arrhenius INSTITUT FÜR ENERGIE- UND KLIMAPOLITIK
INSTITUTE FOR ENERGY AND CLIMATE POLICY

Energy Economics

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Introduction and Summary

- Climate is changing
- GHG emissions need to be reduced considerably
- Many technical options exist (e.g. PV, CCS....)
- Many “fan clubs” (with different interest) exist
- Not all technical options are compatible
- Even without climate policies European power markets as designed today are about to fail
  → More interventions by policy makers necessary
  → More interventions by policy makers → potential for lobbying
  rent seeking of lobby groups → inefficient market outcome

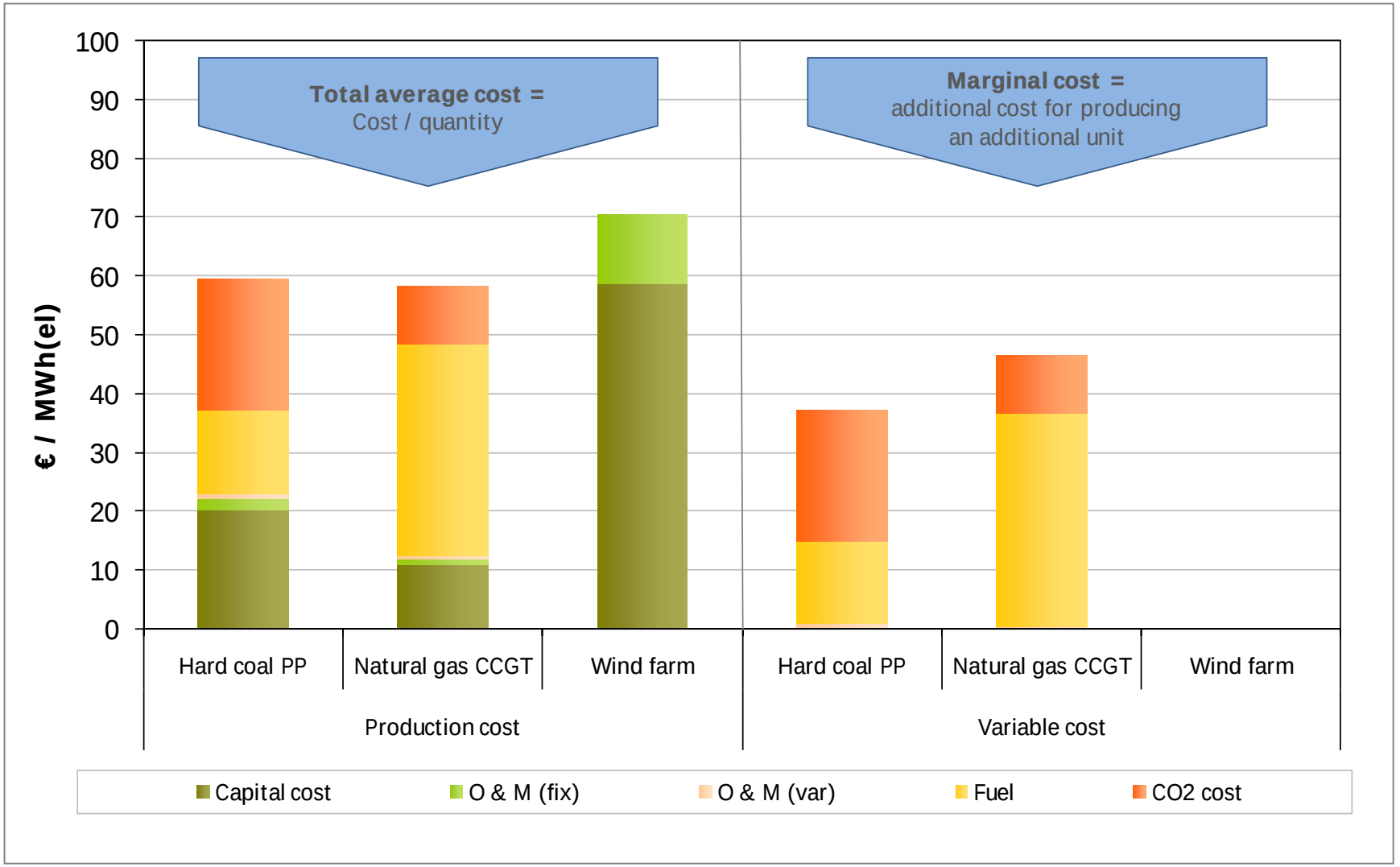
- Some examples...

