

EU carbon border tariff could lead to increased carbon leakage



The European Union's latest agreement on a carbon border tariff is targeting the emissions-intensive materials and energy sectors. But direct shipping of materials contributes only a small share to domestic production while the EU imports a large amount of embodied carbon in non-carbon-taxed manufactured products, especially from China. The tax could actually increase carbon leakage rather than incentivise more domestic production.

This report puts forward two implications regarding the discussion on global carbon tax schemes and climate clubs:

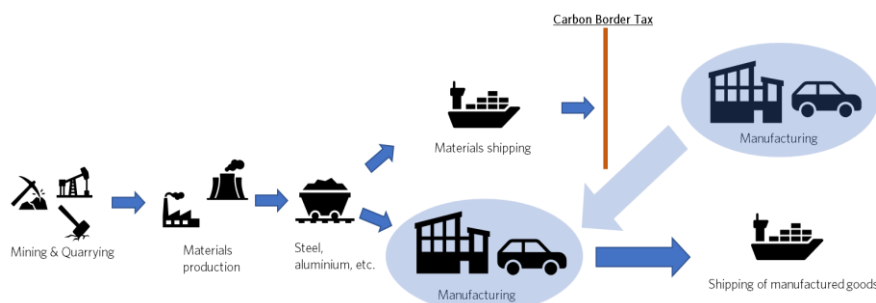
- 1) Materials production shows a strong downstream bias i.e. it is rarely disentangled geographically from further use in downstream production, for example in construction or manufacturing.
- 2) Production and export dynamics in the United States, China and the EU-27 between 2008 and 2018 largely reflect shifts in manufacturing activities towards China.

Selective taxation risks carbon leakage

Direct imports of materials such as cement, steel or aluminium remain small relative to total production value in the EU. But the bloc envisages a continuous increase of manufactured imports. For example, European carmakers plan to produce significantly more cars in China for the European market in forthcoming years. BMW and BASF opened new plants in China in 2022, for example. The German automotive industry alone holds a stock of direct investments of EUR 90bn in the country¹. This compares with EUR 5bn of exported basic metals by China to the whole of the EU (2018 data) while other exported goods and services containing Chinese basic metals amounted to more than EUR 30bn.

Selectively taxing imported materials is unlikely to contribute to lower emissions and may even lead to higher global emissions unless the tax is expanded to other sectors. To illustrate this point, the carbon emissions of basic metal producers in German production (scope 1+2) of around 650g of carbon per euro of production value compare with around 1.6kg of carbon per euro of production value in China. Relocating metals production and downstream processing from Germany to China could thus increase global carbon emissions while simultaneously leading to a loss of downstream economic activity within the EU.

Figure 1: Relocation of manufacturing to avoid carbon taxation



Source: Scope ESG Analysis GmbH

Head of ESG

Bernhard Bartels
+49 696677 38919
b.bartels@scopeesg.com

Analyst

Arne Platteau
+49 696 67738-951
a.platteau@scopeesg.com

Media

Keith Mullin
k.mullin@scopegroup.com

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Scope ESG Analysis GmbH

Lennéstraße 5
10785 Berlin

Phone +49 30 27891 0
Fax +49 30 27891 100

esg@scopegroup.eu
www.scopegroup.com

[in](#) [tw](#) Bloomberg: SCOP

¹ Annual Report VDA Germany (2022): <https://bit.ly/3V7TU0d>.

Non-metallic minerals production requires local plants for construction activity

Limited global trade of basic metals but higher flexibility on production location

Difference in carbon price could lead to materials relocation despite carbon tariff

The downstream bias of materials production

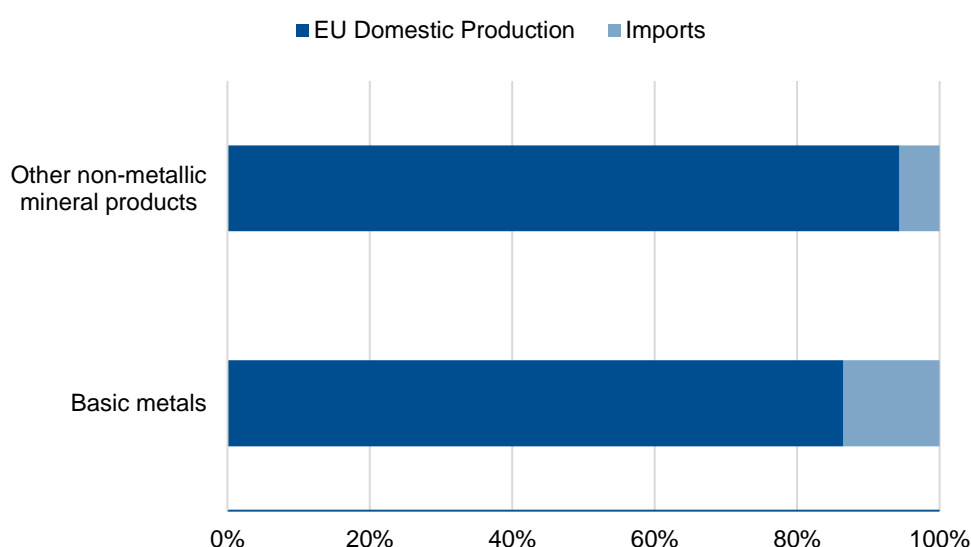
OECD input-output data² reveal that a large portion of value-added from materials production (non-metallic minerals and basic metals) in countries outside the EU is included in other categories of exported goods, including manufacturing, while only small production values are exported directly.

