Institut der deutschen Wirtschaft Köln

Cologne Institute for Economic Research

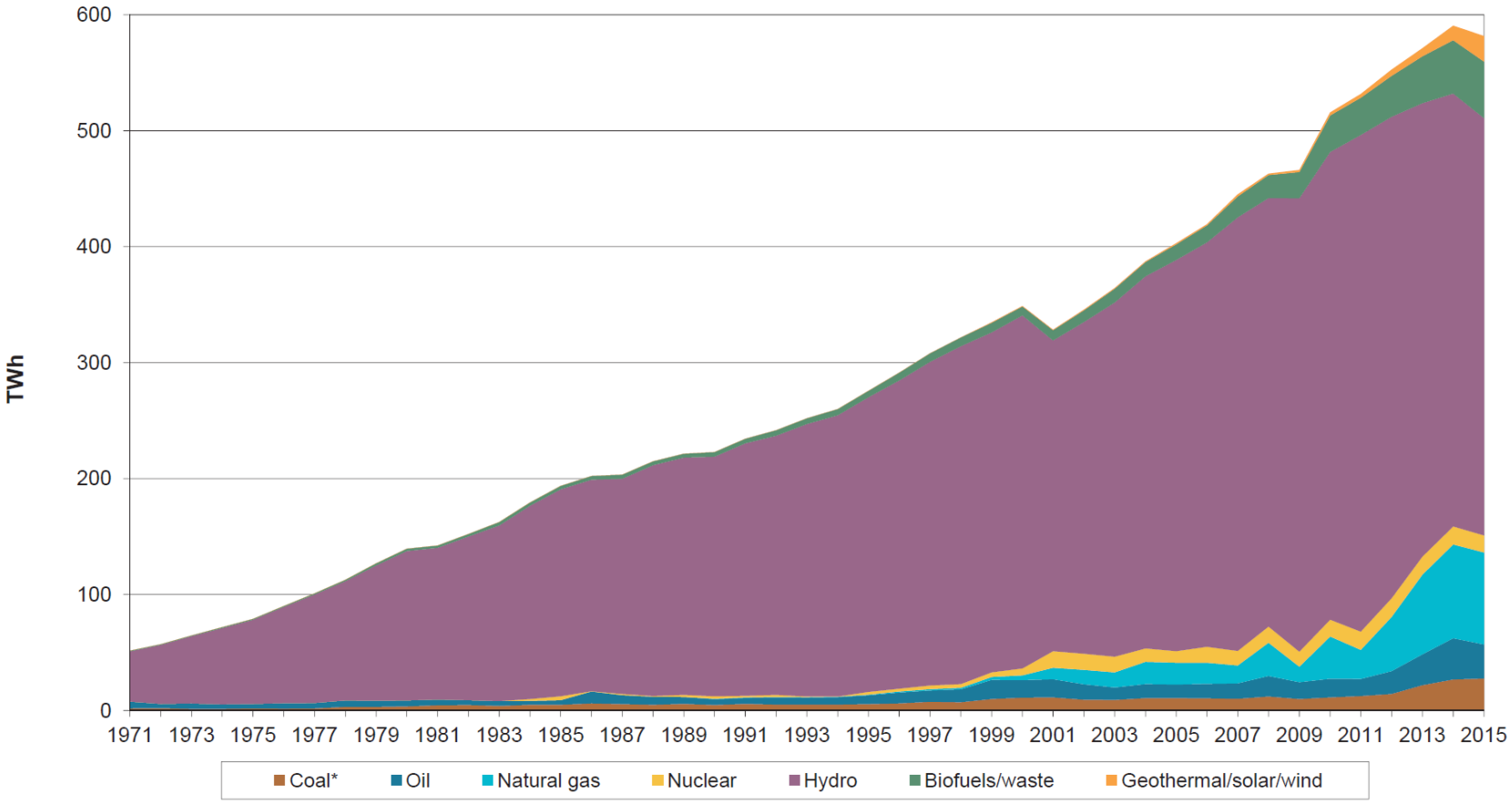
Decentralization of the Electric Sector
Experience from the German energy transition

Dr. Thilo Schaefer
Cologne Institute for Economic Research

17 Oct 2017, Rio de Janeiro

iW.KÖLN.WISSEN
SCHAFFT KOMPETENZ.

