

# Unilateral climate policy and carbon leakage: Quantifying potential competitiveness effects and analysing the value chain to identify potentially vulnerable sectors

Unilateral climate policies and carbon leakage workshop  
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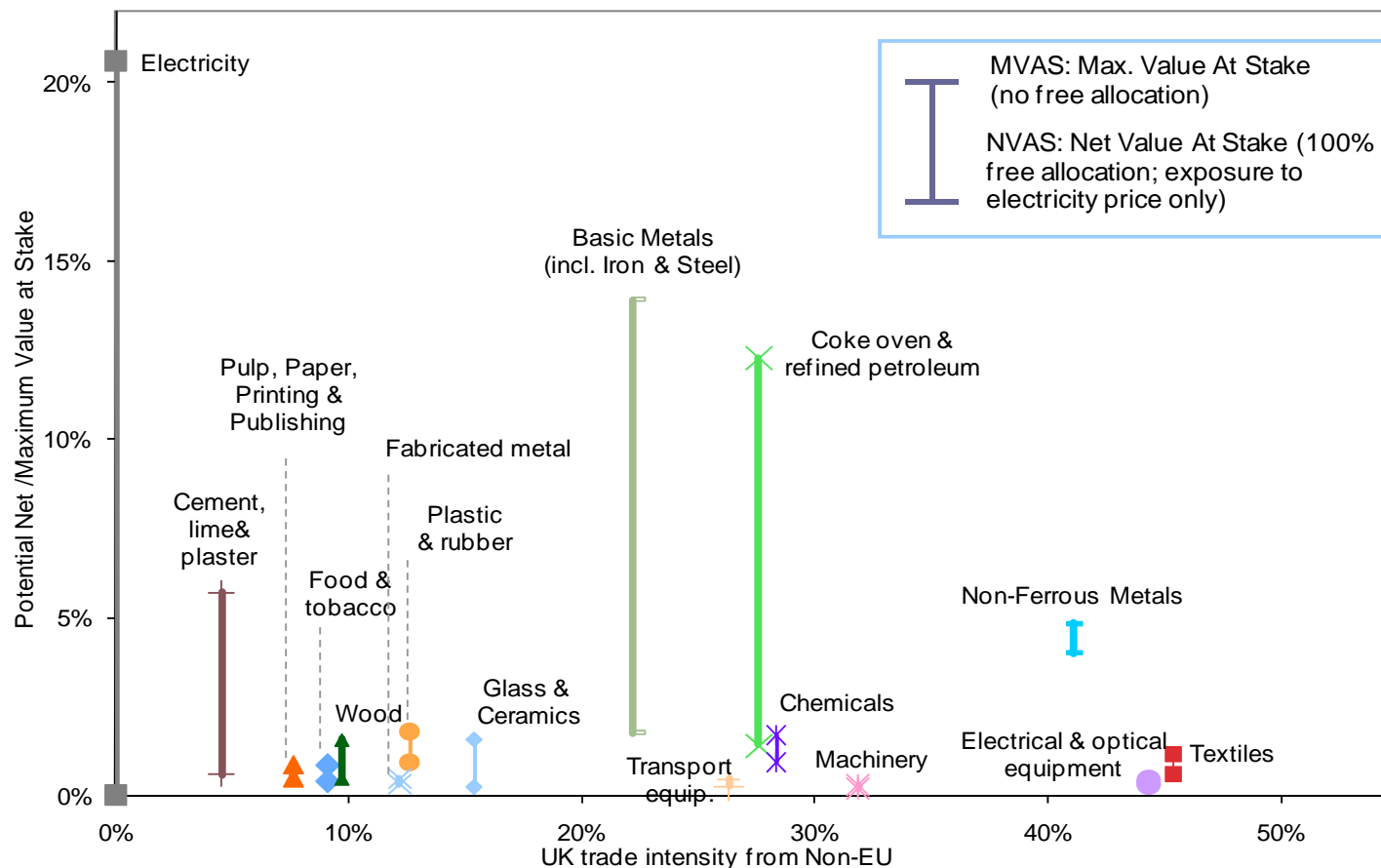
# Overview

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1. Quantifying the first order effect on production costs (direct and indirect)  
=> Which sectors may face significant increase in production costs due to CO2 pricing?
2. Quantifying sector's trade intensity  
=> Which of these sectors have to bear the cost themselves/  
pass on the costs to consumers?
3. Quantifying value chain analysis for the UK  
=> Which segments of the production/value chain are exposed?

First step:  
Quantifying production cost  
impacts from CO<sub>2</sub> pricing

# Carbon Trust study (2004) results using 2-3 digit sector classifications.



Are the impacts of carbon pricing differentiated within sectors?

# Climate Strategies (2008) further disaggregates sectors at 4-digit resolution: the case for the sector “cement, plaster and lime” (previously grouped at 3 digit resolution, SIC 26.5-26.8)”

