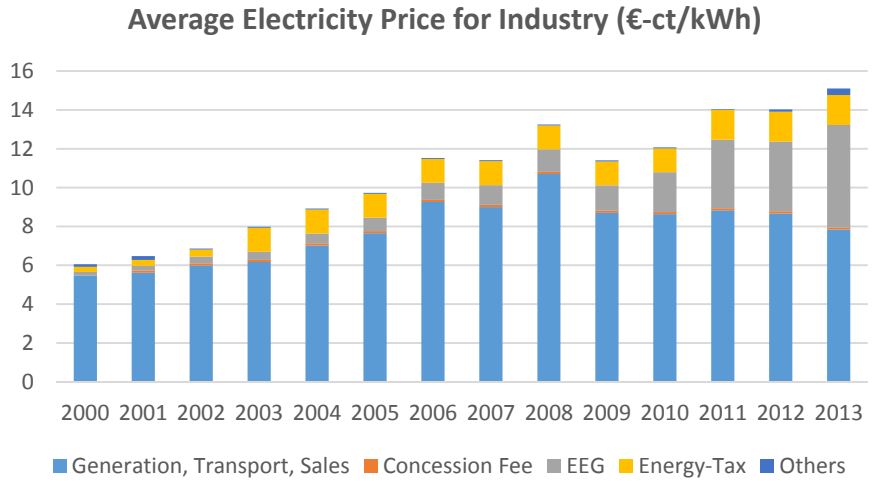
Source: Energy Monitoring Commission (2012), Löschel et al.

Costs play a crucial role, distribution matters

- Willingness to pay unclear
  - on average <<, but positive
  - ca. 12 Euro/ton CO_2
  - but: more than 60% 0 EUR!



