Nordic Electricity Markets

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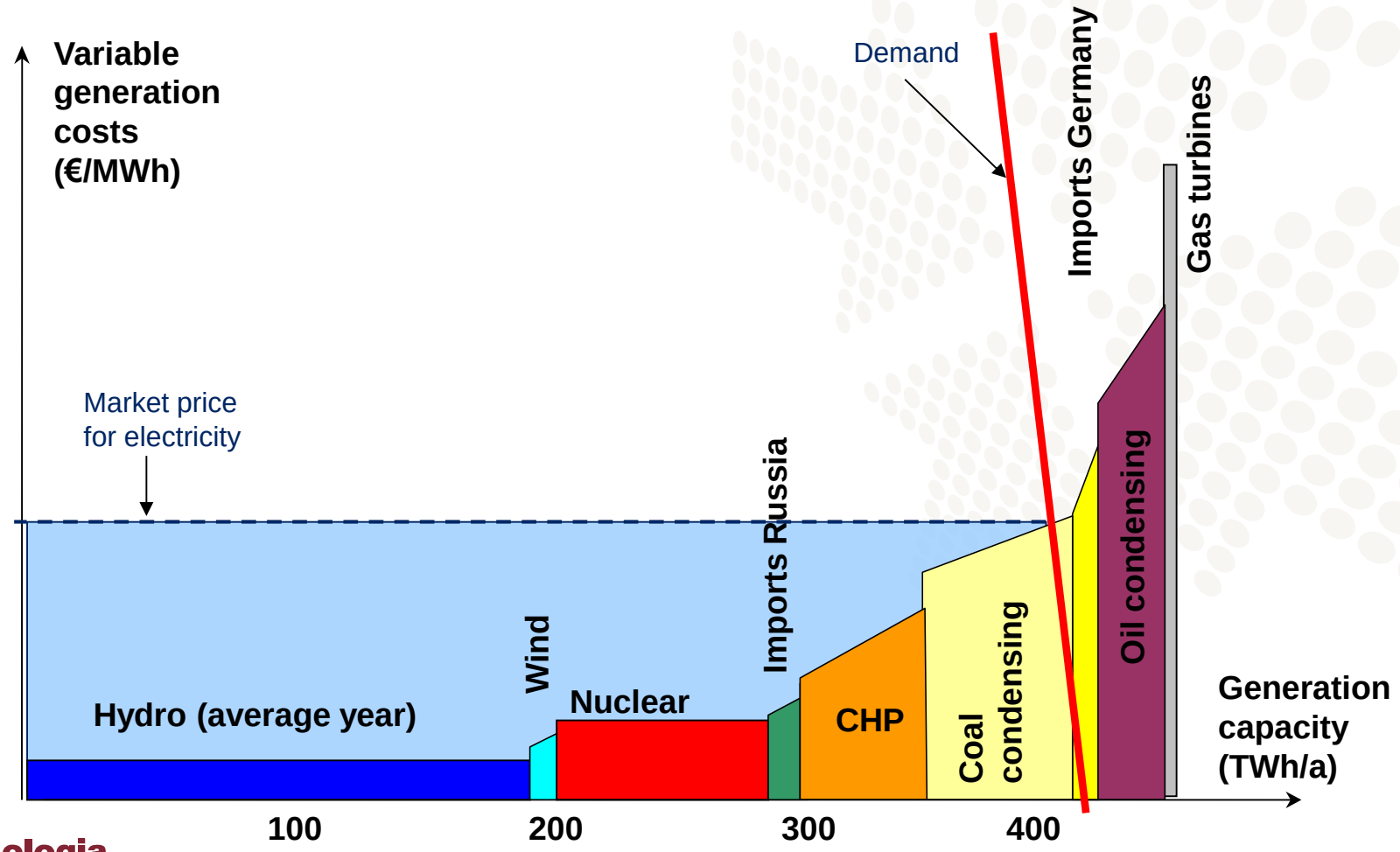
Nordic electricity market without EU ETS

(situation before Kyoto 2005)



