In cooperation with experts from Eurelectric

The impact of the ETS exemptions for sectors at risk of carbon leakage on EU competitiveness

May, 2014

In consultation with: Friends of ETS

Agenda

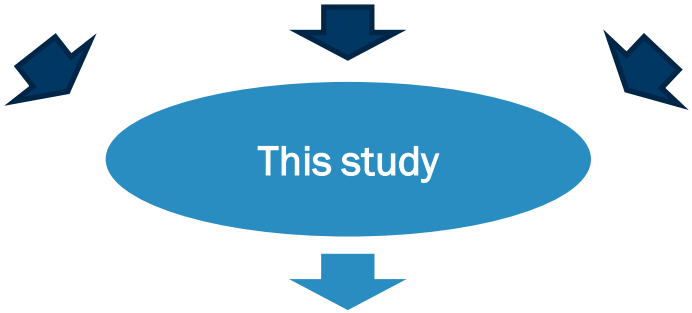
- Context and motivation for the study
- The costs of removing carbon leakage exemptions
  - Steel sector case study
  - Cement sector case study
  - Scaling up to all sectors at risk of carbon leakage
- The benefits of recycling carbon auction's revenues
- Conclusion: comparing costs and benefits

Context and motivation for the study

This study focuses on the interplay of carbon prices and economic competitiveness

Policy context

- European Commission Green Paper - "A 2030 framework for climate and energy policies"
- 2013 Member States Competitiveness Performance and Implementation of EU Industrial Policy report
- Consultation on ETS structural measures



Quantification of the impact of carbon and energy costs on competitiveness

- **The debate on the impact of the costs of carbon and energy and competitiveness has been focused on a narrow list of sectors**
  - But competitiveness is a whole economy issue: costs on some sectors have to be weighted against the benefits in other parts of the economy
  - This study complements existing literature by modeling the aggregate economic effects of carbon and energy prices
- **The policy discussions on competitiveness have been focused on production costs**
  - This study introduces a framework to identify the different drivers of competitiveness in a given sector
  - A number of in depth case studies (steel, cement, chemicals) explore the impact of carbon and energy costs as well as the other drivers of competitiveness in these sectors

As the ETS moves toward increasing auctioning of allowances in Phase 3 the EU addresses the issue of carbon leakage

CARBON LEAKAGE ISSUE

What is carbon leakage?

Carbon leakage is the situation when for reasons of costs related to climate policies production is transferred to countries which have laxer constraints on greenhouse gas emissions.

How does the ETS impact firm competitiveness?

The ETS impacts firms' competitiveness vis-à-vis firms operating in countries without climate policies through two channels:

- Direct carbon costs – firms need to purchase and surrender allowances to cover their carbon emissions
- Indirect carbon costs – firms pay higher electricity prices as power generators pass on the carbon costs to downstream consumers

How does the EU assess carbon leakage?

The EU has developed a framework of quantitative and qualitative criteria to assess the increased costs and the trade intensity of sectors.

Carbon leakage lists – 2013-2014 and 2015-2019

Based on the carbon leakage assessment framework the EC developed a list of carbon leakage sectors in 2009 that is valid for the 2013-2014 period. A revised list for the 2015-2019 period is to be finalized in 2014.

EU MEASURES TO ADDRESS CARBON LEAKAGE

Exemptions of carbon leakage sectors

The sectors deemed exposed to a significant risk of carbon leakage receive the following exemptions:

- Carbon leakage sectors continue to receive **free allowances** in Phase 3 (up to a benchmark and considering the sectoral constraints)
- Additionally, they may obtain **financial compensation** through national state aid schemes for increases in electricity costs resulting from the ETS

The EU assesses exposure to carbon leakage through quantitative and qualitative criteria

Quantitative Criteria

A sector is deemed to have a sufficient exposure to carbon leakage if it passes at least one of three quantitative criteria:

1. Joint Carbon Cost – Trade Intensity

Production costs would increase by at least **5%** of GVA (Gross Value Added), AND

The sector's trade intensity is greater than **10%**

2. Carbon Cost only

The increase in production costs is greater than **30%** , as a proportion of Gross Value Added

3. Trade Intensity only

The intensity of trade is greater than **30%**.

Qualitative Criteria

A more detailed analysis based on the following criteria:

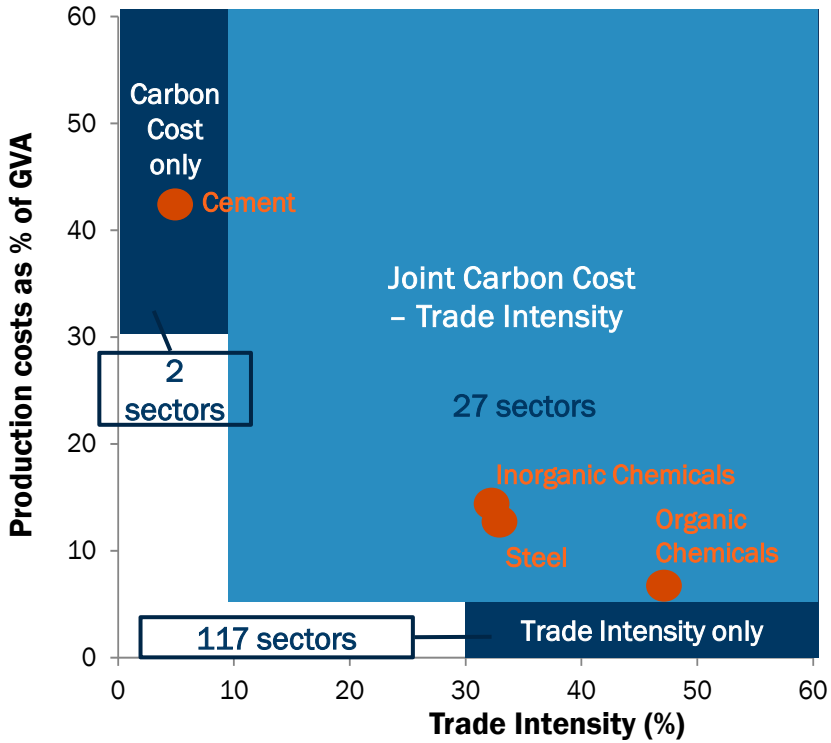
- The extent to which it is possible to reduce emission levels or consumption of electricity;
- Current and projected market characteristics; and
- Profit margins as an indicator of long-run investment or relocation decisions

