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Inclusion of Consumption of carbon intensive materials in emissions trading – An option for carbon pricing post-2020

Report

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About the Project

A project led jointly by Climate Strategies and DIW Berlin has been exploring whether inclusion of domestic sales of selected energy intensive commodities (e.g. steel) in domestic emission trading schemes is an effective and feasible approach towards restoring the carbon price signal in these sectors, without damaging competitiveness. It has been delivered by a multidisciplinary, international team of researchers from a number of institutions, representing various fields (EU law and institutions, climate policy and economics, energy market and infrastructure policy and economics).

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About Climate Strategies

Climate Strategies is an international organisation that convenes networks of leading academic experts around specific climate change policy challenges. From this it offers rigorous, independent research to governments and the full range of stakeholders, in Europe and beyond. We provide a bridge between research and international policy challenges. Our aim is to help government decision makers manage the complexities both of assessing the options, and of securing stakeholder and public consensus around them. Our reports and publications have a record of major impact with policy-makers and business.

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1. Carbon pricing is important for the material sectors

Production of materials is a major source of carbon emissions – the iron and steel, and the cement sectors alone account for 40% of industrial emissions in the European Union (European Commission, 2015). Emissions from the materials sectors will need to drastically reduce in order for Europe to meet its commitments on climate change. International targets such as those agreed by the G7 and the Paris Climate Agreement imply a 80-95% emission reduction in Europe by 2050 for global average temperature to stay well below 2 degrees Celsius. Delivering the necessary emission reductions in the materials sectors depends on investments in three groups of modernization and innovation potentials: (i) efficiency enhancement of production and a shift towards lower-carbon fuel types; (ii) innovation and deployment of break-through technologies for lower carbon production such as Carbon Capture and Storage (CCS) and Use (CCU); and (iii) more efficient materials usage, including a move to higher quality materials and substitution towards innovative and less-carbon intensive materials.

A set of policy elements are necessary to allow industry to exploit these different low-carbon opportunities at scale (Climate Strategies 2014a and 2014b). A high, consistent and effective carbon price will be a necessary requirement. Moreover, a long-term policy perspective is needed to match the decision and investment periods of durable capital and to allow the flexibility to respond to successful innovations on production processes and materials. Public financial support can play a key role in the demonstration and early commercialization of potential breakthrough technologies. For the development of innovative construction materials, a close cooperation and coordination between materials producers and their industrial and final consumers is required (Milford et al., 2013), as was shown possible by the development of light weight high strength steel in the automotive sector.

The Paris Climate Agreement provides a framework for countries to coordinate national policy elements and combine them towards Nationally Determined Contributions (NDCs). While the COP 21 Agreement recognizes the importance of carbon pricing, countries retain the flexibility to determine the role carbon prices play in their policy mix. Carbon prices will be important – but may well differ across regions for some time. This raises an essential question: how might a regional carbon price be made effective in a world of differentiated carbon prices and global trade of products so as to create (i) incentives for the different modernization and innovation potentials, (ii) clarity who will bear incremental costs of some mitigation options, and (iii) funding for innovation? This is a central question for pricing schemes such as the structural reform of the European ETS and the national ETS in China..

2. Free allocation as leakage protection mutes the carbon price

Large regional differences in carbon prices pose the risk of carbon leakage for carbon intensive materials - the relocation of production or investment to regions with lower carbon prices (Demailly and Quirion, 2008; Sato and Dechezleprêtre, 2015). Therefore, emissions trading mechanisms frequently provide free allocation to trade-exposed sectors with high carbon costs.

However, free allowance allocation dampens the effectiveness of the carbon price faced by producers and consumers in the value chain (Heilmayr and Bradbury, 2011): The amount of free allocation give to a plant is typically linked to some activity parameters such as production output (Sterner and Müller, 2008; Sterner and Isaksson, 2006). This means that increasing today's production increases free allocation in the future. This partially compensates firms for cost of allowances, and as a result, firms reflect only part of the carbon prices they face to the product prices (Bernard et al., 2007). Furthermore, carbon intensive materials producers may also chose to pass on only a part of the carbon price to their consumers if faced with competition from trade, so as to not to jeopardize market shares. Estimates of pass-through vary across different ex-ante and ex-post studies and across sectors (European Commission, 2015). The numbers are highly controversial, because if pass-through rates are zero, a reduction of free allocation results in losses, while with high pass-through rates, firms may make additional profits.

