

Climate Change, Developing Countries and Trade

How to leverage the EU's Carbon Border Adjustment Mechanism to incentivize decarbonization investments in developing countries

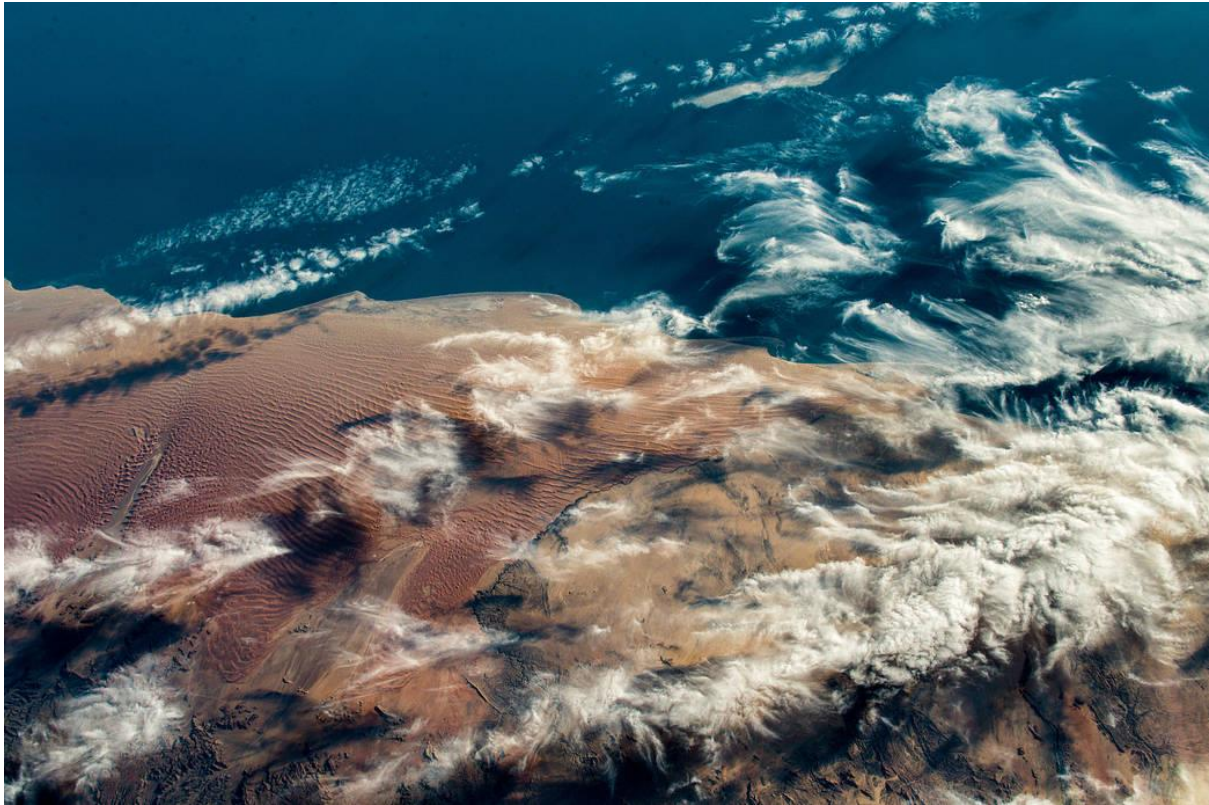


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MPA/ID Second Year Policy Analysis

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Table of Contents

ACKNOWLEDGEMENT	1
EXECUTIVE SUMMARY.....	3
1. MOTIVATION.....	4
<i>a. From international agreements to the EU's recently proposed 'CBAM'.....</i>	<i>4</i>
<i>b. The challenge of engaging developing countries in the fight against climate change.....</i>	<i>9</i>
<i>c. The importance of trade for developing countries.....</i>	<i>10</i>
2. POLICY CHALLENGE	11
3. POLICY PROPOSAL	15
<i>a. Principles.....</i>	<i>15</i>
<i>b. Proposed CBAM-treatment for developing countries</i>	<i>16</i>
<i>c. Implementation proposal.....</i>	<i>24</i>
<i>i. The case of aluminum: Mozambique</i>	<i>26</i>
<i>ii. The case of iron & steel: Ukraine.....</i>	<i>29</i>
4. THEORY OF CHANGE	32
<i>a. Building legitimacy and functionality.....</i>	<i>32</i>
<i>b. Fostering endogenous change.....</i>	<i>34</i>
5. FEASIBILITY CONSIDERATIONS	35
<i>a. Key political actors.....</i>	<i>35</i>
<i>b. Technical and administrative feasibility.....</i>	<i>36</i>
<i>c. Second best options</i>	<i>37</i>
6. CONCLUSION.....	39
7. REFERENCES.....	39
8. APPENDIX.....	43
<i>a. Literature review</i>	<i>43</i>
<i>b. Carbon pricing dashboard.....</i>	<i>47</i>
<i>c. Climate finance from developed to developing countries (OECD, 2018).....</i>	<i>47</i>
<i>d. CBAM and EU ETS complementarity.....</i>	<i>49</i>
<i>e. Potential other sectors to be covered by the CBAM in the future</i>	<i>50</i>
<i>f. Main exporters of iron & steel to the EU-27 (2019).....</i>	<i>51</i>
<i>g. Main exporters of aluminum to the EU-27 (2019).....</i>	<i>51</i>
<i>h. Main exporters of fertilizers to the EU-27 (2019).....</i>	<i>52</i>
<i>i. Main exporters of cement to the EU-27 (2019).....</i>	<i>52</i>
<i>j. Empirical evidence of the “environmental Kuznet curve”</i>	<i>53</i>
<i>k. Carbon emissions vs carbon consumption.....</i>	<i>55</i>
<i>l. Ozone treaties institutional framework</i>	<i>56</i>
<i>m. Social Cost of Carbon (SCC) calculations</i>	<i>57</i>

Executive Summary

The European Union is set to introduce a WTO-compatible Carbon Border Adjustment Mechanism ('CBAM') in 2025. As a result, the CBAM will make importers of five key commodities (iron & steel, cement, aluminum, fertilizers, and electricity) to pay for their carbon content in the same manner as domestic producers are subject to the European carbon market.

The current treatment of developing countries under the CBAM is ambiguous. While the current legislative proposal does not consider any difference in treatment for developing countries, it indicates the EU's willingness to "*work with low and middle-income countries towards the decarbonization of their manufacturing industries*". However, the text does not provide any indication on the form such support could take. This lack of support is already being challenged by the "*common but differentiated responsibilities*" principle of international environmental law.

This report seeks to propose an institutional arrangement to best leverage the CBAM to create decarbonization incentives in developing countries, one of the biggest challenges of international climate policy. A cooperative treatment for developing countries is crucial to minimize opposition against the CBAM implementation, given that over 80% of the imports to be covered by the CBAM will come from low- and middle-income countries. The objective is therefore to find the right balance between creating decarbonization incentives for developing countries while avoiding hurting their exports and growth trajectory.

The proposal is to develop the concept of "Bilateral Climate Deals" (BCDs) between the EU and developing countries, that would represent a transition period during which the proceeds to be paid by the developing country under the CBAM would be redirected to green investments in the country, in exchange of binding, time-targeted and measurable climate commitments. Such transition period, coupled to technical and financial support, aims to help build capacity in the developing countries to reinforce their decarbonization policies and incentivize green investments before being fully subject to the CBAM.

It is recommended to start the framework of BCDs with the countries to be most impacted by the CBAM, as those would have more incentives to collaborate, and will allow to create successful precedents. Countries such as Mozambique (aluminum exports) and Ukraine (iron & steel) would be appropriate candidates, being the low-income country and the lower-middle income country most affected by the CBAM.

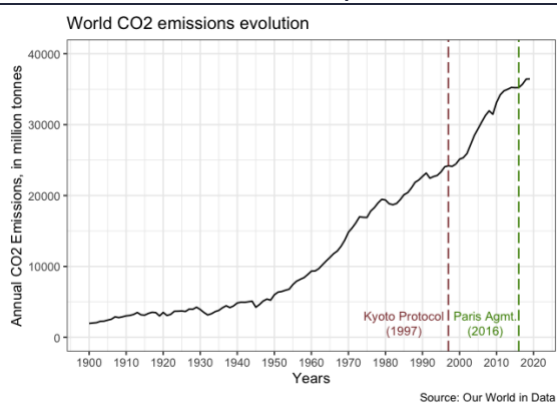
Estimations of the size of BCD transfers in both countries forcefully show that the BCD mechanism provides a powerful incentive to decarbonize given its sizeable financial impact. At the same time, investing these proceeds into decarbonization could yield drastic reductions in carbon emissions.

1. Motivation

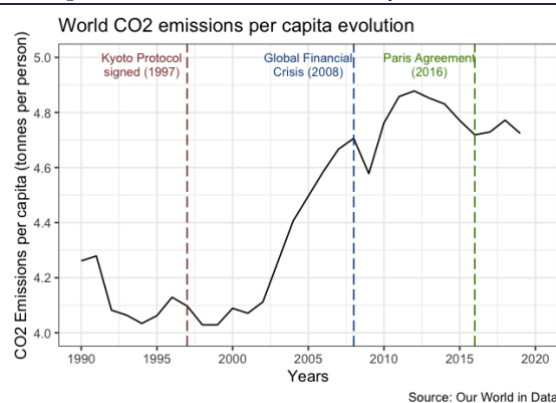
- a. From international agreements to the EU's recently proposed 'CBAM'

Multilateral efforts to reduce global greenhouse emissions are not delivering enough results. Since the 1990s, when global attention started to focus on the problem of climate change, the level of annual emissions has increased by more than 60%. Even per capita emissions have increased by a little more than 10%.

World emissions have increased by 60% since 1990



Per capita emissions have increased by 10% since 1990



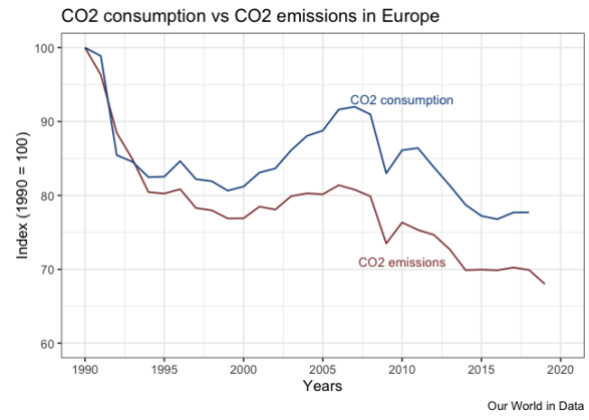
In this context, several regions of the world have introduced unilateral climate objectives, along with carbon pricing mechanisms. However, those steps have only been applied by a minority of regions. According to the World Bank, as of 2021, carbon pricing mechanisms only cover 21.5% of global GHG emission (refer to appendix B for more details). Even worse, only 3.76% of emissions are covered by a carbon price above USD 40 /tCO₂e, the bottom range of 2020 prices recommended to be Paris compliant (World Bank, 2021).

However, in the absence of a global price on carbon emissions (or carbon border mechanisms), unilateral climate efforts are doomed to accelerate 'carbon leakage' dynamics – i.e. moving production outside of regions with carbon pricing schemes towards countries with laxer climate policies (that find themselves at a competitive advantage). As a result, domestic production is replaced by cheaper and more polluting imported goods, while world carbon emissions increase (Kortum and Weisbach, 2017).