Source: Data – BDEW, German Statistic Office, Own Illustration



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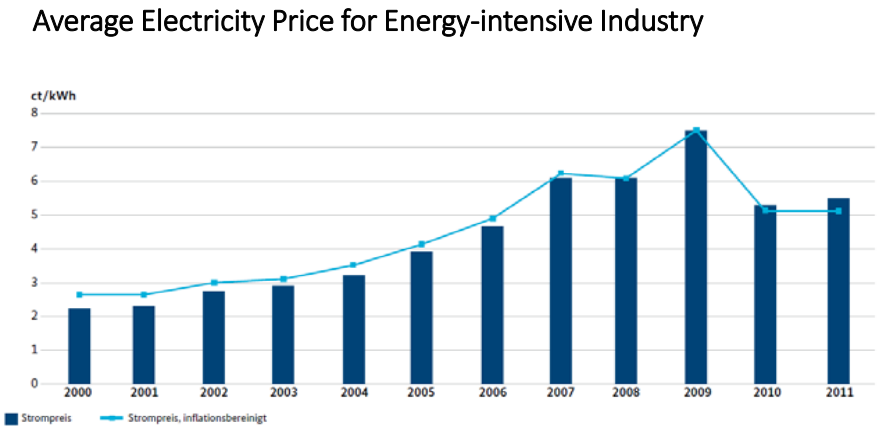
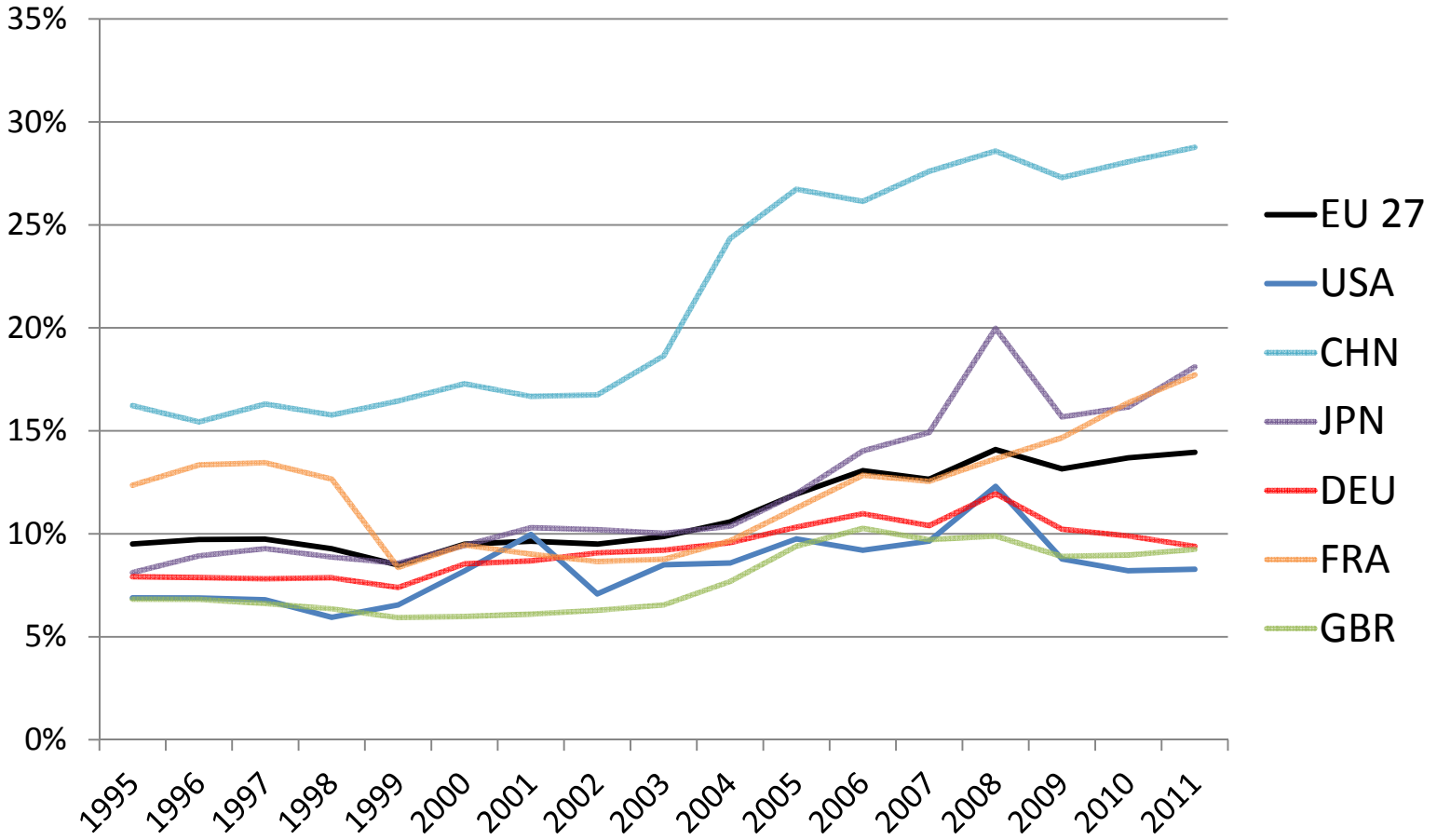


Source: Frontier / EWI (2012)