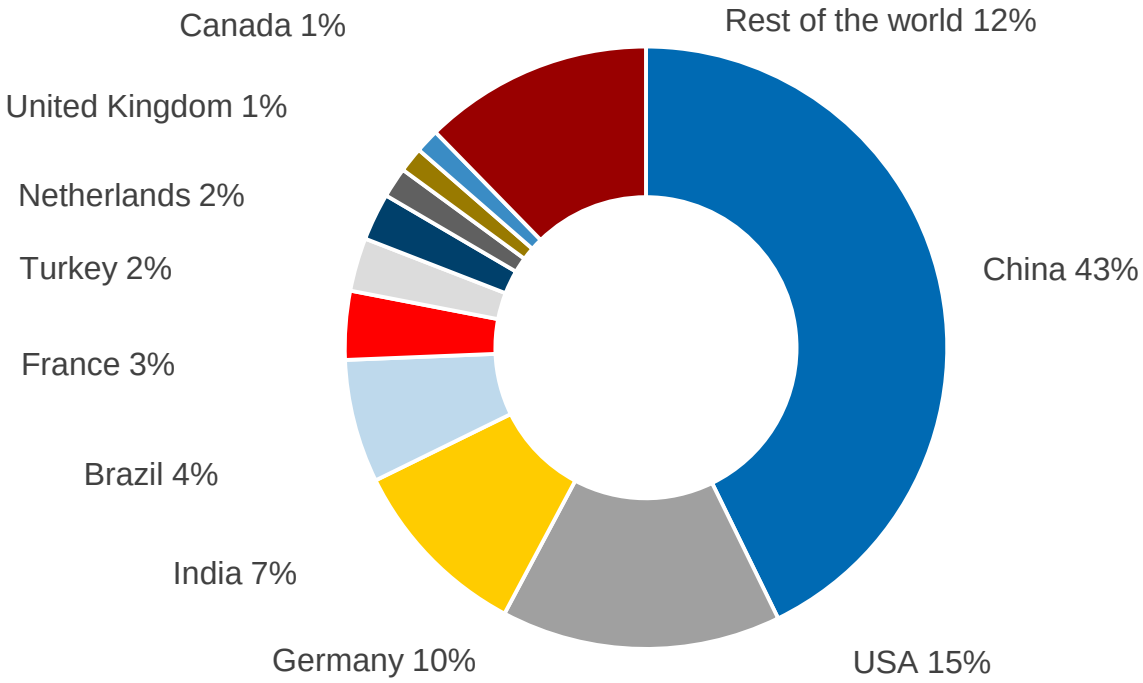
Electricity generation in Brazil



Source: OECD / IEA (2017)

Newly installed wind capacity in 2016

MW



Source: Global wind energy council

Wind installations not necessarily decentral

Source: fotolia (nikilove)

Big solar „plants“

Source: iStock (querbeet)

Growth of renewable installations

More small, decentral suppliers and big consumers

Electricity supply	Electricity demand
	

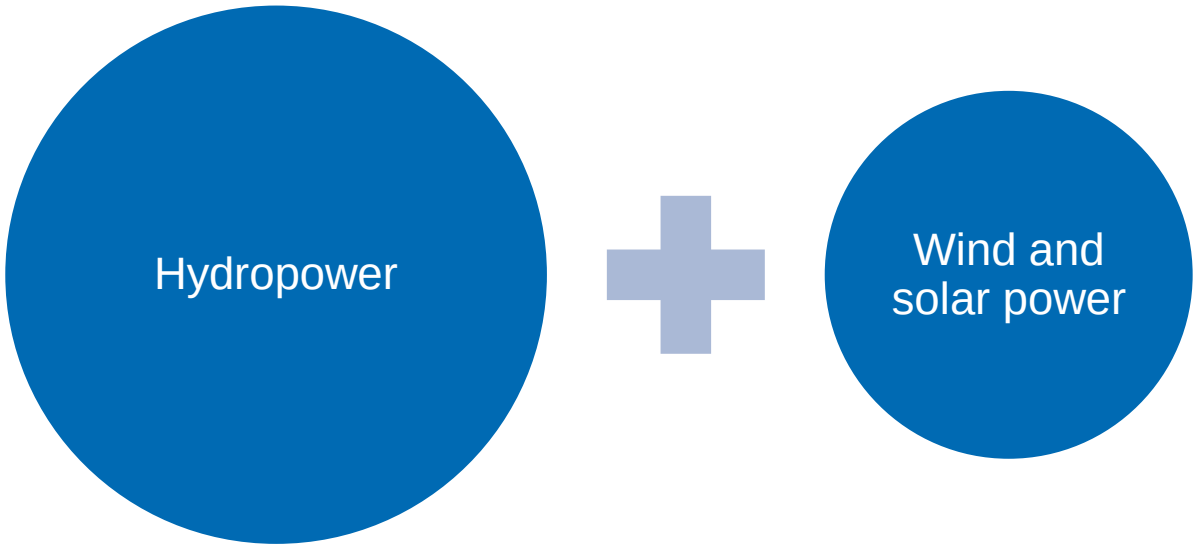
Locations of supply and demand in Brazil

The prospect of a (more) decentralized energy system

Possible advantages	Challenges
• Supply closer to demand • More flexibility • Less market concentration	• Grid connection • Congestion management • Security of supply • Pricing

