



# HEADING TOWARDS SUSTAINABLE AND DEMOCRATIC ELECTRICITY SYSTEMS



Reinhard HAAS,  
Energy Economics Group,  
TU Wien

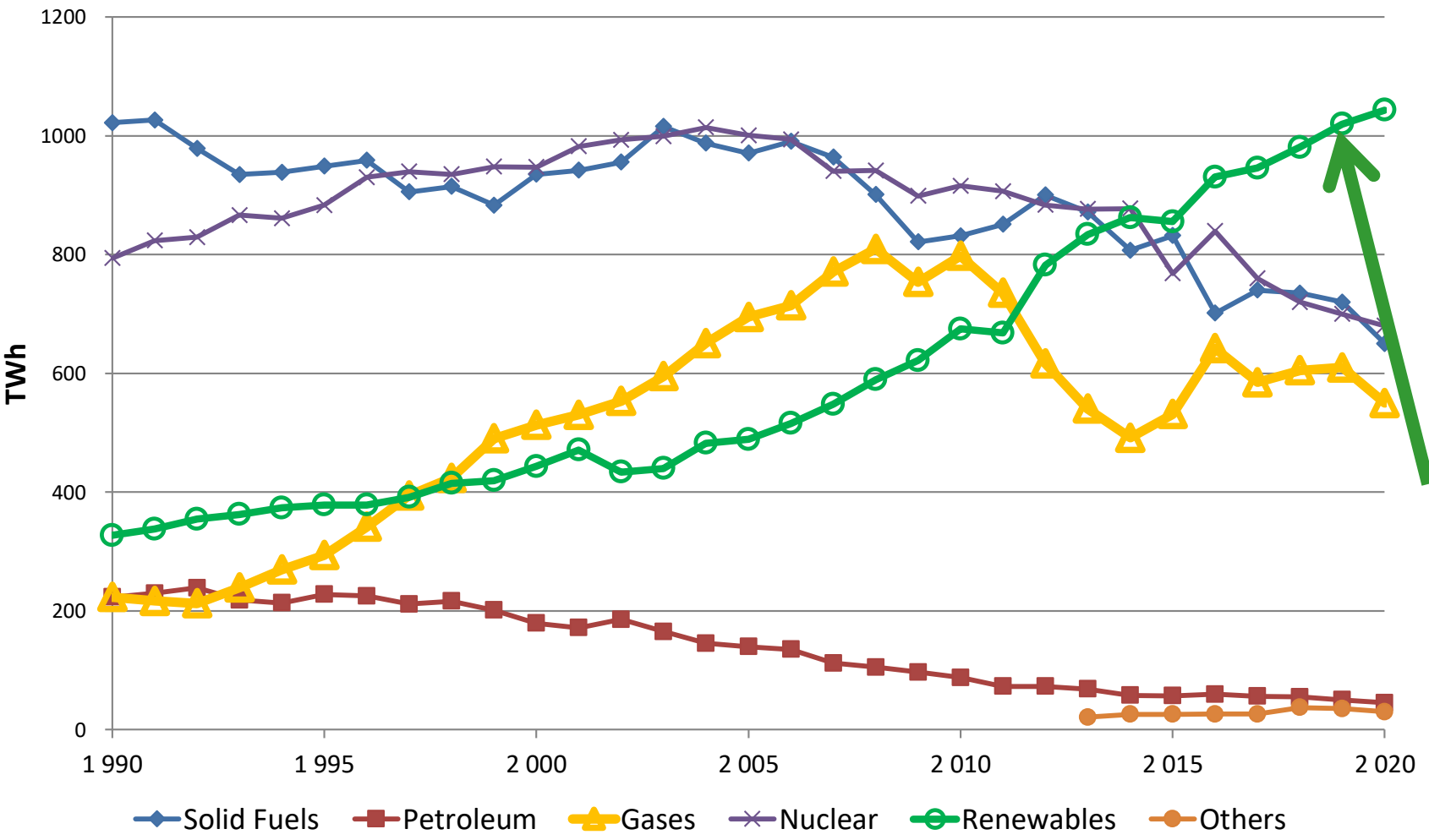
Praha, November 2021

- 1. Introduction: Motivation**
- 2. How variable renewables impact prices in electricity markets**
- 3. The role of flexibility**
- 4. Towards prosumagers and energy communities**
- 5. Conclusions**

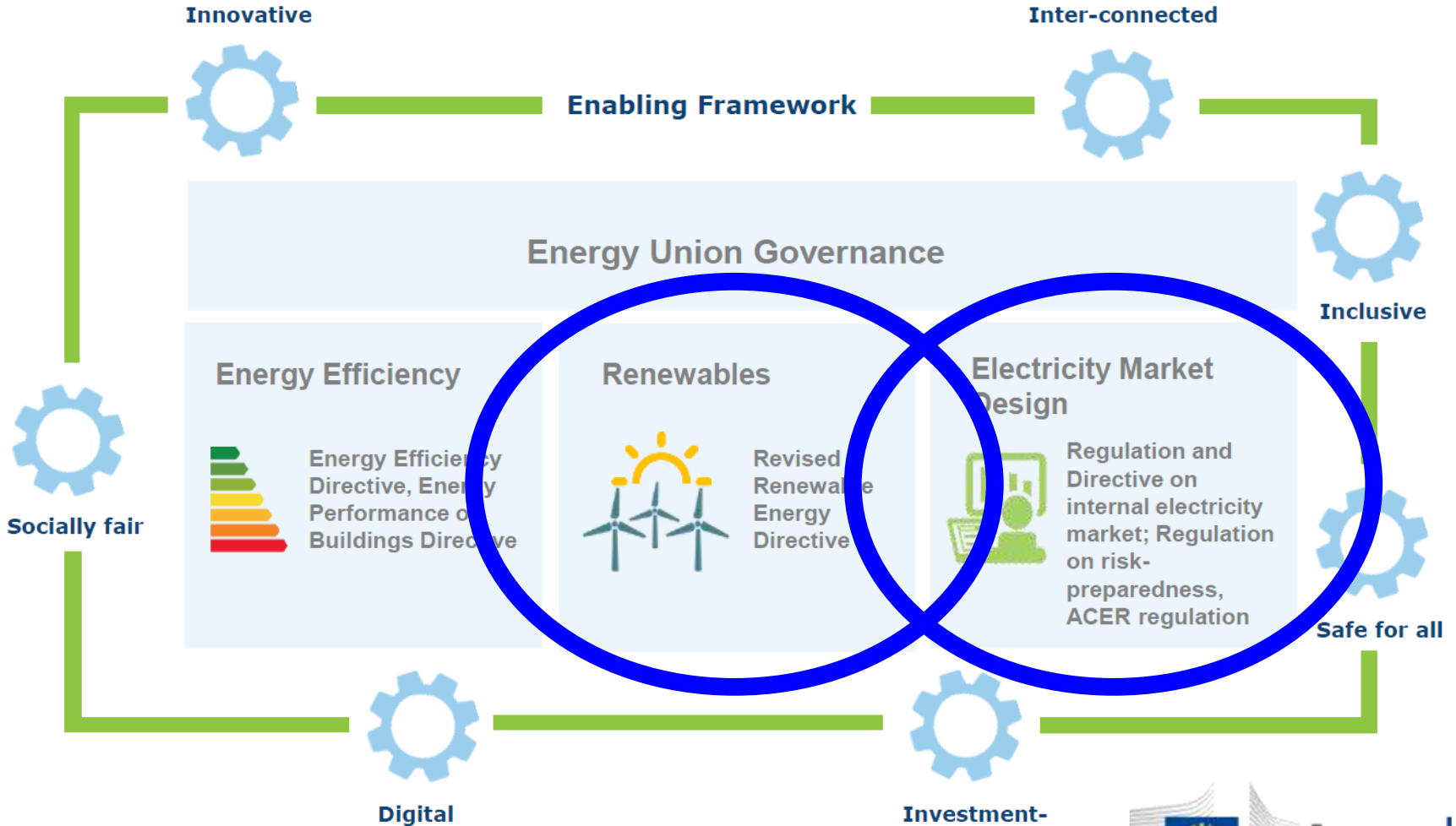
## Motivation:

