

The EU Emissions Trading Scheme – present lessons, future evolution

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Outline

- Introduction and core principles
- Electricity sector insights
- Energy intensive consuming industries
- Uncertainty, instability and the role of auctioning
- Beyond 2012
- Core Conclusions

EU Emissions Trading Scheme – Overview

Participants

- All EU 25 countries
- All electricity, ferrous metals, pulp & paper, cement and all facilities > 20MW, total 46% of EU emissions
- International links through Kyoto project crediting

Allocation

- Member states develop National Allocation Plans (NAPs) by sector and installation
- To be consistent with Kyoto target and anti-subsidy provisions

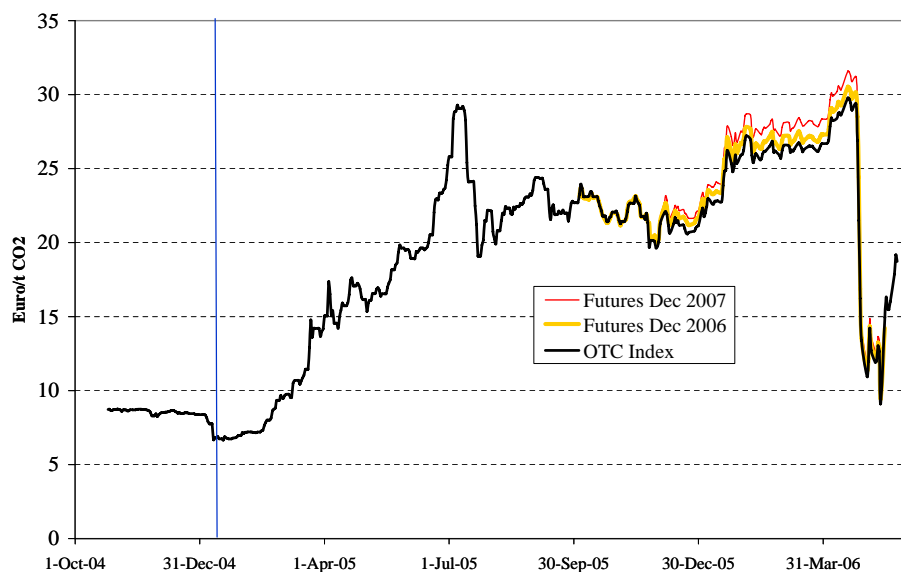
Timing

- 2005-7: phase 1, no national target, opt-out provisions
- 2008-12: governed by Kyoto target, opt-in possibilities
- 2013+ ? Likely to strengthen

Key issues

- Market price – uncertainty – driven by NAPs, relative coal-gas pricing, and emerging nature of market with mixed / late participation
- Specific allocation issues – including new plant, plant closure, etc
- Various legal issues surrounding legal nature, tax rules etc.

The market works but carbon price has had a bumpy ride since inception



Phase I, intended as the initial, trial phase, proves success in market design and verification, reveals important lessons on profits and allocation

- An EU-wide market that gives value to company efforts to reduce CO2 emissions, and incentivises them to seek out the least-cost means of doing so
- The market mechanics have worked well – extensive trading through various mechanisms
- The stringent verification requirements have proved effective and valuable
- .. But raise questions about whether the threshold of 20MW thermal is too low, increasing transaction costs for small environmental gain
- Phase I confirms the predictions that some sectors (notably electricity) profit from the combination of free allowances and passing through the opportunity costs

The recent market 'crash' – and reactions - point to the core issues

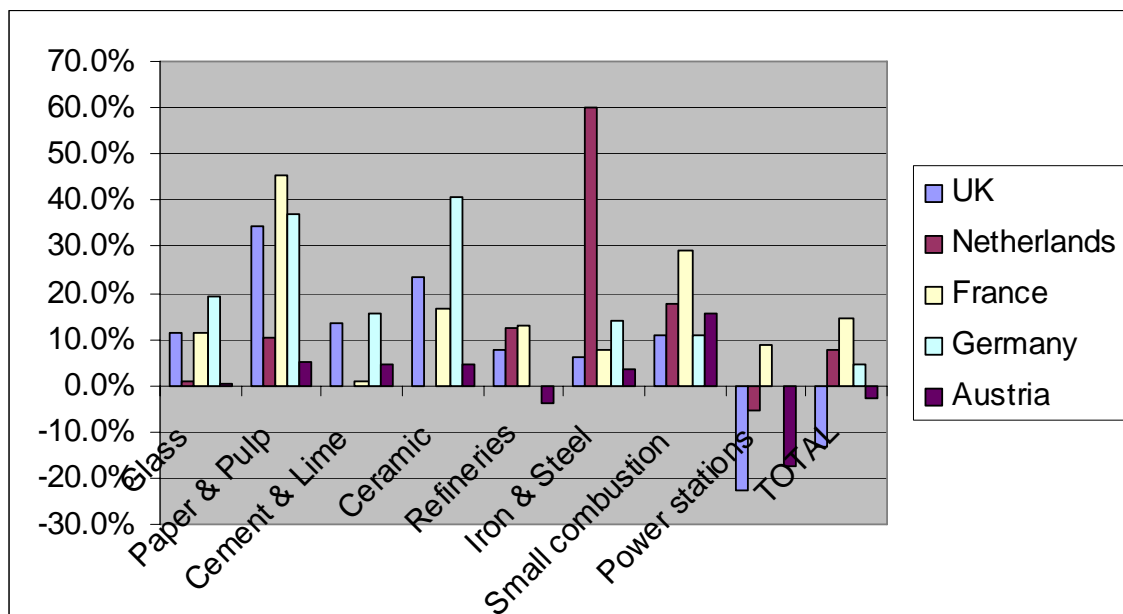
- “Allocation, allocation, and allocation”
- The danger of small cutbacks combined with projection uncertainties
- Gaming of the system given asymmetric information
- lack of harmonisation makes it a problem of EU coordination
- .. And the response:
 - Retrospective political interference undermining market confidence (German proposal)
 - Perverse updating incentives (2005 baseline)
 - Risks of carrying forward into Phase II (banking)
- These and lack of post 2012 certainly are looming concerns