For innovation and modernization, carbon price pass through is important: A carbon price of for example €30/t (compared to 2016 levels of €5/t) that is fully passed-through, increases the price of steel by 11%, of aluminum by 20% and of cement by 28% (Pauliuk et al., 2016). This gives the users a strong incentivize for material efficiency, and creates new markets for improved-strength, higher value materials with lower weight, and also triggers substitution towards lower-carbon alternative materials. Less impact is expected for final consumer choices, for example, the implied increase in the cost of a car due to the carbon price is only around €90.

For innovative break-through technologies like Carbon Capture Utilization and Storage (CCUS) or re-use of waste gas for chemicals and fuels, initial public funding is necessary to enable demonstration projects of increasing scale. However, innovation will only succeed if also supported and driven by private actors. Firms will innovate only if they see a long-term business case and a large-scale shift in future demand towards low-carbon materials. Ensuring that incremental carbon prices will be clearly reflected in carbon intensive materials' prices into the future will be a key to driving private investment.

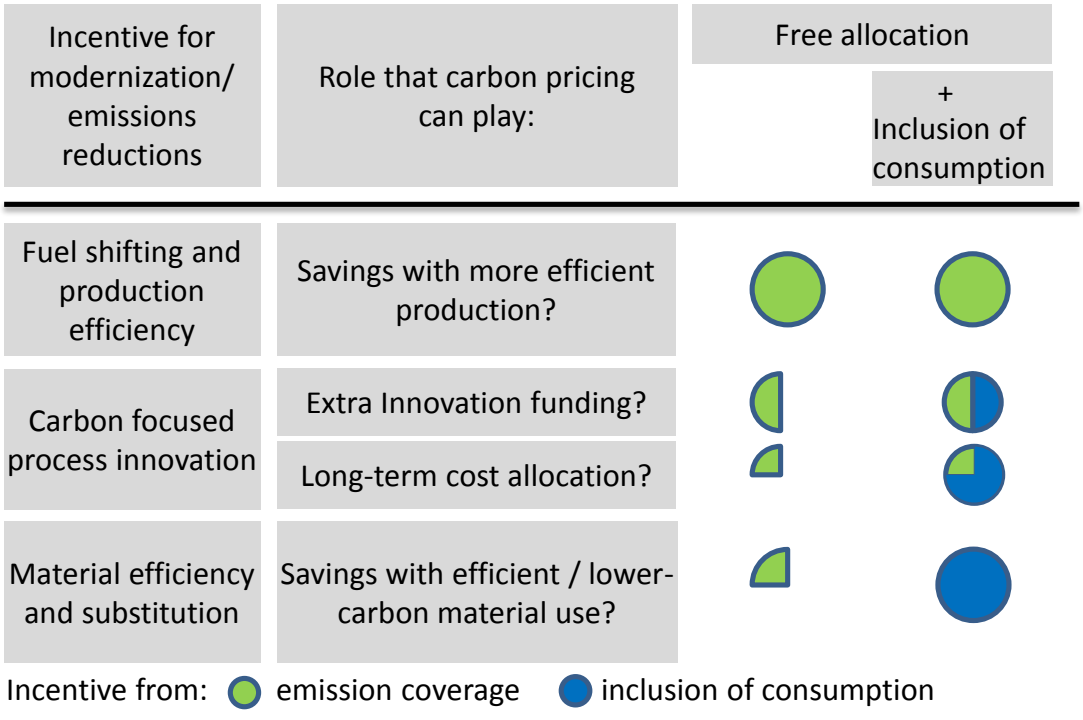
If the carbon price in the value chain is muted, so are the incentives for the uptake of the mitigation and modernization potentials available to these sectors - breakthrough technologies, efficient use of materials, and lower carbon alternatives.

3. Inclusion of Consumption restores the carbon price

Inclusion of Consumption (IoC) restores the carbon price for materials along the value chain, complementing the up-stream coverage of installations in emissions trading.