Cement and concrete production is a typical example of rarely-traded goods given its heavy weight and required proximity to final use in local construction. Accordingly, large European cement producers like Heidelberg Materials, Saint-Gobain or Holcim are unlikely to shift production to other regions, irrespective of tax regimes. The OECD's input-output tables confirm the limited tradability of non-metallic minerals: 94% of domestic production is within the EU. Since minerals are mostly used for buildings and infrastructure, there is limited scope for subsequent trade of minerals embodied in final goods.

Basic metals sectors is a different story. First, steel and aluminium have lower trade costs than cement given their different weights. Second, and more importantly, basic metals serve as inputs for manufacturing, electronics, and household appliances. These sectors are highly trade-intensive compared to the materials industry. With 14% of total value, the import of basic metals into the European Union accounts for a minor share of total production and thus provides a limited tax base for carbon tariffs. Thus, instead of being traded, the materials industry is more likely to relocate entire production.

The EU faces a small tax base for the import of materials (**Figure 2**). Moreover, the bloc may see some of the domestic materials and manufacturing industry relocate without being able to tax re-imported values if these are shipped to the EU as final products. In this case, EU domestic production of materials could relocate to jurisdictions with similarly attractive conditions for subsequent downstream sectors, such as automotive and electronics.

Figure 2: Downstream bias of materials production



Sources: OECD input-output tables, Scope ESG Analysis GmbH

² OECD (2021), OECD Inter-Country Input-Output Database, <http://oe.cd/icio>

China doubles manufactured exports between 2008-18

Basic metal production most relevant for domestic downstream production

Downstream processing of materials increases Chinese exports of manufactured products

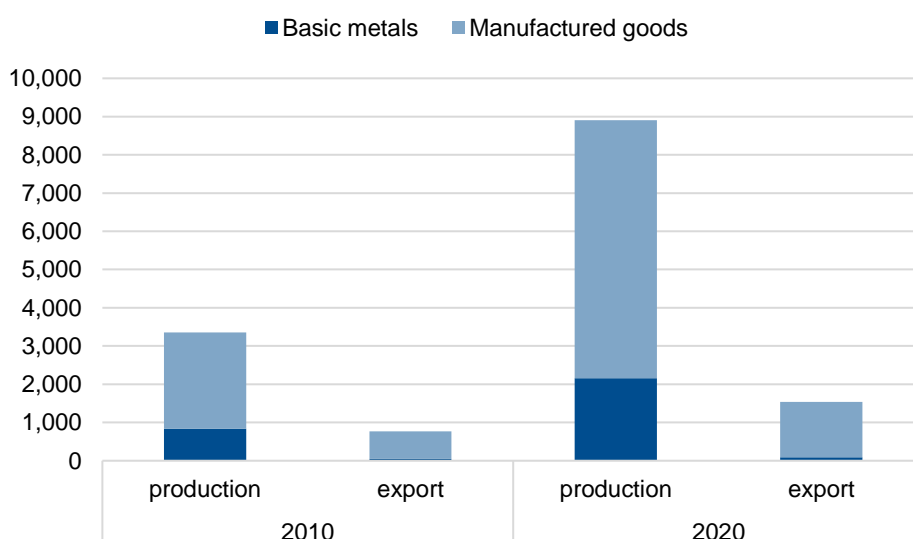
Dynamics of materials and manufacturing production and trade

The growth of absolute production values in materials and manufactured goods³ confirms the fact that Europe and the United States have faced a substantial loss in export markets to China over the past decade. While basic metals comprise a minor share of production and exports, China's manufactured exports almost doubled between 2010 and 2020 and crossed the EUR 1trn threshold.