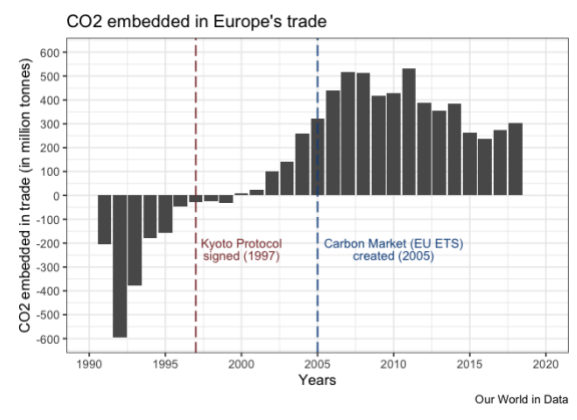
This 'offshoring of emissions' trend is already alive and well. The case of Europe illustrates this phenomenon well. While the European continent has managed to reduce its carbon emissions by c.30% between 1990 and 2018 (measured as the level of annual production-based emissions of

carbon dioxide), its “carbon consumption” has not decreased by as much. Around one third of the reduction of geographically production-based emissions has been offset by carbon embedded in trade: **Europe has moved from being a net exporter to a net importer of carbon content embedded in trade.**

Slower reduction of CO₂ consumption



CO₂ emissions embedded in trade



Going forward, the risk of carbon leakage is expected to intensify as the price of carbon emission in Europe raises on the back of more ambitious climate targets. Indeed, to meet its objective of climate neutrality by 2050, the EU will need to make significant de-carbonization efforts. As a result, the carbon price paid by domestic producers under the EU ETS is expected to significantly increase, likely well beyond the current price of €88 per ton of carbon (as of end-February, 2022).

EU Emissions Trade Scheme, allowances price



Source: EEX, EU primary auction spot data (latest price February 24, 2022)

To overcome the failure of unilateral and global (voluntary) efforts to control carbon emissions, the EU has made a legislative proposal to introduce a Carbon Border Adjustment Mechanism (CBAM). The objective of the CBAM is to ensure that imports reflect their carbon content in the same manner as domestic producers are subject to the EU Emissions Trading Scheme (ETS) – ie. the same price for carbon emissions will be applied, and only sectors covered by the EU ETS will be targeted. The CBAM has been designed to have a clear environmental objective. As such, it provides two clear decarbonization incentives for third parties (Garicano, 2021):

- **‘Macro-level’ incentives:** the CBAM would avoid importers pay twice for the carbon content embedded in their products, hence it would take into consideration existing carbon pricing measures in foreign countries. It therefore creates an incentive for foreign countries to introduce carbon pricing policies.
- **‘Micro-level’ incentives:** the CBAM would also allow importers to demonstrate their real carbon emissions level (if they were to be more efficient than carbon intensity benchmarks), as a result it provides incentives for foreign producers to decarbonize at production plant level.

A properly designed CBAM could allow to move towards the development of “Climate Clubs”. Clubs are mechanisms for the provision of public goods in which members pay their dues and they can exclude non-members. Specifically, in this case, the idea is for members of the “climate club” to incur costs, in the form of investments in climate abatement, and to penalize non-members through “fees” to export to the club (Nordhaus, 2015). Such fees could be the CBAM. Through the introduction of these carbon border adjustment mechanisms, one can envision an end-state in which the number of members of such club is sufficiently large, and the fees sufficiently high, that all have an incentive to contribute to carbon abatement and “join the club”. Consequently, the CBAM could be a first step into the establishment of a “*new global order*” for international climate policy (Rodrik and Walt, 2021).

Box 1: The EU Carbon Border Adjustment Mechanism (CBAM) legislative proposal

EU Commission legislative proposal to establish a carbon border adjustment mechanism was published in July 2021 (European Commission, 2021), laying down the following characteristics:

Mechanism: EU importers will have to declare annually the quantity of goods and the amount of embedded emissions in the total goods they imported into the EU in the preceding year, and surrender the corresponding amount of CBAM certificates. The price of CBAM certificates will mirror the price of the EU Emissions Trading Scheme.

Timing: A transition phase without financial adjustments will be put in place between 2023 and 2025, with the objective of facilitating a smooth roll out of the CBAM and minimizing any potential disruptive impact on trade. Importers will only start paying for their CBAM certificates in January 2026.

Sectors to be covered: While the ultimate objective of the CBAM will be a broad sector coverage (mirroring the sectors covered by the EU ETS), the EU Commission has considered to start the roll out of the CBAM covering only a few sectors, so as to improve its administrative feasibility. As such, sectors where emissions are the highest in absolute numbers and that are highly exposed to carbon leakage have been prioritized. The CBAM will therefore start covering the 5 following sectors: **(i) cement, (ii) iron & steel, (iii) aluminum, (iv) fertilizers and (v) electricity.**

Additional sectors could be added to the CBAM scope in the future once the administrative feasibility of the CBAM is prove. Potential sectors to be included are ceramics, paper, refined products, chemicals, and glass (please refer to appendix E for more details).

Current considerations on developing countries: “As the CBAM aims to encourage cleaner production processes, the EU stands ready to work with low and middle-income countries towards the decarbonization of their manufacturing industries. Moreover, the Union should support less developed countries with the necessary technical assistance in order to facilitate their adaptation to the new obligations established by this regulation” (European Commission, 2021).

The table below provides the list of the 30 countries which exports to the EU will be more impacted by the CBAM.

Top 30 countries most impacted by the CBAM

Exports to the EU to be covered by the CBAM, in USD million (2019 values – pre-Covid shock)

Country	Income group	Iron & Steel	Aluminum	Fertilizer	Electricity	Cement	Total
China	upper-middle-income	15 064	4 247	75	0	10	19 396
Russia	upper-middle-income	5 905	2 846	1 700	687	0	11 138
Turkey	upper-middle-income	7 441	1 773	95	63	128	9 501
India	lower-middle income	4 082	527	10	0	2	4 620
USA	high-income	3 446	1 035	96	0	2	4 579
Rep. of Korea	high-income	3 970	320	0	0	0	4 291
Ukraine	lower-middle income	3 819	26	53	363	27	4 288
Serbia	upper-middle-income	1 049	293	93	536	2	1 973
Brazil	upper-middle-income	1 836	16	4	0	0	1 856
UAE	high-income	272	1 501	1	0	0	1 773
South Africa	upper-middle-income	1 073	473	2	0	1	1 548
Japan	high-income	1 297	100	3	0	6	1 406
Belarus	upper-middle-income	710	41	514	43	25	1 334
Egypt	lower-middle income	231	380	545	0	6	1 163
Vietnam	lower-middle income	1 080	58	4	0	11	1 153
Mozambique	low-income	1	1 093	0	0	0	1 093
Bosnia and H.	upper-middle-income	464	279	1	271	16	1 031
Canada	high-income	345	308	195	0	0	848
Malaysia	upper-middle-income	572	186	0	0	9	767
Morocco	lower-middle income	55	72	462	0	12	601
Indonesia	lower-middle income	563	20	0	0	0	583
N. Macedonia	upper-middle-income	380	11	0	129	0	520
Thailand	upper-middle-income	431	77	1	0	0	509
Bahrain	high-income	12	451	0	0	0	463
Israel	high-income	105	88	219	0	0	412
Tunisia	lower-middle income	264	64	67	0	11	406
Kazakhstan	upper-middle-income	136	234	1	0	0	371
Mexico	upper-middle-income	231	44	11	0	1	287
Algeria	lower-middle income	63	2	209	0	12	286
Saudi Arabia	high-income	33	179	3	0	8	222

Source: Author's calculation based on UN Comtrade Database [HS codes: iron & steel (72, 73), aluminum (76), fertilizer (31), electricity (2716) and cement (2523)] and World Bank 2022 countries classification by income.

Note: (i) The CBAM will not apply to goods originating in Iceland, Liechtenstein, Norway, and Switzerland as they are already connected to the EU Emissions Trading Scheme. As such, those countries have been excluded from the table above.

Note: (ii) For the current 2022 fiscal year, low-income economies are defined as those with a GNI per capita, calculated using the World Bank Atlas method, of \$1,045 or less in 2020; lower middle-income economies are those with a GNI per capita between \$1,046 and \$4,095; upper middle-income economies are those with a GNI per capita between \$4,096 and \$12,695; high-income economies are those with a GNI per capita of \$12,696 or more.

- b. The challenge of engaging developing countries in the fight against climate change

To successfully curb the increasing global trend in carbon emissions, collaboration between developed and developing regions will be key. As indicated by Hall et al. paper, despite developed countries efforts to enact domestic regulation to curb carbon emissions, “*growth in developing country emissions will easily thwart those goals unless a cooperative solution is found*”. Such collaboration will also be key to keep developing countries engaged with existing climate engagements, and therefore crucial to the global climate ambition.

However, engaging developing countries in the fight against climate change remains one of the most challenging aspects of international climate policy (Victor 2015). On one hand, developing countries cumulative contribution to carbon emissions is significantly low compared to high-income countries, accounting for just ~30% of total emissions in the atmosphere, while they represent ~85% of the world population. Hence the climate fairness claim of “*common but differentiated responsibilities*”. On the other hand, developing countries have become a large contributor of carbon emissions (accounting for ~62% of annual emissions in recent years) and are expected to represent the biggest source of emissions growth over the next decades (given their higher rates of GDP growth, population growth, stage of development, etc.).

Key emissions metrics depending on countries' income group

World share (%), 2018 values

Countries' income group	Share of population	Share of GDP	Cumulative CO ₂ emissions	2018 CO ₂ emissions (flow)	2018 CO ₂ consumption (flow)	Annual emissions growth rate
Low-income	8,3%	0,9%	0,6%	0,5%	0,2%	15,2%
Lower-middle income	42,9%	20,6%	10,2%	17,6%	16,5%	5,9%
Upper-middle-income	33,2%	32,2%	29,9%	44,6%	40,6%	1,7%
High-income	15,5%	46,3%	59,3%	37,3%	42,6%	0,6%

Source: Our World in Data and World Bank 2022 countries classification by income.

It is also important to acknowledge that developing countries face higher obstacles to reducing or limiting the growth of their emissions, given their lack of administrative and technological resources, and a greater priority on economic growth and development. The latter is better understood when considering the “*Environmental Kuznet Curve*”: the inverted U-shape pattern between income and environment damage. While it is just a rough generalization, the idea behind the concept is simple and straightforward: at early stages of economic development, growth is associated with a deterioration in the environment. However, passed a certain level of income,

further growth is associated with a decrease in emissions per capita. Please refer to appendix J for more details on the “*Environmental Kuznet Curve*”.

Finally, it is worth noting how small international commitments to help developing countries finance their green transition have been. For instance, the Adaptation Fund associated to the Kyoto Protocol has only committed US\$ 850 million since 2010, distributed among 100 countries. And, to date, the largest environmental fund has been the one associated to the Montreal Protocol, amounting to about US\$3 billion over the lifetime of the agreement.

While this seems surprising considering the above-mentioned concept of “differentiated responsibilities” and the inherent challenge of developing countries to limit the growth of their emissions, it seems to highlight **the issue of large funds for climate change adaptation: resources needed would be too large, and the management of the fund too complex and prone to disputes** (Victor, 2008).

Resources for climate change adaptation and mitigation are significantly larger when channeled through bilateral, non-dedicated multilateral or private instruments. As indicated in appendix C (OECD, 2018), Climate finance provided and mobilized by developed countries for developing countries totaled USD 78.9 billion in 2018, out of which 42% of the funds were public bilateral, 36% multilateral public and 19% private sector debt. The total mobilized amount remains below the UNFCCC goal of mobilizing USD 100 billion per year by 2020 to help developing countries tackle and adapt to climate change.

c. The importance of trade for developing countries

Trade is considered central to most developing countries economic growth. Developing countries that are open to international trade tend to grow faster (World Bank, 2018), thanks to higher productivity growth and innovation. Export-oriented industries have also a particular feature, and it is that they are not constrained by internal demand. As a result, they can expand without turning terms of trade against themselves.

Trade openness is highly correlated with poverty reduction. Trade is considered to especially benefit the poor, thanks to job creation opportunities for unskilled workers, as well as access to more affordable goods and services. For instance, trade opening has been a key element in the economic success of East Asian economies (IMF, 2001).

Export-oriented industries are also key for strengthening countries external position and resilience to shocks. Export-oriented industries, such as the ones to be covered by the CBAM, are key generators of foreign-exchange resources for developing countries. As such, they can help finance country's most needed exports such as energy or food imports, as well as protect countries from potential external debt pressures.

Given the importance of trade as an engine for growth in developing countries, there is a need to minimize the potential negative consequences of the CBAM on developing countries' exports growth potential.

