

Promotion systems for electricity from renewable energy sources – Lessons learned from EU countries

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- 1. Introduction**
- 2. Historical developments**
- 3. Success of strategies**
- 4. The success story of PV**
- 5. Effects on electricity markets**
- 6. Conclusions**

1 INTRODUCTION

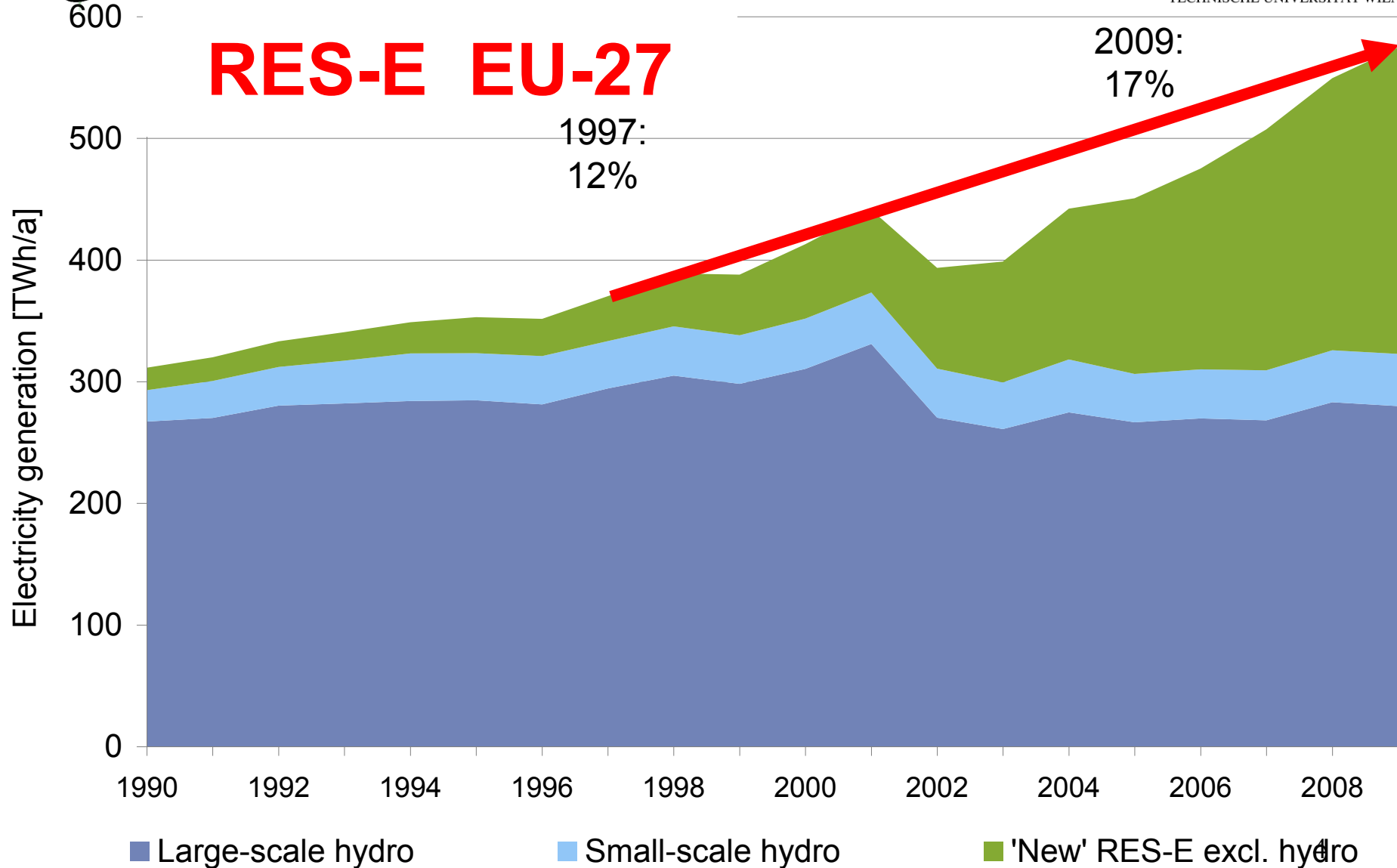
CORE MOTIVATION:

**Policy targets for an
INCREASE of RES-E!**

e.g. 2020/20/20/20 targets

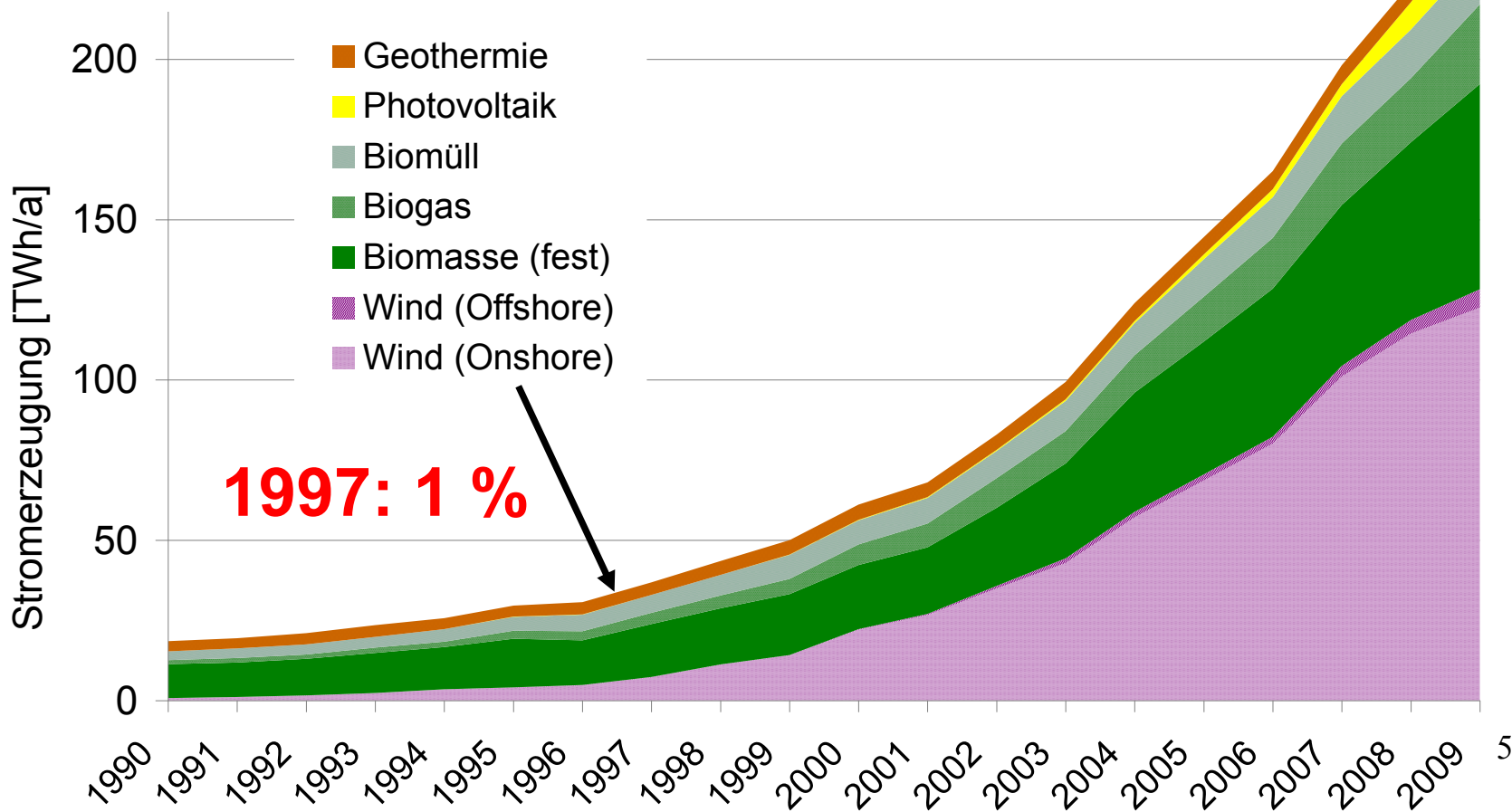
**RES-E directive: increase share of
RES-E from 12% 1997 to 22% in 2010)**

2. HISTORY



ELECTRICITY GENERATION FROM „NEW“ RENEWABLES IN EUROPE

2009: 7 %

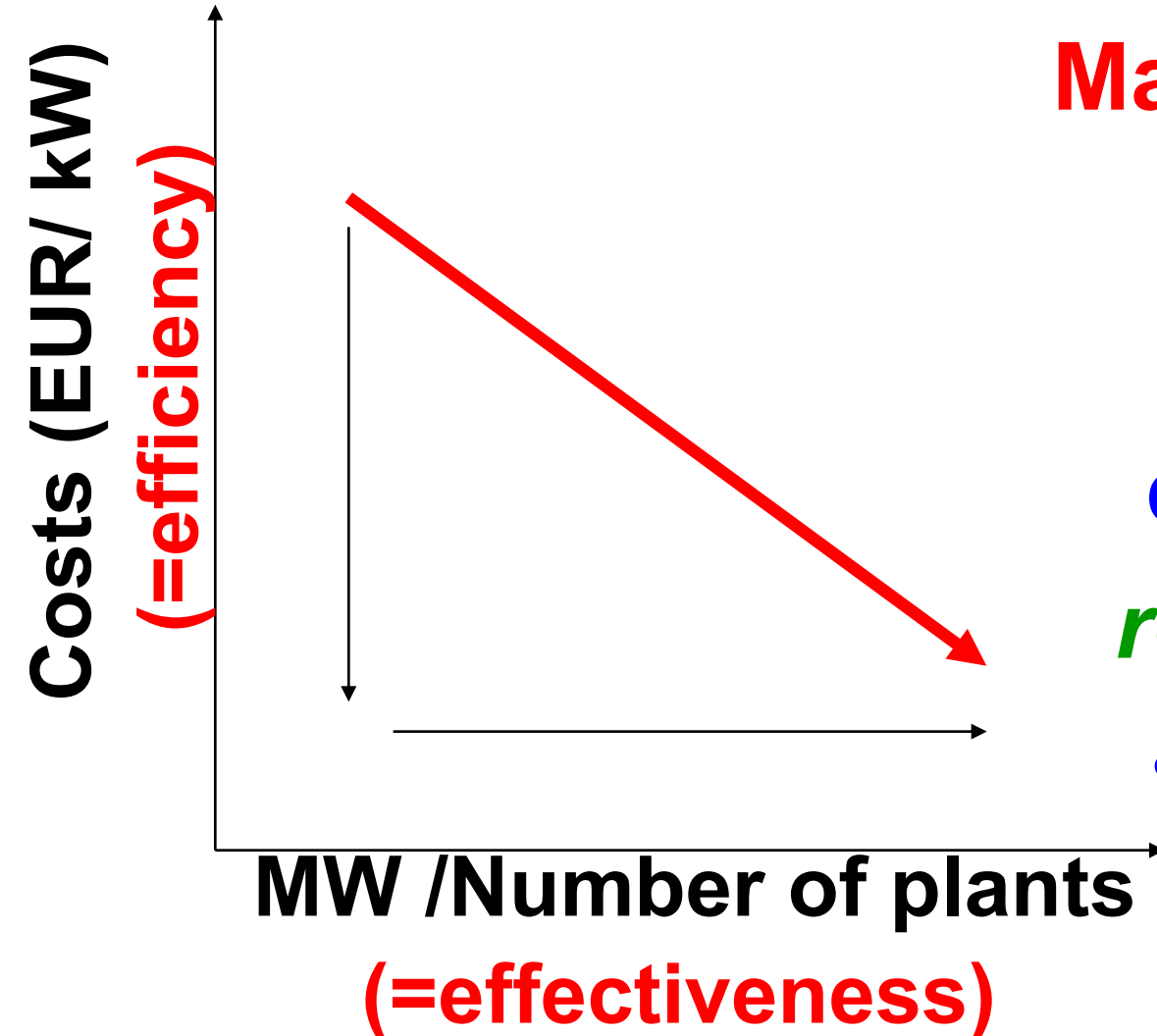


REMARK ON RES – DEPLOYMENT IN THE EU-COUNTRIES

- Since about 1997 triggered by EU-directives and EU initiatives
- Yet, specific country success stories very strongly related to national policies design!

