Dear Alex Kazaglis,

Thanks a lot for sharing your draft of the documents "justification and evidence – pass-through assumptions" and the detailed sector studies.

I fully support your approach of focusing the analysis of leakage concerns to a small set of energy and carbon intensive products and am impressed by the detail of evidence you have gathered on the manufacturing process for these products.

While in the remaining economy the costs of energy and carbon are typically too low to capture the full attention of management – and hence need to be brought to management attention with regulation that prescribes the implementation of energy management systems, the sectors you have selected are more exposed to the direct and indirect effects of putting a price on carbon.

You have asked me three specific questions – which I will attempt to answer in detail below,

Best wishes for your further analysis on this important topic

Karsten Neuhoff

1. Does evidence from the literature, the qualitative analysis of these sectors and your broader understanding of these sectors, support the pass-through ranges that we have used for this analysis, or would you suggest a different range? In particular:

Analysis on pass through rates is haunted by two challenges. For oligopoly modeling approaches in a national setting they provide pass-through rates that depend on the assumed shape of the demand curve for the product. If the curve is assumed to be linear, then the pass through rate is below 100% - if constant elasticity of demand is assumed than pass through rates exceeding 100% result. To simplify numerical implementation models seem to prefer linear demand curves. I would assume this result translates to models if they also consider international trade. For empirical estimates on the price pass through, the frequency of publication of list prices (e.g. for cement) can result in downward bias of the reported pass-through rate.

Hence I tried to reflect the information provided in your qualitative description of the different sectors (that matches and expands descriptions I have previously seen) in a table to check the ranking of the sectors based on factors that enhance the local nature of a market. E.g. if a product – like cement – has very high transport costs, this increases the ability to pass through costs. Below – in a very ad-hoc approach – I summarized a few more factors for the sectors considered in your analysis:

		Transport	Inhomoge	Integratec	Recycling	Sum	Your sugge
Steel	homogeneous	1		1	2	4	50-75%
	specialised	1	2	1	2	6	
Rubber and Plastics		2		1		3	40-75%
Cement		6				6	30-75%
Basic inorganic Chemicals		3		2		5	30-75%
Paper	simple	1			2	3	20-40%
	specialised	3	2	1		6	
Glas	simple	2			1	3	10-45%
	specialised	3	2	1		6	
Fertilizers		2				2	10-20%

Legend:

***Transport costs** can create separate local markets – particularly pronounced for cement where costs of transport relative to value of product are particularly high.*

***Inhomogeneous products** are tailored to local demand, and can thus more easily reflect local costs.*

***Products integrated** in larger value chain can – if the value chain remains – reflect full costs as part of an overall product.*

***Recycling** enhances the value of local production, as transport costs and logistics are saved twice.*

Comparing the ad-hoc points I gave to different products with the suggested pass through ranges illustrates a certain level of consistency in the evaluation. Two observations stand out – that I would consider consistent with initial intuition – but obviously warrant further analysis to verify:

- The lower range of cement pass through rates is difficult to explain (compared to the other assumed pass through rates)
- The pass through ranges assumed for paper and glass seem to be low compared to the assumed pass through ranges for steel – given that all three products have specific characteristics that can contribute to local markets.

2. More broadly, do you agree with our approach for using these rates. That is, given uncertainty regarding future rates, we will consider both (a) a business as usual world where we focus on historical pass-through rates (b) a "frictionless trade" world where pass-through rates go to zero.

In economics 101 short-term prices are set at the marginal costs or scarcity prices – while in the longer-term investment choices and potential for entry determines the price and thus price reflect full production costs. This would suggest that the long-term pass through rate is at 0% in the case of full free allocation and increases to 100% in the case of full auctioning. If at this rate full domestic production costs increase beyond the level of other countries, then investment is pursued in other regions, and observed pass-through rates are accordingly lower.

However, companies tend to invest in new production facilities where there is new demand to be met. For the carbon intensive commodities listed in the report it is difficult to see how their demand would increase in the UK or Europe. Thus companies need the demand for a different product or production process to invest in Europe. Such a demand can be created through climate

policy that requires more carbon efficient products and services. Companies will anticipate charging a margin for such new products, and investors in the companies will – subject to the credible policy framework – value the hedge such investments can offer in their portfolio.

In principle such additional investment in lower carbon products or production processes reduces the demand for carbon intensive products – and thus in a competitive environment depresses prices. If climate policy is credible, then anticipation of declining demand will encourage companies to close excess capacity in a timely manner and thus maintain some level of scarcity prices above short-term production costs. Otherwise they might maintain capacity even at short-term losses to retain the option to serve potentially recovering demand. Furthermore, if demand is anticipated to decline any way, then companies that can exercise some market power might be prepared to increase prices to levels that would not have been attractive for a company that wants to maintain future demand for the product. Thus pass through rates could remain high also in the case of declining demand for carbon intensive products.

Thus, what will matter for investments is likely to be the credibility and confidence of companies in the regulatory and climate policy framework. If a country can demonstrate a robust and predictable policy framework, then this reduces policy risk for the management of companies and allows for investments. The UK climate change bill contributes to a transparent and predictable policy environment. This can make the country an attractive location for new investments.

3. Relevant points on the competitiveness exercise we are undertaking. E.g. as discussed on the call:

My concern about the use of pass-through rates is a different one. Listed companies have a tendency to focus on shorter-term profits rather than longer-term business opportunities. In this context they might prefer to pass through opportunity costs of carbon (even where allowances are allocated for free) in order to maximize short-term profits at the expense of losing longer-term market share to international competition.

For this reason the allocation of free allowances is linked to the production level of companies – thus creating an additional incentive to maintain higher output levels. However, as numerous studies have demonstrated, the free allocation of allowances to compensate for carbon costs creates various distortions – from the political process of their negotiation to the longer-term strategic choices on innovation. Hence I think it is important for governments to take more initiative to explore the different alternative options that are provided in the EU ETS Directive to address the risk of carbon leakage. This could also be explored in the report. The very specific situations of the carbon intensive products lend themselves to such an analysis.