- \* **Europe: The clean energy package → energy communities**
- \* **It is not possible to force variable renewables into the system**
- \* **A strong desire of more and more customers to participate in electricity supply**

# Electricity generation EU-28

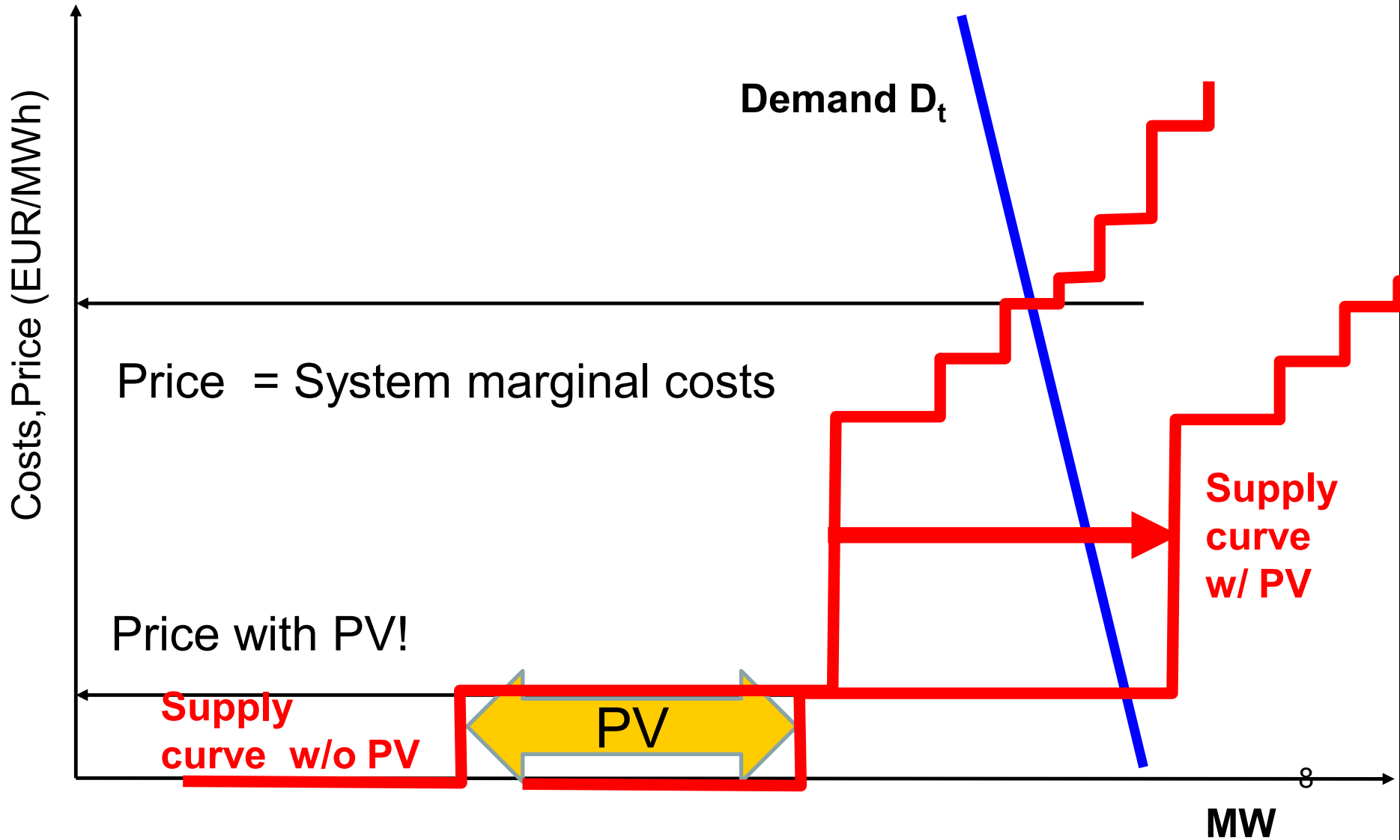


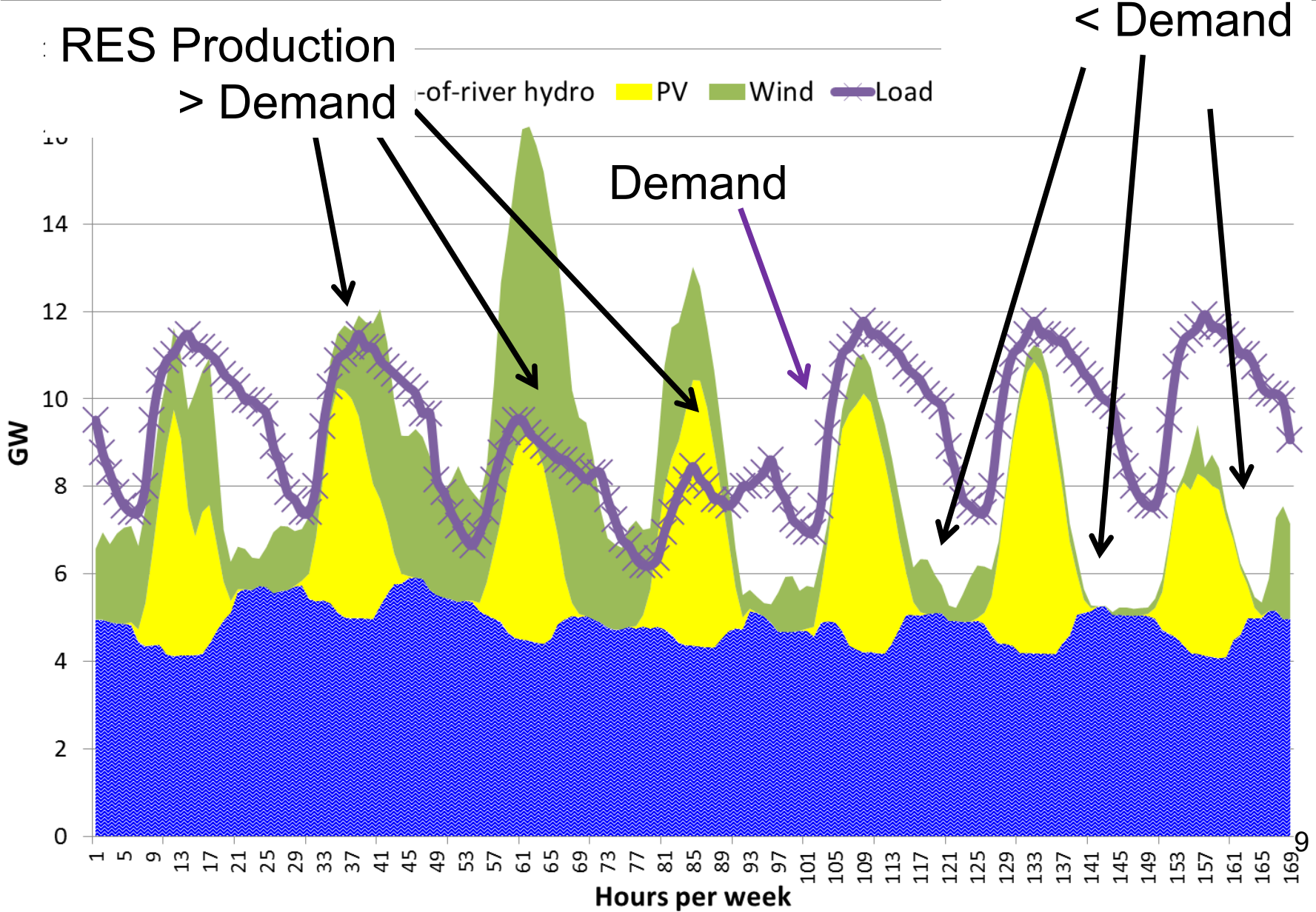
## Structure of the Package



# **2 HOW VARIABLE RENEWABLES IMPACT THE ELECTRICITY SYSTEM AND PRICES IN ELECTRICITY