3. SUCCESS OF STRATEGIES

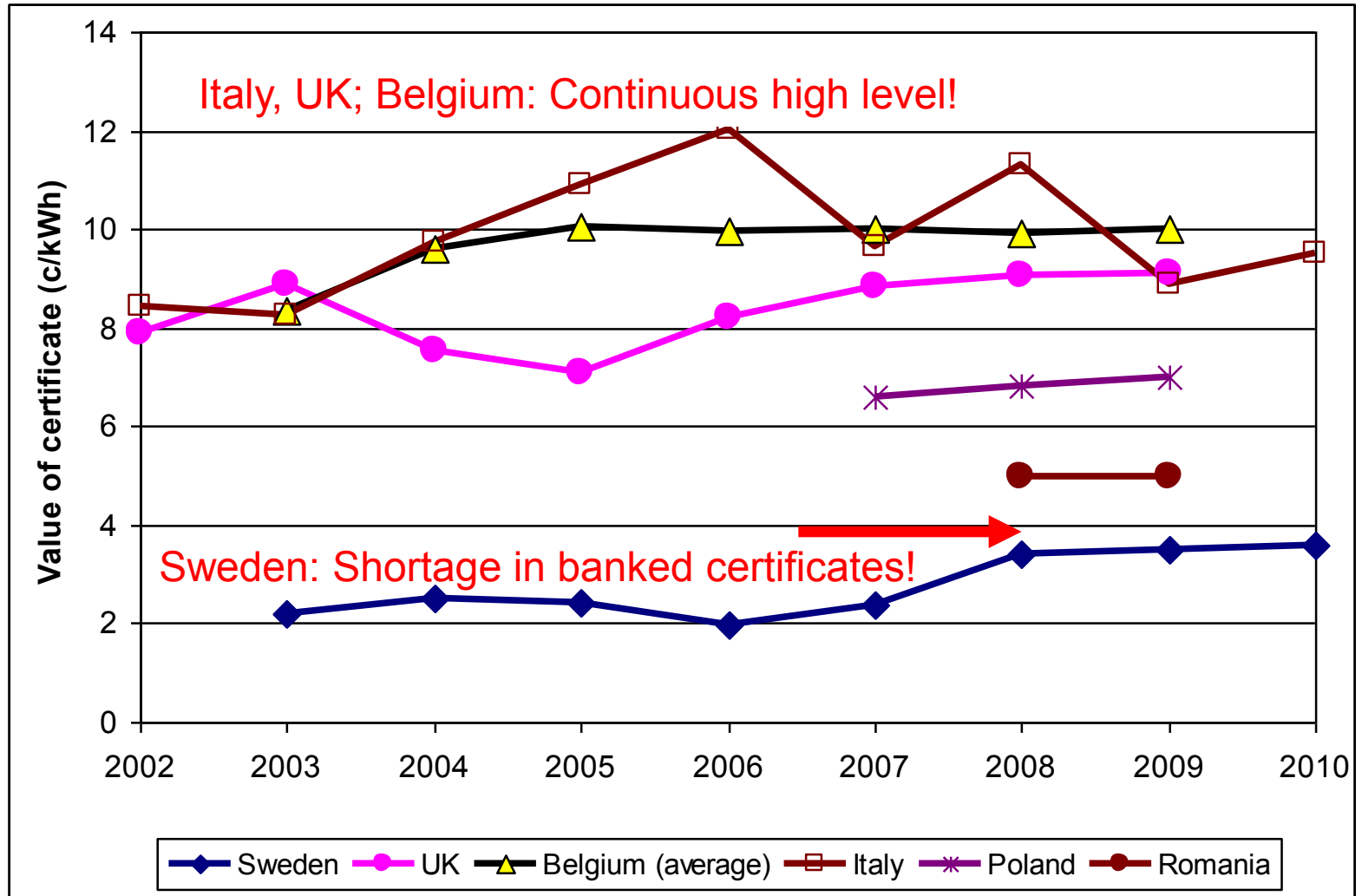
SUCCESS CRITERIA FOR STRATEGIES



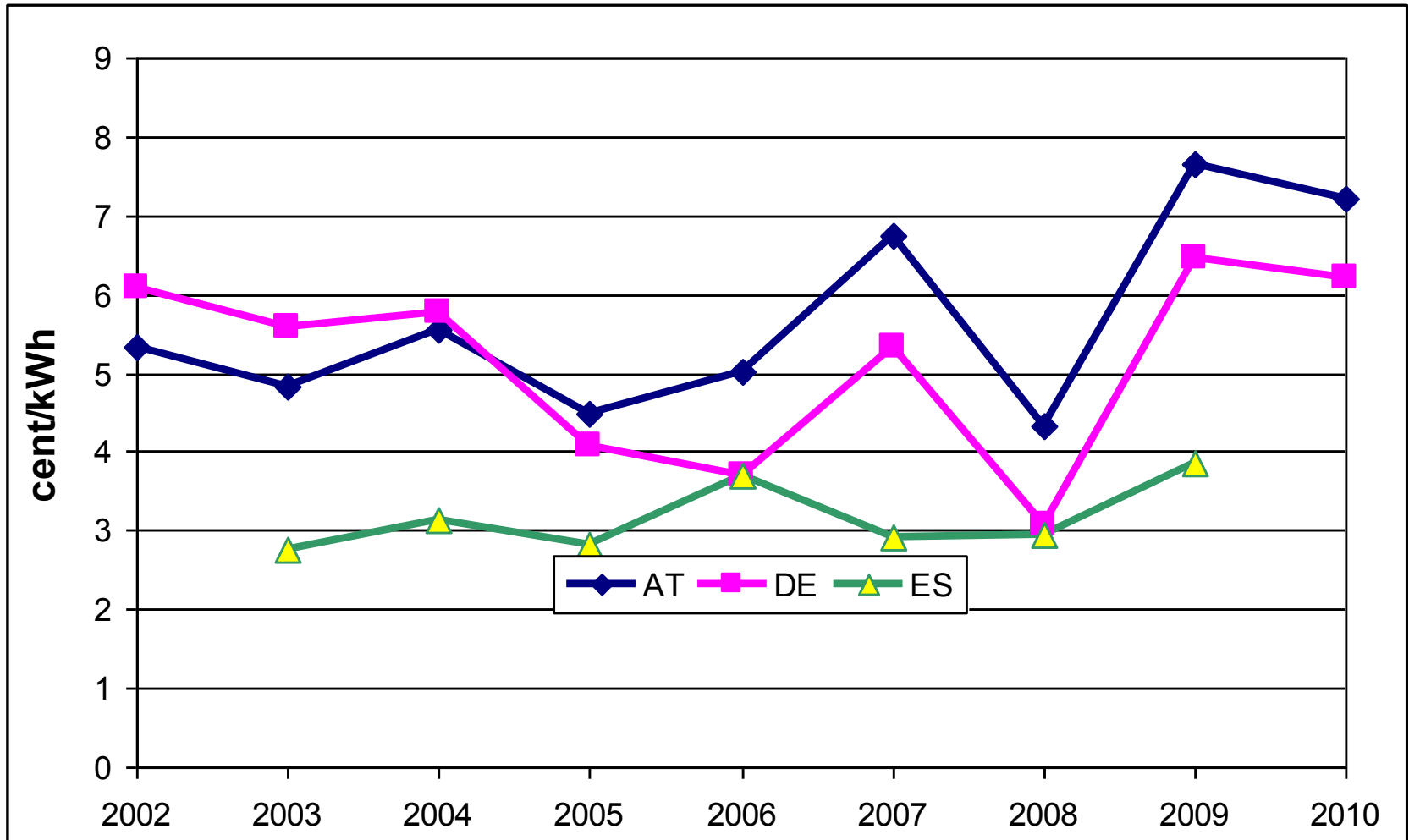
Major objectives:

- increase the amount of electricity from *renewables* and
- reduce costs!

PRICES OF CERTIFICATES



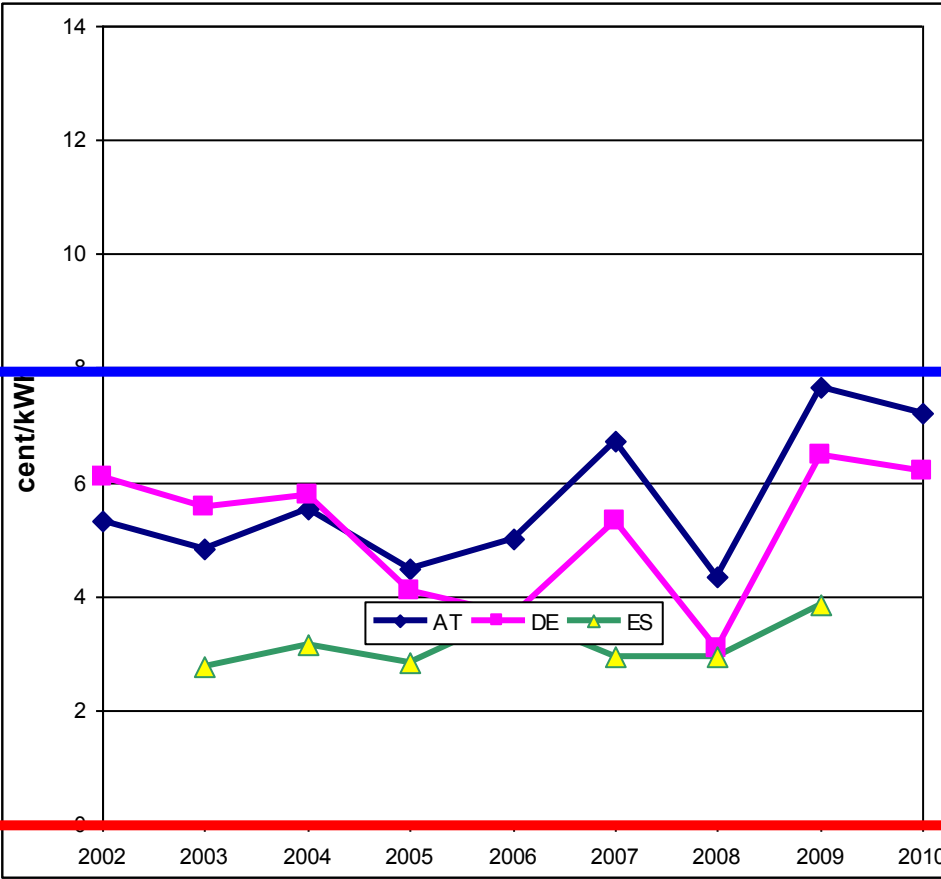
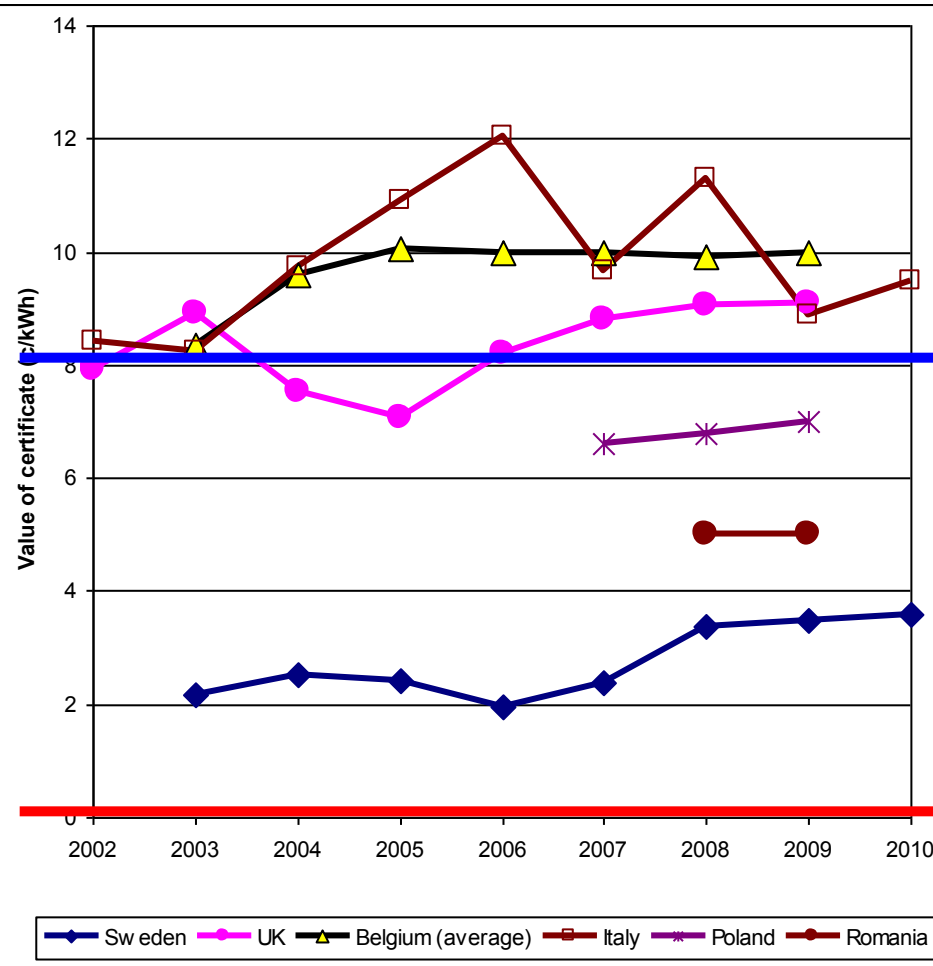
LEVEL OF FEED-IN TARIFFS