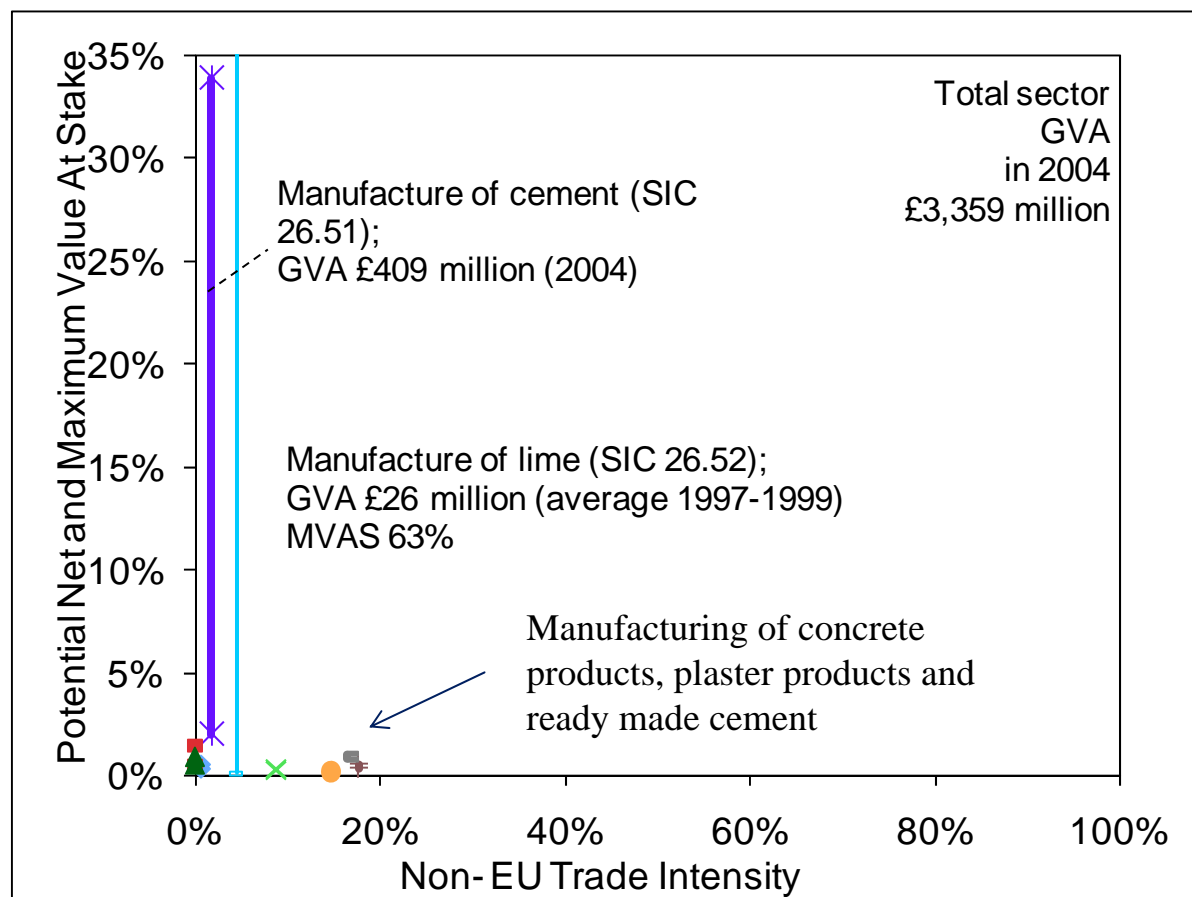
At 4-digit resolution, this sector breaks down into 12 sub sectors.

Of these, two experience significant cost impact:

Manufacturing of cement  
at 34% cost increase  
relative to GVA

Manufacturing of lime  
at 33% cost increase  
relative to GVA

Compared with 6% for  
the sector as a whole

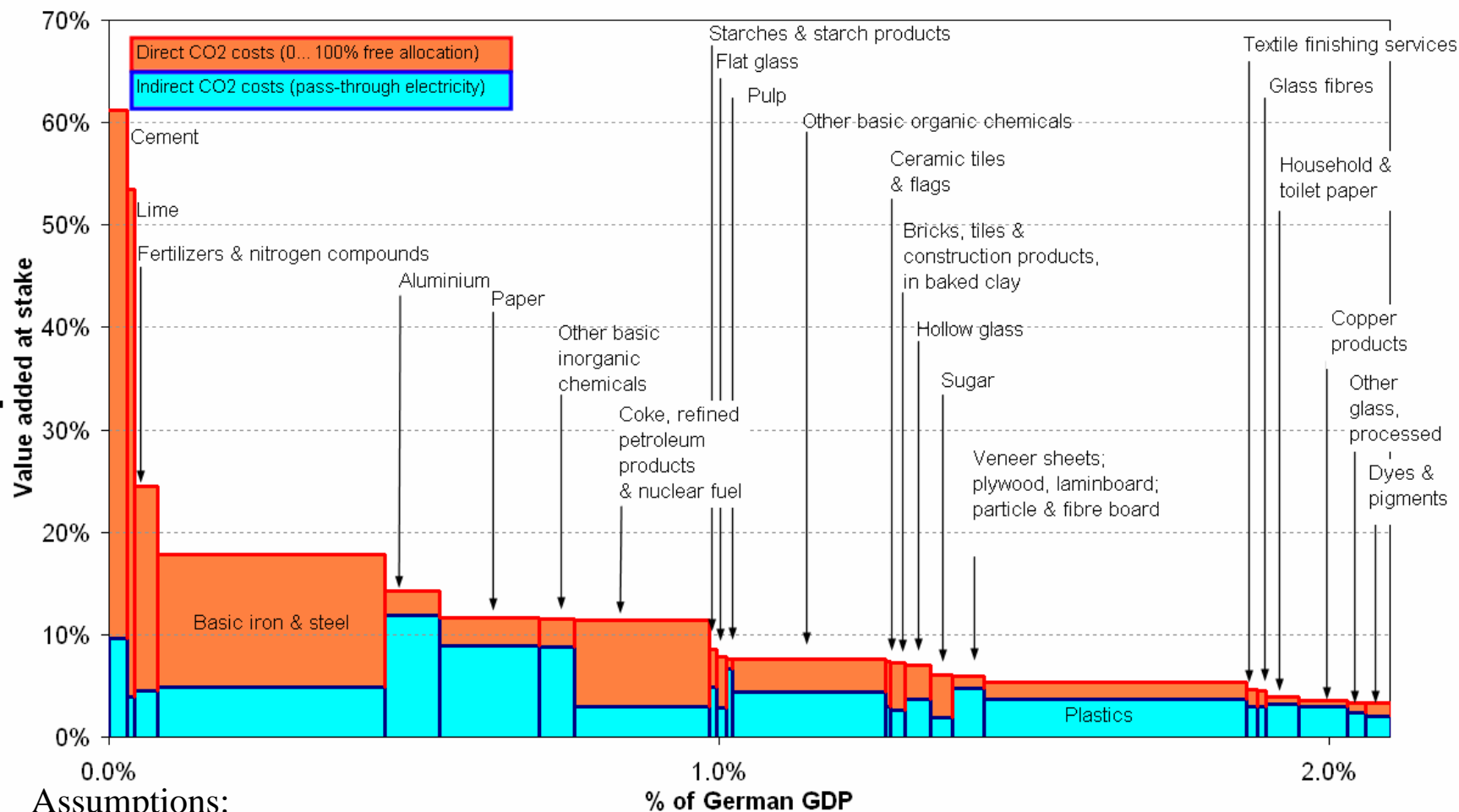


[www.electricitypolicy.org.uk](http://www.electricitypolicy.org.uk)



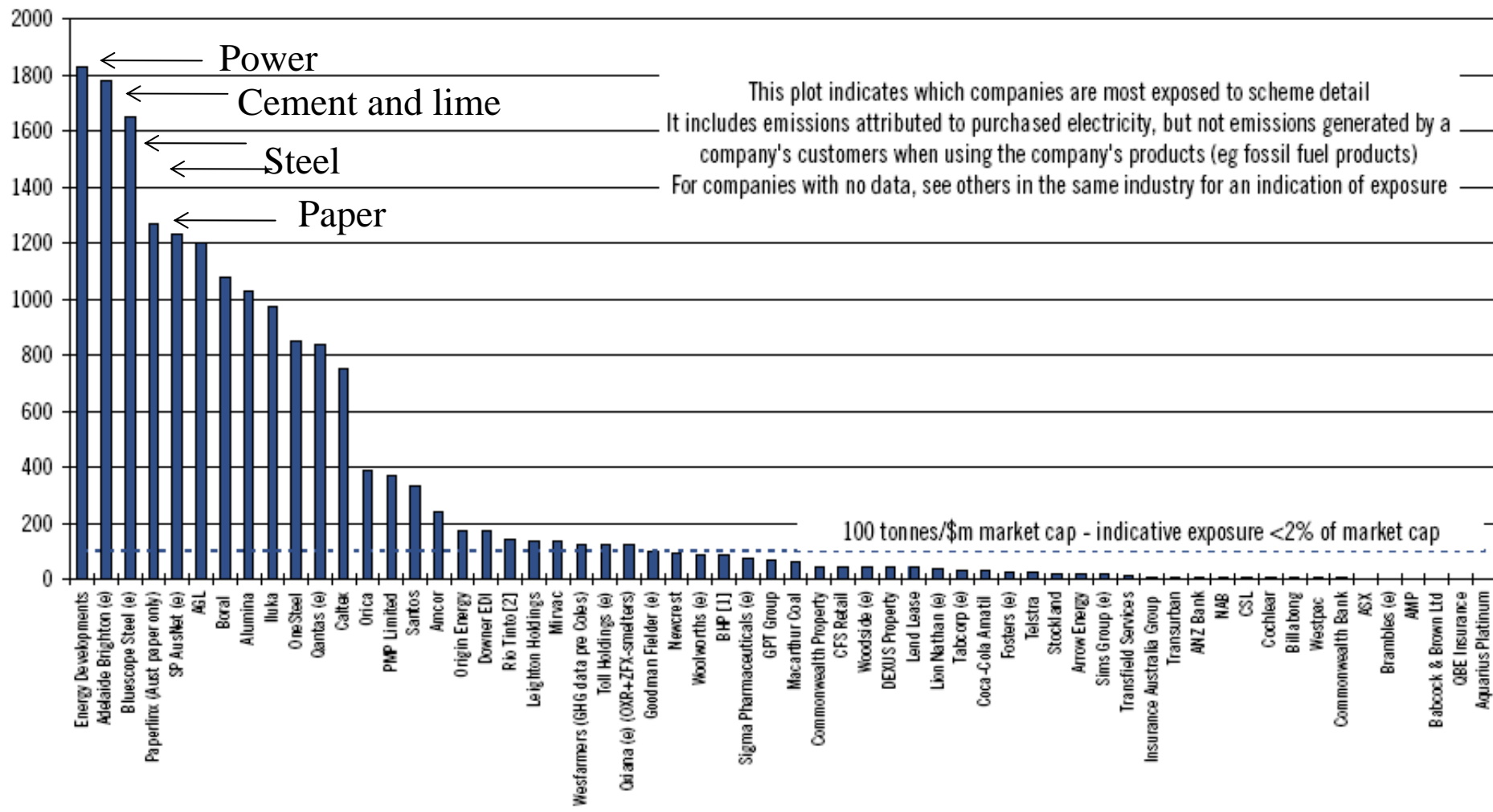
# Oeko et al (2008)

## Results for a similar exercise for Germany



(Citi, 2008) quantifies potential impacts of the announced Carbon Pollution Reduction Scheme in Australia (A\$20/t carbon price) on ASX100 companies. Impacts for  $\frac{3}{4}$  of companies < 2% of value, often well <1% of value.