Renewable energies in a liberalised power market

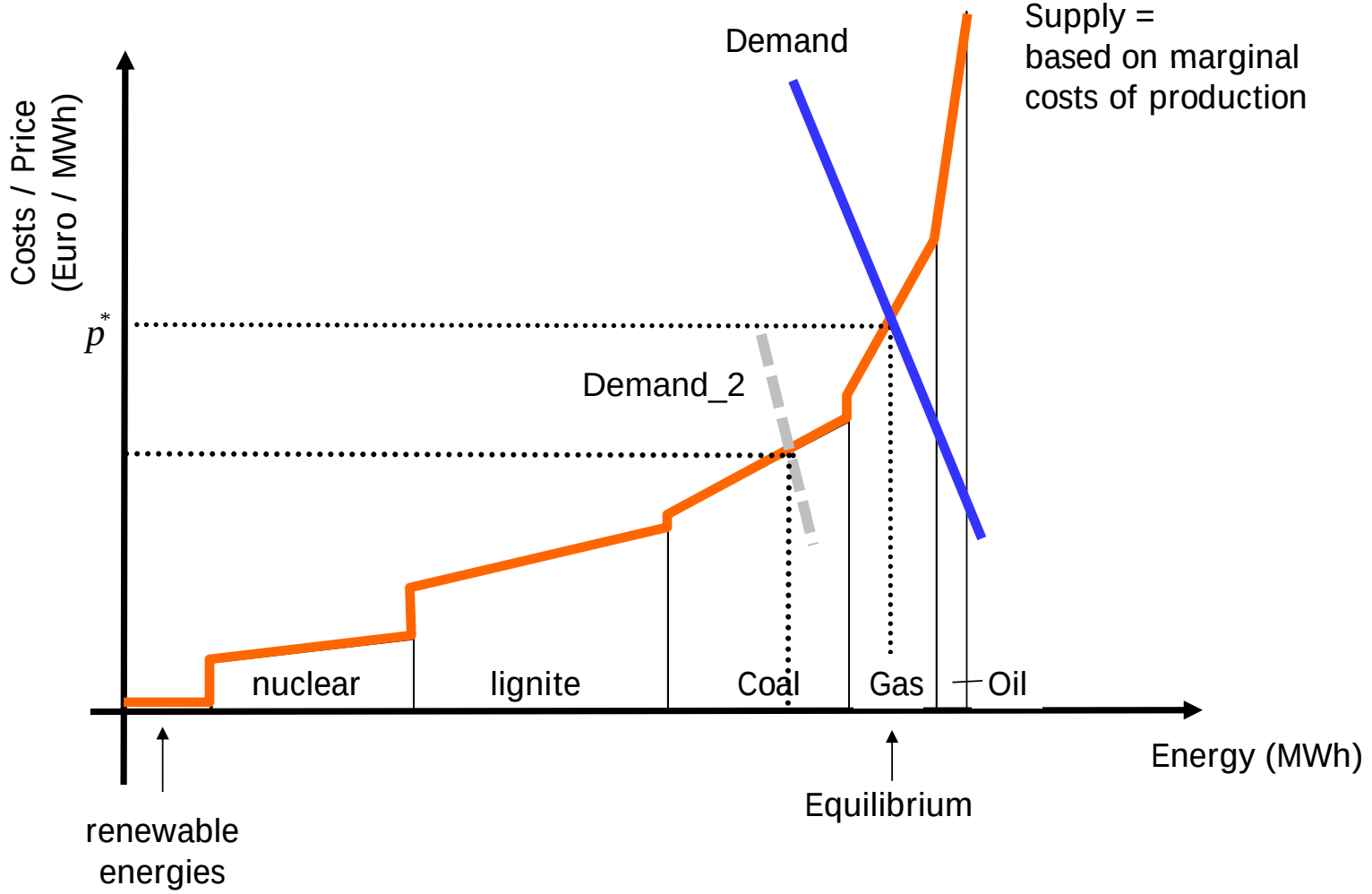
- European directive on renewable energies
  - Specific targets for each member state
  - National action plans required
  - National RE targets might be more stringent

- Impact of additional RE on power markets?

Different types of “costs” available in economic theory with different relevance for investments



Price Formation in Competitive Markets



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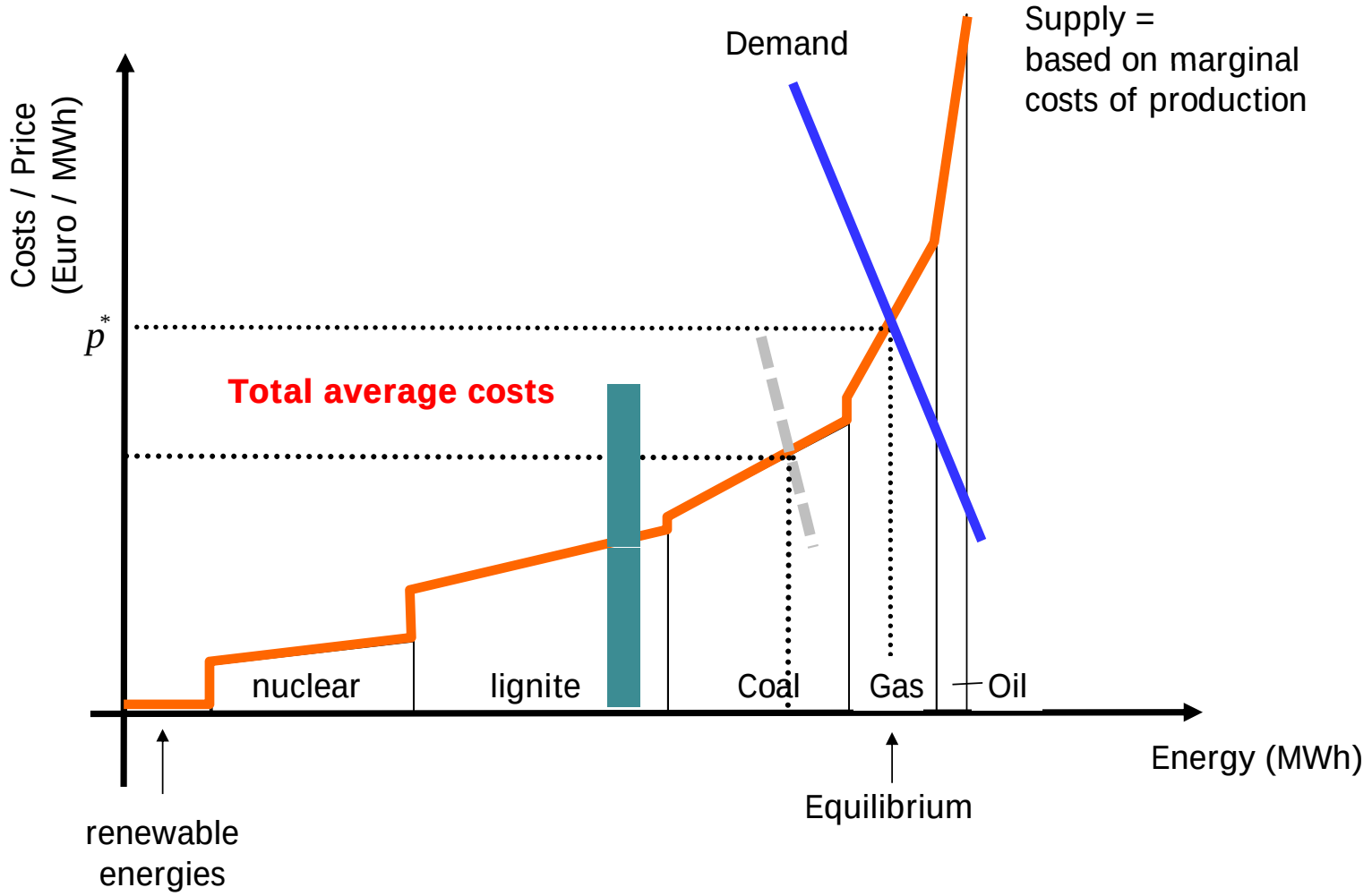