Renewable sources in Brazil

Advantage: complementary rather than alternative

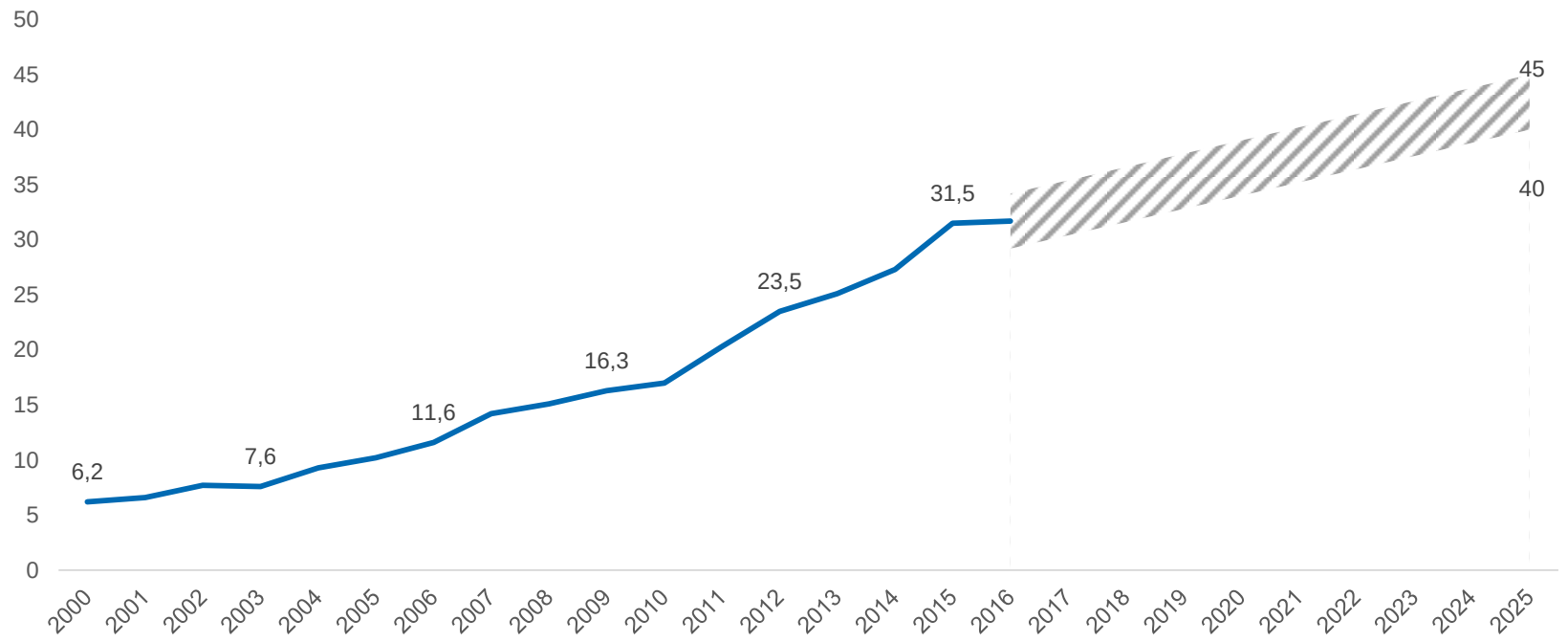


Locations of supply and demand in Germany

Images: fotolia

Renewable energy in Germany

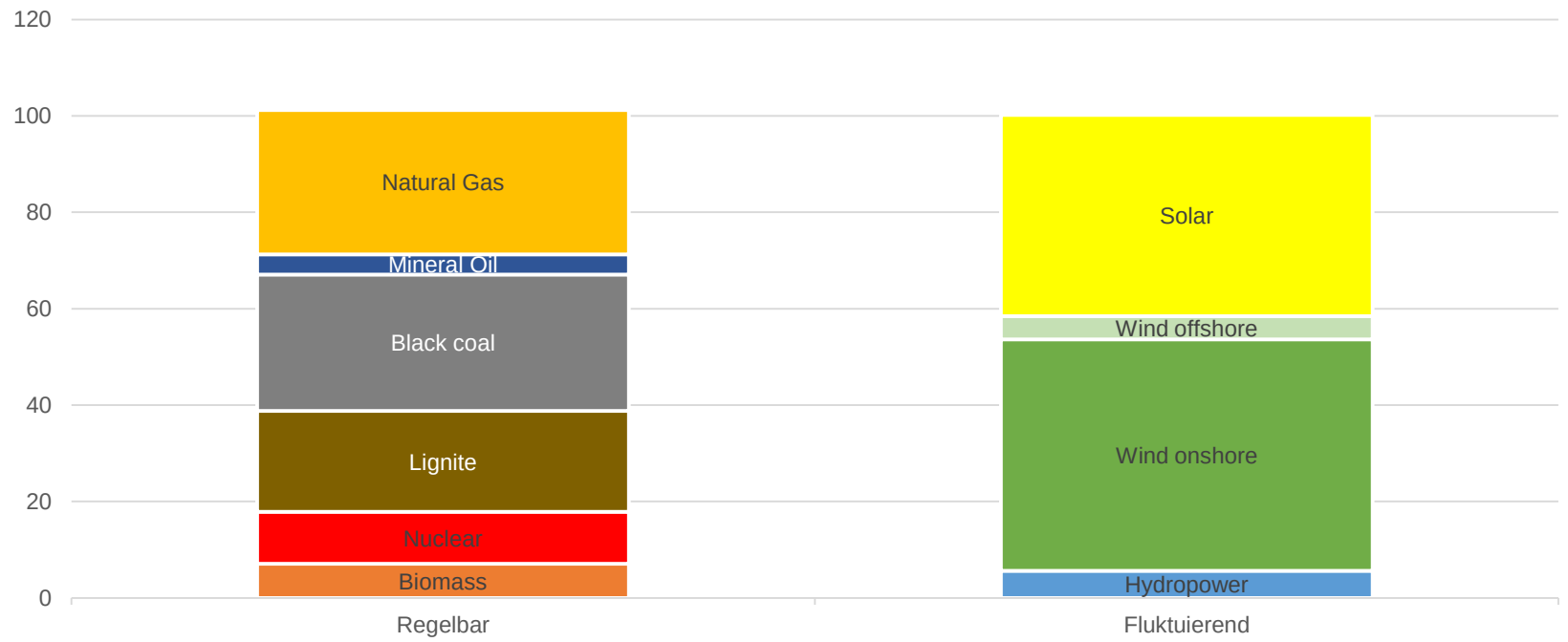
Share of electricity generation from renewable sources in percent



