

# OPTIMAL PROMOTION STRATEGIES FOR INCREASING THE SHARE OF RES-E – LESSONS FROM THE OPTRES PROJECT

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MARIBOR, 10th May 2006

- 1. Introduction**
- 2. Survey on policy strategies**
- 3. Objectives of promotion strategies**
- 4. A comparison of the success**
- 5. Success criteria for Feed-in tariffs**
- 6. Success criteria for TGC-based quotas**
- 7. Conclusions**

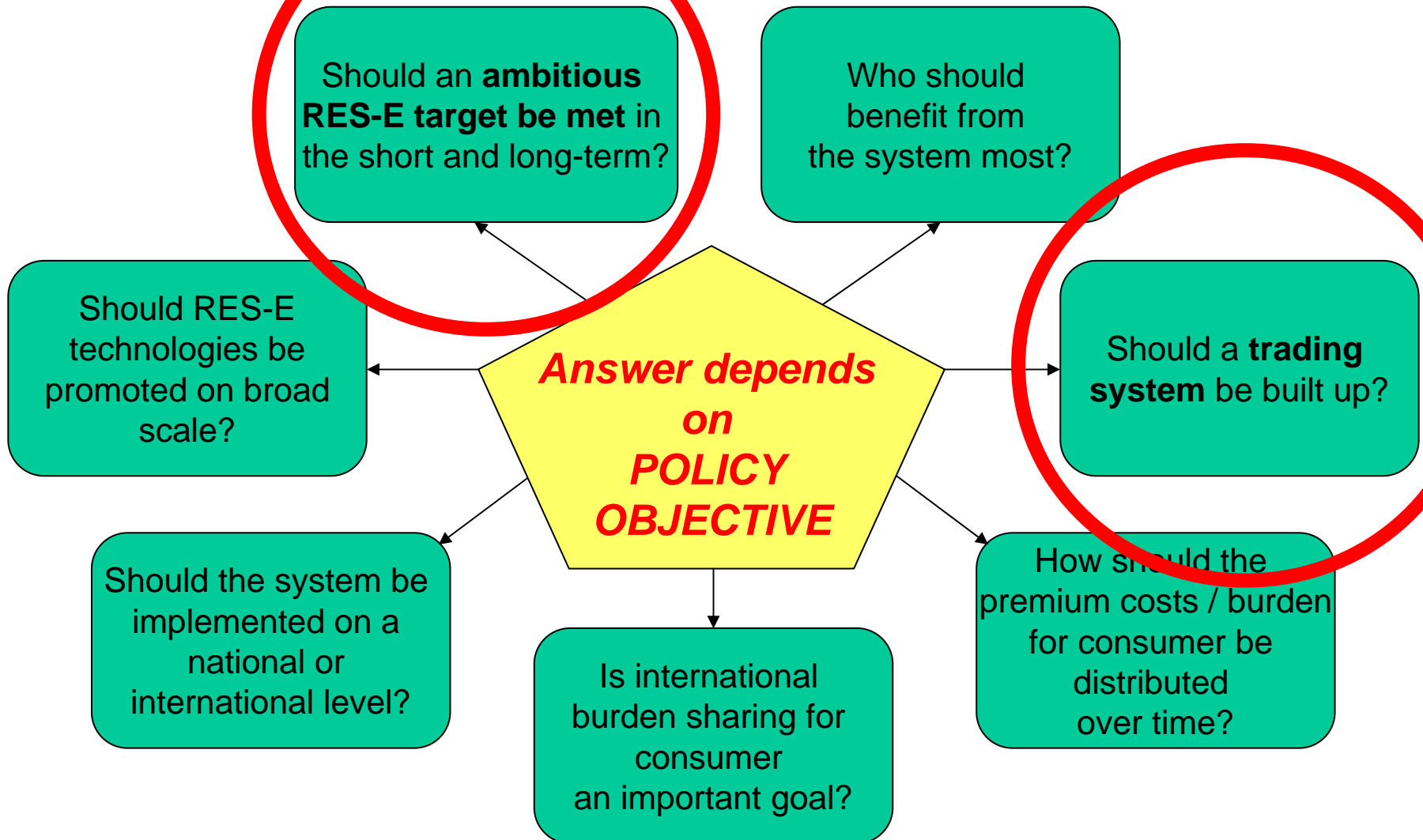
## CORE MOTIVATION:

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

**(e.g. RES-E directive of the EC to  
increase the share of RES-E from 12%  
to 22% until 2010)**

## 2. What is the problem?

# Which instrument fits best?



## MAJOR PROBLEM:

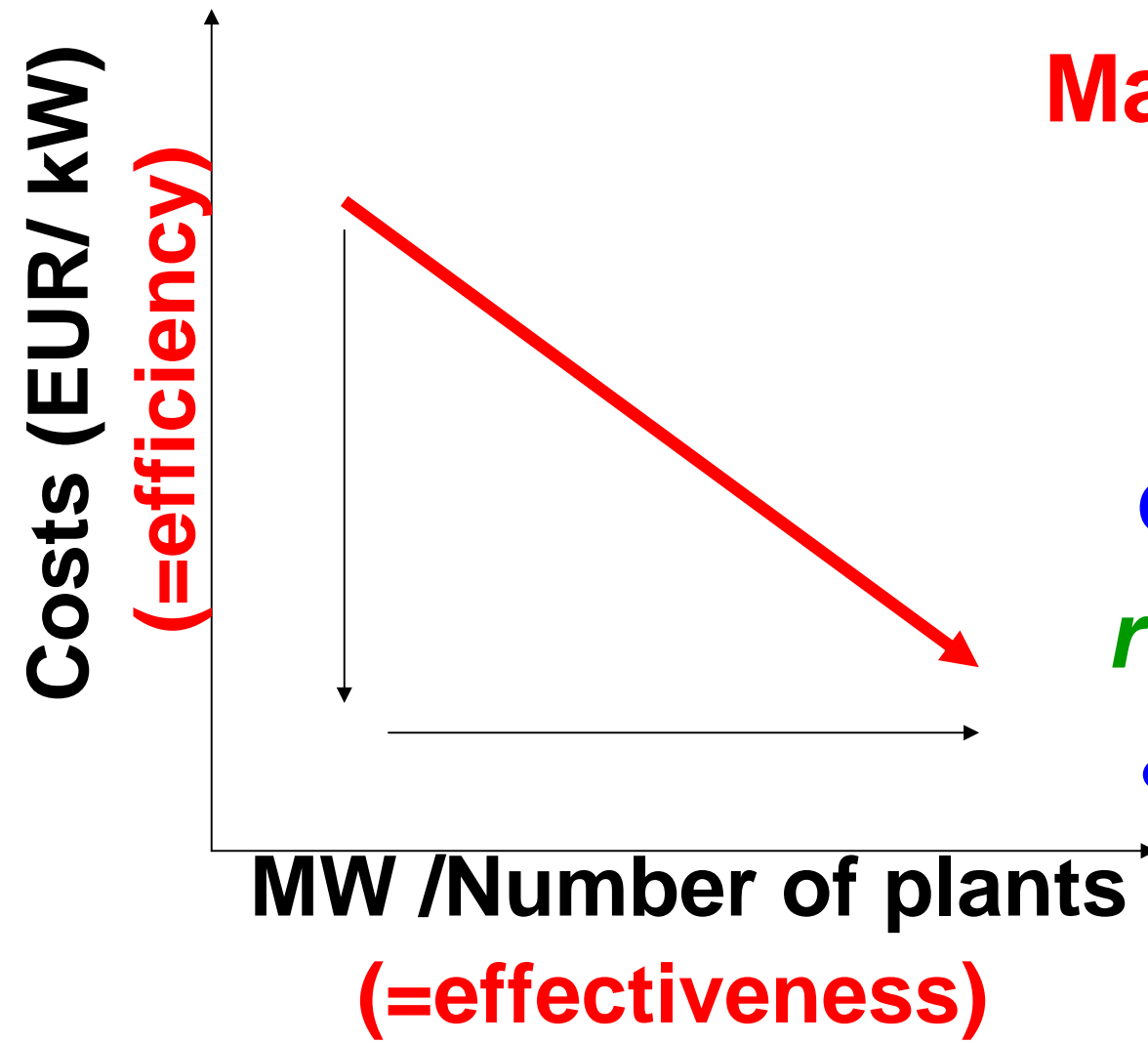
**Correct design of  
policy**

- with respect to:
  - renewable targets
  - Financial incentives
  - Credibility for investors
    - Transfer costs!