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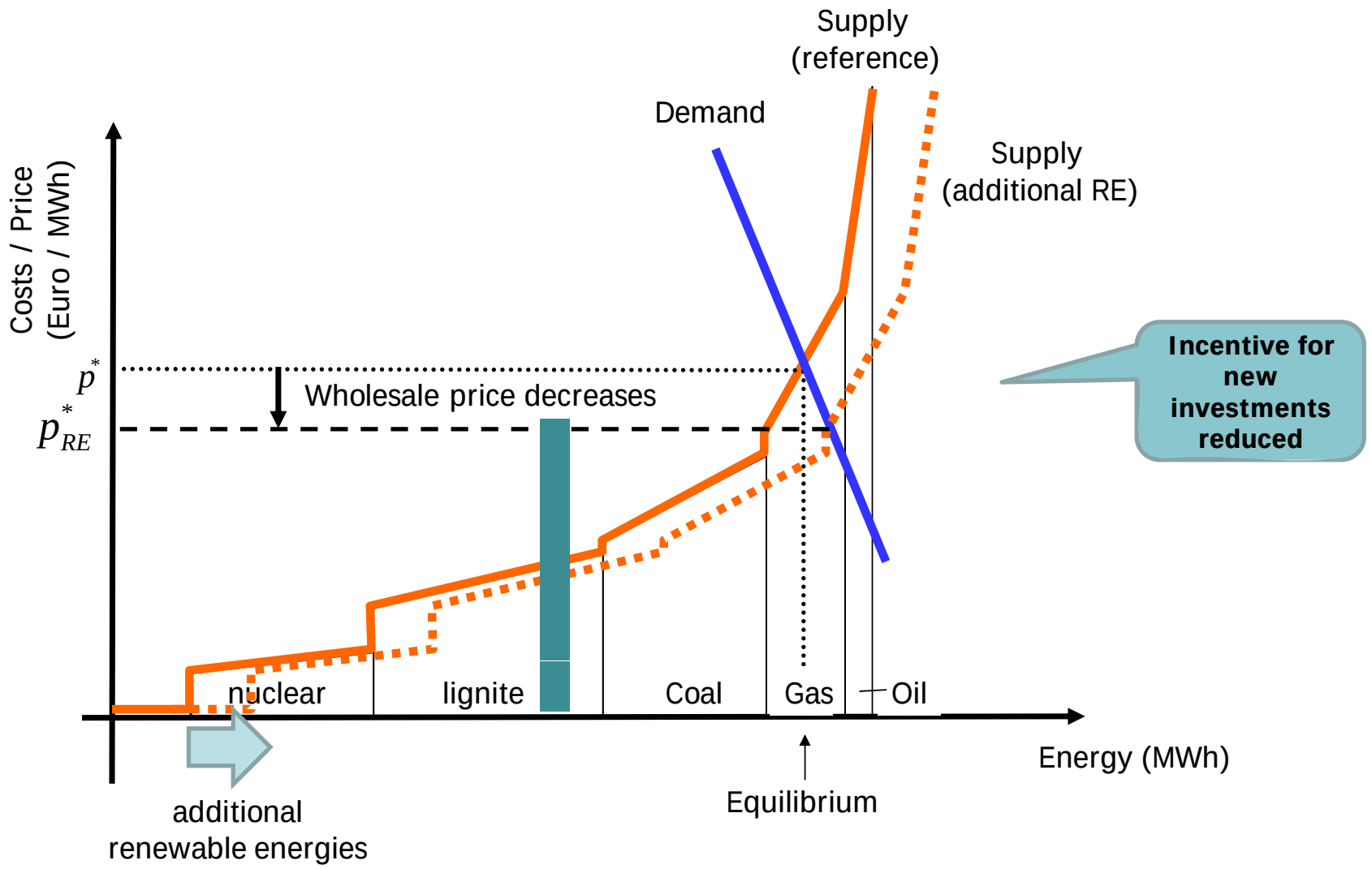