Carbon Leakage List

164 sectors are on the Carbon Leakage list:

- 2 sectors are in the carbon cost only group;
- 27 sectors are in the joint group
- 117 sectors are in the trade intensity group
- 13 sectors qualify at sub-NACE 4 level
- 5 sectors qualify on qualitative criterion

Carbon leakage sector groups by assessment criteria



In 2005-06, the carbon leakage sectors emitted 95% of all industrial emissions

Carbon leakage sector characteristics

- There are 258 manufacturing sectors covered in the ETS
- Of the 258 manufacturing sectors, 162 sectors are on the carbon leakage list for 2013-14. These sectors receive free permits (up to benchmarks)
  - The 162 carbon leakage sectors produce 95% of total industrial emissions
- The vast majority of the sectors only qualify on the Trade Intensity criteria

Emissions of carbon leakage sectors vs. all manufacturing sectors, 2005-2006

Reason for inclusion on CL list	Number of sectors	Verified emissions* (thousand tCO2)	% of industrial emissions
1. Joint carbon cost and trade intensity	13	219,303	36%
2. Carbon cost only	2	177,573	29%
3. Trade intensity only**	133	157,233	26%
4. Qualitative assessment	6	14,436	2%
NACE 6 and beyond***	8	5,779	1%
Total carbon leakage emissions	162	574,323	95%
Total industrial emissions	258	604,955	100%

Source: Delft, 2013

Notes:

* Average of 2005 and 2006 verified emissions

** Sixteen sectors that fall under Trade intensity only would also qualify for Joint carbon cost and trade intensity

*** Maximum estimate of emissions of 16 sectors belonging to 8 sectors at the NACE 4 level

The top emitters are steel, cement and chemicals - according to the free allocations published by the EC in 2013

Industry	Free allocations 2013- 2020 (m EUAs)	% of total	Carbon leakage criterion
Basic iron and steel	1,512	23%	Joint criteria
Cement	1,110	17%	Carbon cost
Basic chemicals (including fertilizers)	998	15%	Various criteria
Refinery products (including coke)	878	13%	Joint criteria
Pulp and paper	247	4%	Trade intensity
Lime	202	3%	Carbon cost
Extraction of crude and natural gas	176	3%	Trade intensity
Ceramics (including bricks and tiles)	140	2%	Trade intensity and Joint criteria
Non-ferrous metals	129	2%	Trade intensity
Glass	121	2%	Joint criteria
Manufacturing total	6,600	100%	

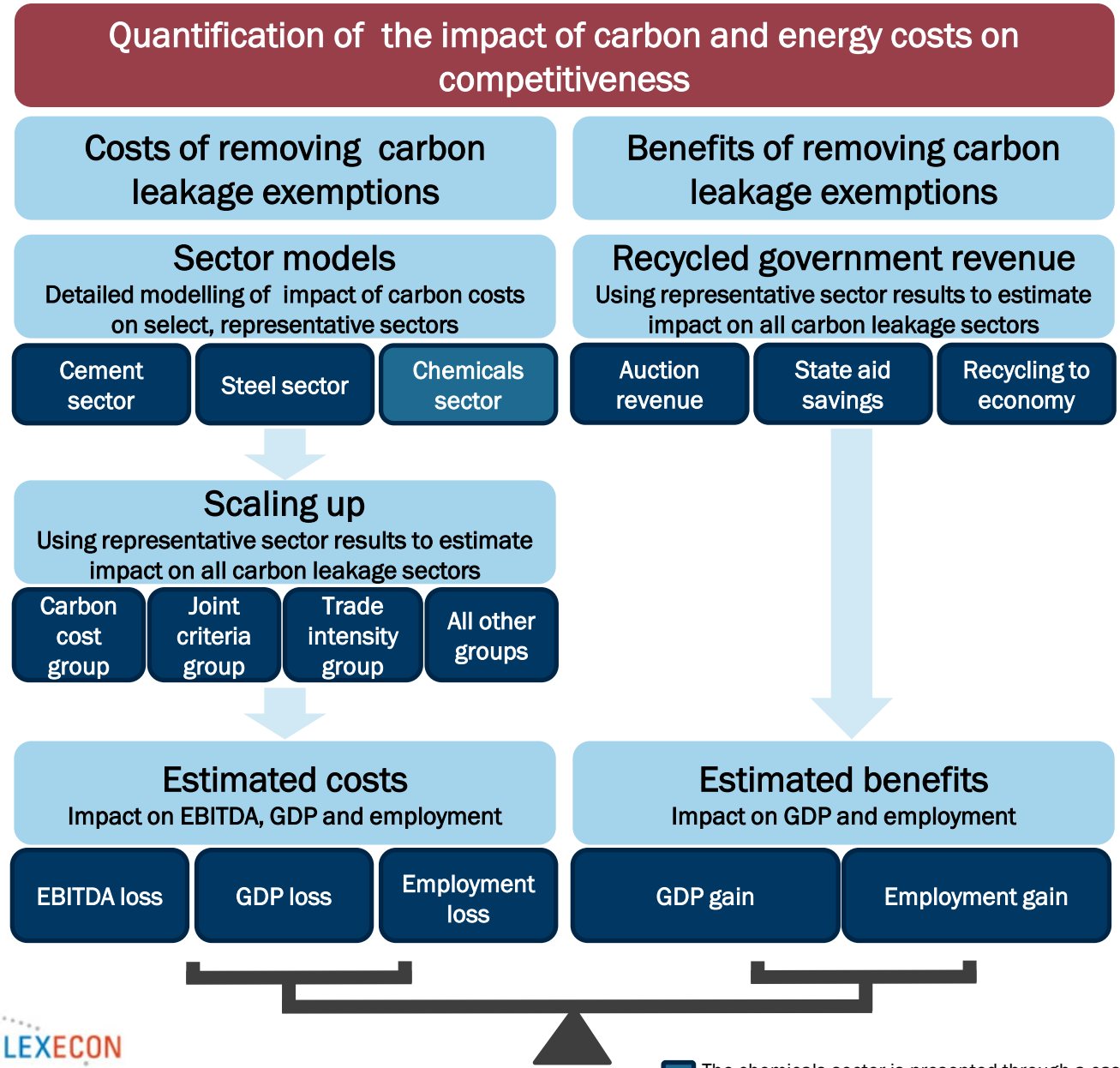
Source: European Commission, October 2013