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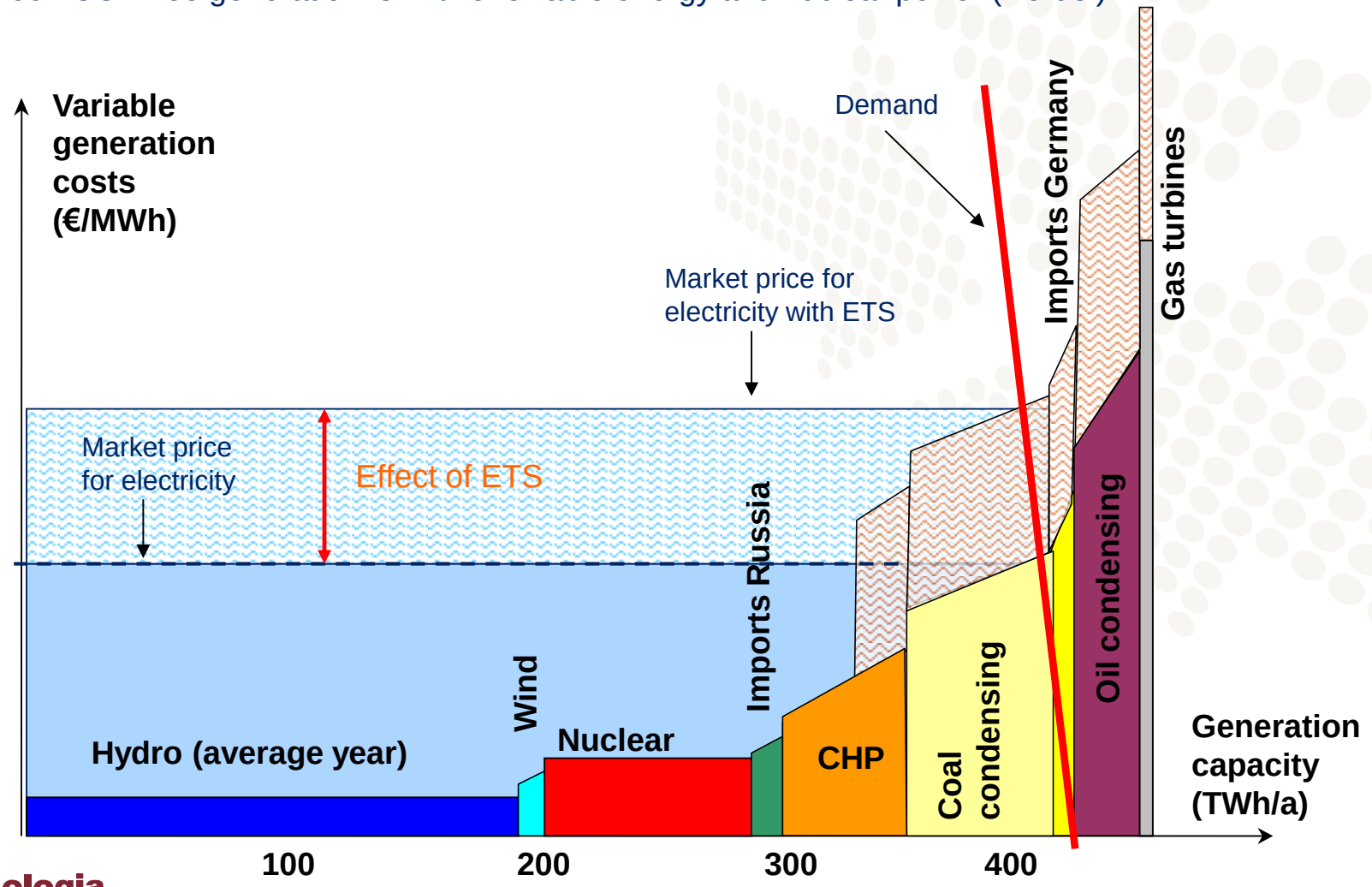
EU ETS = EU Emission Trading Scheme

CHP = Combined Heat and Power

Nord Pool Present Situation (2005-2012): Electricity market with ETS

2007 CO2 free generation: 84 % renewable energy and nuclear power (Nordel)



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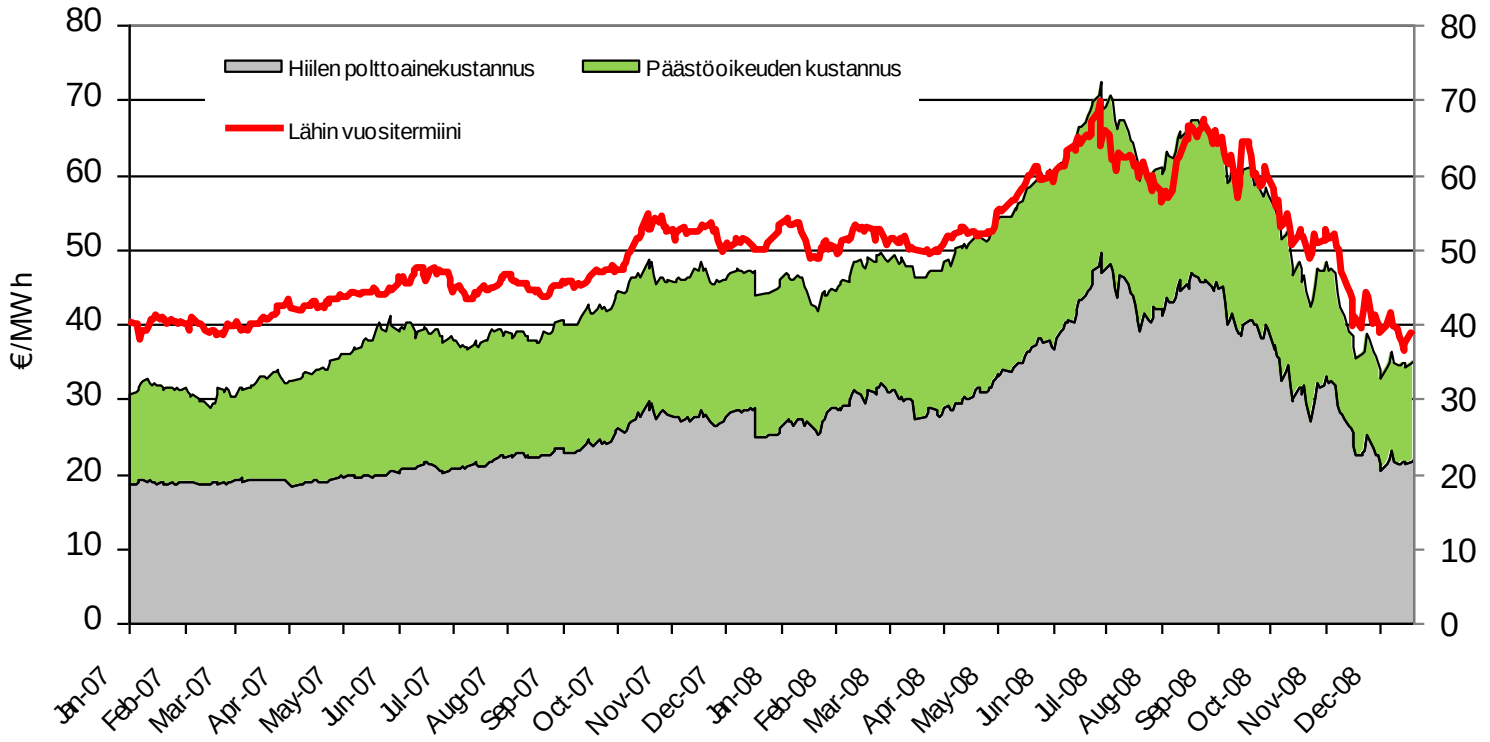
CHP = Combined Heat and Power