Australian Emissions (Tonnes CO<sub>2</sub>e), Generally for FY07, per A\$Million of Market Capitalisation





# More and more studies emerging examining cost impacts...

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Study	Country	Disaggregation level	CO2 price	denominator	Process emissions	Electricity
Carbon Trust (2004)	UK	2-3 digit SIC	€20/tCO <sub>2</sub>	GVA	yes	yes
Morgenstern et al (2004)	USA	4 digit SIC (US)	US\$ 1/ton	Total cost	no	yes
WRI (2004)	USA	2 digit SIC (USA)	-	Final sales value	yes	no
Climate Strategies (2007)	UK	4 digit SIC	€20/tCO <sub>2</sub>	GVA	yes	yes
Oeko et al (2008)	Germany	4 digit SIC	€20/tCO <sub>2</sub>	GVA	yes	yes
Delft et al (2008)	Netherlands	2-4 digit SIC	€20/tCO <sub>2</sub>	GVA	yes	yes
CITI (2008)	Australia	Company (ASX100)	A\$20/t CO2	Market Capitalisation	yes	yes

# Summary 1.

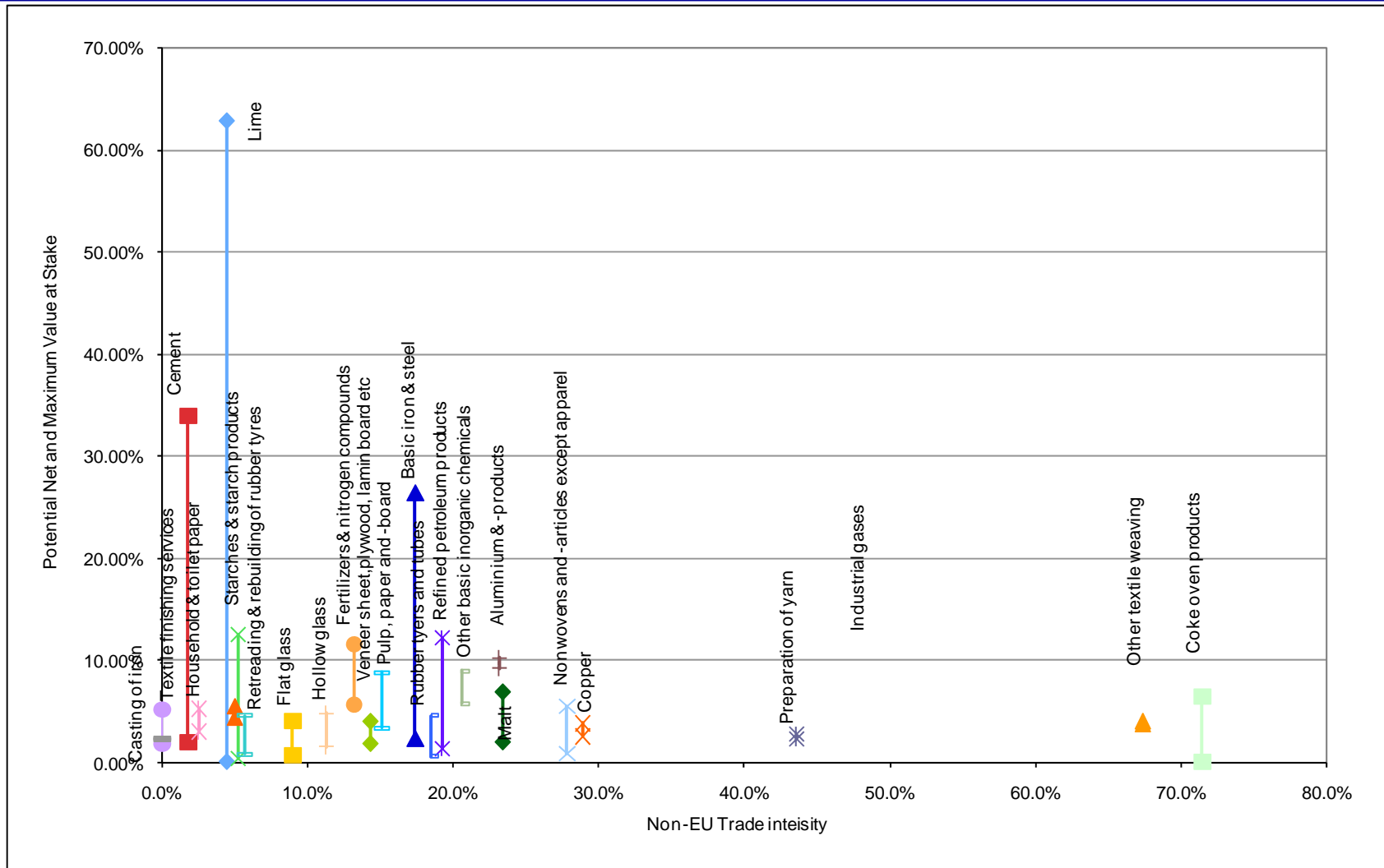
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- Cost impact screening process assesses which manufacturing subsectors are potentially vulnerable to emissions leakage.
- Studies have consistently shown that cost increase (relative to value-added) are focused on a few sectors.
- Broad sector classification masks the higher impacts experienced at sub-sector level.

