CHALLENGES FOR THE ELECTRICITY MARKET DESIGN IN THE ENERGY TRANSITION

Reinhard HAAS,

Energy Economics Group,

TU Wien

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CONTENT:

1. INTRODUCTION

Motivation:

* Europe: The clean energy package → RE-Power → FIT for 55%

* It is not possible to force variable renewables into the system

* Strong desire of more and more customers to participate in electricity supply

* Highly volatile electricity prices

A revised **EU electricity market design** to:

Boost renewable energy investments

Better protect and empower EU consumers

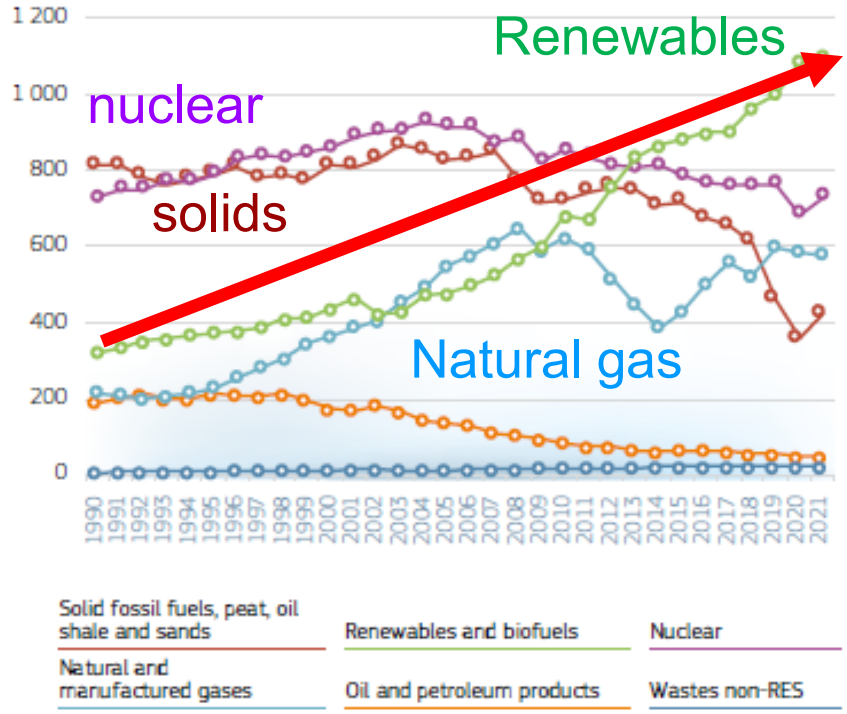
Enhance the competitiveness of EU industry