= CO2-emission costs (opportunity cost)

The marginal production* determines the market price



Grey: variable cost of marginal production

Green: CO2-emission costs (opportunity cost)

Red: market price for electricity nearest year forward (2008 and 2009)

* Marginal production in Nordic is coal condensing power, that set the electricity market price

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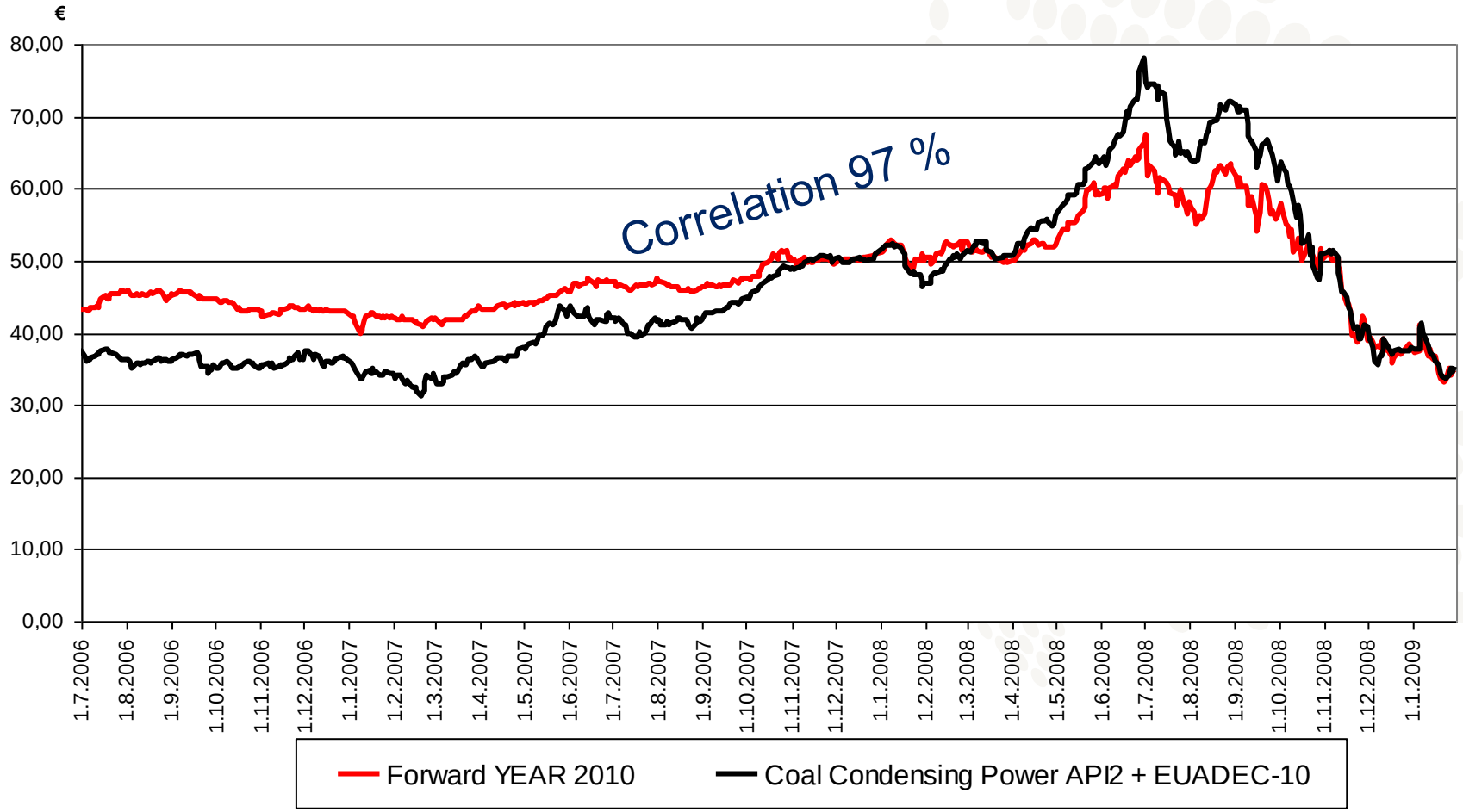
Coal condensing power added with CO2 prices future electricity