Source: German Federal Ministry for Economic Affairs and Energy

Installed net-power for the production of electricity

Capacity in GW in Germany (2016)

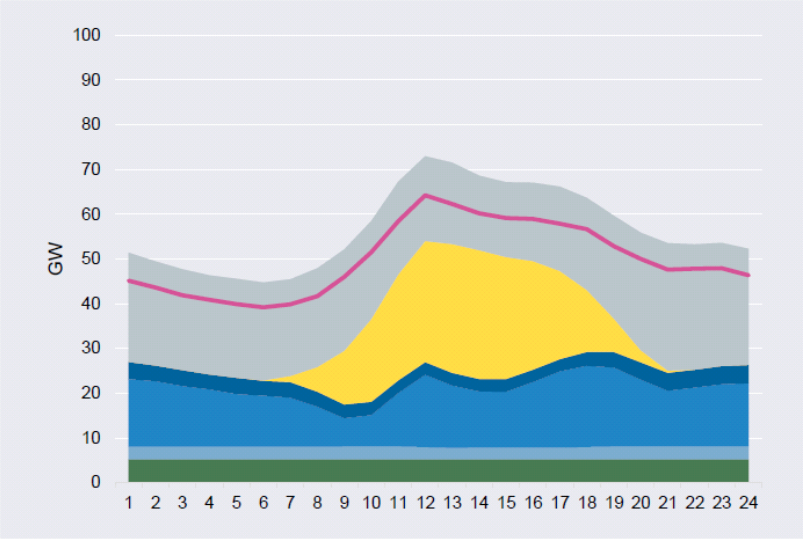


Quelle: Agora Energiewende (2017)

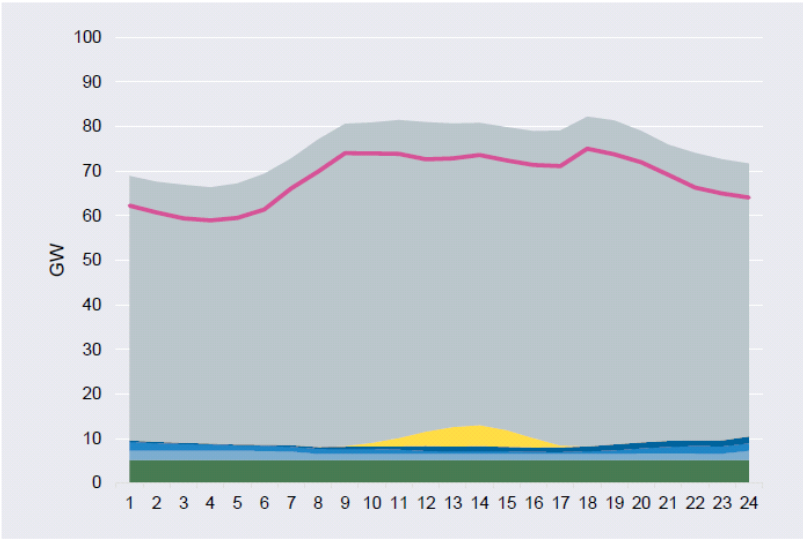
Highest to lowest proportion of renewable energy