# POLICY STRATEGIES

		REGULATORY	VOLUNTARY
Capacity-driven strategies	Generation-based	<ul style="list-style-type: none"> <li>RPS</li> <li>Quota-based TGCs</li> </ul>	<ul style="list-style-type: none"> <li>National generation targets</li> </ul>
	Investment focused	<ul style="list-style-type: none"> <li>Bidding/Tendering</li> </ul>	<ul style="list-style-type: none"> <li>National installation or capacity targets</li> </ul>
Price-driven strategies	Generation-based	<ul style="list-style-type: none"> <li>feed-in tariffs,</li> <li>rate based incentives</li> <li>Net metering</li> </ul>	<ul style="list-style-type: none"> <li>Green Power Marketing               <ul style="list-style-type: none"> <li>Green tariffs</li> </ul> </li> <li>Solar stock exchange</li> </ul>
	Investment focused	<ul style="list-style-type: none"> <li>Rebates</li> <li>Soft loans</li> <li>Tax incentives</li> </ul>	<ul style="list-style-type: none"> <li>Contracting</li> <li>Shareholder progr.</li> <li>Contribution               <ul style="list-style-type: none"> <li>Bidding</li> </ul> </li> </ul>
Other		–	<ul style="list-style-type: none"> <li>NGO-marketing</li> <li>Selling green buildings               <ul style="list-style-type: none"> <li>Retailer progr.</li> <li>Financing</li> </ul> </li> <li>Public building prog.</li> </ul>

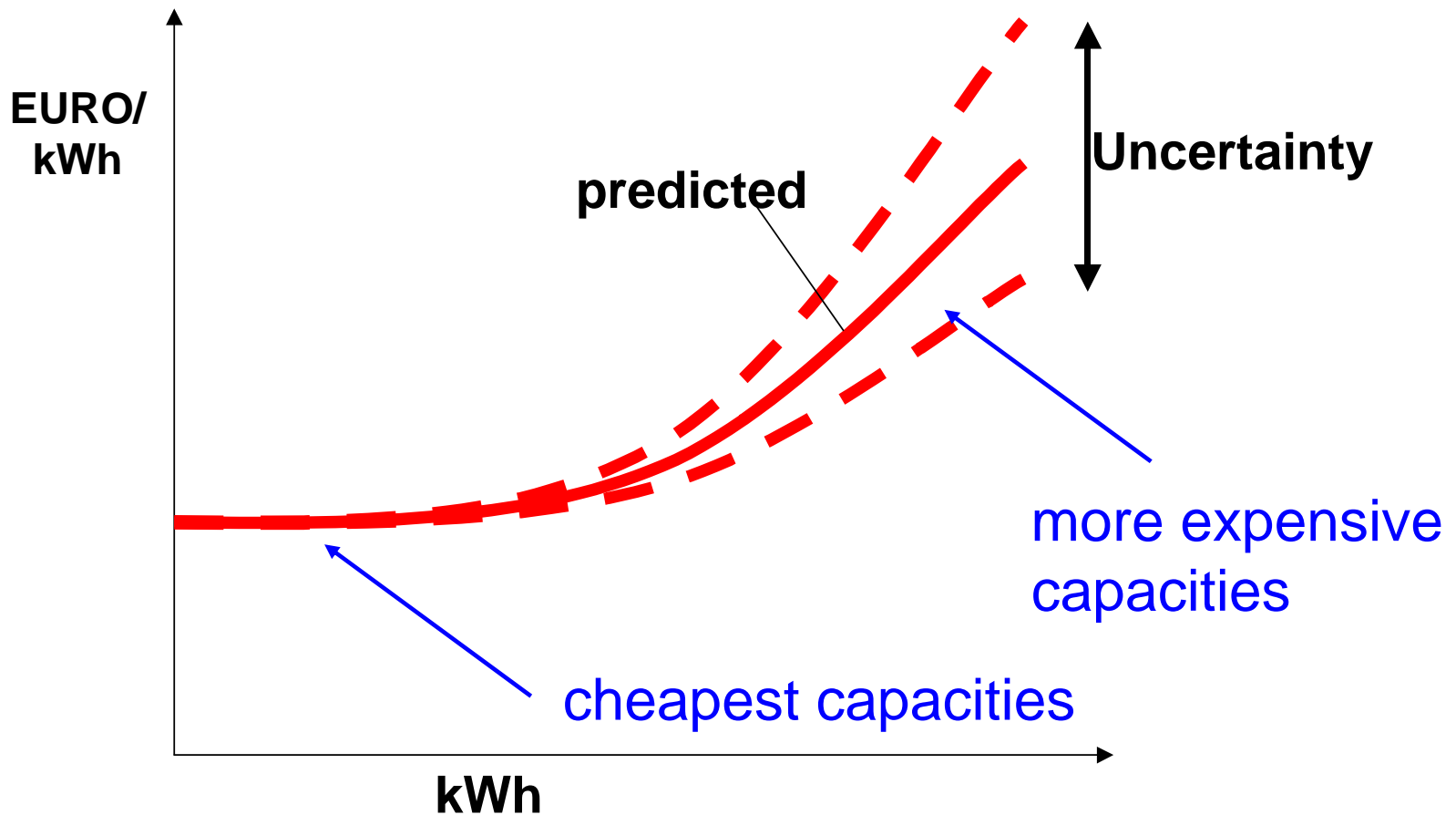
## TO SUCCESSFUL STRATEGIES



Major objectives:

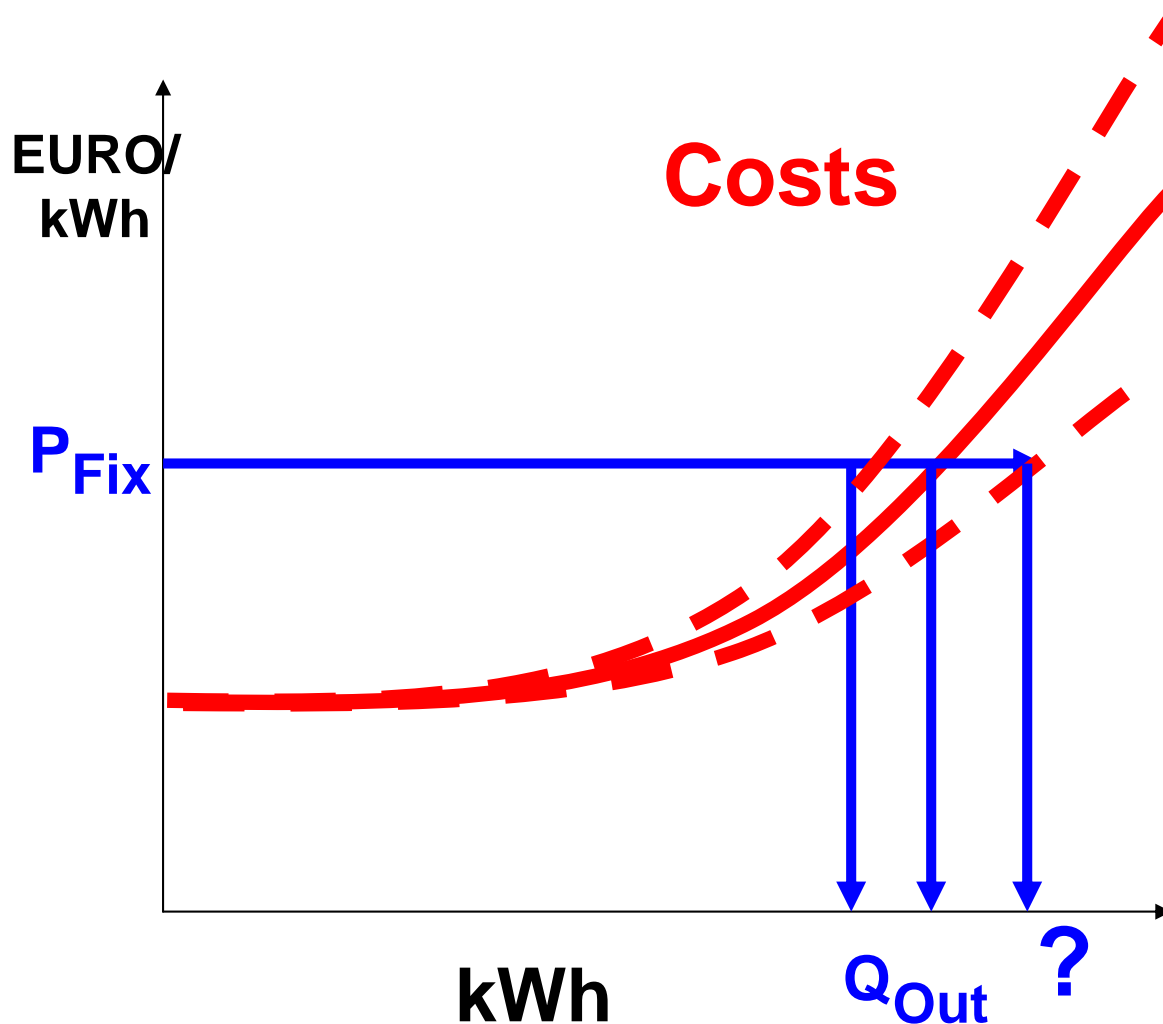
- increase the amount of electricity from *renewables* and
- reduce costs!