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New Design for the Electricity Market

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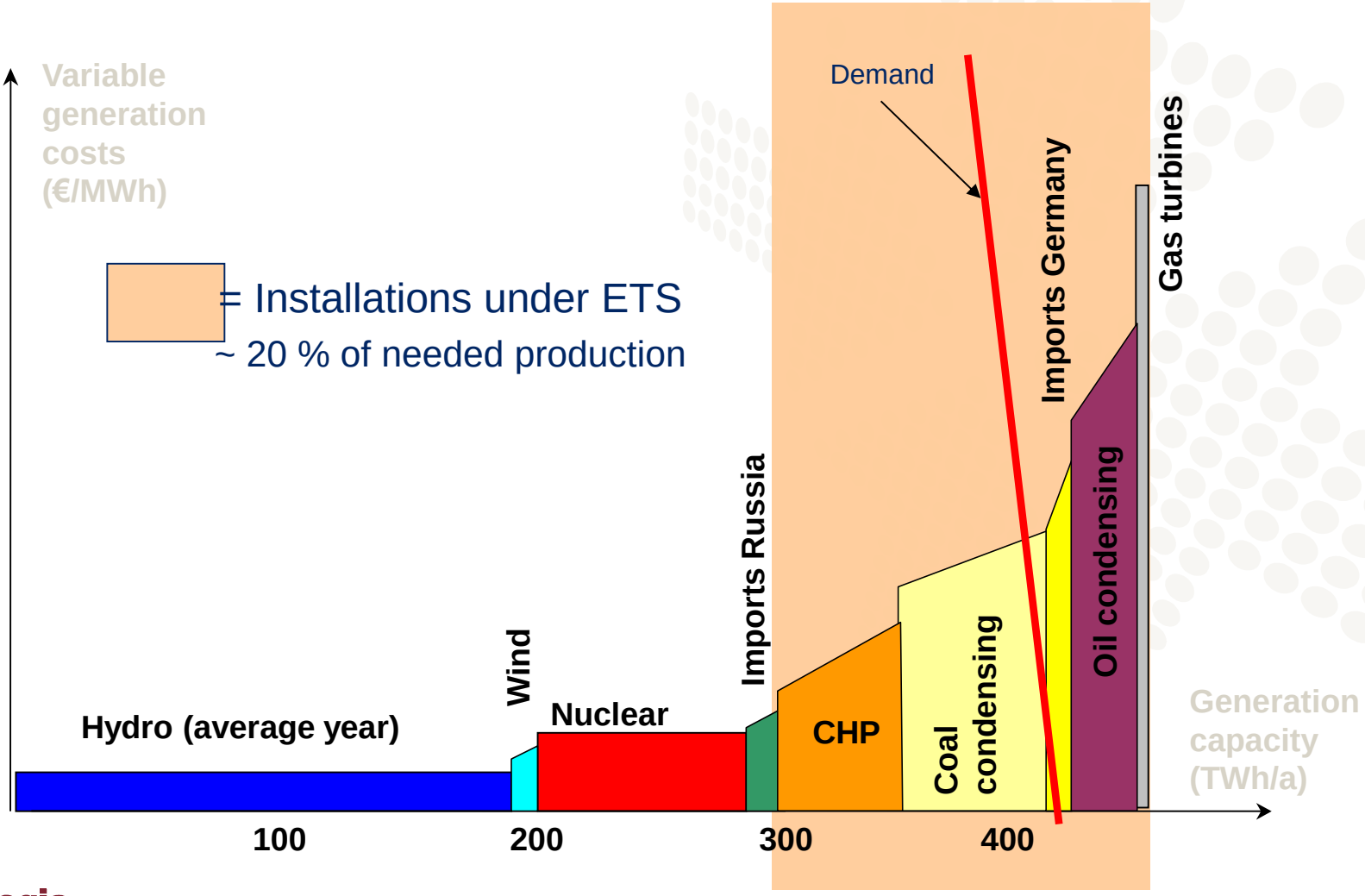
Basic Principle of the New Market Design for the Electricity Market

Carbon cost pass through in the market price of electricity shall be prevented:

- **Electricity producers trade their production to the market as presently**
- **Electricity production by plants operating under EU ETS shall be quantified and the specific emissions of the marginal producer i.e. coal condensing power shall be set as bechmark**
- **Electricity consumers pay the electricity price in their energy bill and the CO2 cost to the producers separately e.g. in their grid fee as a transparent ”climate fee”**

