Electricity Policy Research Group

ECN

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The EU ETS: allocation, competitiveness and longer term design options

Karsten Neuhoff

Commissioned by Climate Strategies and The Carbon Trust (Michael Grubb)

with Kim Keats, Jos Sijm,

Felix Matthes, Angus Johnston, Misato Sato

Cement: Damien Demailly & Philippe Quirion - CIRED

The components of the work

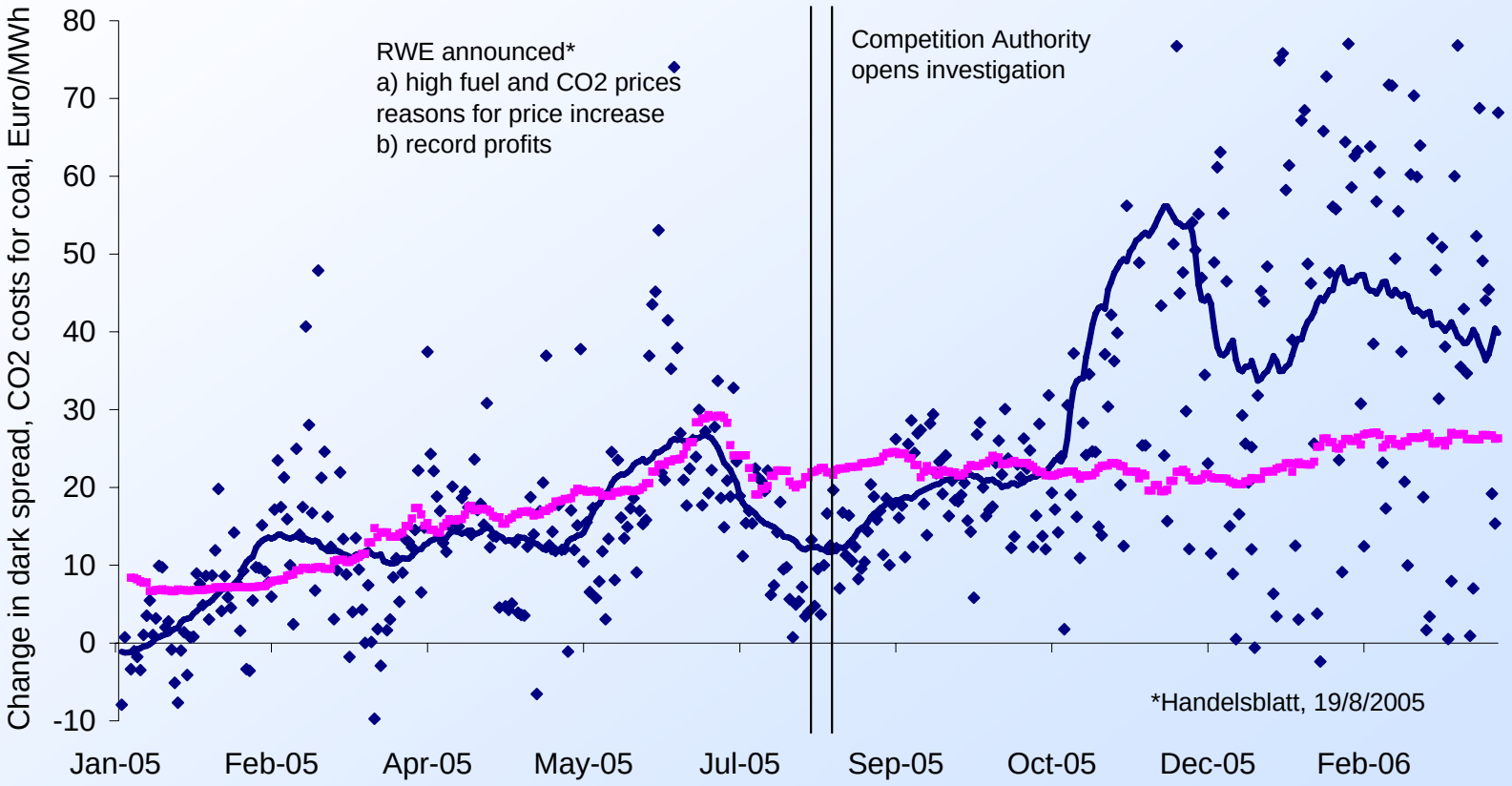
- Price pass through in the electricity sector (Sijm, Neuhoff, Yihsu)
- ETS in the cement sector (Demailly, Quirion)
- The economic impact of Carbon Policy on UK companies (Smale)
- Allowance allocation in the electricity sector (Neuhoff, Keats, Sato)
- Legal aspects (Johnston)
- Auctions (Grubb, Hepburn, Neuhoff)
- Policy conclusions
  (Grubb, Neuhoff, Johnston, Keats, Matthes, Neuhoff, Sijm)

Background papers, at www.electricitypolicy.org.uk

- Border Tax Adjustment: A feasible way to address non-participation in Emission Trading (Ismer, Neuhoff)
- Impact of the allowance allocation on prices and efficiency
  (Neuhoff, Grubb, Keats)

Power generators pass through CO2 price

Evolution of German spot prices (example day ahead 3-4 pm)

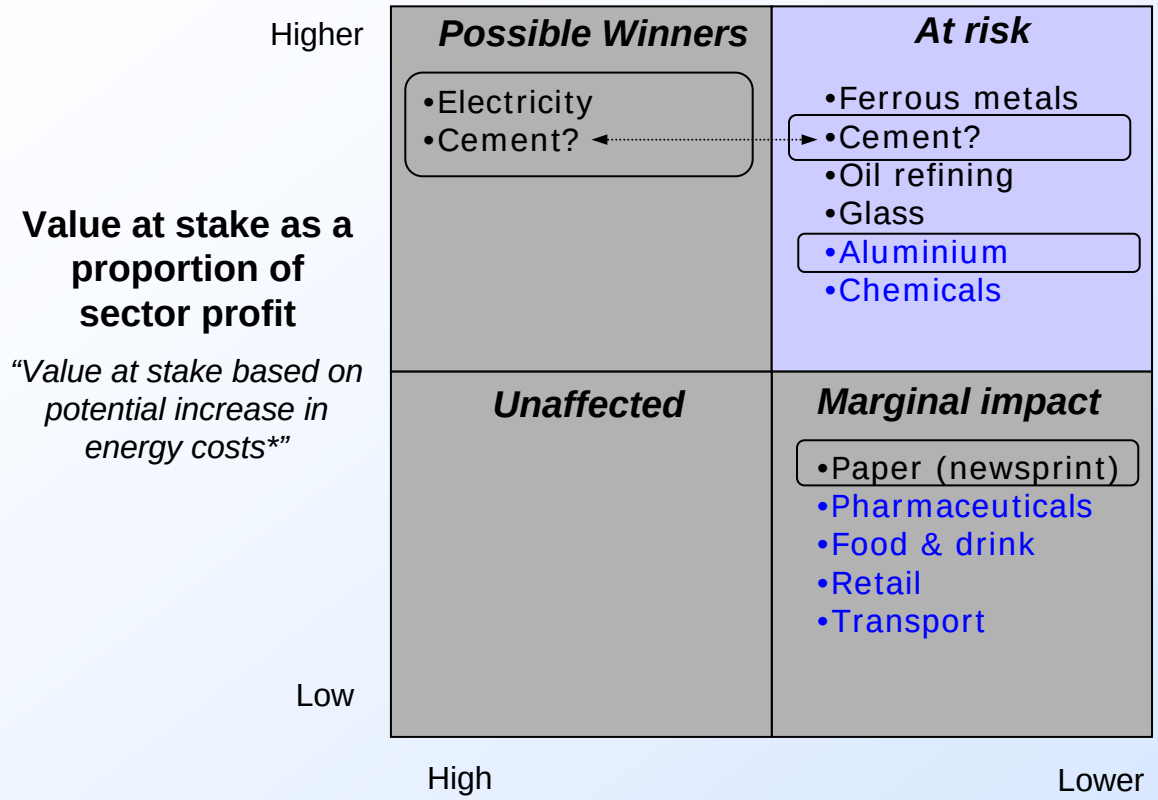


Pass through, based on 2006 forward prices

Table 1 Empirical estimates of CO_2 pass through rates in Germany and the Netherlands for the period January-December 2005, based on year ahead prices for 2006 (in %)

Country	Load period	Fuel (efficiency)	OLS	Bootstrap (2 months)	
				min	max
Germany	Peak	Coal (40%)	117	97	117
	Off-peak	Coal (40%)	60	60	71
Netherlands	Peak	Gas (42%)	78	64	81
	Off-peak	Coal (40%)	80	69	80

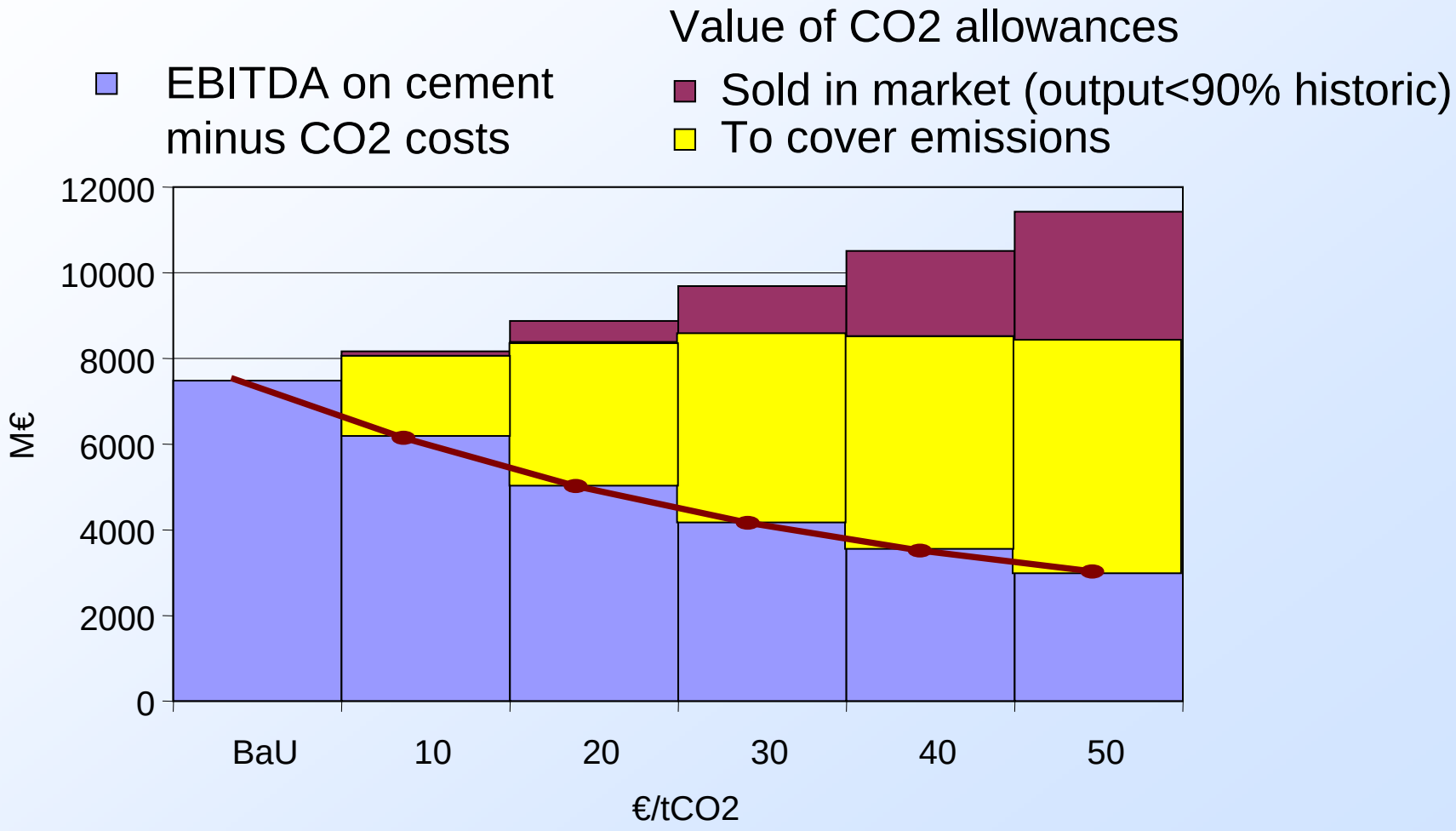
Relative exposure of sectors will depend on value at stake and price pass through