Production and consumption of electricity- Wind/Solar/Conventional in GW 2016

on 8 May 2016



on 21 January 2016

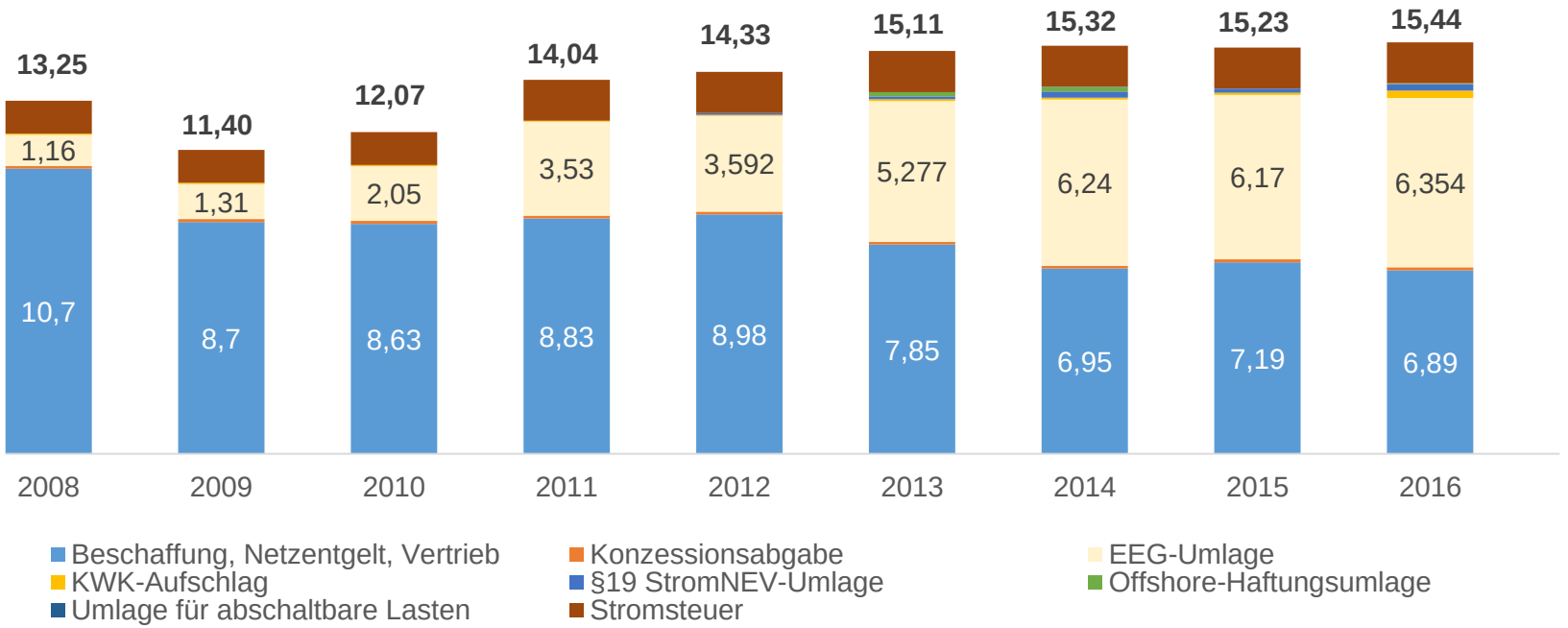


Conventional power stations | Solar | Wind onshore | Wind offshore | Hydroelectric power | Biomass

Quelle: Agora Energiewende (2017)

