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Publikationsdatenbank14th SDEWES Conference

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14th
CONFERENCE ON SUSTAINABLE
DEVELOPMENT OF ENERGY, WATER AND
ENVIRONMENT SYSTEMS




SDEWES CENTRE


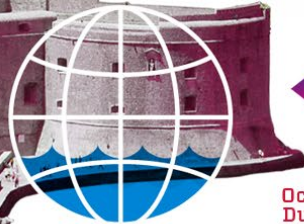

SDEWES CONFERENCES

PUBLISHING

SDEWES ISC



HOME



October 1 - 6, 2019
Dubrovnik, Croatia

ORGANIZERS
& COMMITTEES

PRACTICAL INFO

SPONSORSHIP

SMART³

SCOPE


MEDIA

SCHEDULE


PROGRAMME

INVITED LECTURES

14th SDEWES conference was held **1 – 6 October, 2019** in the pearl of Adriatic, the city of **Dubrovnik, Croatia** and it has brought together around **570** scientists, researchers, and experts in the field of sustainable development from **55** countries. We have listened to **511** presentations, seen **100** poster presentations, attended a record **17** special sessions and one special and one clustering event, and also had the pleasure of listening to **4** invited lectures and **2** panels with some of the most distinguished experts in the field. Those record numbers make us proud and grateful for our amazing participants, invited lecturers, panelists and sponsors. Thank you!



Reinhard



16:18

09.01.2020



HEADING TOWARDS SUSTAINABLE AND DEMOCRATIC ELECTRICITY SYSTEMS

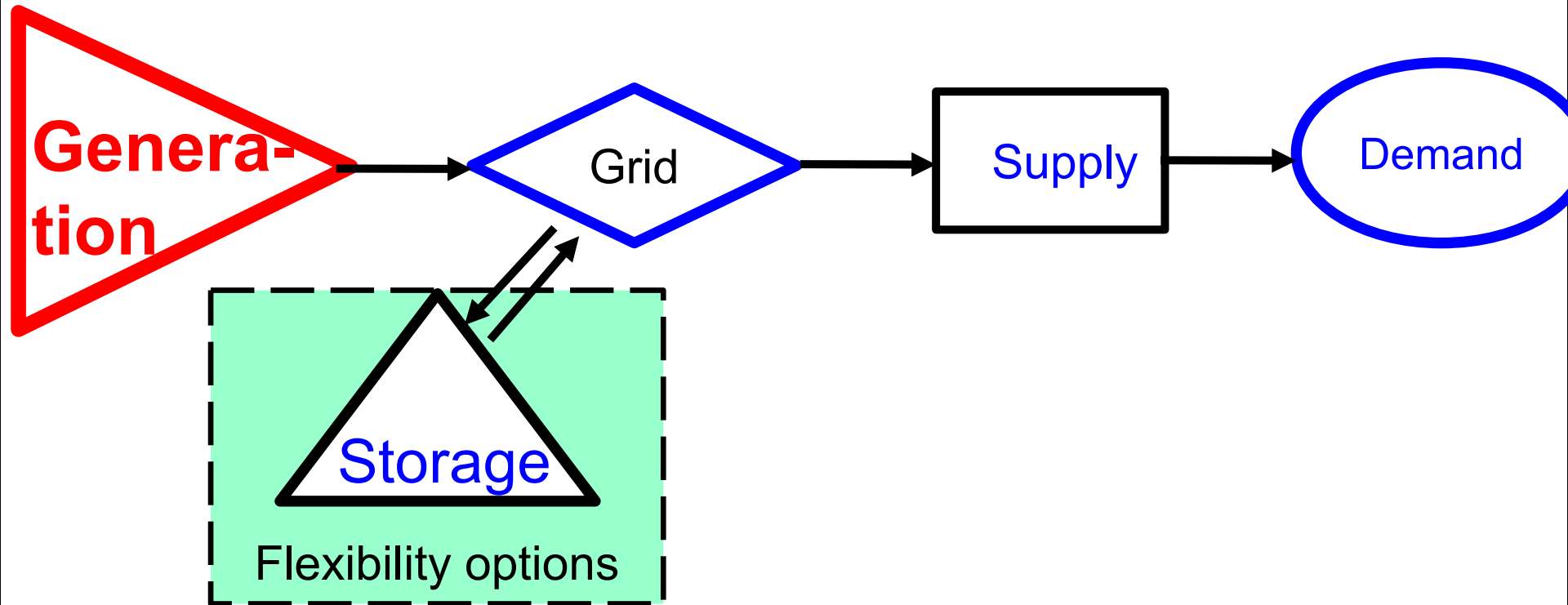
Reinhard HAAS,
Energy Economics Group,
TU Wien

SDEWES, October 2019

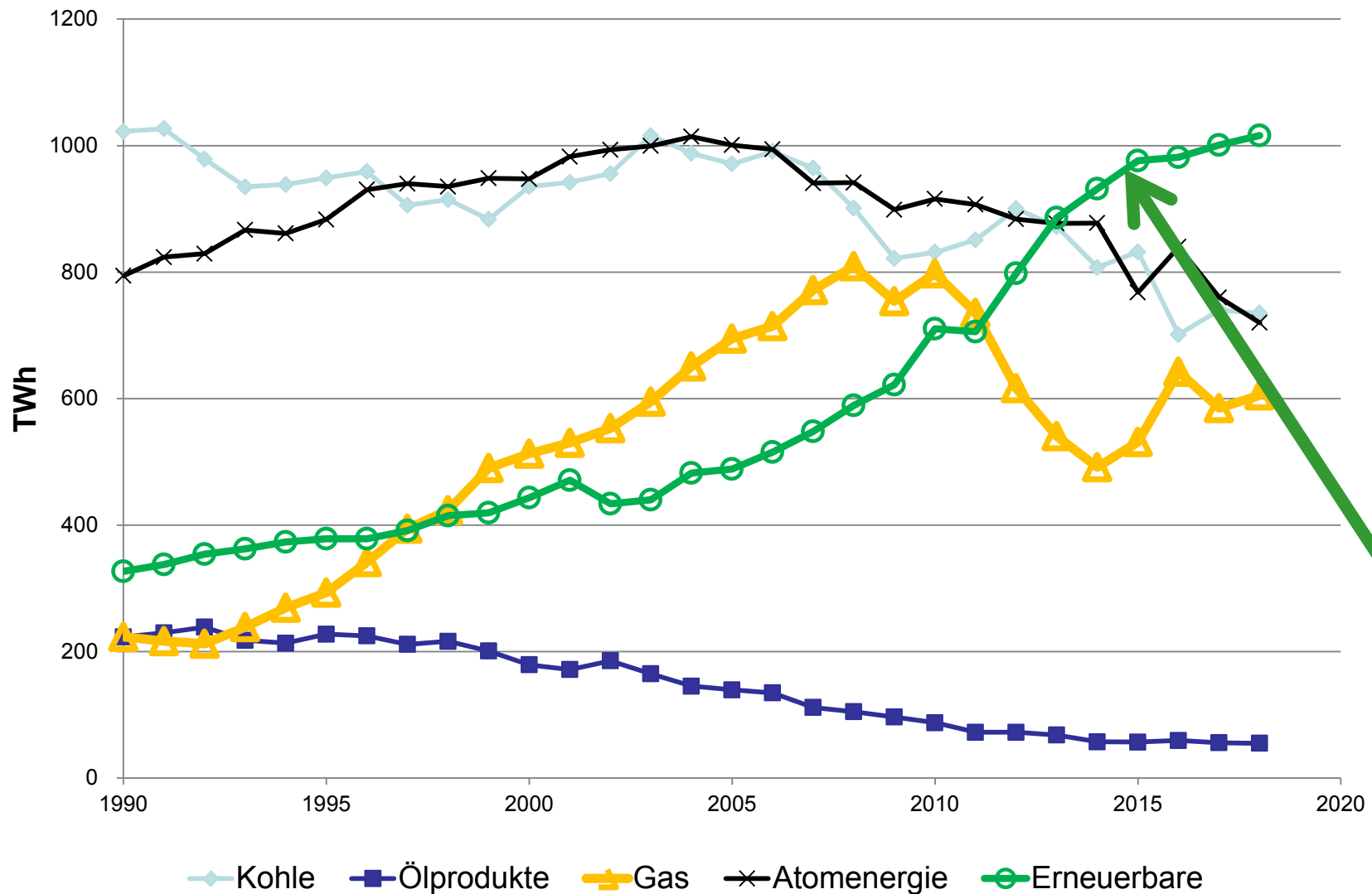
- 1. Introduction: Motivation**
- 2. Method of approach**
- 3. How variable renewables impact prices in electricity markets**
- 4. The core problem of capacity payments**
- 5. The role of flexibility**
- 6. Towards prosumagers**
- 7. Conclusions**