2. Policy challenge

The current treatment of developing countries under the CBAM is ambiguous. While the current legislative proposal does not consider any difference in treatment for developing countries, it indicates the EU's willingness to "*work with low and middle-income countries towards the decarbonization of their manufacturing industries*" (EU Commission, 2021). **However, the text does not provide any indication on the form such support could take.**

The lack of special treatment for developing countries is already being challenged by the "common but differentiated responsibilities" principle of international environmental law. For instance, in a statement from the Ministerial Meeting on Climate Change held on 8 April 2021 by the 30th BASIC (Brazil, South Africa, India and China), ministers expressed "*grave concern regarding the proposal for introducing trade barriers, such as unilateral carbon border adjustment, that are discriminatory and against the principles of Equity and principles of Equity and Common but Differentiated Responsibilities and Respective Capabilities*" (South African Government, 2021).

Given the difficulty of engaging developing countries in the fight against climate change, this report seeks to propose an institutional arrangement that would allow the EU to best leverage the CBAM to create the right incentives for decarbonization in developing countries.¹

¹ To the best of my knowledge, this is the first report to address the question of developing countries treatment under the CBAM, going beyond arguing a full exclusion from the CBAM for low-income countries.

This is all the more important once we realize that more than 80% of imports to be covered by the CBAM come from low and middle-income countries. Considering the current scope of the CBAM, only 18% of imports covered by the CBAM would come from high-income countries. Consequently, the treatment of developing countries should not be a “detail” left for final amendments but a key pillar of its design. It is also in Europe’s best interest to clearly state the expected treatment for developing partners if it wants to minimize opposition to the CBAM implementation, while reinforcing the “climate” objective of the CBAM (in opposition to simply see it as a protectionist measure).

Imports to be covered by the CBAM: from which income group do they come from?

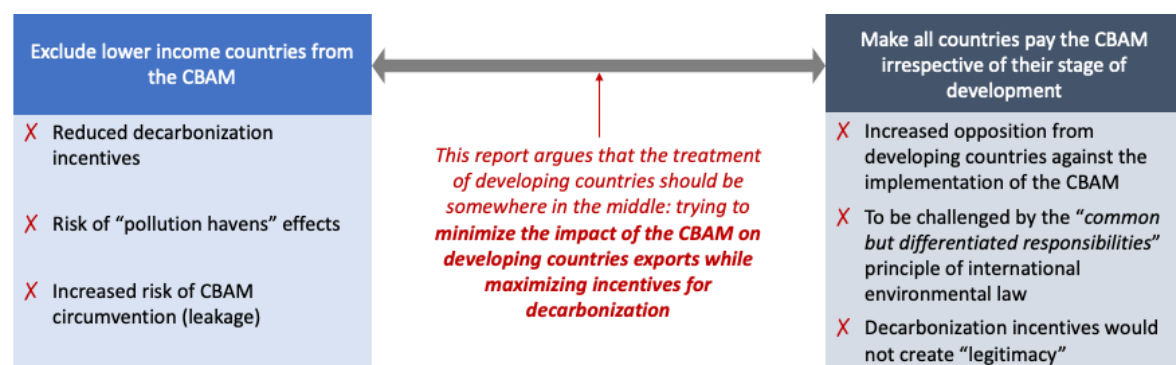
Share of imports to be covered by the CBAM (in value) coming from the different countries’ income groups (in %) – 2019 import values (pre-Covid shock)

Countries’ income group	Iron & Steel	Aluminum	Fertilizer	Electricity	Cement	Total
Low-income	0%	6%	0%	0%	0%	1%
Lower-middle income	19%	8%	29%	17%	25%	17%
Upper-middle-income	64%	62%	57%	83%	70%	63%
High-income	18%	24%	14%	0%	5%	18%

Source: Author’s calculation based on UN Comtrade Database (HS codes: iron & steel (72, 73), aluminum (76), fertilizer (31), electricity (2716) and cement (2523)) and World Bank 2022 countries classification by income.

Despite the importance of laying out a special treatment for developing countries, this report argues that none of the two “simple and extreme” positions seen so far in the political debate should be considered. It should not be a debate about making developing countries assume the full cost of the CBAM or to completely exclude them from the system. Rather, the debate should focus in finding the correct balance between avoiding hurting developing countries export potential while creating the right incentives for decarbonization.

Avoiding the extremes



Source: Author

Why should the option of “excluding lower income countries from the CBAM” not be considered? There are several reasons to be considered to avoid excluding developing from the CBAM:

- **Reduced decarbonization incentives:** if all developing countries are excluded, then the utility of the CBAM would de facto be drastically impaired. As indicated before, up to 82% of imports to be covered by the CBAM come from low- and middle-income countries. As such, the CBAM would not be able to respond to its objective of preventing carbon leakage.
- **Risk of “pollution havens” effect:** Even if only lower-middle and/or low-income countries are excluded from the CBAM, this would nevertheless significantly reduce the decarbonization incentives in those countries, triggering the risk of “pollution haven” effect. Consequently, those countries may fully specialize in the production of the dirty goods, diminishing incentives for development of clean alternatives, and creating a *'dirty input production trap'* (Acemoglu, Aghion & Hemous, 2015). This would clearly be a suboptimal equilibrium for those countries and for the world.
- **Increased risk of CBAM circumvention:** even if the number of countries excluded from the CBAM is limited, it would nevertheless represent a leakage threat. Value chains could get organized to bypass the CBAM through those “pollution havens”, hence reducing the CBAM’s ability to incentivize emissions reduction abroad, and therefore reducing its ability to prevent carbon leakage. Climate change being a global problem, it requires universal participation. A piece-meal approach would be condemned to failure since the beginning.

Why should the option of making all countries pay the CBAM irrespective of their development level not be considered?

- **Increased opposition to the CBAM implementation, including risk of litigation.** The main reasons to argue against the full implementation of the CBAM for developing countries would be the strong opposition it would face (and that it is already visible), potentially triggering significant trade disputes and law procedures that would shift the attention from real decarbonization efforts and coordination, towards trade disputes and retaliation. As mentioned above, most developing countries have already expressed that they consider a full CBAM implementation as against the *“common but differentiated responsibilities”* principle of international environmental law.

- **Would not generate the “legitimacy” required for the implementation of decarbonization measures domestically.** Also, if it is perceived as an externally imposed policy measure, the decarbonization incentives it would create would be weak, as they would not be perceived as legitimate, and would not trigger a bottom-up process of decarbonization measures and investments in host countries.

The proposed policy solution is about finding the right balance between creating decarbonization incentives for developing countries while avoiding hurting their exports. It is also important that the measure allows to develop some sovereignty and legitimacy in the decarbonization plans of developing countries and is therefore not perceived as an imposed cost on them. It should also aim to reinforce financial and technological support from the EU towards developing countries.

The proposed policy suggestion will follow in three parts. First, I will present the main principles of the policy proposal. Second, I will propose a framework for the integration of developing countries into a “climate club” that the CBAM has the potential to develop. Third, I will proceed with some implementation examples and quantification details for countries most exposed to the CBAM.

3. Policy proposal

a. Principles

The proposal is to develop a concept of “**Bilateral Climate Deals**” (“BCD”) between the EU and developing countries, that would represent a transition period during which the proceeds to be paid by the country under the CBAM would be redirected to green investments in the developing country, in exchange of binding, time-targeted and measurable climate commitments. Such transition period, coupled to additional technical and financial support, aims to help build capacity in the developing countries to reinforce their decarbonization policies and investments before being fully subject to the CBAM.

The key principles of such policy proposal are the following:

- **Incentivize decarbonization investments in developing countries**, key to keeping developing countries engaged with the commitments of the Paris Agreement, and hence crucial to the overall global climate strategy.
- **Strengthen the acceptability of the CBAM implementation by developing countries**, with the objective of minimizing the existing opposition to its implementation and the potential risks of legal disputes.
- **Reinforce the climate commitment of the CBAM**, clearly indicating its environmental objective (not protectionist), and maximizing its WTO-compatibility².
- **Make the CBAM affordable to developing countries**, and therefore the decarbonization investments it aims to incentivize.
- **Build legitimacy and sovereignty around developing countries decarbonization agenda**, in order to increase its chances of success (the BCD aims to not be perceived as an externally imposed set of decarbonization measures).
- **Propose an implementable and monitorable concept**, that can be rapidly implemented with most interested countries in order to create successful precedents that could be replicated afterwards by other developing countries.
- **Support the EU’s international climate leadership**. Through this proposal, the EU would reinforce its administrative, financial, and technological support towards developing countries, while expanding the utilization of the EU’s green taxonomy.

²The climate commitment of the CBAM would be essential to justify its alignment with Article XX of the GATT (in particular with letters (b) and (g)). Article XX states that nothing in the GATT shall prevent the adoption of measures “*necessary to protect human, animal or plant life or health*” (Article XX(b)) or “*relating to the conservation of exhaustible natural resources if such measures are made effective in conjunction with restrictions on domestic production or consumption*” (Article XX(g)).

b. Proposed CBAM treatment for developing countries

The proposal is to develop a concept of “Bilateral Climate Deals” (“BCD”) between the EU and developing countries, that would represent a transition period during which the proceeds to be paid by the country under the CBAM would be redirected to green investments in the developing country, in exchange of binding, time-targeted and measurable climate commitments. Such transition period, coupled to additional technical and financial support, aims to help build capacity in the developing countries to reinforce their decarbonization policies and investments before being fully subject to the CBAM.

Summary of the proposed “Bilateral Climate Deal” (BCD)

Objective	Institutionalize a transition period during which the proceeds to be paid by the interested developing country under the CBAM would be redirected to green investments in the developing country, in exchange of binding, time-targeted and measurable climate commitments (to be presented in an <i>ad hoc</i> National Decarbonization Plan).
Duration	5 years for upper-middle income countries (between 2025 and 2030). 10 years for lower-middle income countries (between 2025 and 2035). 20 years for low-income countries (between (2025 and 2045).
Application	Open to all countries categorized as developing countries by the World Bank.
Representation	Developing countries should be represented by its government as well as key representatives from the exporting companies to be impacted by the CBAM. To ensure the participation of all relevant stakeholders in the developing country, the host country should create an <i>ad hoc</i> institutional body in which all the relevant stakeholders – public and private – should be “shareholders”. Such institutional body would be responsible of drafting and presenting the decarbonization plan, yearly investments budgets, and will be the key interlocutor for the ‘BCD’.
Climate commitments	The decarbonization plan would need to present a roadmap of policies and investments, with key milestones and measurable climate commitments, designed to embark on a pace of greening and reducing emissions. <ul style="list-style-type: none"> ○ Policies: more stringent climate regulation, carbon pricing mechanism, etc. ○ Investments: should comply with the EU green taxonomy. ○ Quantifiable objectives: the reduction of the carbon intensity of relevant industry sectors, or the decarbonization of the energy mix, etc. could all be potential considerations to be supported by the considered green investments and policy reforms.
Assessment of implementation	Yearly reviews of the advancement of the agreed program (in the form of the IMF Article IV country meetings and reviews). The yearly reviews should help adapt planned investments and reforms based on ongoing performance and discovered constraints and serve as a discussion for the yearly budgets.
Financial support & technological transfers	Beyond the transfers related to the CBAM proceeds, the EU could foster additional financial support to meet incremental costs, with a focus in the early adoption of new technologies. To access such additional funds, developing countries under the BCD would have the possibility of submitting funding for decarbonization project proposals. The additional funding may be only available to low-income countries and lower-middle income countries, but not upper-middle ones.
Compliance	The compliance framework should be a non-confrontational, conciliatory, and cooperative process – inspired by the Montreal Protocol framework. In case of deviation in compliance, it should favor the issuance of cautionary statements as a warning signal, giving a chance to the developing country representatives to (i) indicate the reasons for the underperformance, and (ii) allowing them to present a plan for redirecting efforts to go back to compliance. Focus should be on assessing the country’s efforts to meet the targets.

Source: Author

Application to the bilateral climate deal by developing countries

The “Bilateral Climate Deal” mechanism would be opened to all developing countries and should be requested by the interested developing country government. Even though a larger array of stakeholders will be involved along the process, it is recommended that the initial request to start the bilateral climate deal should be done by the country government, as the stakeholder with easiest reach to the EU institutions as well as the stakeholder with higher legitimacy (Victor, 2015). Upon request from the host country, a bilateral process would be created, between EU representatives and the developing country representatives, to agree on the terms and conditions of the bilateral climate deal.