Installations under EU ETS



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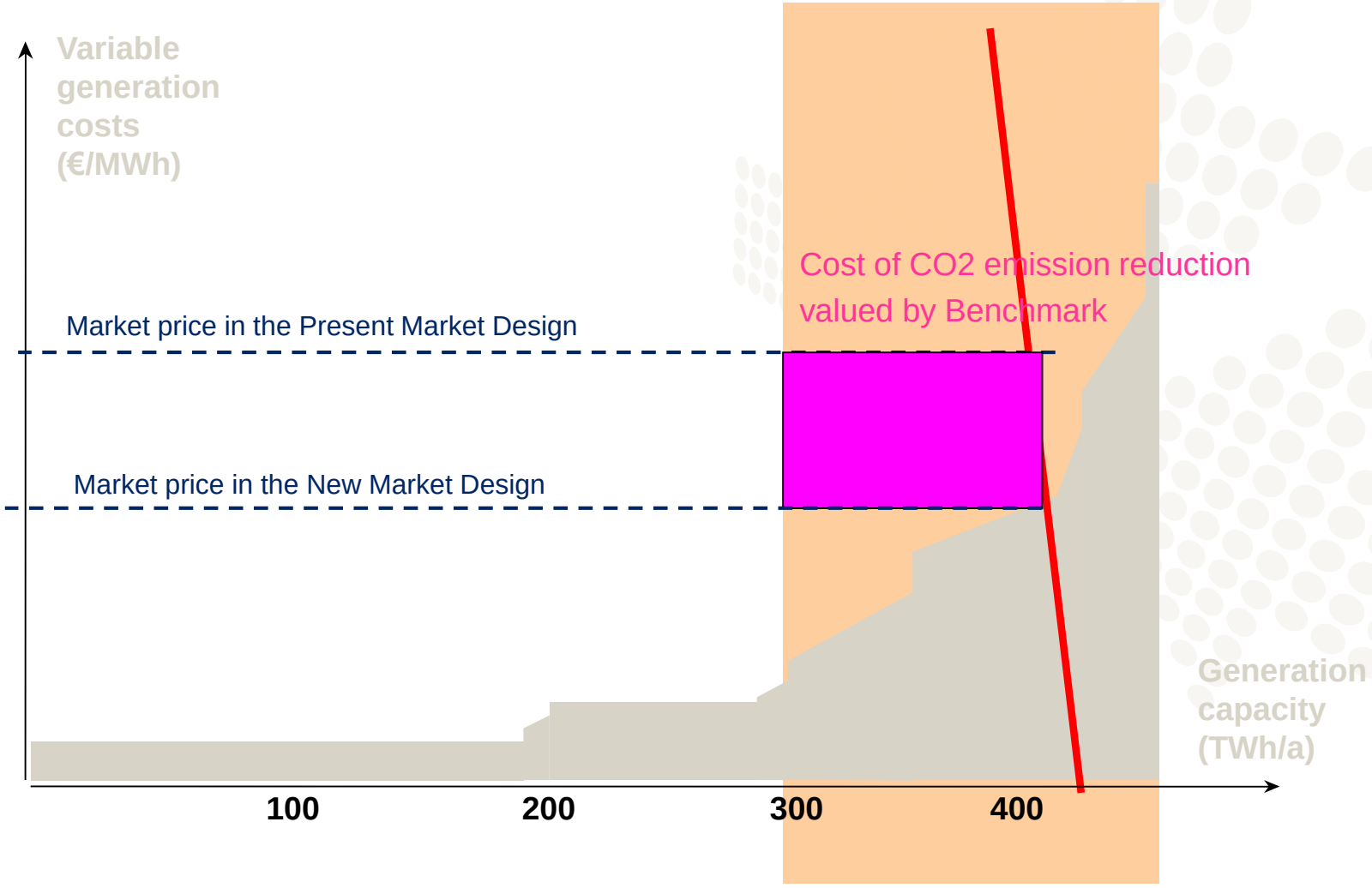
EU ETS = EU Emission Trading Scheme

Effects of the New Market Design



= Installations under EU ETS

~ 20 % of needed production

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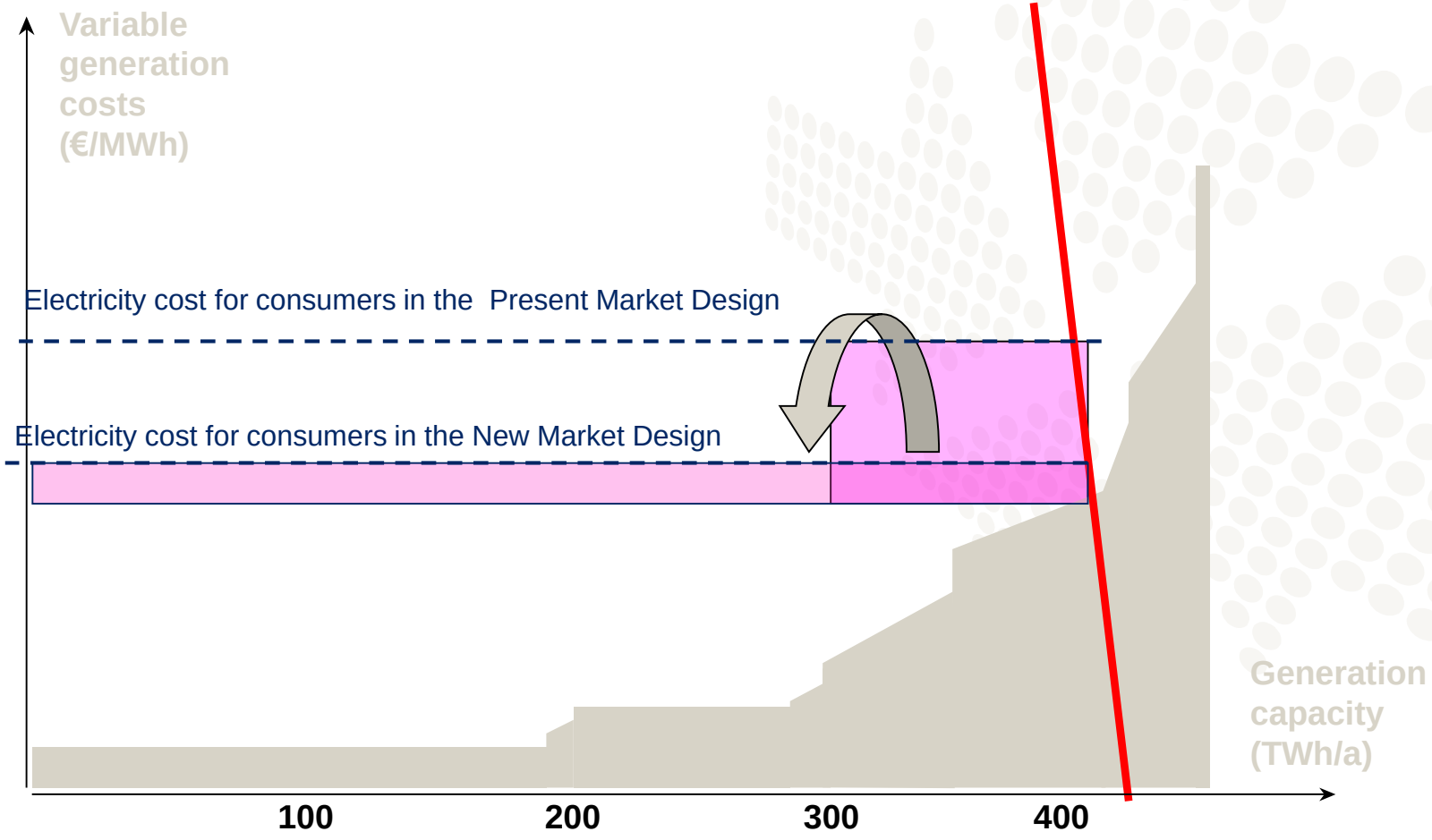
Electricity cost for consumers in the New Market Design