European Commission

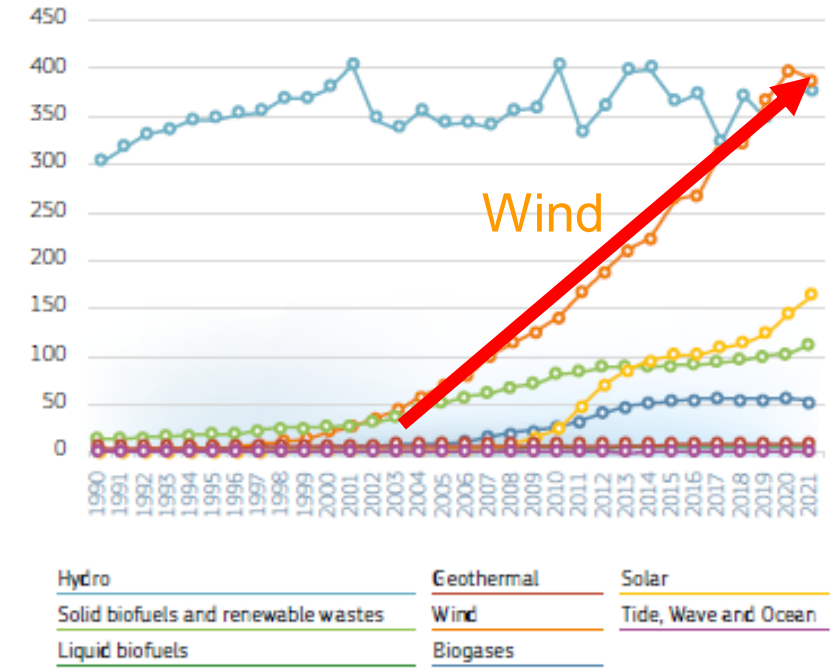
Electricity generation EU-27

2.6.2 Gross Electricity Generation

EU27_2020 – BY FUEL – ALL FUELS – **1990-2021 (TWh)**

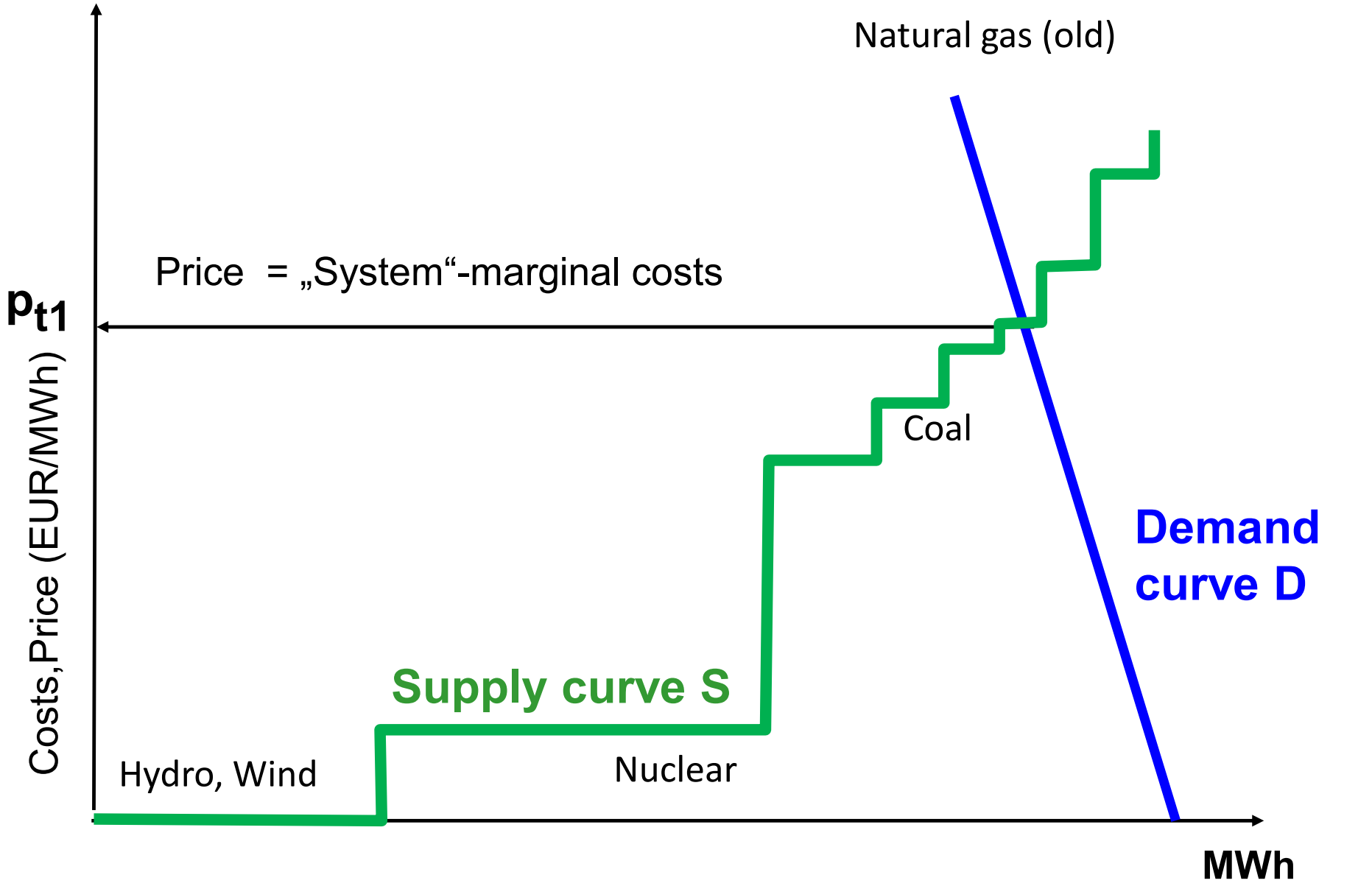


EU27_2020 – BY FUEL – GROSS ELECTRICITY GENERATION, BY FUEL: RENEWABLES – **1990-2021 (TWh)**