Motivation:

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

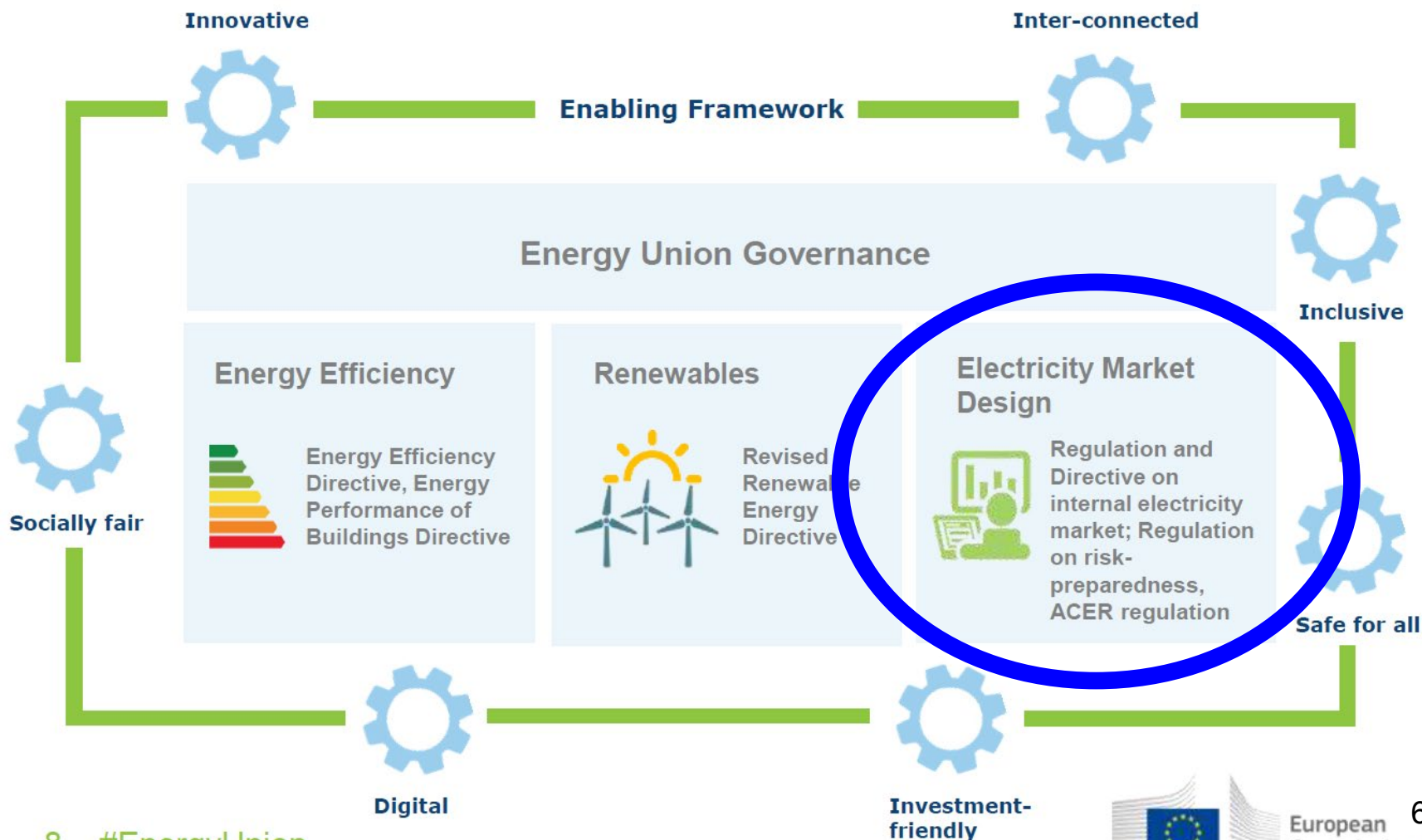


Electricity generation EU-28



2017 und 2018 preliminary

Structure of the Package



... to identify the major boundary conditions to integrate even larger amounts of variable renewables into the electricity system

Very important:

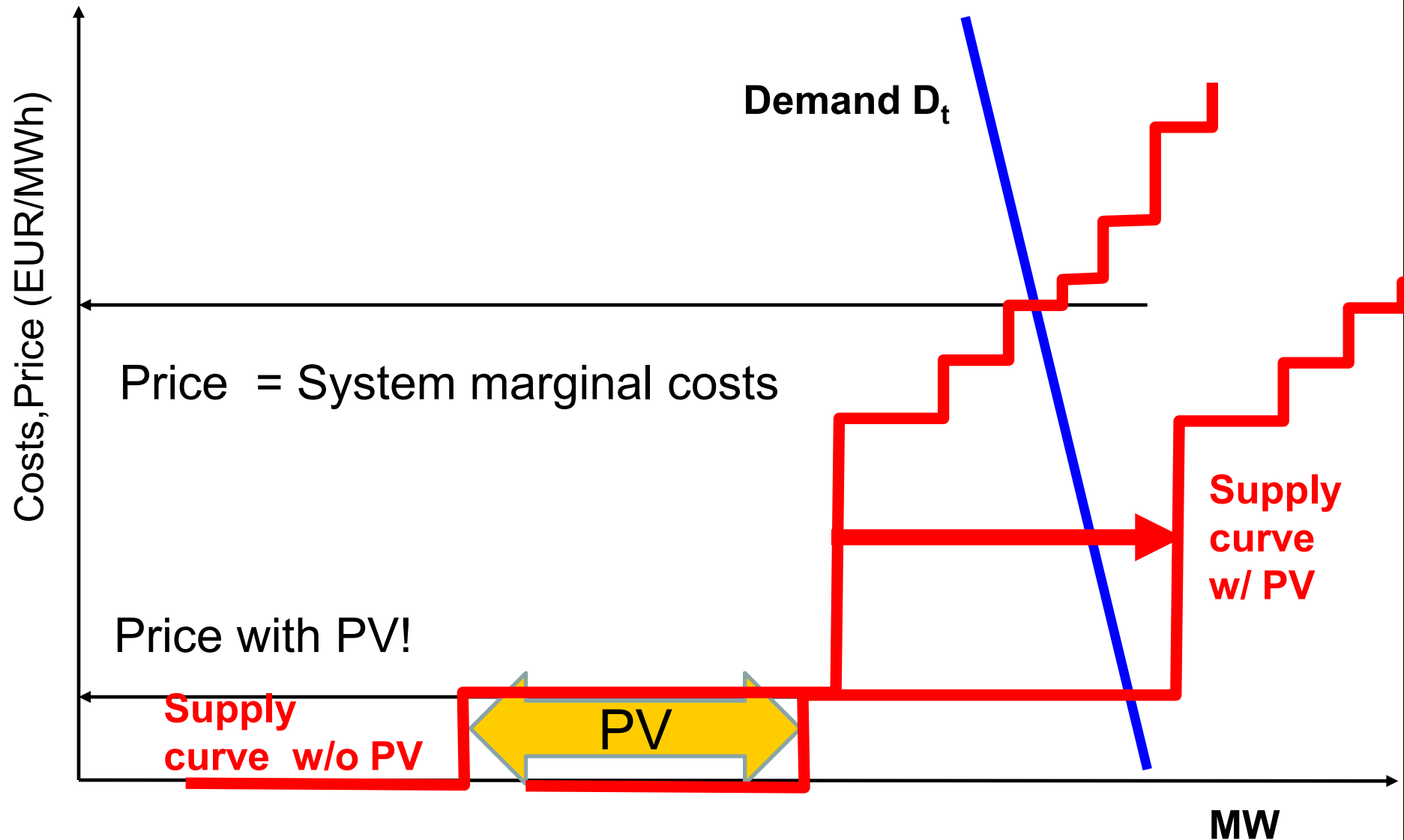
Our reflections apply in principle to every electricity system world-wide