Second step:  
Quantifying trade intensity  
(exposure to foreign competition)

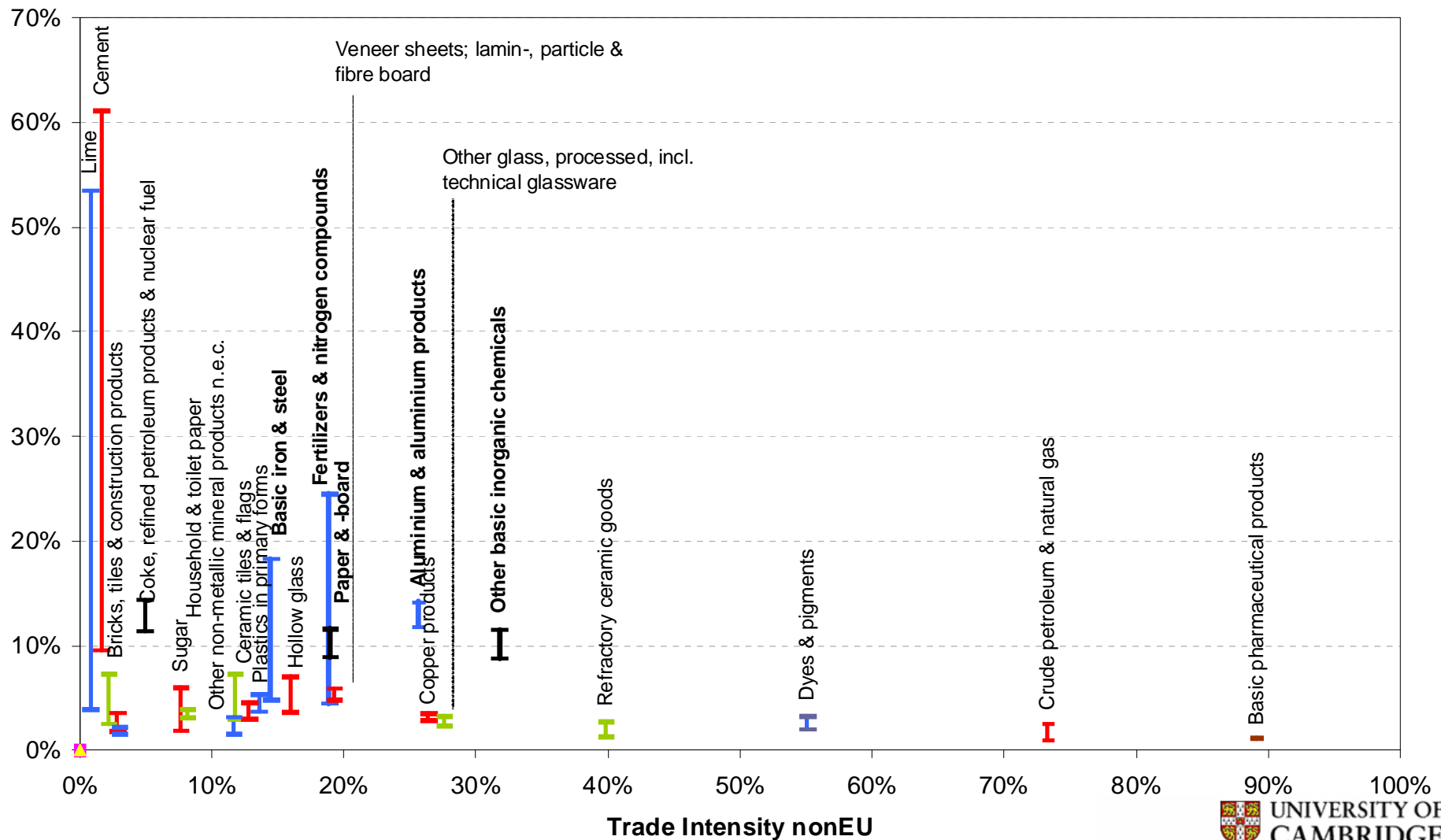
# Climate strategies (2008)