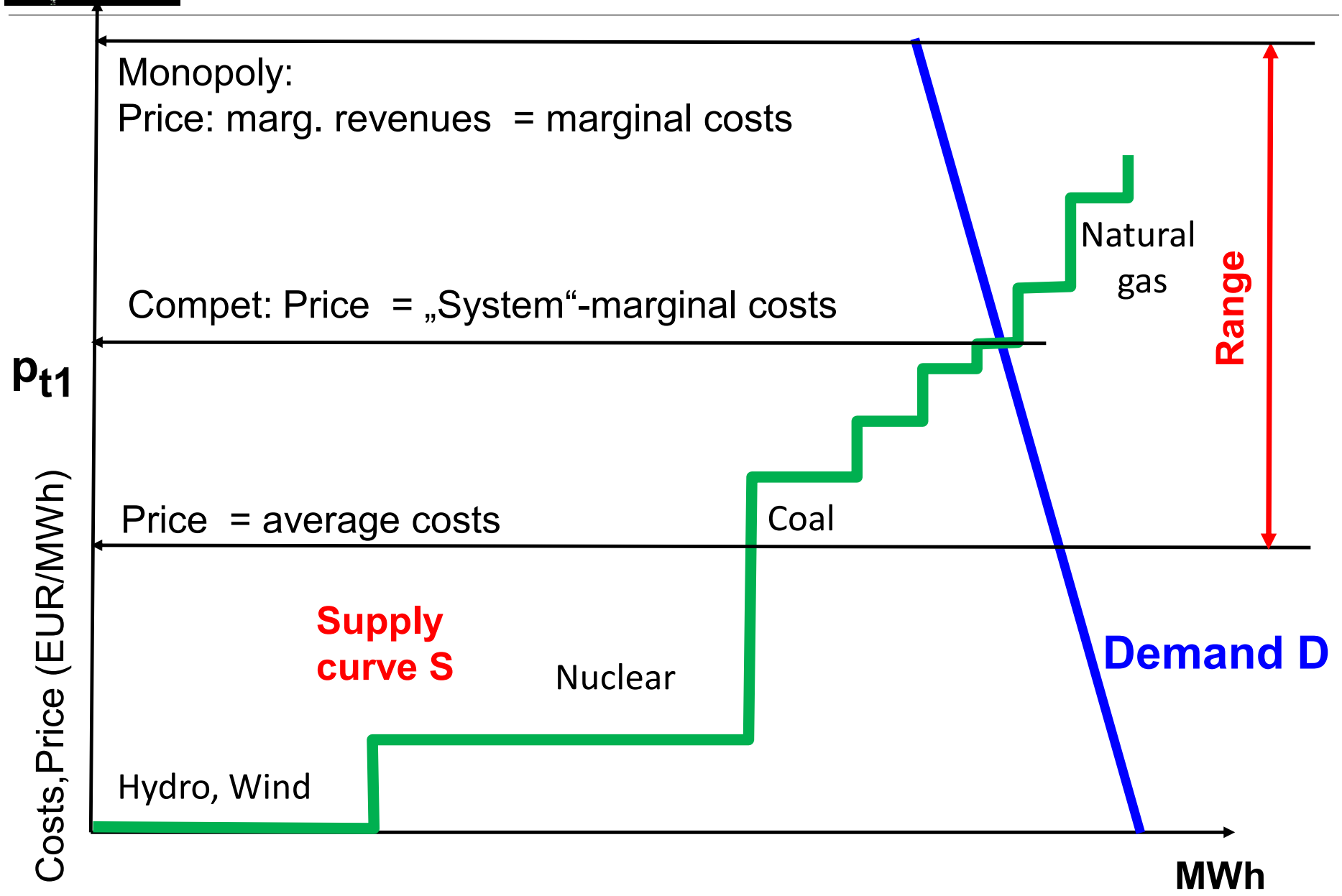


2. HOW PRICES COME ABOUT

BASIC PRINCIPLE OF COMPETITION: PRICE = MARGINAL COSTS

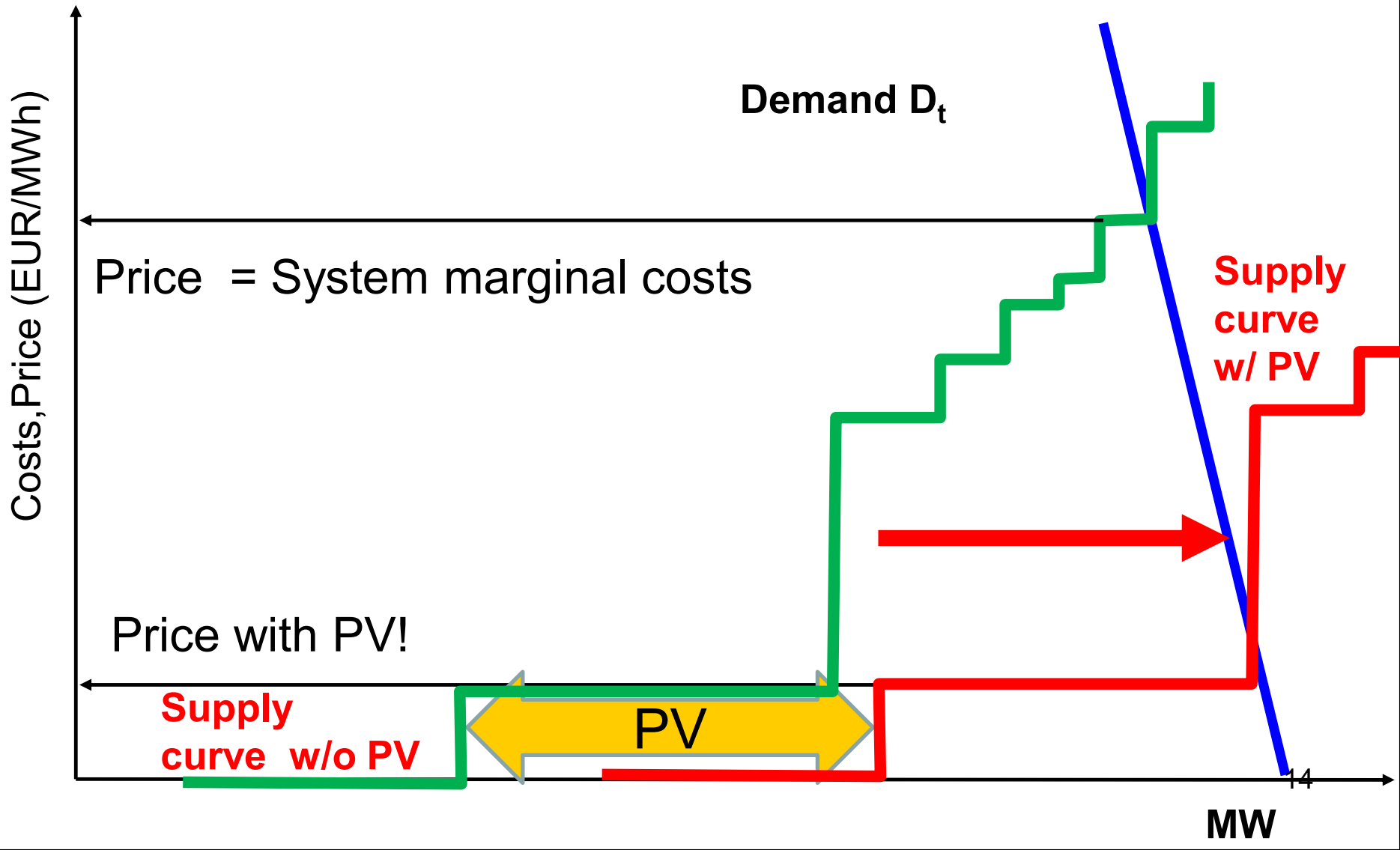


SURVEY: POSSIBLE PRICING PRINCIPLES

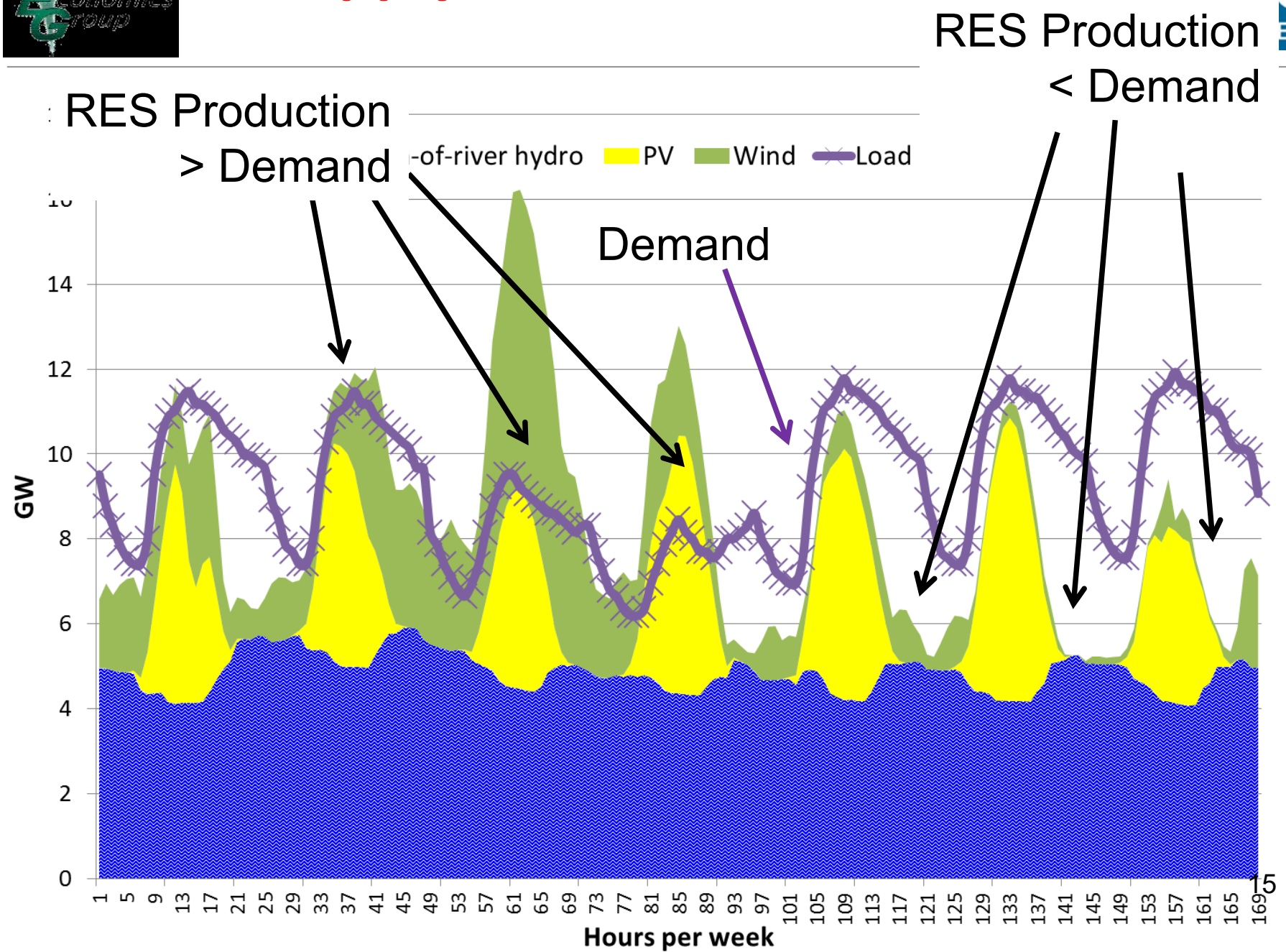


