



Energy sector investment needs and decarbonisation perspectives in EU Member States

Georg Zachmann



Key-Message

- 1) Economic cost of decarbonisation is low in theory
- 2) Infrastructure & power plant investment incentives are largely national and not market based
- 3) Thus, deviation from optimal decarbonisation path
- 4) Increasing the role of European energy and carbon markets could bring decarbonisation cost closer to the efficiency frontier



Agenda

- 1) Investment needs
- 2) Investment incentives
- 3) Conclusion



Theoretical Economic Cost of Decarbonisation is Low

Total cost - Average annual energy system costs 2011-2050 (bn EUR)

Ref	High EE	diverse	High RES	Delayed CCS	Low nuclear
2582	2615 +1%	2535 -2%	2590 0%	2525 -2%	2552 -1%

Source: Impact Assessment of the Energy Roadmap

„The direct effect of the decarbonized pathways on overall GDP growth is negligible, as GDP levels and growth rates are similar in the baseline and in the decarbonized pathways“ [ECF Energy Roadmap 2010]



Shift to investment cost

Capital cost - Average annual energy system costs 2011-2050 (bn EUR)

Ref	High EE	diverse	High RES	Delayed CCS	Low nuclear
955	1115 +17%	1100 +15%	1089 +14%	1094 +15%	1104 +16%

Source: Impact Assessment of the Energy Roadmap

- About one trillion per year up to 2050
- Investment signals crucial for getting the system right



But, we do not move along the optimal path

- Investments in the wrong technologies in the wrong places (smart meter in small households)
- Investment in the potentially right technologies in the wrong places (solar PV in North Germany)
- Investments in the wrong technologies in the right places (coal fired power plants in Germany)
- Insufficient investment in the right technologies in the right places (transmission capacity between Scandinavia and the continent)
- Duplication of capacity on two sides of the border



Agenda

- 1) Investment needs
- 2) Investment incentives
- 3) Conclusion



Investment signals for transmission lines

[EU, MS]

For merchant lines

- Expected wholesale electricity prices
- Exemption from TPA
- National taxation regimes
- National regulation