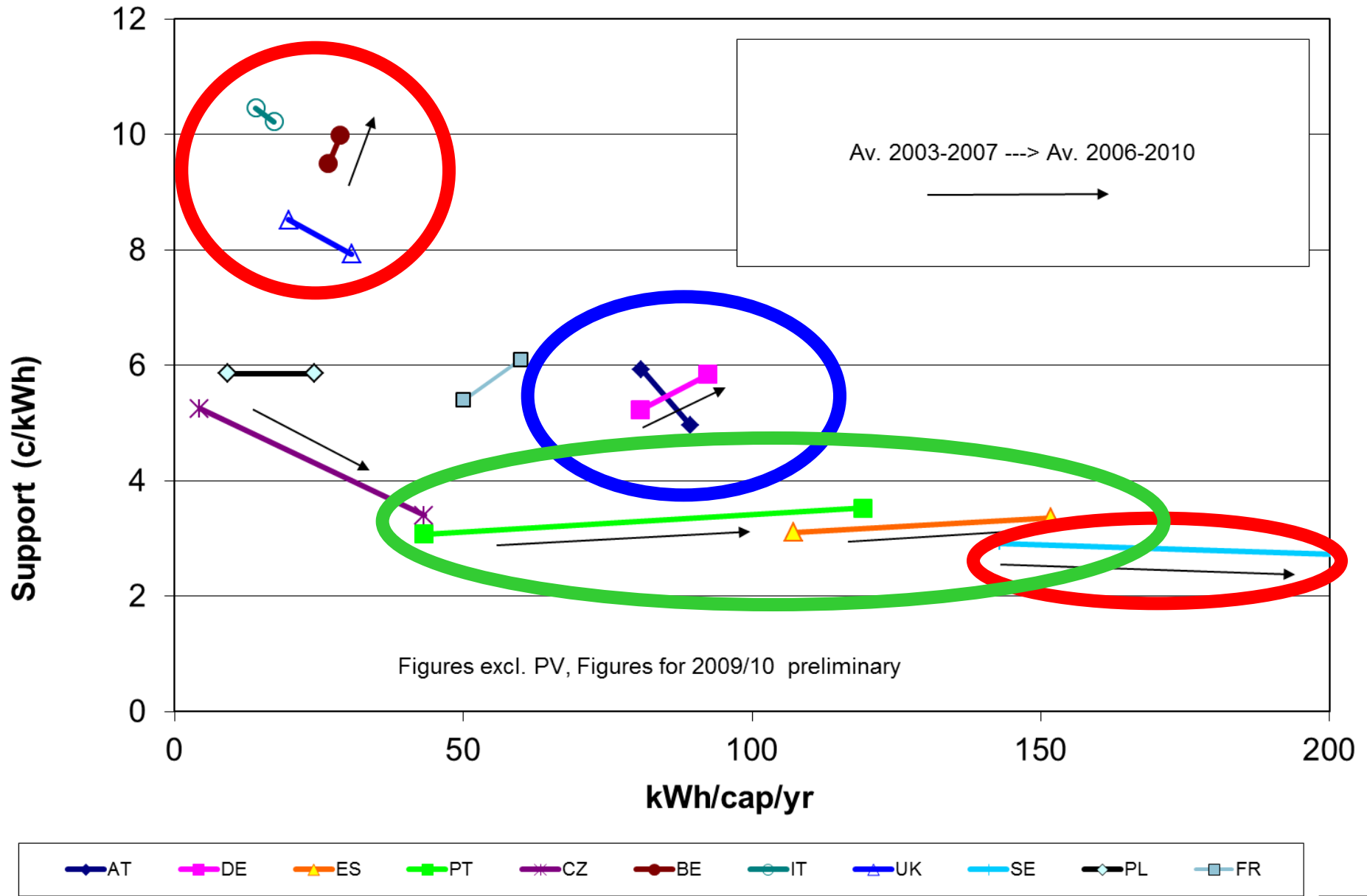
SUPPORT LEVELS: COMPARISON

TRADABLE CERTIFICATES

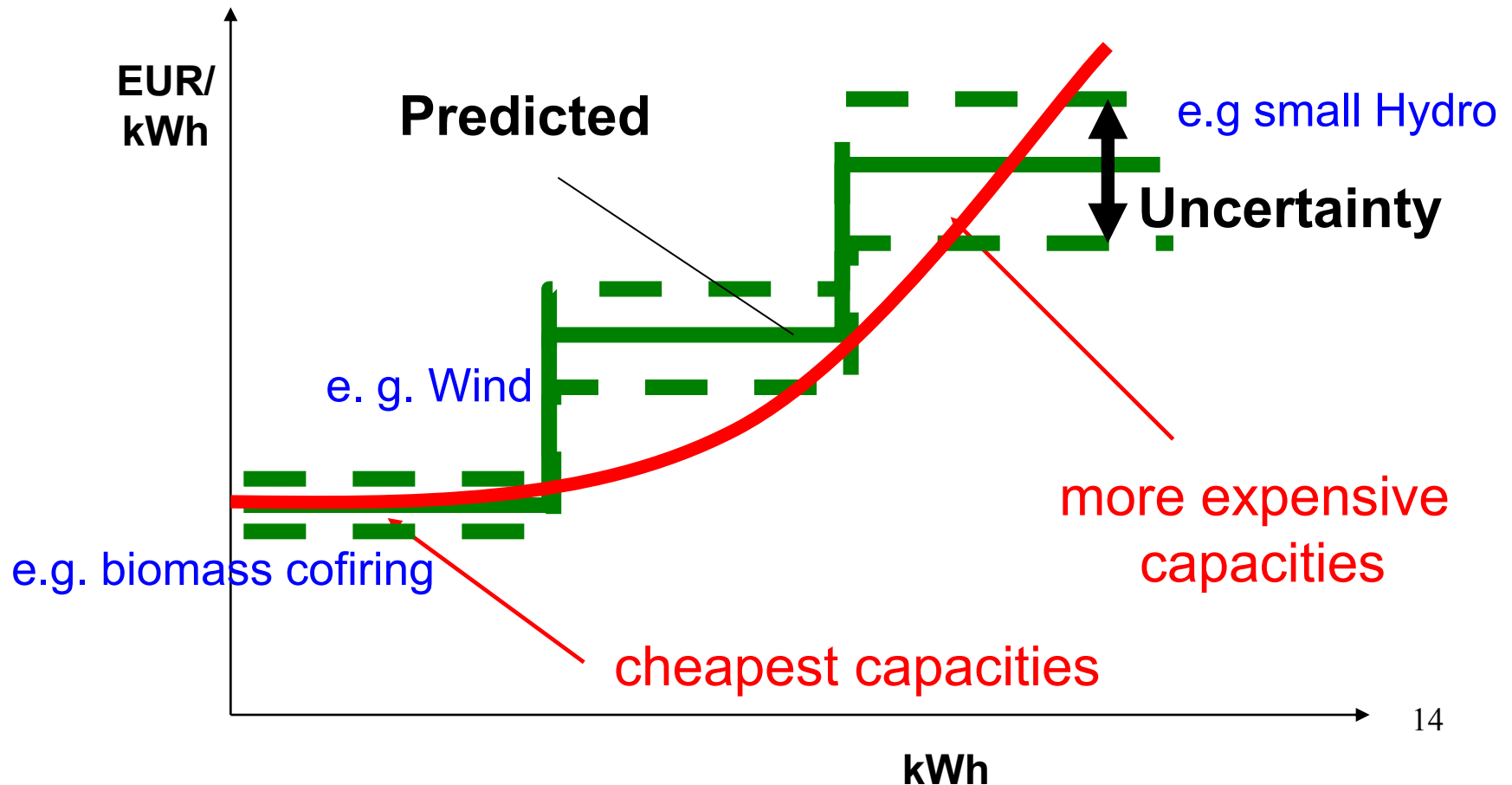
FEED-IN TARIFFS



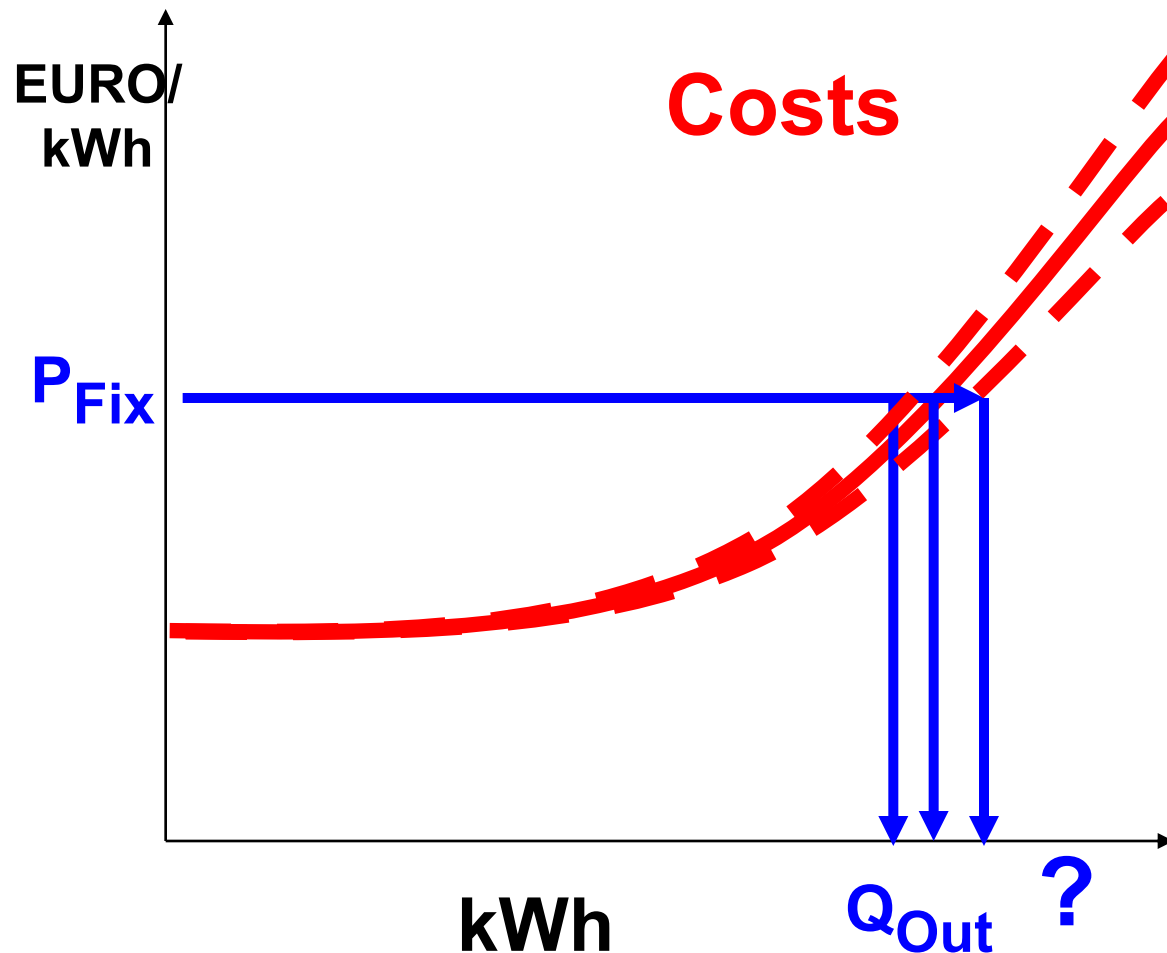
EFFECTIVENESS VS COSTS



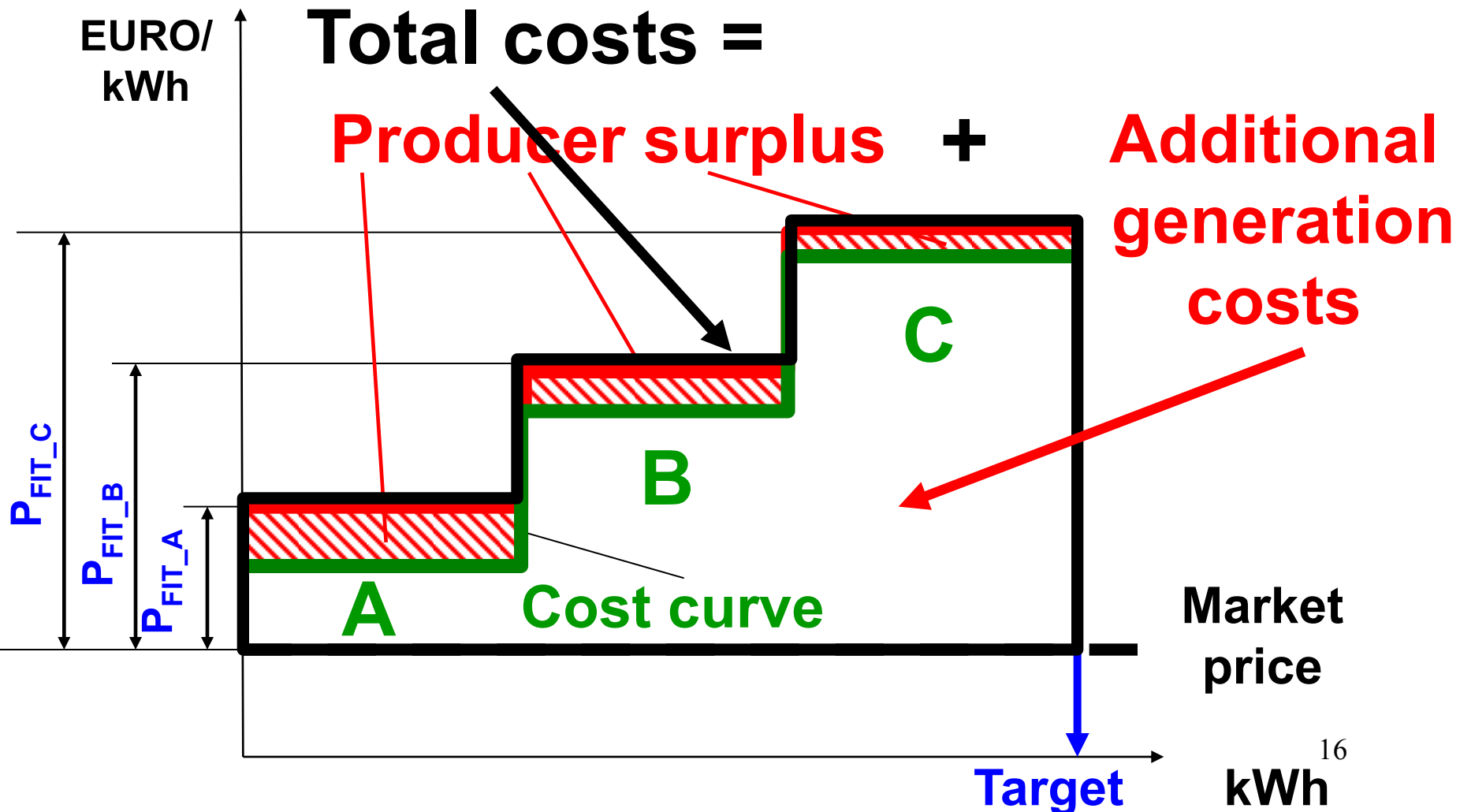
METHOD OF APPROACH: STATIC COST RESOURCE CURVES



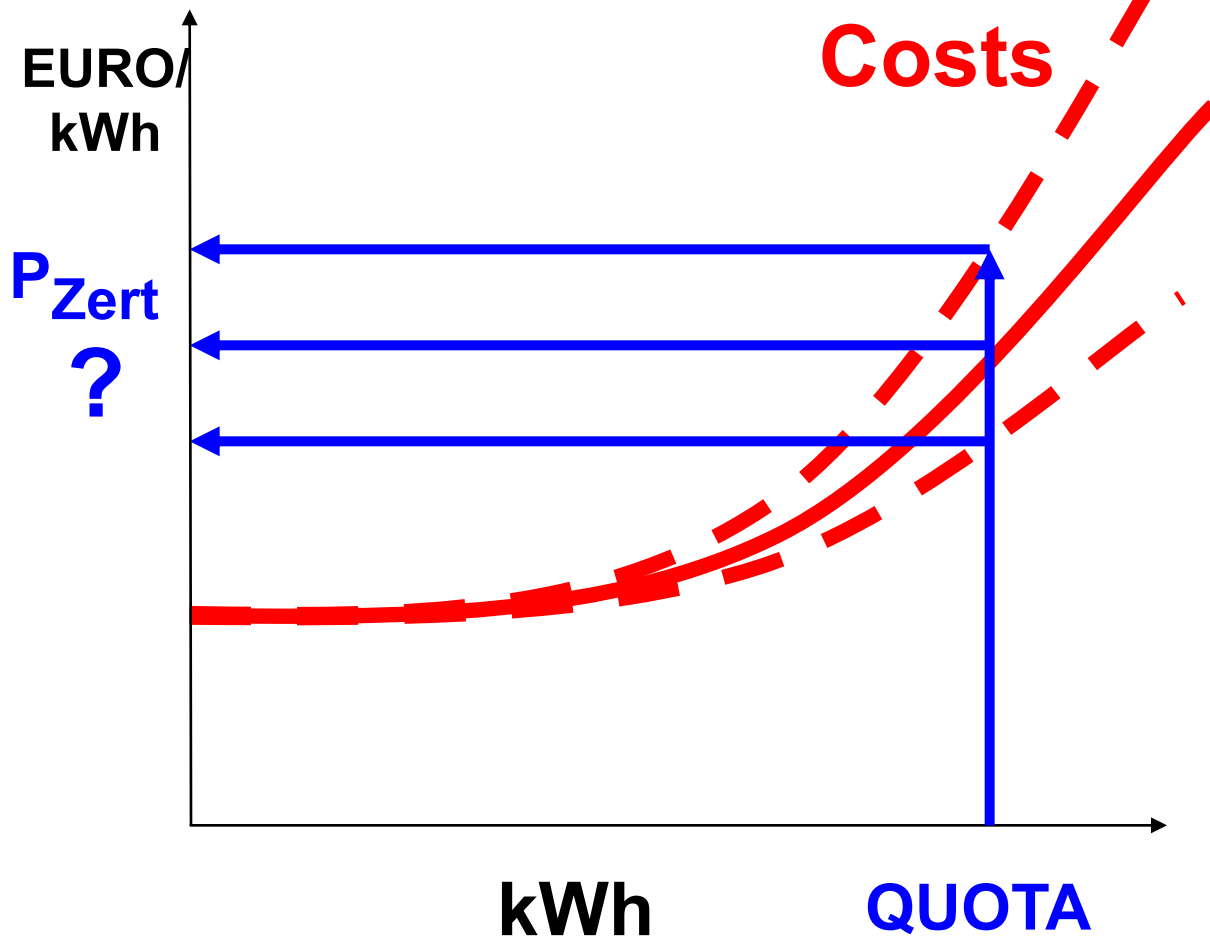
HOW FEED-IN TARIFFS WORK



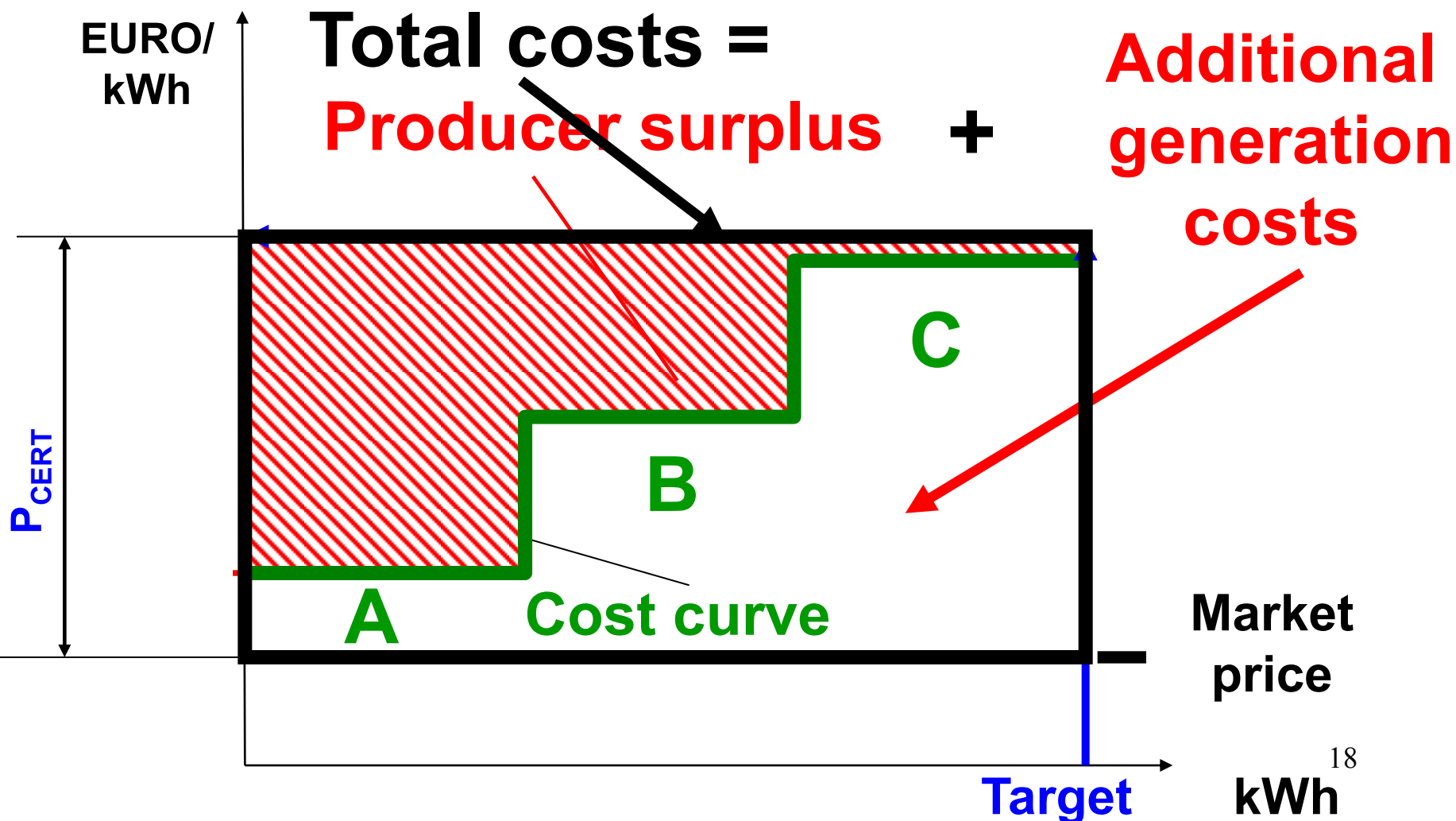
(PREMIUM) FEED-IN TARIFFS



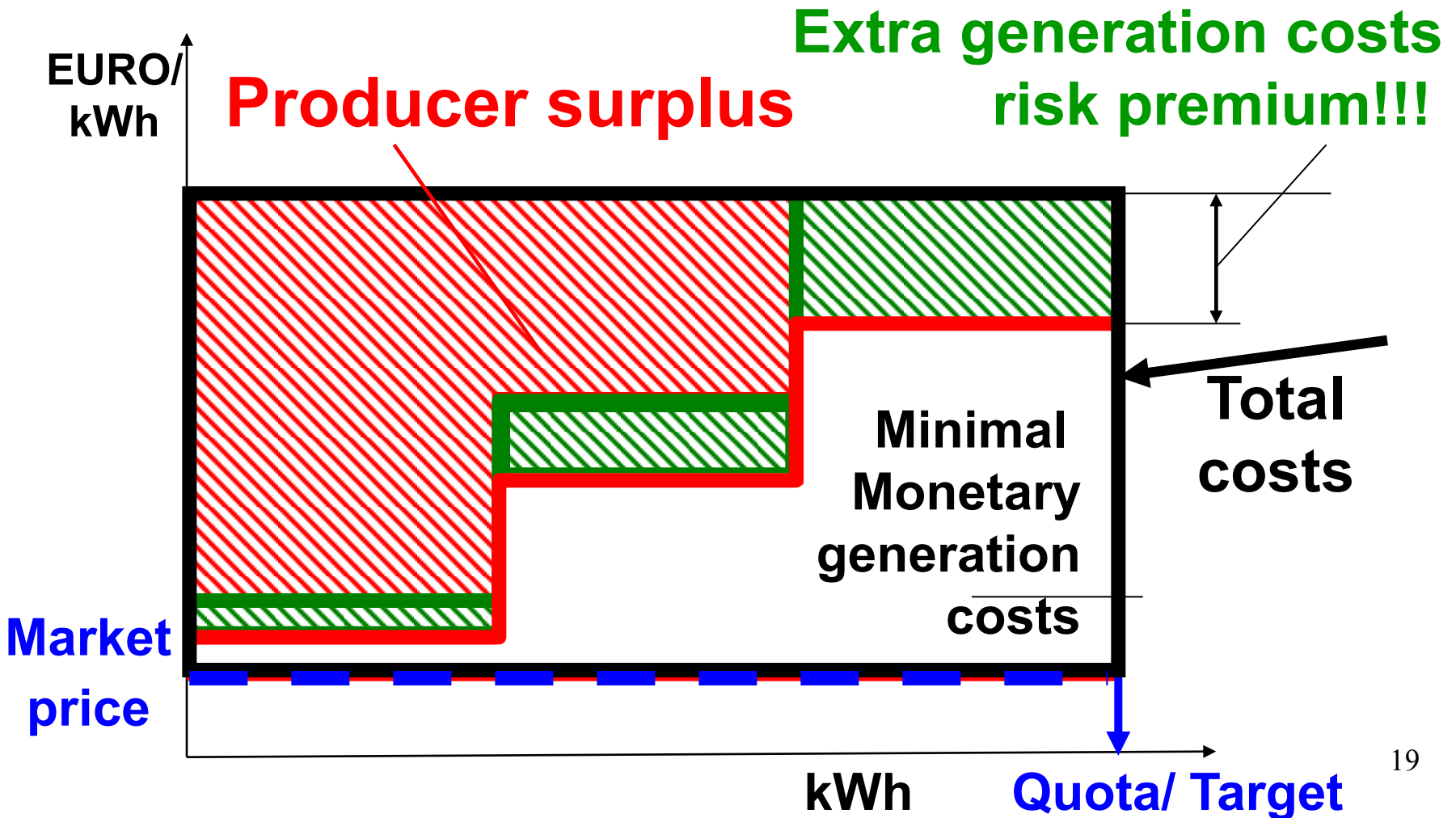
HOW QUOTA-BASED TRADABLE GO - CERTIFICATES WORK