Carbon leakage group	Percentage of free allocations 2013-2020
Carbon cost	20%
Joint criteria	45%
Trade intensity	27%
Sub-NACE-4 level	1%
Qualitative	2%
Total CL	95%

Source: FTI Consulting estimates based on EC published allocations for 2013-2020 and Delft "Carbon Leakage and the Future of the EU ETS market", 2013

Note: Due to lack of data, allocation estimates for the trade intensity and the joint criteria groups could have a significant margin of error (a magnitude of 5-10% points). We have run sensitivities to understand the impact of such difference on the analyses and the conclusions remain the same in the different scenarios.

The study quantifies the costs and benefits of removing carbon leakage exemptions of manufacturing sectors



The chemicals sector is presented through a case study

We modelled 9 scenarios

Baseline scenario assumptions:

- The carbon price is €14/tonne CO2 (the average during Phase I and Phase II of the ETS)
- CL sectors receive 100% of their EUAs for free, no compensation for indirect costs
- The CL sectors' volume, price, turnover and profit are at an 'average' level (2003-2010 average)

Removing CL sectors' exemptions – scenarios:

Carbon prices:

- €5 / tonne of CO2 = "**Ineffective ETS**"
- €20 / tonne of CO2 = "**Moderately effective ETS**"
- €40 per tonne of CO2 = "**Effective ETS**"

Auctioning percentages:

- 34% (as applies to the non-CL manufacturing sectors in 2015) = "**ETS with high compensation**"
- 70% (as applies to the non-CL manufacturing sectors in 2020) = "**ETS with medium compensation**"
- 100% (full auctioning) = "**ETS with no compensation**"

Carbon Price	Auctioning percentage		
	34%	70%	100%
€5 / tonne of CO2	Ineffective ETS with high compensation	Ineffective ETS with medium compensation	Ineffective ETS with no compensation
€20 / tonne of CO2	Moderately effective ETS with high compensation	Moderately effective ETS with medium compensation	Moderately effective ETS with no compensation
€40 / tonne of CO2	Effective ETS with high compensation	Effective ETS with medium compensation	Effective ETS with no compensation

The steel sector and carbon leakage

While the steel sector is facing strong intra-EU competitive pressures there are important barriers to import substitution

Factors strengthening EU plants' competitiveness
Factors neutral to EU plants' competitiveness
Factors weakening EU plants' competitiveness

Strong supplier power

- High volatility of raw material prices demonstrates supplier power:

"Iron ore moved from $35/ton 2004, to $200/ton in 2008, then went back in 2009 to $85 and bounced back in 2011 to $200"
Steel industry expert

Important barriers to entry

- Economies of scale are extremely important for long term viability
- There are very high capital requirements
- Incumbents are ruthless in defending their market share
- There is significant overcapacity in the steel industry already

Strong rivalry within the EU

- High overcapacity: mills are trying to place some volume at all costs
- Relatively large number of competitors
- Part of production is differentiated but the other part is commodity
- Buyers' switching costs are lower for the commodity segment and higher for the specialty segment
- High capex is an important exit barrier

Buyer power is strong in the commodity but less so in the specialty segment

Specialty segment:

- Large buyers buy large volumes
- But qualification process and long term co-design relationship makes switching costly

Commodity segment:

- No product differentiation
- Price is key purchase criterion
- Switching costs are lower

Important barriers to import substitution

Although EU producers are the highest cost producers there are several barriers to import substitution:

- Imports are constrained by issues such as exchange rate volatility, lead time, working capital restrictions, lot sizes, serviceability, etc.

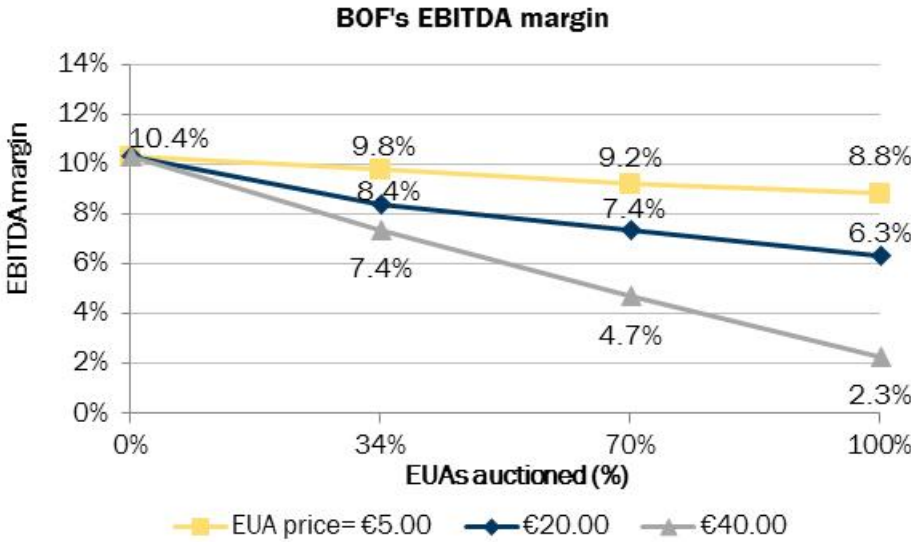
Specialty segment:

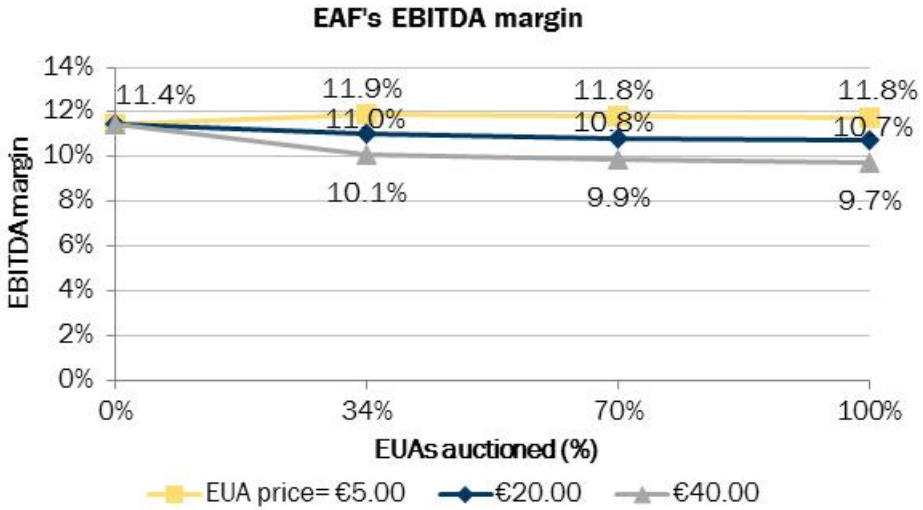
- OEMs have long term relationships with suppliers, switching costs are high
- EU has quality standards that few importers can meet

Commodity segment:

- Both volume and price of commodity orders are lower making transport costs significant

BOF plants are significantly impacted at higher carbon prices and auctioning, EAF plants are only marginally impacted





Source: FTI Consulting analysis

Impact of removing Carbon Leakage exemptions on BOF plants:

- BOF plants' EBITDA margin declines less than 2% point even at full auctioning if carbon prices remain at the €5 level
- In the effective ETS scenario with no compensation, BOF plants' EBITDA margin declines dramatically from 10% to 2%

Impact of removing Carbon Leakage exemptions on BOF plants:

- EAF plants' EBITDA margin improves at the €5 carbon price level. This improvement is driven by the lower carbon prices compared to the baseline (€14 EUA)
- In the effective ETS scenario with no compensation, EAF plants' EBITDA margin declines by less than 2% points

Scenarios:

Carbon Price	Auctioning percentage		
	34%	70%	100%
€5/t	Ineffective ETS with high compensation	Ineffective ETS with medium compensation	Ineffective ETS with no compensation
€20/t	Moderately effective ETS with high comp.	Moderately effective ETS with med. comp.	Moderately effective ETS with no comp.
€40/t	Effective ETS with high comp.	Effective ETS with medium comp.	Effective ETS with no comp.

The cement sector and carbon leakage

Cement sector competitiveness framework highlights significant market power of cement firms

Factors strengthening EU plants' competitiveness
Factors neutral to EU plants' competitiveness
Factors weakening EU plants' competitiveness

Very weak/ no supplier power

- Highly vertically integrated industry, quarrying, processing, manufacturing, sales and distribution done by single firm
- Overall, the monopsony power of few, powerful incumbents minimises supplier power

Substantial barriers to entry

- Limited access to raw materials, typically controlled by incumbents
- Transport costs limit competitive geographical market
- European cement dominated by small number of established, incumbent firms

Established firms, weak rivalry repeatedly found throughout the EU

- Collusive behaviour has been punished throughout the EU. Most recently by the UK Competition Commission in 2013.
- Good understanding of operations between established incumbents and limited geographical scope place limits to fierce rivalry

Few threat from substitutes/imports

- Homogeneous product with few substitutable goods, only available at project's design stage
- EU restrictions on quality of cement to use - incumbents typically supply all accepted grades
- Coastal areas are more exposed to import threat

Weak buyer power

- Cost of cement in buyer's budget is marginal
- Limited availability of alternative suppliers
- Feasible to alter cement intensity in construction with some scope to change cement grades
- Buyer power is limited by unfavourable and localised competition dynamics