•EU ETS sectors
•Non- EU ETS sectors

Note: *e.g. cost increase if 40% uplift in electricity price and allowances need to be purchased for ~10% of emissions – indicative value at stake in phase 2 of ETS scheme

Cournot model of change of cement profitability under ETS (90% grandfathering)



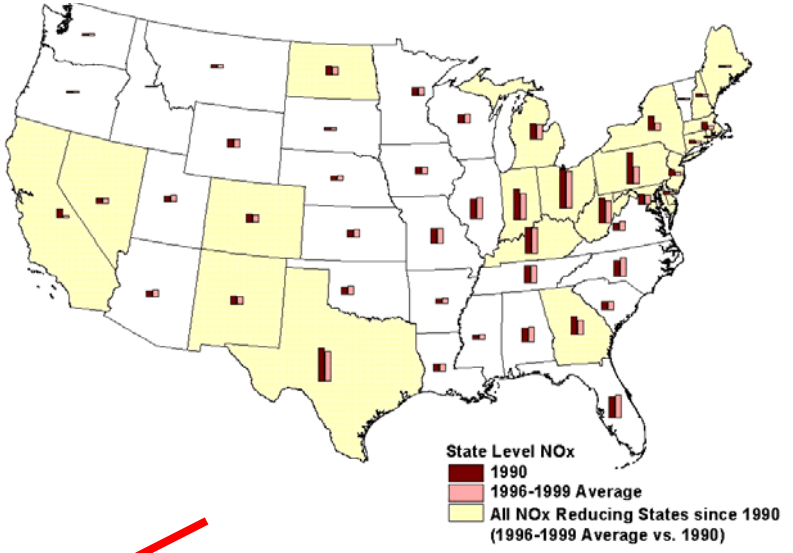
Based on Damien Demailly & Philippe Quirion

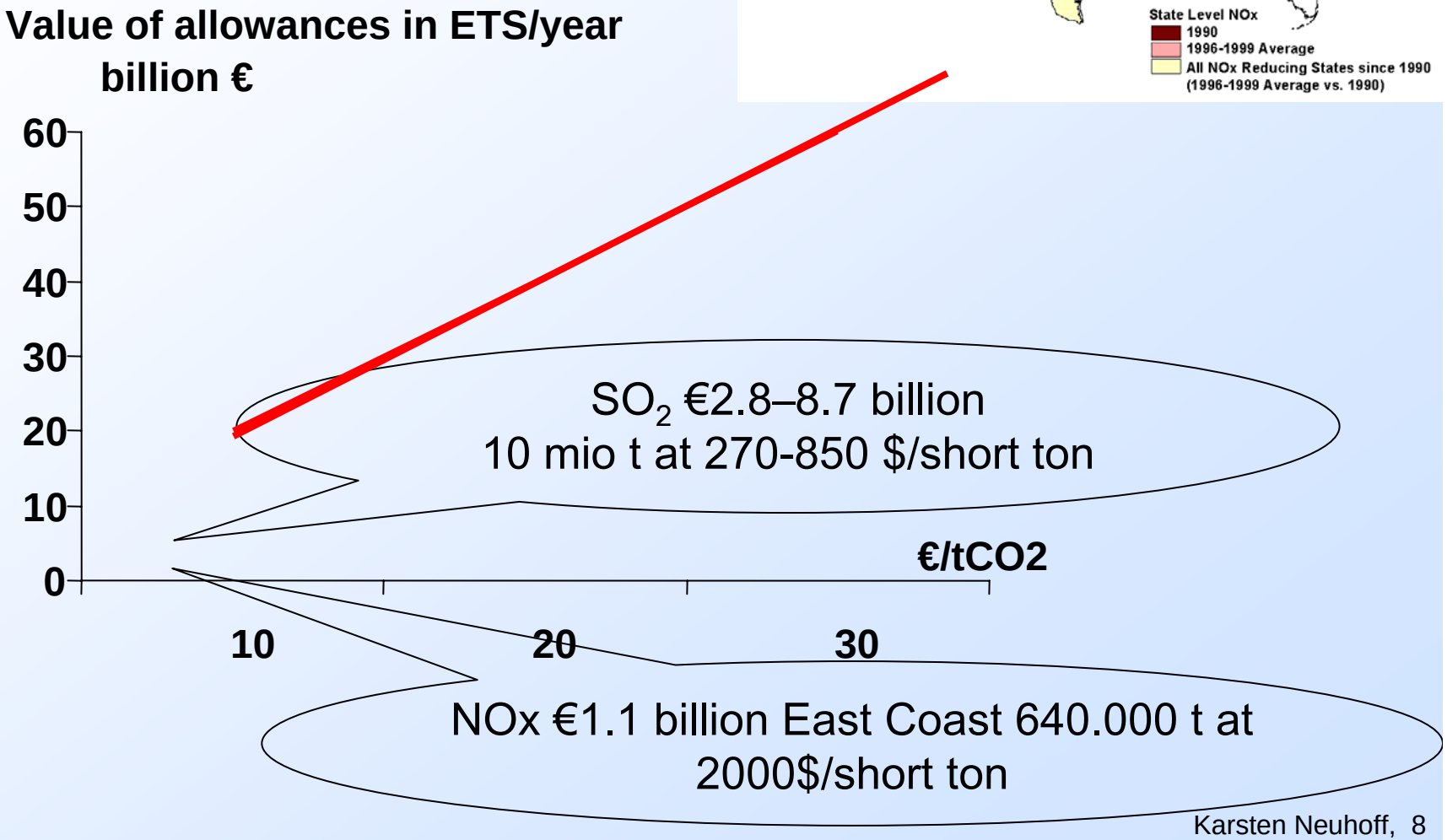
Higher ETS price and allocation cutbacks could bring cement and steel, as well as Al. (if not integrated) potentially into range of competitiveness concern

	*High scenarios**	**Net value at stake**** (% of current EBITDA)		**Product price rise required to keep profits flat** (% of current price)		
		€15/5%	**€30/15%**	**€15/5%**	**€30/15%**	
EU ETS sectors	• **Cement (UK)**	20%	52%	5%	10%	• Need detailed exploration of cement & steel import exposure under higher prices and cutbacks
	• **Steel**	9%	27%	1%	4%	
	• **Newsprint (UK)**	1%	3%	<0.1%	0.5%	
	• **Petroleum**	0.5%	1%	0.1%	0.3%	
CCA sectors	• **Car manufacture**	1%	3%	<0.1%	0.1%	• Aluminium very exposed to EU ETS electricity price rises across EU
	• **Brewing**	1%	3%	<0.1%	<0.1%	
	• **Aluminium**	80%	170%	Unable to maintain current profits		

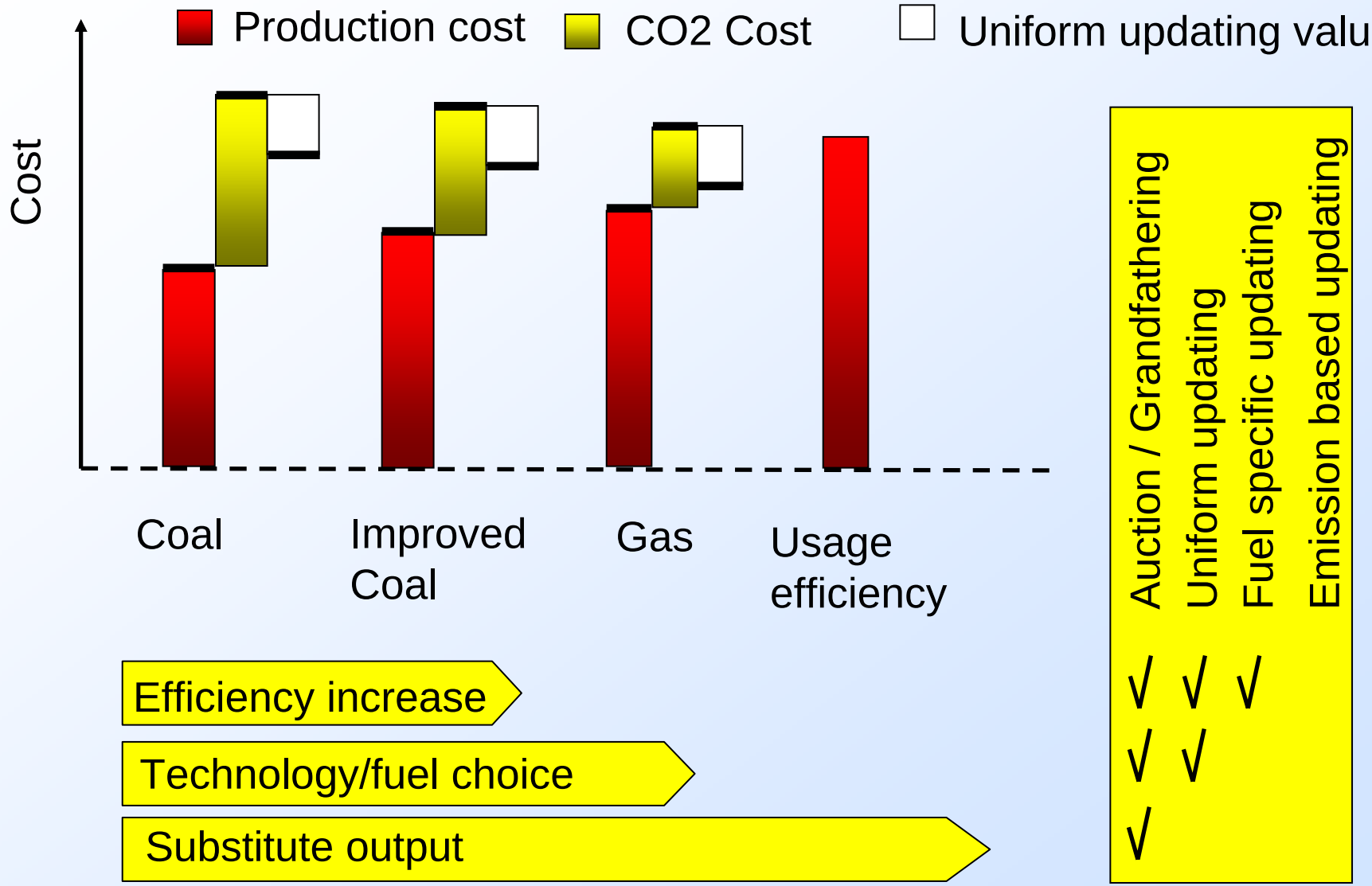
Note: *Includes impact of doubled CCL plus direct and indirect EU-ETS effects **= (inc. in total costs after allocation)/(starting EBITDA), ETS prices 2010:15 €/tCO2, 2020:30€/tCO2, allocation cut back 1%pa from 2005; ***Assuming 100% auctioning at EU ETS prices