MARKETS**

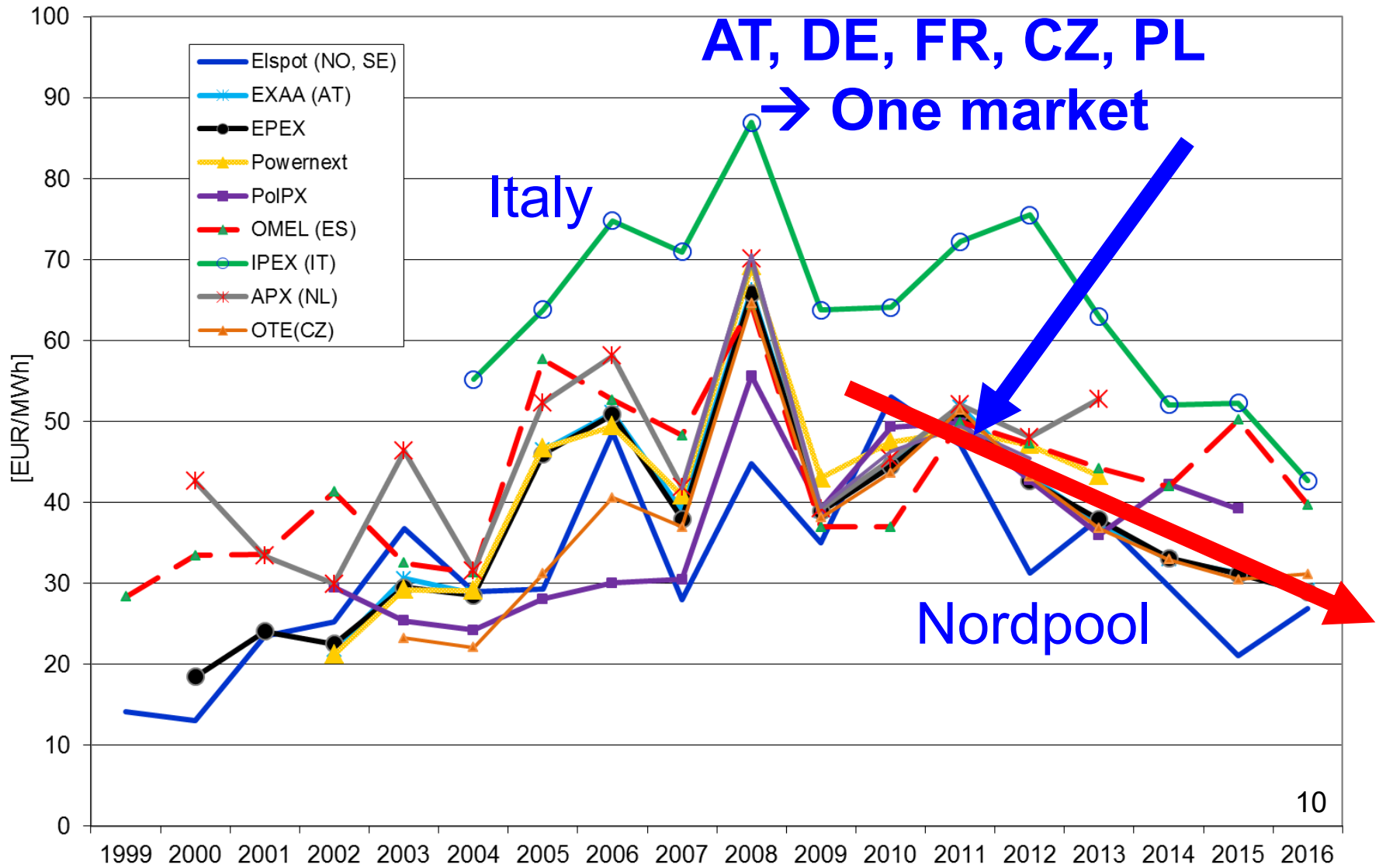
# Example: prices without and with PV







# Development of electricity prices in Europe up to 2016 (1)

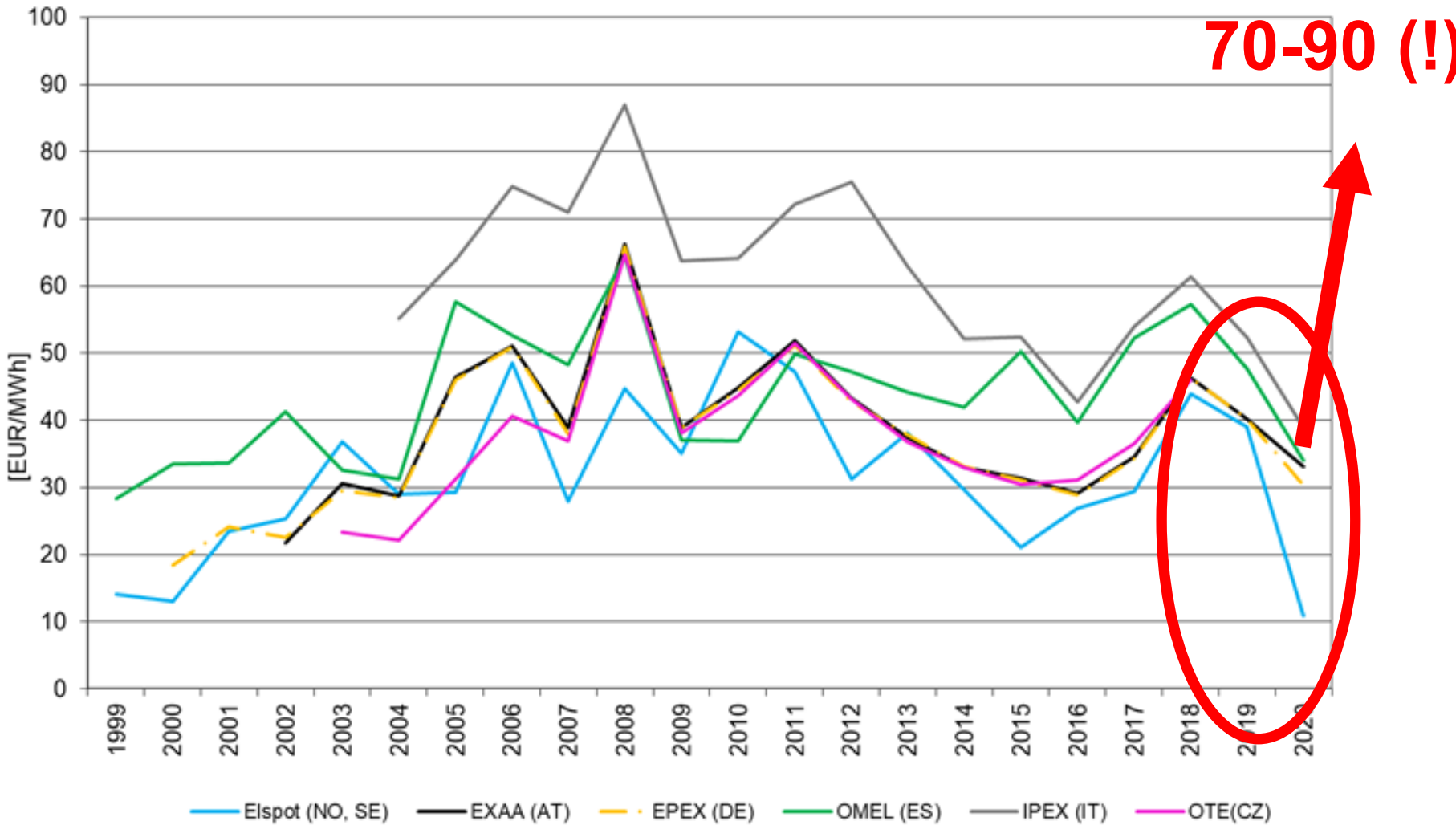


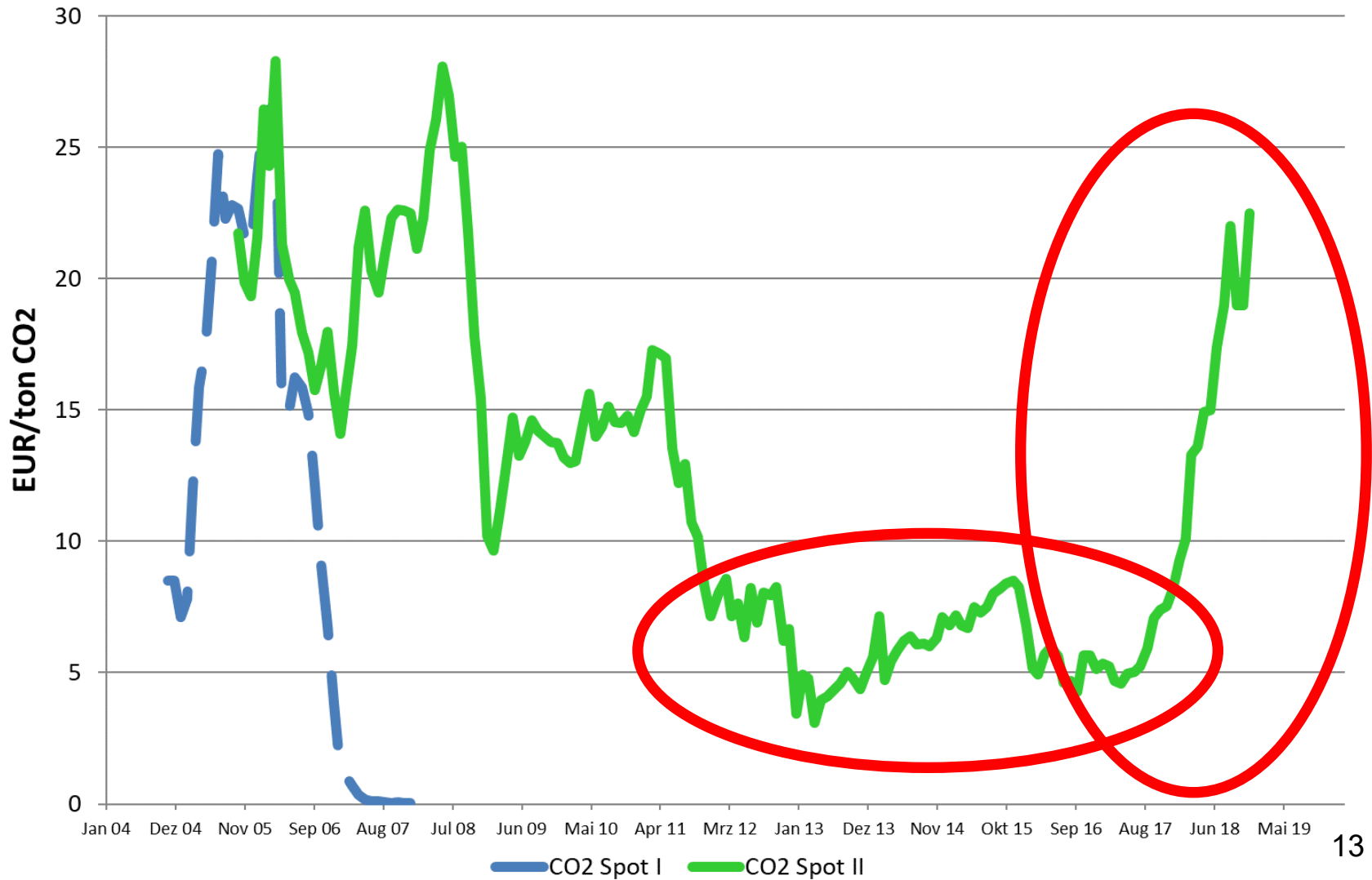