Figure 3 illustrates the importance of materials for domestic production rather than exports: The relative importance of basic metals in domestic production remained relatively stable between 2010 and 2020, reducing from 33% to 32% relative to manufactured production. while the importance of metals exports shrank from 6% to 4% relative to domestic metals production over the same period. China's growth path from the world's work bench towards a producer of manufactured technology allows the country to export high-margin products based on relatively cheap materials.

Figure 3: China's metal and manufacturing production and exports 2010-20

in EUR m.

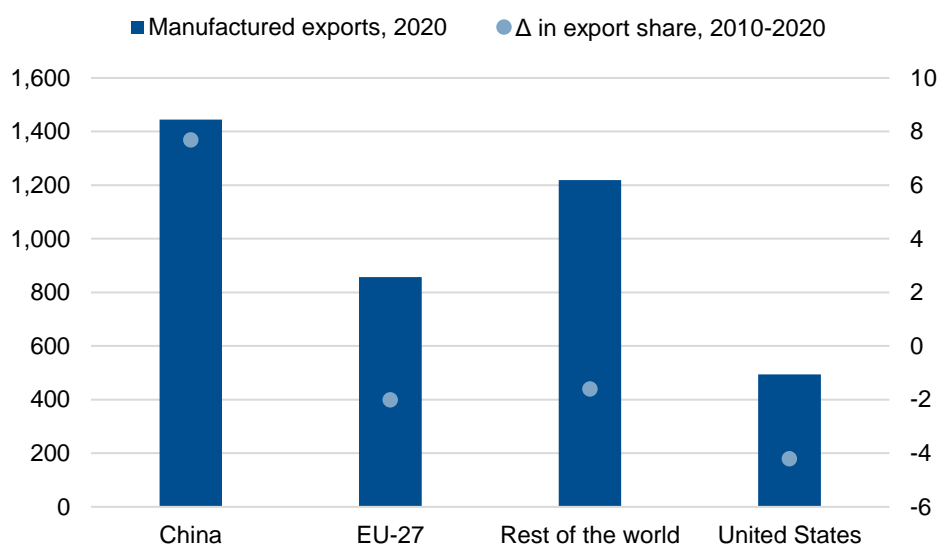


Sources: Eurostat, Scope ESG Analysis GmbH

Over the same period, China's share of global exports of manufactured goods increased by 8 percentage points (to 28% in 2020) while decreasing by 4 percentage points in the United States (to 12%) and by 2 percentage points in Europe (to 21%). China has become the world's leading manufactured exporter in both absolute and relative terms. Concurrently, basic metal exports have remained small and stable across the three regions. This reflects the increasing downstream processing of materials before shipping to final destinations. Hence, the selective introduction of tariff regimes for sectors with high downstream integration remain ineffective if subsequent production sectors can choose their production location flexibly and if they are exempted from the tax.

³This includes value added from the following OECD sectors: fabricated metals, computer, electronic and optical equipment, electrical equipment, machinery and equipment, motor vehicles, trailers, and other transport equipment, automotive production, fabricated metals and machinery and equipment, and other manufacturing.

Figure 4: Change in global export shares for manufactured products, 2010-2020
in EUR m. (l.h.s.), in ppts. (r.h.s.)



Sources: Eurostat, Scope ESG Analysis GmbH

Conclusion: Widening the scope of carbon taxation tied to CSRD reporting

Tax extension to more sectors required but a complex challenge

In many cases, imported goods have made a long journey from sourced inputs to processing and manufacturing, which involves different countries and emissions intensities according to production step. While the origin and quantity of carbon in imported materials such as steel or cement can be identified relatively easily, this becomes increasingly complex for manufactured products such as computers and electronics. We therefore expect that the European Commission will face more calls for the carbon tax to be expanded. Identifying the origins of embodied carbon could become part of the new Corporate Sustainability Reporting Directive (CSRD), which requires European corporates to report on supply-chain exposures after 2024.



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Scope SE & Co. KGaA

Lennéstraße 5
D-10785 Berlin
info@scopegroup.com

Scope ESG Analysis GmbH

Lennéstraße 5
D-10785 Berlin
esg@scopegroup.eu

Scope Analysis GmbH

Lennéstraße 5
D-10785 Berlin
info@scopeanalysis.com

Scope Investor Services GmbH

Lennéstraße 5
D-10785 Berlin
info@scopeinvestors.com

Scope Ratings GmbH

Lennéstraße 5
D-10785 Berlin
info@scoperatings.com

Scope Ratings UK Limited

52 Grosvenor Gardens
London SW1W 0AU
info@scoperatings.com

www.scopegroup.com
www.scopeanalysis.com
www.scoperatings.com
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