3 HOW VARIABLE RENEWABLES IMPACT THE ELECTRICITY SYSTEM AND PRICES IN ELECTRICITY MARKETS

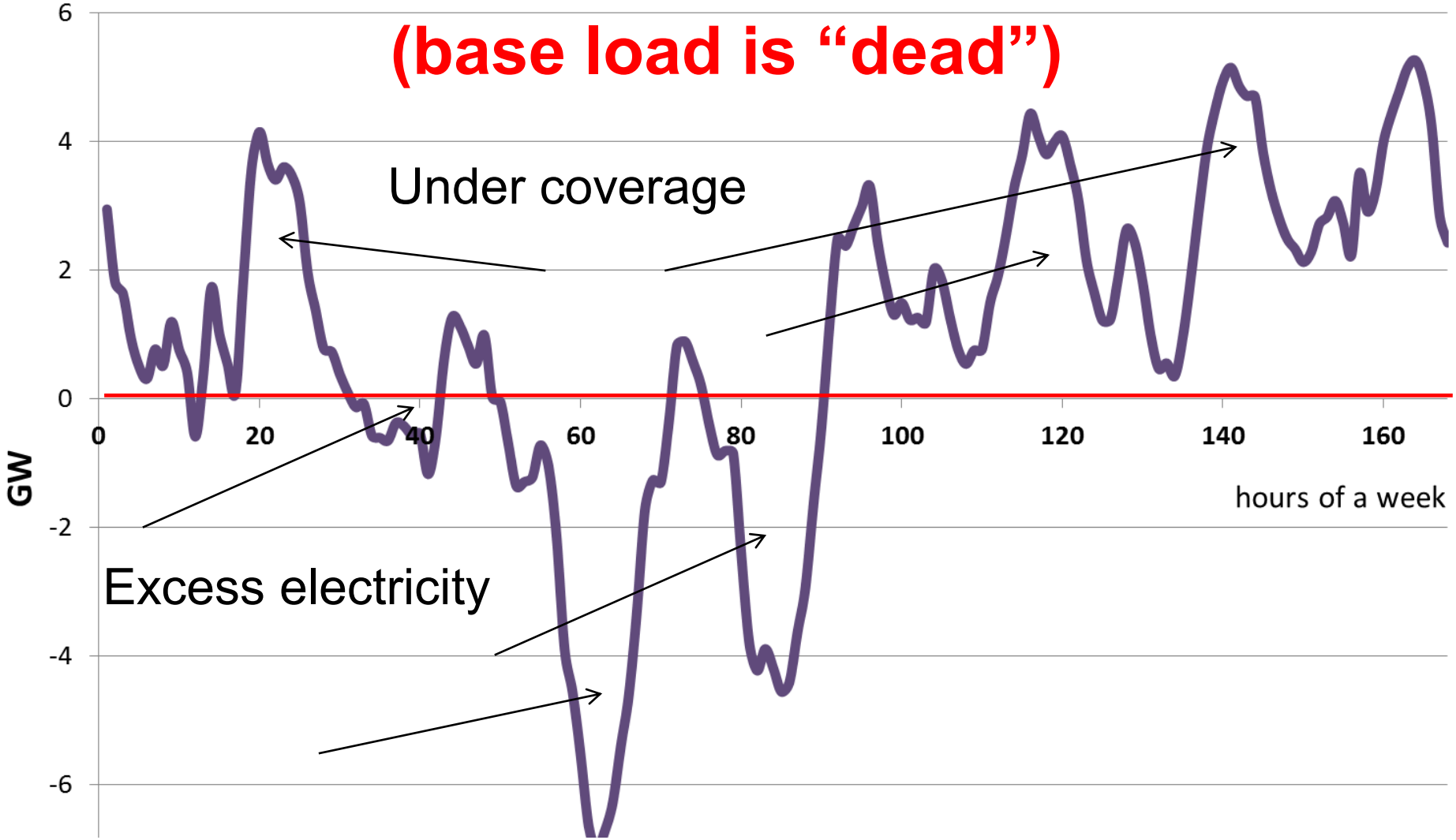
Example: prices without and with PV



Supply and Demand 2030

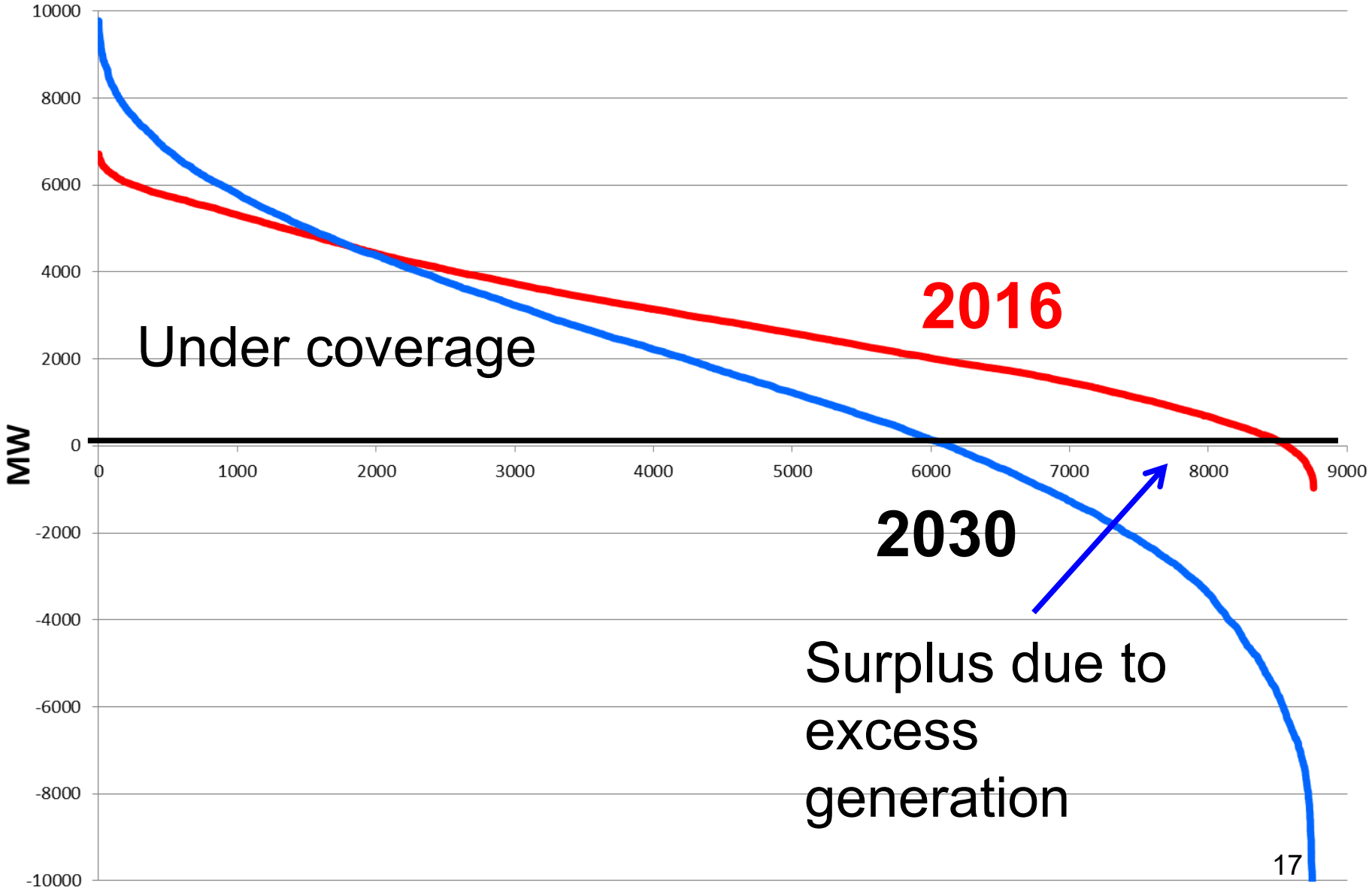


Key term of the future: Residual load (base load is “dead”)