.... are based on **electricity economic** point-of-view

- hourly resolution of residual load over a year in scenarios with large quantities of variable renewables;
- Applying a fundamental model to calculate (static) hourly electricity spot market prices;
- Integration of flexibility/elasticity in a dynamic framework for price calculation;

3 HOW VARIABLE RENEWABLES IMPACT THE ELECTRICITY SYSTEM AND PRICES IN ELECTRICITY MARKETS

Example: prices without and with PV



RES Production

> Demand

on-river hydro

PV

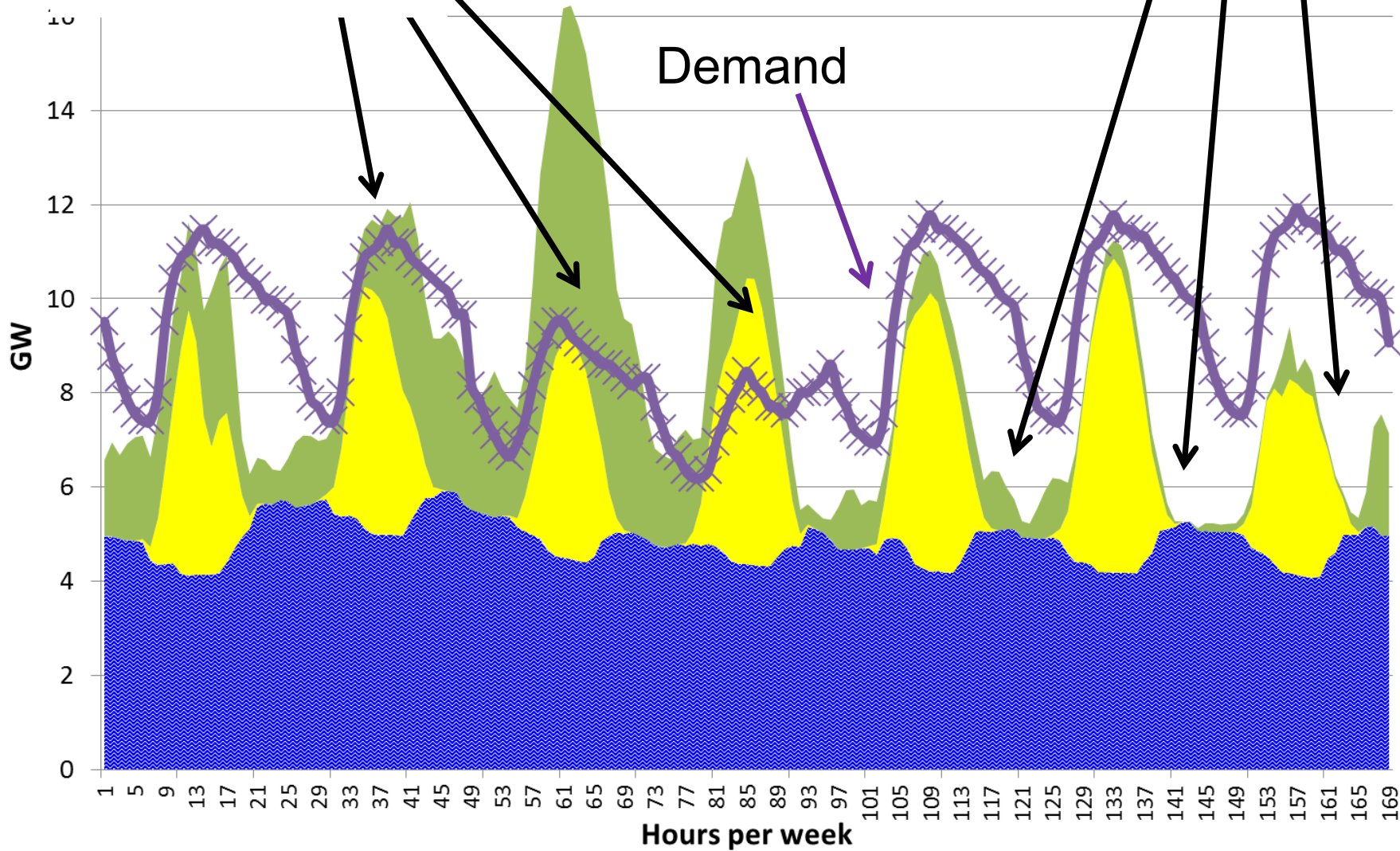
Wind

Load

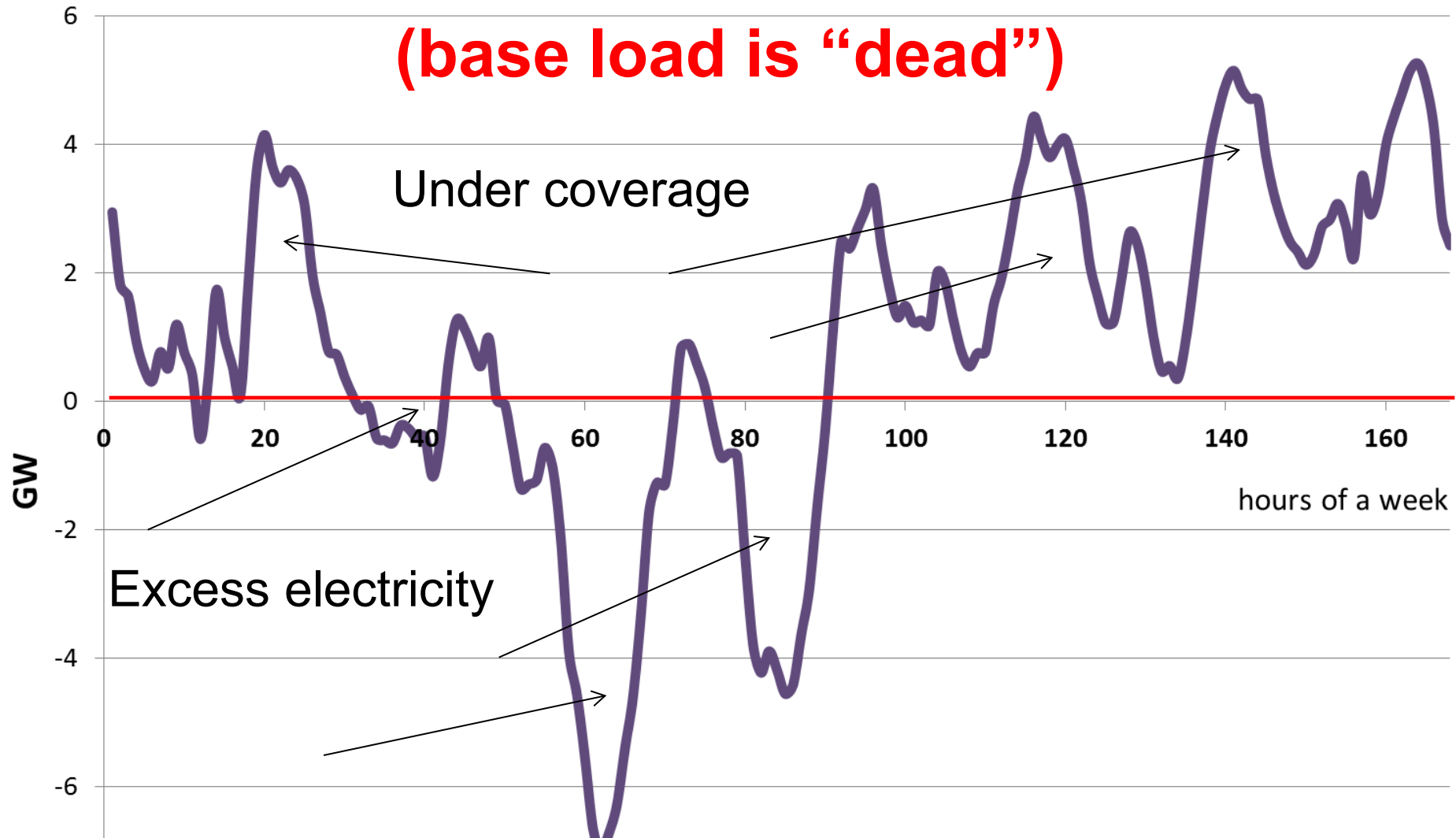
Demand

RES Production

< Demand



Key term of the future: Residual load (base load is “dead”)