## RESOURCE CURVES

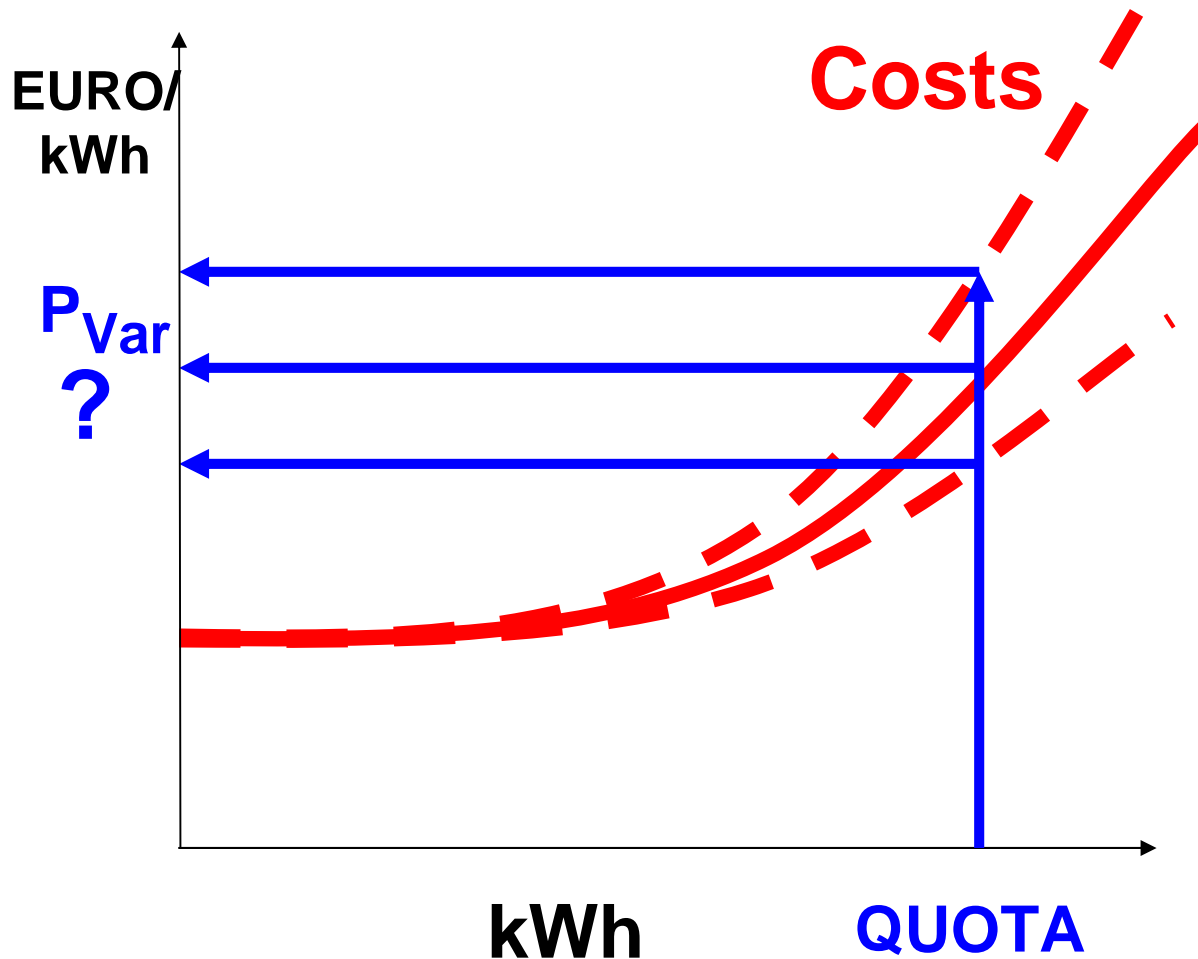




## WORK



# HOW QUOTA-BASED TRADABLE GREEN CERTIFICATES WORK

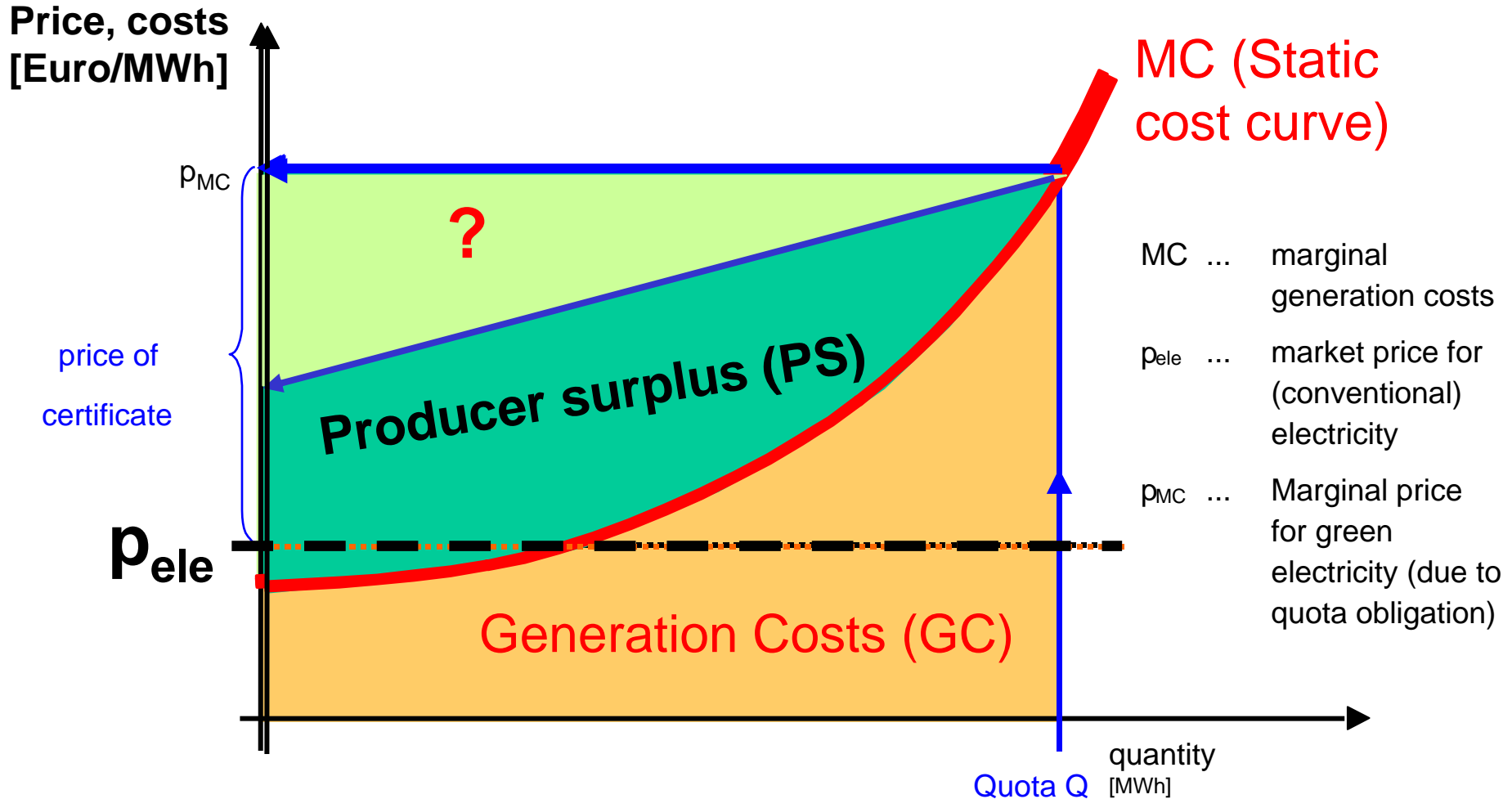


***Quota-based TGC systems as well as  
Feed-in tariff systems create an  
artificial market***

***and cause***

***transfer costs***

Minimise transfer costs for consumers = **Producer Surplus** + Generation costs - Revenues electricity market



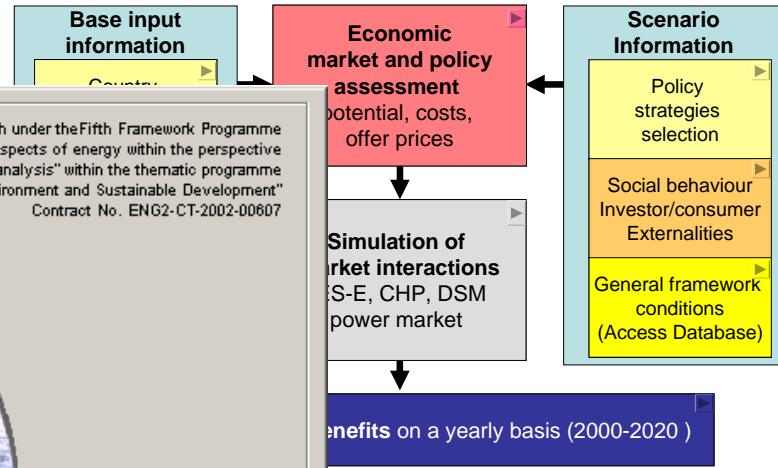
# *Why is it important to minimize transfer costs?*

***Transfer costs are extra costs finally to be paid by the final customers***

**(regardless which promotion scheme is chosen these extra costs will finally be paid by the final customers)**

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***The lower the transfer costs are  
the higher will be public acceptance  
the larger will be the amount of  
additional electricity generated from  
RES.***



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**Green-X**  
Deriving optimal promotion strategies for increasing the share of RES-E in a dynamic European electricity market

**Energy Economics Group**

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Vienna University of Technology

Green-X - Deriving optimal promotion strategies for increasing the share of RES-E in a dynamic European electricity market

File Select parameter Simulation Results Additional tools

**Energy policy instruments - Electricity**

Select Germany

**Germ Wind**

Feed in tariff Tendership system Tradable Green Certificate

Feed in tariff

Fixed tariff

Premium tariff

Valid for plants not older than 15

Guaranteed tariff for 20 year(s)

Flat rate

Value €/MWh

Stepped rate

Maximum value 85,26 €/MWh Full

Minimum value 61,74 €/MWh Full

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**Results - Country specific - Cross-section**

Select European Union 15

**General Results:**

<b>Total Electricity Consumption</b>	
Share of total electricity consumption	
<b>Total Electricity Generation</b>	
Share of total electricity generation	
<b>Electricity Generation</b>	
<b>Total Electricity Generation</b>	
of which from renewable energy sources (RES)	
Share of total electricity generation	
of which from combined heat and power plants (CHP)	
Share of total electricity generation	
<b>Generation Costs</b>	
Total Generation Costs due to renewable energy sources (RES)	248,36,96 Mill. Euro per year
of which due to electricity plants (ELE)	26,741,35 Mill. Euro per year
Share of total generation costs	10,51 %
of which due to combined heat and power plants (CHP)	4,694,72 Mill. Euro per year
Share of total generation costs	1,89 %
<b>Total Costs for Society</b>	

the share of RES-E in a dynamic European electricity market

2020

benchmark

Share of Electricity Generation	Electricity Generation new plants	Share of Electricity Generation new plants	Installed capacity	Share of installed capacity		New installed capacity
				%	MW	
100,00	38,67	100,00	3.522,69	100,00		10,47
100,00	38,67	100,00	3.522,69	100,00		10,47
15,46	11,34	29,33	266,96	7,56		1,76
1,54	0,98	2,53	33,97	0,96		1,38
15,81	15,97	41,30	271,88	7,72		2,76
0,00	0,00	0,00	0,00	0,00		0,00
0,30	0,00	0,00	9,67	0,27		0,00
0,30	0,00	0,00	9,67	0,27		0,00
0,00	0,00	0,00	0,00	0,00		0,00
1,17	0,95	17,98	18,65	0,53		1,20
0,74	0,00	0,00	14,94	0,42		0,00
0,91	0,01	0,00	1,20	0,04		0,00
0,91	0,21	0,00	0,00	0,04		0,00
0,00	0,00	0,00	0,00	0,00		0,00
0,00	0,00	0,00	0,00	0,00		0,00
0,00	0,00	0,00	0,00	0,00		0,00
0,00	0,00	0,00	0,00	0,00		0,00
7,388,44	81,37	20,88	63,49	3,185,67		90,43
8,823,19	88,27	1,215,45	3,743,11	3,765,11		106,88
1,263,83	13,90	137,78	355,00	401,95		73,41

Platform Win2000 SP3  
Win XP SP1  
Version 4.4.3

**... to simulate various policy strategies for the promotion of RES-E in a dynamic framework on a national or international level**