Institutional representation from the developing country: public and private representatives

The host country representatives should include government representatives as well as representatives of the exporting companies to be affected by the CBAM. Additional stakeholders could also be included if deemed relevant by the country, such as representatives from the companies in charge of the electricity production in the country (most of the time run by state-owned enterprises). To ensure the participation of all relevant stakeholders in the host country, this one should propose a discussion body (for discussion with the EU representatives) that include public and private stakeholders. For instance (but not mandatory), the country could create an *ad hoc* “Decarbonization National Fund” in which all the relevant stakeholders – from the government and from the exporting companies impacted by the CBAM – should be “shareholders”. The “Decarbonization National Fund” would be a key agency along the process, as it will be responsible of receiving the proceeds of the CBAM and making the investment decisions, track the utilization of funds and report on the achievements of such investments.

The decarbonization investments have therefore to be decided jointly between private companies involved and relevant government ministries, to benefit from a high level of collaboration between the private sector and the government. As described by Rodrik, this should incentivize the development of “*productive policies as an on-going process of strategic collaboration between private and public sectors, with the following goals in mind: learning, experimentation, coordination, monitoring, evaluation and policy revision*” (Rodrik, 2018).

This is expected to help maximize the success of the decarbonization strategy, avoiding political capture on one hand and lack of information on the other. It should also help maximize accountability. Inspired by the success of the “*mesas ejecutivas*” in Peru, or the “*mise à niveau*” meetings in Tunisia, the collaboration between private and public stakeholders would help develop public-private synergies: private actors are probably better aware of the return on investment of certain decisions, as well as having a better knowledge of the existence and magnitude of constraints and market failures in the local economy; public actors will be necessary to ensure that those investments are accompanied with new policies that maximize the spill-overs of such investments (either through other sectors, or to maintain them over time). The government will also be essential to ensure accountability (to counteract business incentives to “game” the government). Finally, given the high level of uncertainty across the best strategy to decarbonize, this public-private set up is best suited to foster the so-called “experimental governance” (Sabel & Victor, 2022).

Institutional representation from the EU: creation of an ad hoc task force

The European Commission should establish an *ad hoc* Task Force within the CBAM Central Administration.³ Jointly with the Commission’s Directorate General for Climate Action, the Task Force would be responsible for managing the applications to the bilateral climate deal, approving the submitted decarbonization plans and steering their implementation.⁴

Framework

Under the BCD, the proceeds that would have arisen from the CBAM permits purchase by exporting companies, instead of going to the EU, would be directed to the developing country, which in turn would spend those proceeds in decarbonization investments, with the objective of reducing the carbon intensity of its exports and therefore reducing the level of GHG emissions produced in the country.

³ The legislative proposal of the CBAM already considers the existence of a “central administrator”, to be hosted within the EU Commission and that would “act as central administrator to maintain an independent transaction log recording the purchase of CBAM certificates, their holding, surrender, re-purchase and cancellation and ensure coordination of national registries.” (European Commission, 2021).

⁴ This proposal takes inspiration from the EU Recovery and Resilience facility setup, as it considers the creation of a “Recovery and Resilience Task Force (RECOVER) within its Secretariat-General. Jointly with the Commission’s Directorate-General for Economic and Financial Affairs, RECOVER is responsible for steering the implementation of the Recovery and Resilience Facility RECOVER also coordinates the European Semester and reports to Commission President Ursula von der Leyen.” (European Commission, 2021).

The proposed framework is hence to modify the flow of payments related to the CBAM for countries having requested and reached a “BCD” agreement.

- Under the current CBAM structure, exporting companies should buy permits for the carbon embedded in their products.
- Under the proposed BCD framework, the proceeds of the CBAM paid by the country export companies should be directly put on an escrow account, and then directed back to the developing country on a yearly basis, which in turn would have the responsibility to invest such proceeds in decarbonization investments in the host country.

The fact that the CBAM is already considering a central administrator in charge of the recording of the purchase of CBAM certificates should facilitate the proposed framework.

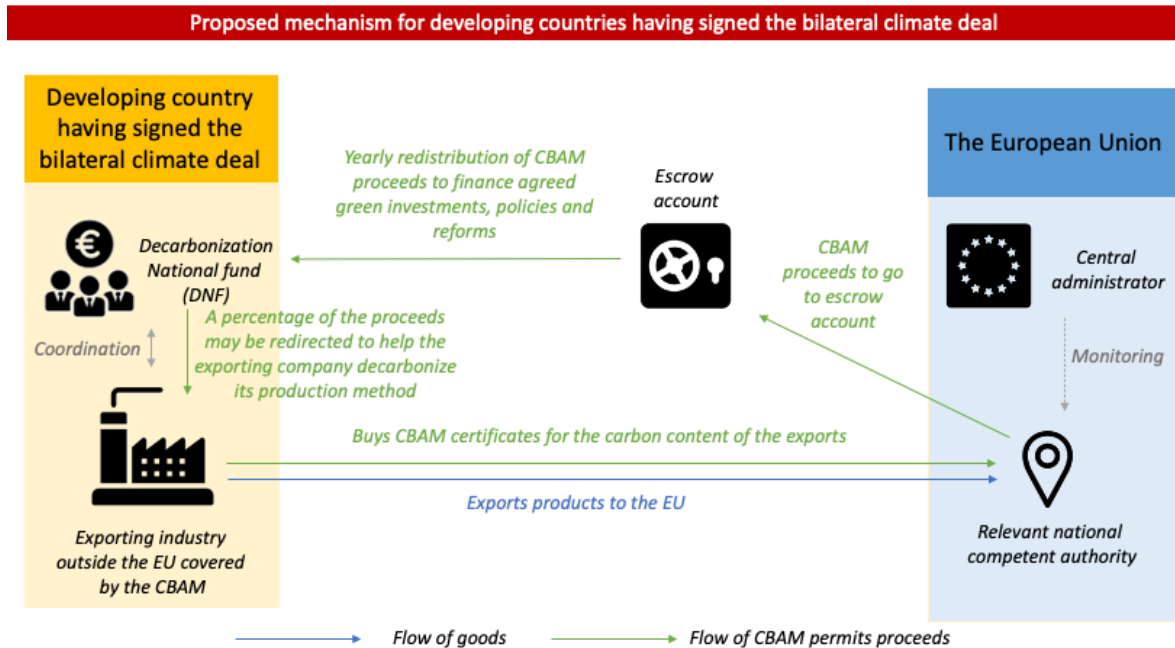
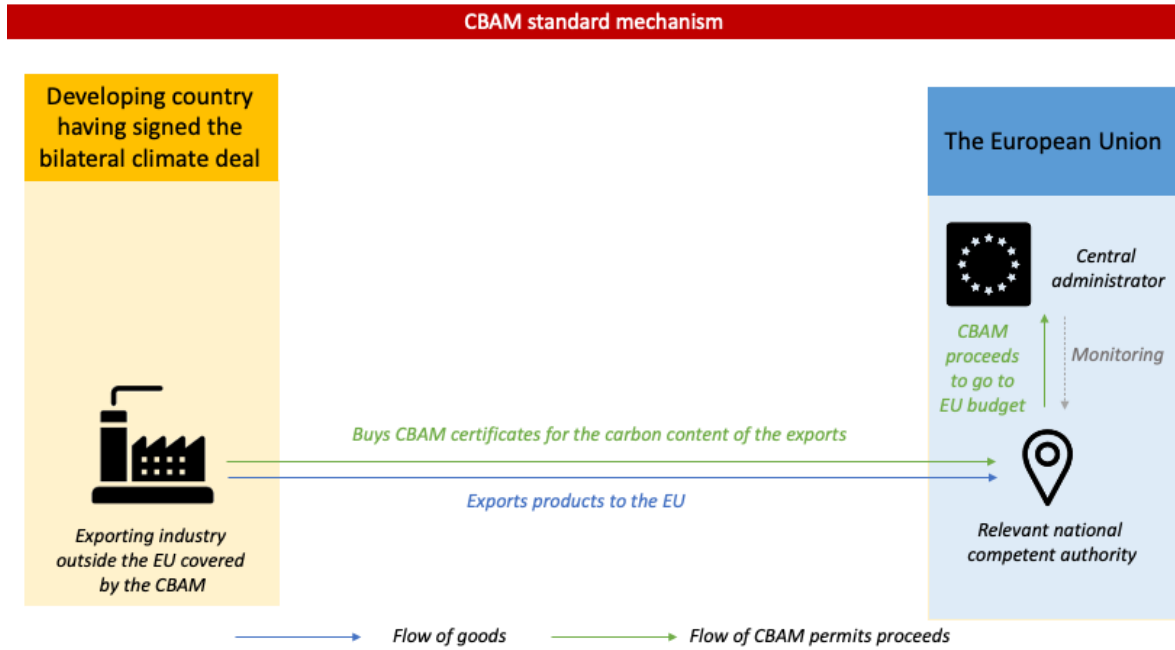
As a result, the proposed Task Force to work within such “central administrator” would therefore have the capability to track the certificates bought by the developing country having signed the bilateral climate deal.⁵

It is considered important to direct the CBAM proceeds coming from the developing country having signed the BCD into a specific escrow account as soon as possible, so as to minimize the movement of such proceeds within national or EU budgets.⁶ It is indeed not recommended that the relevant CBAM proceeds enter the EU budget, because, as soon as those payments are sizeable, it will become harder to redirect this money towards the host country. The utilization of this money would become too political and prone to conflict within the EU. It is therefore better if the money avoids entering the EU budget and stays in the escrow account.

⁵ The element that remains unclear and would require additional investigation is the escrow account mechanism. The main challenge lies on the fact that the payment of the CBAM certificates is done by the companies to the competent national authority (and not the central administrator). More investigation will need to be done before being able to propose a comprehensive and thorough flow of proceeds.

⁶ Following the Council Decision of 14 December 2020 on the system of own resources of the European Union, most revenues generated by CBAM will go to the EU budget (Council, 2020).

Chart of the proposed framework (illustrative)



Source: Author

Decarbonization roadmap: binding, time-targeted and measurable climate commitments

In line with the spirit of the Next Generation Recovery and Resilience facility in the EU⁷, the developing country will present its own decarbonization plan. As such, each BCD will be tailored made by each country, allowing to better adapt the proposed investment, reforms and regulations to each country exporting industries, energy mix, administrative capacity, political economy, etc. Countries will of course be free (and even encouraged) to create as much synergies as possible with existing national climate plans, or existing international climate commitments.

The decarbonization plan would need to present a roadmap of policies and investments, with key milestones and measurable climate commitments, designed to embark on a pace of greening and reducing emissions.

- In terms of policies, it should include elements such as a stringent climate regulation for relevant industries and /or the introduction of carbon pricing.
- In terms of investments, to ensure a smooth alignment on what is considered a green investment, and prevent the risk of greenwashing, the investments should comply with the EU green taxonomy (to date the most comprehensive classification for green investments). This in turn would reinforce the EU taxonomy international utilization, helping make the EU taxonomy the global green standard.
- In terms of quantifiable objectives, the reduction of the carbon intensity of relevant industry sectors, or the decarbonization of the energy mix, etc. could all be potential considerations to be supported by the considered green investments and policy reforms.

The decarbonization plan will need to be approved and submitted by the developing country public-private *ad hoc* body, in order to ensure that it benefits from the support of private and public agents. Once nationally agreed, it will need to be submitted to the designated EU Task Force, to be reviewed and approved. An initial period of bilateral discussions might be necessary to ensure that the decarbonization plan includes sufficient milestones and quantifiable elements to be reviewed and monitored along the way.

⁷ The NextGen EU is the €750 billion European Covid-economic recovery package, characterized by: (i) each Member State works on its own National Recovery and Resilience Plan (which is therefore not dictated by the EU Commission); (ii) each plan sets out the reforms and investments to be implemented by each country in a certain period of time (by end-2026); (iii) the investments need to focus on green and digital priorities; and (iv) it is a “performance based” facility, as a result fulfilment of agreed milestones and targets towards achieving the reforms and investments in the plans are necessary to unlock the agreed regular payments (EU Commission, 2021).