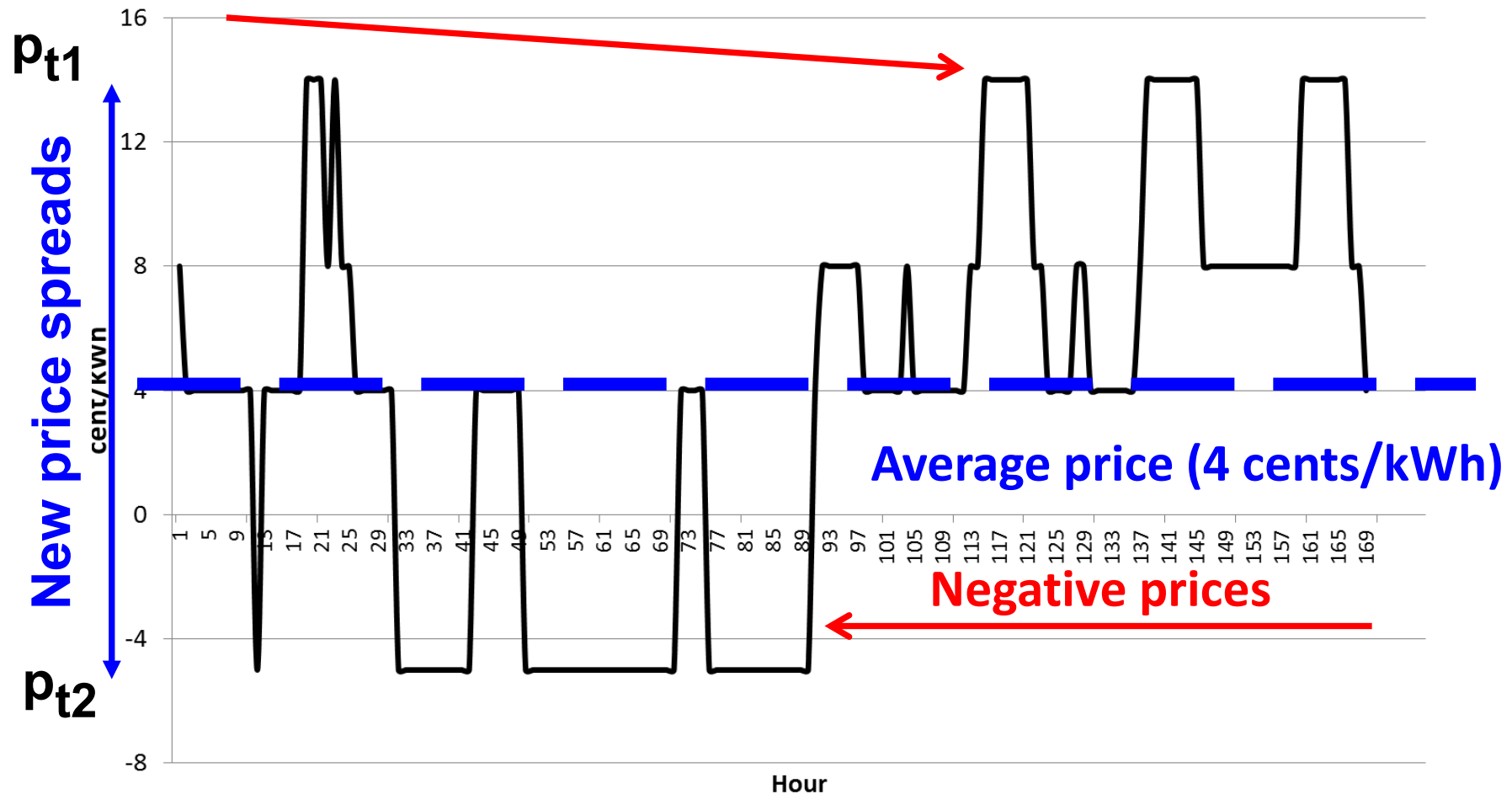


Residual load = Load – non-flexible generation

Deviation from STMC-pricing in spot markets

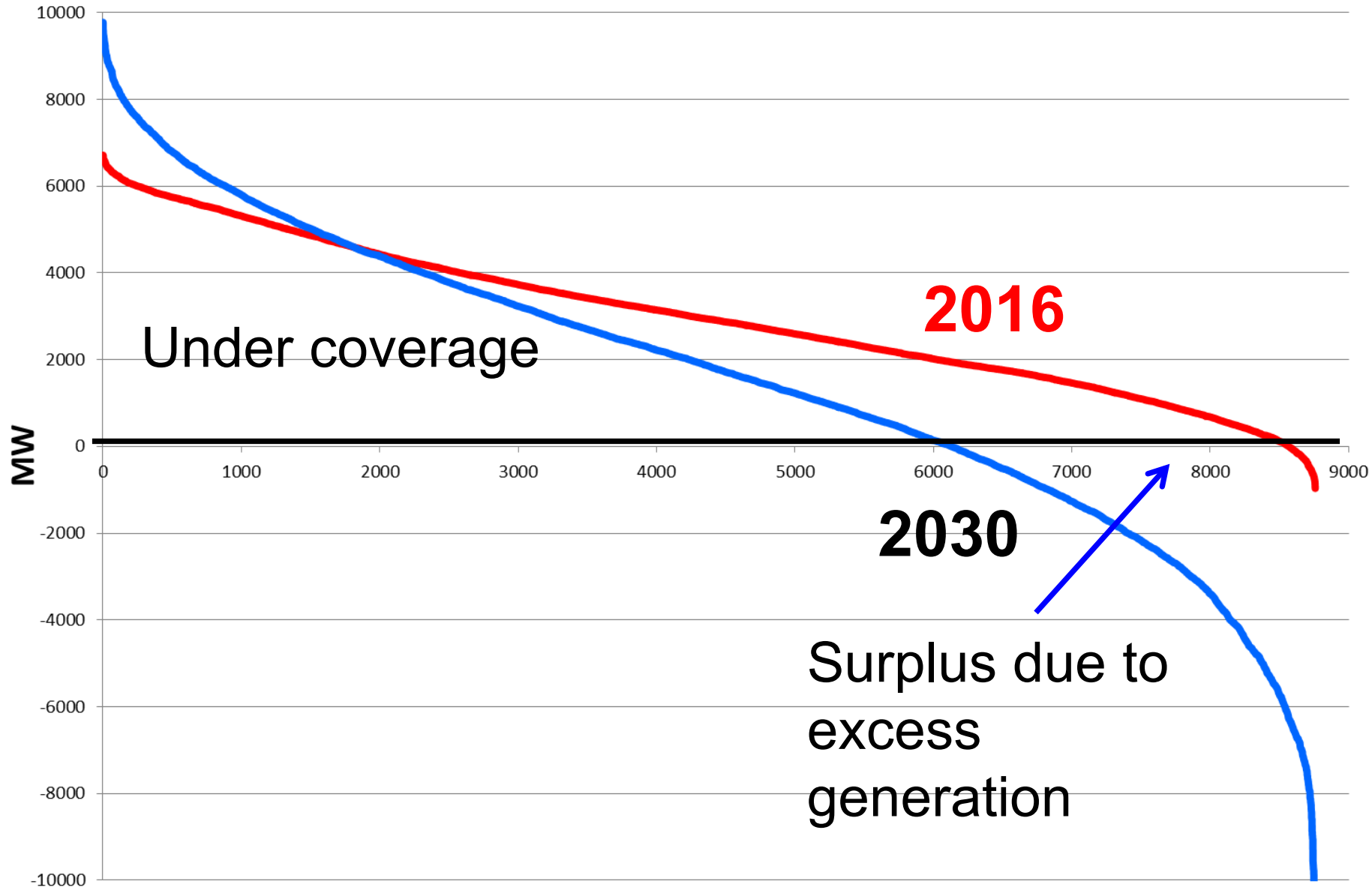
Scarcity prices

Electricity price spot market

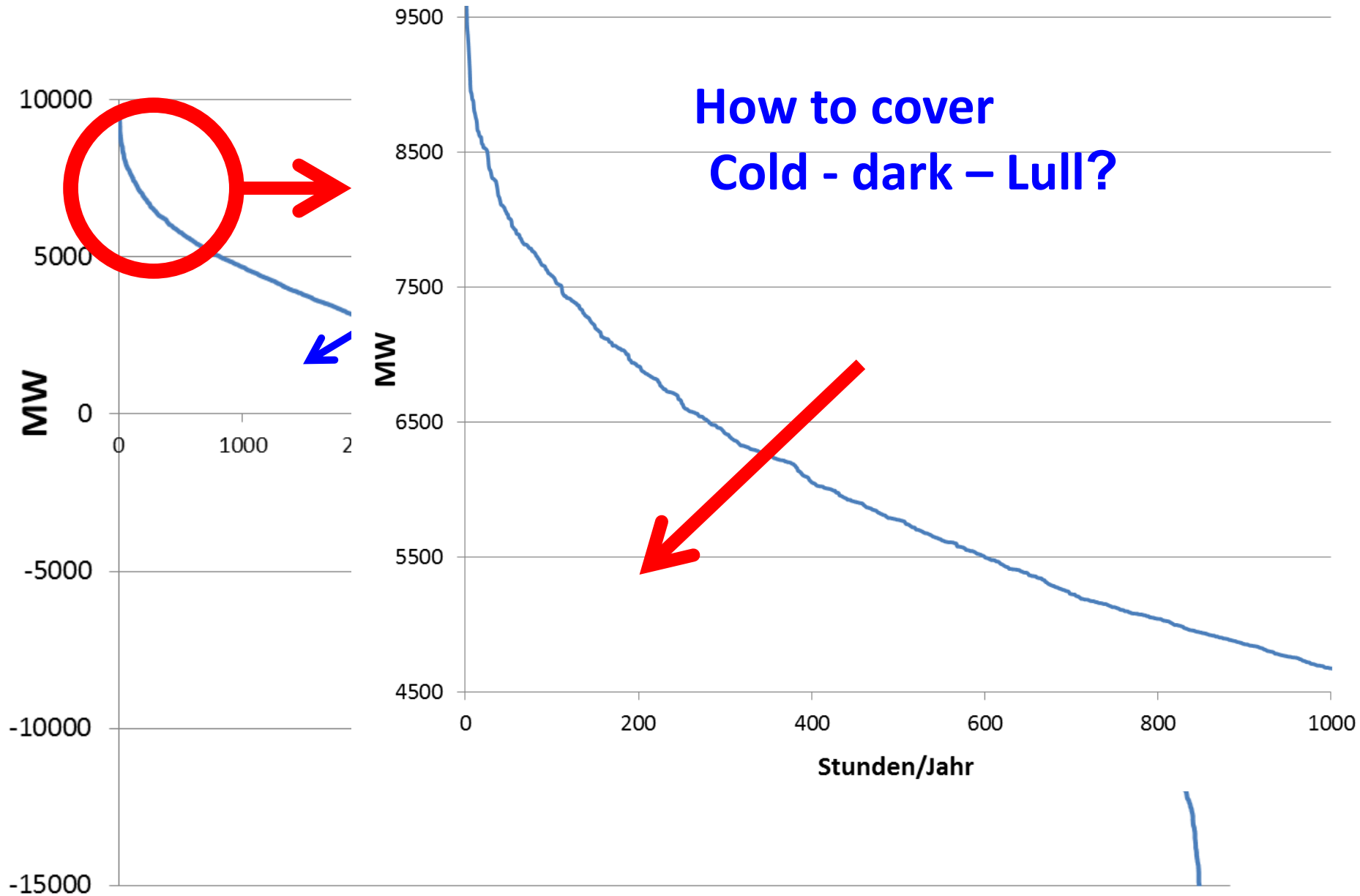


→ These price spreads provide incentives