TRADABLE GO CERTIFICATES

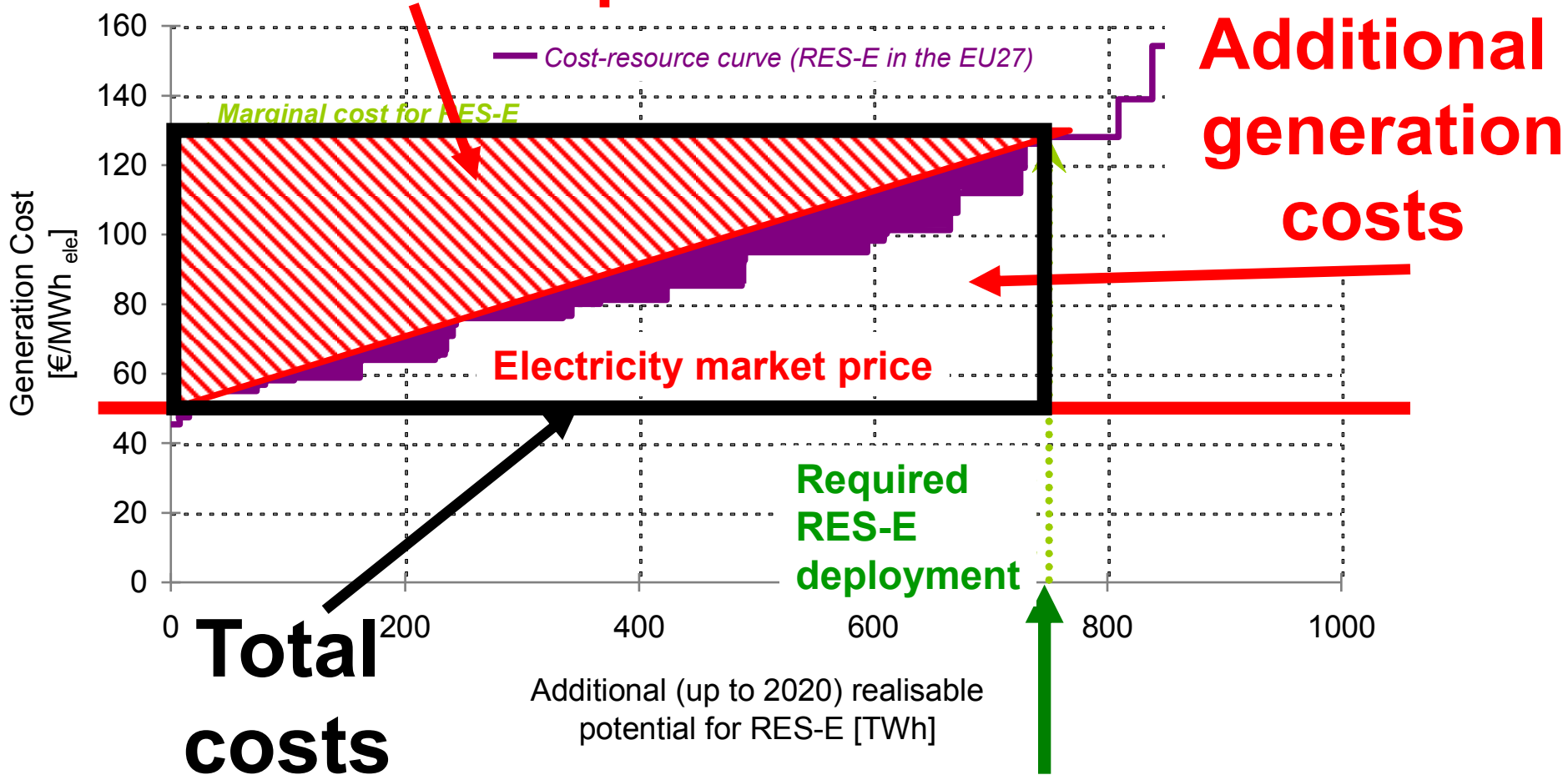


TRADABLE GREEN CERTIFICATES



THE SHAPE OF THE COST CURVE EU - 27

Producer surplus



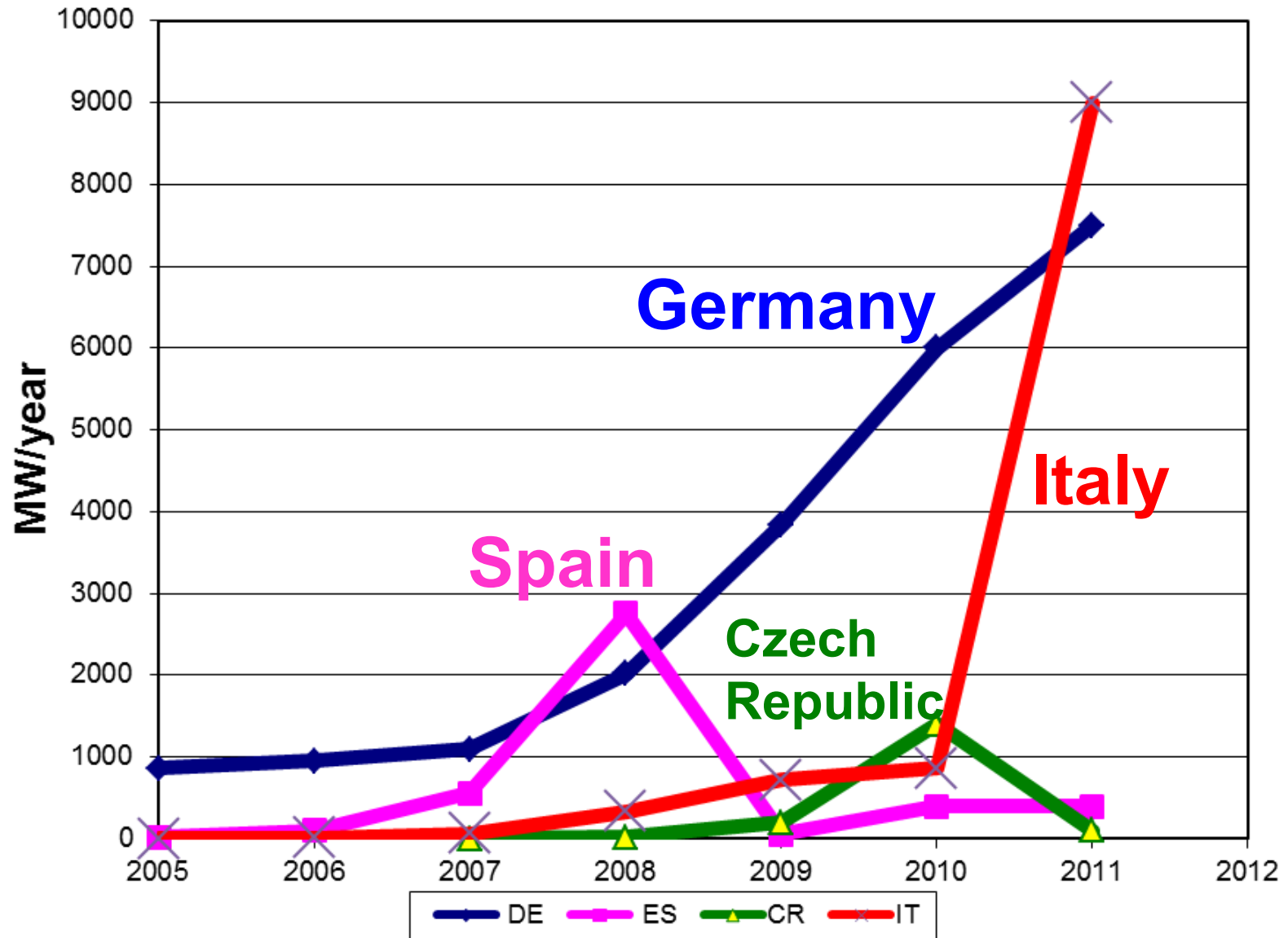
THE CASE OF SWEDEN

**IMPROVE/OPTIMIZE THE
CURRENT SYSTEMS
BEFORE HARMONISING
OR IMPLEMENTING
MAJOR CHANGES!**

- A European-wide trading system would lead to a much higher burden for European citizens than a comparable FIT for meeting the 2020/20%RES target!

4. THE SUCCESS STORY OF PHOTOVOLTAIC DEPLOYMENT (IN GERMANY)