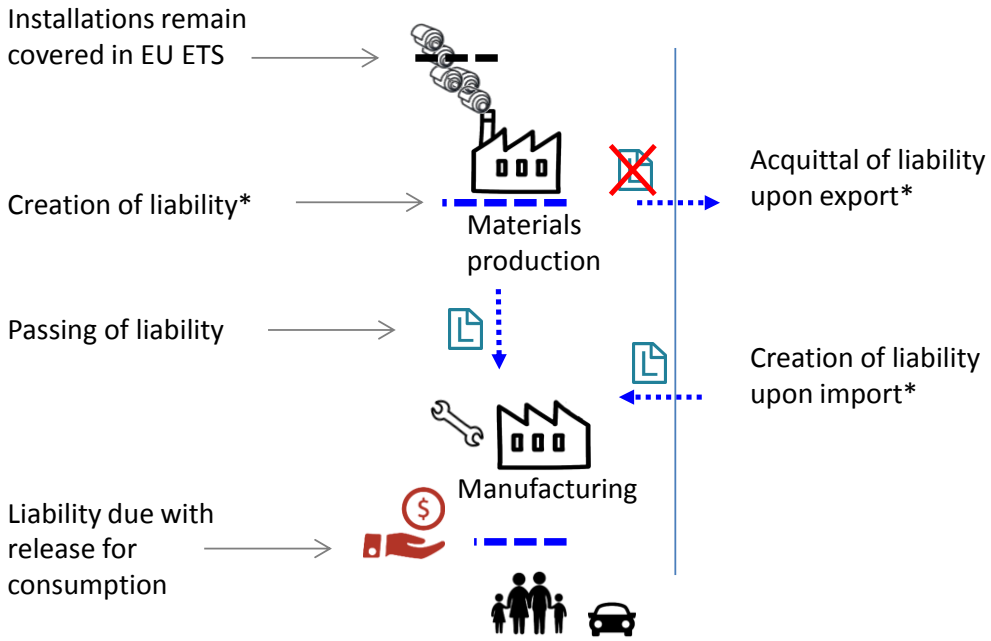
A charge is added on the consumption of carbon intensive materials corresponding to emissions from an additional unit of primary production of the material. It restores the carbon price signal along the value chain to incentivize efficiency and substitution to higher value and lower carbon materials. The charge is gathered in national trust funds, providing for resources of sufficient scale for public co-funding for technology demonstration and early commercialization. As materials bear the incremental cost of carbon or mitigation action, market participants can see a long-term business case for product and process innovation with incremental costs.

In parallel, material producers remain liable to surrender allowances under emission trading schemes to match their verified emissions. Firms of materials covered by IoC receive free allowances at the volume as if they had used best available technology for the production, for leakage protection. Thus they only bear incremental costs corresponding to their inefficiency and incentives to enhance the efficiency.



4. Inclusion of Consumption builds on existing structures

Inclusion of Consumption builds on existing EU ETS structures. The coverage of installations included in the EU ETS is not altered.



* Based on weight of material times benchmark for material (e.g. steel, clinker)

With IoC, in addition to the EU ETS, a charge is added on the consumption of carbon intensive materials. This method has some predecessors. In China and Korea, where price regulation in the power sector mutes the pass-through of carbon costs to retail power prices, electricity consumers need to surrender allowances in proportion to average carbon intensity of power to restore the carbon price signal (Munnings et al., 2016). Europe also has extensive experience with consumption-based charges, such as excises on tobacco and alcohol. IoC has the following elements:

- A liability is created upon the production of carbon intensive commodities, e.g. at the time of the hot rolling of steel. This liability is then passed to products along the value chain.
- Firms can register with national authorities to receive, handle and dispatch products under duty suspension arrangements. Alternatively firms buy products free of liability.
- A product sold to a non-registered firm or to a consumer is *released for consumption.* The seller has to pay a charge into a national trust fund, to be used for climate action.
- The same liability to the charge is also created upon the import of carbon intensive products and would be acquitted upon their export. A de minimis rule limits administrative effort.

5. Inclusion of Consumption is based on benchmarks for basic materials

Since 2013, allowances in the EU ETS have been allocated based on benchmark values of direct and indirect (electricity related) emissions of top performing plants in Europe. Benchmarks have also become a key element of other emissions trading mechanisms. They would be the cornerstone for calculating the consumption charge, which would equal the product of the following three components:

- *the weight of the material*, which can be easily verified and is a good proxy for carbon intensity of primary production of carbon intensive materials;
- *the product-specific benchmark value* for primary production (as opposed to, for example, a benchmark for electric-arc furnaces that primarily used for recycling of steel), because additional material consumption triggers additional primary production; and
- *the price of EU ETS allowances*, which is already being calculated from allowance auctions, and could be updated on an annual basis to limit administrative efforts for companies.