for new flexible solutions!!!!

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?

4 THE CORE PROBLEMS OF CAPACITY PAYMENTS

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

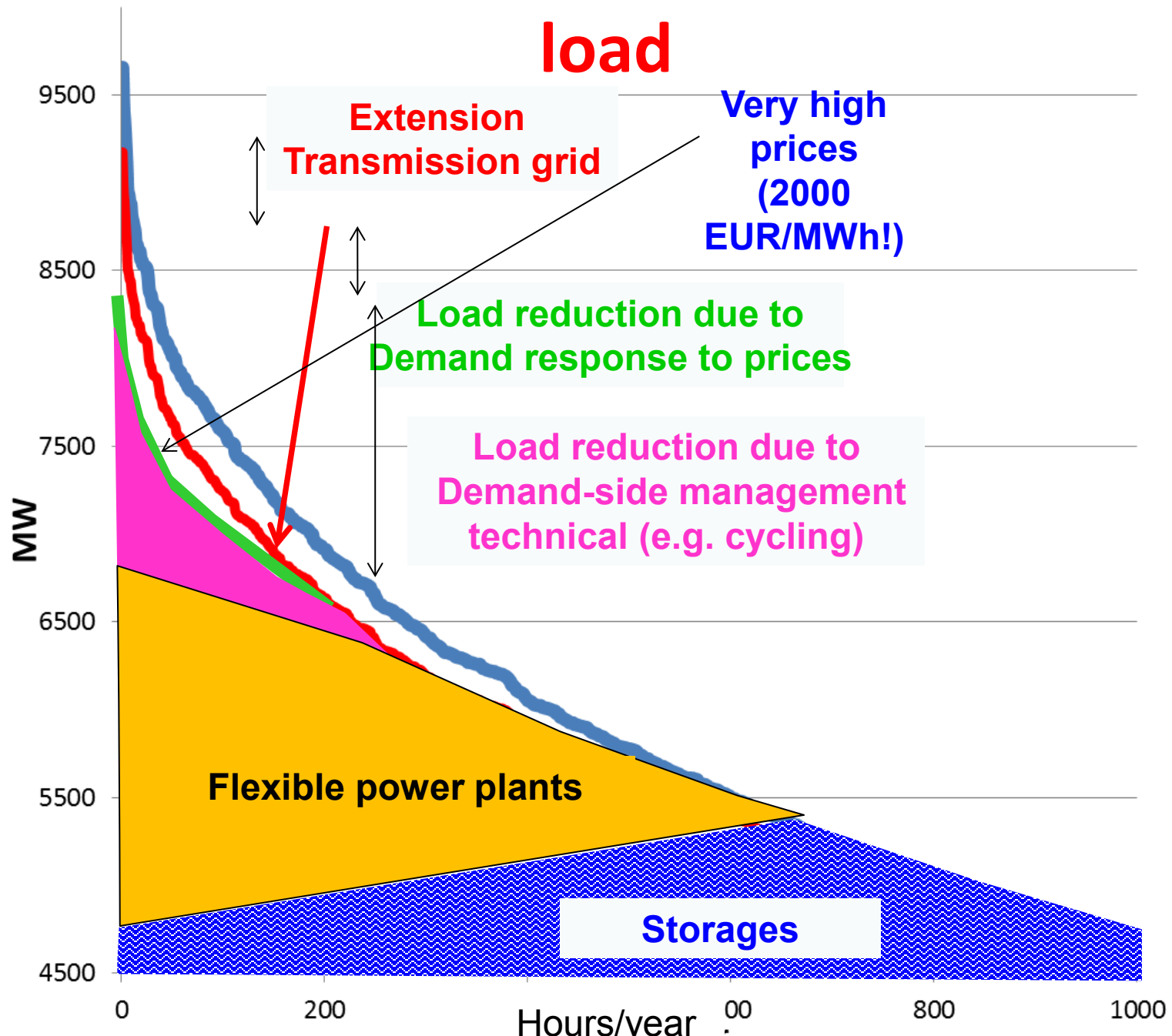
**Price peaks at times of scarce resource should
revive the markets and lead to effective
competition**