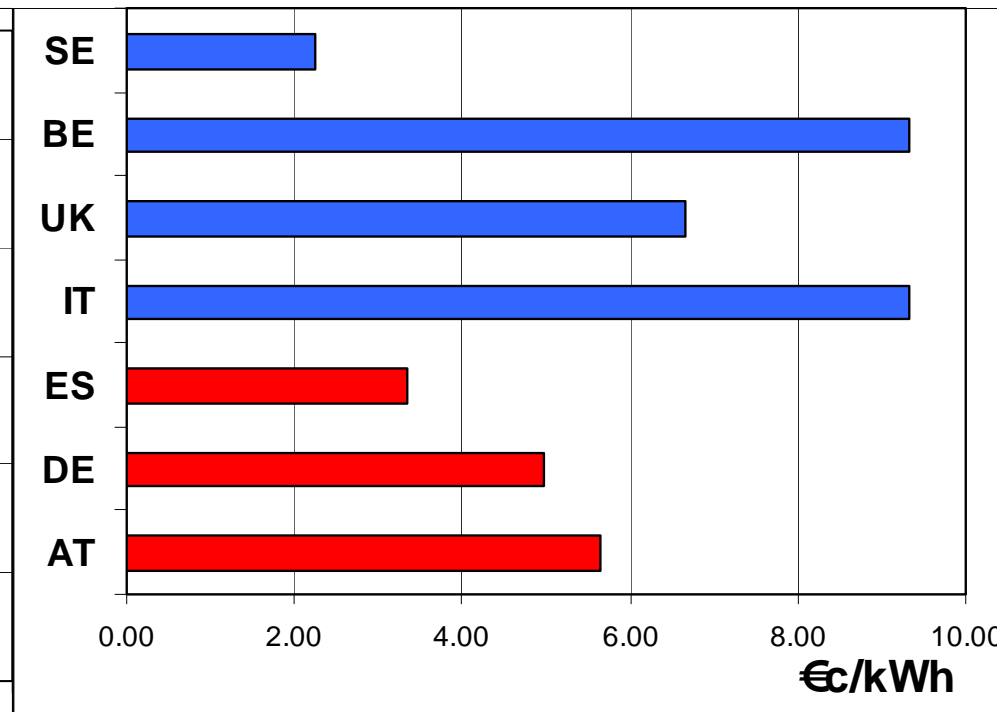
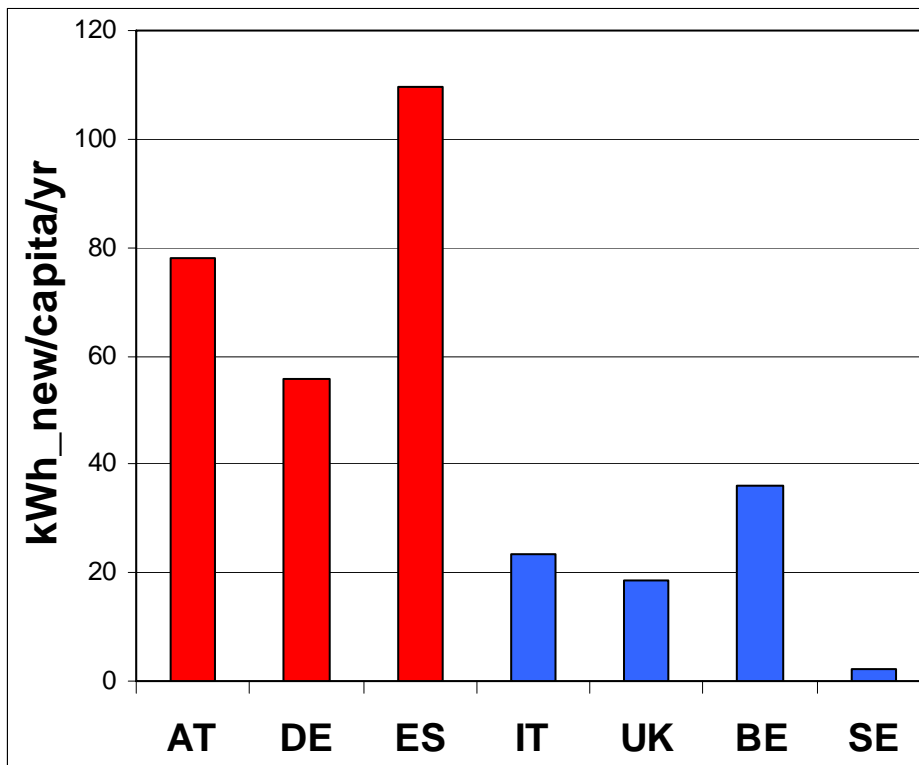
**(Current: EU15, end 2005: EU27, future: EU 39???)**