The total sum raised from a consumption charge in Europe linked to the main carbon intensive materials that could be considered for IoC would be 17 Billion Euro per year at €30 /t CO2.

Material	Total production, EU28 2012, (Mt)	EU-ETS benchmarks tons of CO_2-eq/ ton of material)	Liability per ton (EUR)	Total liability created within EU28 (MEUR)
Steel	160	1.780	53	8500
Aluminum	3.6	12.82	385	1400
Plastics	57	1.5	45	2500
Paper	100	0.4	12	1200
Cement	170	0.69	21	3600
Sum				**17200**

Source: Pauliuk et al. (2016), assuming carbon intensity of continental European power generation for indirect emissions.

To limit administrative requirements, the mechanism will be focused on carbon intensive materials where full internalization of carbon costs has a significant impact on material prices. Materials that are close substitutes need to be jointly considered, for example steel, aluminum and cement competing in automotive and construction industry.

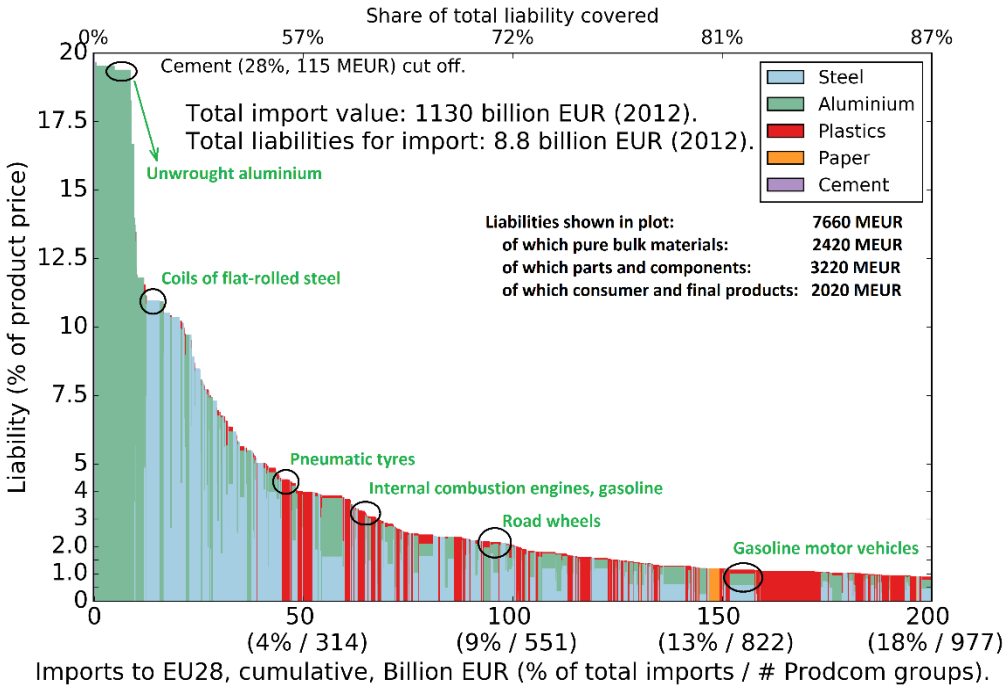
For materials covered by the inclusion of consumption, allocation to producers needs to be at the full benchmark of best available technology and linked to (recent) production volumes to avoid double charging. This clear economic requirement avoids political negotiations and provides long-term clarity. It can also guide differentiation of free allowance allocation to match sector needs.

6. Limiting number of involved firms reduces administrative effort

All producers of materials covered by inclusion of consumption have to report their production volumes and are liable for the associated consumption charge. They can either directly pay the charge or sell the product under duty suspension arrangements. The firms acquiring materials or products under duty suspension arrangements have to be authorized. They again can decide whether to pay the charge and sell their product free of liability or to sell it again under duty suspension arrangements.

Firms will handle materials and products under duty suspension arrangements if they – or their customers – will export the product, because at exportation the liability is acquitted without a payment. Firms can self-select whether or not register for duty suspension arrangements. Actors with small liabilities or with all consumers located within the territory, like the construction industry, are unlikely to acquire authorization.