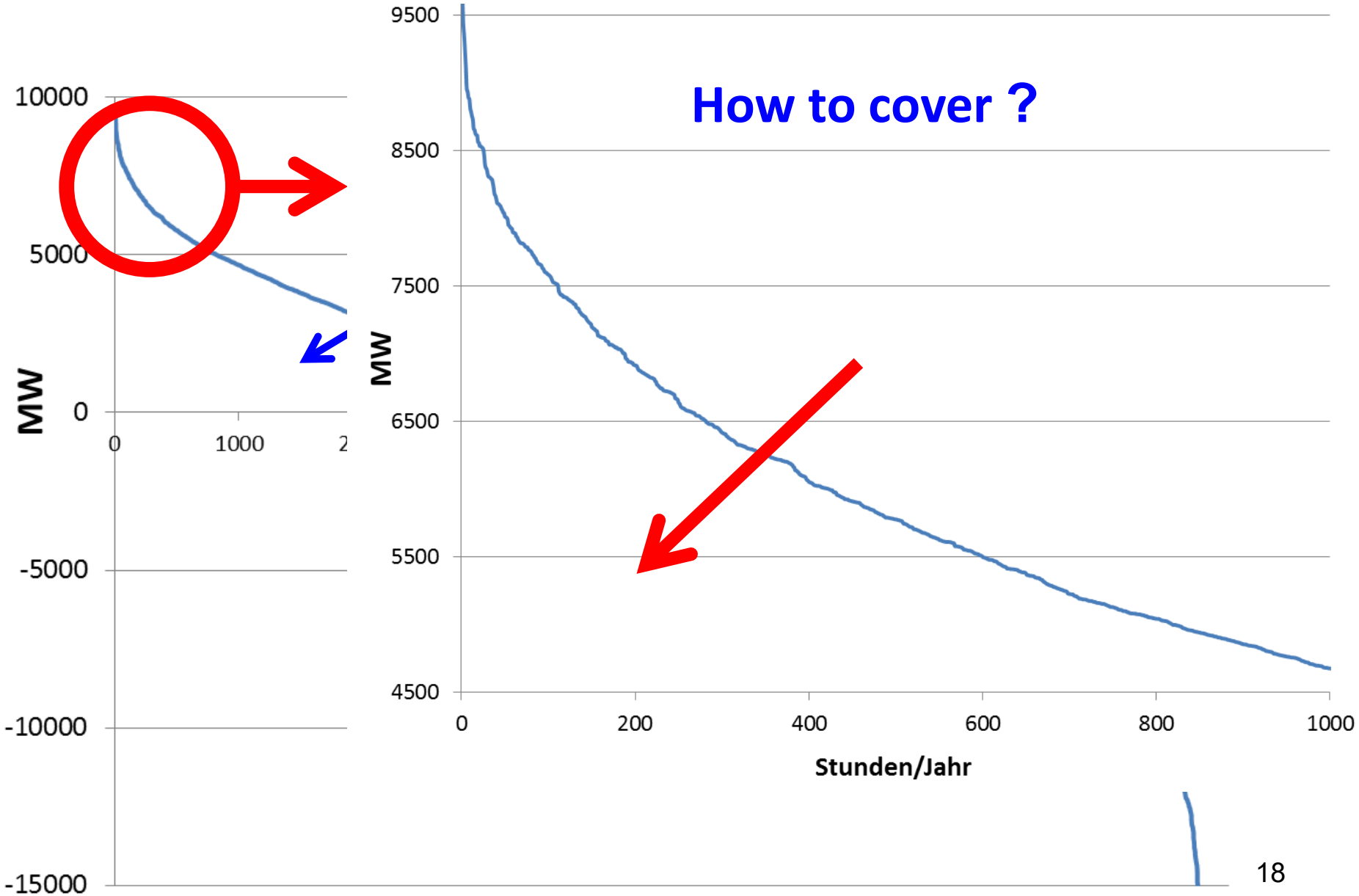


Residual load = Load – non-flexible generation

Classified residual load over a year



Classified residual load



3 Capacity payments vs Flexibility

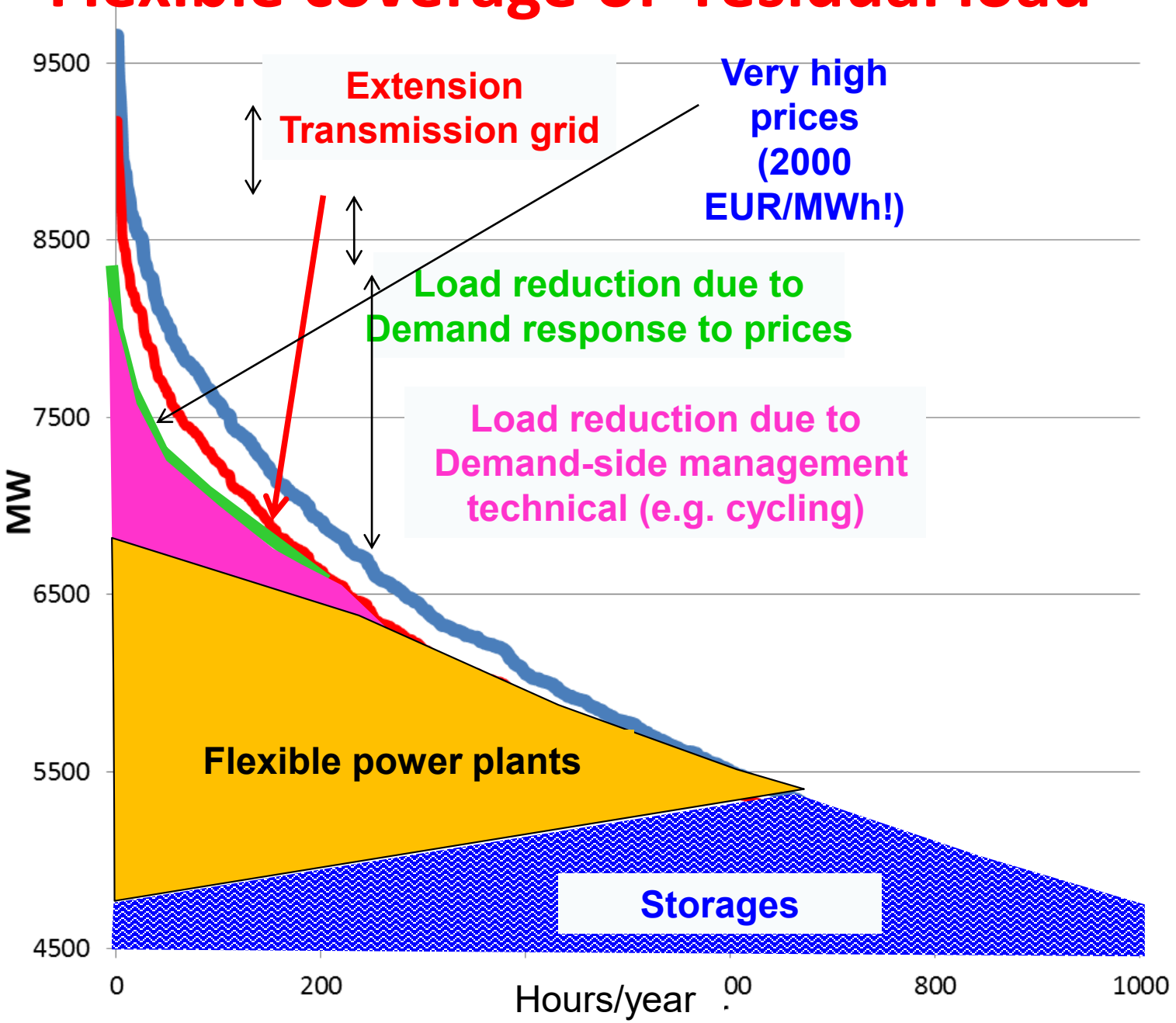
There are two extreme positions:

By a regulated capacity payment with STMC pricing?

or

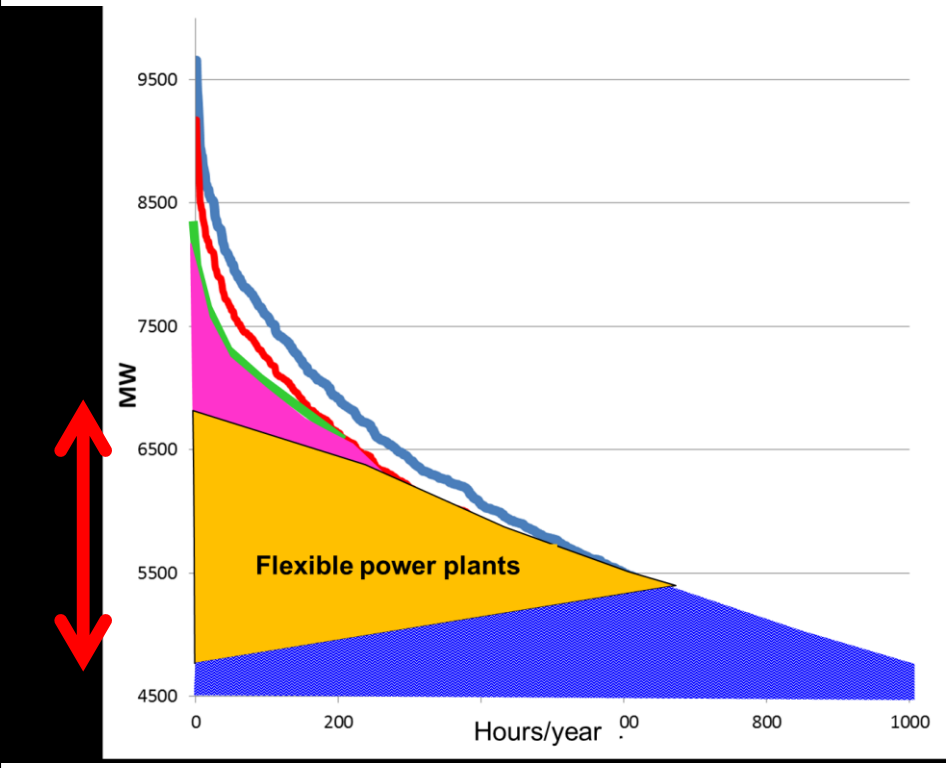
By competition between supply-side and demand-side technologies and behaviour (incl. Storages, grid and other flexibility options) with correct scarcity pricing signals?