Value of ETS allowances bigger than in US cap and trade programs





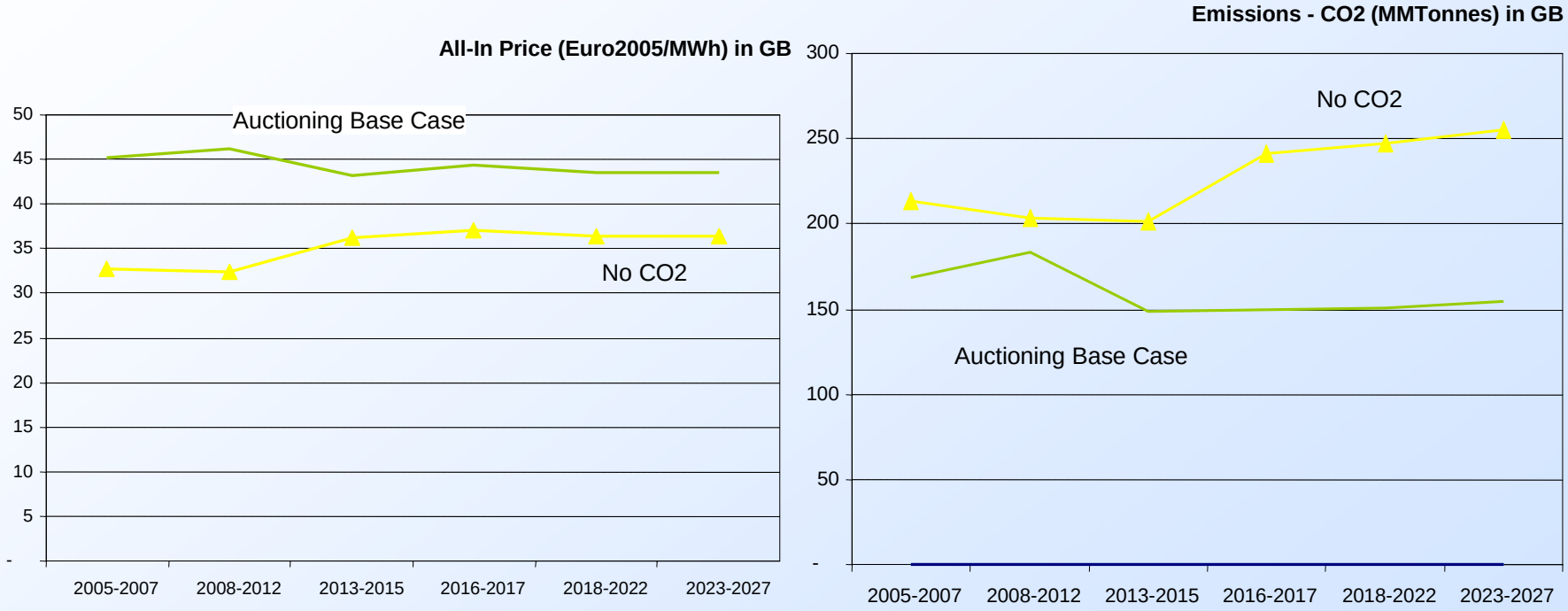
Allocation methods effect ETS effectiveness



Analytic and numerical analysis of allocation

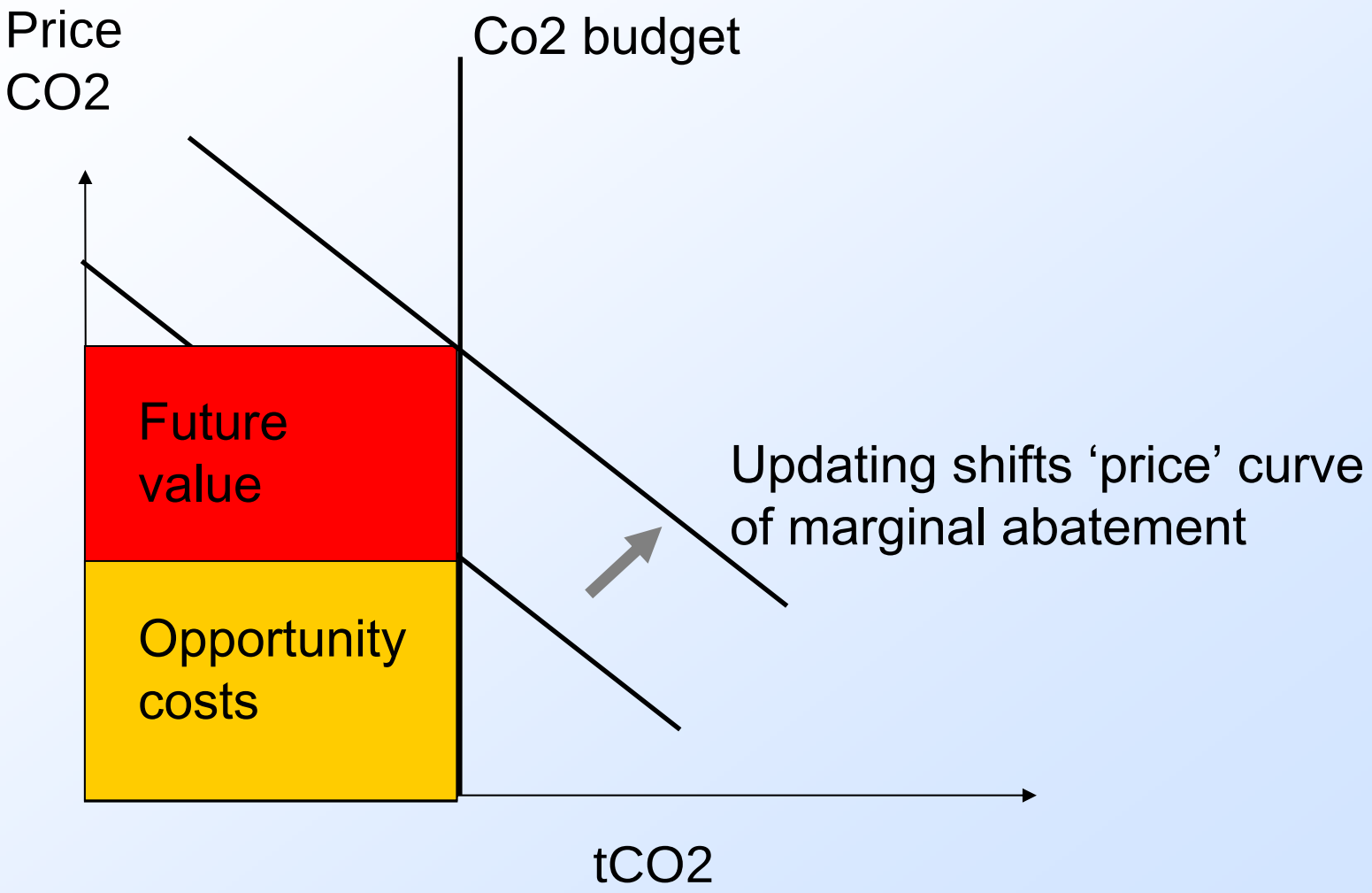
- Effect of allocation to existing facilities
  - Perfect grandfathering / auctions
  - Contingent on availability
  - Uniform benchmarking using moving base
  - Fuel specific benchmarking using moving base
- Effect of allocation to new facilities
  - Uniform benchmark
  - Fuel specific benchmarking

Effect of auction – UK simulation



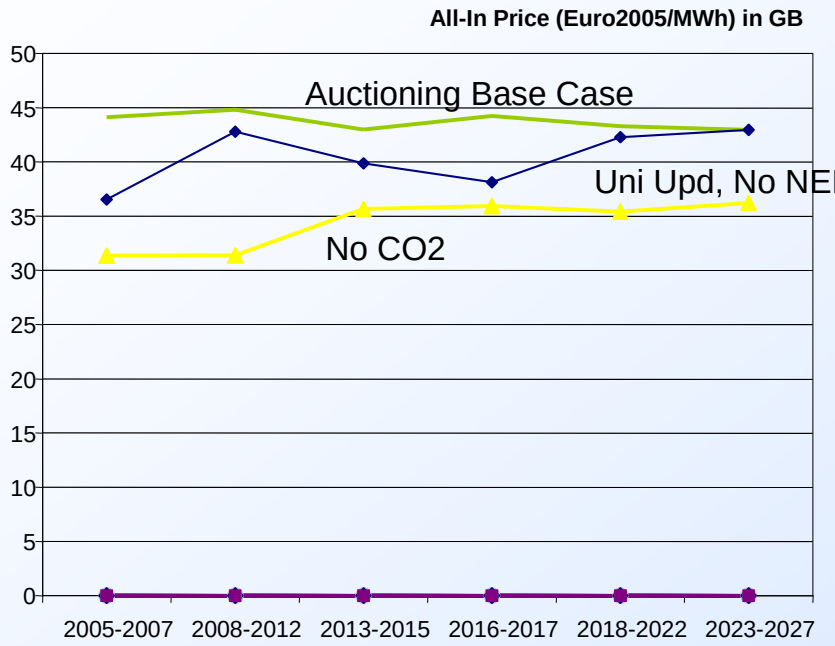
CO2 prices are assumed, starting with 10 Euro/t CO2 in 2005-2007 and followed by, 20€/tCO2)

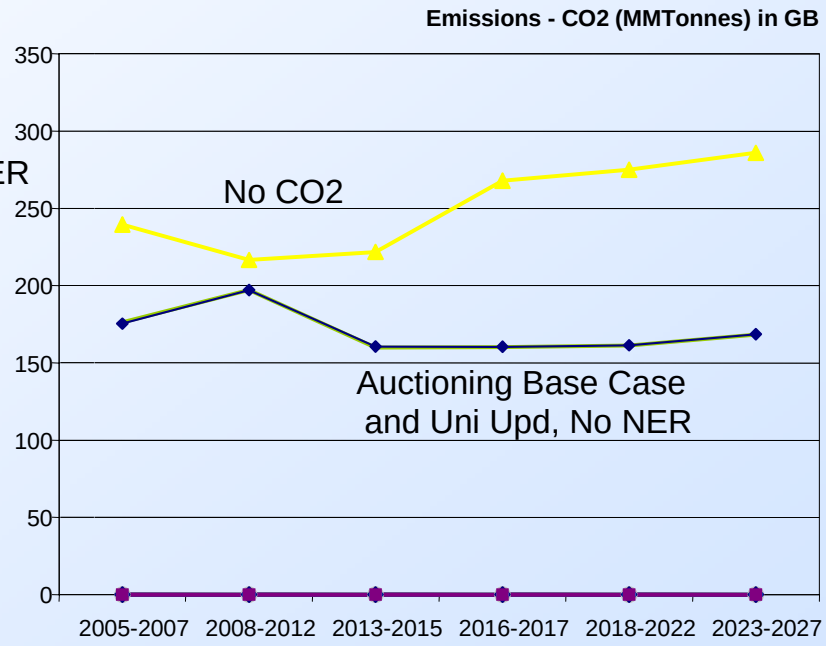
Illustration of distortions from updating