Liability to the charge is also created when carbon intensive products are imported. To limit administrative efforts, this would not apply to about 3000 of the 4000 product categories of the Harmonized Commodity Description and Coding System (HS) with a small share of carbon costs relative to the product value. For the remaining imports, the importer has to report the weight components of the relevant materials. For bulk materials and most parts and components the weight is already reported to customs authorities. They comprise the majority of liability that needs to be covered.



The bulk of liabilities created during importation is concentrated in a few hundred commodity groups, about half of which are pure bulk materials like unwrought aluminum or coils of flat-rolled steel. The constitution and total liability acquitted at exportation is similar to this picture for imports.

Source: Pauliuk et al. (2016).

7. Low fraud vulnerability allows for simplified administration

Administrative costs are to a large extent a function of the risk of fraud and the implications this has for the stringency of reporting and compliance mechanisms.

With inclusion of consumption, vulnerability to fraud is low for the following reasons: First, for the majority of products, the consumption charge constitutes a small fraction of the value of the product compared to VAT or other consumption charges. Having small potential gains limits the incentives for fraud (Delipalla, 2009). Second, the transport costs of products covered by the scheme are high, as carbon intensive goods such as steel and cement are heavy commodities. Perpetrating fraud by means involving transport across national borders is thus costly and leads to a high risk of getting caught (Delipalla, 2009). Third, IoC does not provide any cash reimbursements and thus is not prone to so-called 'carousel fraud', unlike the VAT (Keen and Smith, 2006; Keen, 2007, Crawford et al., 2010). Fourth, the charge imposed is identical across EU Member States, avoiding incentives for nominating products for consumption in a country with low CO2 prices (Crawford et al., 2010).

IoC compliance mechanisms can therefore be simplified compared to excise and VAT laws (Ismer et al., 2016). For monitoring and verification, quarterly reporting of liabilities created, held, received and acquitted can suffice, instead of transaction-based reporting. Companies can use documents and processes that are already in place for business and tax purposes, such as balance sheets, inventory or commercial documents related to the sale of products (e.g. invoice and delivery notes). The competent authority can then verify the data supplied by the companies and conduct audits if discrepancies are detected.

Import and export reporting requirements can be embedded into existing customs declaration procedures. In the course of their customs declarations, importers would have to report the weight of carbon intensive commodities to customs authorities. Import by an authorized actor would suspend the payment of the charge. Unauthorized actors, in contrast, would have to pay the charge immediately upon import.

The combined administrative costs for public and private actors would likely remain below 5% of the levied consumption charge. Reporting arrangements and functioning are similar to excise and VAT, for which administrative costs do not exceed this limit (KPMG, 2006; HM Revenue & Customs, 2011, 2013, 2014 and 2015). As reporting and monitoring requirements of the IoC can be incorporated into existing reporting structures, synergy effects may further limit administrative costs..

8. Inclusion of Consumption is on the good side of WTO Law

IoC is on the good side of WTO law, because there materials consumed within one territory are treated equally if domestically produced or imported. The same charge is also applied irrespective of the production process employed.

Thus, it follows the principles of the World Trade Organization (WTO) and its body of law, in particular the national treatment requirement under Art. III:1 and 2 of the General Agreement on Tariffs and Trade (GATT). According to this principle, imported products may not be subject to internal taxes or other internal charges in excess of those applied directly or indirectly to equivalent domestic products. Under the IoC, this is indeed the case for the following reasons. First, the charge addresses all carbon intensive commodities consumed within one specific territory. The consumption charge is not differentiated by the country where the material was produced but is equally applied on all products consumed within one territory (principle of taxation in the country of destination). Second, the charge imposed does not distinguish among production methods, as it is independent of a specific carbon footprint but calculated according to a product-specific carbon benchmark and the weight of carbon intensive products incorporated. Thus, domestically produced and imported "like" products are treated equally and both deliver incentives for low-carbon materials and efficient material use in all products served to domestic consumers. The system does not create direct incentives for enhanced carbon efficiency of material production in foreign territory. This would be incompatible with the concept of a consumption charge and remains in the liability of respective governments.

At the same time, WTO law limits the use of revenue generated by the IoC charge. If not used for climate action or innovation funding, but merely distributed among domestic producers of carbon intensive commodities it would most likely qualify as an actionable subsidy under the Agreement on Subsidies and Countervailing Measures.