Timeline

The reforms and investments considered under the decarbonization plan should be made through the duration of the BCD, which length in time should be a function of the level of development of the country. For instance, it could be considered to propose a 5-year transition period for upper-middle income countries, 10 years for lower-income countries and 20 years for low-income countries.

Assessment of implementation: yearly reviews crucial to ensure regular monitoring

Inspired by the IMF Article IV reviews (but focusing on decarbonization policies instead of macroeconomics), there should be yearly reviews of the advancement of the agreed program. Through annual country visits and discussions with the members of the “Decarbonization National Fund”, the EU Task Force should review the use of proceeds of the annual budget, the decarbonization efforts made by host country and compare the yielded results with the ex-ante expected objectives and keep track of the alignment of the yearly investment with the broader long-term commitments. The annual meetings should also be the moment for the presentation, discussion and agreement on the following year objectives and budget.

The objective of the yearly revision is to be able to adapt planned investments and reforms based on ongoing performance and discovered constraints. It is expected that barriers and constraints might appear along the way and will require to adapt the objectives, or at least to delay on time certain commitments.

The annual review should also emphasize on the encountered barriers to the implementation of given policies or reforms, so as to create new case studies for other countries potentially facing similar challenges. As a result, the country should emphasize the barriers or constraints that they have been able to circumvent, and how. As well as the ongoing barriers or constraints that remain to be addressed and what is the expected strategy. This would allow to develop a rich literature on climate-change related policy measures, reforms and decarbonization investments that may prove very useful.

Additional financial support and technical assistance from the EU

Beyond the transfers related to the CBAM proceeds, the EU could foster additional financial support to meet incremental costs, with a focus in the early adoption of new technologies. The EU could leverage its €79.5 billion “Neighborhood, Development and International Cooperation Instrument”, which objective is to help countries achieve its Sustainable Development Goals and the Paris Agreement. 10% of the total amount, amounting to almost €8 billion, represent a “cushion” of unallocated funds. Those unallocated funds could be mobilized to strengthen the BCDs.

To access such additional funds, developing countries under the bilateral climate deal would have the possibility of submitting funding for “decarbonization project proposals” that would need to be approved by the EU Task Force.⁸ Some expenditures could have a fast-track process of validation when related to technological transfers in the form of cost of patents or R&D investments.

The envelope of additional funding coming from the EU could be a multiple of CBAM proceeds, based on the level of development of the countries. Higher for low-income countries and lower for upper-middle income countries. It could also be only targeted to those countries, and not opened to higher-middle income countries if deemed politically easier.

Compliance

Compliance should be assessed through the annual reviews, taking into consideration both quantitative results related to level of emissions, as well as government efforts to implement regulation and legislation related to climate change.

In case of deviation from the agreed roadmap of objectives, it is recommended to favor a non-confrontational, conciliatory, and cooperative process – very much inspired by the one in the Montreal Protocol. As such, **issuance of cautionary statements as a warning** should be considered, giving a chance to the developing country representatives to (i) indicate the reasons for the underperformance (there might be obstacles or barriers beyond their control), and (ii) allowing them to present a plan for redirecting efforts to go back to compliance.

⁸ The project proposals submitted for funding is a feature of the Montreal Protocol (Bankobeza, 2007).

In the spirit of the conciliatory and cooperative process, as long as it is considered that the country can demonstrate that the deviation from the roadmap is due to administrative, technical or economic barriers, and that there are ongoing efforts to approach those constraints, no suspension or withdrawal of privileges under the bilateral climate deal should be considered. This element is key, as EU officials should acknowledge that most developing countries may have limited administrative ability to control emissions in many sectors of their economy.

However, if there are clear signs of bad faith and lack of efforts during a continued period of time (for instance during 2-3 annual review sessions in a row without any tangible improvement or effort made), then there might be a clause in the bilateral climate agreement allowing to cancel the agreement and putting the developing country back in the “standard” CBAM treatment. This in turn represents a monetary threat to maximize compliance.

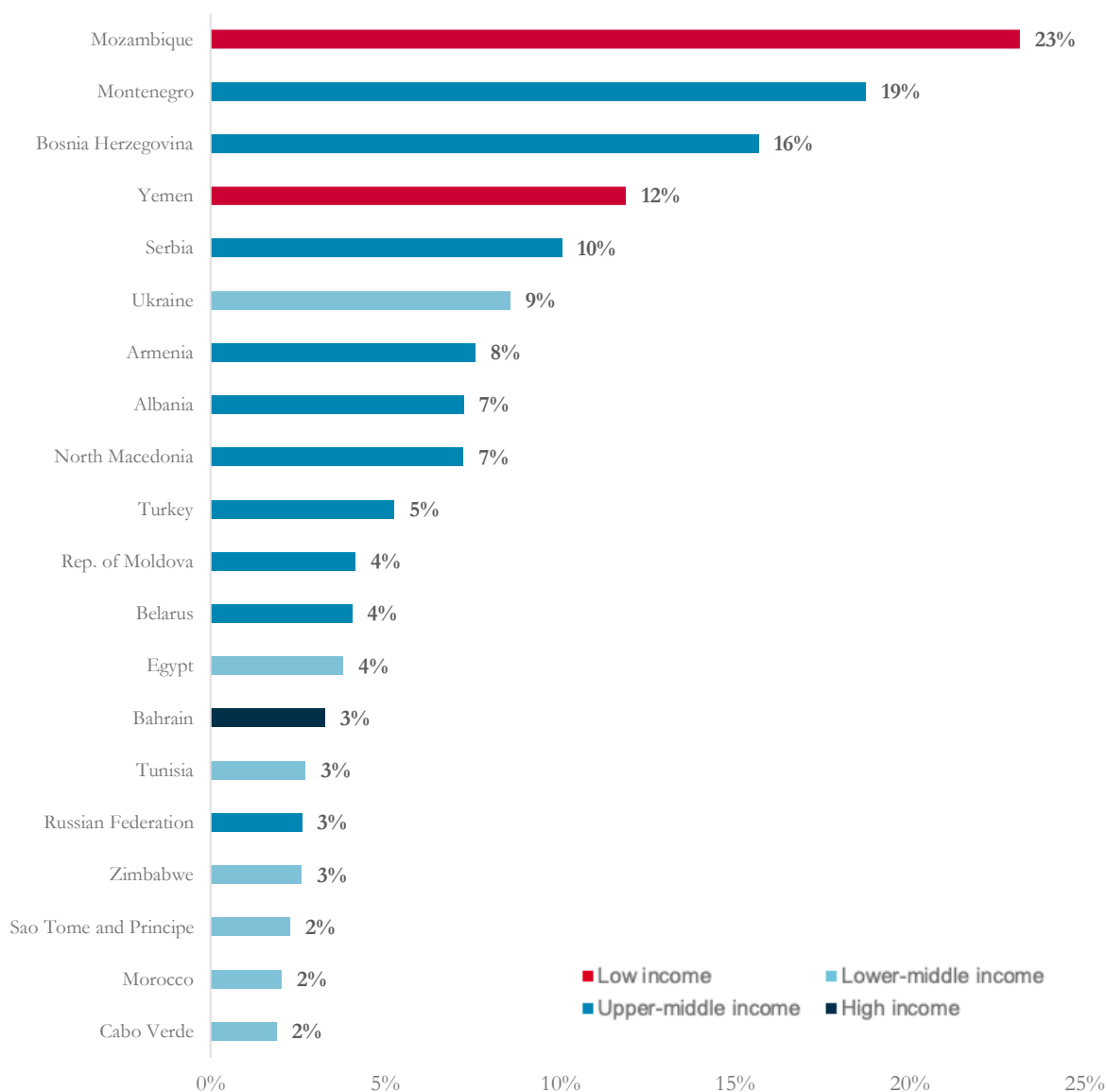
c. Implementation proposal

Some countries would obviously be more impacted than others concerning the CBAM. The table below presents the top 20 countries for which the imports to the EU to be covered by the CBAM represent more than 2% of their total basket of exports (using 2019 data).

The recommendation would be to try to create the first precedents of “Bilateral Climate Deals” with the countries most impacted by the CBAM, as those would have more incentives to collaborate in their development given that it will run in its own interest. For instance, countries such as Mozambique and Ukraine are very well positioned to collaborate in the implementation of the CBAM as the low-income country and the lower-middle income country most affected by the CBAM, respectively, 23% and 9% of their total exports are expected to be impacted by the CBAM.

Countries most impacted by the CBAM as a relative share of their total exports (>2%)

Share of countries total exports to be covered by the CBAM

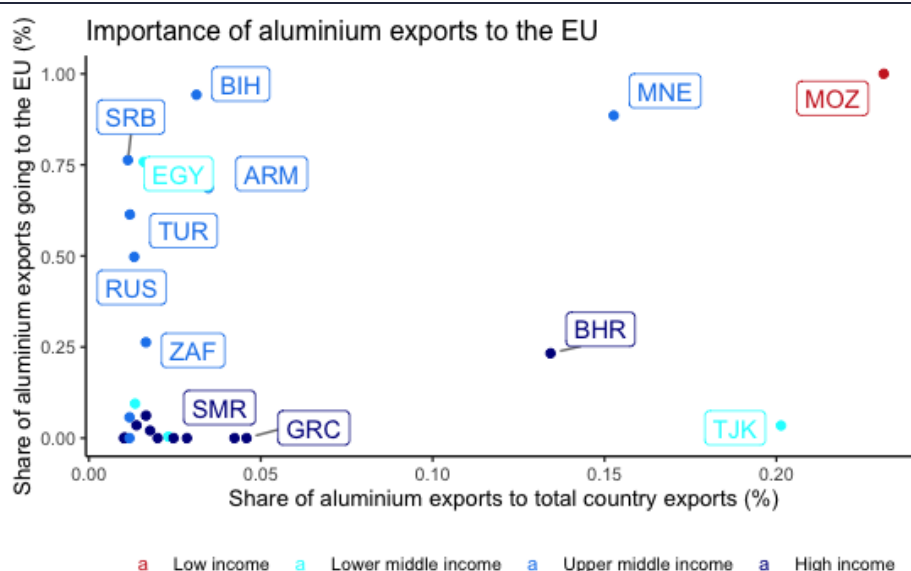


Source: Author's calculation based on UN Comtrade Database (HS codes: iron & steel (72, 73), aluminum (76), fertilizer (31), electricity (2716) and cement (2523)). Total exports are assessed using exports and re-exports from each country.

i. The case of aluminum: Mozambique

Mozambique stands out as the aluminum exporter most impacted by the CBAM regulation. Its exports of aluminum represent more than 20% of the country total exports, and almost all their aluminum exports are directed towards the EU.

Importance of aluminum exports to the EU



Source: UN Comtrade

Source: Author's calculation based on UN Comtrade Database (HS codes: aluminium (76)). Total exports are assessed using exports and re-exports from each country.