## COMPARISON OF STRATEGIES

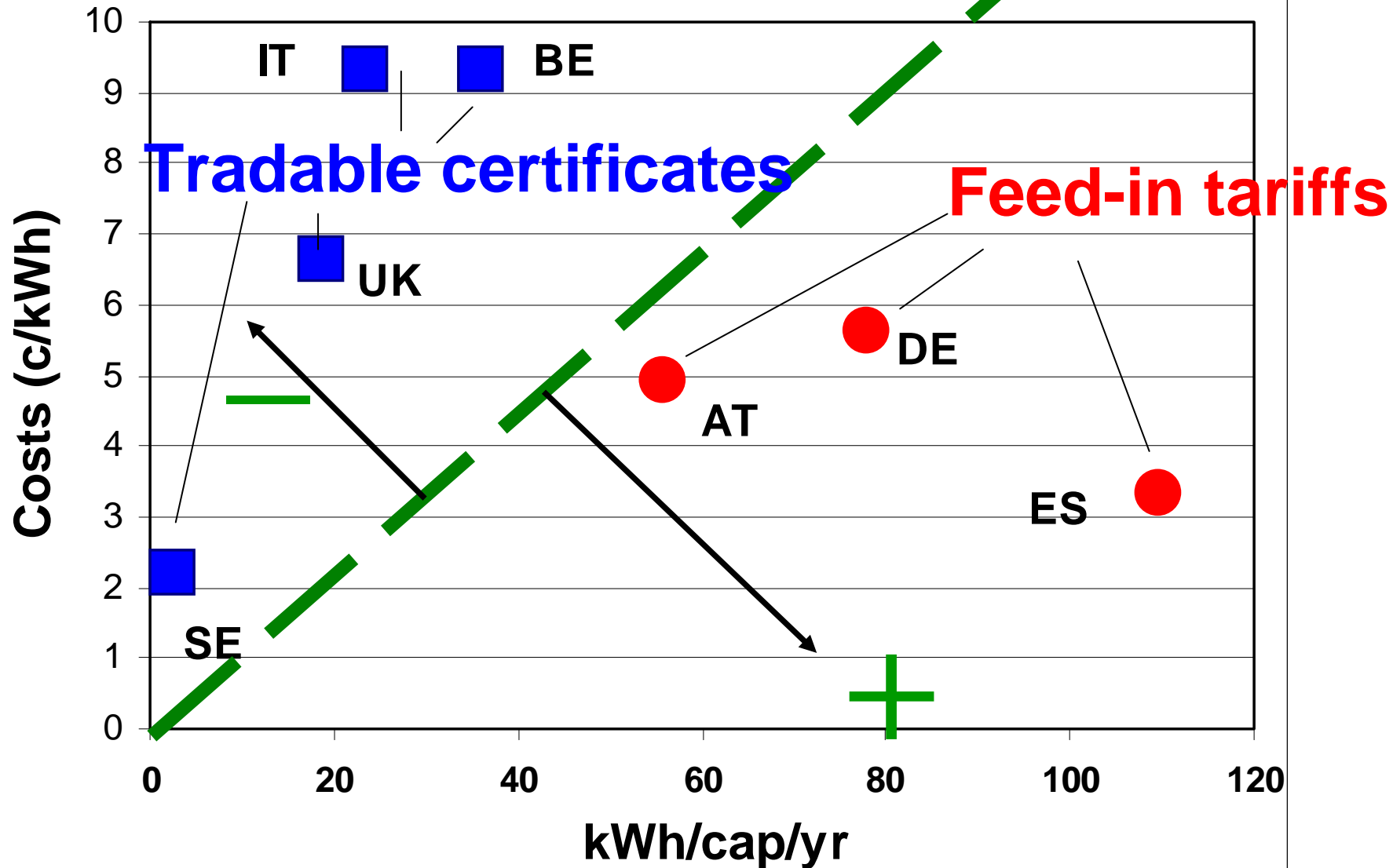
**Effectiveness:**

**Costs:**

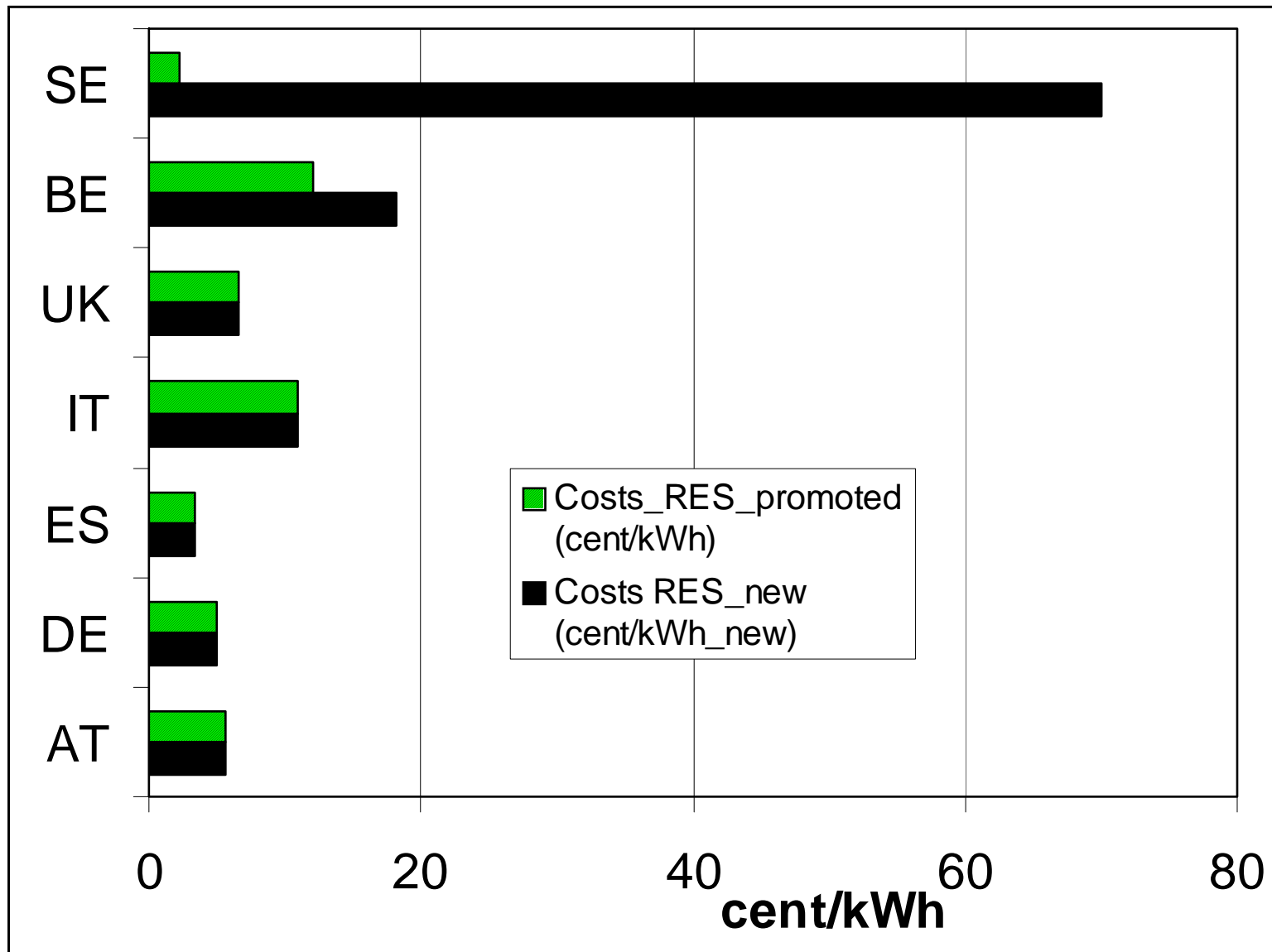