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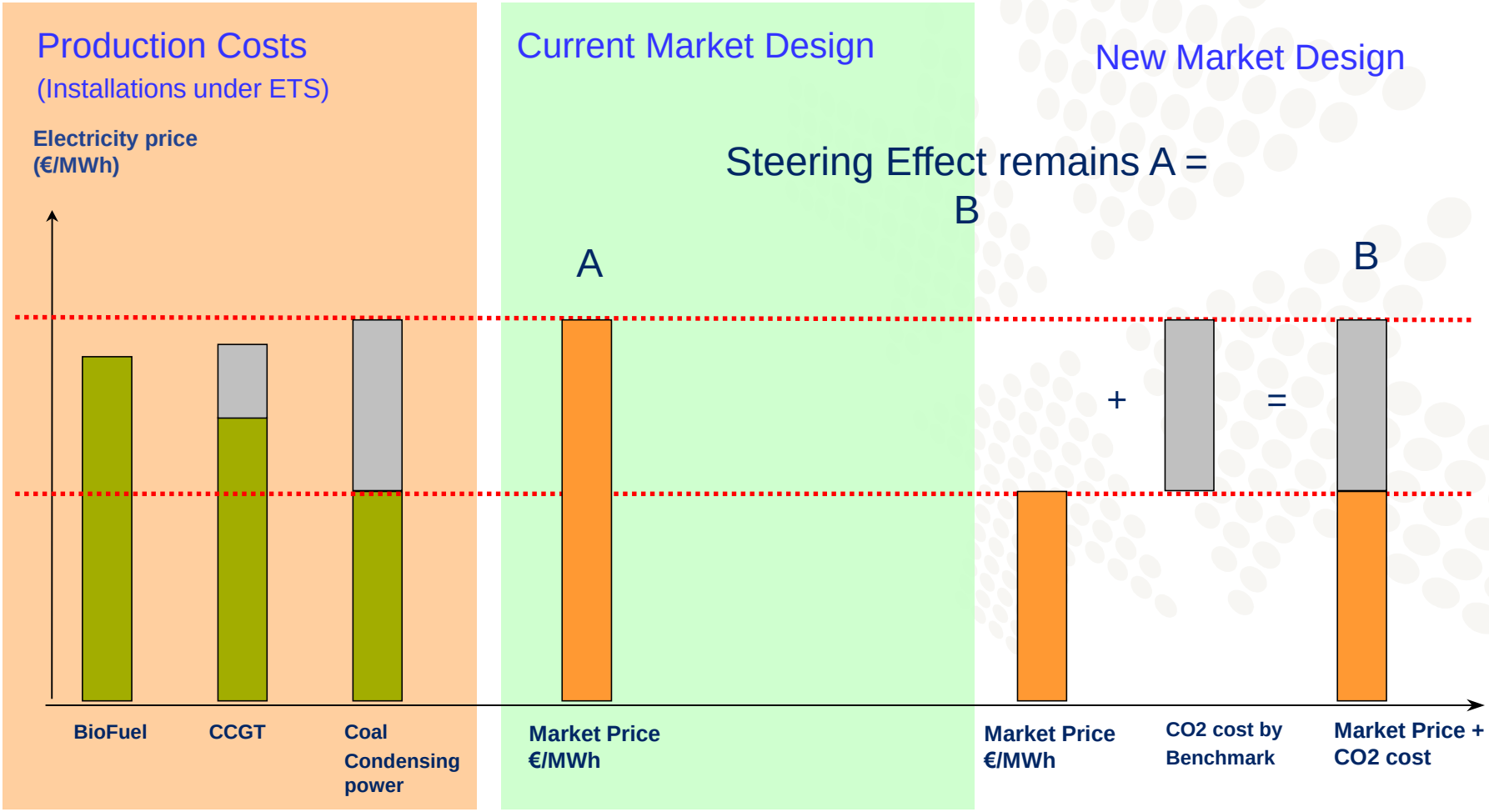
Steering Effect for installations under ETS remains - Producers point of view -