**The higher the excess capacities, the lower is the
share of RES**

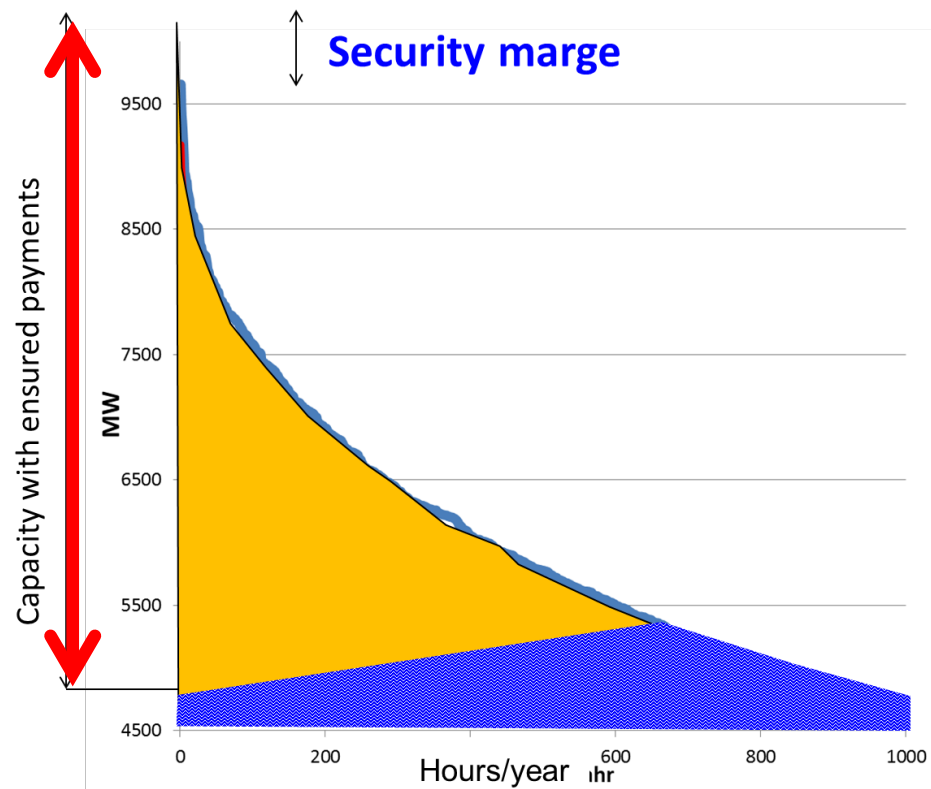
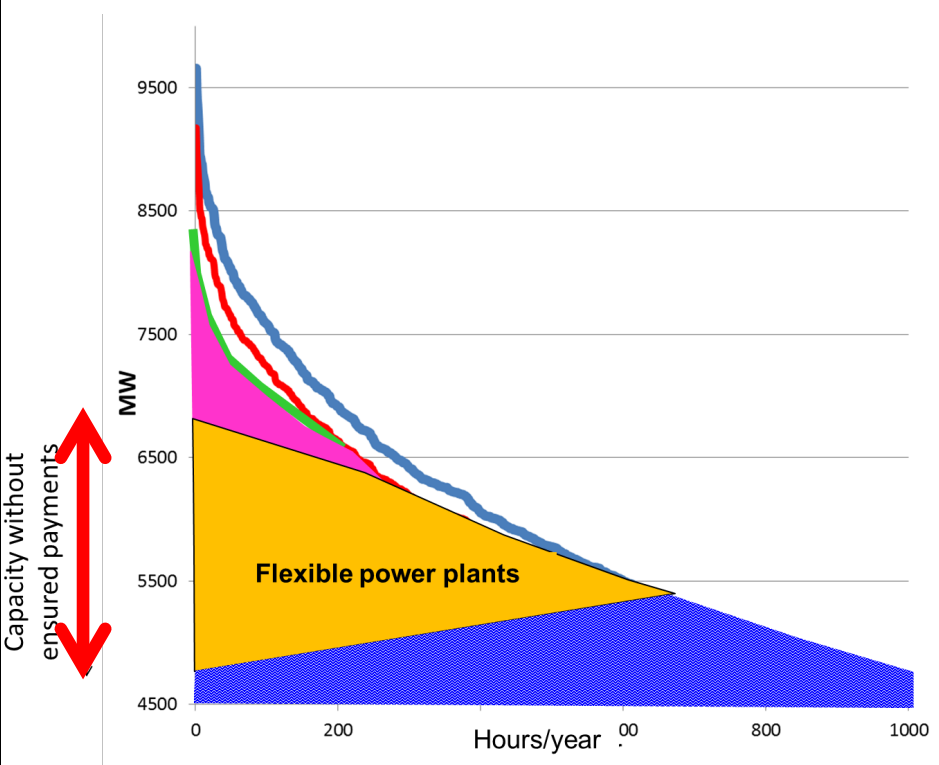
**strive to retain system resource adequacy by
correct price signals**