UK Simulation – uniform updating

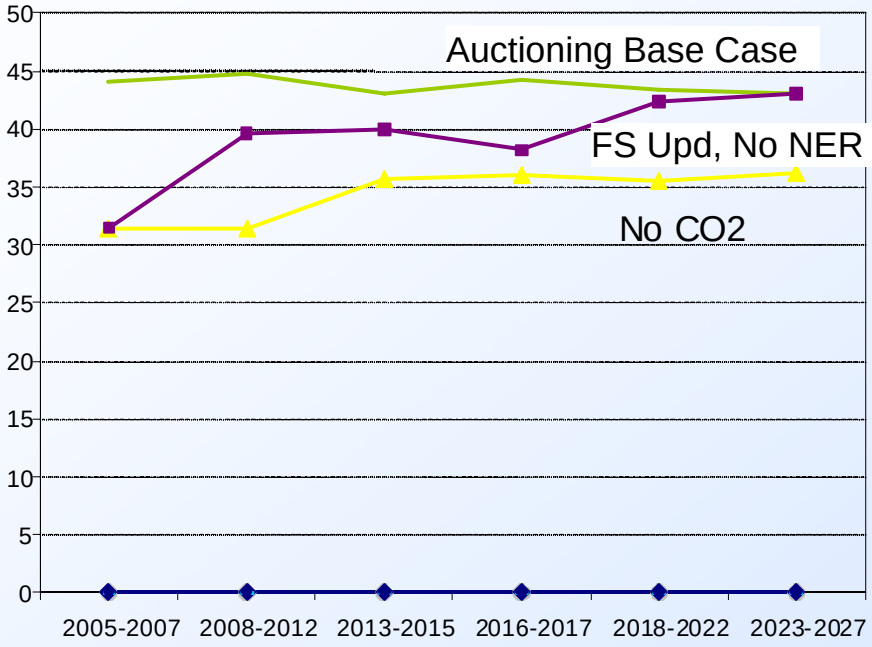
Assuming fixed CO2 price

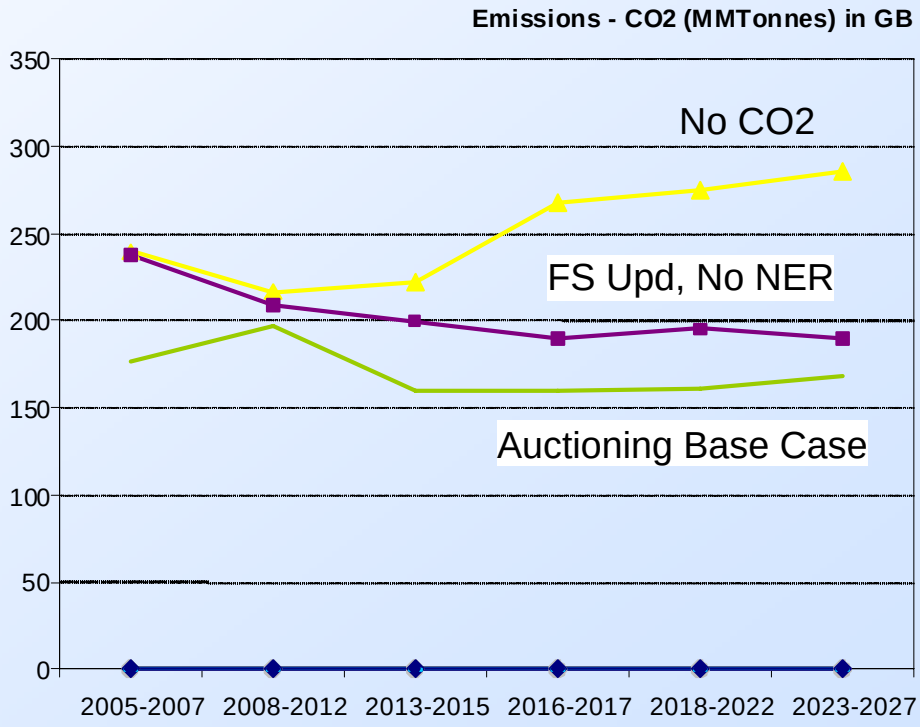




UK simulation – fuel specific updating

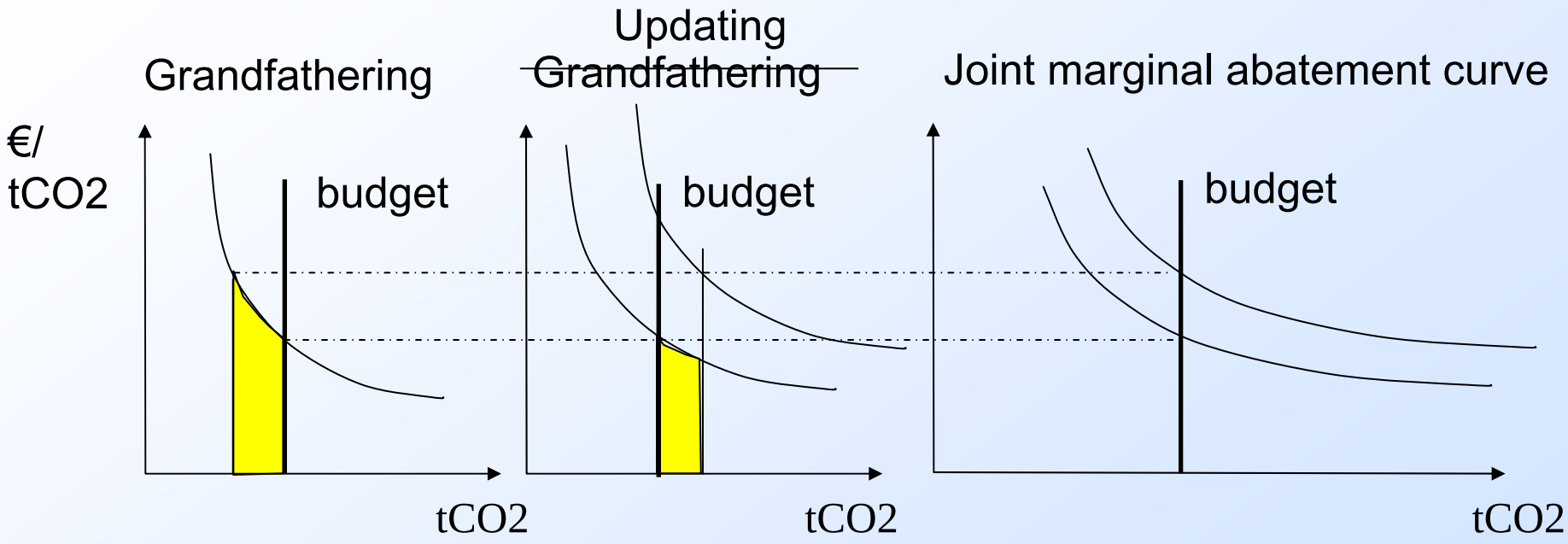
Assuming fixed CO2 price





What happens if only some countries update?

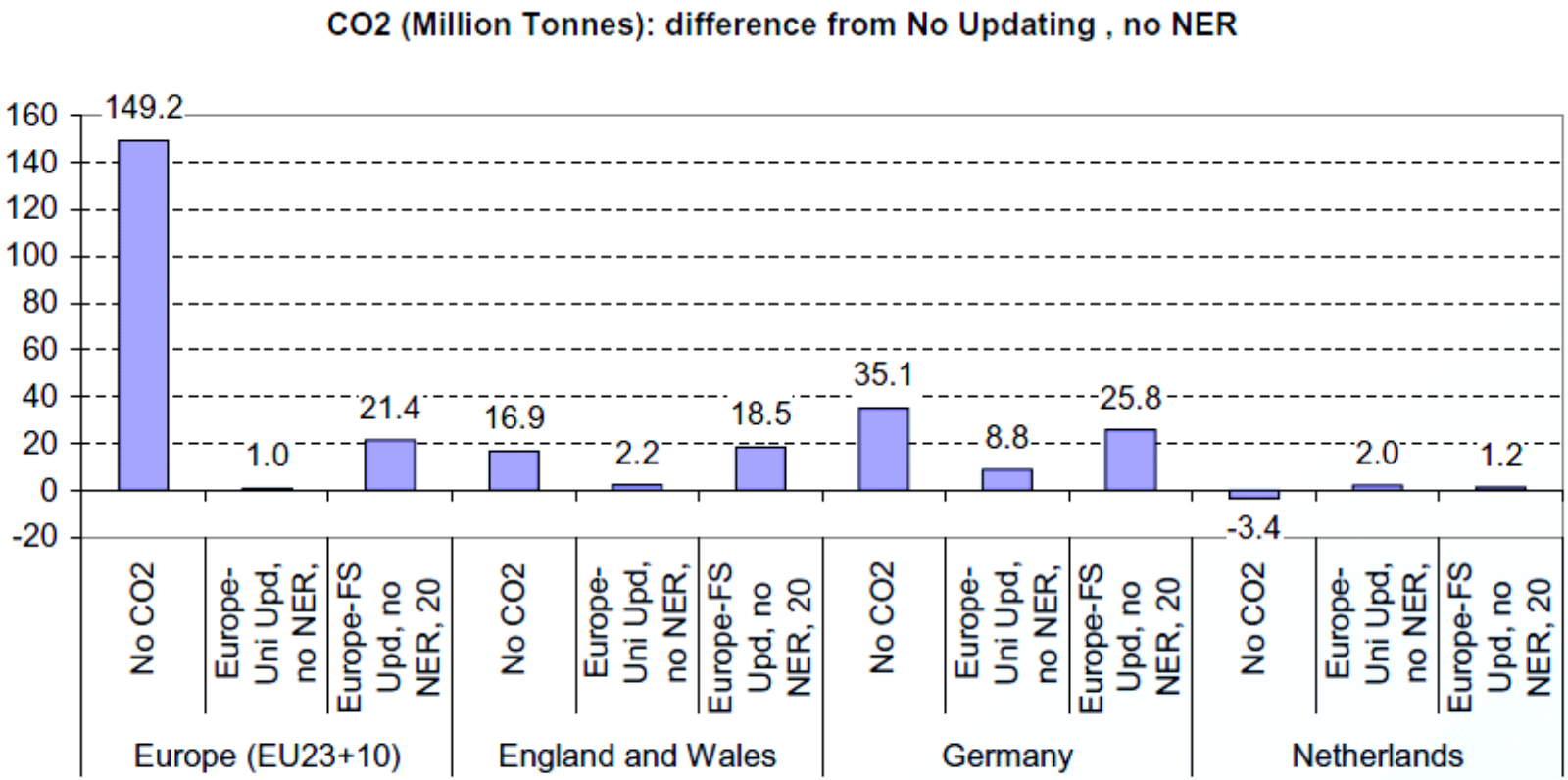
Marginal abatement curves for two identical countries…