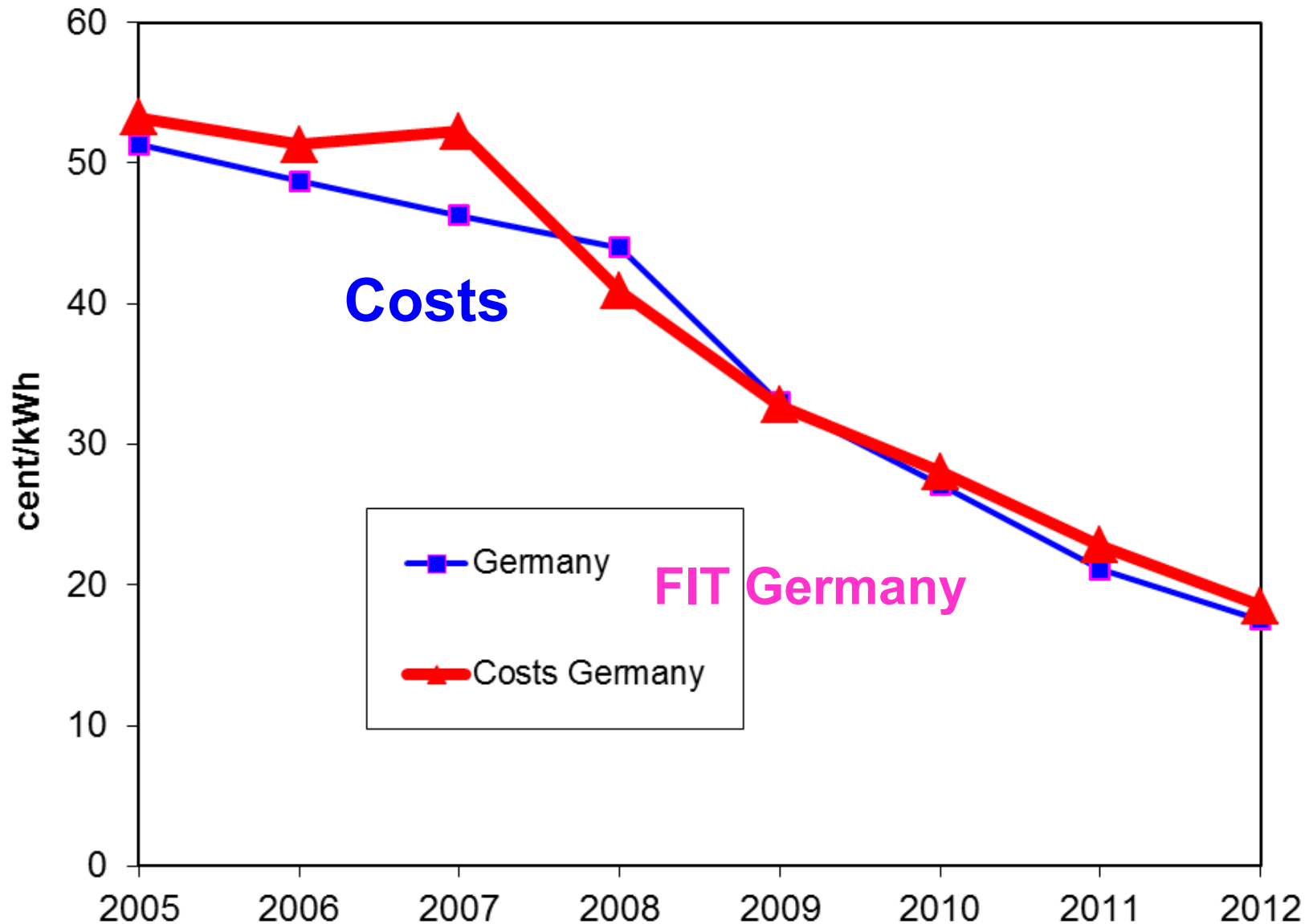
PV increases in recent years in Europe



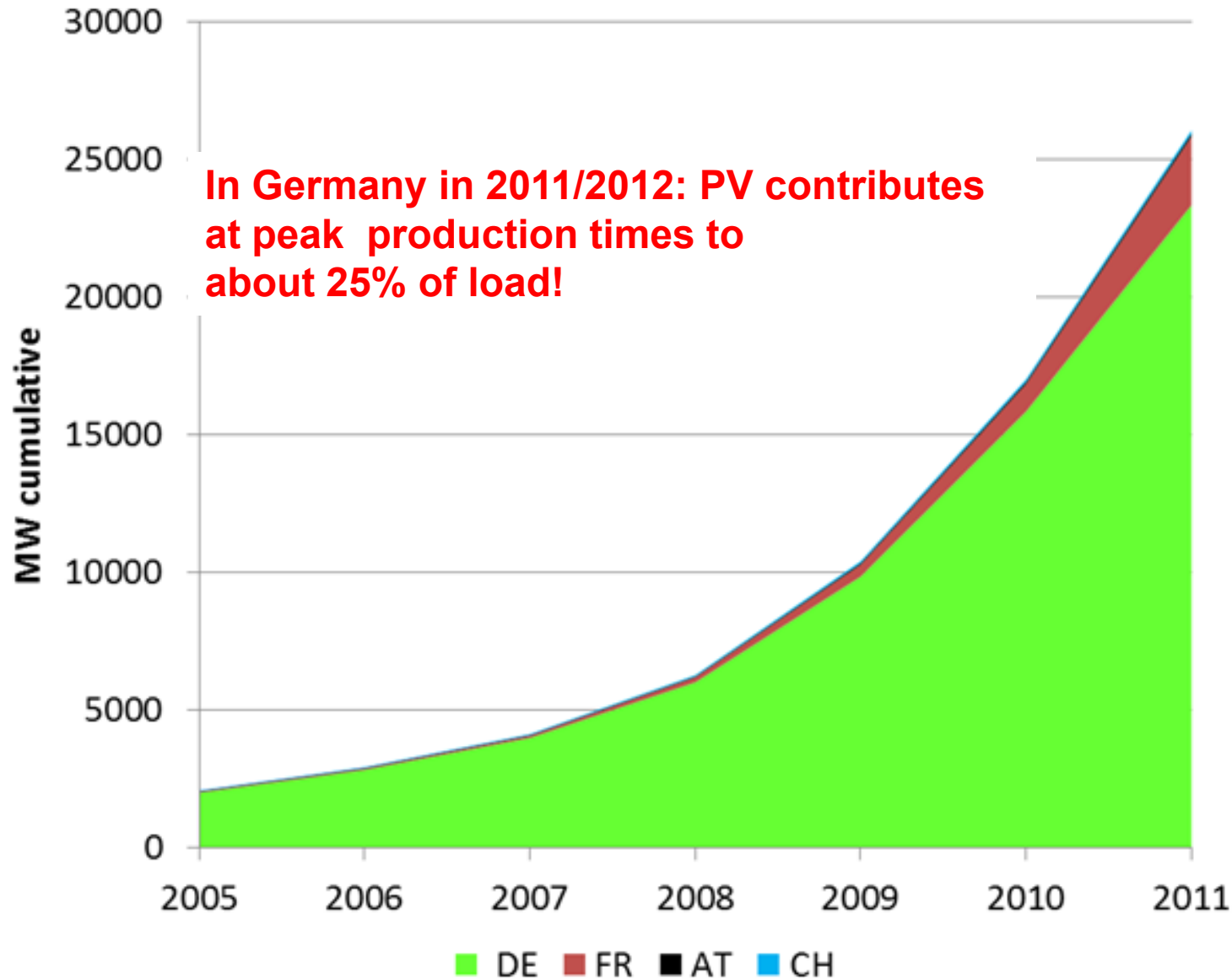
**Total installed capacity 2011: 27.7 GW
(compared to 16.6 GW in 2010)**



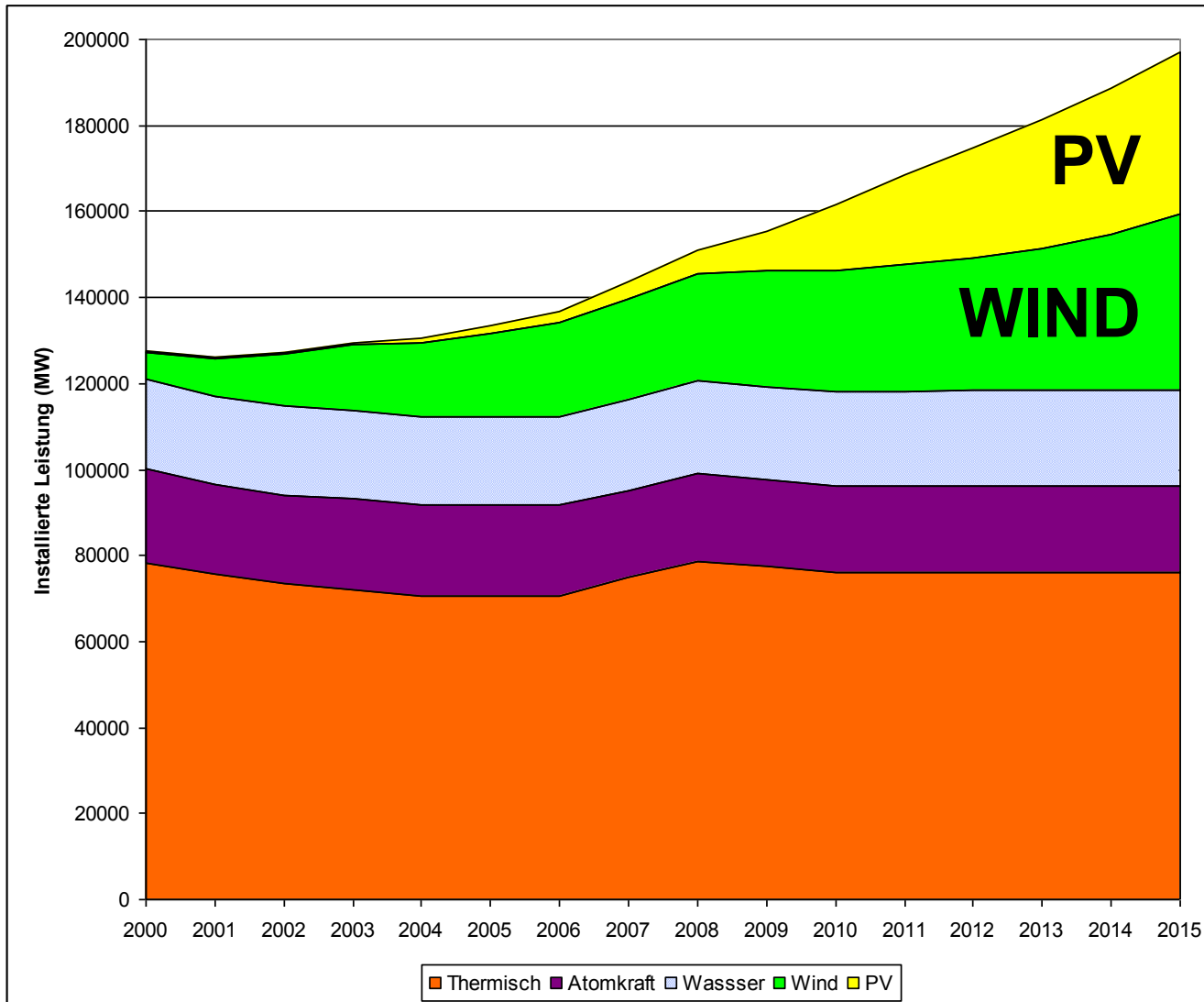
Costs of and FIT for PV



PV: cumulative development in Central Europe



SINCE 2000: INVESTMENTS MAINLY IN RENEWABLES!



2020: ca.
25000
MW
PV



5. EFFECTS OF PROMOTING RES-E ON ELECTRICITY MARKETS

LONG-TERM MARGINAL COSTS

Cheapest:

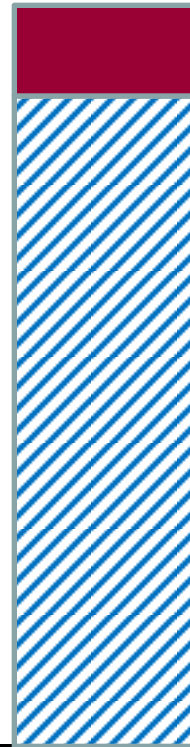
1.