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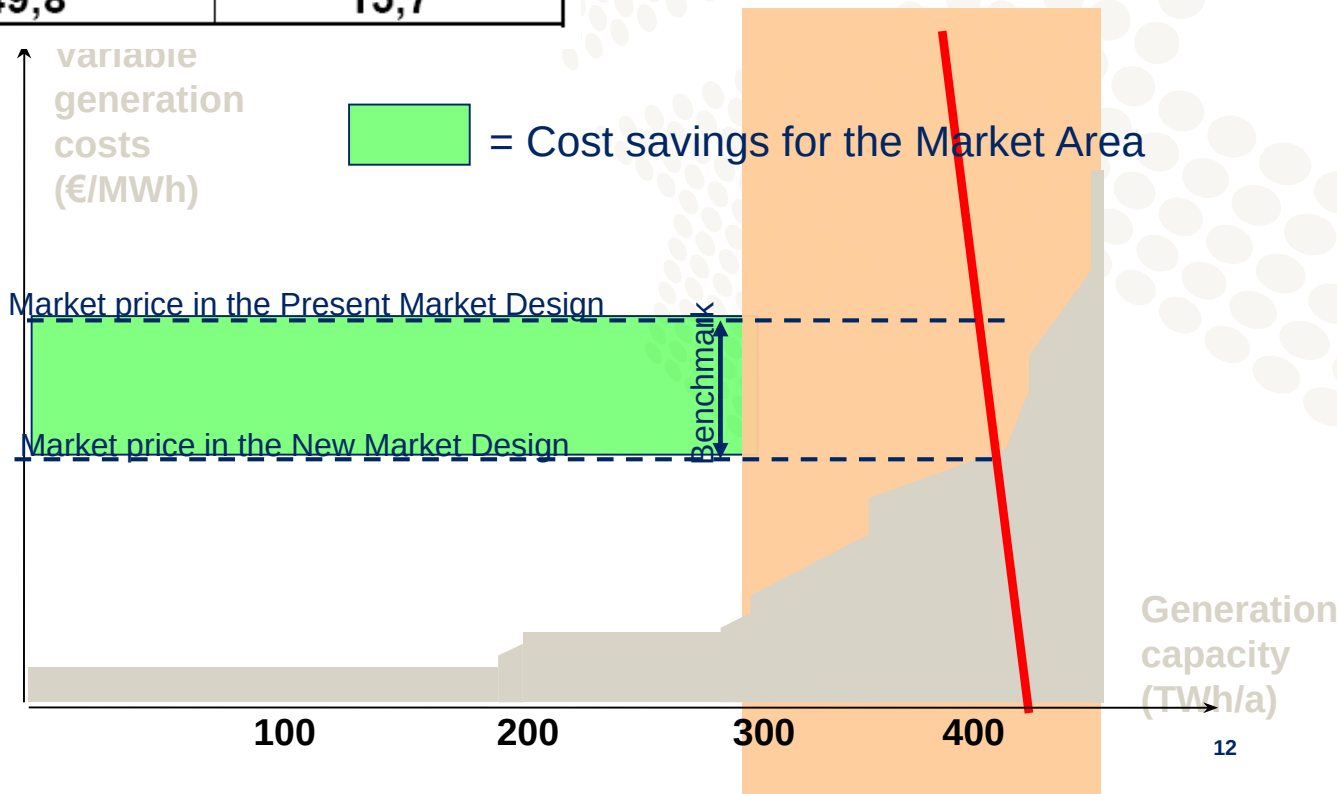
= Fuel, O&M and Sales margin = CO2

New Market Design

Annual cost's savings for the society in the Nordic Markets

Price of CO2 €/ton	Impact in electricity price €/MWh	Cost Savings in Market Area billion €/a
10	8,3	2,6
20	16,6	5,2
40	33,2	10,5
60	49,8	15,7

Cost Savings calculated by actual production volumes in year 2007.