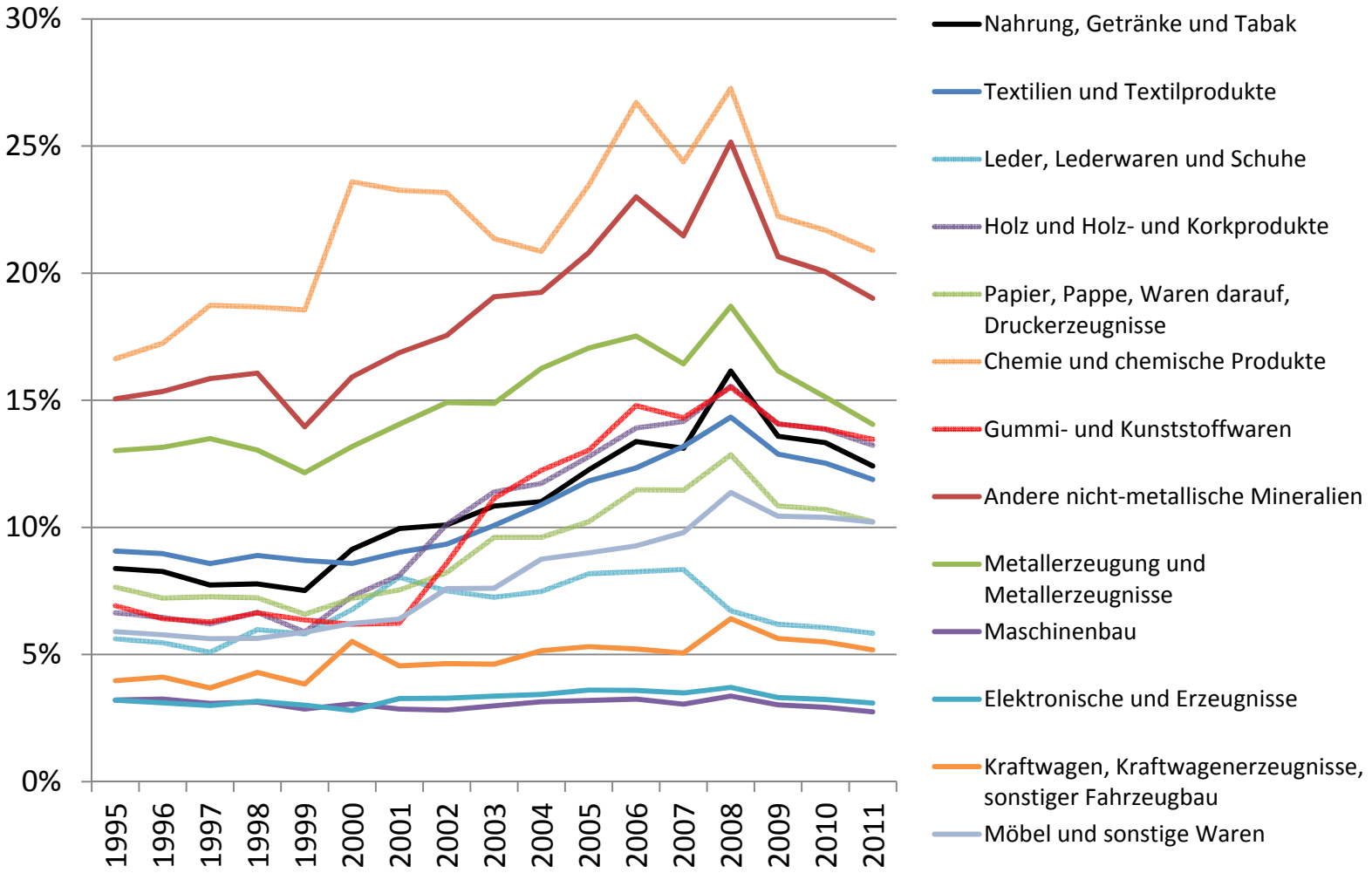
Real per unit energy costs in manufacturing sector

Real per unit energy costs as source of comparative advantage



Source: Germeshausen und Löschel (2015)