Nat. Gas



2.

Nuclear



3.

Wind



Capital costs



Operation/Fuel costs



CO2 costs

SHORT-TERM MARGINAL COSTS

Cheapest:

3.

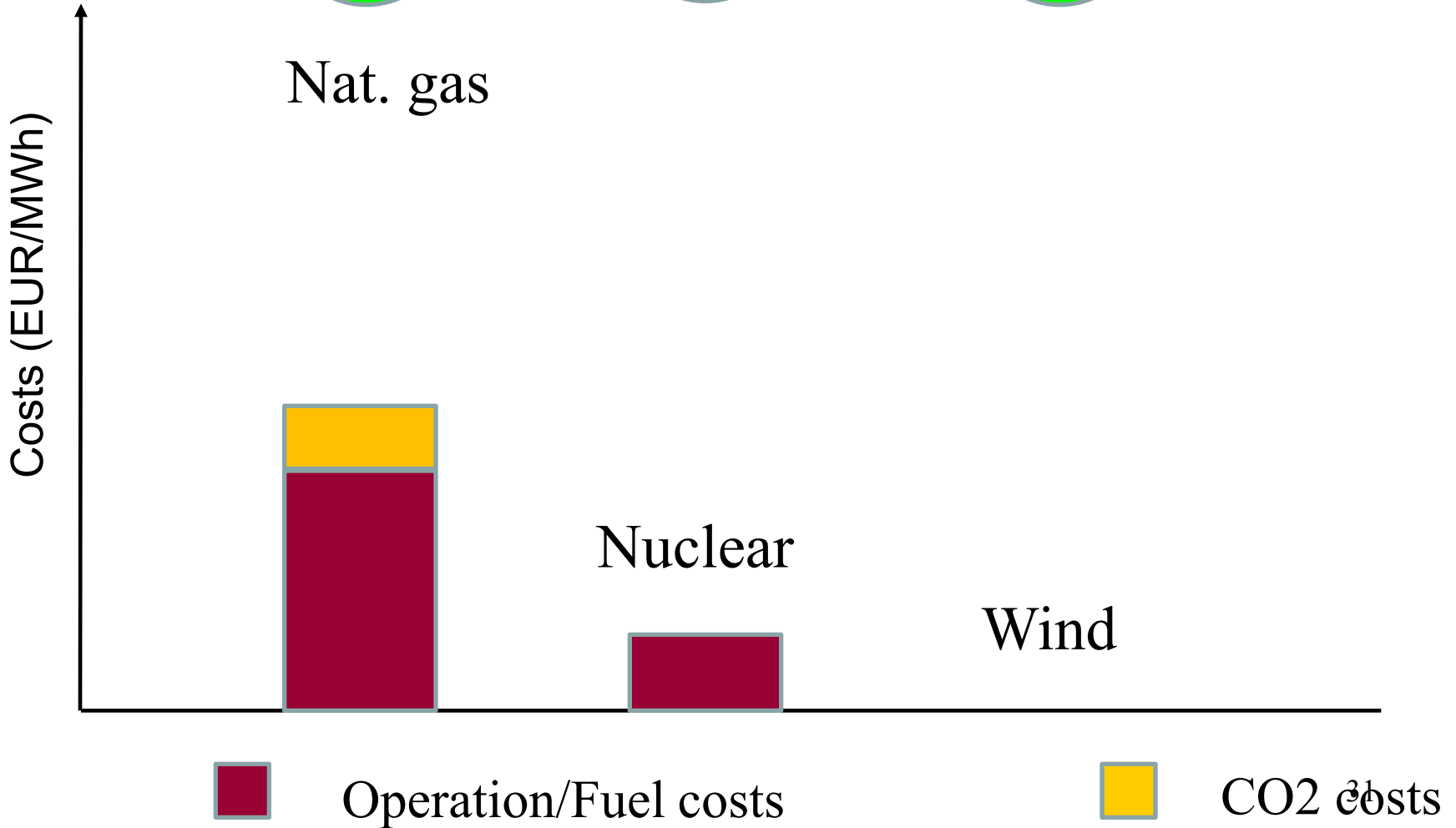
2.

1.