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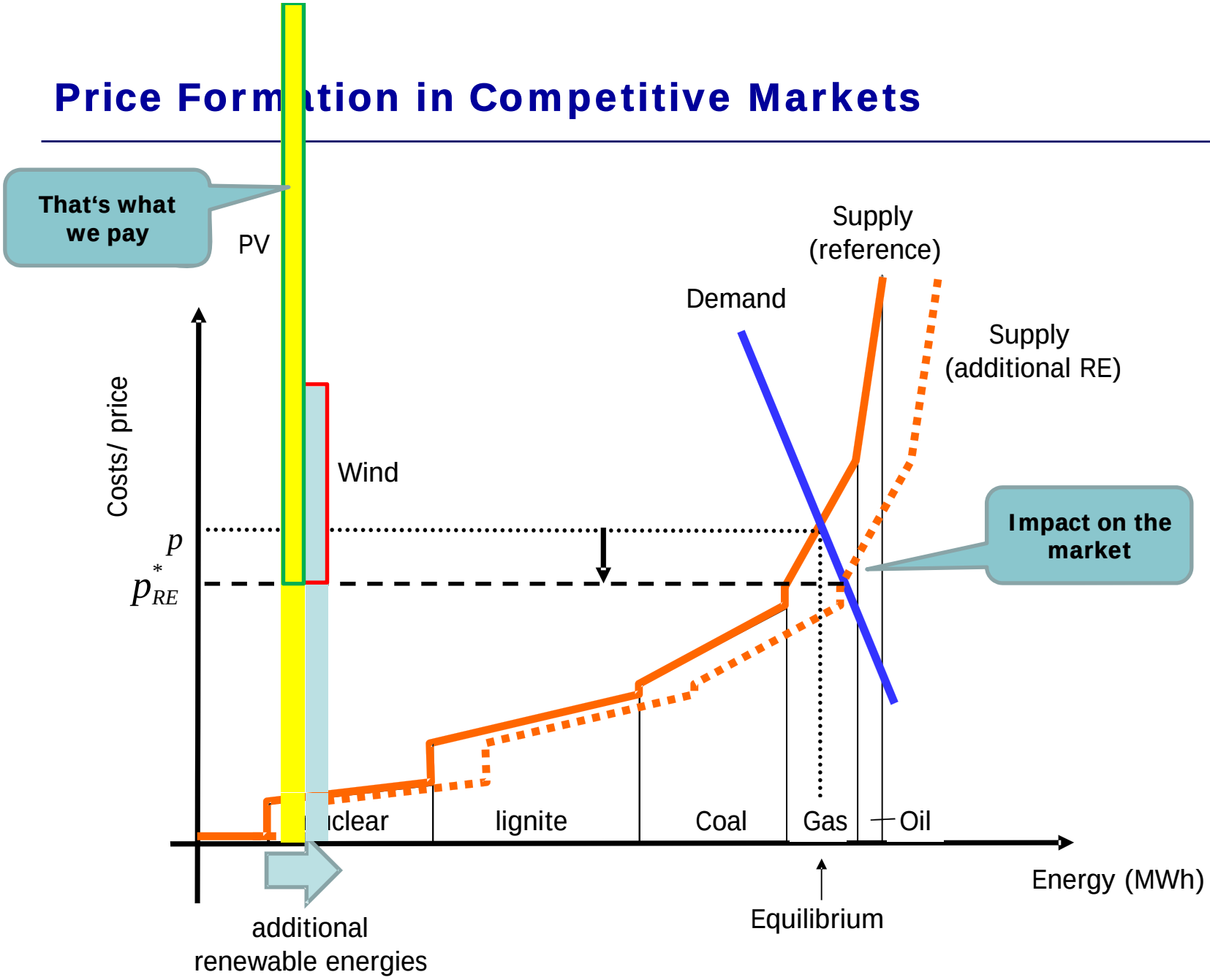
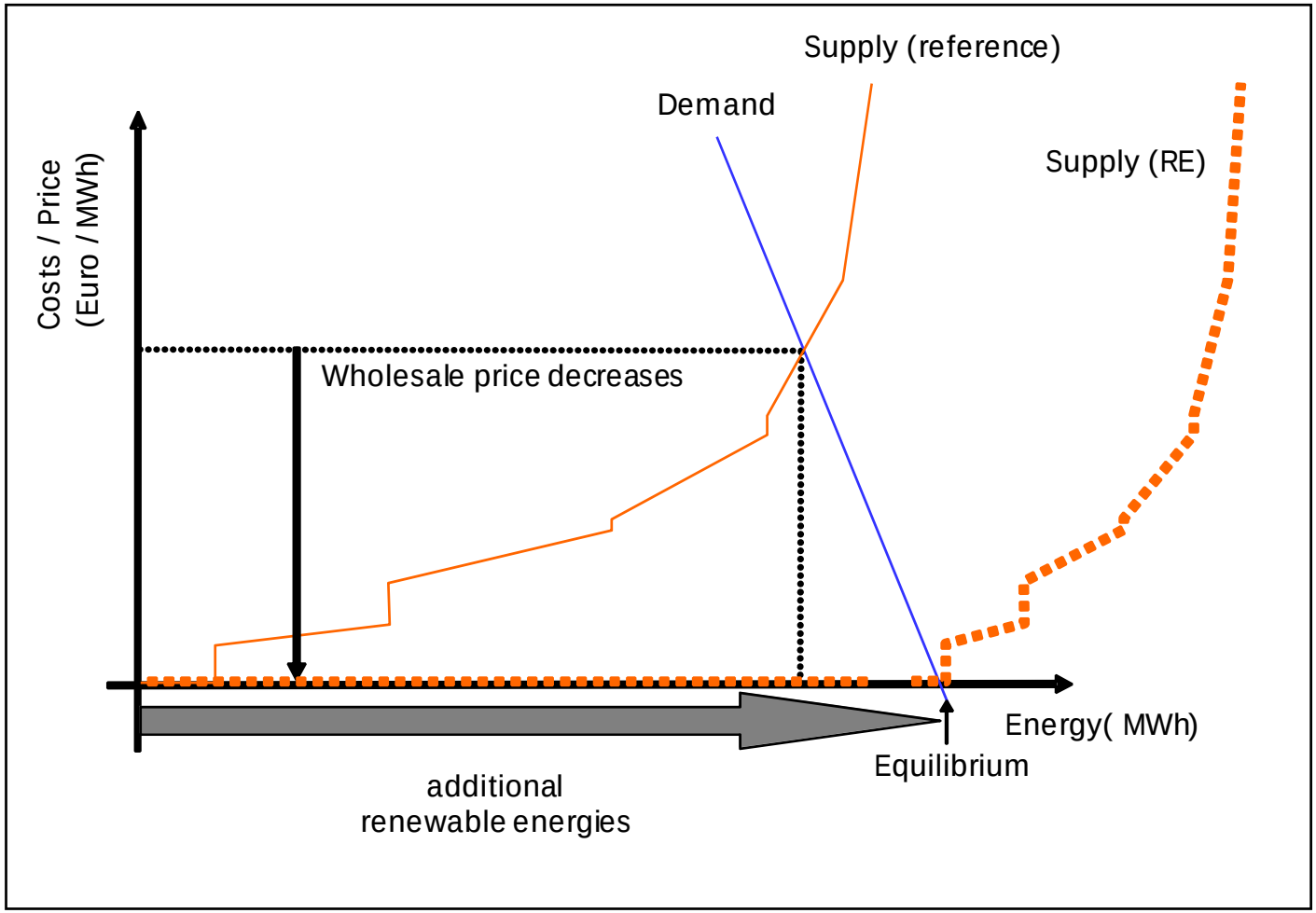