BIG Money – though not quite in the way that some expected

- At €20/tCO₂, the asset value of 2.2bnCO₂ allowance is around €40bn/yr ... €100ms have been won or lost in trades against erroneous price expectations
- Disputes continue over the reasons for the surplus in 2005 - but it is some combination of overallocation and greater than predicted abatement (eg. in cement sector)
- Where competitive electricity markets, pricing effects as expected lead to profits – probably totalling around **€5bn** across the EU, swamping the modest net purchases in the sector

2005 verification data by sector underline the ubiquity of the overallocation problem

Excess of >10% common in many sectors across leading EU economies – even greater in many others (esp Accession 10)



Economic principles and incumbent competitiveness

Making business sense of climate change



Focusing only on **volume** of allocation is shortsighted and misses issues more important to long-run incentives and competitiveness, ie. influence on prices

	Approx UK domestic output, 2001	Relative impact on value-added of 10% allocation change	Relative impact on value-added of 30% elec pass-through change
Pulp, paper etc	£8bn	0.12%	0.59%
Glass & Ceramics	£4bn	0.07%	0.27%
Cement & construct	£6bn	0.38%	0.46%
Iron & Steel	£8bn	0.73%	0.80%
Electricity	£30bn	1-2%	5%

Total value of these commodity sales in EU over 2008-12 > €2000bn

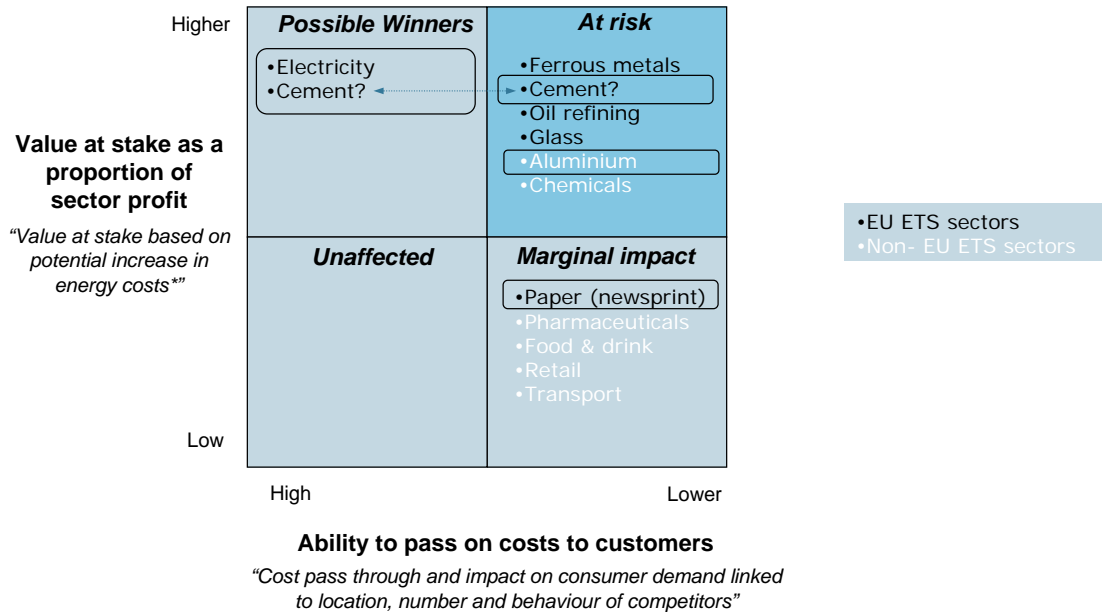
A 1 or 2% change in product prices generally matters more than the current struggles over allocation and pass-through