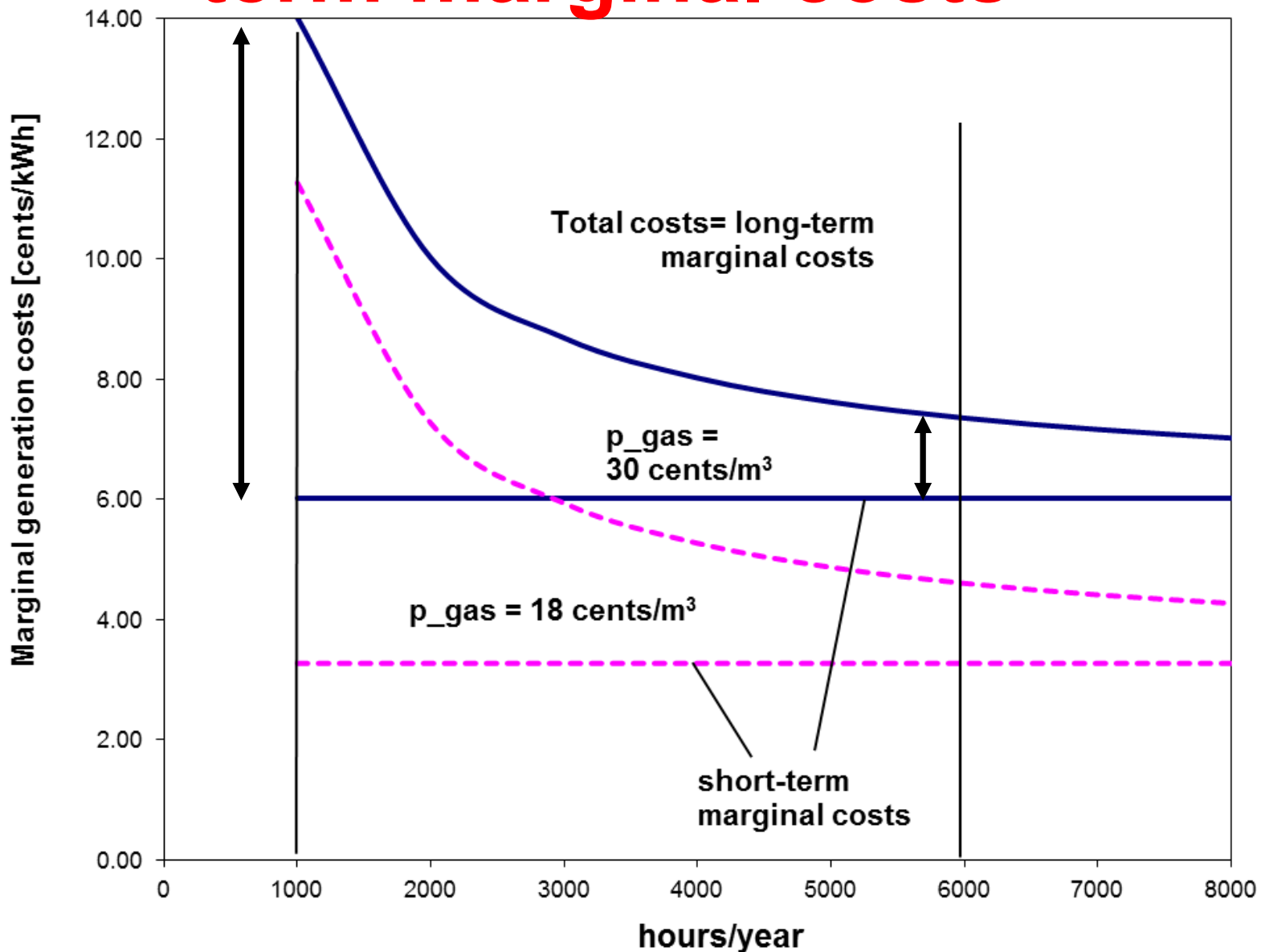
Nat. gas

Nuclear

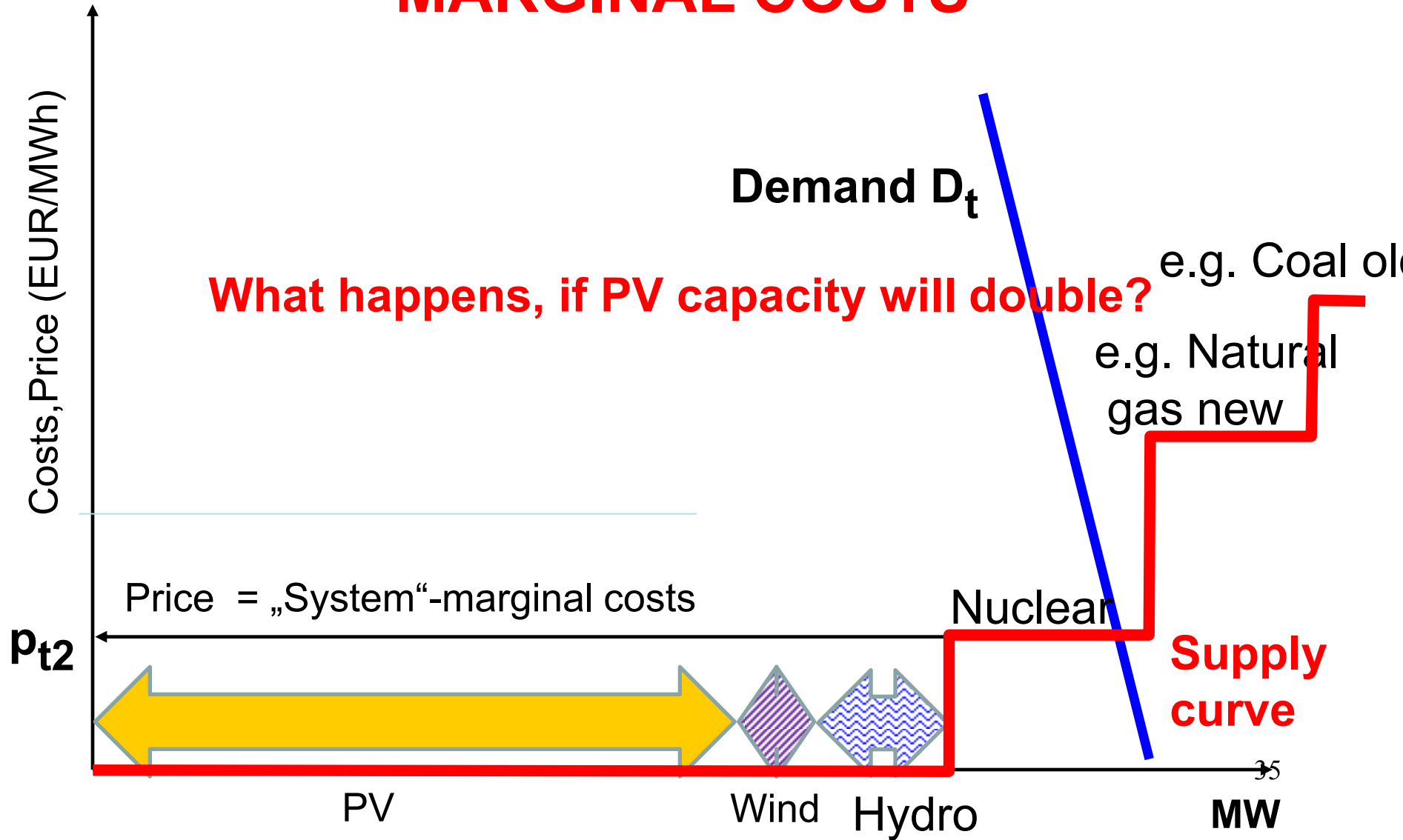
Wind



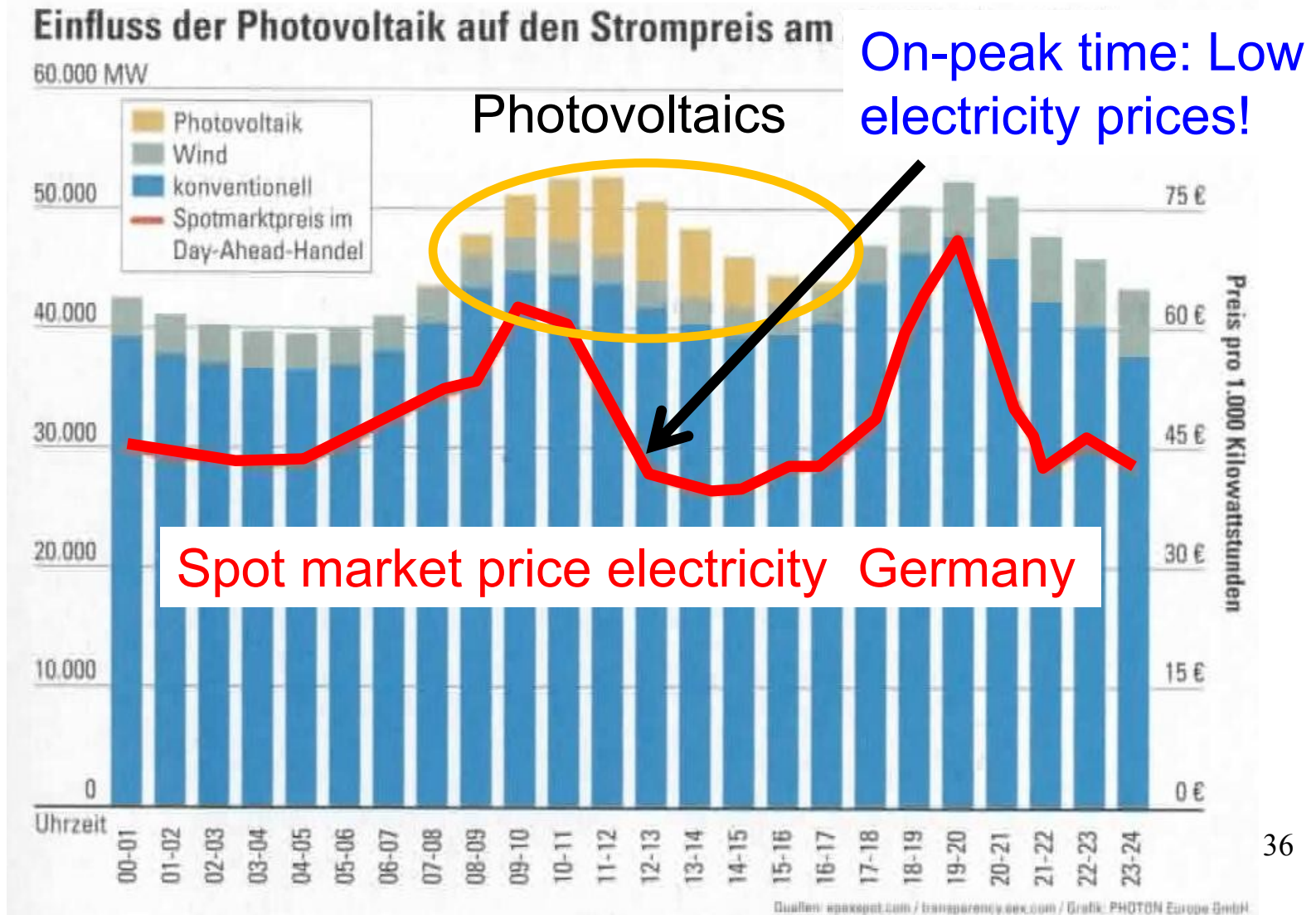
Long-term vs short-term marginal costs



ON-PEAK NICE SUMMER DAY: PRICE = SHORT-TERM MARGINAL COSTS



IMPACT OF PV ON THE ELECTRICITY MARKET PRICE IN GERMANY



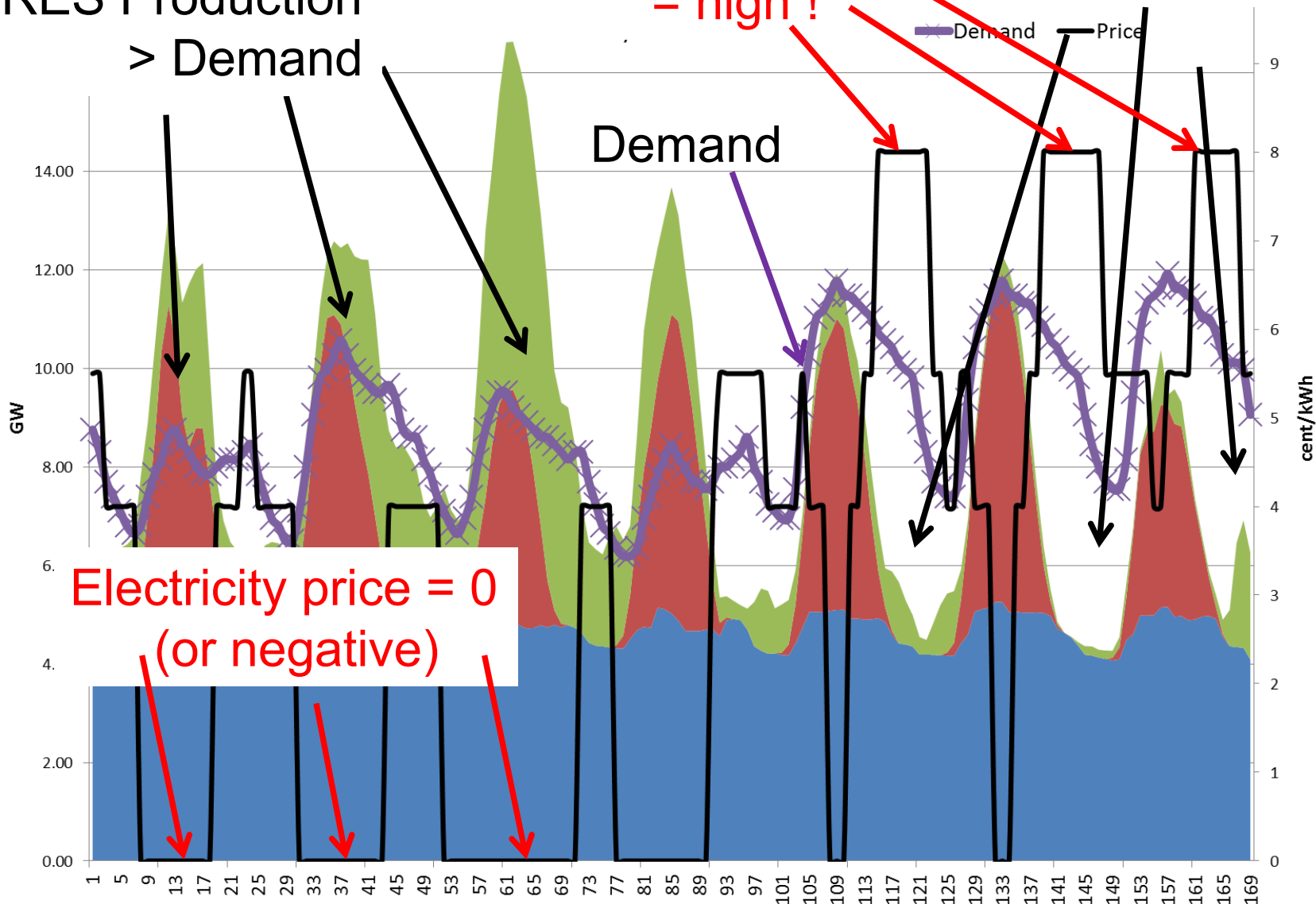
Supply and Demand



RES Production
> Demand

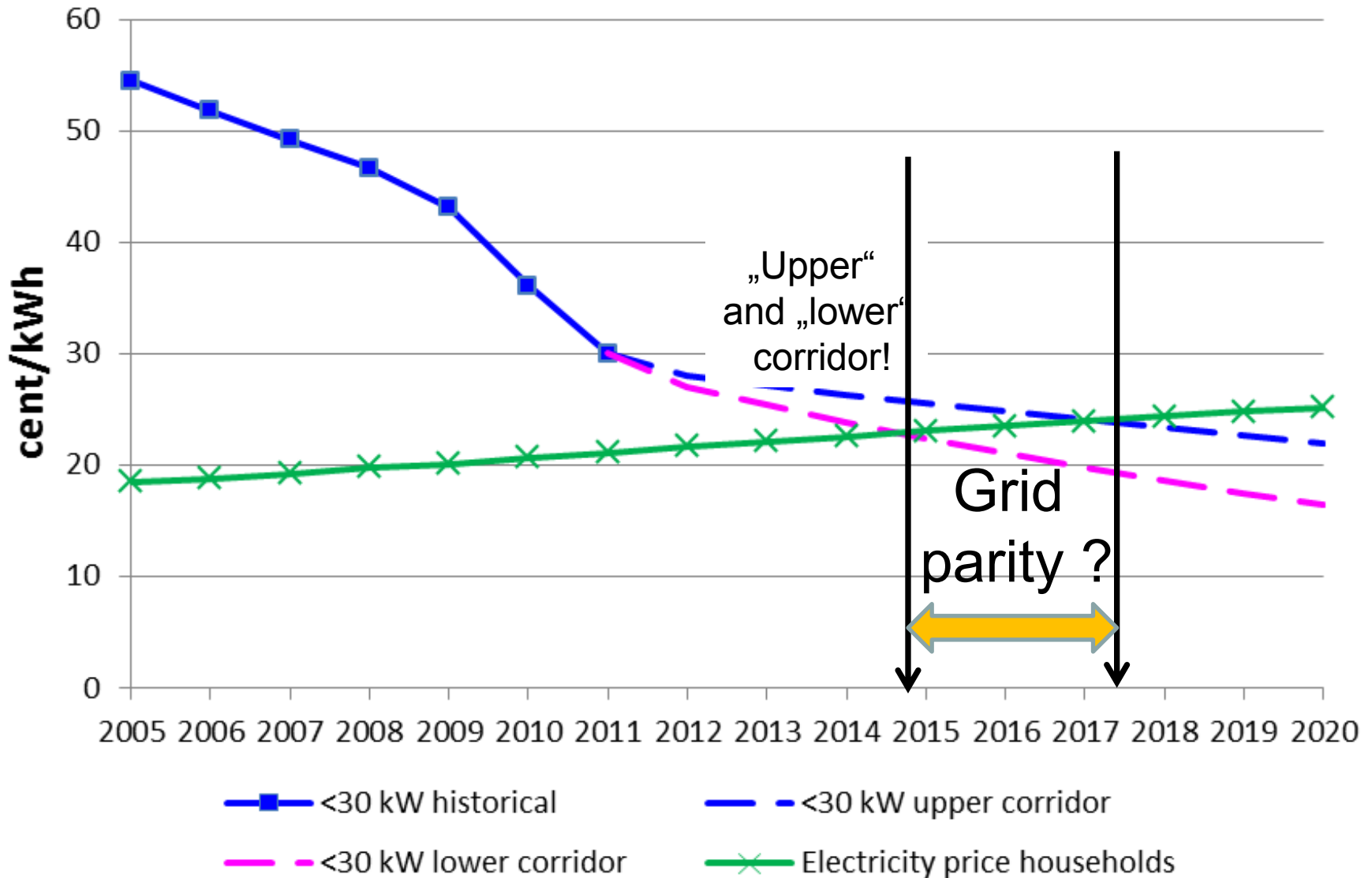
Electricity price
= high !

RES Production
< Demand

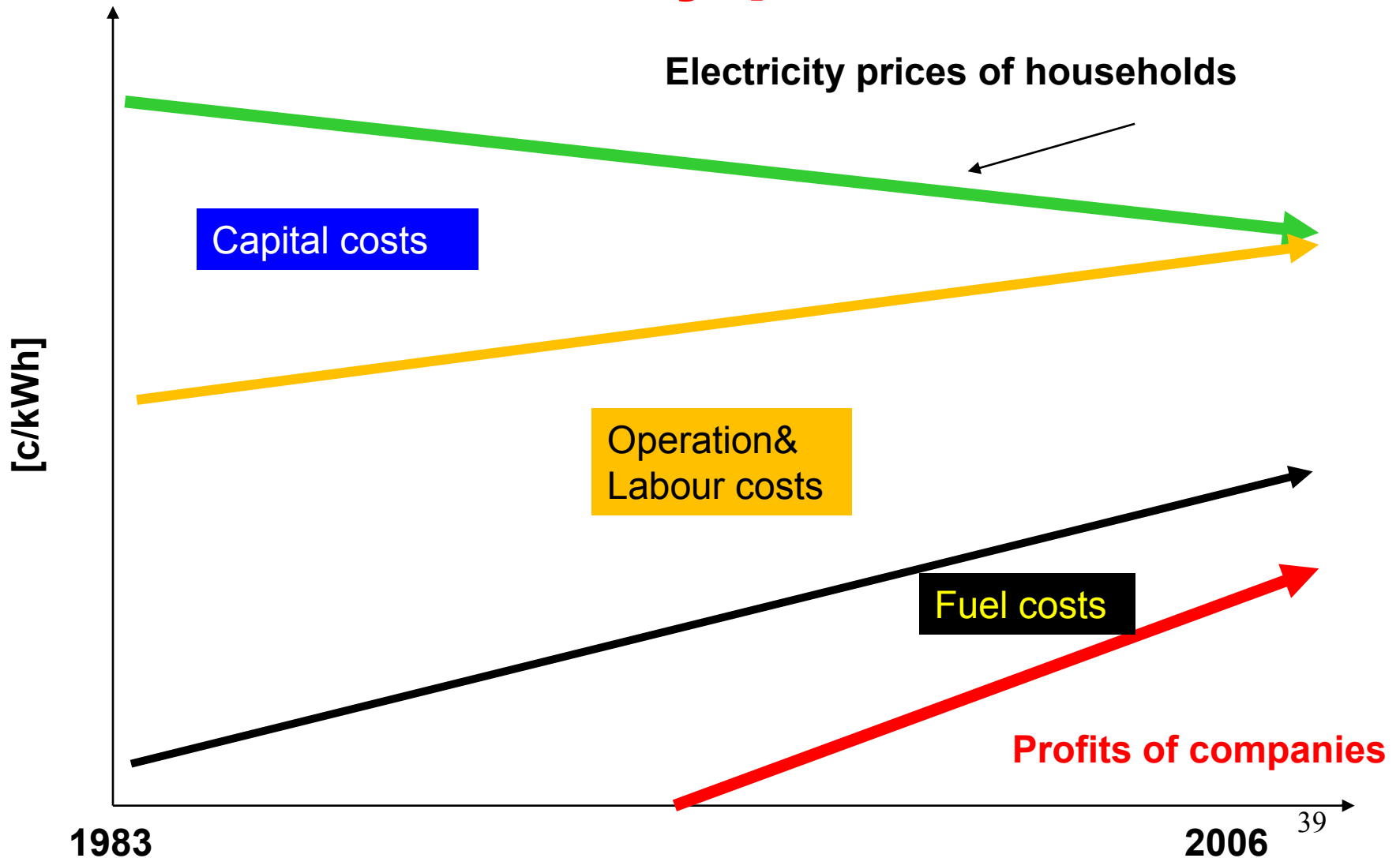


Electricity price = 0
(or negative)