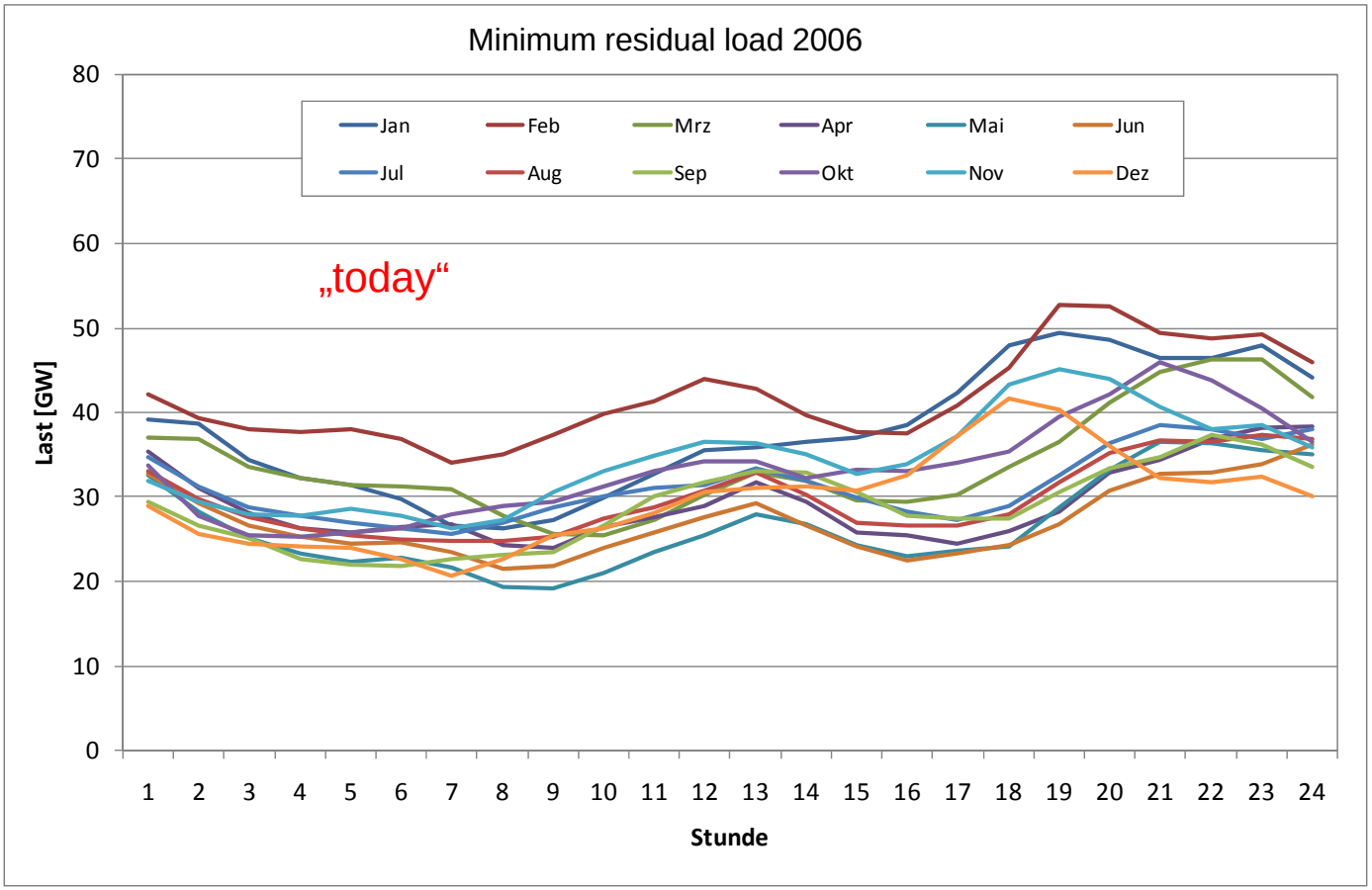
Price Formation in Competitive Markets

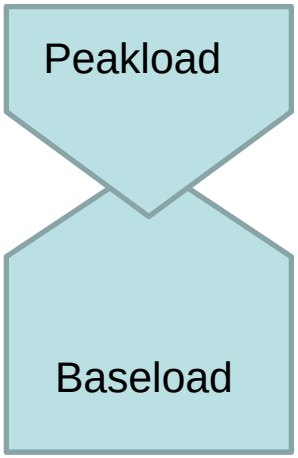
Example: strong wind….