Mozambique’s aluminum exports to the EU could generate between €100 and €300 million per year in CBAM proceeds^{9,10}, depending on different scenarios of estimated carbon intensity of aluminum exports and price of carbon allowances:

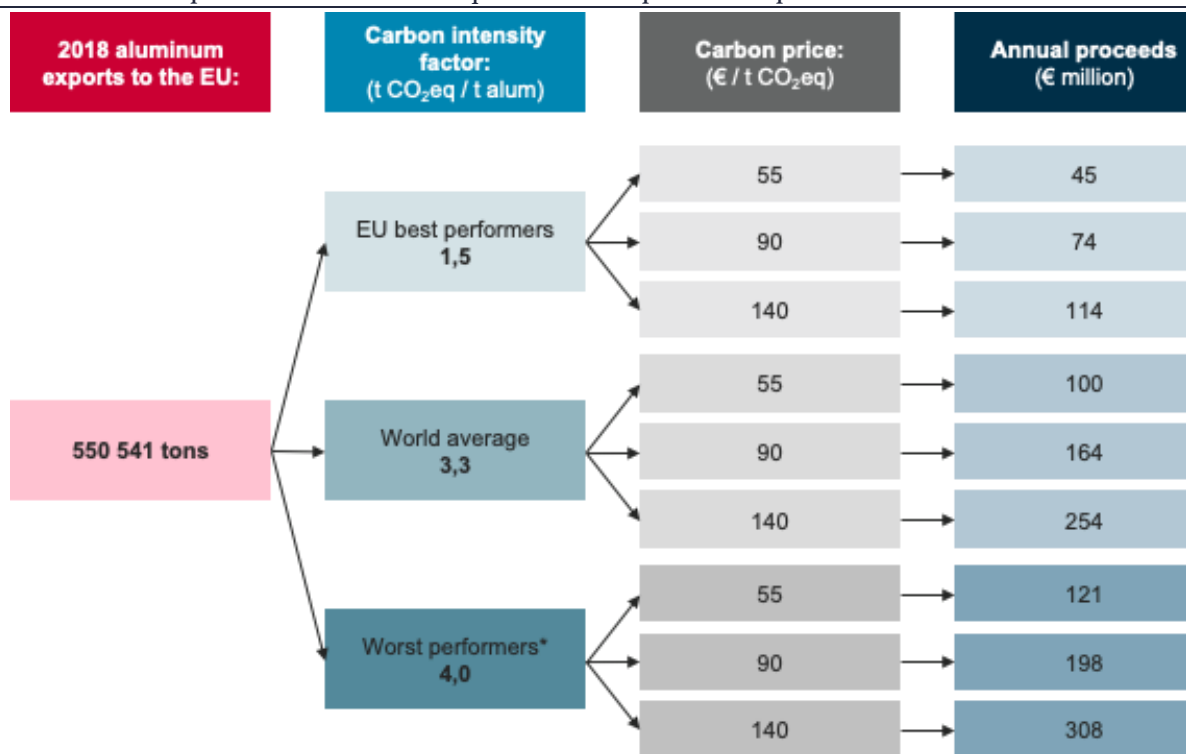
- Aluminum carbon intensity of direct emissions is estimated using three different scenarios: the optimistic end-range is determined by the EU average value of the 10 % most efficient installations in 2017 (**1,5** tons of CO₂ equivalent per ton of aluminum produced) as indicated by the EU Commission; an average data point considering the world average **3,3** tCO₂eq/t of aluminum produced using the Carbon Trust data; and a final worst case scenario estimated by the author at **4,0** tCO₂eq/t of aluminum.

⁹ Assuming that the carbon intensity of EU best performers is currently not a realistic scenario for Mozambican aluminum exporters (given the significant gap between the best EU performers and the world average).

¹⁰ It is important to note that we are assessing the total level of proceeds to be generated by the CBAM assuming that the EU would phase out its existing distribution of “free allowances” for the top 10% greener producers. If the distribution of free allowances is not completely phased out, then – in order to remain WTO compliant – the CBAM should also deduct the level of emissions associated to the 10% threshold. In this case, it would be as deducting the annual proceeds associated to the “EU best performers” scenario to the two other scenarios. Hence, the total level of proceeds would oscillate between €55million (ie. €100 million minus €45 million of free allowances) and €194 million (ie. €308 million minus €114 million of free allowances).

- Carbon price: three different prices are considered, (i) **55€** corresponding to the average EU ETS price during 2021 (EEX, 2022), (ii) **90€** per ton of CO₂ corresponding to the average price of the EU ETS between January and February 2022 (EEX, 2022), and (ii) **140€** per ton of CO₂ corresponding to existing estimates of future carbon prices for 2030¹¹.

Back of the envelope assessment of Mozambique aluminum exports CBAM proceeds



Source: Author's calculations, EU Commission information for 2018 aluminum imports, European Commission Implementing Regulation (2021/447), Carbon Trust and public information on carbon price in the EU ETS.

The range of CBAM proceeds, between €100 and €300 million per year, would represent between 2,4% and 7,4% of the country total €4.2bn total exports value, and between 10,3% and 31,9% of its total value of aluminum exports to the EU (almost €1bn). Consequently, the CBAM “tariff” would be between 4 and 12 times more important than the usual 2.5% Most Favored Nation duty rate treatment (OEC, 2022).

¹¹ EU ETS carbon prices are expected to reach €140 by 2030, according to a team of analysts of “Carbon Pulse”, Link: <https://carbon-pulse.com/147214/>

In terms of revenues, €100-300 million per year would represent a sizeable amount of proceeds if used for decarbonization investments and support towards a green transition. Indeed, it would represent between 1,9% and 5,6% of Mozambique’s 2024 expected government revenues.

In terms of international support, the CBAM proceeds could represent between a 28% and 83% increase compared to the World Bank’s International Development Association (IDA) allocation to Mozambique, which amounted to US\$410m per year between 2018 and 2021.¹²

	2019	2024
National accounts		
Mozambique GDP (USDbn)	15,1	24,2
Total govt revenues (% of GDP)	24,0%	25,2%
Total govt revenues (USDbn)	3,6	6,1
CBAM proceeds (€m)		
Min. Estimate	100	100
Max. Estimate	300	300
EUR / USD exchange rate		
	1,13	1,13
CBAM proceeds (USDm)		
Min. Estimate	113	113
Max. Estimate	339	339
CBAM proceeds as % of government revenues		
Min. Estimate	3,1%	1,9%
Max. Estimate	9,4%	5,6%

Source: Author's calculations, Mozambique IMF Article IV (2019), World Bank Data

Considering the below (hypothetical) decarbonization path, Mozambique’s aluminum production could avoid emitting up to 15.8 million tons of direct carbon emissions between 2025 and 2050. This would represent a saving of 38% of direct carbon emissions, as the country would be emitting 41 million tons of carbon for a total production of 14 million tons of aluminum between 2025 and 2050.

- Decarbonization path assumptions: a constant production level in terms of tons of aluminum, and a decreasing carbon intensity factor for direct emissions (starting from a carbon intensity of direct emissions of 4 tCO₂eq/t of aluminum in 2025, it is considered that the world average level of 3,3 tCO₂eq/t is progressively achieved by 2035, and the level of the EU 10% top performers is achieved by 2050).

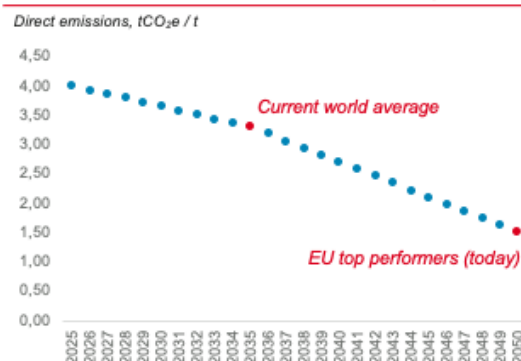
¹² “The institution pledges an estimated US\$410 million per year from Fiscal Year 18 onwards”. Link: <https://www.worldbank.org/en/news/press-release/2017/04/27/new-world-bank-group-strategy-seeks-growth-diversification-in-mozambique>

Potential decarbonization path of Mozambique’s aluminum sector (direct emissions)

Hypothesis:

- + **Constant production level** (550k tons / year)
- + **Reduction of carbon intensity of direct emissions:** from 4.0 tCO₂e/t, with the objective of reaching the world average level of 3.3 tCO₂e/t by 2035, and current level of EU top performers at 1.4 tCO₂e/t by 2050

Mozambique aluminum production carbon intensity path



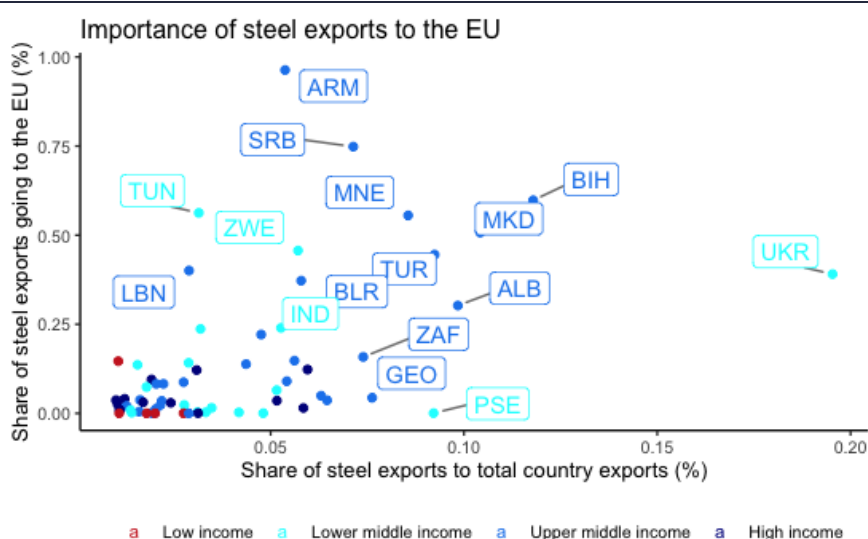
Source: Author’s estimations

The 15.8 million tons of carbon emissions “saved” under the above decarbonization path would represent between €564 million and €1.8 billion in savings under the social cost of carbon assumption. The associated Social Cost of Carbon is estimated using the RFF central scenarios of a 2% discount rate, yielding an average carbon price of US\$168, and a 3% discount rate yielding an average carbon price of US\$61 (RRF, 2021) – refer to appendix M for more details.

ii. The case of iron & steel: Ukraine

Ukraine stands out as the iron and steel exporter most impacted by the CBAM regulation. Its exports of iron and steel represent more than 20% of the country total exports, and close to 50% of their steel exports are directed towards the EU.

Importance of iron and steel exports to the EU



Source: UN Comtrade

Source: Author’s calculation based on UN Comtrade Database (HS codes: iron and steel (72 & 73)). Total exports are assessed using exports and re-exports from each country.

Ukraine’s iron and steel exports to the EU could generate between €250 and €800 million per year in CBAM proceeds^{13,14}, depending on different scenarios of estimated carbon intensity and price of carbon allowances. The scenarios considered are based on the following information:

- Iron and steel carbon intensity of direct emissions is estimated using three different scenarios: the optimistic end-range is determined by the EU average value of the 10 % most efficient installations (**0,21** tCO₂eq/t of iron & steel); an average data point considering the world average **1,4** tCO₂eq/t of iron & steel using the IEA data (IEA, 2021); and a final worst case scenario using Ukraine’s data from the Ministry of Ecology and Natural Resources (2017 estimates) of **1,7** tCO₂eq/t of iron and steel.
- Carbon price: same three scenarios than above: €55, €90 and €140 per ton of CO₂.

Back of the envelope assessment of Ukraine’s iron and steel exports CBAM proceeds

2018 iron & steel exports to the EU:	Carbon intensity factor: (t CO ₂ eq / t steel)	Carbon price: (€ / t CO ₂ eq)	Annual proceeds (€ million)
3 336 099 tons	EU best performers 0,21	55	38
		90	63
		140	97
	World average (IEA data) 1,4	55	257
		90	420
		140	654
	Ukraine performance (Min. of Ecology UKR) 1,7	55	312
		90	510
		140	794

Source: Author’s calculations, EU Commission information for 2018 aluminum imports, European Commission Implementing Regulation (2021/447), IEA Iron and Steel Report, Ukraine’s Ministry of Ecology and Natural Resources, and public information on carbon price in the EU ETS

¹³ Assuming that the carbon intensity of EU best performers is currently not a realistic scenario for Ukrainian producers (given the significant gap in carbon emissions between those best EU performers and the world average).

¹⁴ It is important to note that we are assessing the total level of proceeds to be generated by the CBAM assuming that the EU would phase out its existing distribution of “free allowances” for the top 10% greener producers. If the distribution of free allowances is not completely phased out, then – in order to remain WTO compliant – the CBAM should also deduct the level of emissions associated to the 10% threshold. In this case, it would be as deducting the annual proceeds associated to the “EU best performers” scenario to the two other scenarios. Hence, the total level of proceeds would oscillate between €219million (ie. €257 million minus €38 million of free allowances) and €697 million (ie. €794 million minus €97 million of free allowances).

The range of CBAM proceeds, between ~€250 and €800 million per year, would represent between 0,6% and 1,8% of the country total €44bn exports value, and between 7,6% and 23,5% of the total value of iron and steel exports to the EU (c. €3.4bn).