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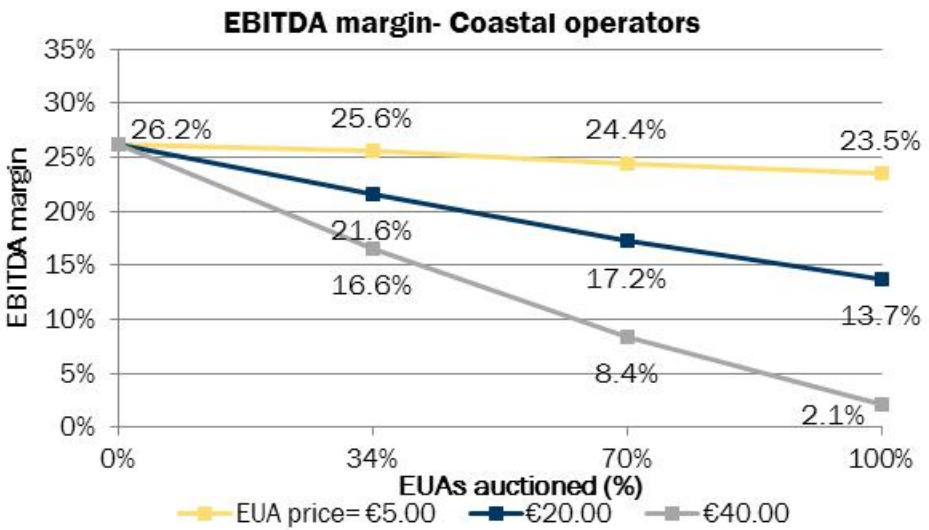
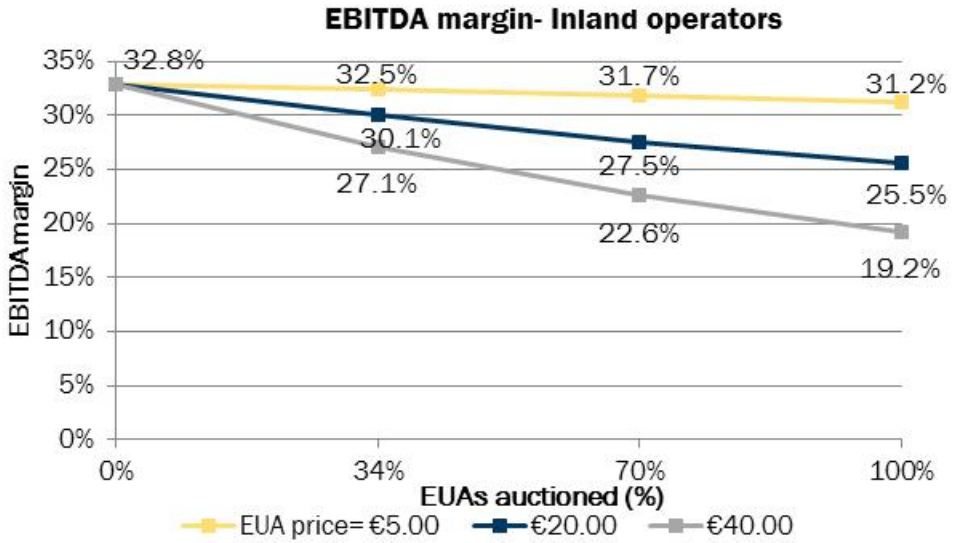
Coastal plants are significantly impacted at higher carbon prices, inland plants retain close to 20% EBITDA margins even in the strictest scenario





Source: FTI Consulting analysis

Impact of removing Carbon Leakage exemptions on coastal operators:

- Coastal operators' EBITDA margin declines less than 3% point even at full auctioning if carbon prices remain at the €5 level
- In the effective ETS scenario with no compensation, coastal operators' EBITDA margin declines dramatically from 26% to 2%

Impact of removing Carbon Leakage exemptions on inland operators:

- Impact on inland operators' EBITDA margin is negligible at €5 carbon price level
- In the effective ETS scenario with no compensation, inland operators are significantly impacted (a fall of 13% point EBITDA) but are able to retain close to 20% margins

Scenarios:

Carbon Price	Auctioning percentage		
	34%	70%	100%
€5/t	Ineffective ETS with high compensation	Ineffective ETS with medium compensation	Ineffective ETS with no compensation
€20/t	Moderately effective ETS with high comp.	Moderately effective ETS with med. comp.	Moderately effective ETS with no comp.
€40/t	Effective ETS with high comp.	Effective ETS with medium comp.	Effective ETS with no comp.

Scaling up to all sectors at risk of carbon leakage

We applied the cement and steel model results to the carbon and joint criteria groups, the trade intensity group was modelled differently

We model three types of effect:

- **Direct** - Sectors have to pay for carbon permits
- **Indirect** - Electricity producers have to pay for carbon, and they pass this cost onto CL sectors in the form of higher electricity prices
- **Volume** - CL sectors lose sales volumes, as they raise prices in an attempt to pass on some of the carbon cost

Approach differs by reason for inclusion in the CL list

Carbon cost group

Cement sector:

- Detailed bottom up model to estimate direct, indirect and volume effects

Other carbon cost sectors:

- Direct impact for each sector is estimated as 2013 allocations, times % auctioned, times assumed carbon price
- Indirect impact is estimated using data on electricity consumption, carbon intensity, electricity pass-through, and carbon price assumptions
- Carbon cost pass through (and impact on EBITDA and employment) is assumed in line with the estimated cost pass through of the cement sector

Joint criteria group

Steel sector:

- Detailed bottom up model to estimate direct, indirect and volume effects

Other joint criteria sectors:

- Direct and indirect impacts are estimates as per the method in the carbon cost group
- Carbon cost pass through (and impact on EBITDA and employment) is assumed in line with the estimated cost pass through of the steel sector

Trade intensity group

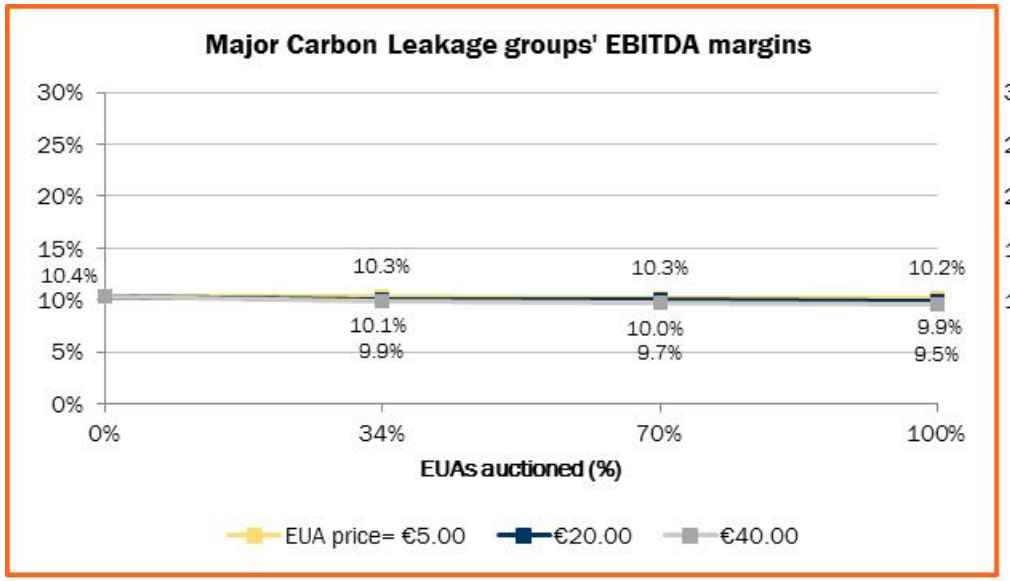
All trade intensity sectors:

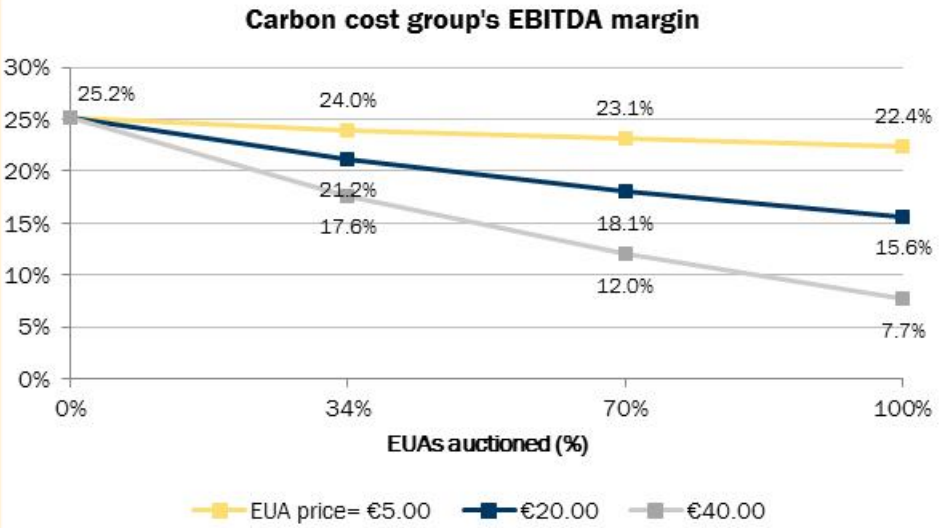
- Direct impact for each sector is estimated as 2013 allocations, times % auctioned, times assumed carbon price
- Indirect impact is estimated using data on electricity consumption, carbon intensity, electricity pass-through, and carbon price assumptions
- Zero cost pass through is assumed given the constraints resulting from high trade intensity. The sectors are expected to pay for their permits from their margins

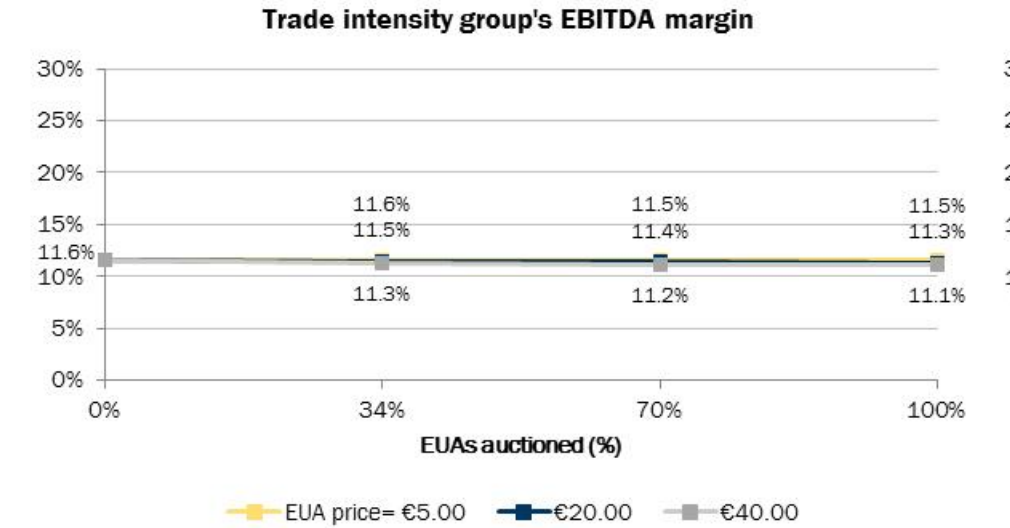
Key assumptions: cement and steel sectors are good proxies for the electricity intensity and pass through behaviour of their respective groups

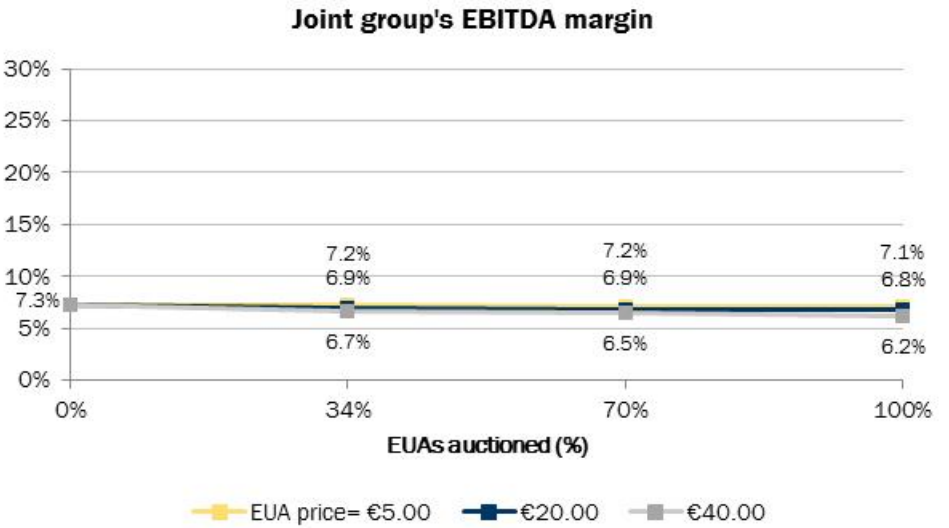
Key assumption: sectors absorb carbon costs