**WHY?**

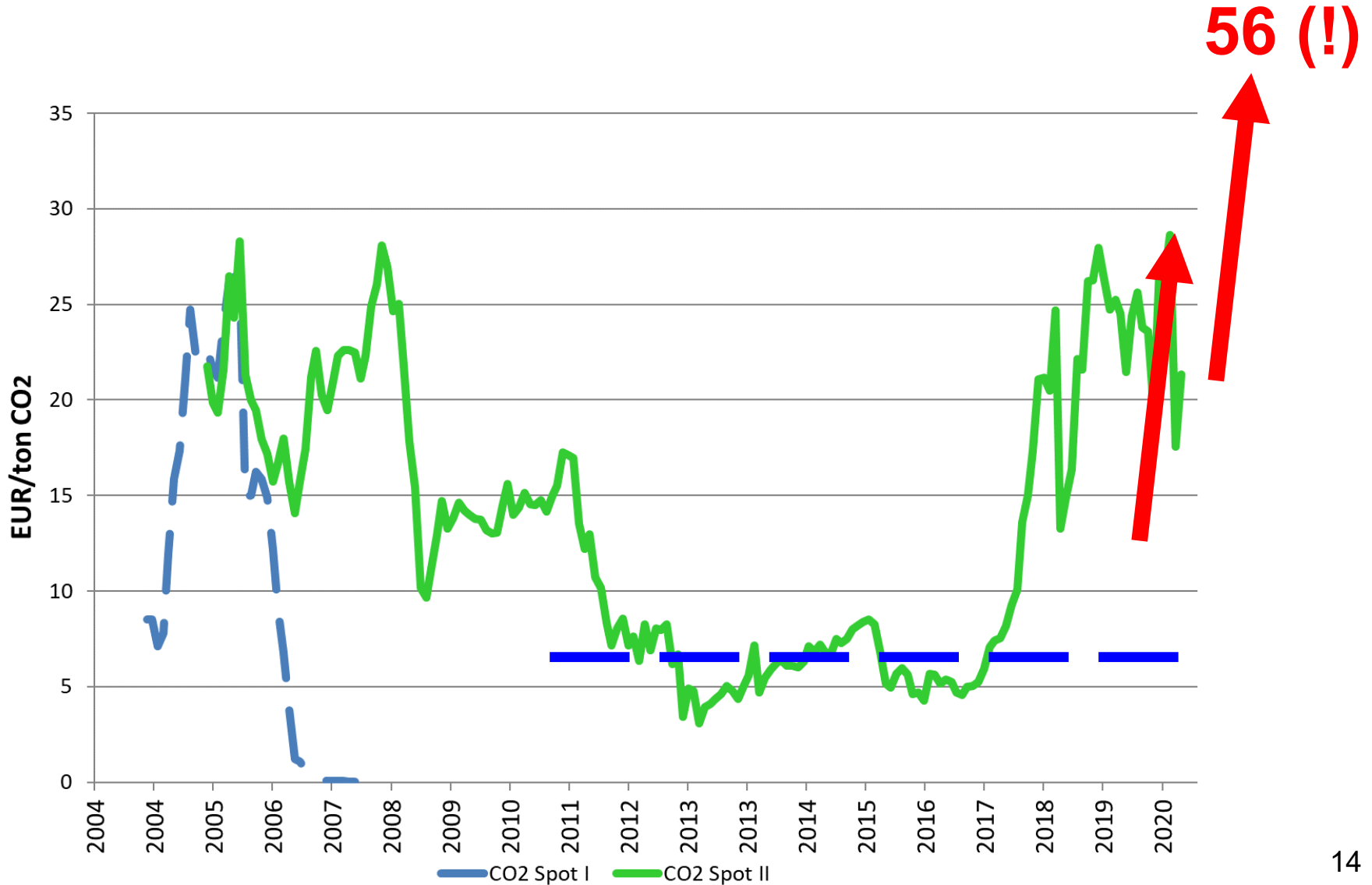
**STMC = 0!**

**Price of CO<sub>2</sub> was low**

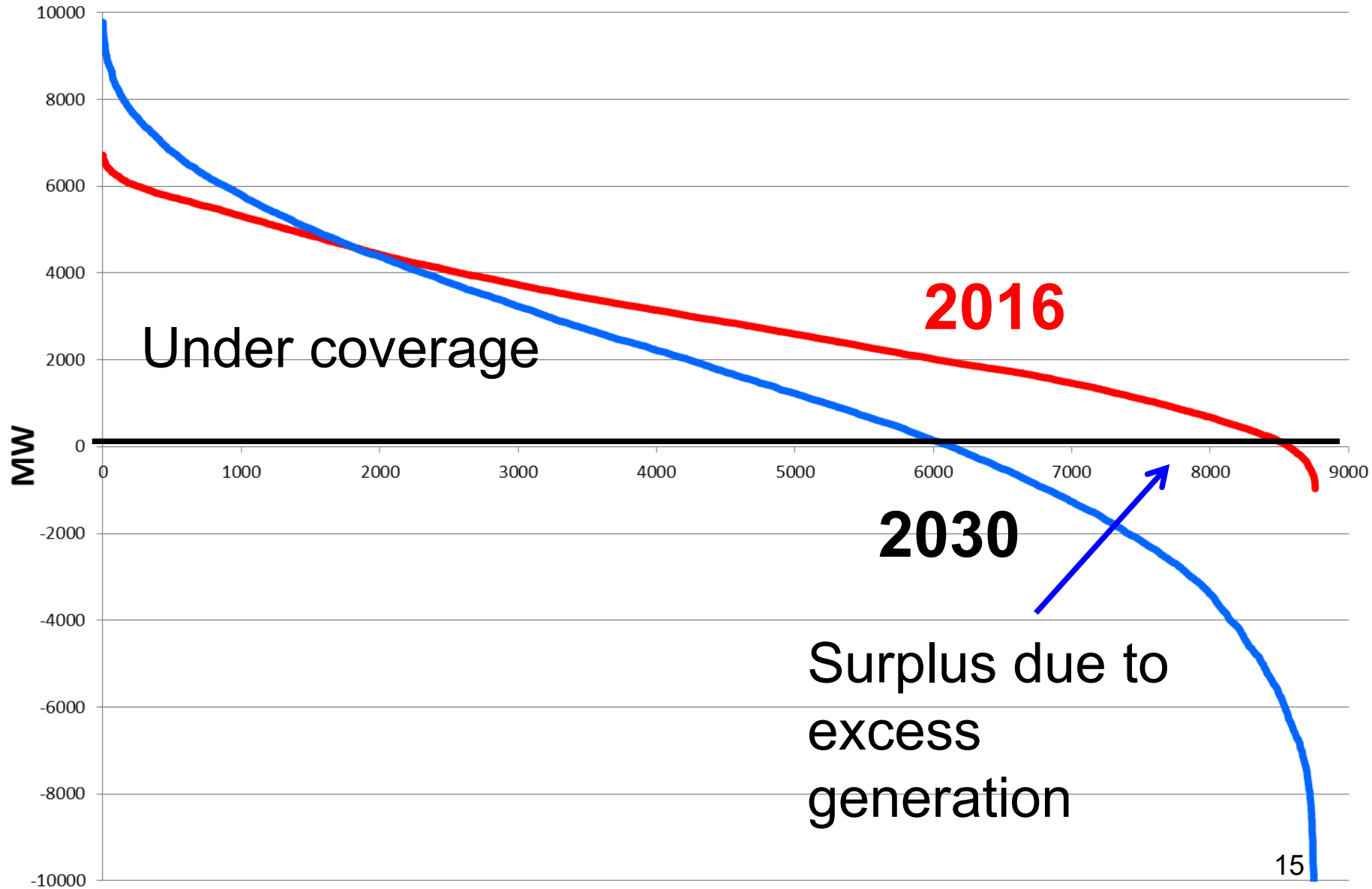
# Development of electricity prices in Europe up to 2020 (3)







