Tackling carbon leakage

Presentation to BIEE Parker Seminar group

Climate Change and Competitiveness

New Opportunities on Trade, Investment and Innovation for Developing Countries

1 Victoria Street, 18th November 2009

Professor Michael Grubb Executive Chair, Climate Strategies & Editor-in-Chief, Climate Policy Journal

with Dr Susanne Droege, Head of Global Issues Division, SWP Berlin Prof Tom Brewer, Professor, Georgetown University & Research Director, Climate Strategies





If damaging externalities are not internalised in prices, there is no basis to assume that economic liberalisation and free trade will ultimately improve human welfare





1. Emissions Trading in the EU and US

- 2. Competitiveness exposure and leakage
- 3. The basic options and their economic characteristics
- 4. Distortions arising from free allocation
- 5. Border adjustment dangers and challenges
- 6. The overall story
- 7. Sector-specific recommendations





Key features relating to caps and exposed industries

- Wide coverage including upstream caps on oil and gas throughput, partial free allocation to refineries
- Overall cap: under negotiation ! (2020 close to 1990 levels)
- 'Exposed industries' (c.15% of total emissions) to receive free allocation / output based
- Trade provisions:
 - Automatic Border Adjustments 2020 unless President and Congress vote against
 - .. On grounds of 'equivalent action' in other countries



EU ETS Phase III acknowledge rationale to auction, in power .. Strategies

.. now ranged against the fear that this would drive carbon leakage in manufacturing





EU ETS sets trade and cost thresholds for 'at risk of leakage' Strategies





Presentation to IMD-Evian Group / FES Stakeholder forum VI, Lausanne, 25 Sept 2009

1. Emissions Trading in the EU and US

2. Competitiveness exposure and leakage

- 3. The basic options and their economic characteristics
- 4. Distortions arising from free allocation
- 5. Border adjustment dangers and challenges
- 6. The overall story
- 7. Sector-specific recommendations



CO2 emissions heavily concentrated in a few primary activities of Climate

- UK Study examined 159 subsector activities and identified a "top 20+3" for which combined cost impacts @ €20/tCO2 exceed 4% of Sector Value Added - These activities account for 1% of UK GDP

CO2 cost screen: Sectors potentially exposed under unilateral CO2 pricing



Price increase assumption: CO₂ = €20/t CO₂; Electricity = €10/MWh



Source: Climate Strategies (2007): Hourcade, Neuhoff, Demailly and Sato, Differentiation and dynamics of EU ETS industrial competitiveness impacts



Similar concentration evident in other countries



Some sectoral differences, US economic structure closer to German, though Germany has higher % Value Added in the most cost-impacted sectors, US refining sector exceptionally large





Source: Grubb, Brewer, Houser & Sato, 'Climate policy and industrial competitiveness: ten lessons from the EU ETS', German Marshall Fund – US, Washington DC, 2009



Similar concentration evident in other countries



Some sectoral differences, US economic structure closer to German, though Germany has higher % Value Added in the most cost-impacted sectors, US refining sector exceptionally large



Source: Grubb, Brewer, Houser & Sato, 'Climate policy and industrial competitiveness: ten lessons from the EU ETS', German Marshall Fund – US, Washington DC, 2009





Industries have potential to profit through combination of free allocation and price passthrough, but this may attract imports in exposed industries



Impacts differ by sector, are modest, but



Modeling of three key sectors for EU ETS Phase III

- biggest emissions impact on cement, mainly through clinker reduction and trade
- biggest leakage as % of overall emission reductions in steel (40%)
- cement and aluminium have similar leakage rates (c.20%) relative to reductions
- emission gains from finding solutions that preserve incentives biggest in cement



Two types of leakage, risk eclipsing two types of benefits







>Focus on *carbon leakage*, not *competitiveness* per se:

- •Much sharper focus on ETS-related impacts rather than generalised pleas for protection
- •Aligns environmental with economic concerns

➢For the period 2012-2020, acknowledge case for concern in up to [six] key sectors that may be (imperfectly) addressed through free allocation if other avenues are not developed:

- •steel from blast oxygen furnaces;
- •cement/clinker;
- •fertilisers & nitrogen compounds;
- •'other' inorganic basic chemicals;
- •pulp and paper
- •Aluminum / electricity intensives not exposed under US design of electricity allocation

>Other key sectors could be monitored for *evidence-based* assessments of impacts, not driven by projections

Political judgement may be needed regarding a few other exceptional subsectors/subproducts, that are macroeconomically very small (<< 0.1% GDP)</p>





Presentation to IMD-Evian Group / FES Stakeholder forum VI, Lausanne, 25 Sept 2009

- 1. Emissions Trading in the EU and US
- 2. Competitiveness exposure and leakage
- 3. The basic options
- 4. Distortions arising from free allocation
- 5. Border adjustment dangers and challenges
- 6. The overall story
- 7. Sector-specific recommendations



Fundamental options for addressing carbon leakage



- All divide into leveling down, leveling up, or dealing with adjustment at the border





• Tools to level costs **downwards**:

- free allocation;
- direct compensation/state aid,
- reduction of non-carbon location costs (taxes, labour)
- export rebates by ETS region
- Tools to maintain prices / level **upwards**:
 - import adjustment by ETS region
 - Product benchmarked at border
 - Embodied-carbon (PPM)-specific
 - export charge by non-ETS region
 - international agreements (countries, sectors)

Note: the **geographical scope** of 'leveling upwards' differs for each of these options





Presentation to IMD-Evian Group / FES Stakeholder forum VI, Lausanne, 25 Sept 2009

- 1. Emissions Trading in the EU and US
- 2. Competitiveness exposure and leakage
- 3. The basic options
- 4. Distortions arising from free allocation
- 5. Border adjustment dangers and challenges
- 6. The overall story
- 7. Sector-specific recommendations





- Protecting energy intensive sectors inevitably requires the rest of the economy to 'work harder' to reach a given emissions target
- Free allocation or other compensation risks degrading the underlying incentives to decarbonise
- To be effective in tackling carbon leakage, such 'leveling down' must be aligned with production and investment decisions – in which case it starts to negate more of the incentives to decarbonise along the economic system



ource: Climate Strategies (2009): Droege S. et al., *Tackling Carbon Leakage in a world of nequal carbon prices*, final report

Climate Strategies

But understanding 'Pyramid of inefficiencies' can help to navigate the trade-offs

	Impacts on	Increase plant operation		More expenditure on extending plant life relative to new build		Less Energy efficiency investments and demand substitution	
Allocation Method	Distortions	Bias towards dirtier plants	Encourages operation	Discourage plant closure	Bias towards dirtier plants	Reduces incentives for consumers	Reduces incentives for producers
Auction							
Grandfathering	Capacity only	_		х			
with Benchmarking	Capacity by fuel/plant type			х	Х		
Grandfatharing	Output only		Х	Y		Х	
with updating from previous	Output by fuel/plant type*	х	Х	х	Х	Х	
periods	Emissions	Х	Х	Х	Х	Х	Х
Output-based * (undifferentiated) allocation or rebates	Final product	-	х	х		XX	
	Intermediate product (eg. clinker)		Х	х		XX	XX



Source: Adapted from Grubb & Neuhoff, 'Allocation and competitiveness in the EU ETS: Policy overview', *Climate Policy*, Vol.6:1 pp. 7-30, and associated Carbon Trust (2006)

Windfall profits risk inherent in free allocation



Exacerbated in cement where transport costs protect pass-through in inland markets

	Carbon price - €20/tCO2			Carbon price - €30/tCO2		
Cost pass-through rate	Cement price (€/t cement)	Cement price increase	Increase in profits under ETS (€m/yr)	Cement price (€/t cement)	Cement price increase	Increase in profits under ETS (€m/yr)
0%	€ 60.00	0.0%	-€ 503	€ 60.00	0.0%	-€ 754
30%	€64.02	6.7%	€431	€66.03	10.1%	€697
50%	€66.70	11.2%	€ 1,038	€ 70.05	16.8%	€ 1,632
70%	€69.38	15.6%	€ 1,635	€74.07	23.5%	€ 2,542
90%	€72.06	20.1%	€ 2,220	€78.09	30.2%	€ 3,426
100%	€73.40	22.3%	€ 2,508	€80.10	33.5%	€ 3,858

Theoretical models suggest the industry would pass through anywhere between 33-90% of opportunity costs, depending on market structure and location: a reasonable estimate of increased profits is $\leq 1-3bn/yr$, say $\leq 10-20bn$ over Phase III.