5 Flexible coverage of residual load

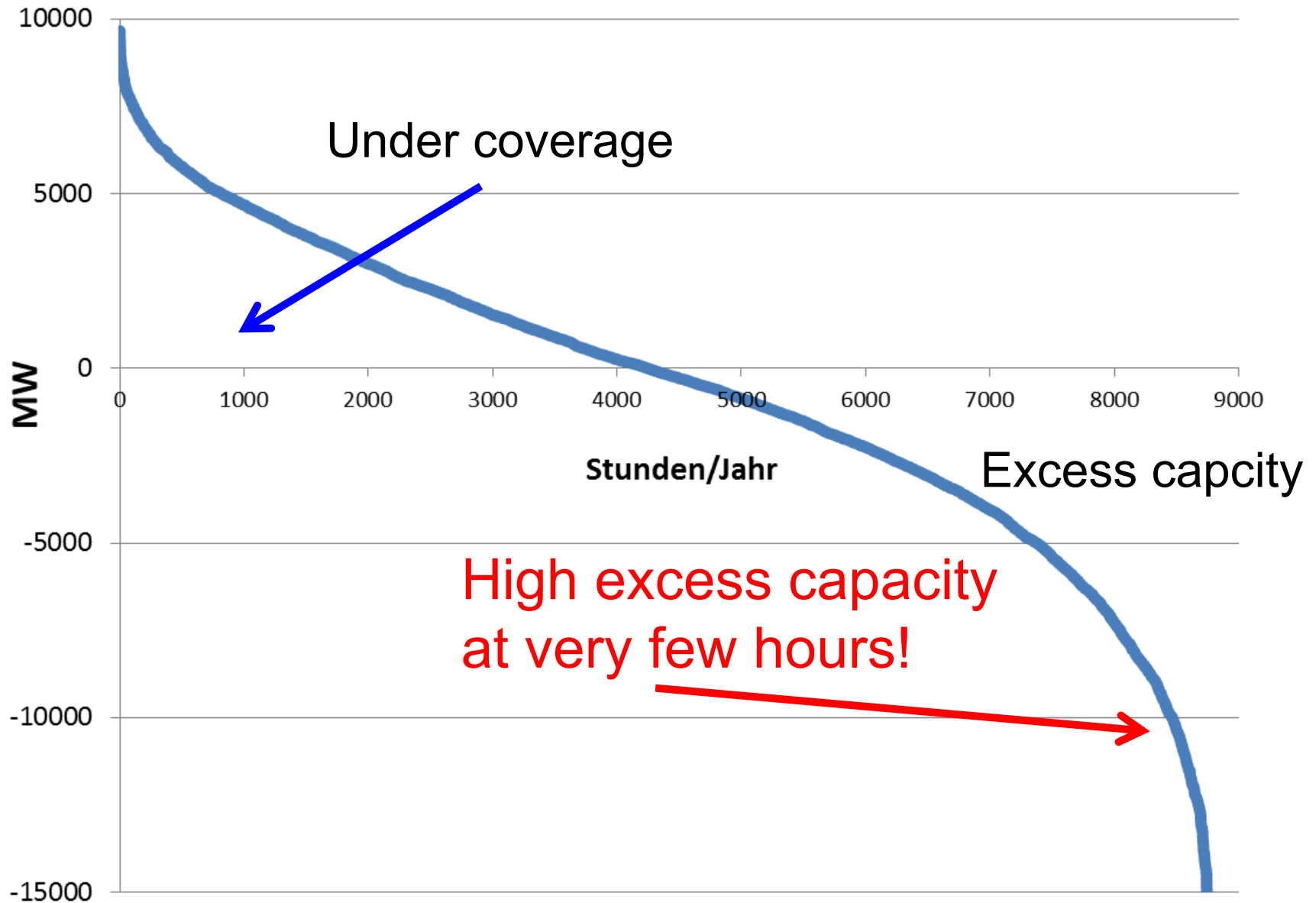
Capacity without
ensured payments



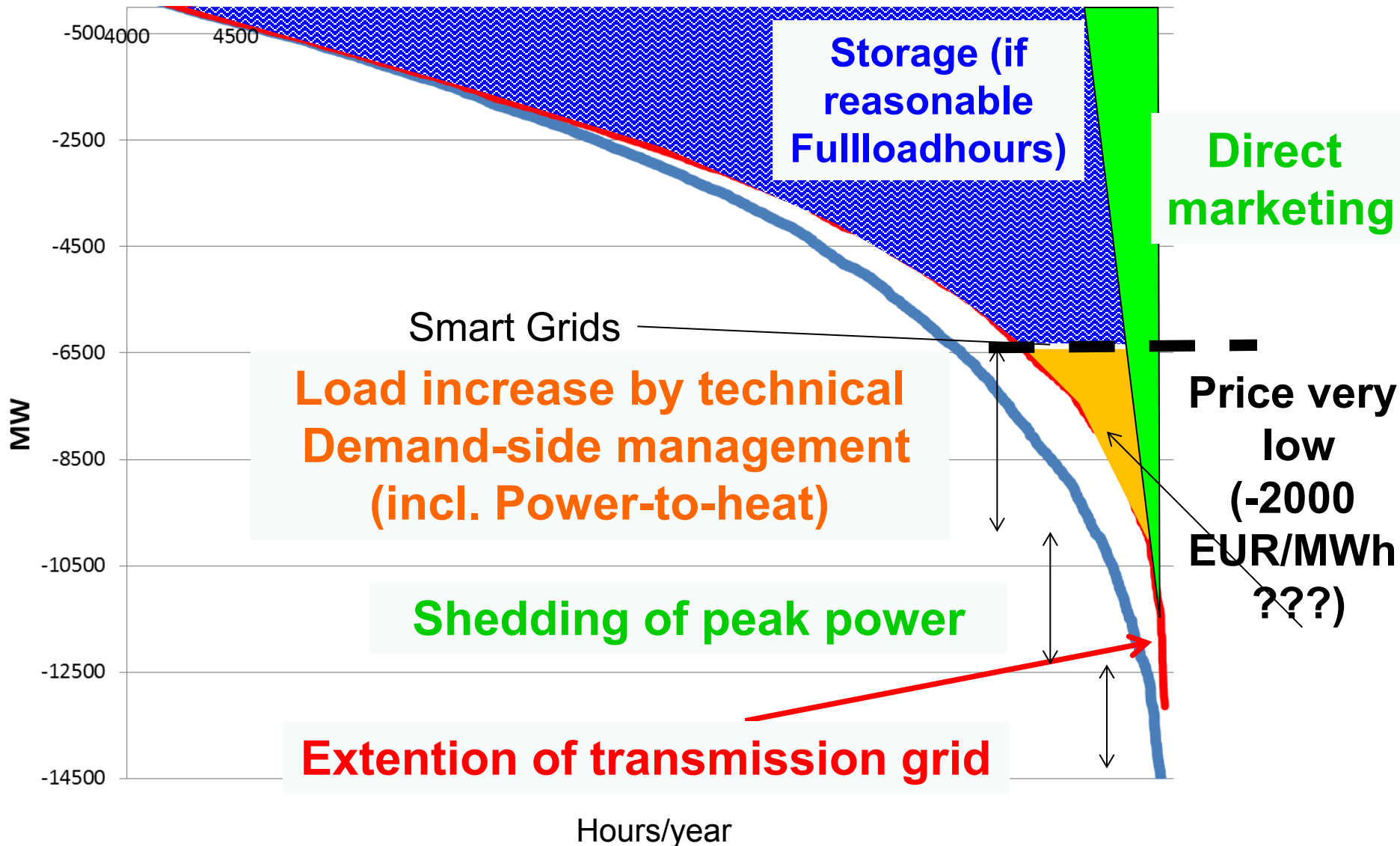
Comparison



6. STORING EVERY PEAK?

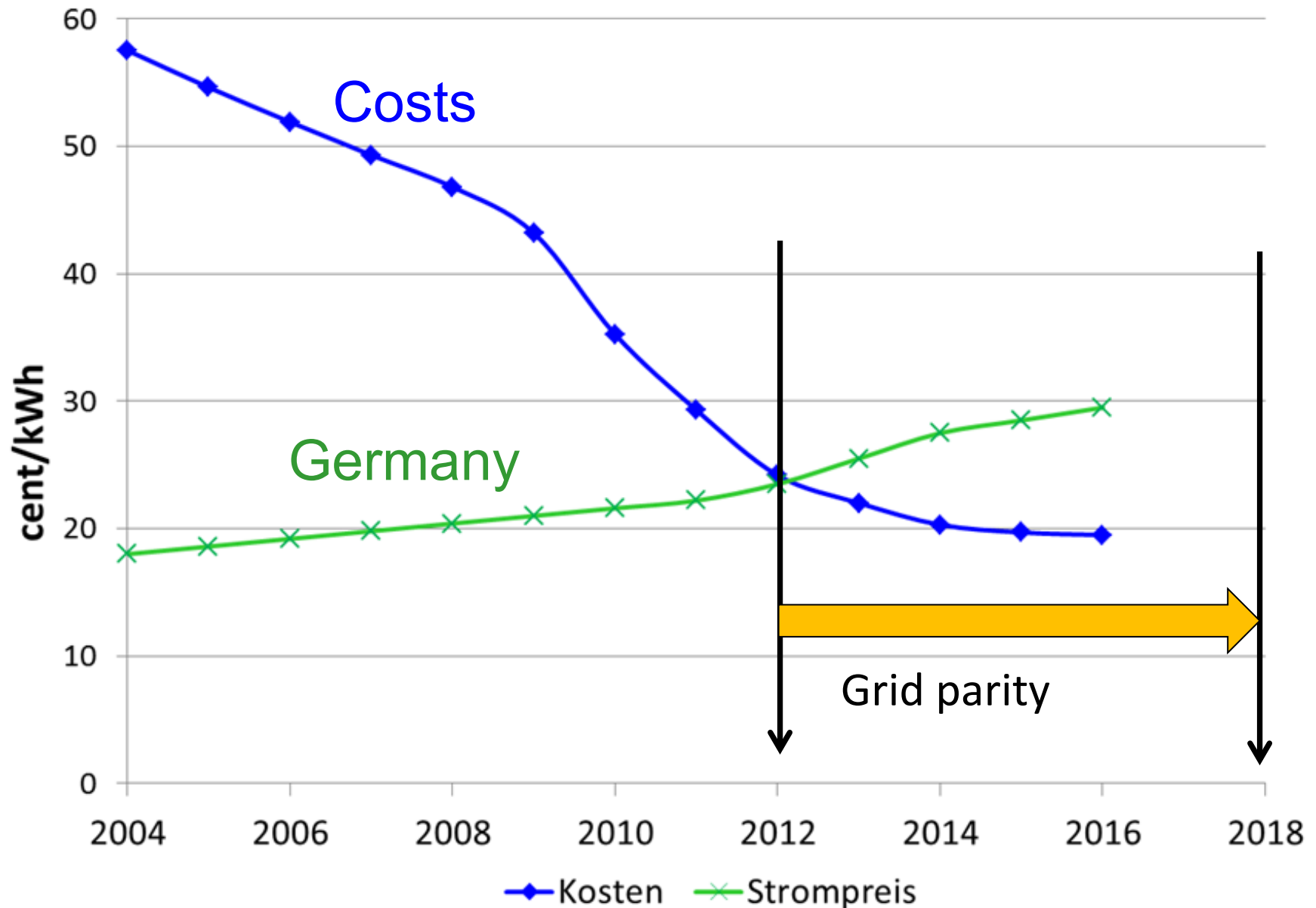


Flexible use of excess electricity



6. TOWARDS PROSUMAGERS

Grid parity: PV-costs and household electricity prices

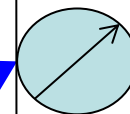


Tenant electricity model and Blockchain

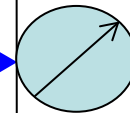
PV-System on the roof

Tenant electricity model:
Contracted PV-electricity