## Trade intensity for the UK



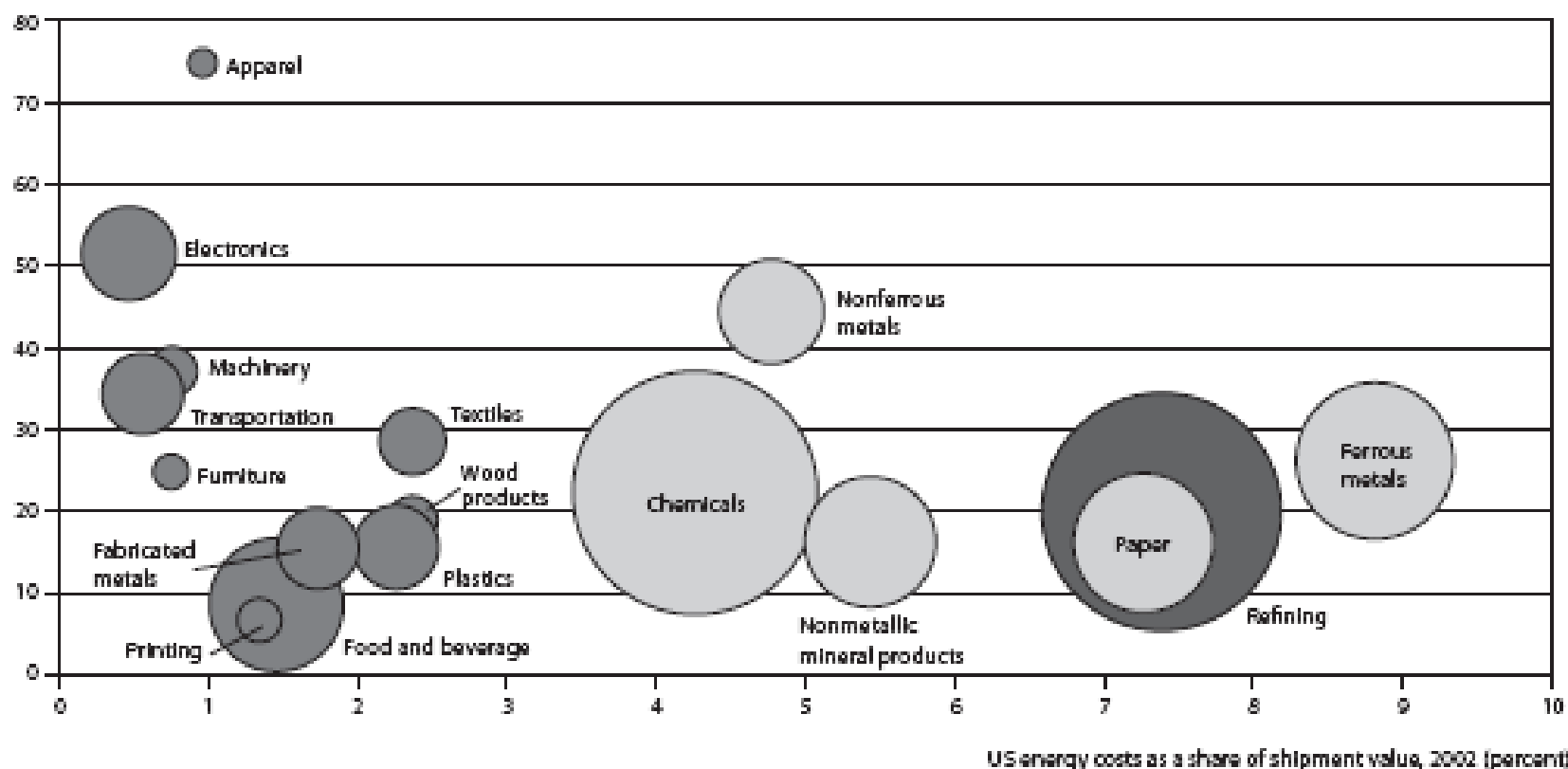
# Oeko (2008)

## Trade intensity for Germany



# Trade intensity for US manufacturing, 2-3 digit sector resolution (WRI, 2008)

Imports as a share of consumption, 2006 (percent)



Note: The size of the bubbles indicates the total CO<sub>2</sub> emissions from the industry in 2002.

Sources: US Department of Commerce, Bureau of Economic Analysis, Industry Economic Accounts, 2007; US Department of Energy, Energy Information Administration, Manufacturing Energy Consumption Survey 2002.

# Approaches to quantify sectors' ability to pass through CO<sub>2</sub> costs

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- *Ex-post* econometric analysis
  - Power sector estimates: 40-120% for Dutch and German power markets, Phase I EU ETS (Sijm et al 2005)
  - Cement sector estimates: 10-40% in general, though varies between country markets (Walker and Convery, forthcoming)