Considering the below (hypothetical) decarbonization path, Ukraine’s iron & steel production could avoid emitting up to 52.3 million tons of direct carbon emissions between 2025 and 2050. This would represent a saving of 55% of direct carbon emissions, as the country would be emitting 95 million tons of carbon for a total production of 87 million tons of aluminum between 2025 and 2050.

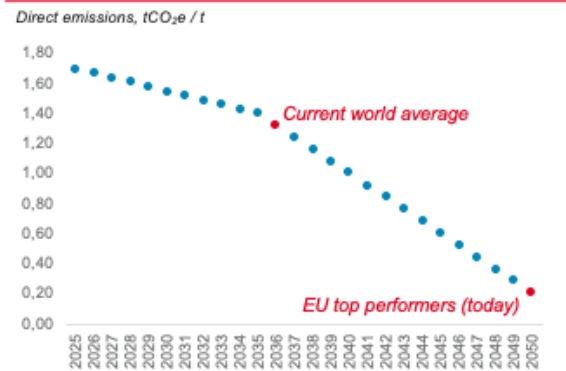
- Decarbonization path assumptions: a constant production level in terms of tons of iron & steel, and a decreasing carbon intensity factor for direct emissions (starting from a carbon intensity of direct emissions of 1,7 tCO₂e/t of iron & steel in 2025, it is considered that the world average level of 1,4 tCO₂e/t is progressively achieved by 2035, and the level of the EU 10% top performers is achieved by 2050).

Potential decarbonization path of Ukraine’s iron and steel sector (direct emissions)

Hypothesis:

- + **Constant production level** (3.3m tons / year)
- + **Reduction of carbon intensity of direct emissions**: from 1.7 tCO₂e/t, with the objective of reaching the world average level of 1.5 tCO₂e/t in 2035, and current level of EU top performers at 0.2 tCO₂e/t by 2050

Ukraine's iron & steel carbon intensity reduction path



Source: Author's estimations

The 52.3 million tons of carbon emissions “saved” under the above decarbonization path would represent between €1.8 and €6.0 billion in savings under the same social cost of carbon assumptions as above (please refer to appendix M for more details).

To summarize, the cases of Mozambique and Ukraine forcefully show that the BCD mechanism provides a powerful incentive to decarbonize given its sizeable financial impact. At the same time, investing these proceeds into decarbonization could yield drastic reductions in carbon emissions.

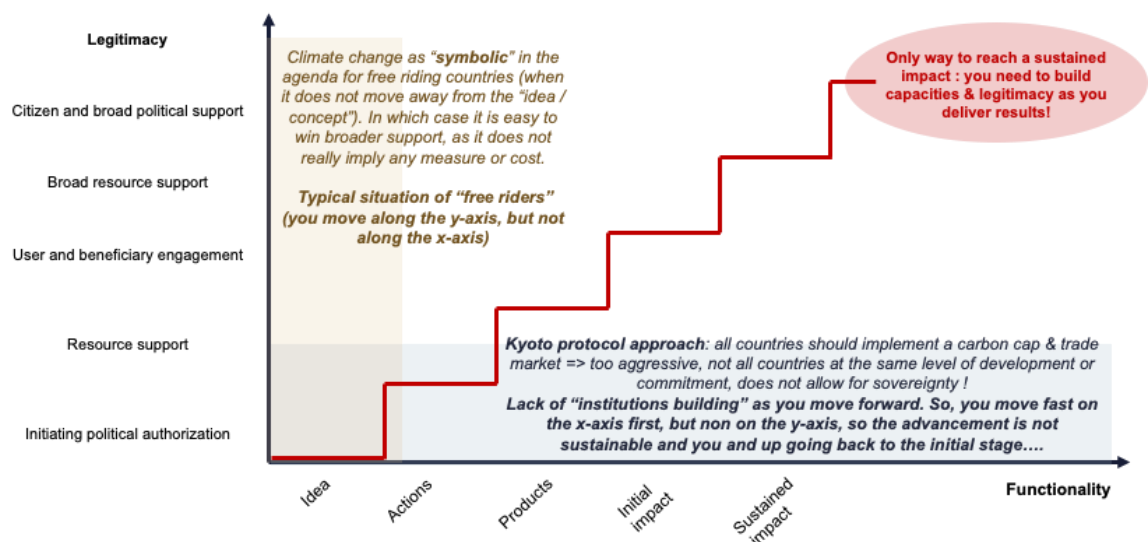
4. Theory of change

a. Building legitimacy and functionality

As mentioned in the problem motivation section, previous initiatives to incentivize decarbonization investments in developing countries have mostly failed for a variety of reasons. We will use the “functionality and legitimacy” framework proposed by Andrews (Andrews, 2021) to illustrate a prism of analysis for the reasons of past failures and how we believe that the current proposal learns from those past mistakes.

As per the “functionality-legitimacy” framework, the key element to ensure policies sustainability is to progressively build legitimacy and functionality along its implementation.

Legitimacy-functionality framework



Source: Andrews MLD102 Class “Getting things done” at the Harvard Kennedy School

Applying this framework to past efforts to incentivize decarbonization investments in developing country, we realize that:

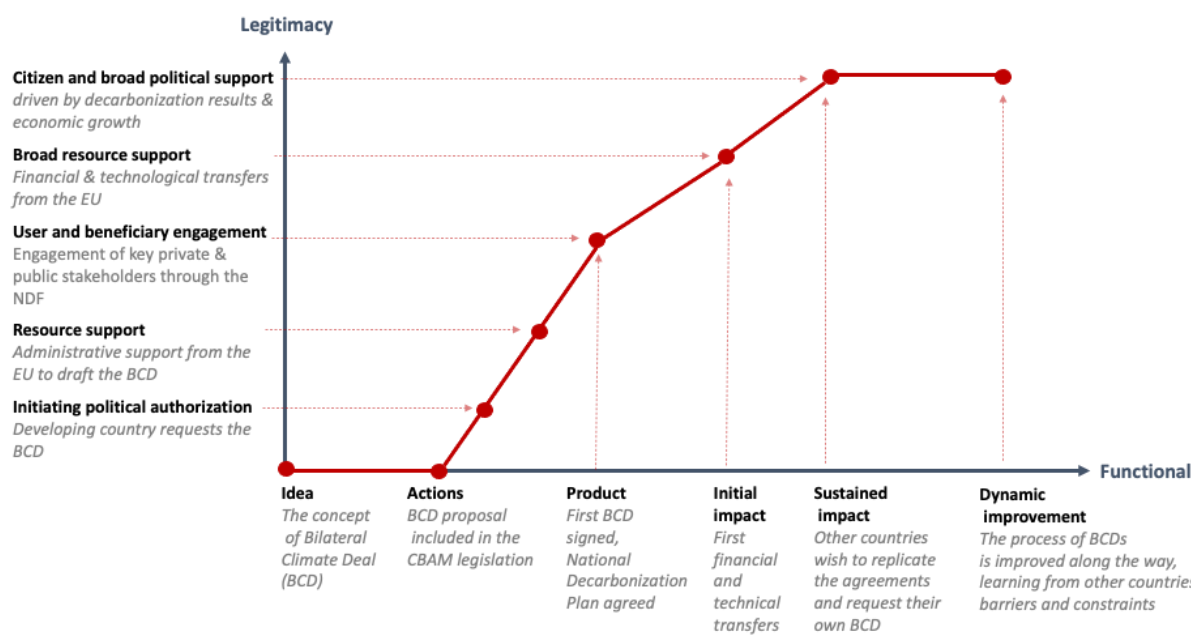
- **The Kyoto Protocol is an example of building functionality without legitimacy.** It aimed to go too fast, in a too radical form: by aiming that all countries implement a carbon market, it did not consider countries different levels of development or commitment, nor their specific challenges. It also disregarded any form of national sovereignty and did not focus on institutions building. As a result, it represented a too large push along the functionality axis, without building capabilities and creating a strong opposition. Any potential short-term results were eliminated.

- **On the contrary, most of the other environmental international agreements represent a push of legitimacy without building functionality.** Their lack of clear commitments has allowed countries to put climate in their “symbolic agenda”, as a way of showing that climate change was on top of their political agenda, while not engaging any tangible measure to curb emissions.

The proposed policy framework aims at building both legitimacy and functionality:

- Legitimacy is maximized by:
 - The fact that the decarbonization strategy and investments are decided by the developing country, hence ensuring that the efforts are in line with the country interests and capabilities.
 - Collaboration between private and public representatives to avoid political capture or favoring private interests.
- Functionality is maximized by:
 - Guaranteed financial and technological transfers.
 - Flexibility in the compliance mechanism, cognizant of the potential barriers and the limited capability of governments’ administration to control country emissions.
 - Bilateral engagements being easier to agree and coordinate than multilateral ones.
 - Successful precedents by the first signatories of the BCDs could be replicated by other developing countries.

Theory of change: building legitimacy and functionality along the policy proposal implementation



Source: Author, using Andrews (2021) framework

b. Fostering endogenous change

There seems to be a broad consensus among trade economists concerning the fact that trade policy is influenced by interest groups, and in particular powerful incumbents (Grossman & Helpman, 1994). In the same manner as trade policies are endogenous to more powerful companies, it would seem very likely that climate policy (not necessarily country-wise, but at least related to some industries) may also be endogenously influenced by powerful incumbents. Given that the proposed policy proposal aims to involve those powerful incumbents in the design of the National Decarbonization Plans, and that they will benefit from the financial transfers to be spent on green investments, powerful incumbents may progressively “become greener”.

Consequently, the proposed BCD may create an endogenous positive feedback loop among the developing country stakeholders, as it will become in their economic and political interest to pass more stringent climate policies.

5. Feasibility considerations

a. Key political actors

The political feasibility of the policy proposal needs to be assessed among the key political actors: the European Union political leaders, the developing countries political leaders, and the emitting industries in developing countries. The following tables assess the context, as well the potential pros and cons of the BCD for each key actor.