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

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

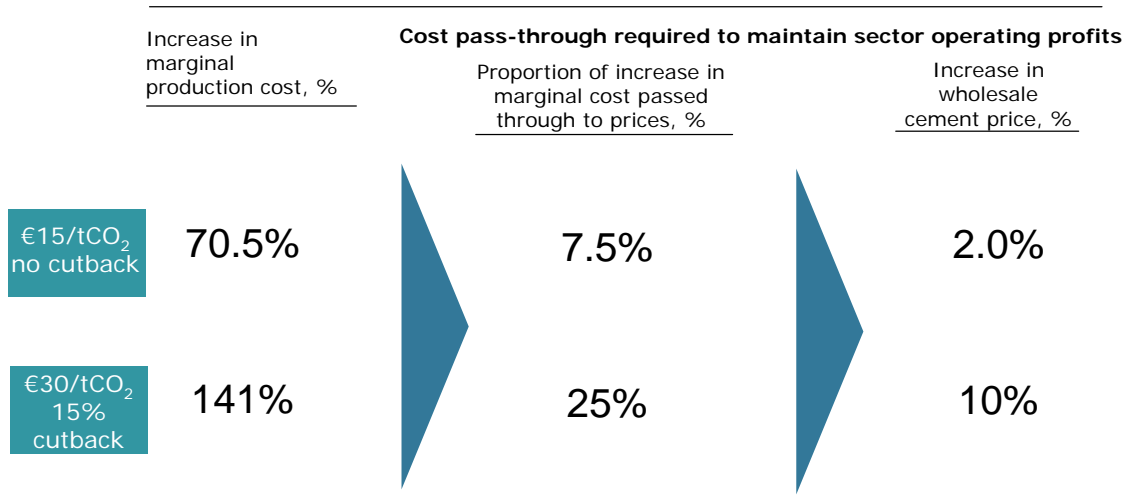


Note: *e.g. cost increase if 40% uplift in electricity price and allowances need to be purchased for ~10% of emissions – indicative value at stake in phase 2 of ETS scheme

Getting a sense of magnitude

- Its easy to make generalised assertions about competitiveness; it is quantification that matters
- Widely cited results of Carbon Trust (2004) and IEA (2005) find profitability of several downstream sectors *increases*
- Initial understanding from magnitudes of pass-through to maintain profits ...

Even Cement has potential to profit from the EU ETS with modest price rises – but at cost of market share
e.g. modest pass through needed to maintain profits but marginal cost change makes imports competitive near coastal ports



Scenarios 1 & 2, 100% direct allocation assumed helps offsets electricity price rise (c.90% cost pass-through in electricity)
 Long term scenario, required cement cost pass through increases as its direct allocation is cut back 30%

Profit-maximising pass through predicted by Cournot modeling: >50%

Allocation, profit and competitiveness: understanding the Five Principles

- *In general*, the economic rents associated with CO₂ constraints mean that free 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
- Profit and market share are not synonymous, and *in short term they are usually in opposition*
- Accumulated evidence confirms that where there are competitive power markets, power sector is passing through bulk of opportunity costs, resulting in substantial profits and downstream costs
- Most other sectors within EU ETS can be expected to profit but to much less degree, with some loss of market share over time, details complicated by details of 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

Electricity sector insights

Making business sense of climate change



Executive Summary: Price impacts

Impact of CO₂ allowance prices on electricity prices

- **In countries with liberalised markets and competition:**
 - Empirical evidence confirms that generators add opportunity costs
 - CO₂ price of 20Euro/tCO₂ increases electricity price by 10-16 Euro/MWh
- This is neither an aberration nor unfair - it is a natural consequence of efficient pricing in a competitive market
- **In countries *without* competitive retail prices:**
 - Regulation or threat of regulation can prevent pass through of opportunity costs to domestic consumers
 - If governments intervene to prevent pass through to industrial contracts, then transparency/liberalisation further reduced
 - Likely to undermine incentive structure of ETS towards efficient investment and operation as CO₂ prices are not internalised
- And with competitive markets, price pass-through *is* affected both by electricity market structure and CO₂ allocation methods

Repeated allocations to power sector incumbents can lead to significant distortions, - degree and nature depends on allocation method

		Auction				
Benchmarking	Capacity only	X				
		Capacity by fuel/plant type	X	X		
Updating from Previous periods	Output only	X		X		
	Output by fuel/plant type	X	X	X	X	
	Emissions	X	X	X	X	X

Impacts
<ul style="list-style-type: none"> • Increased expenditure on extending plant-life • Inefficient fuel choice • Less efficiency improvements

Distortions
Discourage plant closure
Distortion biased towards coal
Shields output from average carbon cost
Distortion biased towards coal
Reduce incentives for efficiency-improving investment

Executive Summary: Distortions from allocation

Closure and new entrant allocation rules can induce additional investment-related distortions

- Withdrawing allocations upon power station closure (“contingent” allocation) leads to unwarranted life-time extensions (relative to new build), increasing system costs and allowance prices
- Allocation plans grant free allowances to new entrants partly to compensate for distortions created by closure conditions
- If new entrant allocation is fuel or technology-specific
 - The more CO₂-intensive technology is shielded from CO₂ costs but benefits disproportionately from price uplift
 - Leads to inefficient *additional* investment in carbon-intensive plants, extra costs, and higher long term electricity prices
- If new entrant allocation is based on uniform benchmark (tCO₂/kWe)
 - Acts as a capacity payment supporting all new investment
 - Can reduce electricity prices as it reduces scarcity premium and lowers marginal carbon intensity over time