- Econometric tests on regional price influences:
  - Basic metals: US price has a strong and significant influence on prices in five EU countries. A stronger external price effect found with German prices on the EU countries. (COMTER 2007)
  - Cement: only the German price has a statistically significant effect on cement prices in other EU countries. (COMTER 2007)
- Existing degree of trade in the sectors
  - Given that the biggest single constraint on ability to pass CO<sub>2</sub>-related costs on to customers is foreign competition from outside regions.
  - Results...

# Summary 2.

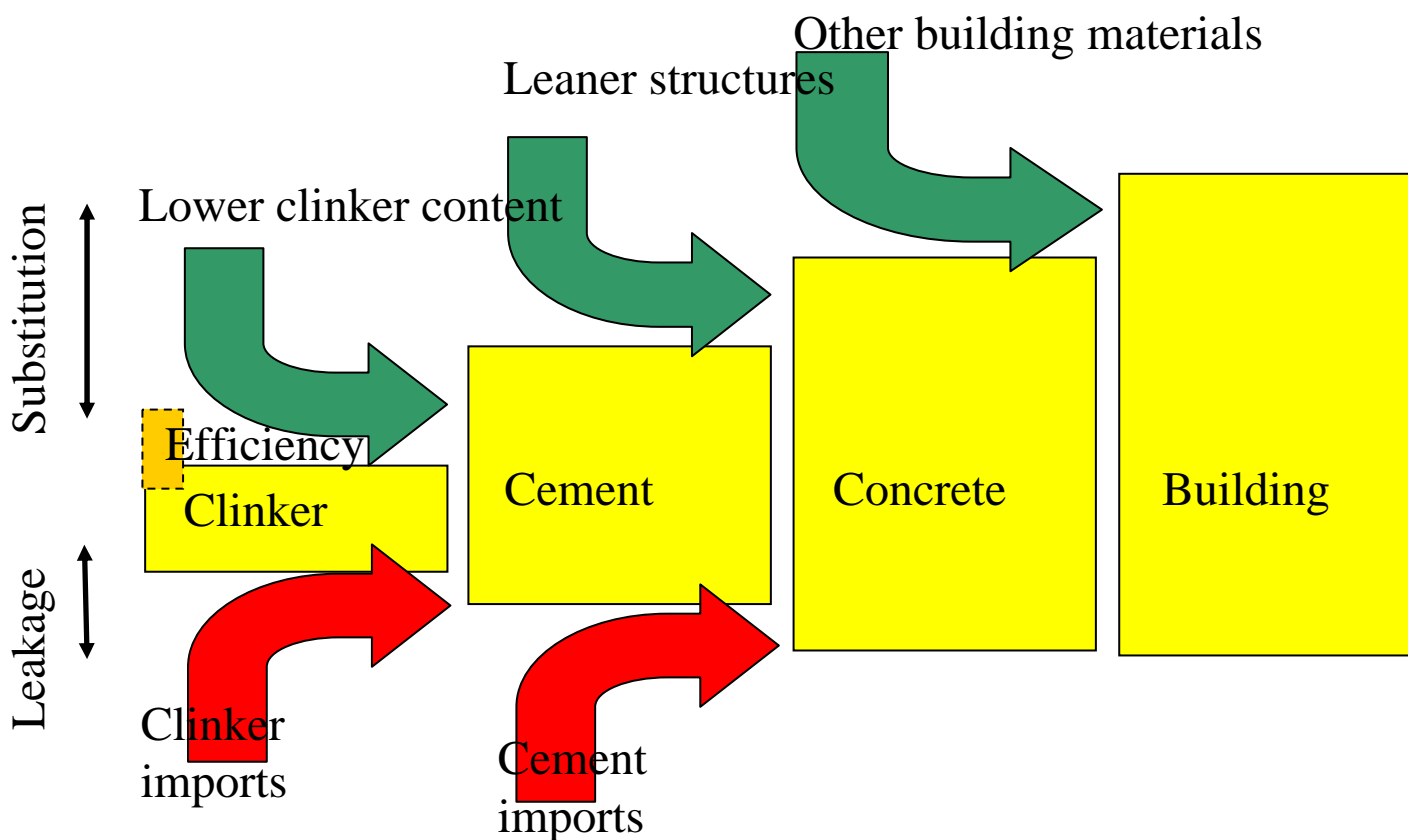
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- Key manufacturing sectors (with high production cost impacts) are likely to also have a degree of cost pass through abilities.
- Further sector-by-sector assessment of the trade barriers is necessary to gauge their ability to pass on CO<sub>2</sub> costs.