**(2000-2003)**

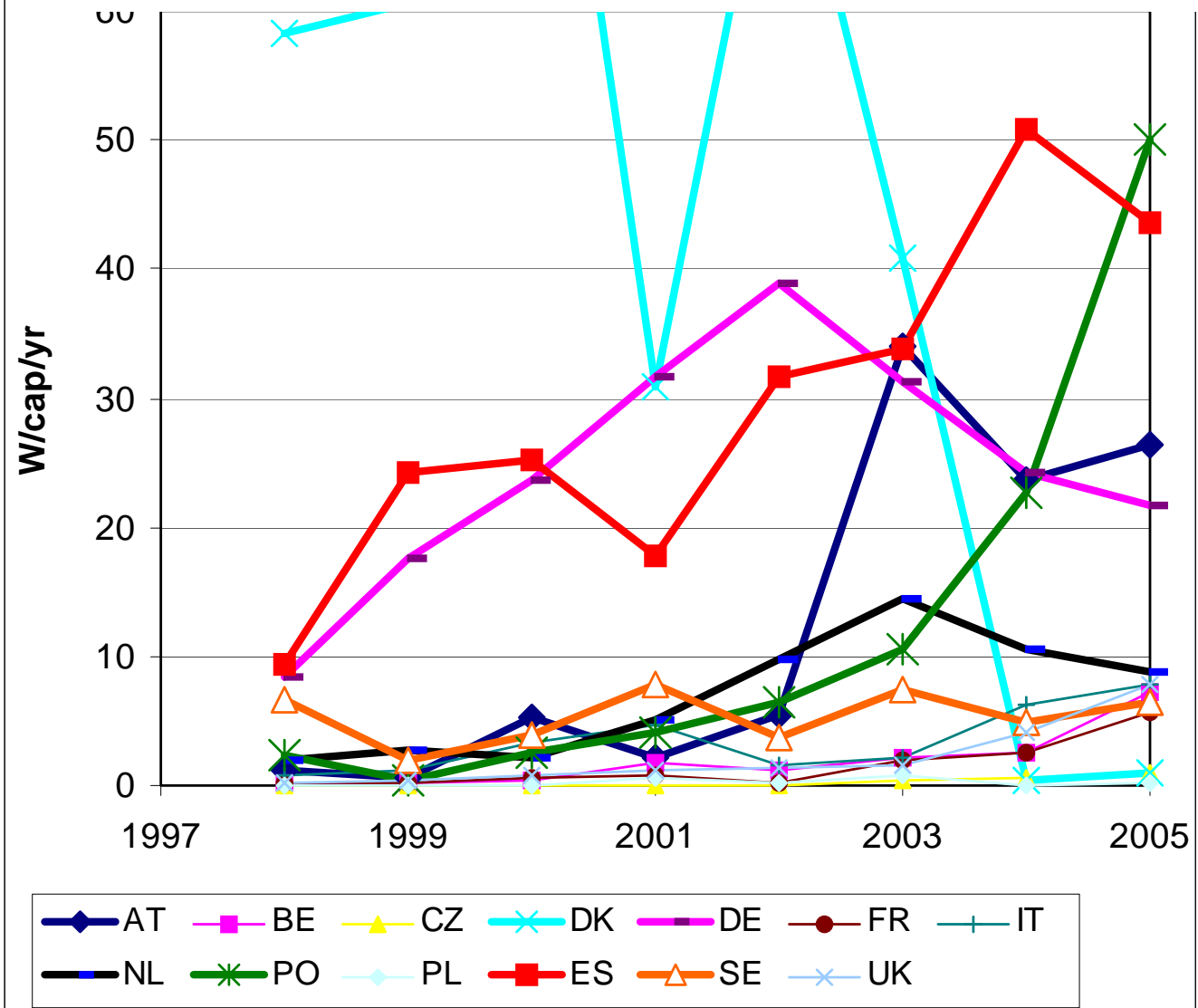
# EFFECTIVENESS VS COSTS



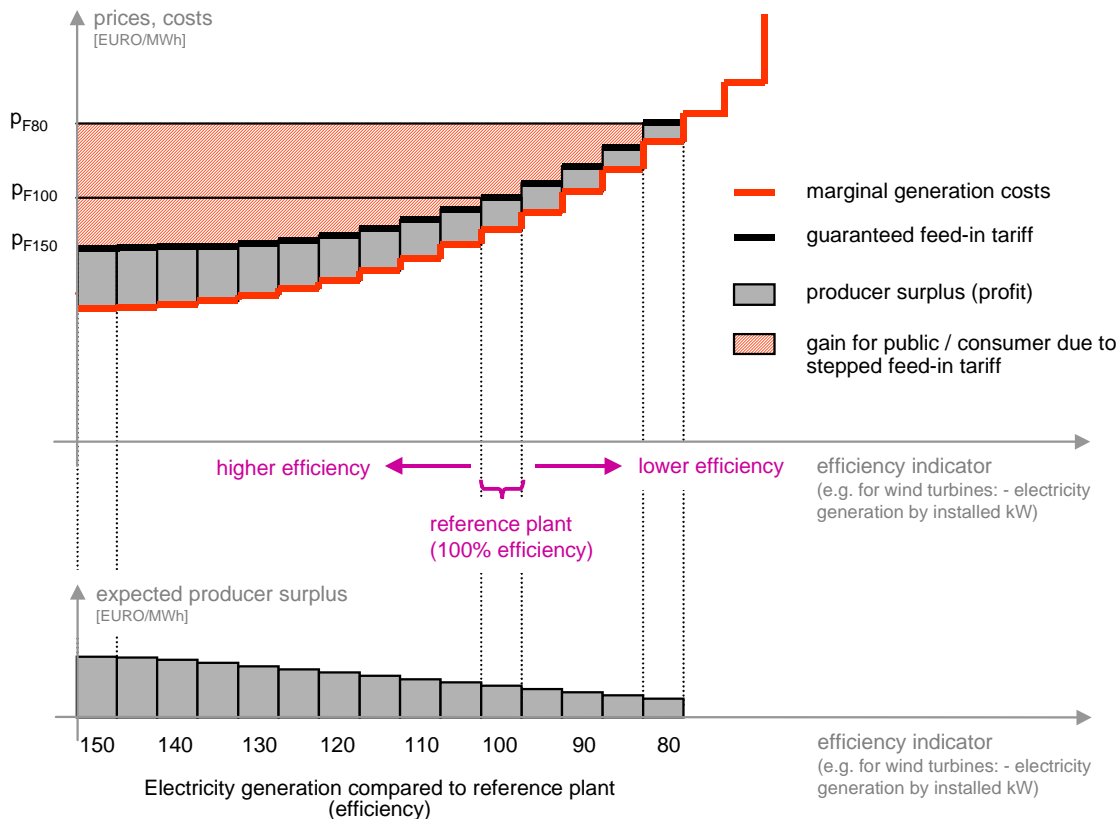
# Costs of promoted kWh vs costs of new kWh