Development of the components of electricity costs

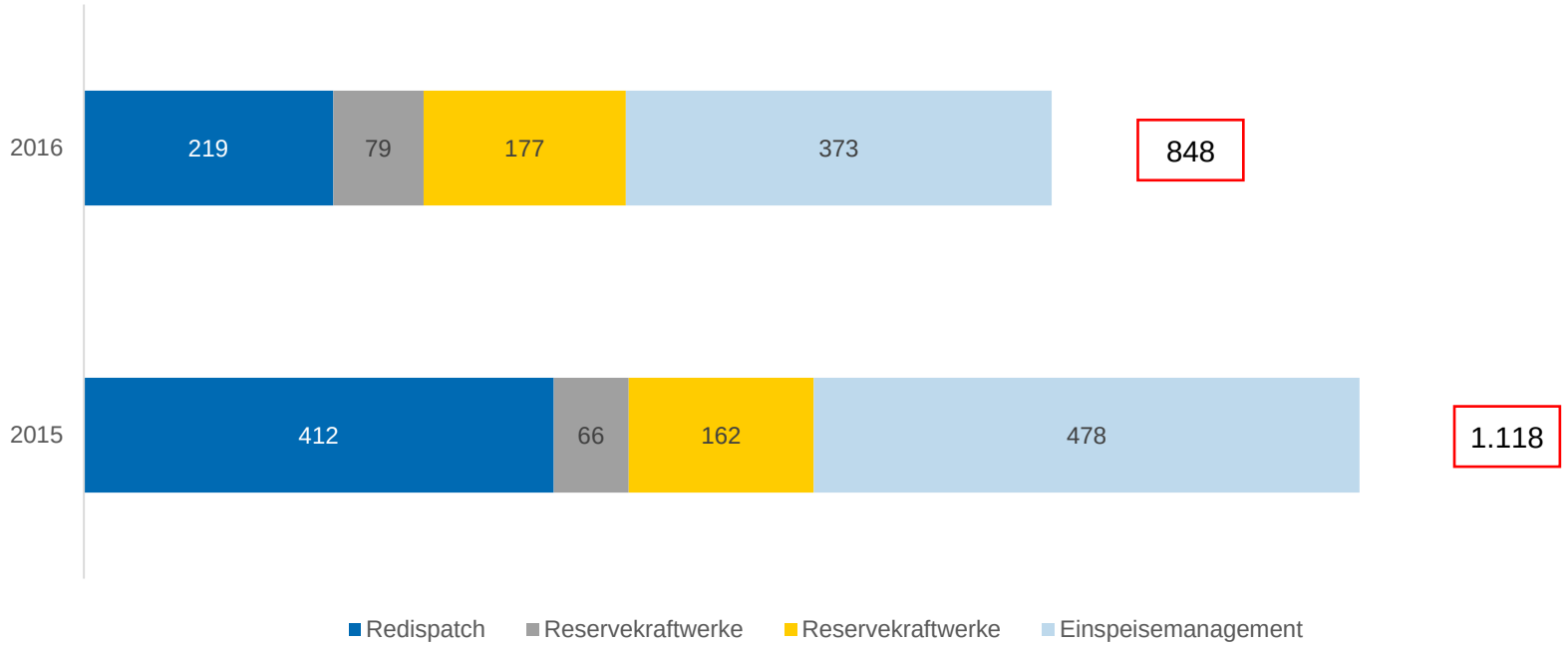
Data in cents per kWh



Quelle: BDEW

Cost of congestion management in Germany

in million Euro



Quelle: Bundesnetzagentur

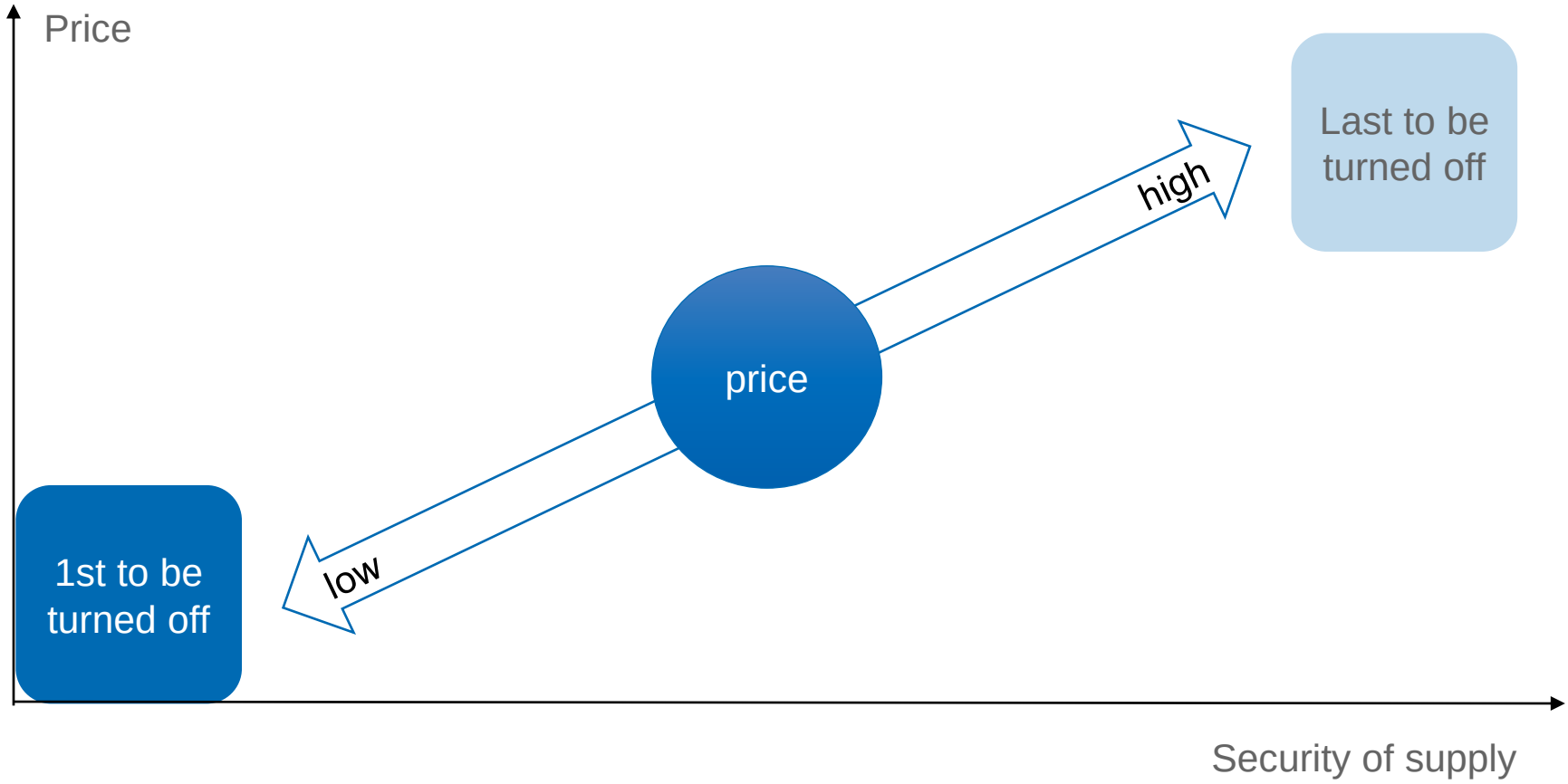
New Risks: Security of Supply?