Source: Climate Strategies (2009): G.Cook, 'Climate change and the cement sector'



Output-based compensation the ultimate response to leakage.

• **Fixed free allocation** with new entrant / closure rules can deter *investment leakage*, but may do little to shield operational decisions & thus can risk leakage + windfalls

• **Output-based allocation** should be more effective at tackling both windfall profits and leakage (a good thing) providing it is applied to the carbon-intensive step in production:

- .. suppresses incentive to factor carbon costs into production and price decisions (good or bad, depends on whether focus is on distribution or efficiency)
- ... hence takes out the incentive to use the product more efficiency, or to substitute it with lower-carbon product, throughout the rest of production & the consumption (bad: Chart 11)

•.. But by how much ?

US studies suggest impact by 2020 small, raising carbon prices a few percent: concern that these models do not represent product substitution which would be dominant efficiency loss

The only EU study to date finds much bigger impacts, raising carbon prices by 30%: but this focuses on delivering internal EU cap only

Allocation approach	CO2 price in 2016
Auctioning	14.4
Output-based inc.electricity	27
Output-based for steel & cement direct	20
Output-based direct and indirect	21

.. a major difference between EU ETS and US/Australia.





Presentation to IMD-Evian Group / FES Stakeholder forum VI, Lausanne, 25 Sept 2009

- 1. Emissions Trading in the EU and US
- 2. Competitiveness exposure and leakage
- 3. The basic options and their economic characteristics
- 4. Distortions arising from free allocation
- 5. Border adjustment dangers and challenges
- 6. The overall story
- 7. Summary recommendations





'Tackling carbon leakage' is very different from trying to deter 'inadequate' action by other countries

- Tackling carbon leakage
 - In principle, cost-leveling between domestic and international where a specific problem can be demonstrated
 - Generally non-discriminatory
- Or threatening trade measures against countries not taking `comparable' action
 - Extra-territorial judgement on `adequate' action
 - Explicitly discriminatory





`Tackling carbon leakage' is very different from trying to deter `inadequate' action by other countries

- Tackling carbon leakage
 - In principle, cost-leveling between domestic and international where a specific problem can be demonstrated
 - Generally non-discriminatory
- Or threatening trade measures against countries not taking `comparable' action
 - Extra-territorial judgement on `adequate' action
 - Explicitly discriminatory





Key aspects from WTO perspective

- Key principles:
 - Non-discrimination (MFN): all WTO Parties treated the same
 - National Treatment: no preferential treatment for domestic production
- WTO rules prefer 'product' measures
- Only 'product' or 'consumption' measures can be imposed also on imports (VAT v. income tax)
- WTO prefers application of 'internal' measures to imports (e.g. VAT or asbestos ban) over purely 'border' measures
- Border adjustments should only compensate for direct charges as incurred on domestic goods, not for other forms of domestic regulation or indirect costs (such as income taxes)



Different adjustments have different characteristics of Strategies

The debate needs to differentiate at least four major issues

- o Actual carbon vs benchmark on product only
 - applied to imports from all origins satisfies non-discrimation (MFN) principle
 - Best available technology' assumption for the adjustment for direct emissions costs satisfies National Treatment principle
- o Benchmark level: Best available technology or 'Average performance'
 - Average performance is plausible but consistency with National Treatment could be debated
 - with provision for cleaner manufacturers to acquire corresponding allowances only?
 - Could create interesting incentives for 'cleaner' producing companies to provide audited trail
- o .. Moving towards 'Embodied carbon' accounting for actual emissions
 - Relates more directly to PPM and definition of ,like products'
 - Essential for electricity-intensives BAs to have impact
- o Form of purchase required and use of revenue could also form a topic of international negotiation
 - Could demoninate in terms of need to purchase CDM or JI credits
 - Or revenues otherwise associated with international expenditures