# Classified residual load over a year



# Classified residual load



**By a regulated capacity payment with STMC pricing?**

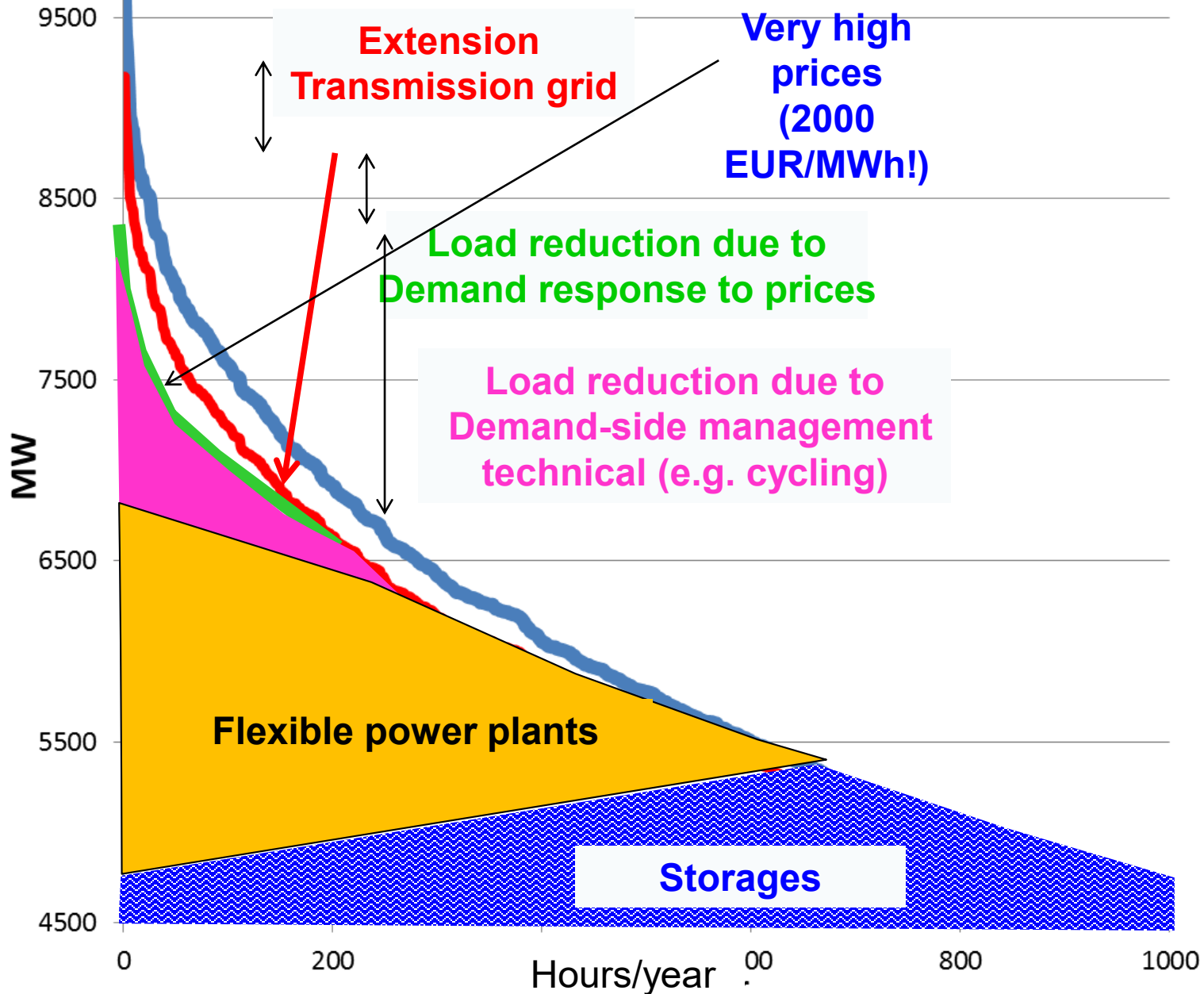
or

**By competition between supply-side and demand-side technologies and behaviour (incl. Storages, grid and other flexibility options) with correct scarcity pricing signals?**