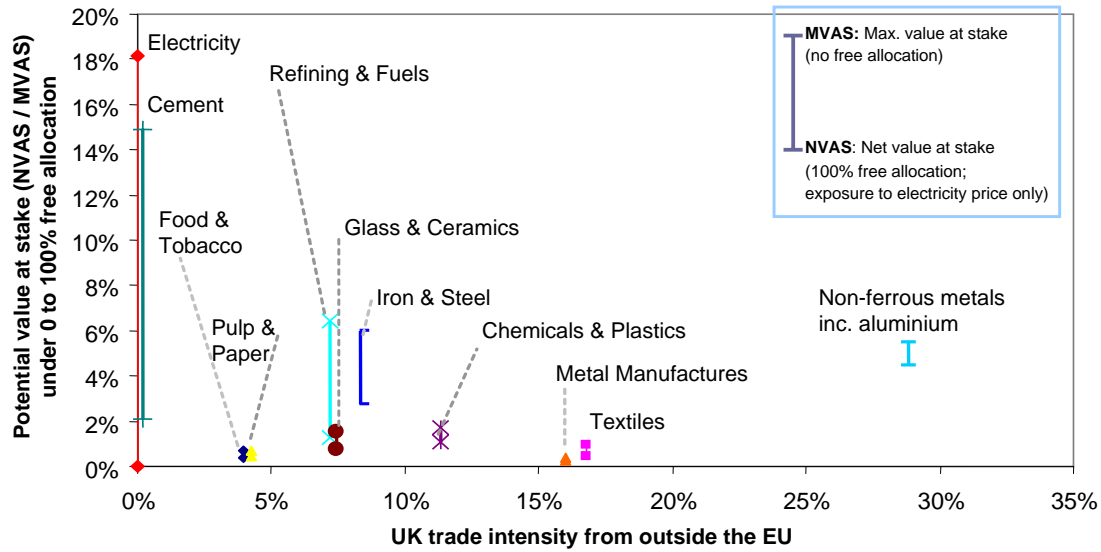
How much do these theoretical distortions matter?

- If power sector expects gas prices at levels up to c.2003, or expects free allocations to decline substantially across all technologies, perverse incentives may be short-run but not long-run / investment problem
- But many companies really “believe” the most recent evidence – and under current gas prices and allocations, if projected forward, allowance updating results in construction of new coal fired power stations
- ... even if these coal plants are subsequently rarely used, the value of allowance sales (opportunity cost) makes investment profitable and inflates future electricity prices

An inherent logic must minimise special closure rules and drive new entrant allocation rules towards capacity-based benchmark across EU

Energy intensive consuming industries

Costs & competitiveness: profit/loss depends upon pricing policies and incentives, allocation, and trade situation net value-at-stake insufficient for major Phase II problems

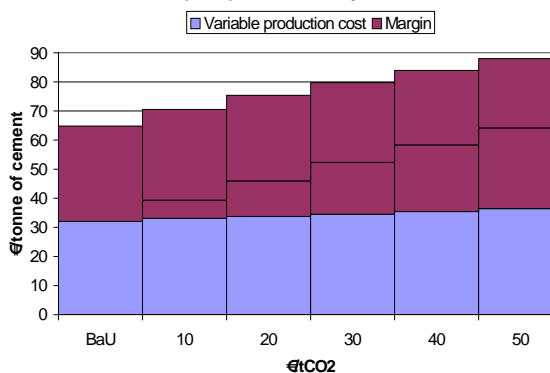


- **Upper end of range:** zero free allocation
- **Lower end of range:** 100% free allowances (effect of €10/MWh electricity price increase to sectors)
- Assumes allowance price of €15/tCO₂ and no CO₂ price pass through in sector

With fixed allocation, domestic cement costs rise and profit-maximisation leads to big profits with erosion of market share

COSTS

Variable production cost increases;
→ CO₂ opportunity cost increases but less than proportionally.