9. Inclusion of Consumption is an Environmental Regulation

Inclusion of Consumption is an environmental regulation in the context of the EU, because it constitutes an integral part of the EU ETS for the following reasons (Ismer and Haussner, 2015). First, it establishes a pass-through of carbon costs to deliver a price signal along the value chain. This price signal is necessary to restore mitigation opportunities that are lost under free allocation of allowances. Although a pass-through of carbon costs is not the primary purpose of the EU ETS, it is "consistent with the logic of the market mechanism of EU ETS" that "is intended to put a price on environmental pollution so that those costs are included in the decision making of all relevant actors" (Kokott, 2011).

Second, the use of revenue collected for climate change mitigation restores the revenue lost by free allocation that would otherwise be (partially) employed for climate mitigation according to the EU ETS directive. It thus alleviates current climate funding problems.

Third, the current EU ETS directive provides for the possibility to include imports of carbon intensive products into the EU ETS, e.g. by requiring importers to acquire and retire emissions allowances for carbon imports. This possibility would be implemented by the IoC, as parts of the revenue are used to acquire and retire emission allowances at the auction platform, but in a WTO compliant and non-discriminatory way.

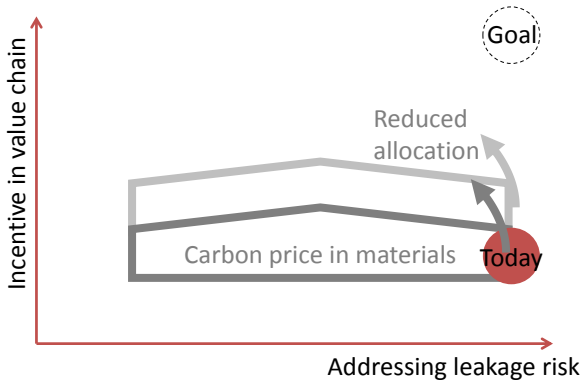
Fourth, the IoC is technically linked to the EU ETS, as the charge imposed is calculated according to the benchmarks used for free allocation and on its recent carbon price. The level of the charge is thus determined by the market mechanism of EU ETS.

Summarizing, the above points imply that the IoC qualifies as integral part of the EU ETS and thus as environmental regulation, and not as a "provision primarily of a fiscal nature" according to Art. 192(2)(a) TFEU. Just like the EU ETS directive itself, the IoC can be implemented with qualified majority voting in the EU Council according to Art. 192(1) TFEU.

10. Inclusion of Consumption offers a new path to effective carbon pricing

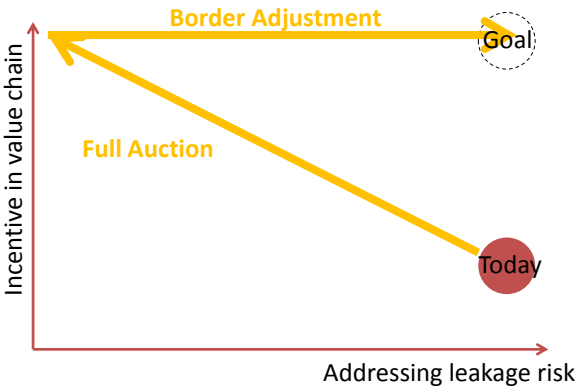
Three pathways can be envisaged to combine leakage protection and full incentives:

First, as carbon pricing becomes more widespread, gradually reducing allocation volumes is one option to make the carbon price more effective along the value chain.

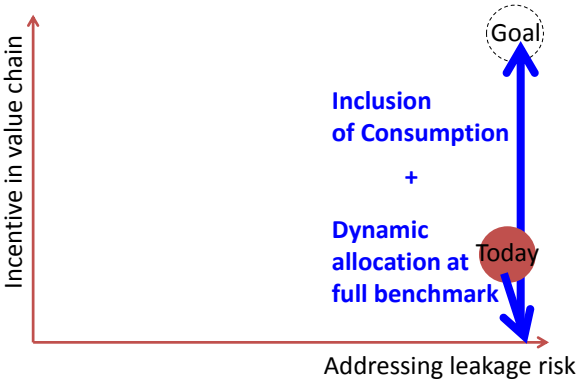


If implemented across regions, the level of carbon price reflected in globally traded commodities would increase, allowing for a further reduction of free allocation. Yet experience to date suggests that allocation volumes remain high and thus the effect of the carbon price on the value chain of materials sectors remains low.