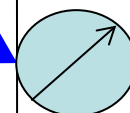
**Balancing
Group/
Supplier**



Customer 1



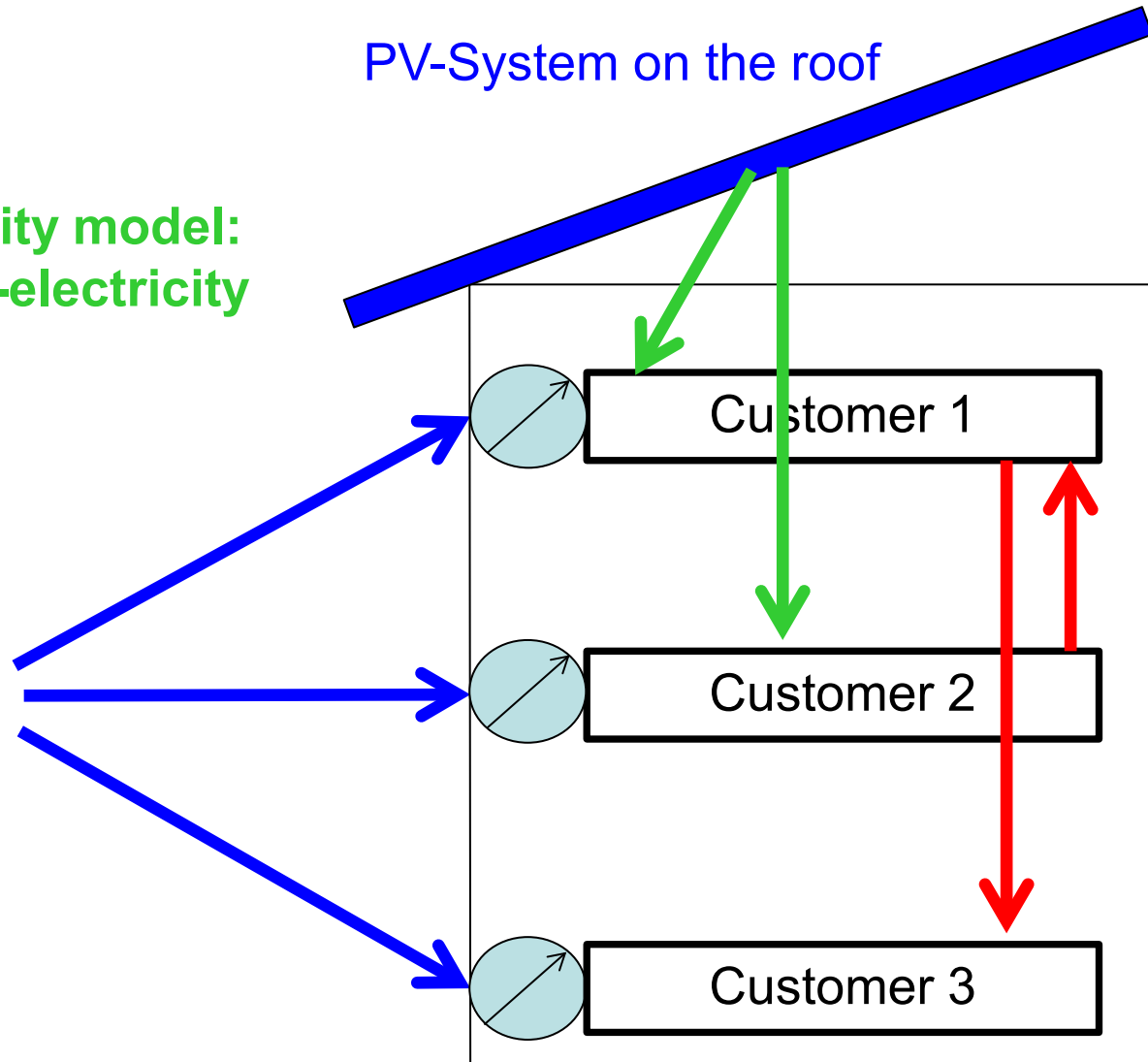
Customer 2



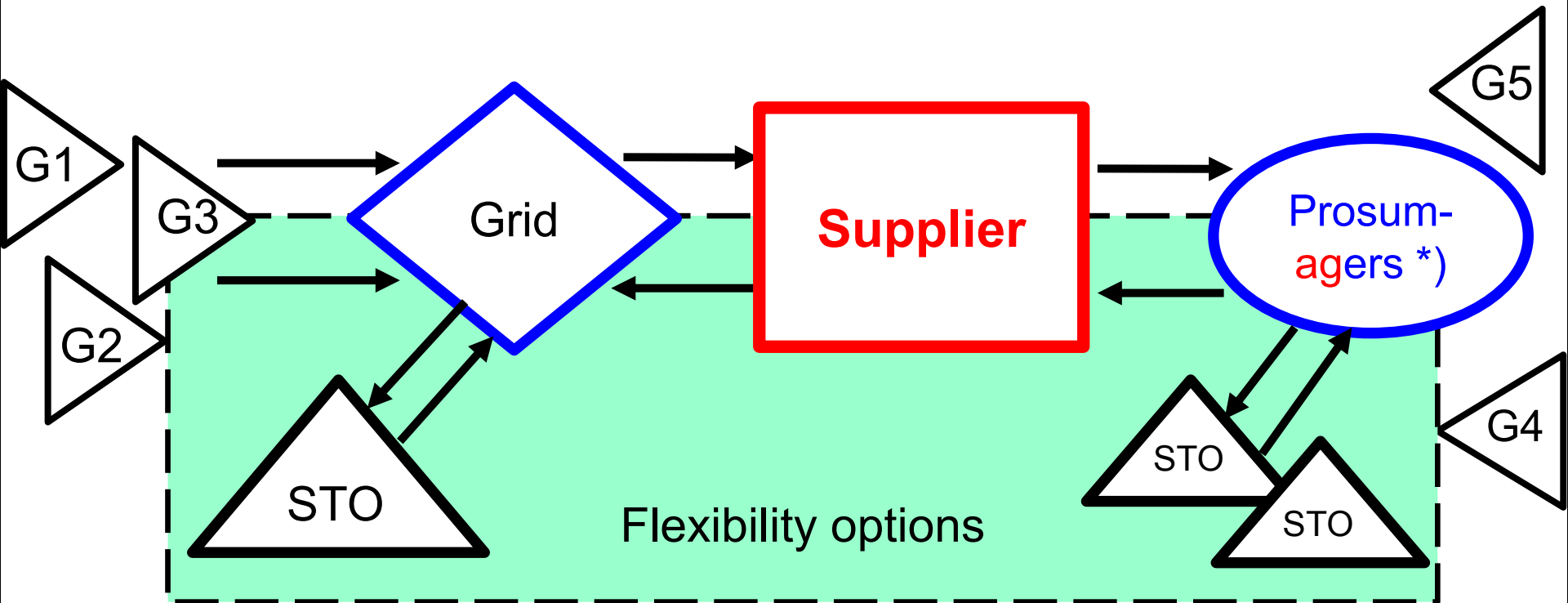
Customer 3

Meter

Blockchain



New Thinking: Making the electricity system more democratic



7. 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. CO₂)
- most urgent: exhaust full creativity for flexibility of all market participants (Erdmann)
- Prospects for storage: less bright than argued
- New key players: Suppliers / balancing groups