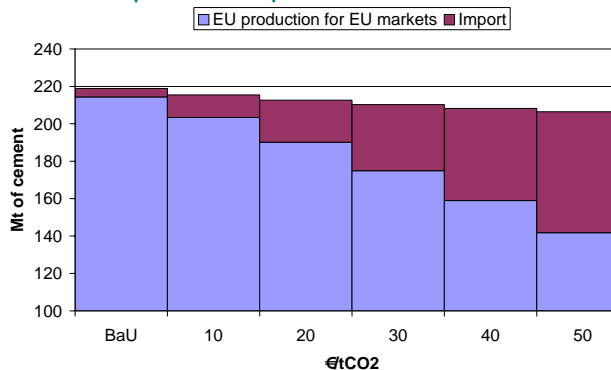


Margin over variable production cost increases, large aggregate sector profit

For 20€/tCO₂, extended cost: +14€/t cement (~200km by road) domestic price: +15%

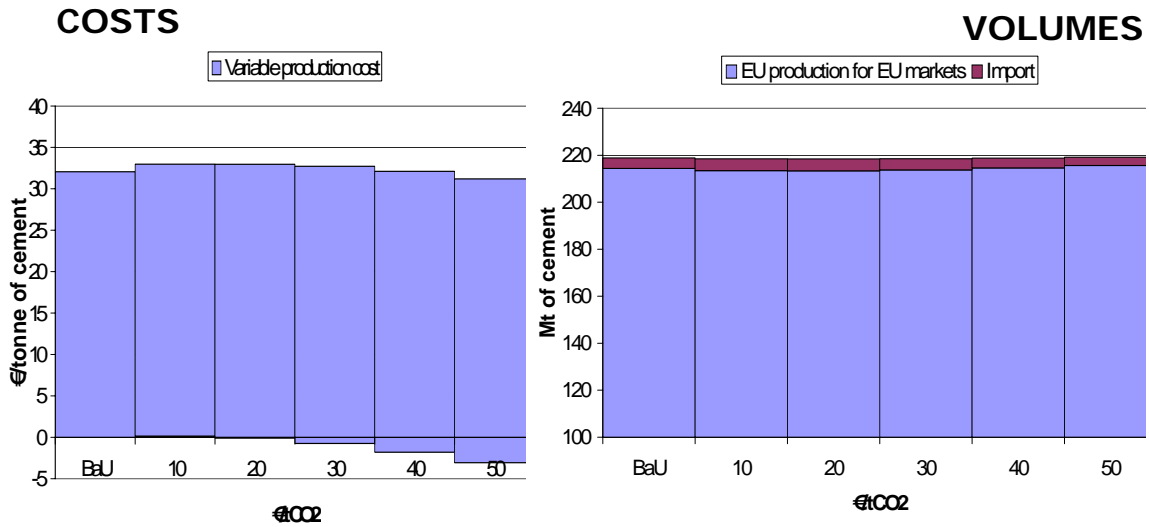
VOLUMES

consumption not highly hit (-3% for 20€/tCO₂) but big rise of imports
→ Exports collapse.



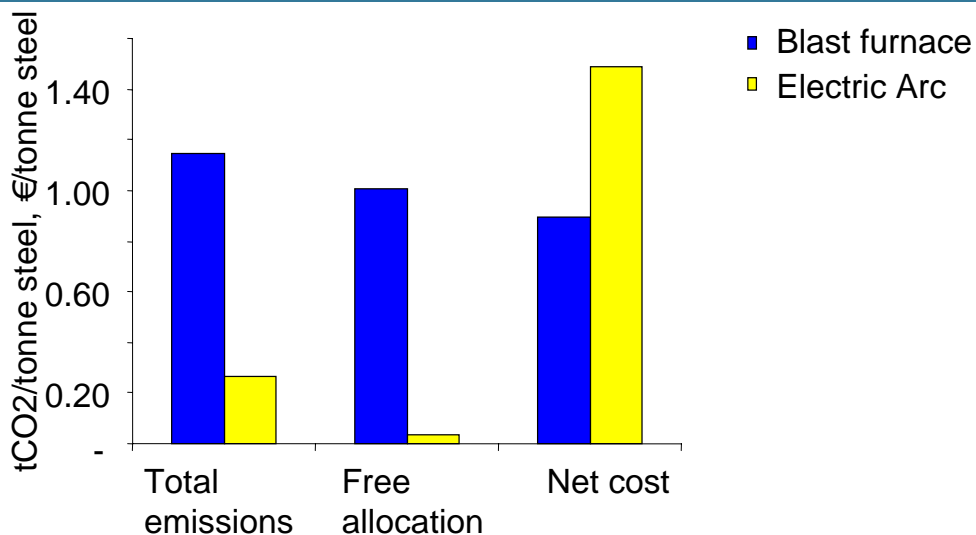
EU aggregate imports rise from 2% in BaU to 10% of consumption for 20€/tCO₂

Output-based (intensity) allocation, per tonne of cement produced, changes picture dramatically by aligning marginal (opportunity) costs to average costs



... But shields the economy from the true cost of carbon and incentives for radical process innovation that avoid carbon-intensive intermediates ...

Potential for distortions also in other sectors: Blast furnace vs. electric arc steel production



Integrated blast furnace the most carbon intensive.

But electric arc faces bigger cost deficit under grandfathered allocation.

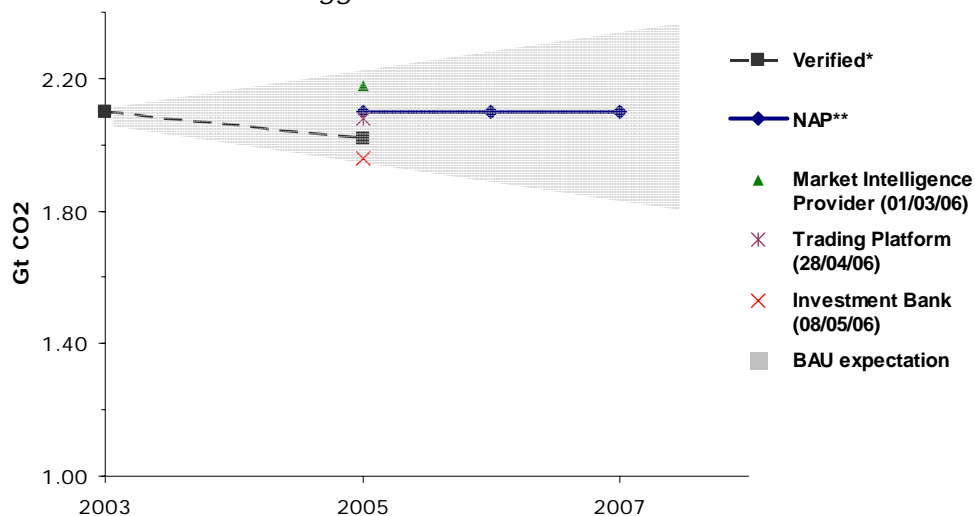
However, important caveats due to limited substitutability of inputs & products