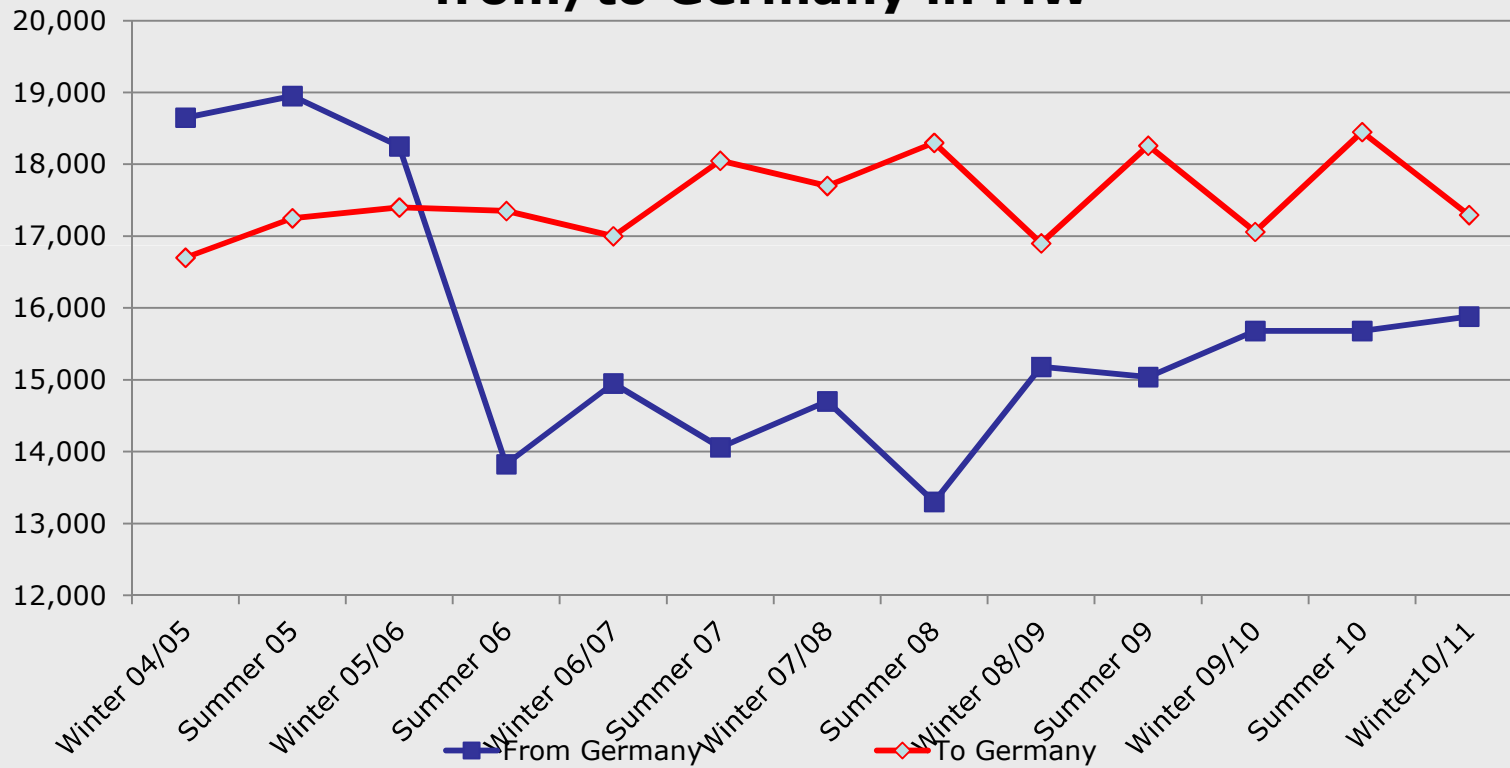
For regulated lines

- National regulator
- Some funding for Projects of European Interest



Example Germany: No increase in transmission capacity

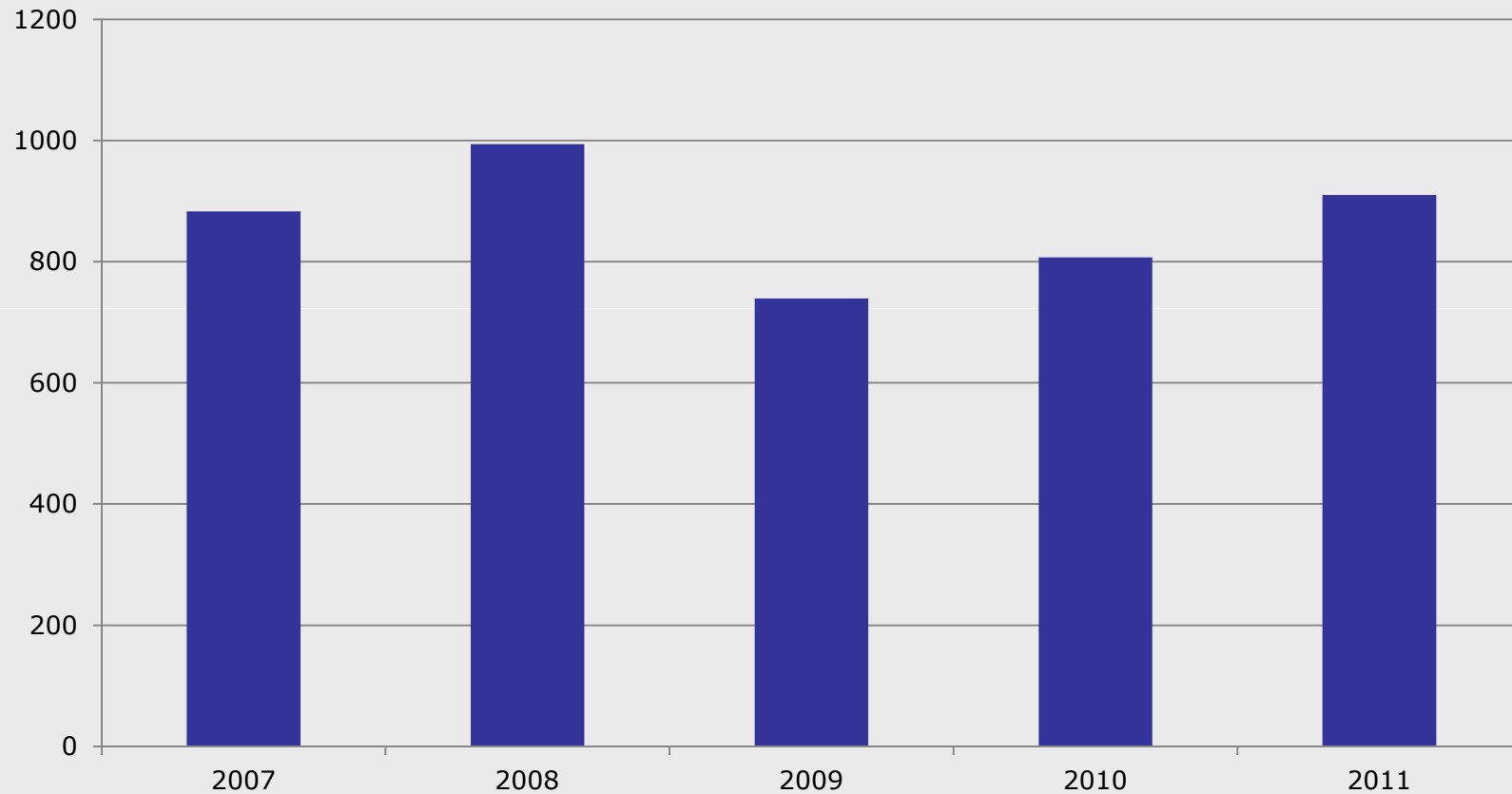