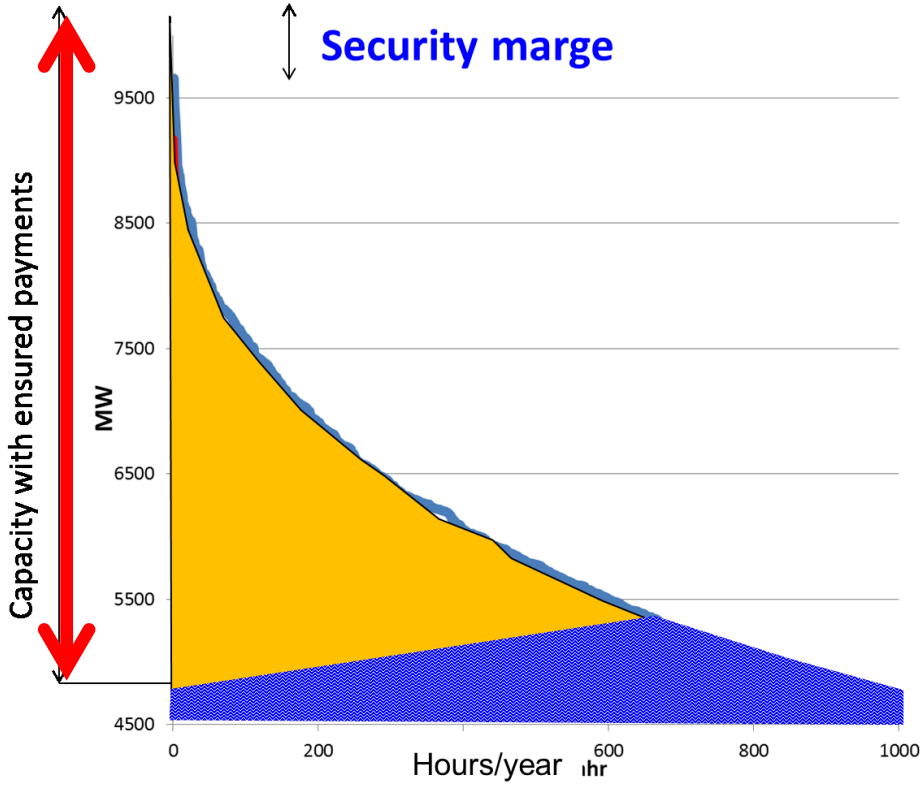
Flexible coverage of residual load



Capacity without ensured payments

Comparison


9500
8500
7500
6500
5500
4500
MW
Flexible power plants
0
200
Hours/year
800
1000


Security marge
Capacity with ensured payments
9500
8500
7500
6500
5500
4500
MW
0
200
600
800
1000
Hours/year

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

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

strive to retain system resource adequacy by correct price signals

Even in the critical year 2022 system resource adequacy was retained only by price signals … and natural gas back-ups would not have been fully secure

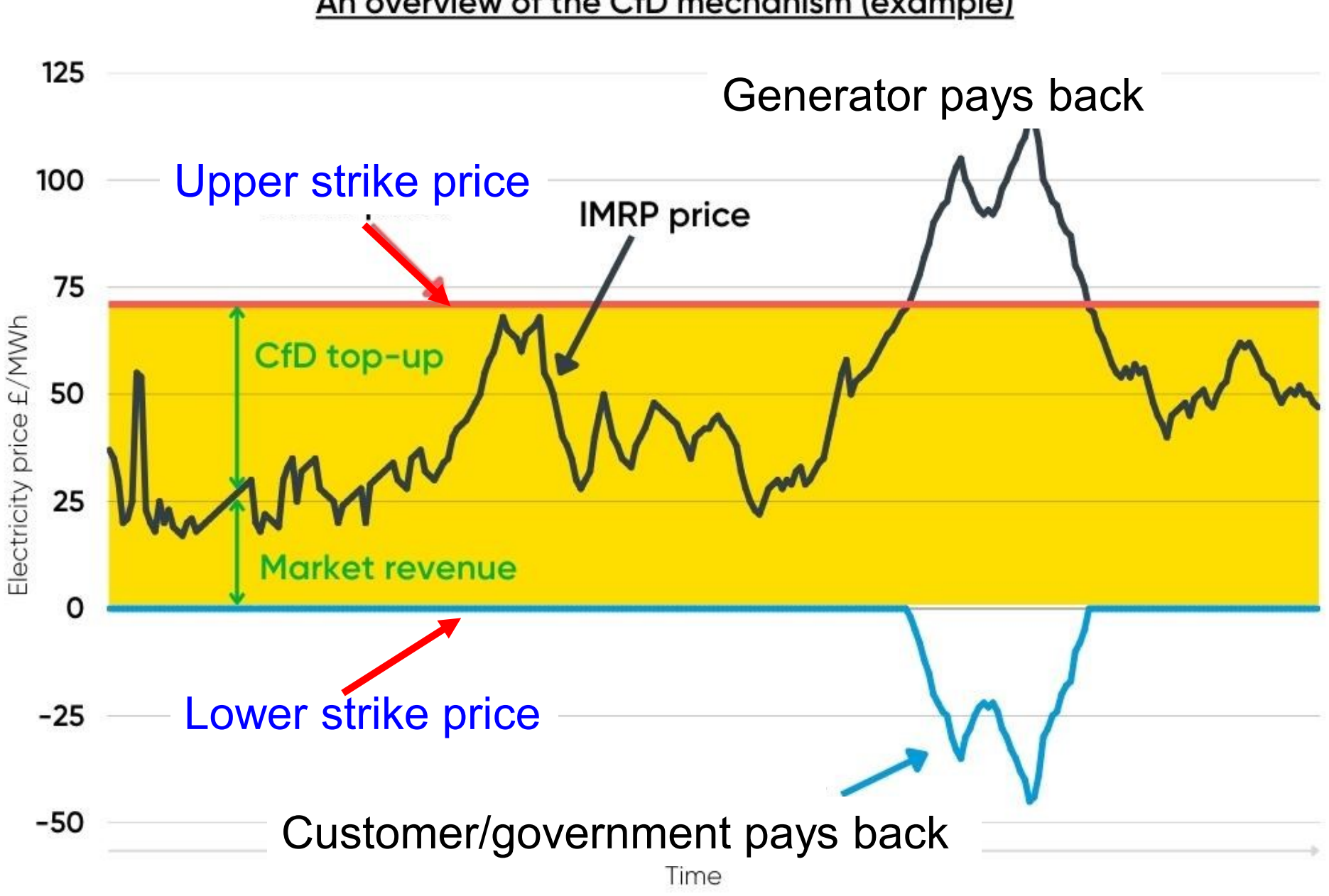
4. LONG-TERM CONTRACTS

* How to recover the investment costs of variable renewables if P=0?

* Future and forward markets: How strongly to interfere by a regulatory authority or by the EU ?