Uncertainty and the role of auctioning



The price crash of Spring 2006 shows how small cutbacks with projection uncertainties carries potential for price volatility

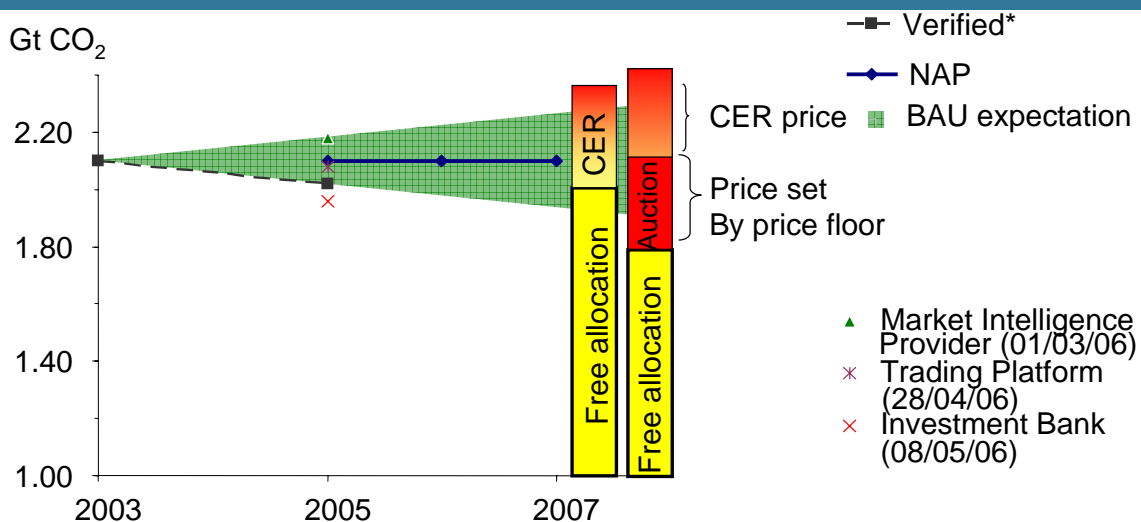
- *Cutbacks were only about 1% below projected 'BaU'*
- *As late as March 06, major provider got "retrospective estimate" completely wrong*
- *Power sector emissions were focus of all cutbacks and shortages (tbc) – surplus in other sectors must be much bigger*



Systematic upward bias in emission projections is to be expected and the empirical evidence is now overwhelming

- At least three factors explain upward bias in emission projections
 - Inherent optimism of macroeconomic and sector growth assumptions: no-one plans for or promotes the possibility of underperformance or failure
 - The 'gaming' incentives combined with asymmetric information between government and industry
 - 'You don't know what you don't know' in emission abatement possibilities: repeated evidence of 'awareness' effects in mitigation delivery
- The empirical evidence in is consistent and overwhelming
 - UK ETS
 - Climate Change Agreements
 - .. And now European-wide overallocation for 2005

Volatility unavoidable unless minimum-price auctions used to give scope to adjust



Coordinated auction with price floor can set floor to allowance price

- Facilitates low carbon investment
- Reduces emissions and thus allowance price

* Still incomplete data as of 5 June 2006

Phase II allocation

Making business sense of climate change



Context for Phase II allocations (Kyoto first period, 2008-12)

- Deadline for Phase II NAPs to be submitted was just a few weeks after the release of the Phase I verification data
- Continued diverse perspectives on prospects with big downside potential on prices
 - Large volume of CDM / JI credits (100-200 MtCO₂/yr through period from CDM alone)
 - Additional potential governmental supply associated with Kyoto surplus in eastern Europe and other Transition Economies
 - Baselines have been universally readjusted to world of high gas prices: fall in gas prices could remove 10s MtCO₂ from market
- Auctioning restricted to 10% of total allocations; a continuing hot topic of debate
- Competitiveness unlikely to be problem in course of Phase II but is a *strategic* issue about expected future revenue streams from investment in different regions