cumulated available net transfer capacities from/to Germany in MW





Investments: not much change

German transmission investment in Mio €



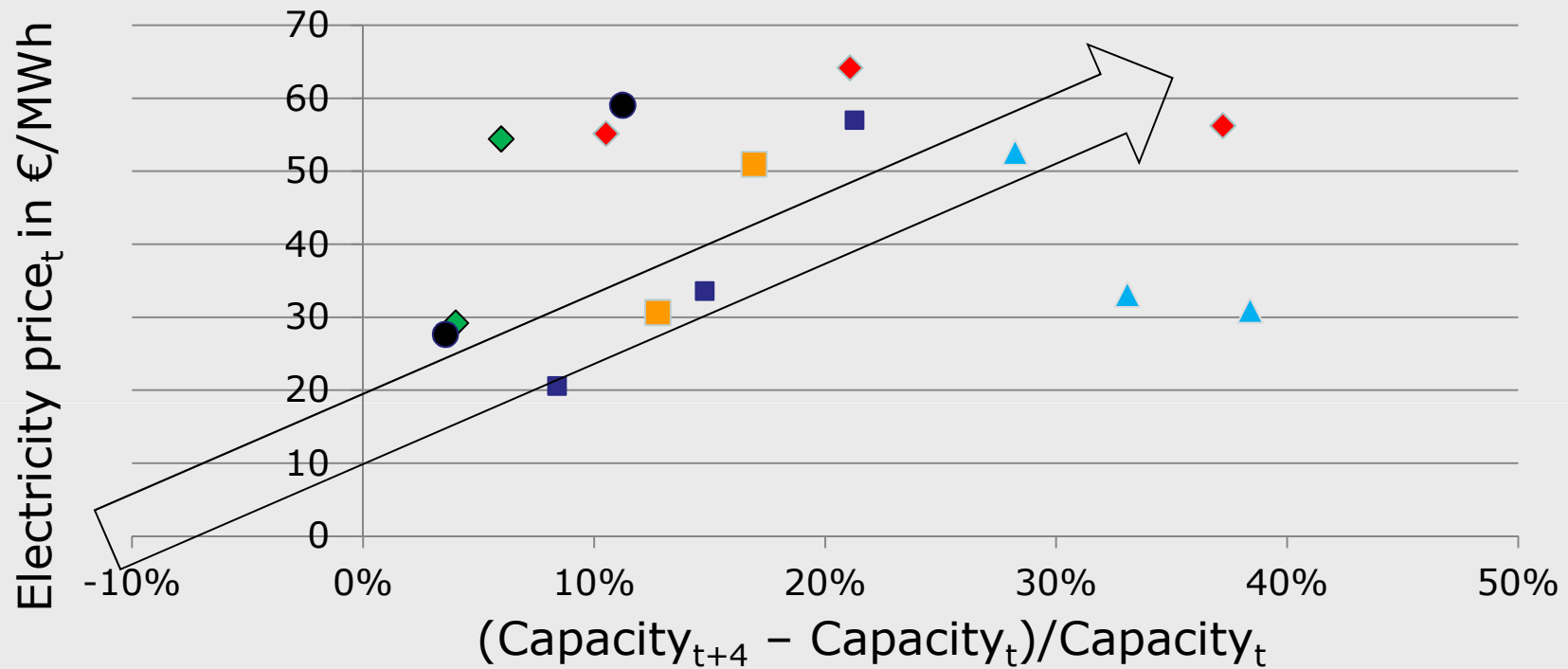
Source: BNetzA(2012)