Energy costs in different manufacturing sectors

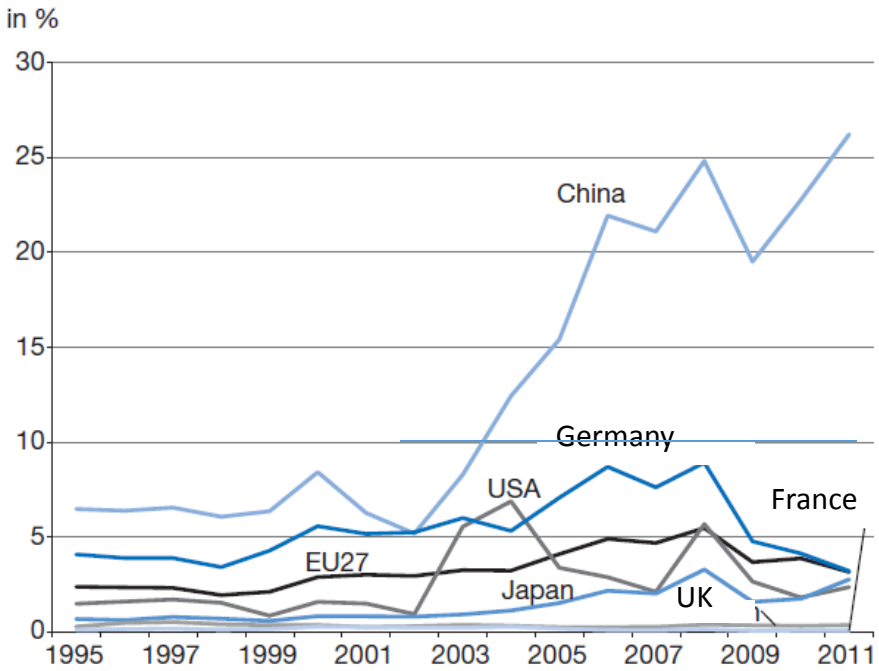


Quelle: Germeshausen und Löschel (2015)

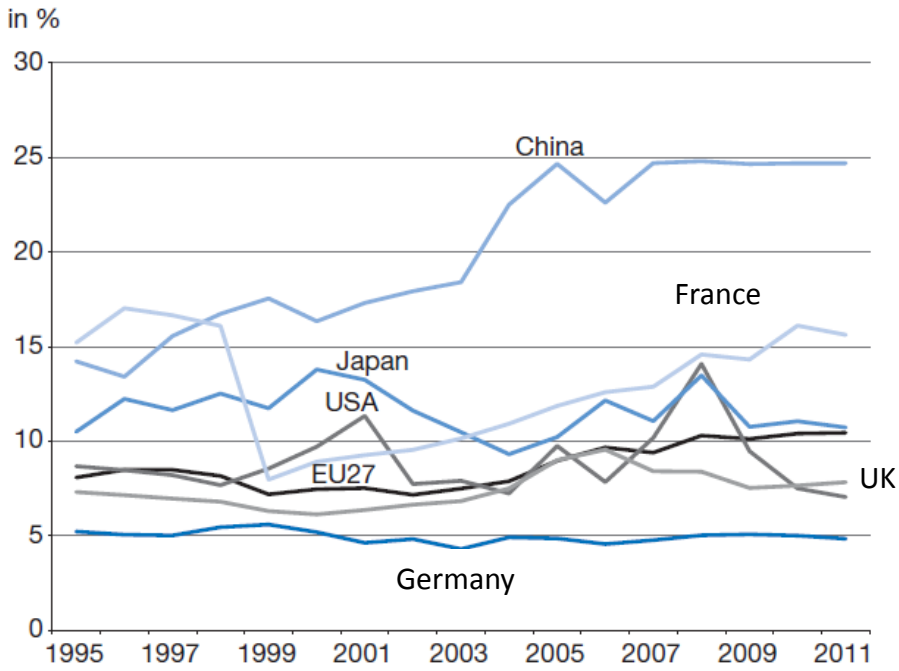
Real per unit energy costs in chemical sector