Unilateral action risks serious problems in the international trade system (and climate change negotiations), but negotiations focused on the carbon leakage problem could yield solutions

- Intrinsically more acceptable
- Much less susceptible to being captured by domestic protectionism
- Opens up a wider set of more effective solutions
- Can contribute to rather than detract from the wider multilateral effort

Recommendation

'Negotiate multilateral arrangements to structure the use of border adjustments, focused on minimising emissions leakage, as and when specific problems can be demonstrated'





Recent Chinese emissions growth driven by goods for export Attribution of these is an issue of accounting convention and monitoring







Presentation to IMD-Evian Group / FES Stakeholder forum VI, Lausanne, 25 Sept 2009

- 1. Emissions Trading in the EU and US
- 2. Competitiveness exposure and leakage
- 3. The basic options and their economic characteristics
- 4. Distortions arising from free allocation
- 5. Border adjustment dangers and challenges

6. The overall story

7. Sector-specific recommendations



There is trade-off between ease and effectiveness Strategies

Illustrated by modeling of steel, cement and aluminium in EU ETS Phase III





Sector characteristics profoundly affect the cost, effectiveness and feasibility of different options, including:

- Direct (carbon) vs. indirect (electricity) cost
- Capital intensity
- Capacity utilisation, part load options
- Homogeneity of process
- Homogeneity of product(s)
- Value of international trade



There is no 'one-size-fits-all' approach: differentiate by sector



oo hard?



Reconsider approach on a sector by sector basis

efficien



- There are different options for addressing carbon leakage, few are easy
- Approaches that differentiate by sector and time will open options, increase effectiveness and reduce the risks
- Linked to assessment of 'sectors at risk' and allocation approaches
 - output-based allocation buys more time (because more effective at tackling leakage) but may ultimately require broader application of border adjustments (because the economywide efficiency losses are bigger)
 - fixed free allocation drives greater sector differentiation (because its effectiveness depends heavily on sector characteristics)
 - Clinker (from cement) poses significant problems for both allocation approaches and is a simple, homogenous low traded value product



And set policy choice in the long-term strategic context ...







Presentation to IMD-Evian Group / FES Stakeholder forum VI, Lausanne, 25 Sept 2009

- 1. Emissions Trading in the EU and US
- 2. Competitiveness exposure and leakage
- 3. The basic options and their economic characteristics
- 4. Distortions arising from free allocation
- 5. Border adjustment dangers and challenges
- 6. The overall story
- 7. Sector-specific recommendations

Annex: Research and communication resources:

Climate Strategies, the Carbon Trust, and Climate Policy journal



Conclusions on the 'big one'



Steel most defines the problem and has biggest trade value

- Justified to treat as "sector at risk of carbon leakage"
- Free allocation (either variety) may tackle majority of the leakage problem and is a plausible approach for a few years, but results in increasing efficiency problems the longer it is sustained
- Differences between EU and US allocation (fixed vs output-base) could cause friction and should be 'on the table' of discussions about linking their trading systems
- There is no case for export compensation / adjustments providing EU and US collaborate on allocation and leakage measures
- During the coming decade, one of the following three options will need to be negotiated for implementation by 2020:
 - Border adjustments for BOF steel imported in to regions imposing a carbon cost
 - Specific agreements with principal producer regions (eg. Russia, Ukraine, Kazakstan, Brazil, South Africa) for them to impose carbon charges on steel exports
 - A global sectoral agreement imposing carbon costs on steel production in all significant producer countries
- Free allocation should be withdrawn at this point, ie. no later than 2020, providing that effect border adjustment measures are in place