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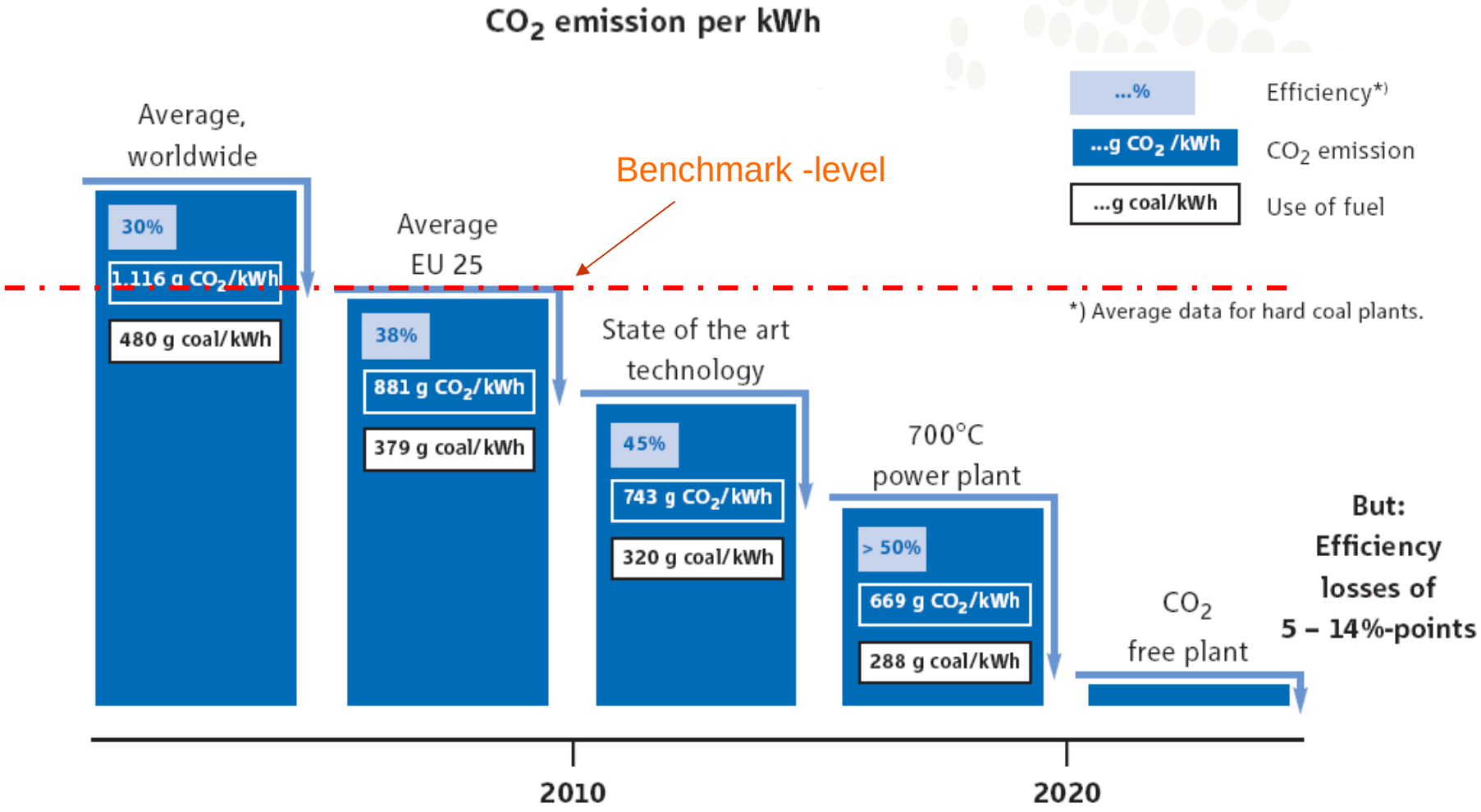
Example: Setting the Benchmark



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Defining the CO2 –emission reduction cost's

- **The produced electricity by ETS installations* will be defined**
- **The volume of CO2 -emissions of ETS installations will be calculated by benchmark** and**
- **Valued by the CO2 -allowance price in the market and**

→The total cost of CO2 –emission for the electricity market is defined

- **The total cost of CO2 –emission will be divided evenly to total used electricity consumption volume and transferred to consumers for payment for example via grid companies**

* Electricity production installations under Emission Trading Scheme ETS

** Bechmark (ton/MWh) will be defined separately for example by coal condensing power

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TSO's role

- The Produced Electricity (PE) by ETS installations will be measured
- The Electricity Consumption (EC) in the market area will be identified

→ CO2-emission cost's for Electricity Consumers:

Cost' of CO2-emissions (€/MWh) = Benchmark * CO2-price * PE / EC

- TSO's are natural party to invoice Cost's of C02-emission based on actual consumption in each country in Markets.

Note: Analogy with RES Feed-in tariff Sheme procedure

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New Market Design example

1. Power Producer (”PP”) registers to ”Authority Office” (”AO”)
   1. PP can register to AO at the Electricity market area it is physically located
   2. PP has to be under EU ETS

2. After each month PP submits Refund application to AO

3. AO checks the application and Refunds PP (in accordance with BAT-based CO2-factor), ie. xx MWh/month * yy ton/MWh * zz €/ton, where

   1. xx MWh/month = energy produced per month
   2. yy ton/MWh = tons of CO2 per MWh decided (benchmark)
   3. zz €/ton = Market price for the Emission allowances EUA

4. The production and payments are revised annually afterwards by relevant authorities and AO in parallel with ETS system. Possible errors corrected.

   Note. AO should be official body that is naturally linked to the electricity market like TSO, Energy Market Authority, etc.

Benefits of the New Market Design

- Market price for electricity will be lower
- Windfall profit for power producers is reduced
- Consumers pay for needed costs of CO2-emissions (fairness)
- Order of power plant operation (merit order) is not changed
- Steering effect is maintained (benchmark & RES Schemes)
  - Position of fossil generation is not changed (e.g. coal condensing power)
- No need to change emissions trading directive
- Enhances competitiveness of industries and thus gives a positive contribution to employment
- reduces carbon leakage and the use of public revenues to compensate for indirect costs of ETS
- No need for windfall taxation to limit excess profits of power companies

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