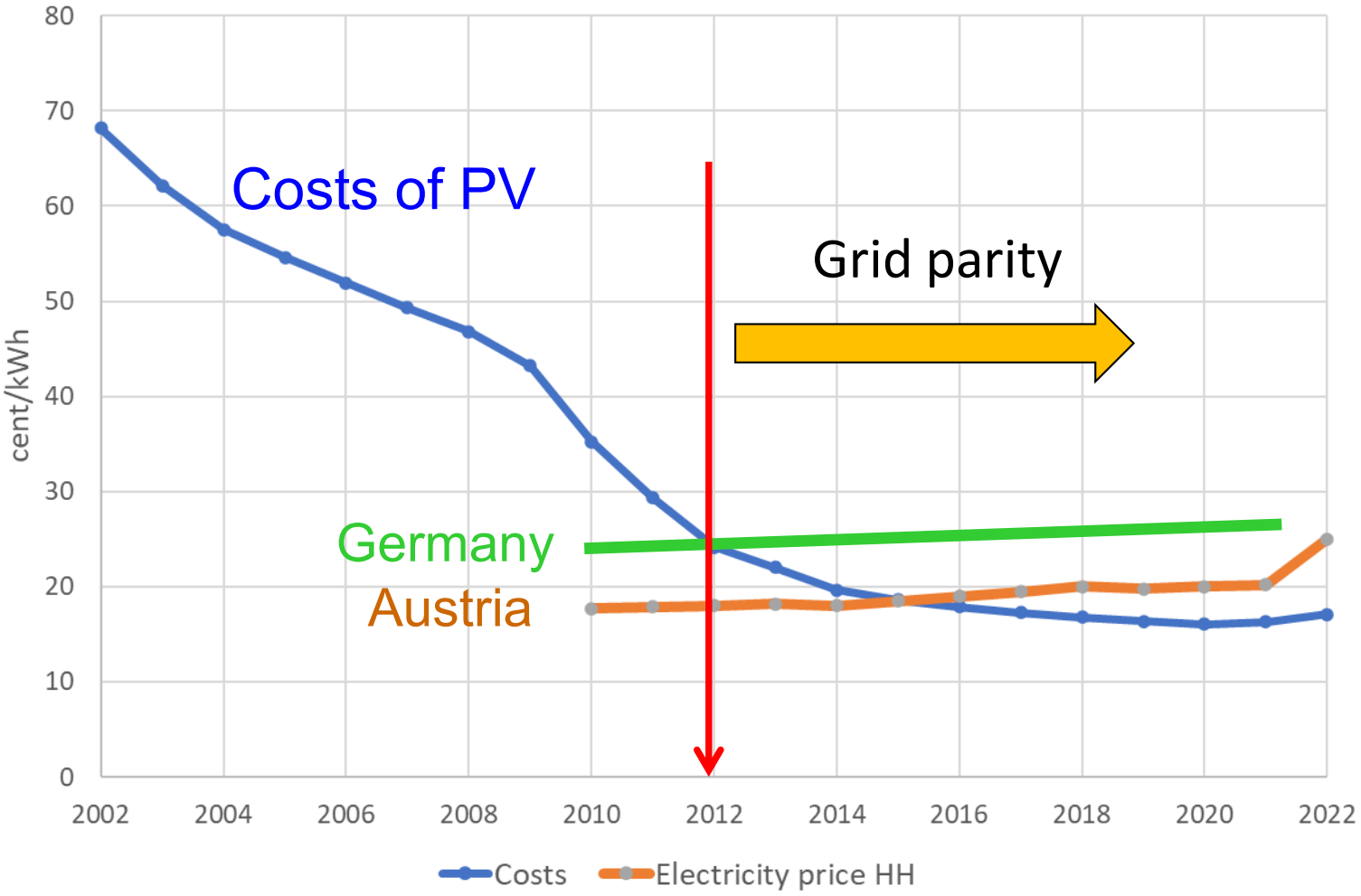
* PPA – for Renewables?

* C f D as ultimative solutions?

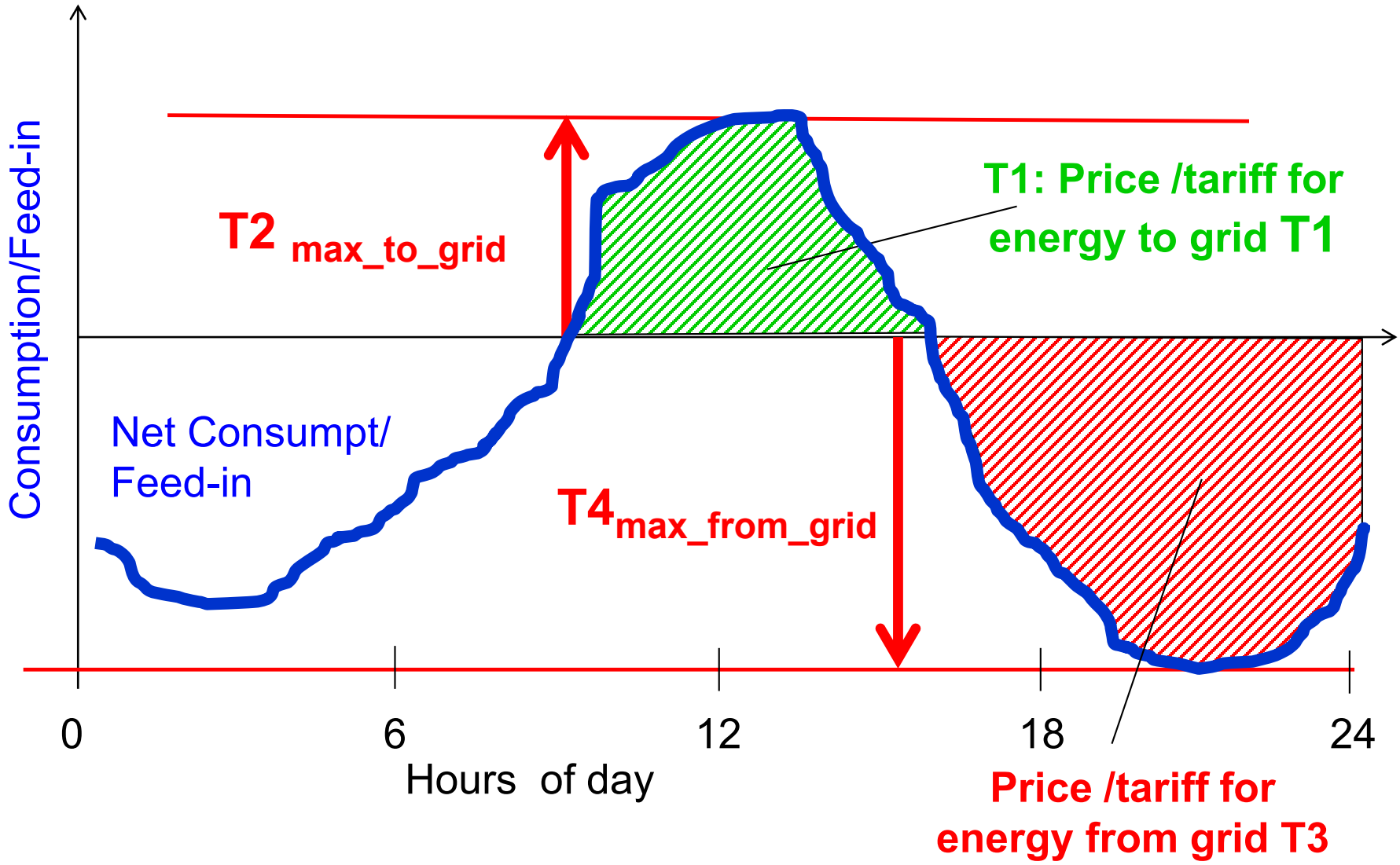

An overview of the CfD mechanism (example)
125
100
75
50
25
0
-25
-50
Electricity price £/MWh
Generator pays back
Upper strike price
IMRP price
CfD top-up
Market revenue
Lower strike price
Customer/government pays back
Time
Figures used are for illustrative purposesonly.