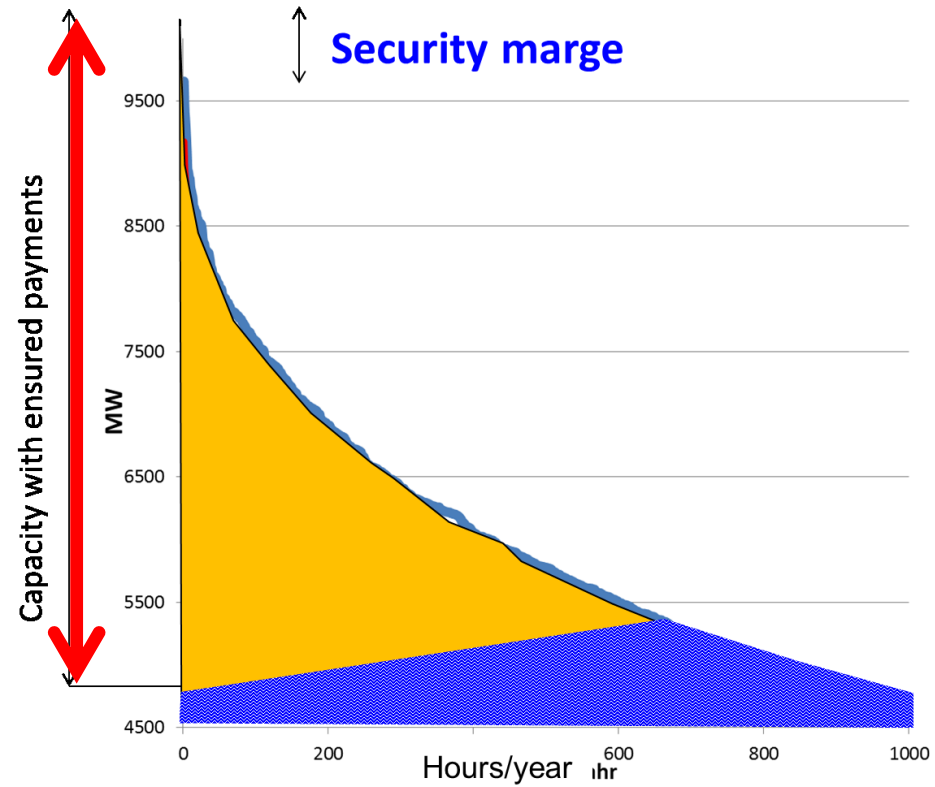
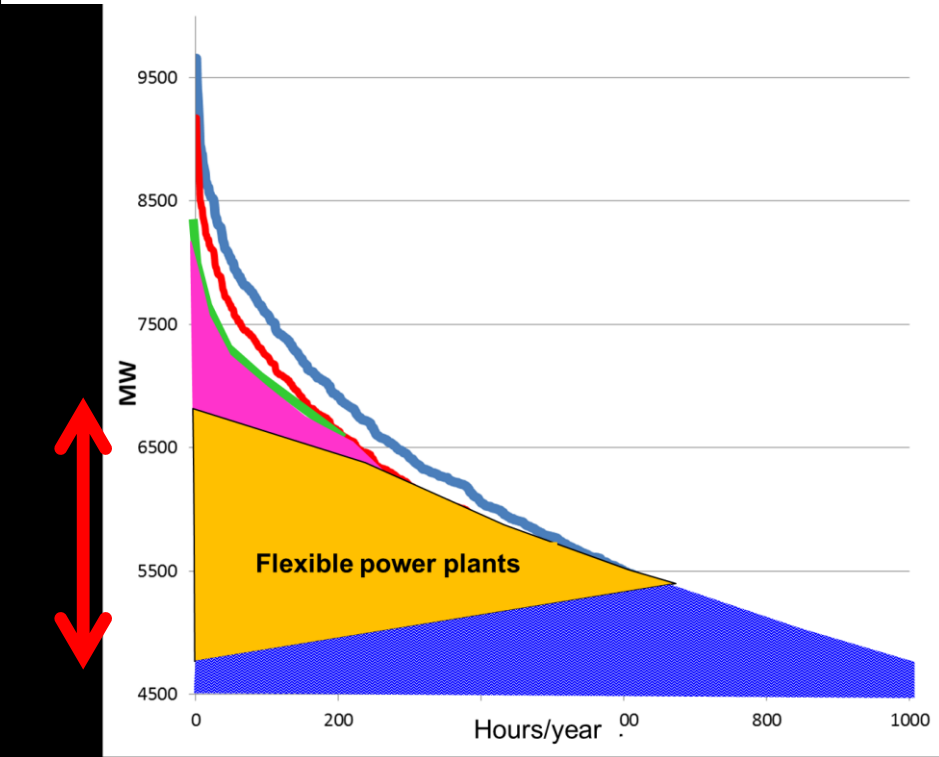


**All regulatory capacity payments for power plants distort the EOM and lead to wrong price signals for all other options**