# WIND: INSTALLATIONS PER YEAR



## 1 Use a stepped FIT and calculate starting values carefully

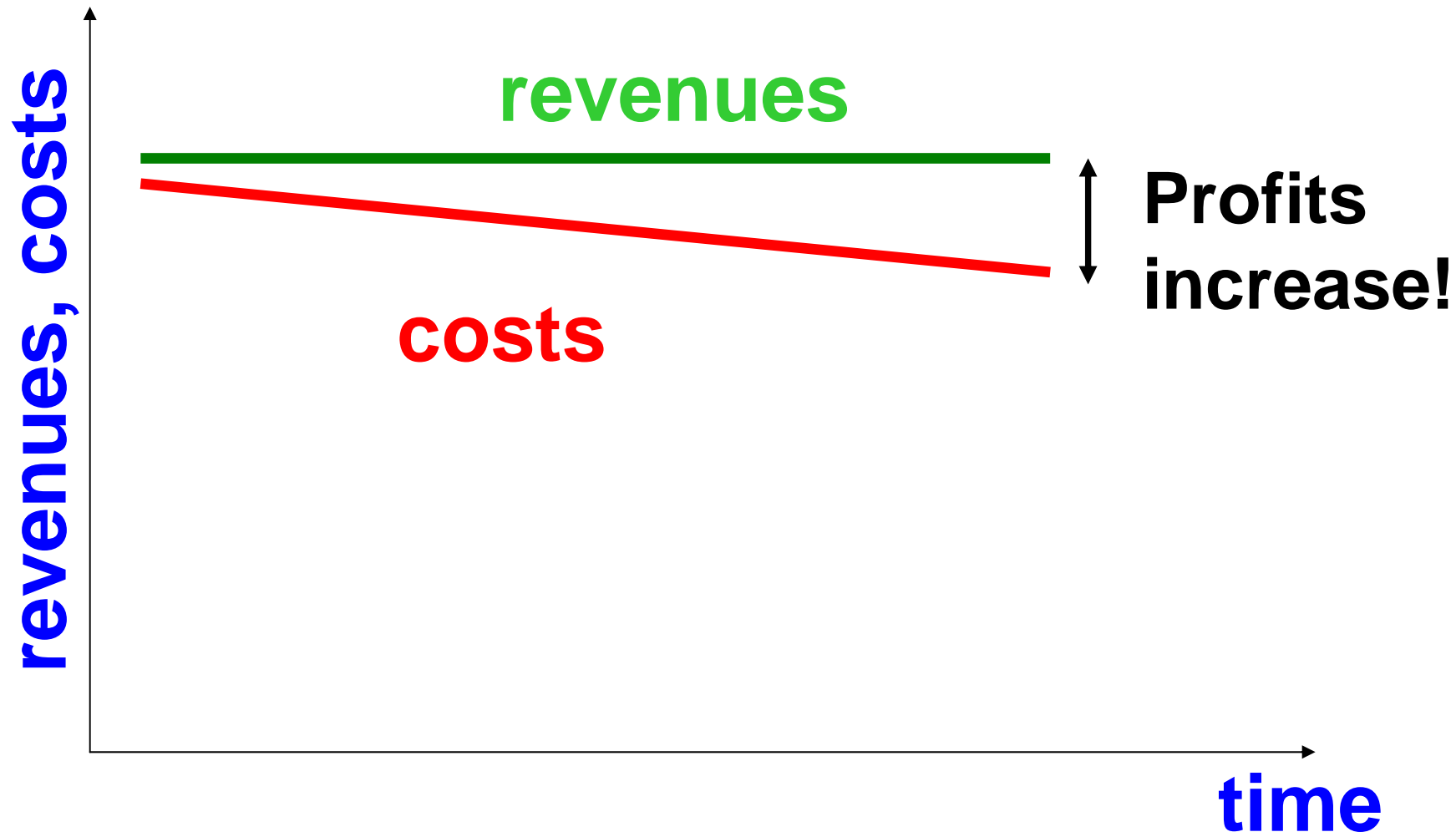


2 Decrease over time!

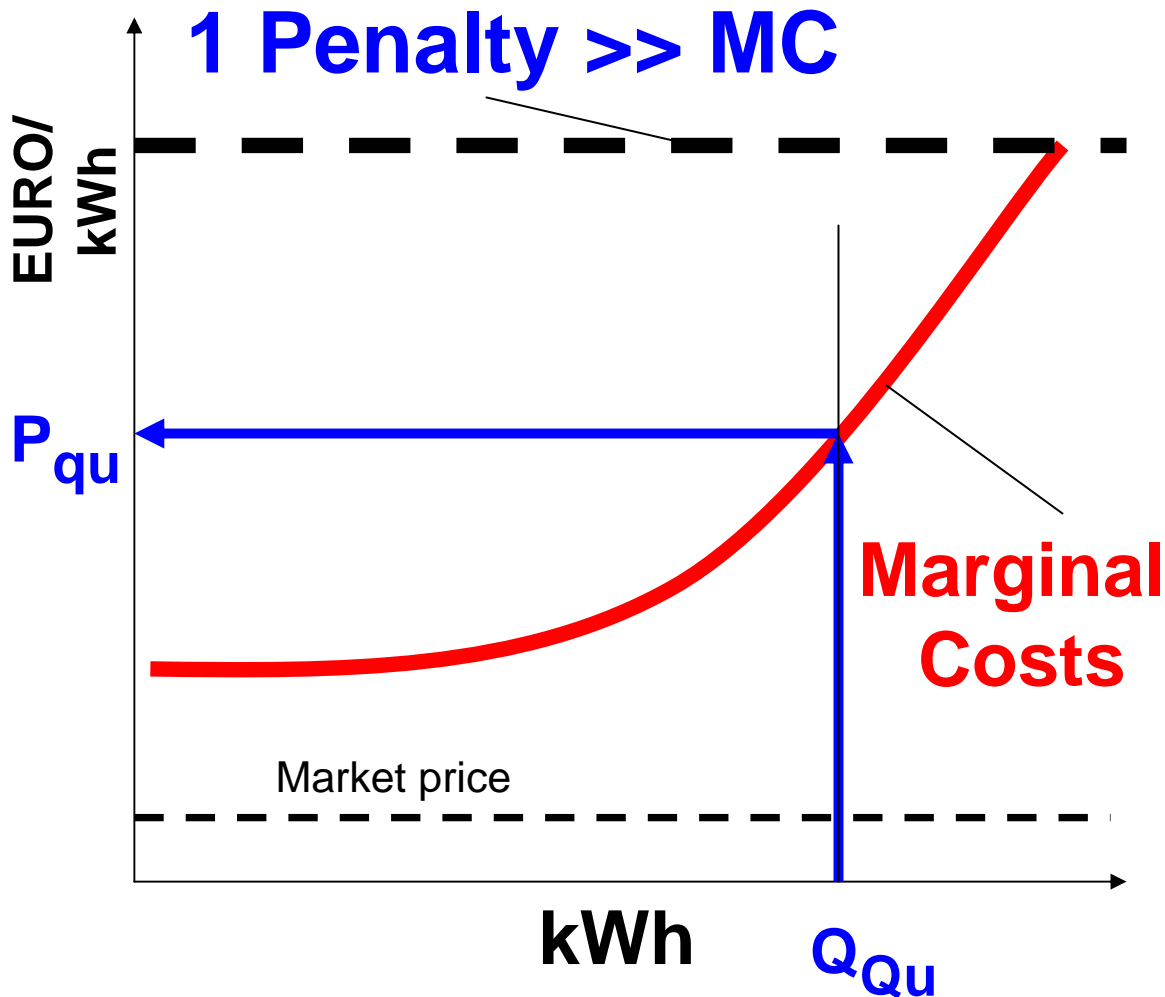
3 Realistic time frame

# EMPIRICAL PROBLEM OF FITs:

## The example of wind



# 6. SUCCESS CRITERIA FOR QUOTA-BASED TGC'S



2 Ensure long-term planning horizon!

3 Focus on new plants

## FOR QUOTA-BASED TGC'S

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**1 Market is too small:**

**e.g. in a small country for one technology with very limited potential -> Non-Liquid because every single plant is known (e.g. Flanders (BE))**

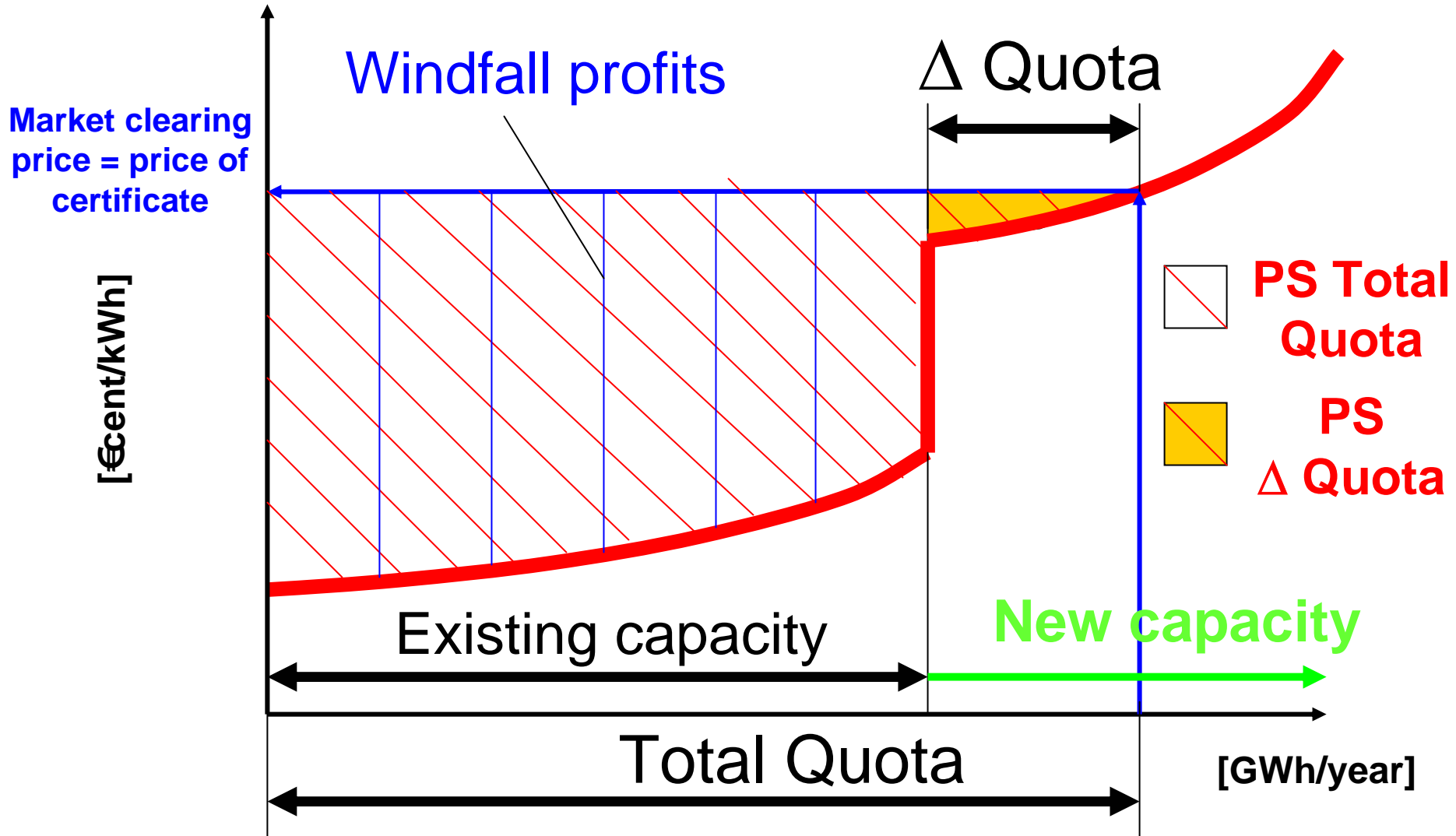
**2 Windfall profits for existing capacities (e.g. Flanders (BE), Sweden)**

**3 Penalty is too low (e.g. UK)**

**4 Planning horizon too short (e.g. UK 2003, Italy)**



# QUOTA: EXISTING VS NEW CAPACITY



- **The careful design of a strategy is by far the most important success criteria!**
- **There should be a clear focus on NEW capacities!**
- **To ensure significant RES-E deployment in the long-term, it is essential to promote a broad portfolio of different technologies**
- **Encourage competition among manufacturers**
- **Consider „learning“ for price-based strategies**
- **Ensure credibility of the system! Avoid „stop-and-go“ approaches**

- FIT: rather diversified structure of investors
- TGC markets: Why should competition work if it does not in the conventional electricity market?
- In addition, it is hard to imagine that a European-wide TGC market will work disconnected from the large incumbent generators
- Utilities/generators are in favour of TGC because they can make much more money and can easier control the market
- A well-designed (dynamic) FIT system provides a certain deployment of RES-e fastest and at lowest costs for society

# INTERESTED IN FURTHER INFORMATION?

- Download reports from:  
[www . tuwien . ac . at / eeg](http://www.tuwien.ac.at/eeg)  
[www . green-x . at](http://www.green-x.at)  
[www . optres . de](http://www.optres.de)

- E-Mail to:

[Reinhard.Haas @ tuwien. ac.at](mailto:Reinhard.Haas@tuwien.ac.at)