Extra abatement costs > Avoided abatement costs

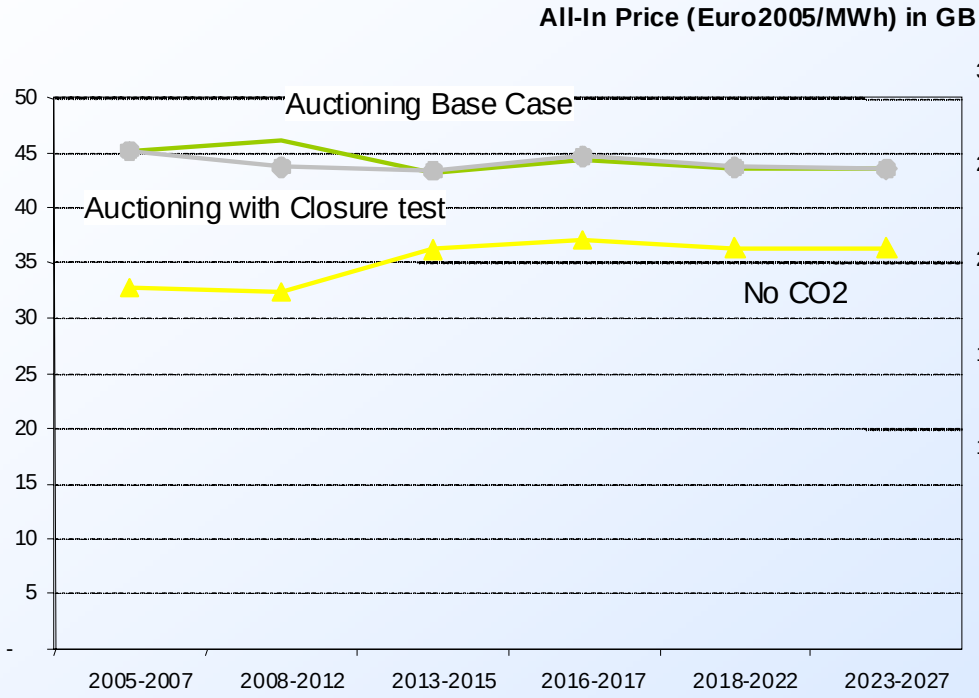
European simulation

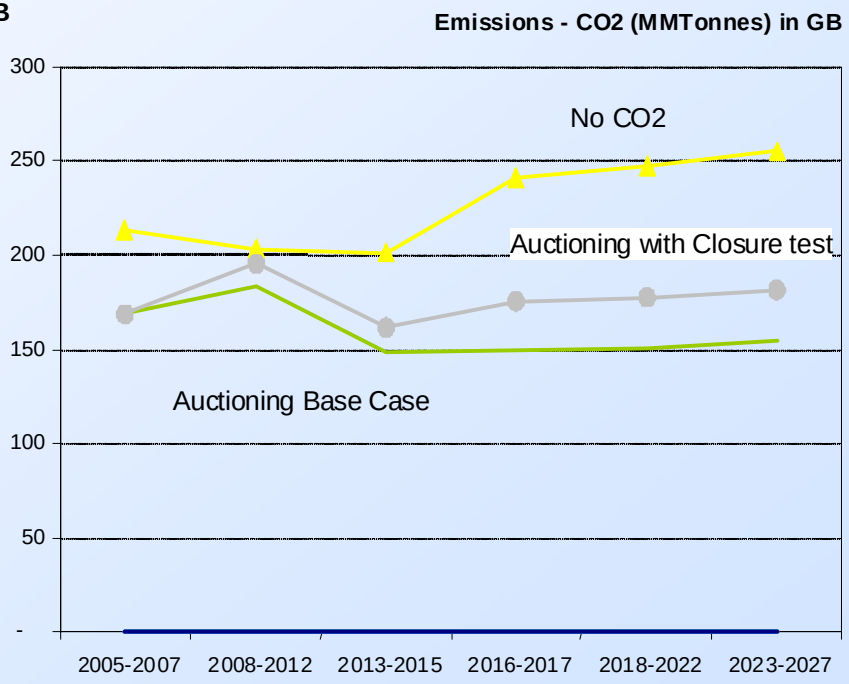
Assuming fixed CO2 price



Impact of closure test

Assuming fixed CO2 price





Distortions from allocations to existing plants

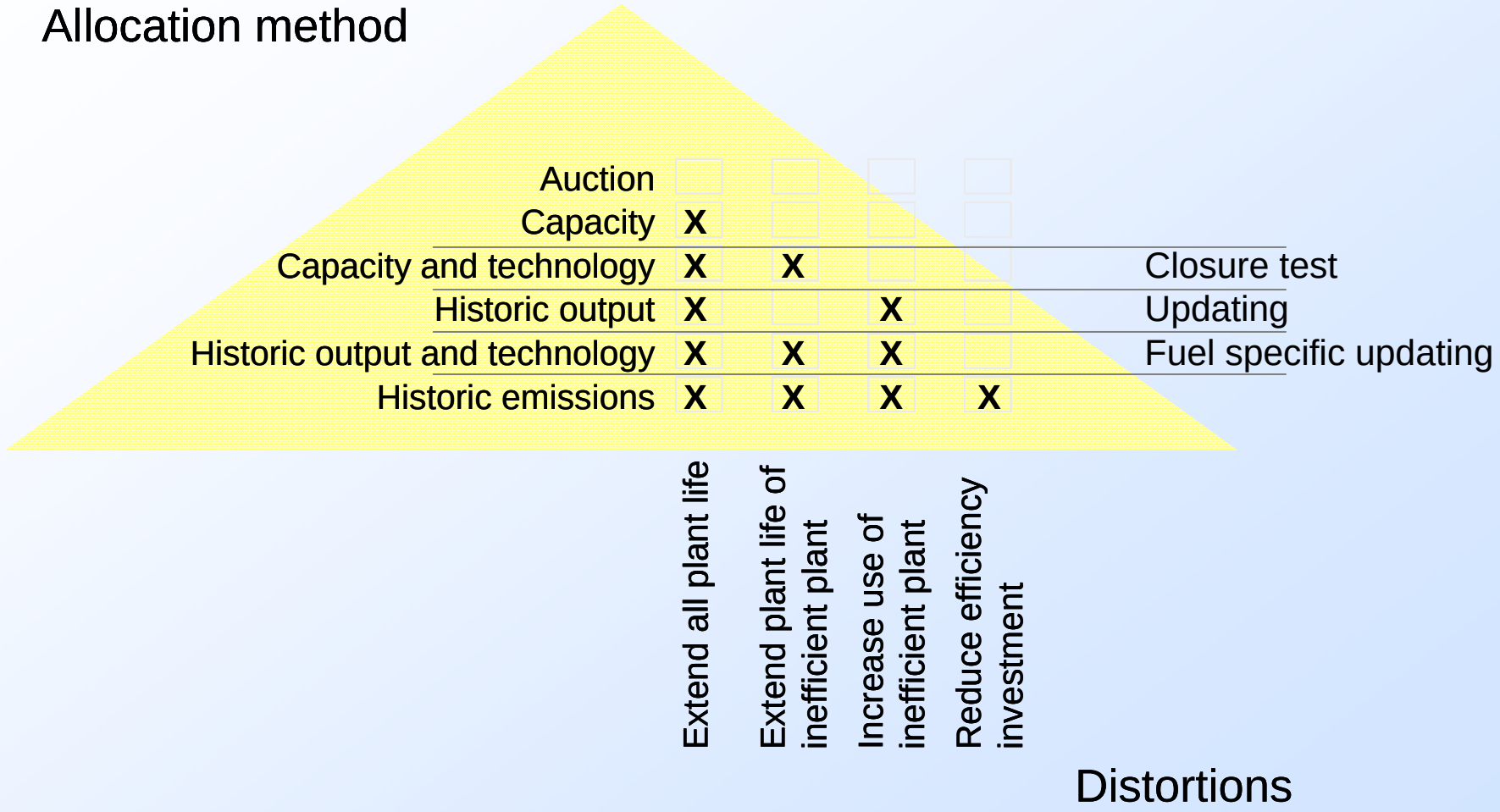
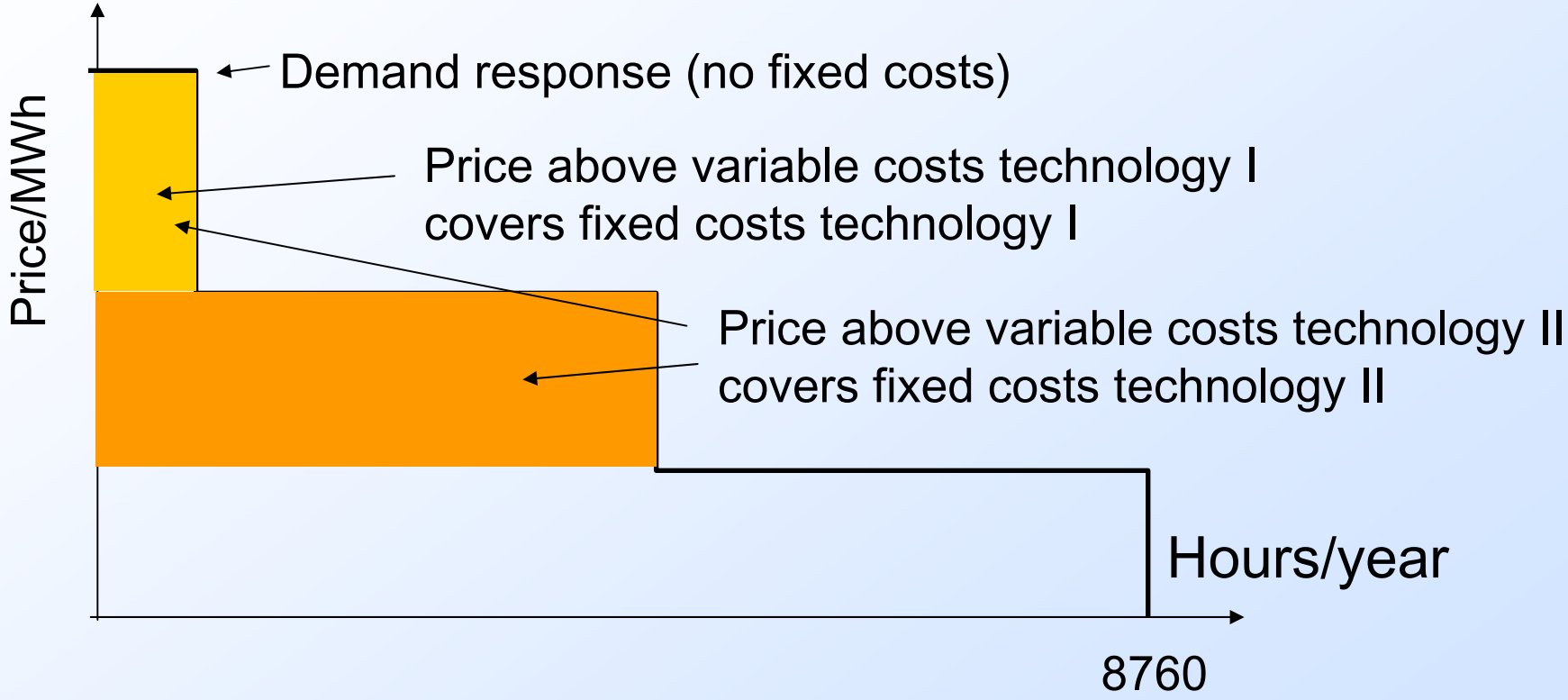
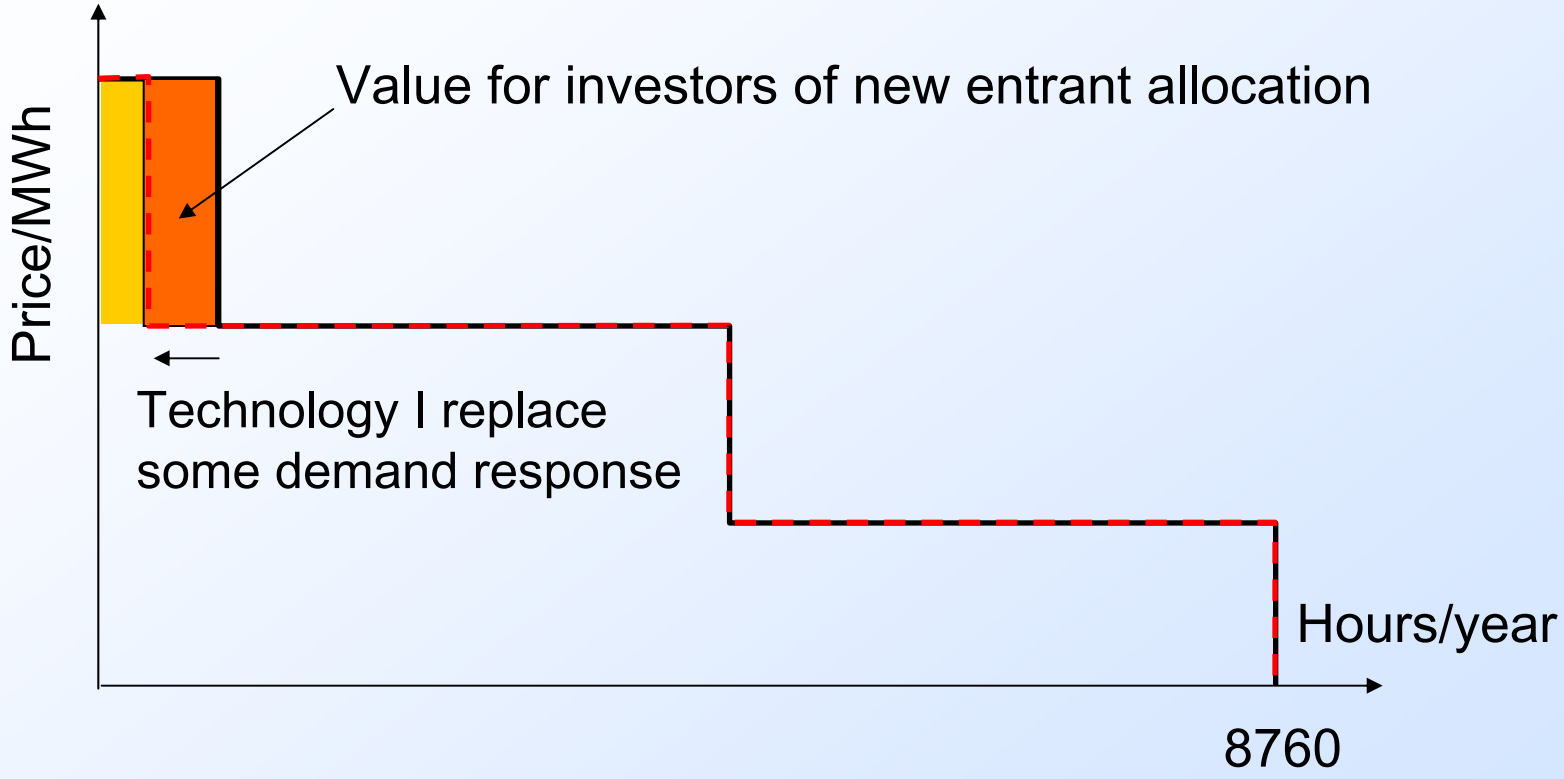