Only the carbon cost group experiences significant declines in EBITDA margin- the impact on the carbon leakage groups' overall EBITDA margin is modest





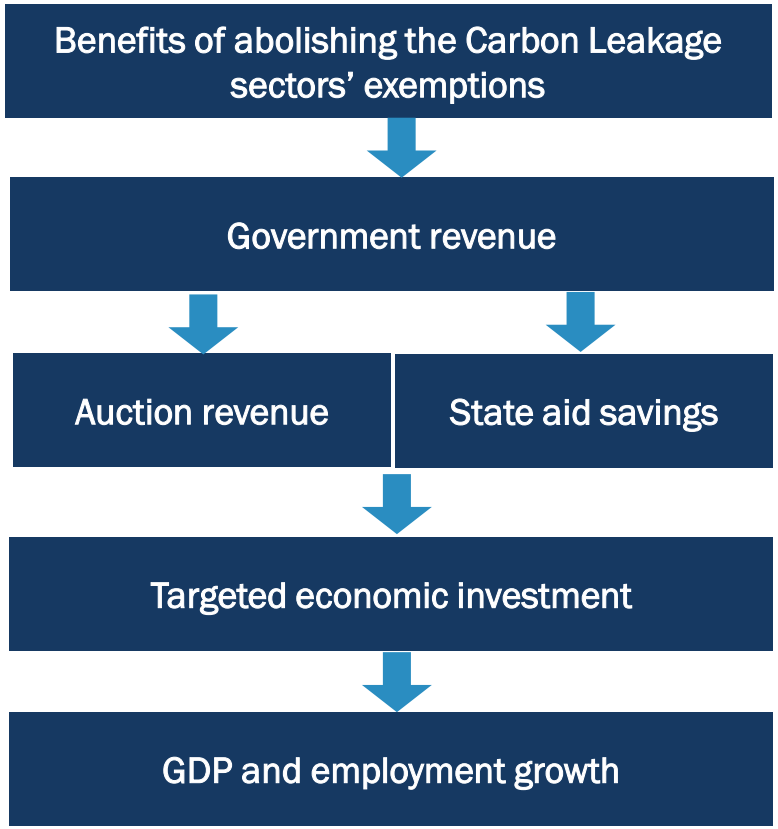




Source: FTI Consulting analysis
Note: Only the carbon cost, joint and trade intensity groups of the Carbon Leakage list are included in the analysis

The benefits of recycling carbon auction revenues

The main source of benefits from removing carbon leakage exemptions is government revenues that can be recycled into the economy



If carbon leakage exemptions are abolished governments will receive revenue from auctioning permits…

Calculation of additional auction revenue if carbon leakage exemptions are removed:

Additional auction revenue = Number of permits freely allocated to the carbon leakage sectors × % of these permits that will be auctioned × Carbon price

Estimates of additional auction revenue range from €1 billion - €30 billion:

Estimates of EUA auction revenue (€ billion)			
EUA price (€/tonne)	Auctioning percentage		
	34%	70%	100%
5	1.3	2.6	3.7
20	5.0	10.3	14.7
40	10.0	20.6	29.5

Source: FTI Consulting analysis

… and will save state aids offered as a compensation for indirect costs

Estimates of the magnitude of the state aid differ between Member States

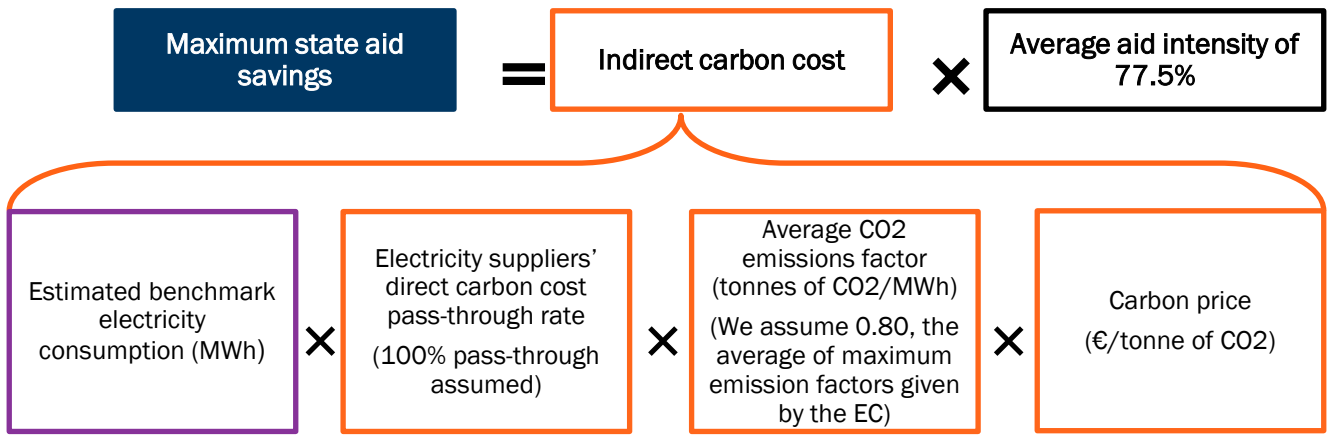
- The German government has set aside **€350 million** for 2013 (Source: BUND, 2013), and the aid intensity is expected to be approximately **70%** (Oeko Institute for Applied Ecology, 2013)
- The UK government has allocated up to £113 million over the Spending Review Period (approximately £50m or **€59m annually**), and the aid intensity is intended to be the maximum permissible **85%** (BIS, 2013)
- The Dutch government intends to provide €624m over eight years (approximately **€78m** annually)

Our modelling approach – 2 scenarios:

- Other Member States may also intend to provide such aid, but details have not been published
- We therefore estimate state aid savings in two scenarios:

State aid saving scenario	Description	Details
1	ONLY Germany, the UK and the Netherlands provide state aid	The total state aid is therefore **€487m** (sum of €350m for Germany, €59m for UK, and €78m for the Netherlands)
2	All Member States provide state aid	We assume the average EU wide aid intensity is 77.5% (i.e. the average of the UK and Germany)

Modelling method and assumptions:



We also estimate the fall in corporate tax revenue as a result of the carbon leakage sectors' loss of EBITDA

- We estimate the fall in corporate tax revenue as:

Fall in corporate tax revenue = Fall in taxable income × Corporate tax rate

Fall in taxable income

- We estimate the fall in taxable income using the fall in EBITDA modelled for the carbon leakage sectors
- We recognise that EBITDA is not the same as taxable income – so this is a simplifying assumption
- For example, although tax rules differ between Member States, adjustments are made to EBITDA to calculate taxable income (for example, a depreciation expense may be deducted)
- The fall in EBITDA varies from €2.2bn (when the carbon price is €5 and 34% of permits are auctioned), to €42.4bn (when the carbon price is €40 and 100% of permits are auctioned)

Corporate tax rate

- We use a representative corporate tax rate of 27.8%
- Since our modelling is at the EU level (and not country by country), we use a single tax rate
- Corporate tax rates vary within the EU, from 10% (in Bulgaria and Cyprus) to 35% (in Malta)
- We calculate a weighted average corporate tax rate of 27.8%, using the Member States' GDP in 2012 (at market prices) as a weight

We model this as a reduction in government spending across the economy, in proportion to the government's existing pattern of spending

We model three scenarios for the recycling of government revenues into the economy

Scenarios:

1. The additional revenue is spent in line with the existing pattern of government spending

- Member States' governments spend the majority of their budgets on public administration, defence, education, health and social work
- In this scenario, we assume that the additional revenue is distributed similarly to other general tax revenues

2. The additional revenue is earmarked for research and development and clean technologies

- In this scenario, we assume that the funds are designated according to the EC's six "Priority Action Lines" for investment, based on an example of the sectors in which this investment could take place

3. The additional revenue is earmarked for the manufacturing sector

- In this scenario, we assume that the funds are distributed back to the manufacturing industry

Product category	Allocation of additional government spending		
	Existing pattern of spending	R&D, clean technologies	Manufacturing
Products of agriculture, forestry and fishing	0%	0%	0%
Mining and quarrying	0%	0%	0%
Manufactured products	2%	40%	100%
Electricity, gas, steam and air conditioning	0%	0%	0%
Water supply; sewerage, waste management and remediation services	0%	0%	0%
Constructions and construction works	0%	20%	0%
Wholesale and retail trade services; repair services of motor vehicles and motorcycles	2%	0%	0%
Accommodation and food services	0%	0%	0%
Transportation and storage services	1%	0%	0%
Information and communication services	0%	0%	0%
Financial and insurance services	0%	0%	0%
Real estate services	1%	0%	0%
Professional, scientific and technical services	2%	40%	0%
Administrative and support services	0%	0%	0%
Public administration and defence services; compulsory social security services	38%	0%	0%
Education services	20%	0%	0%
Human health and social work services	31%	0%	0%
Arts, entertainment and recreation services	2%	0%	0%
Other services	0%	0%	0%
Services of households as employers; undifferentiated goods and services produced by households for own use	0%	0%	0%
Services provided by extraterritorial organisations and bodies	0%	0%	0%
Total	**100%**	**100%**	**100%**

Source: Eurostat Input-Output tables (2009), FTI Consulting analysis

Conclusion: comparing costs and benefits

Our findings suggest that benefits will likely outweigh the costs of abolishing the carbon leakage sectors' exemptions

Costs of carbon leakage		Benefits of abolishing CL exemptions		Commentary
Ineffective ETS, high compensation		Ineffective ETS, high compensation		Ineffective ETS, high compensation
GDP loss	€1.5 - 2.0 billion	GDP gain	€3.2 billion	▪ The economy gains €3.2 billion in GDP (0.02% of the EU's total GDP) compared to the carbon leakage sectors' €1,5-2,0 billion GDP loss ▪ The net employment generation is between 11,000 -18,000 employees (~0.01% of the EU's total employment)
Employment loss	16,000- 22,000 employees	Employment gain	33,000 – 34,000 employees	
Moderately effective ETS, medium comp.		Moderately effective ETS, med comp.		Moderately effective ETS, med comp.
GDP loss	€7.0 - 9.5 billion	GDP gain	€22.6 billion	▪ The economy gains €23billion in GDP (0.2% of the EU's total GDP) compared to the carbon leakage sectors' €7.0-9.5 billion GDP loss ▪ The net employment generation is between 137,000 – 234,000 employees (~0.1% of the EU's total employment)
Employment loss	76,000 – 103,000 employees	Employment gain	242,000 – 310,000 employees	
Effective ETS, no compensation		Effective ETS, no compensation		Effective ETS, no compensation
GDP loss	€17.5 – 23.6 billion	GDP gain	€60.6 billion	▪ The economy gains €61 billion in GDP (0.5% of the EU's total GDP) compared to the carbon leakage sectors' €17,5-23,6 billion GDP loss ▪ The net employment generation is 398,000 – 601,000 employees (~0.3% of the EU's total employment)
Employment loss	189,000 – 255,000 employees	Employment gain	653,000 – 790,000 employees	

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Source: FTI Consulting analysis
Note: Ineffective ETS assumes 34% auctioning and €5 EUA, Moderately effective ETS assumes 70% auctioning and €20 EUA and Effective ETS assumes 100% auctioning and €40 EUA. Government spending assumed to be earmarked for R&D and cleantech. All countries assumed to provide state aid at 77.5% intensity