Investment signals for power plants

- **Expected wholesale electricity prices**
- **Expected carbon cost**
- **EU environmental standard**
- **National environmental standards**
- **National support schemes**
- **National ancillary service prices**
- **National capacity mechanisms**
- **National taxation regimes**
- **National redistribution schemes**
- **National grid access regulations**
- **Expected fuel cost**

Power plant investments do not happen where wholesale prices are highest



Sources: ENTSO-E, Datastream, Macrobond, DECC



ETS vs. renewables

- **Renewables subsidies**
- ⇒ **Renewables replace conventional power plants**
- ⇒ **Lower CO2 emissions in the power sector**
- ⇒ **More emission allowances in the market**
- ⇒ **Emission allowance price decreases**
- ⇒ **Fuel switch from expensive but cleaner natural gas to cheaper but more dirty coal**
- ⇒ **No net emission reductions but significant cost**



Example: Germany

- >80% of investments in 2009 and 2010 received national technology specific feed-in tariffs (in EU ~40%)
- NPV of about 100 bn Euro
- If all 25 GW of German PV (~900 kWh/kWp) would have been installed in Greece (~1300 kWh/kWp) the value of the additional electricity would have been ~ €1.3bn in 2011

Example: France

- New organisation of the French market (loi NOME)
 - Maintain regulated tariffs => limits demand side response
 - Capacity markets => an incentive for building in France



Example: UK

- **UK White paper: Energy “market” reform**
 - Feed-in tariffs for all zero-carbon technologies (renewables, nuclear)
 - Capacity mechanism for gas fired power plants
 - => the government essentially hardwires the fuel mix
 - Carbon floor price (above current ETS price)
 - => Shifting of abatement from the continent to the UK



Agenda

- 1) Investment needs
- 2) Investment incentives
- 3) Conclusion



Government failure can easily inflate the cost

Total cost - Average annual energy system costs 2011-2050 (bn EUR)

Ref	High EE	diverse	High RES	Delayed CCS	Low nuclear
2582	2615 +1%	2535 -2%	2590 0%	2525 -2%	2552 -1%

Source: Impact Assessment of the Energy Roadmap

To stay close to the optimal path:

- **Stepping-up the role of the ETS**
- **and, Stepping-up the role of the single energy market**



Getting closer to the frontier