The present state of play

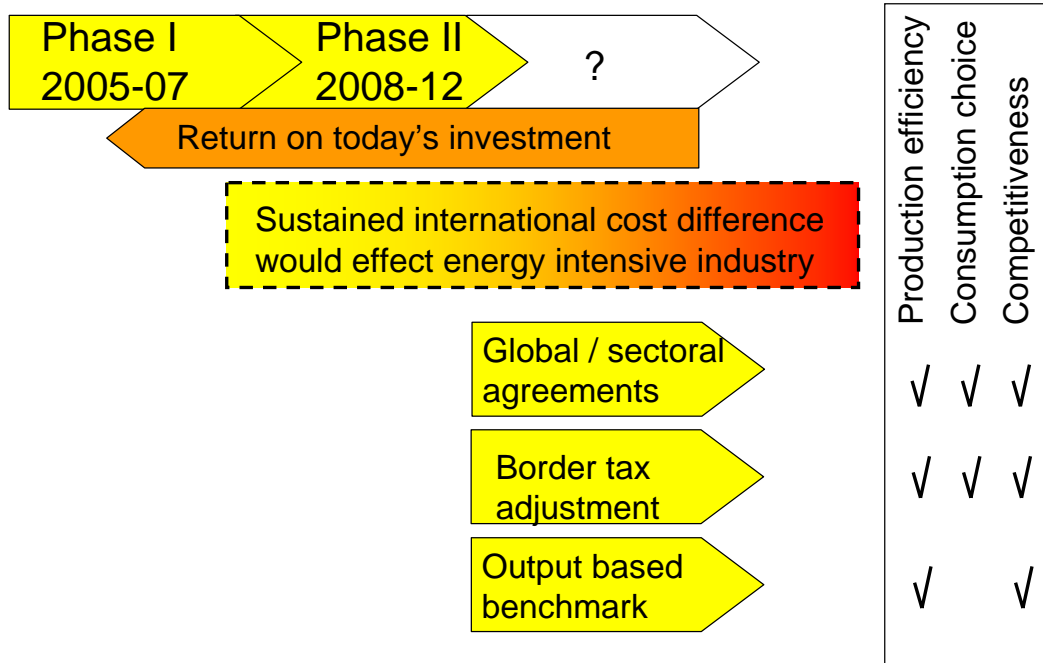
- Almost all Member States have announced Phase II NAPs, most submitted to the European Commission, which formally has 3 months to accept / reject
- First European Commission decisions expected in next few weeks
- Formal criteria for decision:
 - Avoidance of subsidy / State Aid compatibility
 - Kyoto consistency
 - Requires a projection of *total national* emissions
 - Requires evidence of Treasury commitment to fund purchase of sufficient international Kyoto credits to ensure compliance
- Informal criteria
 - Countries that have submitted strongest NAPs (eg. Spain, Italy) or strongly committed with significant cutbacks and auctioning (eg. UK) lobby for stronger allocations in others
 - Not uncommon for other government bureaucracies to be quietly encouraging rejection after losing battle with industry lobbying
- Expect many months of ongoing negotiation before the final Phase II picture emerges

Beyond 2012

Looking beyond Phase II

- Without a clear sense of Phase III, the EU ETS becomes a short term incentive / cost for operational adjustment but not an investment driver
- Much of the attention on Phase III has surrounded 'additional sectors and gases'. Whilst important for the sectors concerned, this is a sideshow to the big picture. The EU ETS is designed for large energy-intensive facilities and is likely to remain so
- Active auctioning provides opportunity to seek the right balance between quantity- and price- signals, and open prospect for post-2012 price signalling
- But tackling climate change seriously will require higher carbon prices for some decades – making competitiveness a more genuine source of concern

Efficient response to the ETS requires clarity post-2012
Expectation drives investment, detailed options determine competitiveness



The EU ETS faces five broad structural scenarios/options for post-2012

Option for post-2012	Comments
(1) Embed "as is" in a comprehensive global agreement	The "first-best" – almost certainly unobtainable
(2) Embed "as is" in global sectoral agreements covering core exposed sectors	More credible in terms of "high politics" but institutionally wholly unprecedented – how to reach binding deal with global sectors? <i>Hybrid</i> with (1) could be explored
(3) Move to output-based and/or downstream allocations for core competitively exposed sectors	Removes core incentives related to product pricing & substitution and complicates system
(4) Sectoral protection through Border Tax Adjustment	Maintains core incentives but complicates trade and carries attendant risks of trade disputes
(5) Abandon the EU ETS	Disaster for EU credibility and for global efforts to tackle the problem

There are now *four* official intergovernmental negotiation and dialogue processes

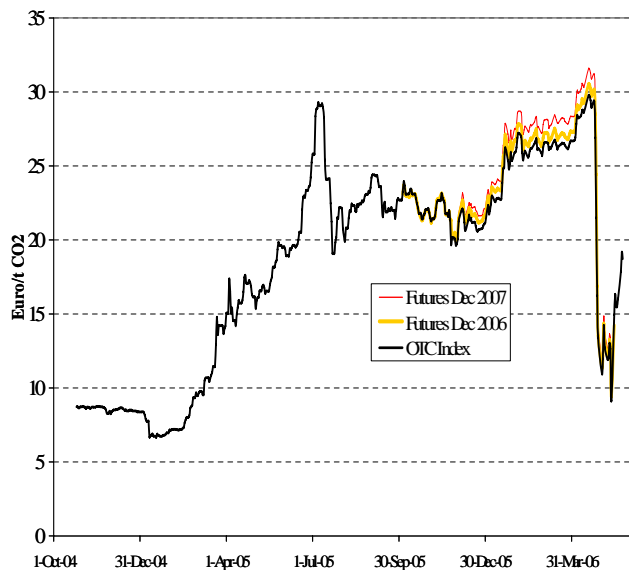
- The Kyoto Second Period negotiations launched at the Montreal Meeting of Parties to the Protocol (153 countries of which 32 are currently Annex B with a couple seeking to join)
- The UN global dialogue on future action launched at the Montreal Conference of Parties to the UNFCCC (c. 180 countries)
- The G8+5+? Dialogue that culminates in Japan in 2008 including the world's Big Emitters
- The Asia-Pacific Partnership on clean technologies including the A-P Big Emitters