5. RETAIL MARKETS: TOWARDS PROSUMAGERS AND ENERGY COMMUNITIES

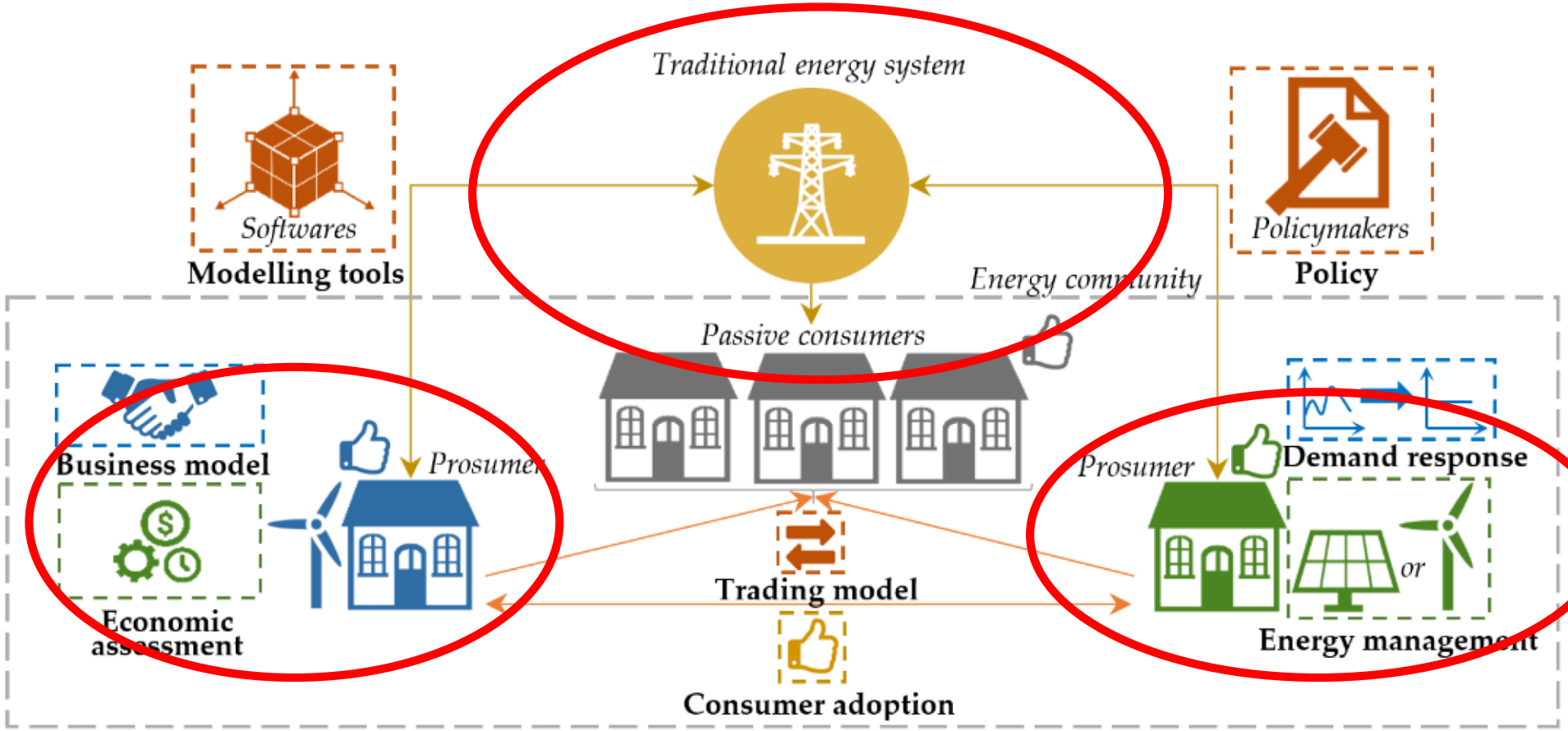
Grid parity: PV-costs and household electricity prices



Bidirectional tariffs (and prices) for Power and energy

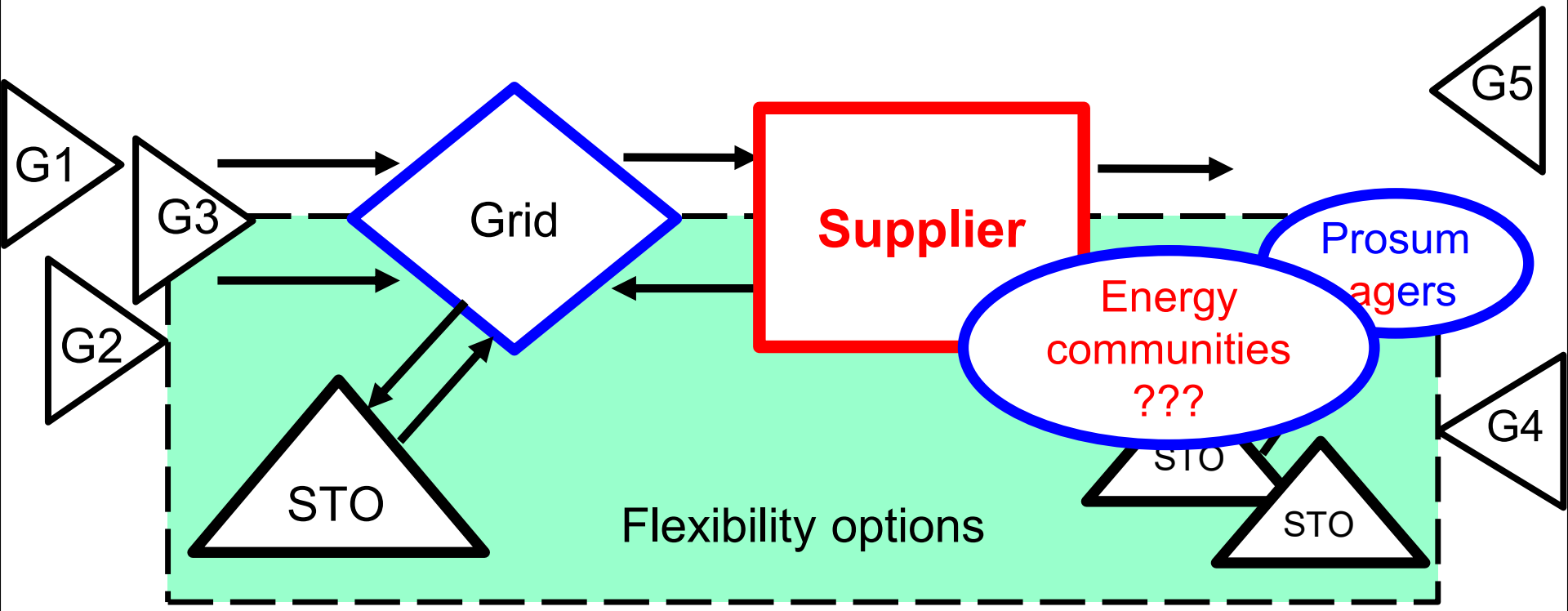


Energy Communities



6. CONCLUSIONS

NEW THINKING



6. CONCLUSIONS

- Sustainable electric. system → integration of a broad technology portfolio & demand-side options
- A more democratic system allows customers to participate in supply, storage and DSM
- Capacity payments: → most urgent exhaust full creativity for flexibility of all market participants
- New market design? New models of long-term contracts? However … „If it ain‘t broke, don‘t fix it“

https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/13668-Electricity-market-reform-of-the-EUs-electricity-market-design_en

https://eur-lex.europa.eu/legal-content/DE/TXT/PDF/?uri=CELEX:32019R0943&from=EN

See EU regulation on the internal market (https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32019R0943), Article 6, paragraph 9.

Regards,