Second, free allowance allocation could be replaced by auctioning and combined with border adjustments as leakage protection. This approach would in principle allow for the full carbon price to act along the value chain within countries. However, to the extent that free allowance allocation is continued, such an approach does not improve incentives in the value chain, since imports would have to be afforded similar allocations as well (Cosbey et al, 2012). A further challenge relates to the politics and potential international repercussions of border adjustment.



Third, for selected materials, free allowance could be allocated based on recent production volumes and at the full benchmark level, supplemented with a consumption charge at the benchmark for the primary production process. The carbon price signal in the value chain would thereby be re-instated. Consumption charges are not considered to be trade-related measures, and they provide an effective internalization of carbon externality to incentivize all mitigation opportunities.



11. Conclusion

The European analysis on carbon leakage protection has focused on free allowance allocation to mitigate cost impacts and border related measures to adjust for cost differences (e.g. Grubb and Neuhoff, 2006). The third option, that combines free allocation with inclusion of consumption has received relatively less attention since introduced in 2014 (Kim, 2014; Climate Strategies 2014a; Böhringer et al, 2015). However, it is gaining more ground in the debate as border related measures are being largely disregarded as a viable way forward due to potential implications on climate and trade.

The first option, to use free allowance allocation for carbon leakage protection is in principle easy. However, it mutes the carbon price signal for the majority of mitigation, innovation, and investment opportunities. Therefore free allowance allocation has to be limited to retain some carbon price pass through from efficient installations in contribute to iterative increase the carbon price signal in different regions. However, the EU ETS experience during the first three phases has shown that designing free allocation involves multiple design choices that trigger large scale industry and political lobbying and over-complicates the ETS.

Inclusion of Consumption of selected carbon intensive materials in emission trading avoids complexity and provides a consistent solution from a governance, business, and environmental perspective. For materials covered by the consumption charge, allocation to installations needs to be at the full benchmark level and linked to recent production volumes to avoid double charging and wind-fall profits. Thus Inclusion of Consumption offers early and long term clarity on allocation volumes for industry, and a transparent criterion for differentiation of free allowance allocation volumes. This eliminates regulatory uncertainty for business and makes the full carbon price relevant for all corporate choices thus reducing complexity. From an environmental effectiveness perspective, this option provides robust carbon leakage protection and this opens the space for constructive discussions on decarbonization pathways and the necessary stringency of the scheme.

This study explored the economic implications for different products and value chains and analyzed the relevant international experience. In cooperation with industry, administrative processes were aligned with existing public and private sector processes to limit the administrative cost. Legal analysis confirmed viability under WTO and EU environmental regulation (Ismer and Haussner, 2015). Projects workshops on IoC in EU, China and Korea helped to identify questions and allowed for testing of results with academics, public and private stakeholders. We found that IoC is a viable approach for effective carbon pricing in a post Paris world.

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Complementing project deliverables

Work Package 1 – Report on the Pulp and Paper Sector

Roth, S., L. Zetterberg, W. AcWorth, H-L Kangas, K. Neuhoff and V. Zipperer (2016). "The Pulp and Paper Report - Sector analysis for the Climate Strategies Project on Inclusion of Consumption in Carbon Pricing", Climate Strategies Overview Paper, May 2016.

Work Package 2 – Quantification of the carbon content in different trade categories

Pauliuk, S., K. Neuhoff, A. Owen and R. Wood (2016). Quantifying Impacts of Consumption Based Charge for Carbon Intensive Materials on Products. DIW Discussion Paper 1570.

Work Package 3 – International Comparison of Carbon Pricing Mechanisms

Munnings, C., Y. G. Kim, O. Sartor, K. Neuhoff, and W. Acworth (2016). "Experience with Pricing Carbon Consumption", RFF Discussion Paper (f*orthcoming*).

Work Package 4 – Administrative implications of IoC

Ismer, R., M. Haussner, K. Neuhoff, W. AcWorth (2016). Inclusion of Consumption into Emissions Trading Systems: Legal Design and Practical Administration. Climate Strategies Overview Paper, May 2016

Work Package 5 – Legal Analysis in the context of EU Law

Ismer, R., & Haussner, M. (2015). "Inclusion of Consumption into the EU ETS: The Legal Basis under European Union Law". *Review of European, Comparative & International Environmental Law*.

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