- Electricity from guaranteed capacities is needed in a system that highly relies on fluctuant energy sources.
- Decreasing revenues of conventional power plants (less production hours, lower prices)
- Investment restraints within the conventional power plant sector

But: This is not necessarily a signal for market failure = Ongoing Debate

Security of supply as a product?

Demand side management increases flexibility



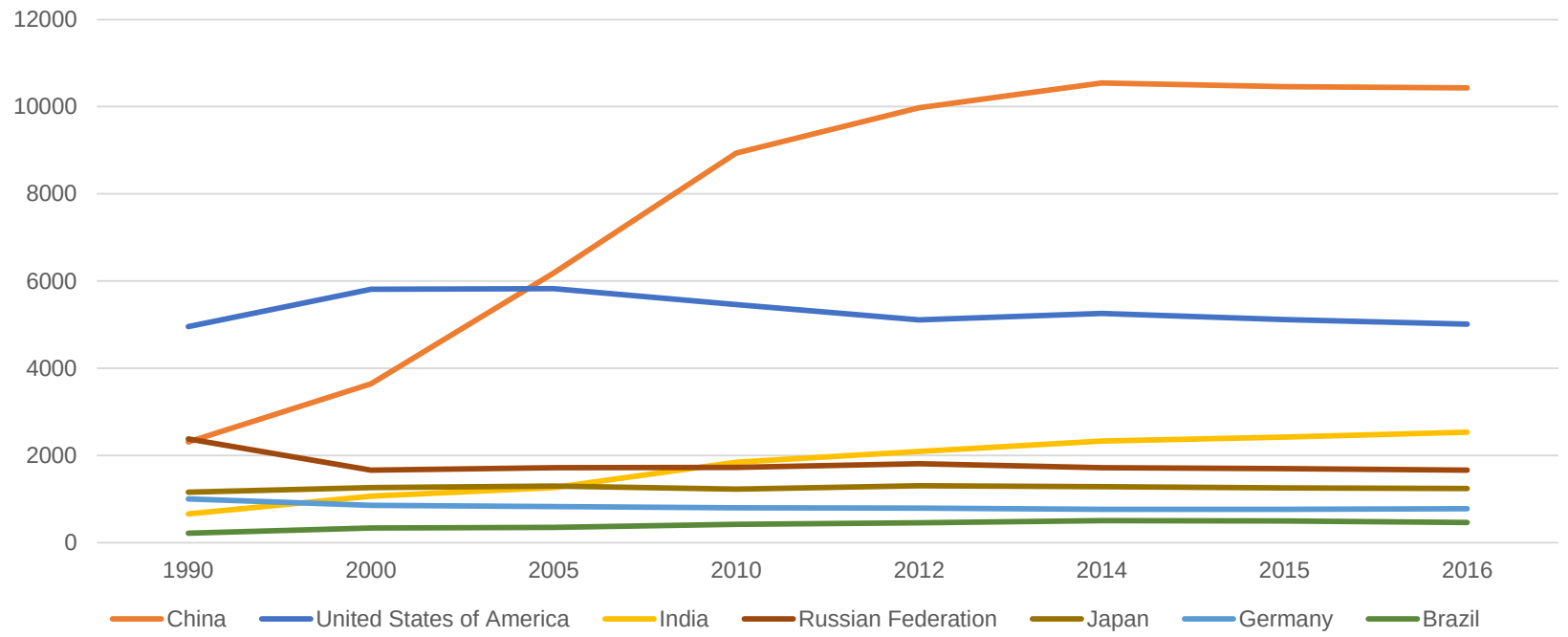
Decentralization is a possible market result