Illustration of investment equilibrium

- Infra-marginal rents cover fixed costs



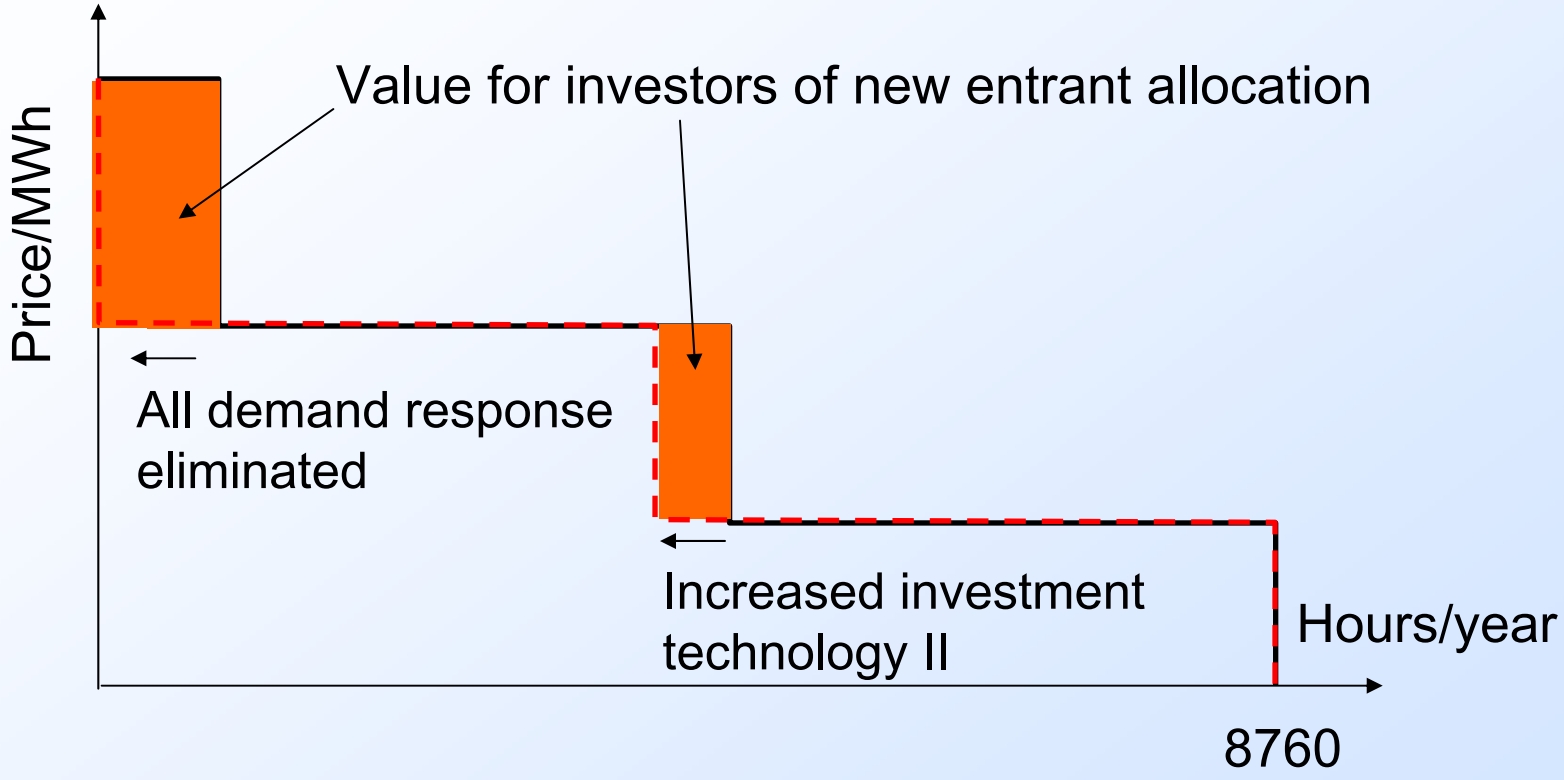
Impact of small new entrant allocation (uniform benchmark)



In competitive equilibrium mod:

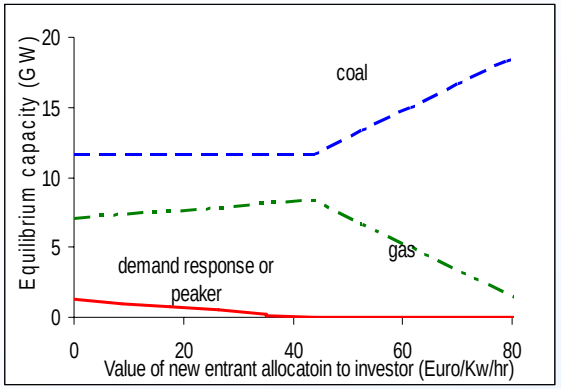
- P_{elec} reduced by value of new entrants allocation to investors
- Subsidy to new investment is wasted: generation costs > consumer value
- Emissions increased by (slightly higher) demand

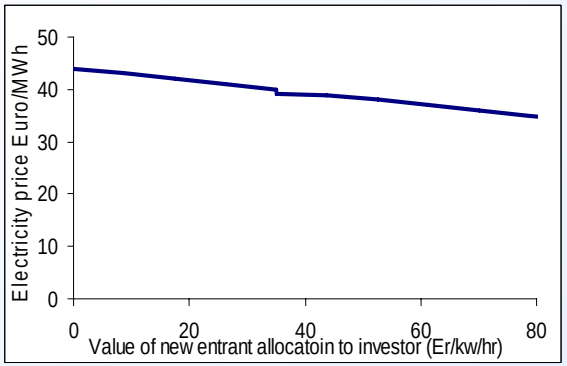
Impact of higher new entrant allocation (uniform benchmark)

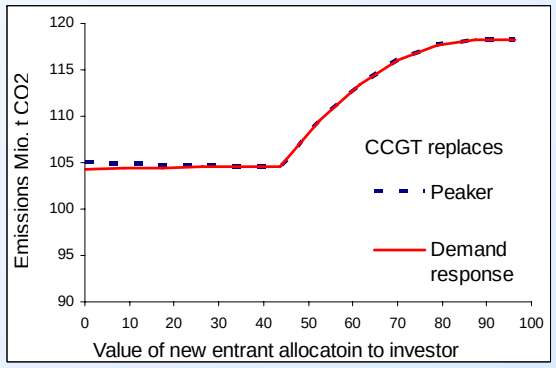


- Further reduction of electricity price
- More subsidy wasted on choice of tech. II instead of tech I
- If technology II coal, technology I gas -> emissions increase

National perspective, uniform new entrant allocation







Installed capacity

- Demand response/peaker replaced by CCGT
- At high levels of subsidy coal replaces CCGT

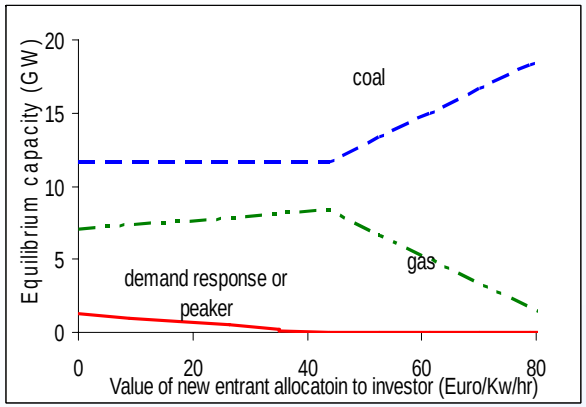
Electricity prices

- Decrease due to capacity subsidy

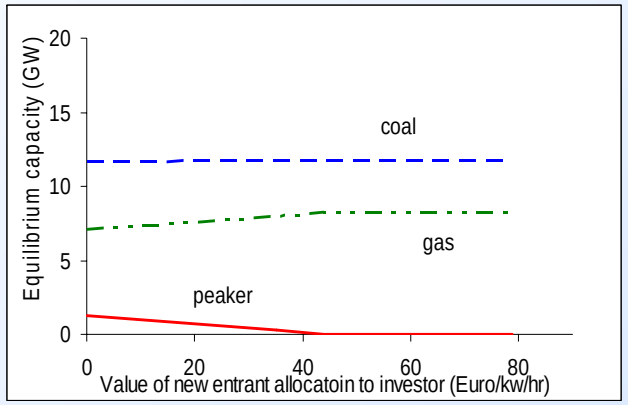
Emissions

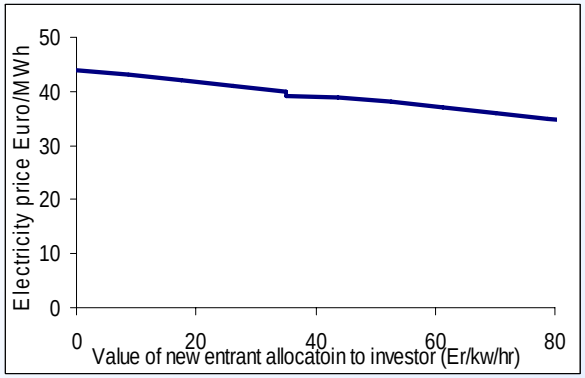
- Increase if demand response replaced by CCGT
- Decrease if CCGT replaces peaker
- Increase if at high subsidy coal replaces gas
- Demand elasticity not modelled