PV costs vs household electricity price in Germany

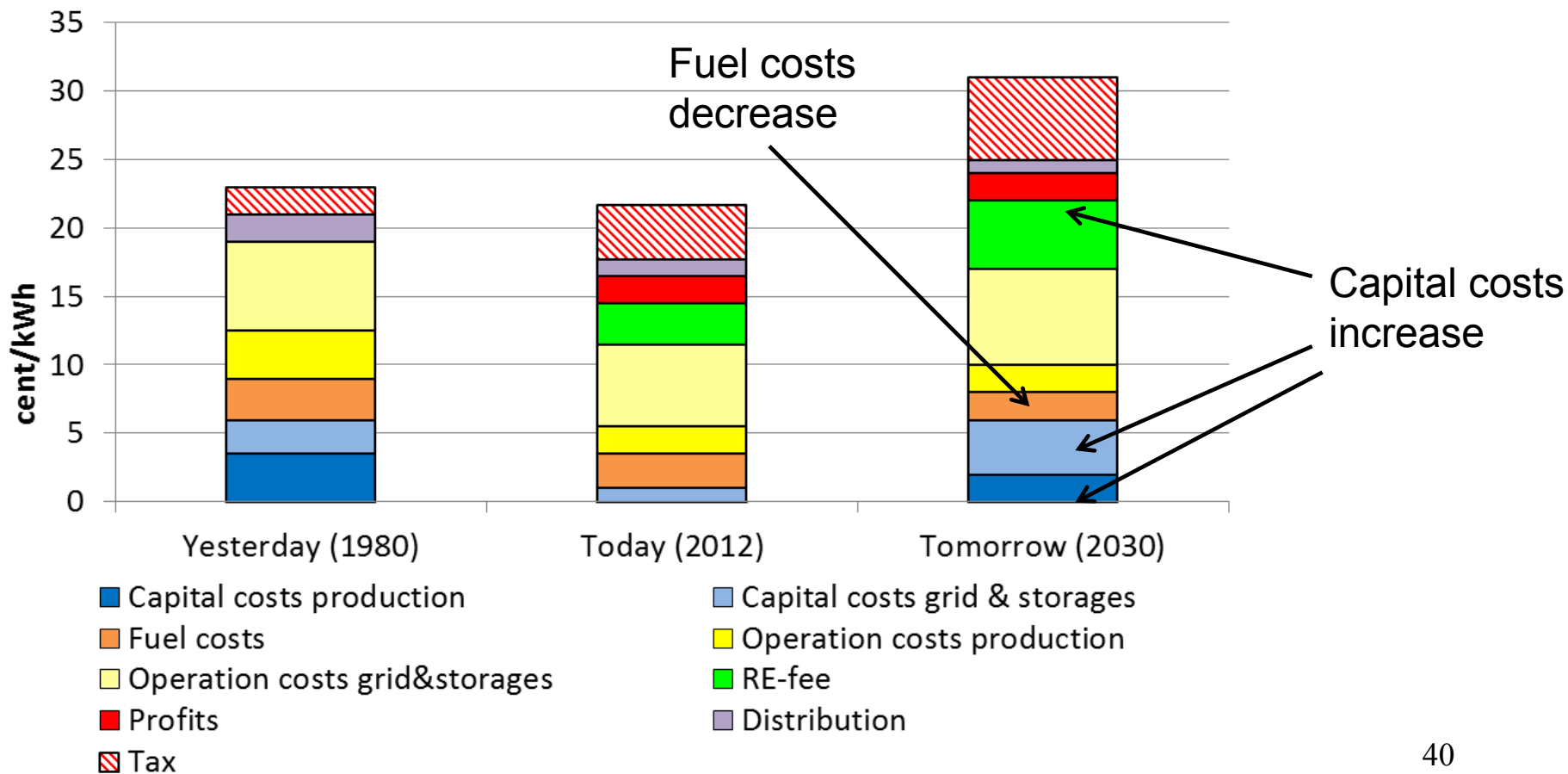


Share on household electricity prices

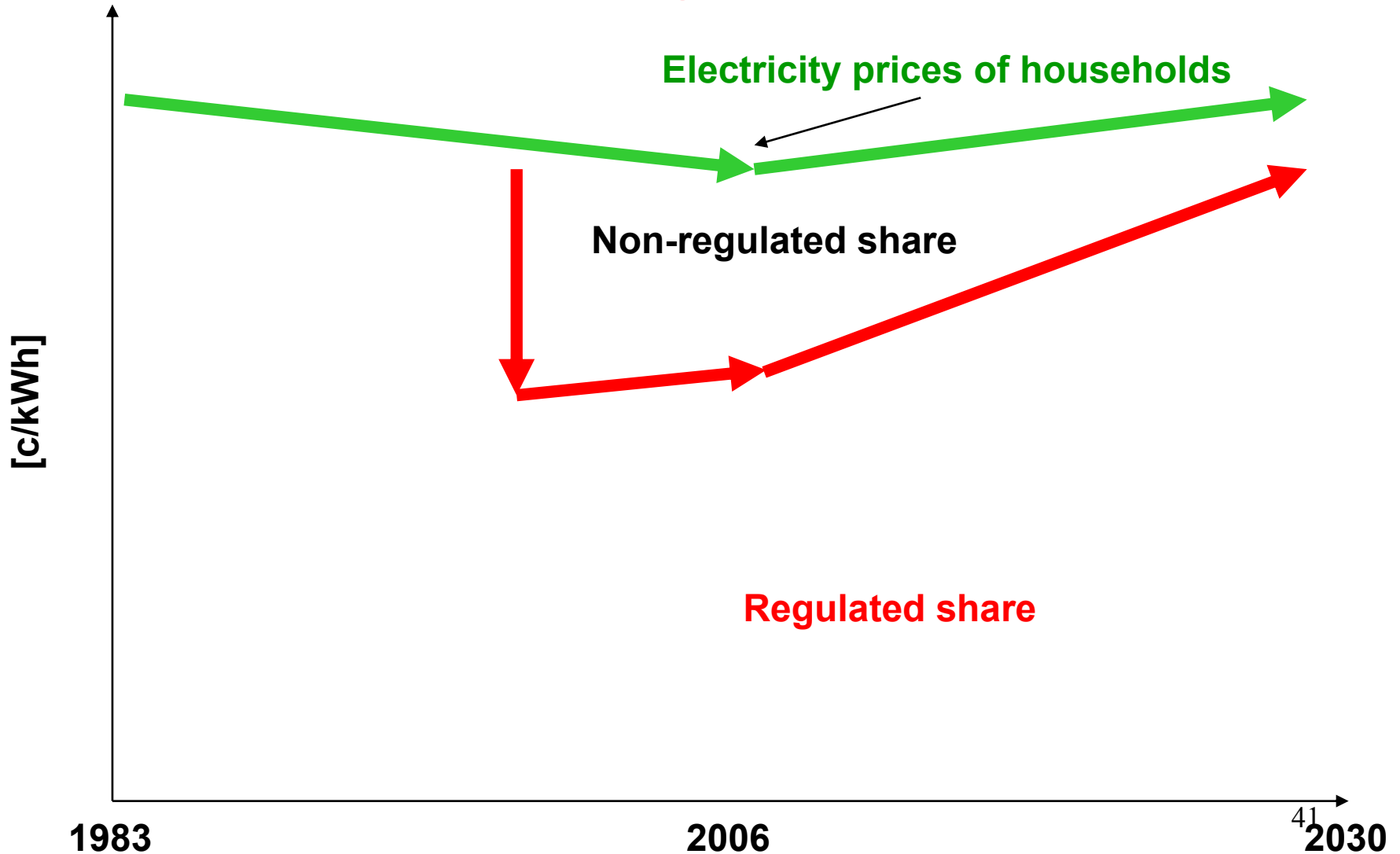


Structure household electricity prices

Household electricity price structures 1980 - 2012 - 2030



Share on household electricity prices



6. Conclusions

- (i) well-designed (dynamic) Feed-in tariff → certain deployment of PV fastest and at lowest costs for society → correct dynamic design!**
- (ii) “Overheating” destroyed other markets (Czech Republic, Spain, Italy(?));**
- (iii) Looming “grid-parity” for PV? → change to investment subsidies?**
- (v) New market design will emerge**
- (vi) New pricing mechanisms for end users**
- (vii) Regulated share on electricity prices will increase**

INTERESTED IN FURTHER INFORMATION?

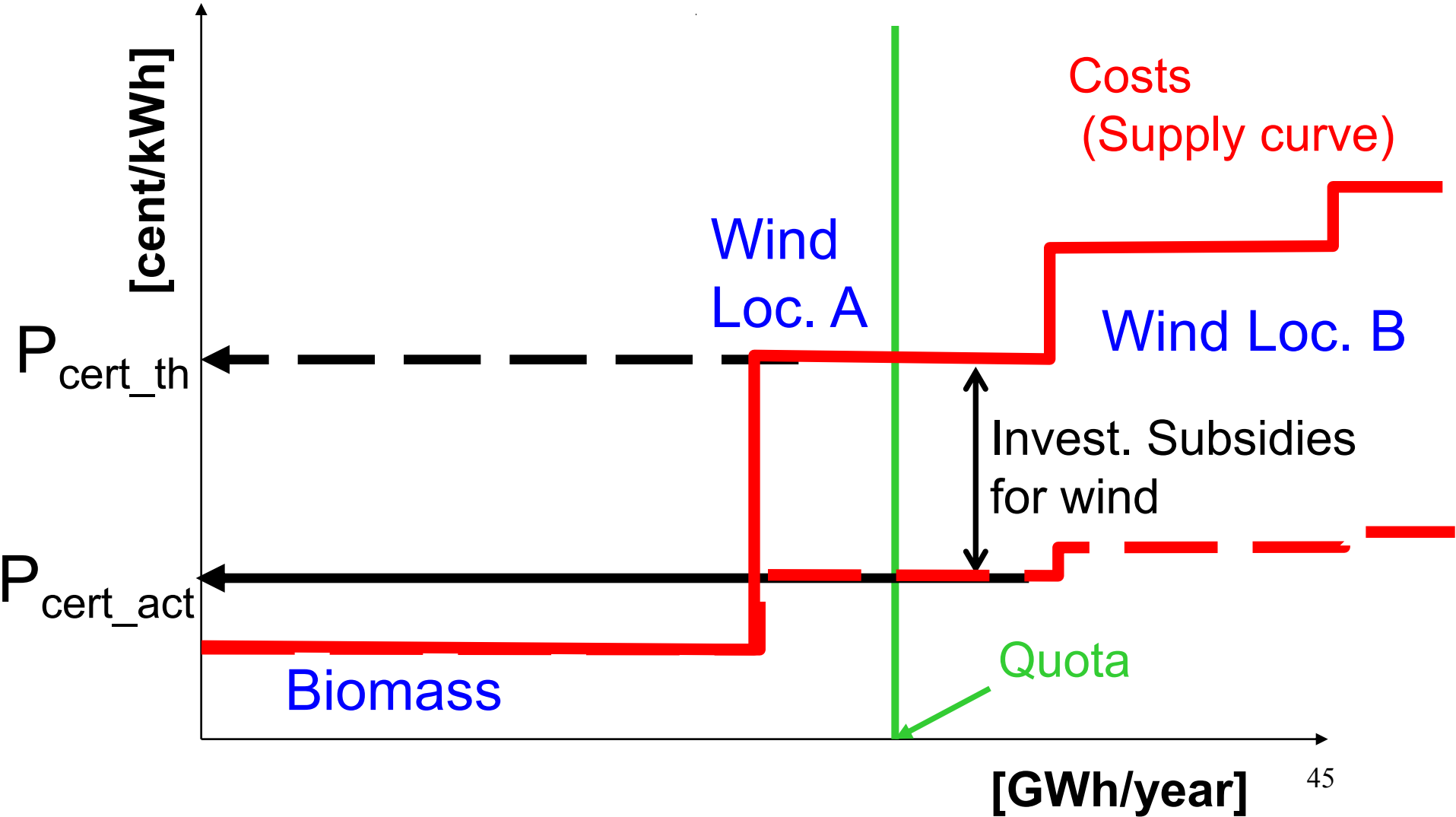
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THE CASE OF SWEDEN

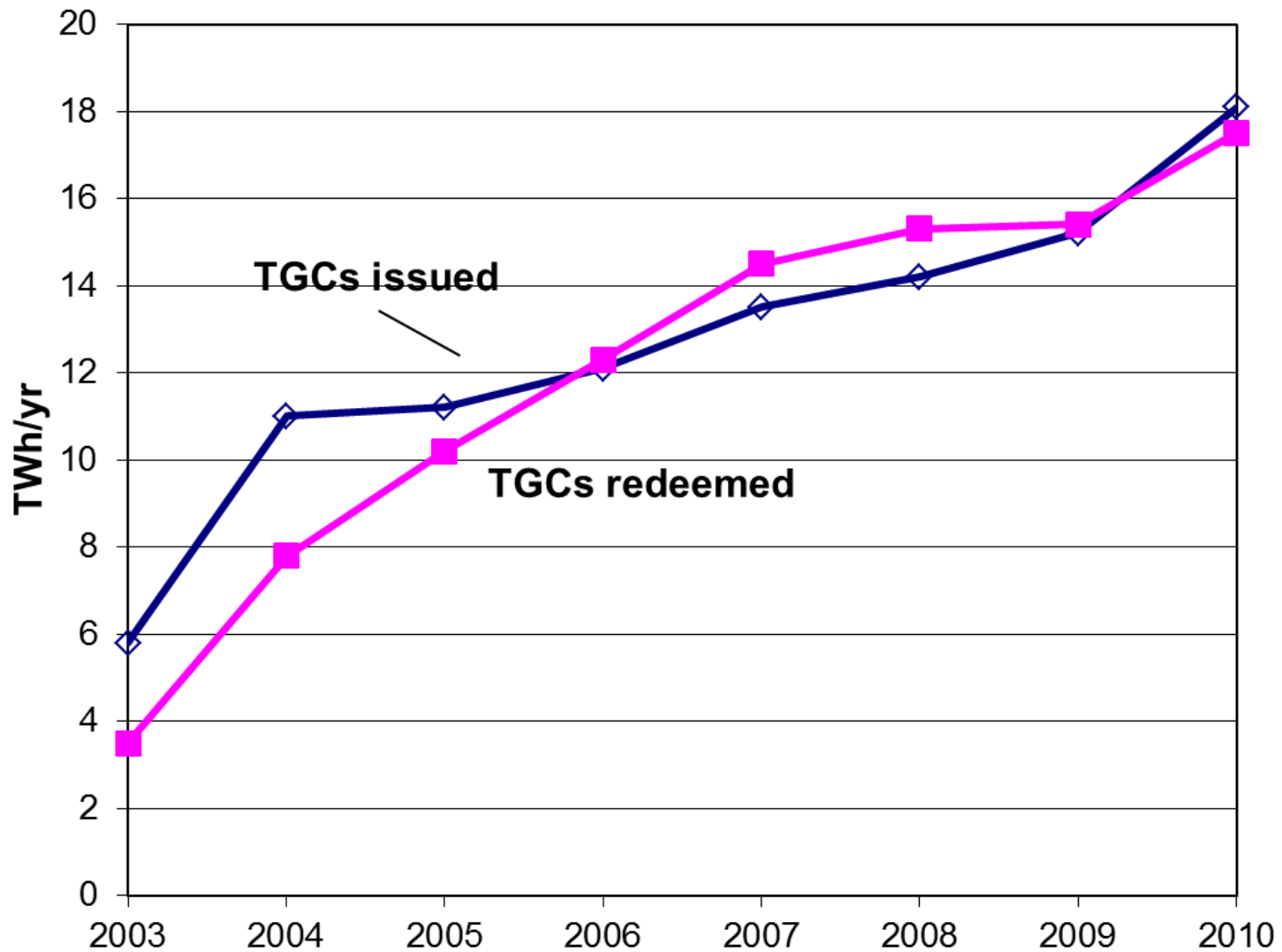
Major characteristics:

- * since 2002: quota-based system of Tradable Certificates
- * also „old“ capacity allowed to fulfill quota
- * additional investment subs. for wind!

SWEDEN: IMPACT OF INVESTMENT SUBSIDIES



PRICES OF CERTIFICATES IN SWEDEN



(EUR/kWp)