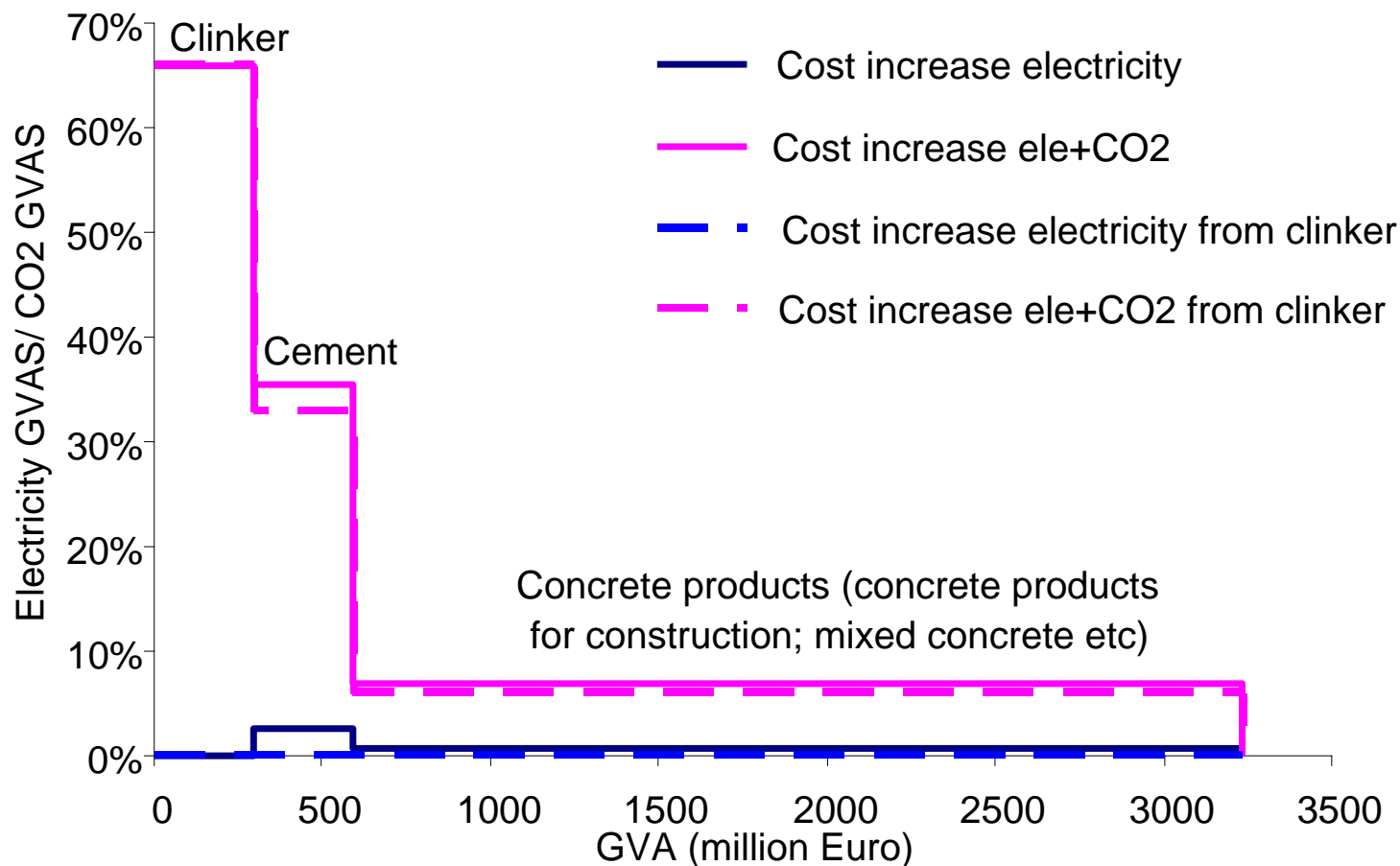
# Third step: Value chain analysis

# Emission reductions in value chain



# Cement sector

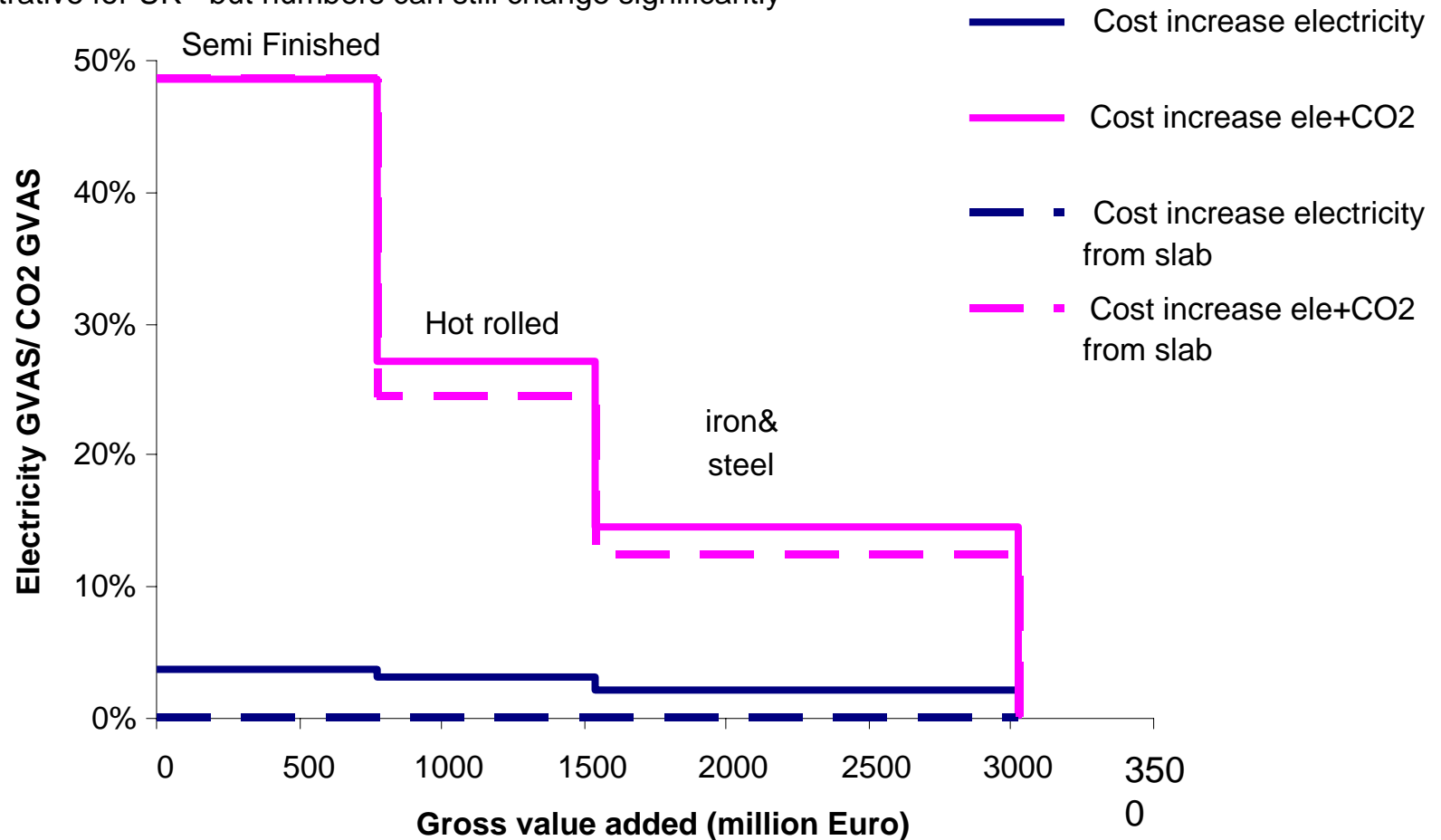
Illustrative for UK - but numbers can still change significantly



Most leakage concerns from clinker – easily transportable

# Steel sector

Illustrative for UK - but numbers can still change significantly



- Most exposure from BOF (and possible coke oven)
- Steel can be transported at semi-finished stage

# Leakage in the value chain

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- Usually primary products are most CO<sub>2</sub> intensive
  - As we go down the value chain CO<sub>2</sub> intensity reduces
- If primary products are not transported only exposure of more complex products matters (e.g. gases, food)
  - This is typically small
- If primary products are / can be traded
  - Leakage possible (cement, steel)
  - Reduces price impact -> substitution in value chain

# Summary 3.

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- Quantification 1. Production cost impact screen
  - Few sub sectors experience high cost increase relative to profits
- Quantification 2. Trade intensity (cost pass through abilities)
  - For majority of those sub-sectors, a reasonably high degree of cost pass through ability is likely
- Quantification 3. Value chain
  - Non-transportable goods are protected
  - Transportable goods: leakage/ responses to it reduces substitution to lower carbon options
- Suggests we are left with a small set of products where leakage is a concern.

Thank you for your attention.

[www.electricitypolicy.org.uk/tsec/2](http://www.electricitypolicy.org.uk/tsec/2)

[www.climate-strategies.org](http://www.climate-strategies.org)