# 3 Flexible coverage of residual load

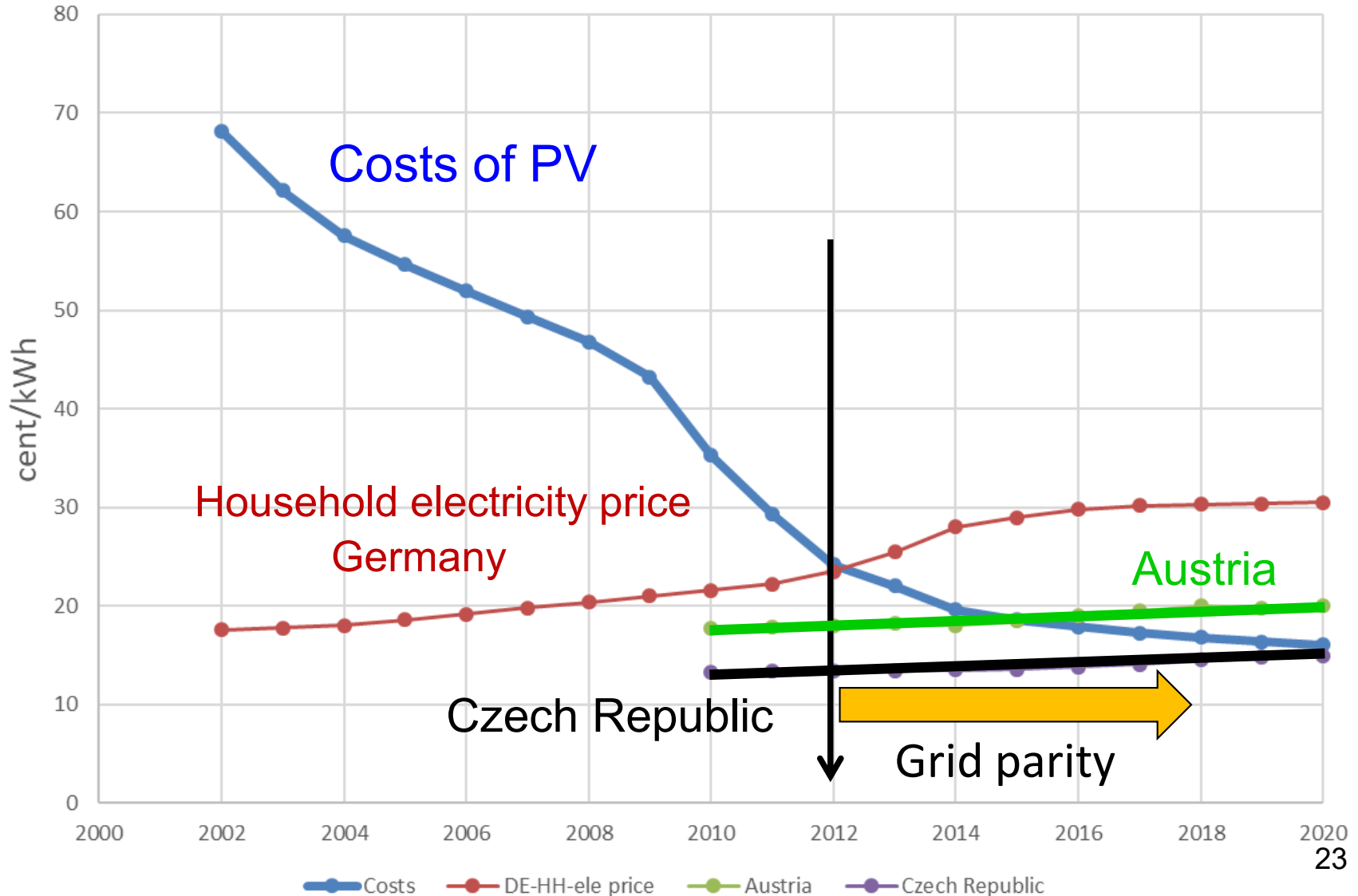


# Comparison

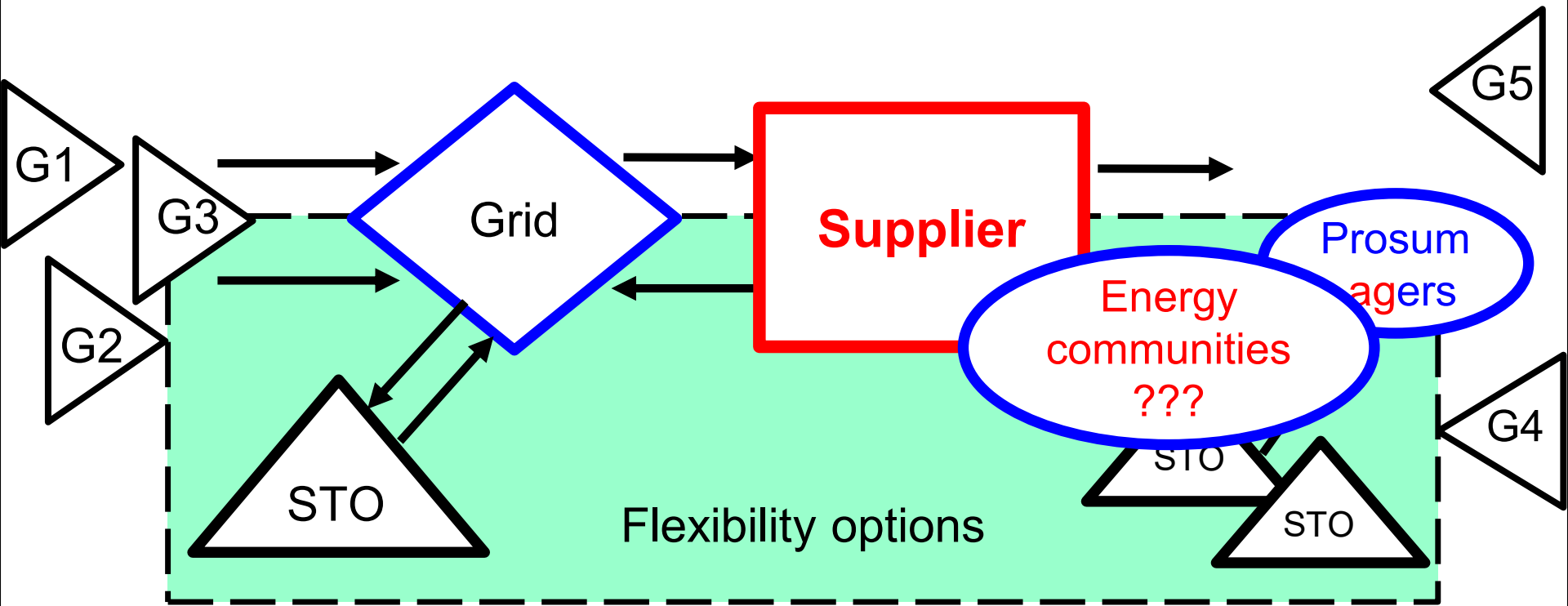


## **4. TOWARDS PROSUMAGERS AND ENERGY COMMUNITIES**

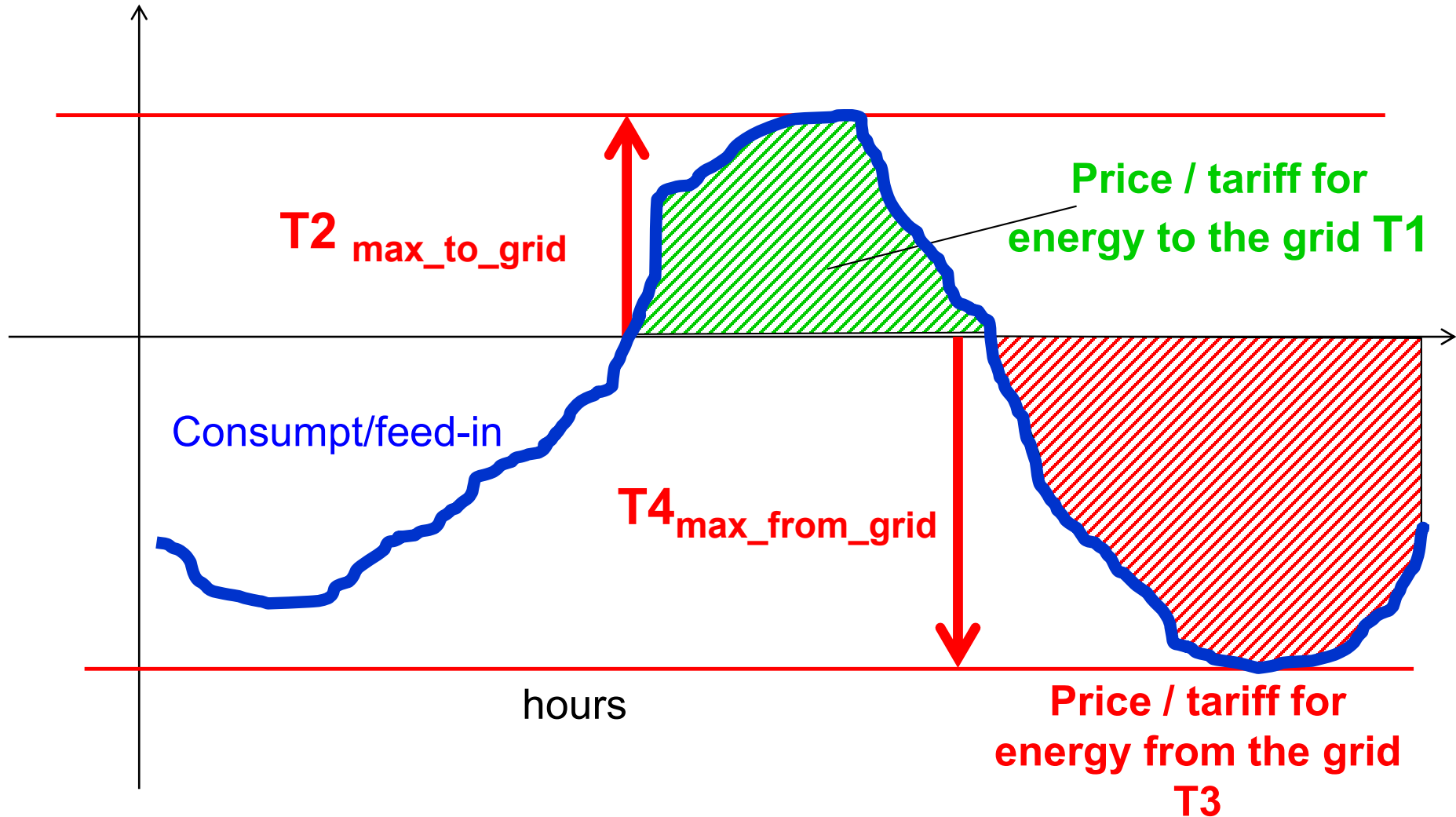
# Grid parity: PV-costs and household electricity prices



# New Thinking: Making the electricity system more democratic



# Bidirectional tariffs for power and energy



## 5. CONCLUSIONS

- Sustainable electric. system → integration of a broad technology portfolio & demand-side options
- No quick fix, no one size fits all solutions
- Larger market areas favourable
- Very important: correct price signals (incl. CO<sub>2</sub>)
- most urgent: exhaust full creativity for flexibility of all market participants (Erdmann)
- introduce new pricing/tariff schemes
- storage and hydrogen less favourable ...