With any free allocations, the pursuit of long-term objectives using instruments that have to adapt to shorter term cycles requires institutional independence

- Current allocation processes mix security of supply, secure industry support, and compensation for forgone profits
 - Political process with multiple objective creates complex NAPs
 - NAPs create perverse economic incentives
 - 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
- **Use the next few years to establish institutional mechanisms analogous to national and European Central Banks, charged with prime goal of designing allocation to deliver emission goals with minimal distortion whilst compensating existing installations for distributional impacts**

Lessons and Conclusions

A carbon cap generates economic rents - which can lead in interesting directions ...



- Power sector profits from EU ETS c. €5bn during 2005
- E.On announce €100m R&D Centre
- UK Environmental Transformation Fund announced 'co-incident' with Auctioning decision
- UK £1bn National Institute for Energy Technologies (NIET) announced to be 50:50 co-funded with private sector, initial sponsors E.On, EdF, Shell, BP.
- International and sectoral investment linkages emerging through the CDM

Where are we now?

- In the middle of one of the biggest man-made rent grabs in modern history, as 25 governments and their industries struggle over allocations for 2008-12
- In a situation of high stakes and volatility, as the European Commission tries to exercise its role as 'policeman of the governments'
- At a defining moment in European energy policy, as we struggle with the relationship between the Nation and the EU, and between further Liberalisation or Retreat to cope with the profit-making properties of EU ETS

Some initial high-level conclusions from EU experience with economic instruments

- No practical economic instrument is 'pure': because it aims to change relative prices in ways that favour lower carbon technologies over high carbon incumbents, fierce struggles are inevitable
- It has proved *possible* to implement a harmonised market in emissions cap-and-trade for industrial emissions across 25 diverse countries
- Industry attitudes change once the instrument is adopted: lobbying then focuses upon 'getting the best', and 'the best' has been large aggregate profits for some sectors,

Some specific conclusions around the EU ETS

- The major problems are not with market design, but with the allocation process
 - Allocation and efficiency *do* interact particularly with repeated-rounds
 - The logical solution to most problems with the EU ETS is to work towards greater auctioning over time
 - Free allocation can only work if there is a central authority empowered to accept or reject allocation plans according to agreed criteria
- For the longer term, continuing free allocation will require greater institutional independence of allocation authorities, tasked with neutralising P&L impacts rather than a host of other pressures
- The EU ETS will continue post 2012 irrespective of progress elsewhere

If Phase I was a trial, Phase II is a transitional period ...

- ... allows most participating sectors to profit and build up reserves to help fund low carbon adjustment
- Directive will need renegotiation for Phase III
- Renegotiation neither necessary nor possible for Phase II
- ... a period of intense analysis, development and negotiation with all long-term options "on the table"



Headline conclusions for post-2012: Three options and their implications

- Competitiveness is a *strategic* issue about investment location: investment security and efficient operation require EU governments to commit unambiguously to continuation of the EU ETS, but in ways that do not drive investment abroad
- To be credible, design and allocation should be based upon joint exploration with other Kyoto Parties of three contingent options:
 1. Sectoral agreements covering all significant trade partners
 2. Sector- and carbon-specific border tax adjustments
 3. Output-based (intensity) allocation and downstream allocation
- These will require revisions to Directive for post 2012, but not before
- Continued free allocation will also require new institutional foundations analogous to the creation of Central Banks

Some possible generic lessons for emissions trading system design

- A 'first phase' relatively short trial period is invaluable – many actors just don't understand the system until it starts operating
- Don't be too ambitious about the lower size threshold: the system can be designed to evolve
- A wide market is valuable, central authority design can be helpful, if allocation is decentralised then a central 'policing' authority is absolutely essential
- Sequentially-allocated CO2 is *different* – not all lessons from the US sulphur experience can be simply extrapolated, and need to guard against perverse incentives
- The EU ETS will continue post 2012 but important design issues will be up for negotiation – an opportunity for other countries to engage and influence

EU ETS allocation and competitiveness: Collaboration between researchers in UK, Netherlands, Germany and France

Allocation and competitiveness in the EU Emissions Trading System: policy overview	Grubb, Neuhoff  
Emissions, firm profits, and market prices: the consequences from emissions trading	Smale, Hartley, Hepburn, Ward, Grubb
CO2 cost pass through and windfall profits in the power sector	Sijm, Neuhoff, Chen
Allocation, incentives and distortions: the impact of EU ETS emissions allowance allocations to the electricity sector	Neuhoff, Keats, Sato
CO2 abatement, competitiveness and leakage in the European cement industry under the EU ETS	Demailly, Quirion
Free Allocation of allowances under the EU Emissions Trading System – legal issues	Johnston
Auctioning of EU ETS Phase II allocations: how and why?	Hepburn, Grubb, Neuhoff, Matthes, Tse