– not a sensible policy target

- Depending on the market design smaller decentral installations of wind and solar power are encouraged by the promotion of renewable energy
- Still, there are advantages of bigger (renewable energy) plants:
  - Scale effects of bigger installations
  - More efficient land use in windy / sunny areas
  - Distance to residential buildings
  - Transportation
- Net infrastructure needs to fit installation structure
- Prices should incentivize most efficient locations for installations

Trends in global CO_2 emissions

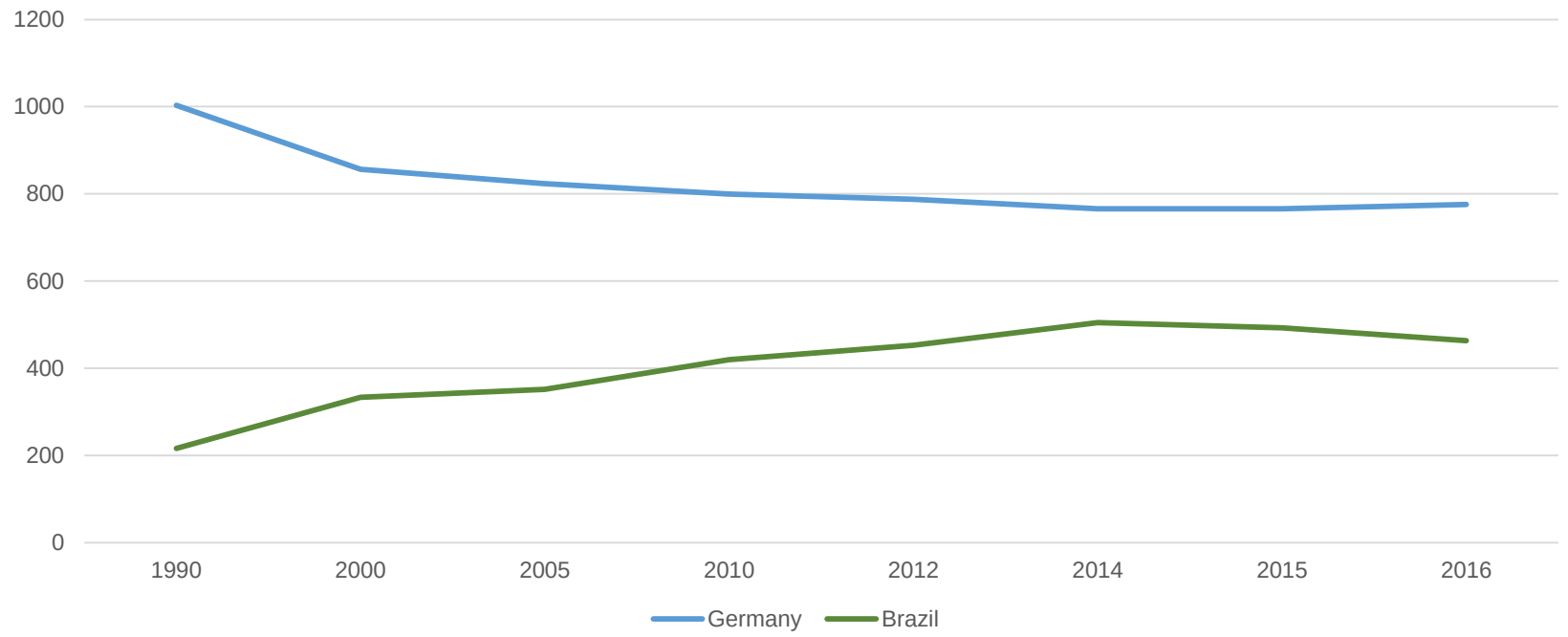
in millions of tonnes of CO_2



Source: EU Commission / EDGAR, 2017

Comparison of CO_2 emissions in Germany and Brazil

in millions of tonnes of CO_2



Source: EU Commission / EDGAR, 2017

Political implications

Inconsistencies will persist without internationally comparable CO_2 prices.

1st best solution	▶ **Global** emissions trading system resulting in consistent prices for greenhouse gas emissions
2nd best solution	▶ **Regional** emissions trading for all sectors with perfect carbon leakage protection for highly competitive sectors
Current situation	▶ Inconsistent regulation of different sectors ▶ Overlapping inconsistent instruments ▶ Higher costs due to additional national regulations

Criteria for an efficient policy mix

- International agreements and/or instruments in place?
  - Additional national targets or measures have no extra effect
- Which target(s) does a policy instrument address?
  - Are other instruments adressing the same target(s)?
  - Is there a priority / hierarchy of targets?
- Simple rule (Tinbergen):
  one instrument ↔ one target