National v.s. harmonised perspective

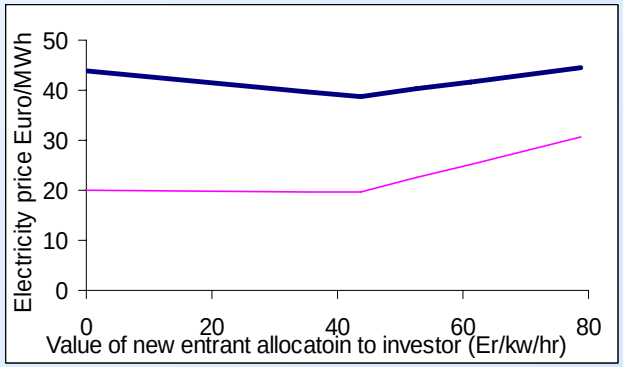


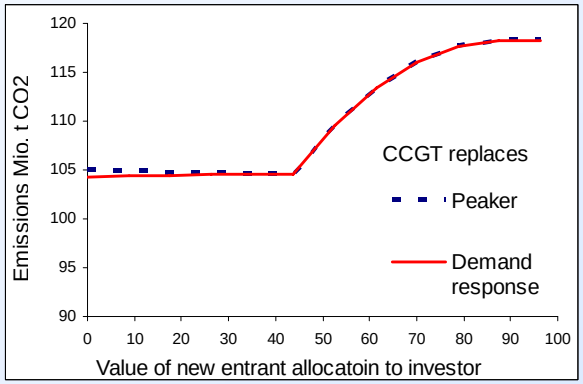
Installed capacity



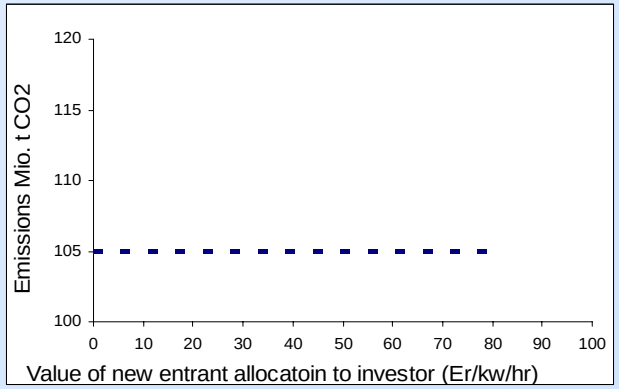


Price





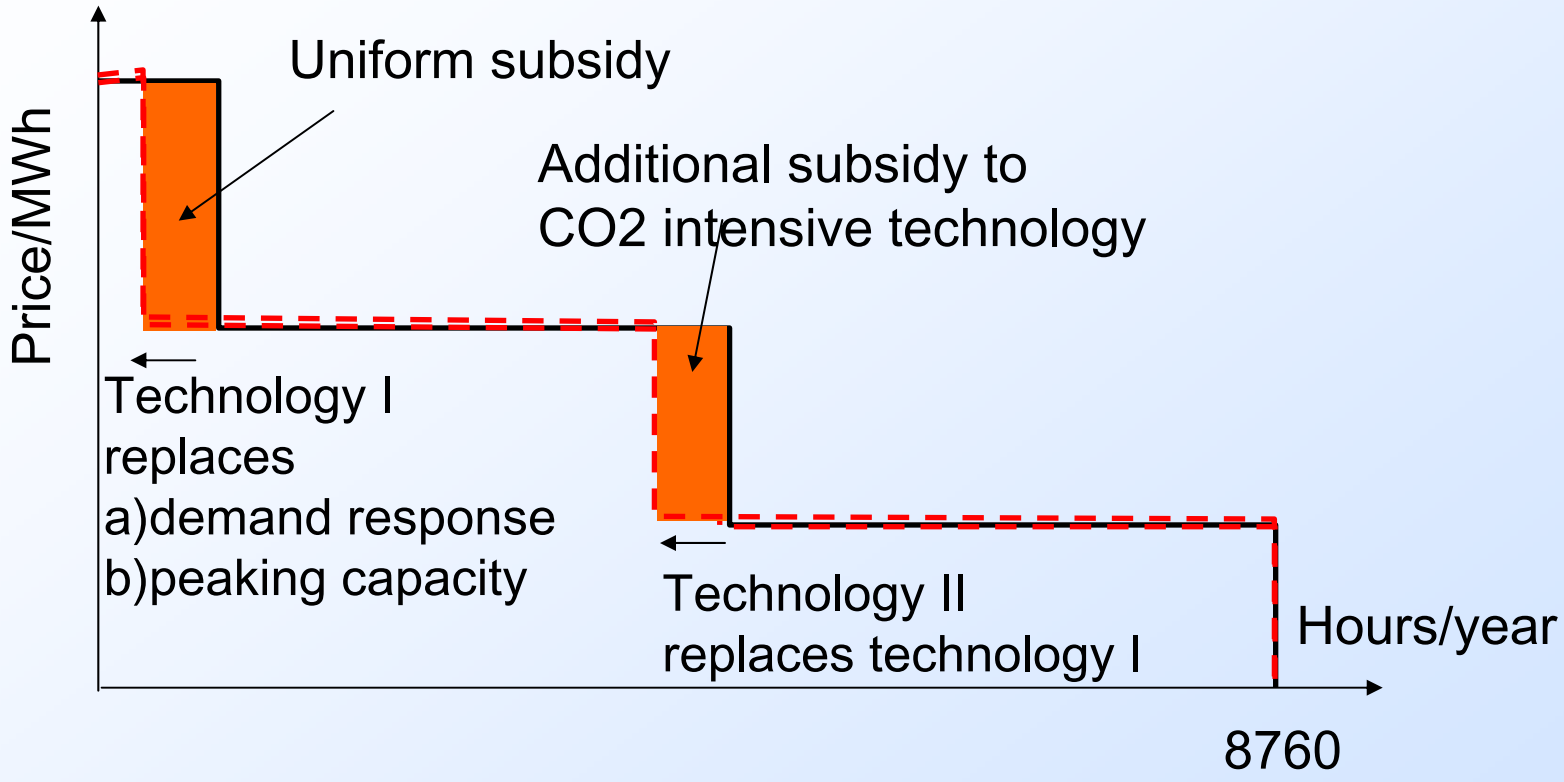
CO2 Emissions



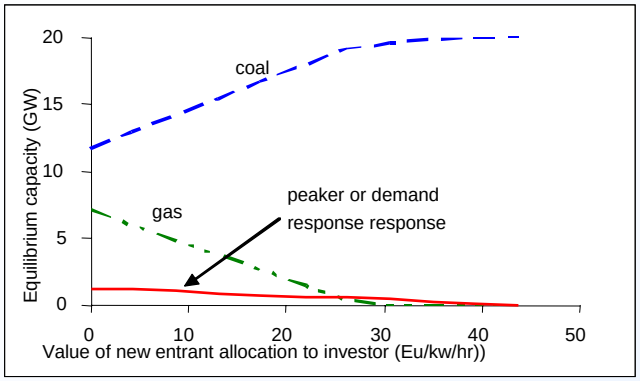
(a)

(b)

Impact of fuel specific new entrant allocation

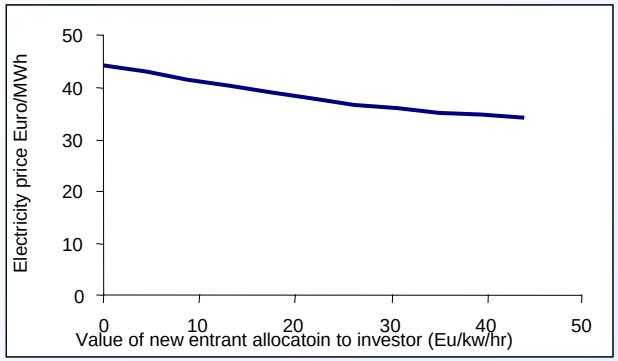


Fuel based benchmarking new entrant allocation



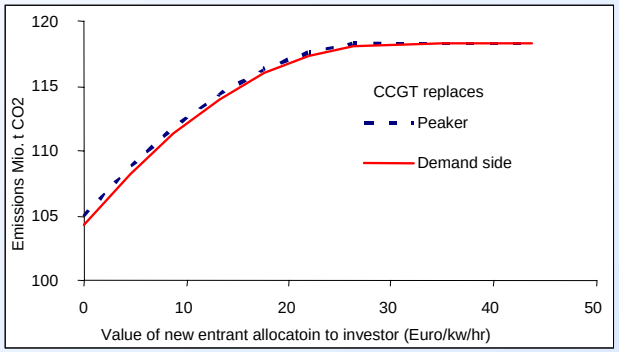
Installed capacity

- Coal replaces gas and peaker



Electricity price

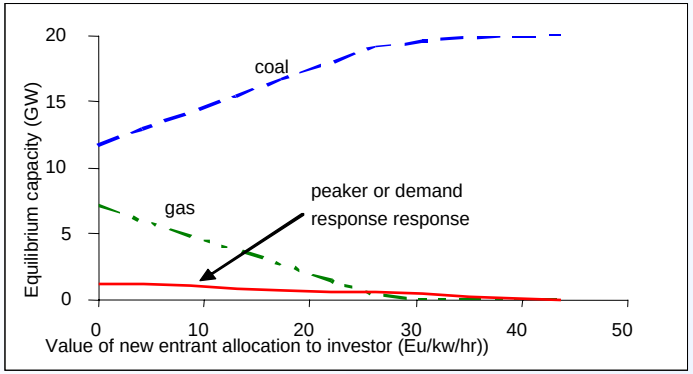
- Reduced as before



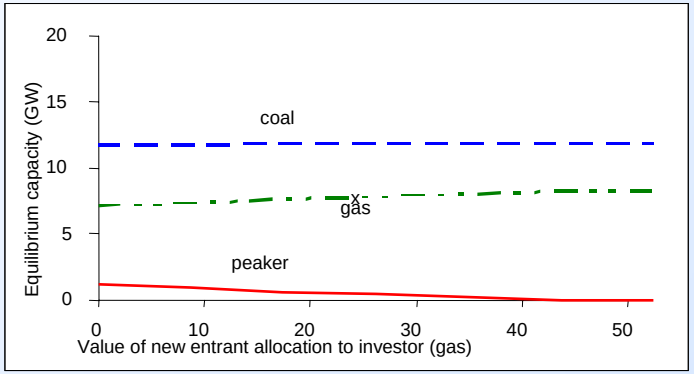
Emissions

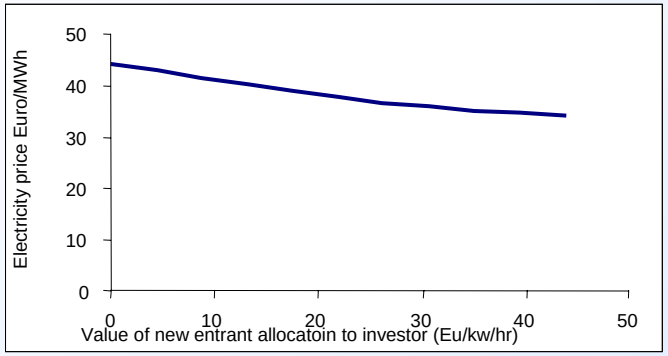
- Increase

National vs. harmonised perspective



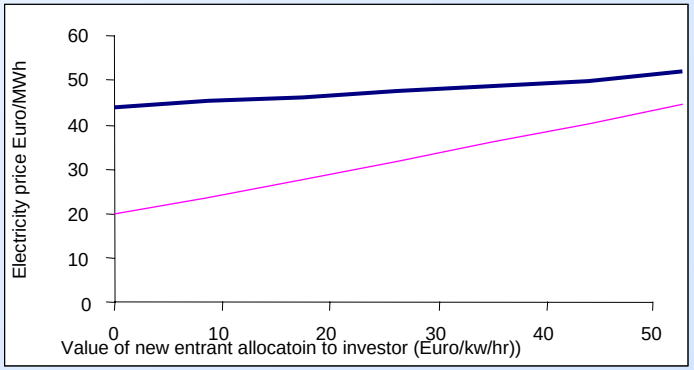
Installed capacity

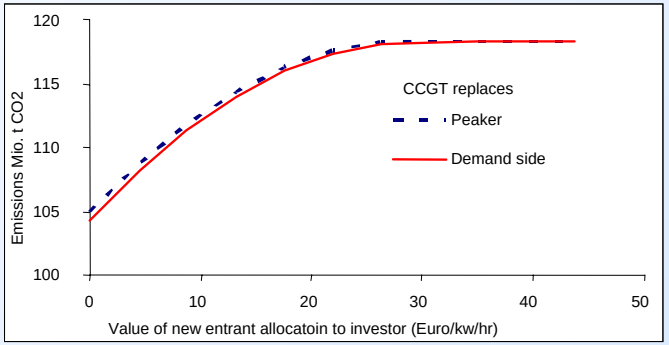




Electricity, CO2 Price

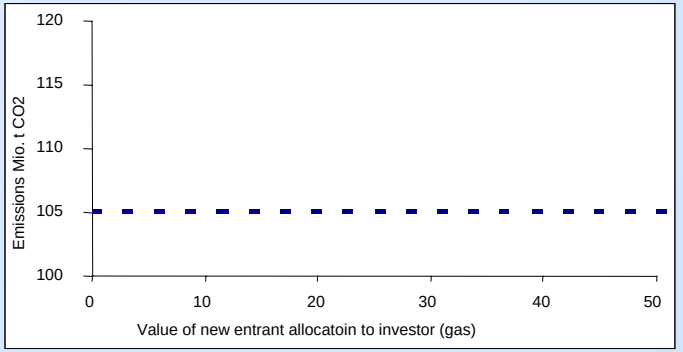
- CO2 price increase to compensate coal incentive