→ High market share of RE only with permanent support scheme

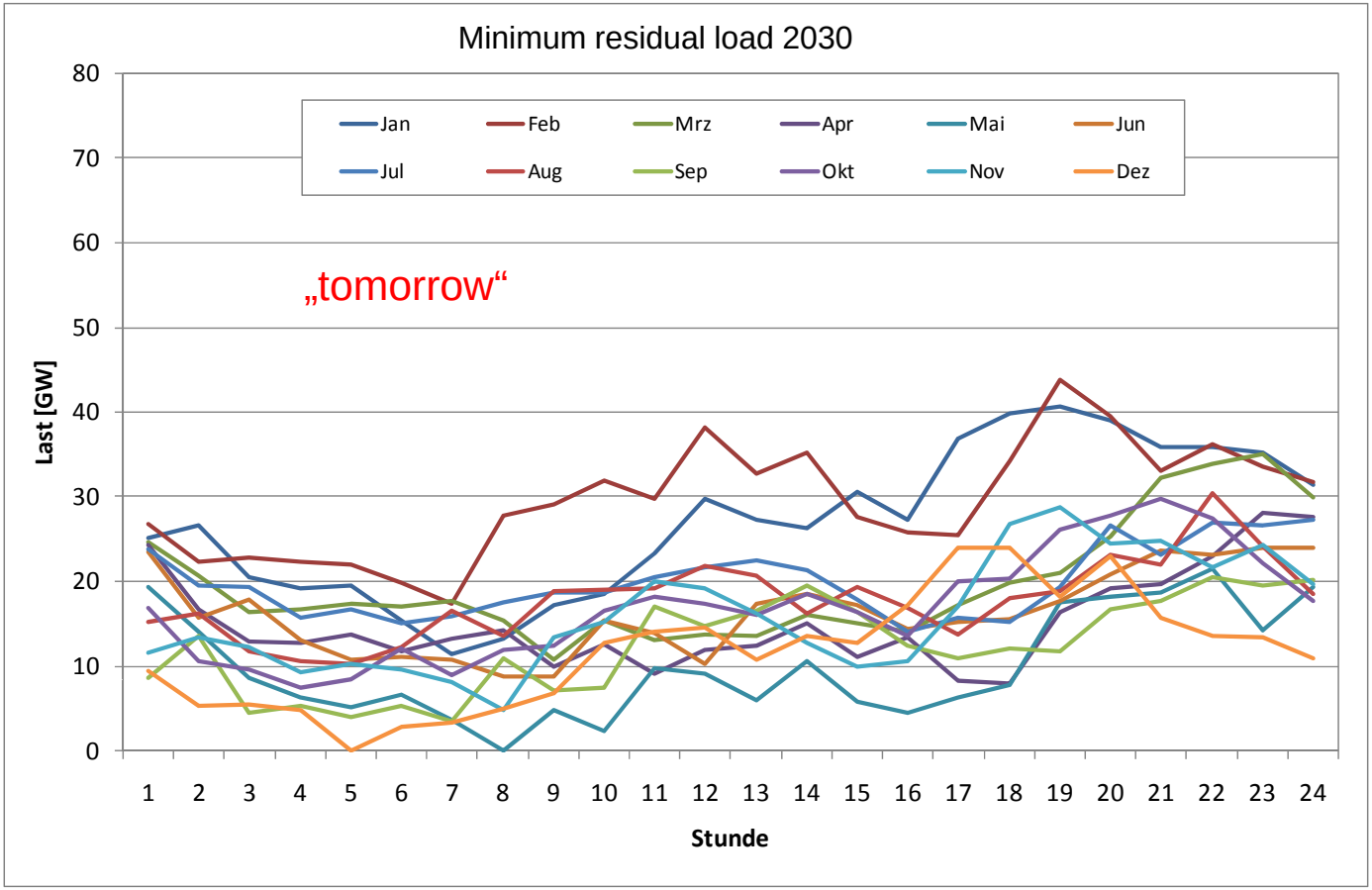
Technical aspects of more RE

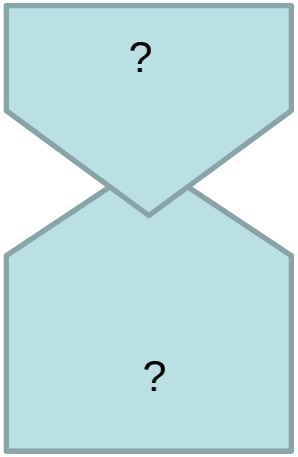




Residual load = total load – RE generation
(to be met by conventional plants incl. storage)

Technical aspects of more RE





- Dispersal of traditional structure ”base load - peak load“
- Different requirements for remaining conventional plants

Price Formation in Competitive Markets

- Little incentive to invest in new capacities (even without climate policies)
  - Trade-off competition vs. investments
    - High capital costs (esp. lignite/ coal fired power plants)
    - Limited potential for increases in efficiency
      → Need for re-regulation of the market*)
- British regulator Ofgem: Consultation Document, 3. Feb. 2010

> We have identified a number of concerns with the current arrangements and have concluded that significant action will be called for given the unprecedented challenges facing the electricity and gas industries. We are keen to work with consumers, industry and government to find the best way forward. Prompt action will reduce the risk to energy supplies and environmental objectives, and can help reduce costs to consumers.
>
> We have put forward for consultation a wide range of possible policy measures, ranging from improvements in pricing and/or obligations on suppliers to deliver specific levels of supply security, through to models that mandate or secure specific investments in new generating capacity and gas infrastructure.

*) For detailed analysis: Bode et al (2009) On the a re-regulation of the liberalised power market in Europe, in: Carbon and Climate Law Review, 2, p. 188 - 197

Renewables – but which technology?