Shale gas boom etc. vs Energiewende

Energy per unit costs from gas and oil



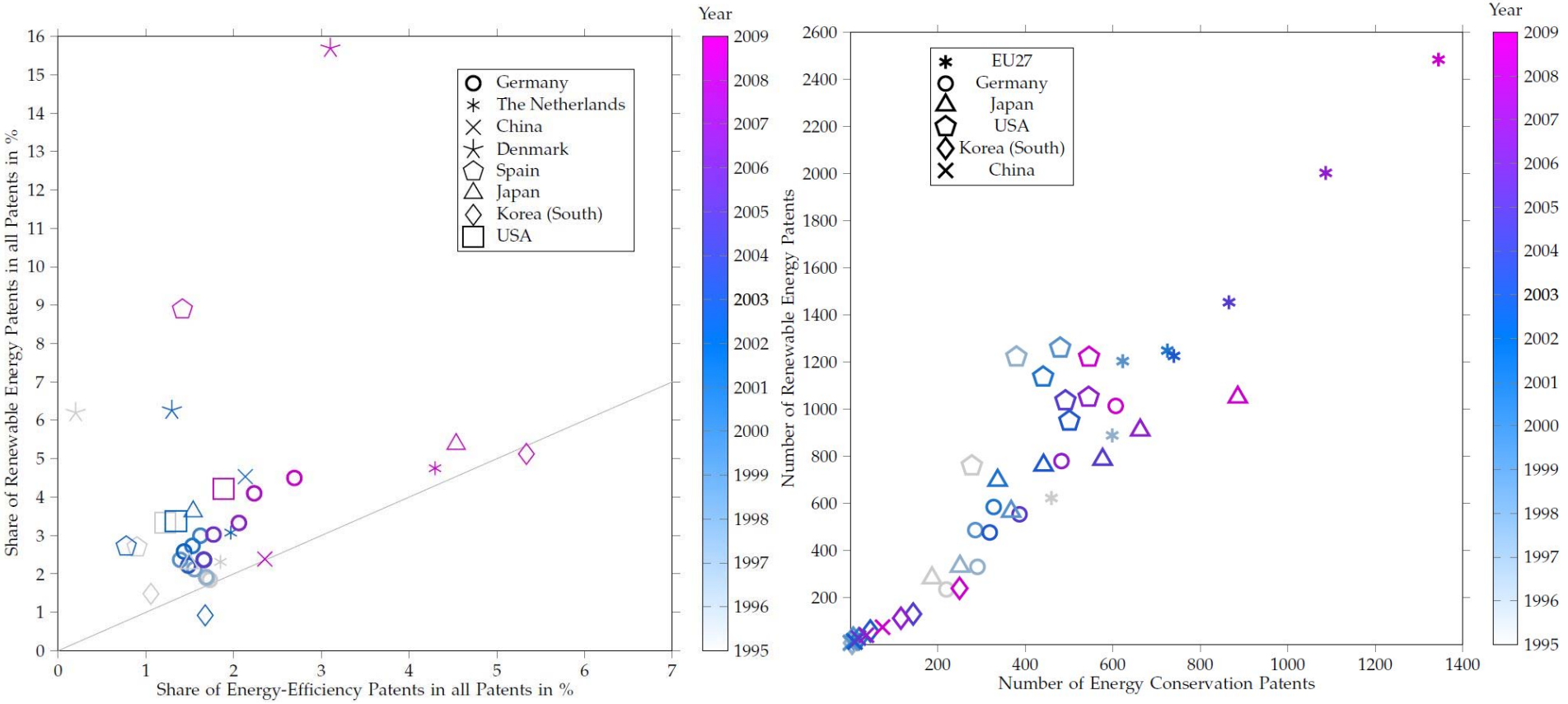
Energy per unit costs from electricity & steam



Quelle: Germeshausen und Löschel (2015)

Energy innovation crucial for success

Focus on renewable patents, high absolute numbers



Conclusion: Energiewende

- Gaps in climate target and efficiency
- Climate policies largely determined in ETS sectors
  → focus on ETS reform and non-ETS sectors
- Renewable policies not efficient - use market mechanisms as far as possible (premia and market splitting)
- Grid extension as a bottleneck (also in EU)
- Total costs are still under control even though prices increased, costs for industry important (also consideration of energy poverty)
- Willingness to pay for climate measures in Germany to be seen → acceptance unclear
- European vision is necessary – harmonisation of renewable support and further development of internal market for energy