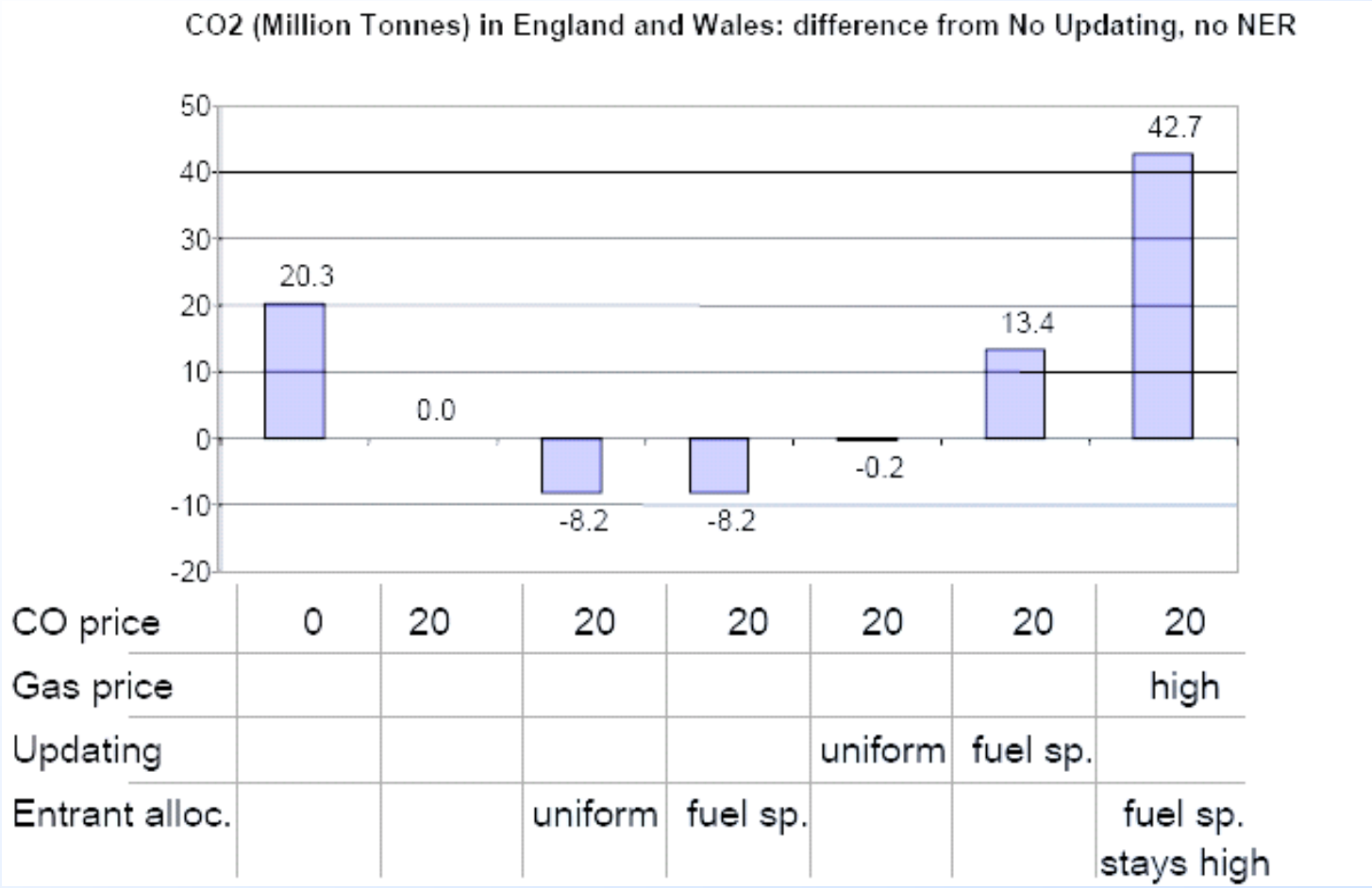


Emissions

- Constant due to cap

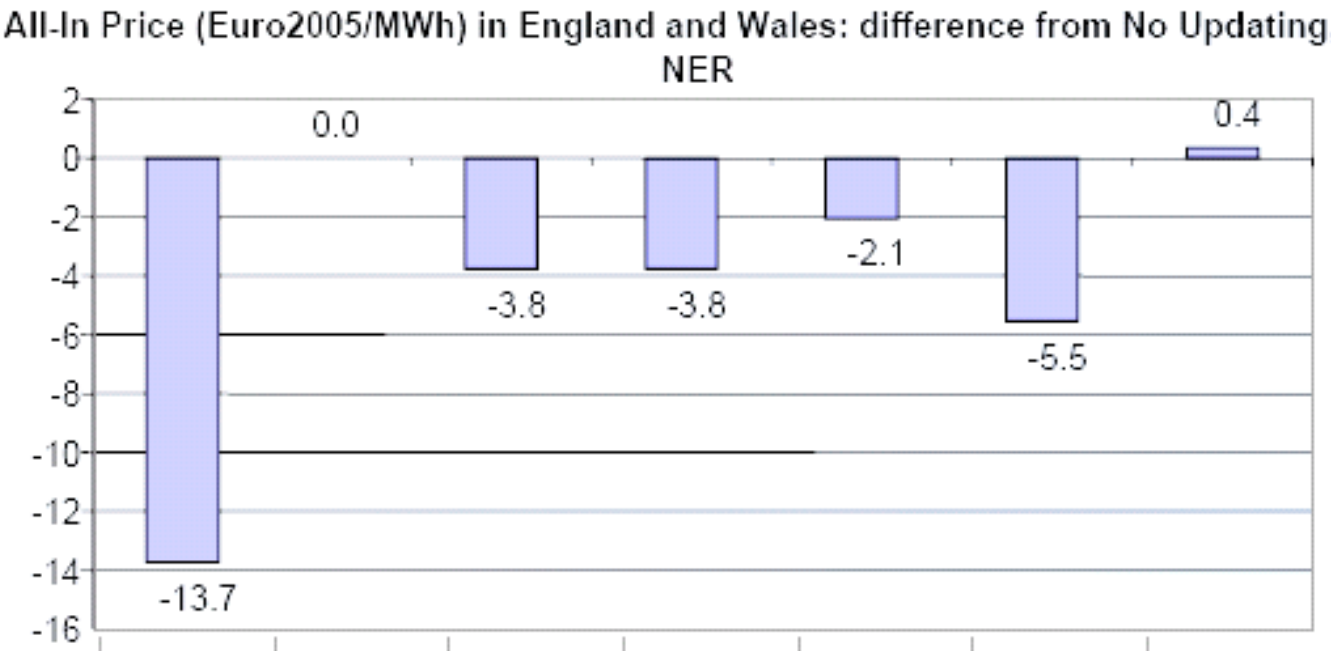


UK, New entrant allocation and emissions



CO price	0	20	20	20	20	20	20
Gas price							high
Updating					uniform	fuel sp.	
Entrant alloc.			uniform	fuel sp.			fuel sp. stays high

UK – New entrant allocation and elec prices



CO price	0	20	20	20	20	20	20
Gas price							high
Updating					uniform	fuel sp.	
Entrant alloc.			uniform	fuel sp.			fuel sp. stays high

Allocation, profit and competitiveness: *Four principles*

- *In general,* the rents associated with CO2 constraints mean 'grandfathered' allocation gives *potential* to profit, subject to:

  (a) degree of alignment of allowances with costs (eg. Not sectors outside EU ETS or affected primarily by electricity pass-through costs)

  (b) constraints on cost pass-through due to imports and other factors
- Power sector in liberalised markets will pass through (opportunity) costs of CO2 allowances to electricity price and thereby profit
- Net impact on other sectors less clear and complicated by details of electricity retail market regulation, by international trade, and by downstream company, regional and product differentiation
- New entrant, closure, and incumbent allocation rules all affect the incentives, pricing and efficiency of the scheme; Key is to understand the difference between
  - *marginal incentives* – which affect prices and long-run competitiveness
  - and *allocation transfers* – which determine short run cash flows

The pursuit of long-term objectives using instruments that have to adapt to shorter term cycles requires institutional independence

- Governments decide on the distribution of free allowances
  - Unlike SO_2/NOx in US, not lump sum because of 5 year cycles
  - Therefore, market repeatedly exposed to government intervention
  - This creates uncertainty for investment (technology choice, timing), and distorts operation and consumption decisions
- Historically monetary policy was in government hands
  - But political process too short-sighted for long-term commitment
  - Complex economic interactions difficult to manage in political process
  - Therefore, independent central banks were created

➢ <u>Minimise government influence on ETS via allocation process, e.g. creating institutional independence.</u>

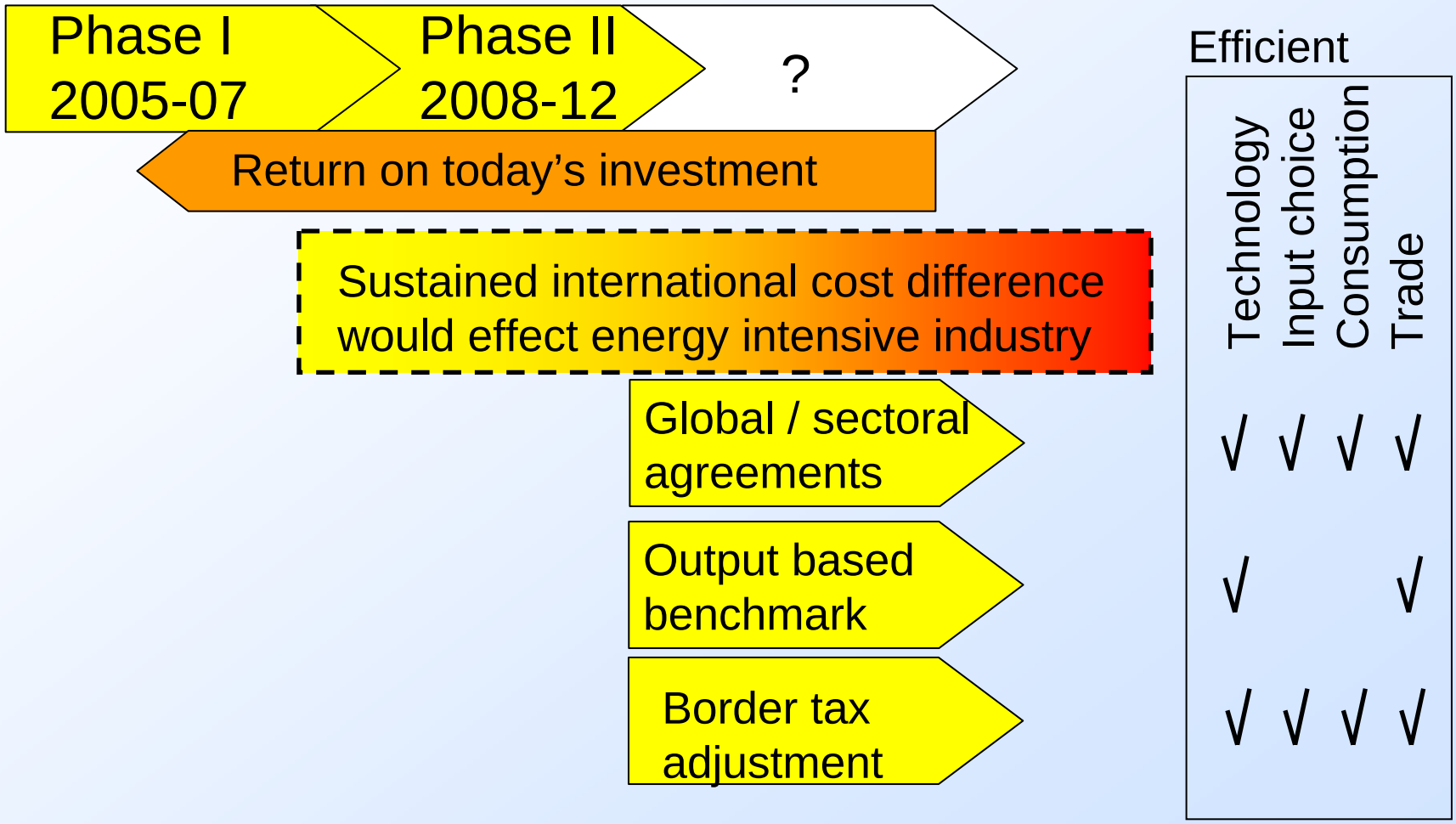
The 'terms of reference' for allocation institutions should focus on a specific clearly articulated objective, not a diverse collection of conflicting goals

- Allocation process aims to achieve security of supply, secure industry support, and compensate for forgone profits
  - Political process with multiple objective creates complex NAPs
  - NAPs create perverse economic incentives (section 4 and 5)
  - Investment delayed/distorted because future NAPs unpredictable
- Historically monetary policy had multiple objectives
  - Governments could not credibly commit to low inflation target as market knew employment and GDP growth are important
  - Therefore, they had to compromise more on GDP growth and employment to convince market of low inflation objective
  - Central banks now have one objective: control inflation

➢ <u>Use allocation process only to compensate existing installations for the reduction in profitability under ETS</u>

Efficient response to the ETS requires clarity post-2012

Expectation drives investment, available options determine competitiveness



The post 2012 options in detail

Option	Comments
(1) Global agreement	The “first-best” but highly unlikely
(2) Embed in a sectoral agreement for a specific energy intensive product	• More credible in terms of “high politics” • Institutionally wholly unprecedented • How to reach binding deal with global sectors?
(3) Move to output-based (intensity) and/or downstream allocations for core competitively exposed sectors	• Output-based allocation maintains market share by curtailing pass-through, but: –Undermines internalisation of CO2 price –Inefficient choice of intermediate products and consumption –Increases macroeconomic costs –Complex system
(4) Level playing field through Border Tax Adjustment	• Fall back option for (1) and (2) • Maintains core incentives • For WTO compatibility: Allowance auction so that compensation is for average costs

Conclusions

- In liberalised markets opportunity costs are passed through – unless strong international competition
- Competitiveness issues in sector with high energy costs and exposure to international competition
- Address Investment and post 2012 to address competitiveness issue
  - International (sectorial) agreement
  - Output based allocation / new entrant allocation
  - Border tax adjustment
- Vivid and creative industry core for European competitiveness -> **Simple** regulatory framework!