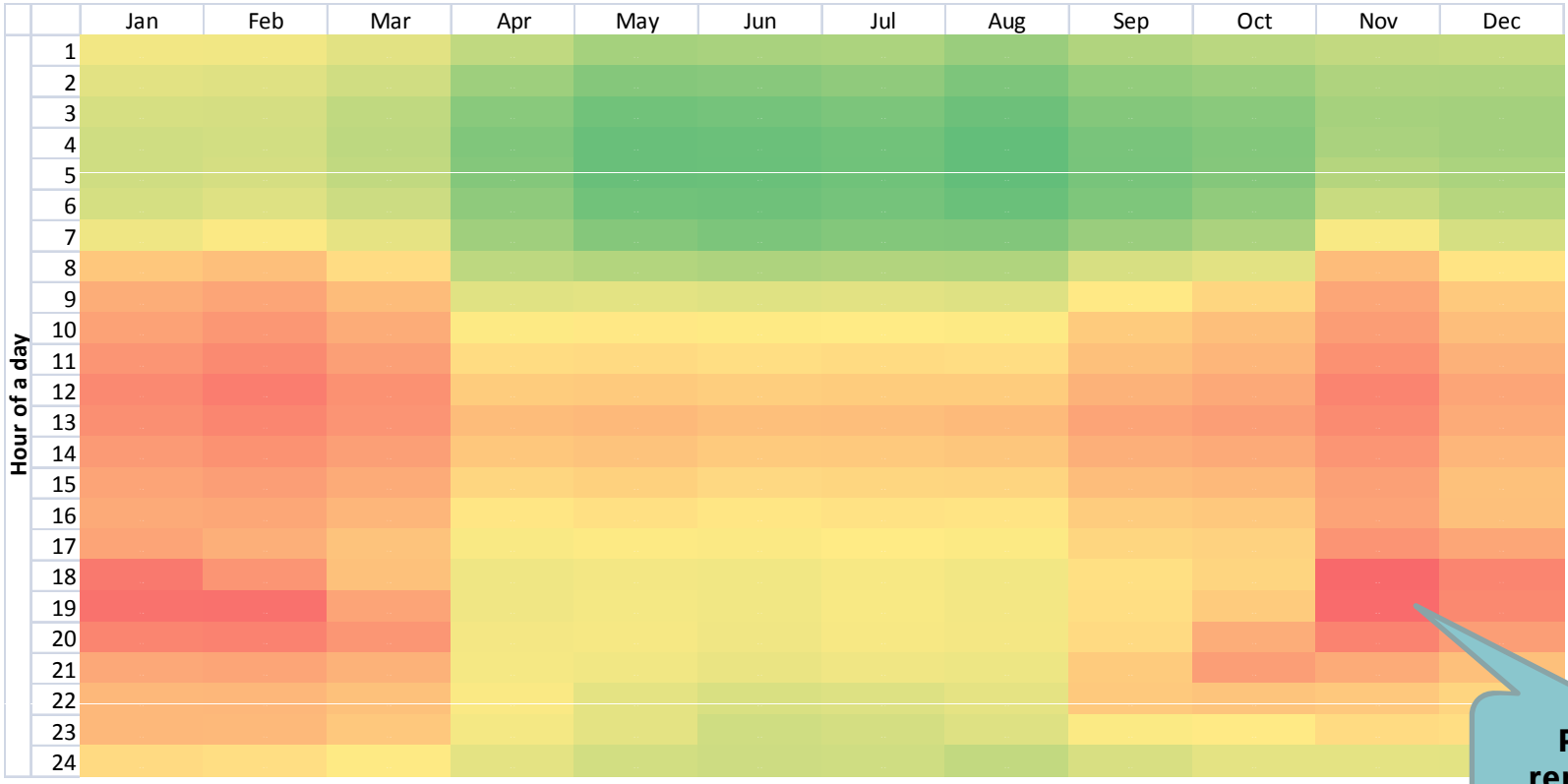
- PV in Germany: after massive growth in 2009 (~ 4 GW) and intensive debate: change of feed-in tariff (EEG) 1st half of 2010

  - Target corridor between 2.5 and 3.5 GW per year;

    expected capacity:
    2020: 42 GW
    2030 **74 GW** (65 GW s.t. FiT)

Load in Germany

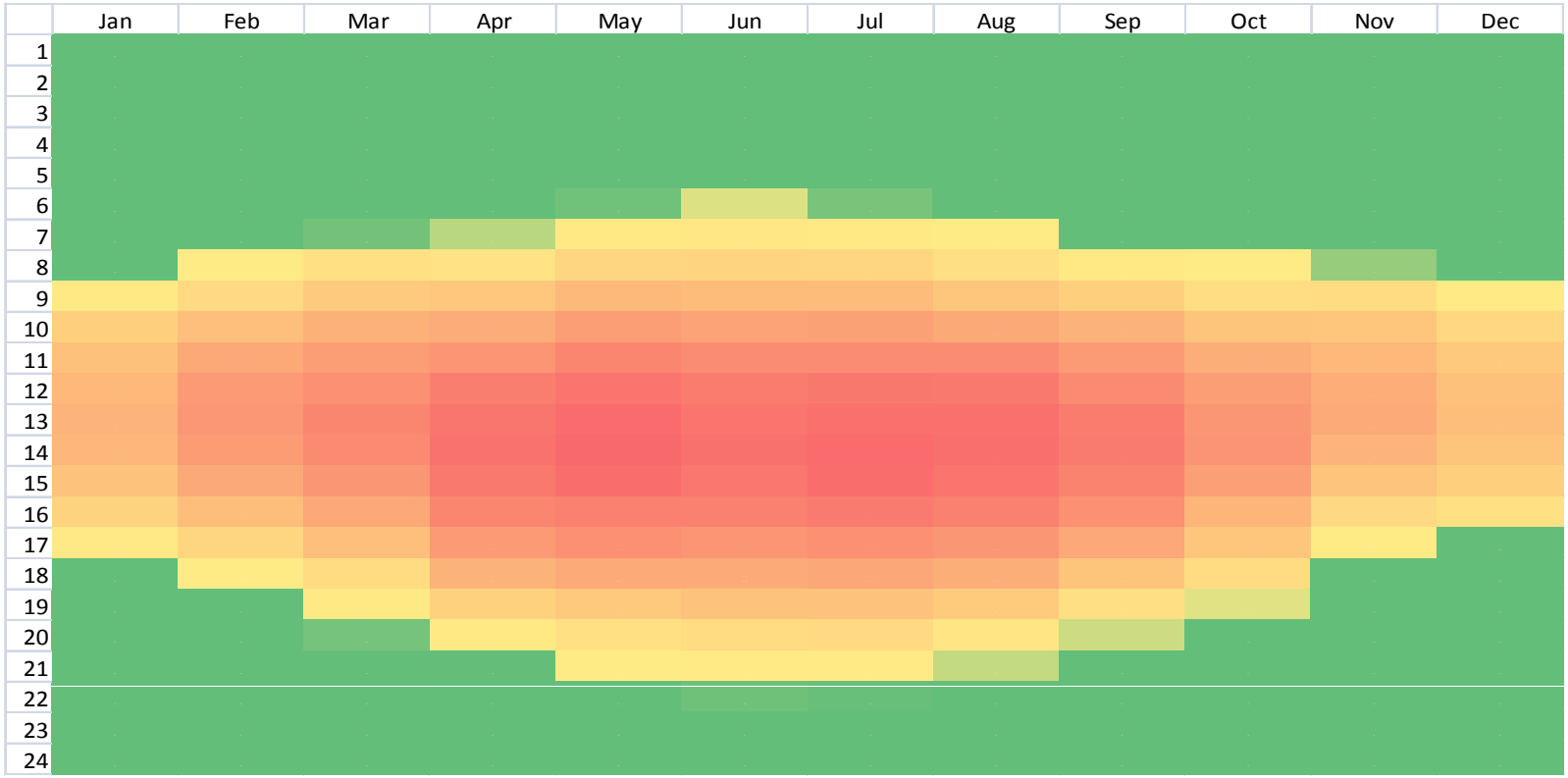
„Load mountains“: average demand in different hours of the year
(red = high; green = low)