... and radically different approaches are required

Sector	Recommendation	Notes & rationale
Cement	A 'best available technology' Border Adjustment is entirely WTO-compatible, relatively simple and the only effective approach	Free allocation does not solve leakage problem but generates windfall profits. WTO-compatible border adjustments relatively easy and low political risk of challenge
Aluminium	Subsidies evaluated on case- by-case basis w.r.t. State Aid provisions whilst pursue 'carbon added' production data / regulation and decarbonise electricity	Loss of production not necessarily carbon leakage, indirect emissions vastly complicate both free allocation and undifferentiated BA. Effective solution must track embodied carbon





Presentation to IMD-Evian Group / FES Stakeholder forum VI, Lausanne, 25 Sept 2009

- 1. Emissions Trading in the EU and US
- 2. Competitiveness exposure and leakage
- 3. The basic options and their economic characteristics
- 4. Distortions arising from free allocation
- 5. Border adjustment dangers and challenges
- 6. The overall story
- 7. Sector-specific recommendations

Annex: Research and communication resources:

Climate Strategies, the Carbon Trust, and Climate Policy journal



Climate Climate Strategies research and stakeholder organisations strategies Underlying research published as Synthesis reports and sometimes *Climate Policy* special issues Publications on EU ETS, economic instruments & competitiveness with the Carbon Trust Climate Strategies CARBON TRUST Sponsored research through project-specific international network of academics. Explains the issues and opportunities to business and the public sector Tackling Leakage project led by Susanne Droege at the German Institute for International and Security Affairs (SWP), Carries out further analysis to clarify, develop $\mathbf{\Sigma}$ Berlin, with research by: IDDRI, Öko-Institut, and test the implications of the research Vrije Universiteit, Georgetown University, Ecologic Institute, Ryukoko University, National Institute for Environmental Studies Carries out UK stakeholder engagement, both (NIES), CIRED, Mineral and Energy Economy before and after publication Research Institute, University of Greifswald Produces a 'glossy' publication \sum Some engagement with stakeholders: available from: Workshops, Paris 08 & Berlin, 09 www.carbontrust.co.uk Published a series of academic papers, with final report Sept 09, available from www.climatestrategies.org

The Carbon Trust is a founding supporter of Climate Strategies





	Climate Strategies Academic Synthesis Reports <u>www.climatestrategies.org</u>	Carbon Trust Insights publications www.carbontrust.co.uk		
EU ETS design and Incentives	 National allocation plans in the EU ETS (2006)*1 Grubb, Neuhoff et al.: Submission to EU ETS review Neuhoff et al. paper on Auctioning 	 > EU ETS Phase II allocation: implications and lessons (2007). > Cutting Carbon in Europe: The 2020 plans and the future of the EU ETS (2008) 		
Competitiveness and carbon leakage	 Emissions trading and competitiveness (2006)*2 Hourcade et al, Differentiation and dynamics of EU ETS industrial competitiveness (2007) Droege et al., 'Tackling carbon leakage in a world of unequal carbon prices' (2009) 	 The European emissions trading scheme: implications for industrial competitiveness (2004) Allocation and competitiveness in the EU emissions trading system: options for Phase II and beyond (2007). EU ETS impacts on profitability and trade: a sector by sector analysis (2008). Tackling carbon leakage (Jan 2010) 		

Key papers published as Special Issue of the Climate Policy journal



1. Grubb and Neuhoff (eds)



	Climate Strategies Academic Synthesis Reports* <u>www.climatestrategies.org</u>	Carbon Trust Insights publications www.carbontrust.co.uk
Global Carbon Mechanisms & international linking	 P. Castro and A. Michaelowa, Empirical analysis of the performance of CDM projects (June 2008); A. Korppoo and O. Gassan-Zade, Joint Implementation: looking back and forward (October 2008); D. Urge-Vorsatz et al., Green Investment Schemes: maximising their benefits for climate and society (November 2008). <i>Tuerk</i> et al., Linking emission trading schemes*³ Michaelowa and Mueller, <i>Future</i> of <i>CDM</i> report (in review) 	 The Global Carbon Mechanisms: evidence and Implications (Feb 2009) Linking emissions trading schemes (Sept 2009)

Own academic papers: http://www.econ.cam.ac.uk/faculty/grubb/index.html