Corresponds with wholesale power price
(red = high; green = low)

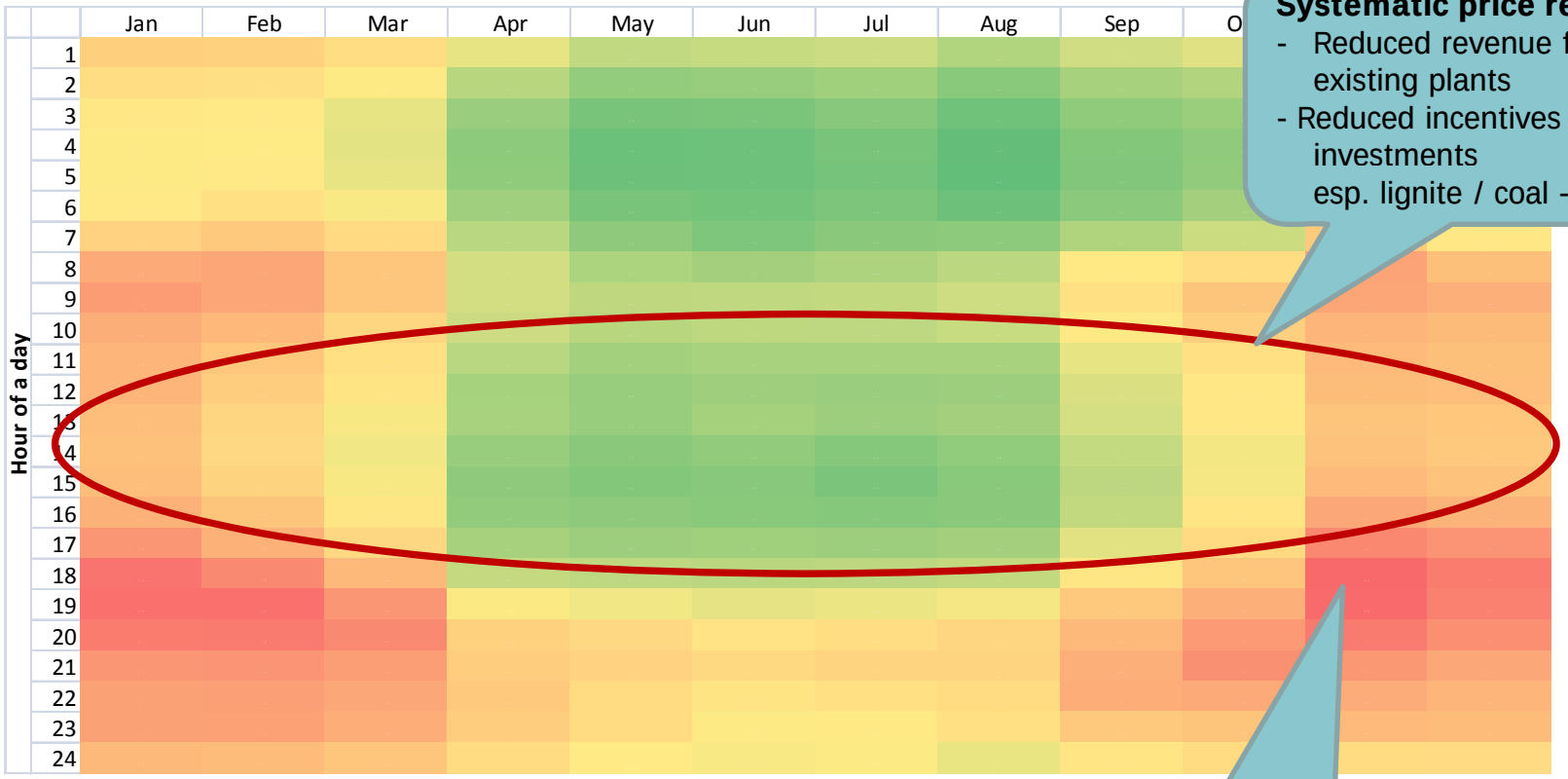
Power generation from PV in Germany

„PV production mountains“: average power production in different hours of the year (red = high; green = low)



Residual Load in Germany

„Risidual load mountains“: average residual load in different hours of the year (red = high; green = low) **with 42 GW installed capacity**



Systematic price reduction:
- Reduced revenue for existing plants
- Reduced incentives for new investments esp. lignite / coal - CCS

Unchanged residual load here: doubling of capacity, especially with 100 % RE

Corresponds with wholesale power price (red = high; green = low)

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