The European Union					
Context	<ul style="list-style-type: none"> • The EU is responsible of c.18% of cumulative CO₂ emissions • In the last two decades, it has imposed some of the most ambitious climate regulation: <ul style="list-style-type: none"> ○ In 2005 the EU implement the first and largest to date carbon market, the EU Emissions Trading Scheme (EU ETS). The current price of carbon emissions is increasing, having reached the ~60 € / tCO₂) ○ The EU Green Taxonomy is considered the most granular and comprehensive green taxonomy so far ○ The EU Green Deal has set significant decarbonization objectives for the next decades • In implementing the CBAM, the EU expects to achieve a double objective: (i) sustain the decarbonization of its economy without fostering “carbon leakage”, and (ii) incentivize external players to decarbonize 				
BCDs Pros & Cons	<table border="0" style="width: 100%;"> <tr> <td style="background-color: #90c090; width: 50%;">Advantages of the BCD framework for the EU</td> <td style="background-color: #d0e0f0;">Disadvantages</td> </tr> <tr> <td style="vertical-align: top;"> <ul style="list-style-type: none"> ✓ Minimize international resistance to the CBAM implementation ✓ Avoid excluding developing countries from the CBAM scope (what would represent a leakage threat) ✓ Expand the utilization of the EU green taxonomy as a reference for green investments. ✓ Position the EU as a key reference for climate leadership </td> <td style="vertical-align: top;"> <ul style="list-style-type: none"> X Potential opposition from EU companies and some political parties that would have preferred to channel the CBAM proceeds for the decarbonization of EU companies, not foreign ones X Potential opposition from citizens that would have preferred to channel the proceeds of the CBAM to lower-income households in the EU to support them in the transition towards greener energy sources </td> </tr> </table>	Advantages of the BCD framework for the EU	Disadvantages	<ul style="list-style-type: none"> ✓ Minimize international resistance to the CBAM implementation ✓ Avoid excluding developing countries from the CBAM scope (what would represent a leakage threat) ✓ Expand the utilization of the EU green taxonomy as a reference for green investments. ✓ Position the EU as a key reference for climate leadership 	<ul style="list-style-type: none"> X Potential opposition from EU companies and some political parties that would have preferred to channel the CBAM proceeds for the decarbonization of EU companies, not foreign ones X Potential opposition from citizens that would have preferred to channel the proceeds of the CBAM to lower-income households in the EU to support them in the transition towards greener energy sources
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Developing countries political leaders					
Context	<ul style="list-style-type: none"> • Responsible of 45% of cumulative carbon emissions, while aggregating 85% of the world population. The flow of carbon emissions is rising faster than for developed countries. • Decarbonization is probably not on the top of the agenda for most developing countries (other most important development challenges need to be faced: growth, education, inequality, infrastructure investments, ...). • They usually face more challenging barriers when addressing carbon emissions given weaker administrative capacity, lack of technology access and lack of low-cost finance to foster the required investments to decarbonize their economies. • While decarbonization efforts might not be in top of their political agenda, developing countries are on average more exposed to the potential risks of climate change in the short / medium term. 				
BCDs Pros & Cons	<table border="0" style="width: 100%;"> <tr> <td style="background-color: #90c090; width: 50%;">Advantages of the BCD framework</td> <td style="background-color: #d0e0f0;">Disadvantages</td> </tr> <tr> <td style="vertical-align: top;"> <ul style="list-style-type: none"> ✓ Better to take advantage of the BCD than to fully absorb the cost of the CBAM. As the BCD would allow to redirect back to the country the CBAM proceeds. ✓ Investments and policies under the BCD would be proposed and approved by the country, hence aligned with internal capabilities and constraints. ✓ Potential to leverage additional financial and technical support from the EU. ✓ Support to decarbonize the economy, hence to be aligned with international commitments, and give a future competitive edge to national companies. </td> <td style="vertical-align: top;"> <ul style="list-style-type: none"> X Potentially hard to coordinate between public and private actors, in particular if several private actors involved (the more the number of private actors to be exposed to the CBAM, and the larger the number of sectors exposed, the more challenging it will be to coordinate the National Decarbonization Plan and the yearly investment decisions). X If the BCD is agreed, there is a missed opportunity to fully oppose the CBAM. </td> </tr> </table>	Advantages of the BCD framework	Disadvantages	<ul style="list-style-type: none"> ✓ Better to take advantage of the BCD than to fully absorb the cost of the CBAM. As the BCD would allow to redirect back to the country the CBAM proceeds. ✓ Investments and policies under the BCD would be proposed and approved by the country, hence aligned with internal capabilities and constraints. ✓ Potential to leverage additional financial and technical support from the EU. ✓ Support to decarbonize the economy, hence to be aligned with international commitments, and give a future competitive edge to national companies. 	<ul style="list-style-type: none"> X Potentially hard to coordinate between public and private actors, in particular if several private actors involved (the more the number of private actors to be exposed to the CBAM, and the larger the number of sectors exposed, the more challenging it will be to coordinate the National Decarbonization Plan and the yearly investment decisions). X If the BCD is agreed, there is a missed opportunity to fully oppose the CBAM.
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Carbon emitting industries in developing countries, to be covered by the CBAM

Context	<ul style="list-style-type: none"> • No financial incentive to internalize the cost of decarbonization, in particular under international competition (global commodities), which may trigger a "race to the bottom" in terms of unregulated emissions • Most of the time, those companies are more carbon intensive than EU-peers, given lack of green regulation in their host countries 	
BCDs Pros & Cons	Advantages of the BCD framework	Disadvantages
	<ul style="list-style-type: none"> ✓ Potential to leverage additional financial and technical support from the EU. ✓ Embark in the pace of greening their production, as future climate "tariffs" may be a risk looming ahead (beyond the CBAM) 	<ul style="list-style-type: none"> ✗ Potentially hard to coordinate between public and private actors, in particular if several private actors involved (the more the number of private actors to be exposed to the CBAM, and the larger the number of sectors exposed, the more challenging it will be to coordinate the National Decarbonization Plan and the yearly investment decisions). ✗ If the BCD is agreed, there is a missed opportunity to fully oppose the CBAM ✗ Lack of competitiveness in the short term in international markets

b. Technical and administrative feasibility

This proposal implies mobilizing significant resources back to the developing countries to be devoted to green investments and climate policies. While this seems feasible both from a technical and administrative perspective by the EU (provided that the political support is achieved)¹⁵, developing countries would need to provide significant commitment to this measure to ensure a successful implementation and the achievement of decarbonization investments. Particular challenges may lay in the following fronts:

- **Ensuring a positive coordination between public and private parties.** Key for the development of the “national decarbonization plans”, as well as to ensure a smooth distribution of the proceeds and an alignment of public policies with private sector needs,
- **Creating accountability for the reduction in emissions.**

To overcome those two challenges, both from an administrative and technical perspective, the proposed framework would gain from considering the following elements:

- **Decarbonization objectives and measurability should be done at medium term**, to avoid creating a “rush” in the short term to achieve significant decarbonization targets, when overall mobilized funds are not yet enough to finance such investments.
- **Decarbonization objectives should be set in a measurable and accountable manner.** In that regard, the closer they are linked to the carbon intensity of industrial producers, the simpler it would be to monitor and assess accountability (whereas overall carbon emissions

¹⁵ Taking into consideration the strong inspiration that this proposal has from the framework of the EU’s Next Generation Recovery and Resilience Facility, already in place.

at national level will be more difficult to assess and to consider responsibility from private agents or the government).

c. Second best options

In case there were not to be sufficient support for the development of the BCD framework in the presented form, second-best options could include (from best to worst):

- **Create additional differences in treatment within the BCD framework between low-income countries, lower-middle income and upper-middle income ones.** There is a risk of facing strong internal political resistance to prevent upper-middle income countries such as China, Russia, Turkey, South Africa, Brazil, etc. from benefitting from the proposed BCD treatment. As such, the level of CBAM proceeds being redirected to upper-middle income countries could be limited to a certain percentage of the proceeds (for instance 50%), in order to avoid generating too big transfers of CBAM proceeds back to the upper-middle income countries, who have a stronger administrative capacity, as well as easier access to technology and capital than lower income countries. In this case, it is considered that the amended BCD proposal would still be of interest to upper-middle income countries, while helping minimize internal opposition. It would also still clearly pursue the objectives of minimizing external resistance to the CBAM and strengthening EU leadership in climate policy.
- **Propose the same BCD framework, but only opened to low-income countries and lower-middle income countries.** If the political resistance from EU actors against upper-middle income countries turns out to be too strong, policy leaders could nevertheless try to propose the BCD treatment for low- and lower-middle income countries. This would cover c.18% of emissions to be covered by the CBAM. While it may not be as effective in minimizing opposition to the CBAM and strengthening the EU position as a climate leader, it would nevertheless be a positive step towards supporting decarbonization incentives in low- and lower-middle income countries. It would also create a clear signal on the fact that the CBAM (and associated BCD) are not a protectionist measure, but a measure with a clear climate objective and that is aligned with the “*common but differentiated responsibilities*”.

- Exclusion of low-income countries from the CBAM scope and seek a bilateral decarbonization partnership with Mozambique.** If resistance to the BCD turns out to be too strong, or its implementation too challenging, it is advised to consider excluding low-income countries from the CBAM scope, or at least giving them a longer transition period before the CBAM becomes applicable to them. This would help minimize criticism of non-compatibility with the “common but differentiated responsibilities” of climate law, while minimizing the impact on the potential impact and functionality of the CBAM given that imports from low-income countries only represent 1%. It is important to keep in mind that low-income country imports to be covered by the CBAM are almost exclusively made up of Mozambique aluminum exports (see chart below). As a result, the EU could seek a bilateral support agreement with Mozambique, in order to better target their development and green support towards the decarbonization of the aluminum sector.

Low-income countries to be covered by the CBAM with exports to the EU above €100k for selected commodities

Exports to the EU to be covered by the CBAM, in USD million (2019 values – pre-Covid shock)

Country	Income group	Iron & Steel	Aluminum	Fertilizer	Electricity	Cement	Total
Mozambique	low-income	0,92	1 092,56	0,00	0,00	0,00	1 093,48
Yemen	low-income	0,03	4,36	0,26	0,00	0,00	4,65
Afghanistan	low-income	1,06	0,00	0,00	0,00	0,00	1,06
Guinea	low-income	0,53	0,44	0,00	0,00	0,00	0,97
Togo	low-income	0,00	0,67	0,00	0,00	0,00	0,67
Ethiopia	low-income	0,15	0,38	0,02	0,00	0,00	0,55
Dem. Rep. of the Congo	low-income	0,12	0,15	0,00	0,00	0,00	0,27
Madagascar	low-income	0,07	0,14	0,04	0,00	0,00	0,25
Syria	low-income	0,12	0,04	0,00	0,00	0,00	0,16
Uganda	low-income	0,03	0,05	0,06	0,00	0,01	0,14
Sierra Leone	low-income	0,03	0,09	0,00	0,00	0,00	0,12
Liberia	low-income	0,10	0,00	0,00	0,00	0,00	0,10
Sudan	low-income	0,03	0,07	0,00	0,00	0,00	0,10
Mali	low-income	0,06	0,03	0,00	0,00	0,00	0,10

Source: Author's calculation based on UN Comtrade Database (HS codes: iron & steel (72, 73), aluminum (76), fertilizer (31), electricity (2716) and cement (2523)).

6. Conclusion

This policy proposal is built around two key environmental challenges:

- **First:** engaging developing countries in the fight against climate change remains one of the most challenging aspects of international climate policy.
- **Second:** while the CBAM aims to extend the EU's climate ambition to foreign producers and third countries, its implementation will only prove successful if it has a clear and strong environmental objective (key to ensure WTO-compatibility and reduce the risk of legal disputes and retaliation).

This report aims to respond to those two key challenges by leveraging the implementation of the CBAM (and using it as an opportunity) to create decarbonization incentives for developing countries in a manner that tangibly transfers financial and technical resources, while creating legitimacy and sovereignty. The two combined are expected to create a sustained impact over time.

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8. Appendix

a. Literature review

To respond to the specified challenge, the policy recommendation builds on the following literature. Even though, of course, other articles and authors have also been consulted, the ones highlighted here are the most fundamental ones to shape the policy proposal.

William's Nordhaus concept of climate clubs. In his different books and articles on climate change, Nordhaus builds the following key concepts when thinking about climate policy:

- Institutions matter: International agreements around trade represent a successful precedent of international agreements to face global externalities. The development of strong institutions was key for their success.
- Near universal participation is required to effectively slow down global warming.
- Harmonize policies through a minimum carbon price (instead of a carbon market): easier to negotiate, easier to implement and would benefit from higher acceptability at national levels.
- Combatting free riding with enforcement mechanisms: when national economic interests collide with international agreements, there will be a temptation to shirk, dissemble, and withdraw. The way to introduce enforcement mechanisms is through tariffs on trade.
- Special treatment for low-income countries: combination of financial and technological assistance in adopting low carbon technologies, while pressuring them to implement a carbon tax (instead of other taxes).

David G. Victor's case for "the small Club approach" and the concept of "Climate Accession Deals". Potential institutional reforms that could allow for more progress in climate negotiations, given that "*the most important yet challenging aspect of international climate policy has been to encourage developing countries to contribute to this portfolio of efforts*":

- Framing climate deals in "smaller groups" would:
 - Reduce the effort and complexity of required deal making.
 - Be anchored in host countries' interests and capabilities and thus do not require negotiating agreements that run contrary to a country's interests.
 - Allow for the flexibility needed to coordinate policies on technological innovation and deployment.
 - Create successful precedents (i.e. demonstrate solutions to hard problems) that could be replicated or expanded into more widespread use.

- The concept of “Climate Accession Deals” (CAD) to introduce developing countries into the “Climate Club”:
 - CADs would frame a long-term transition during which the developing country would become a full member of the climate regime.
 - Developed countries would support each CAD by providing specific benefits such as financial resources, technology, administrative training, etc.
 - CADs would take advantage of the fact that there are many large policy shifts that are in these countries’ interests, and which also reduce GHG emissions.

Acemoglu, Aghion et al. recommendations based on the paper “environment and directed technical change in a North–South model”:

- The optimal global policy involves research subsidies and carbon prices being adopted both in the North and the South. Implementing research subsidies and carbon taxes in the North only, without such policies in the South, is not optimal.
- The need to ease technology transfer from the North to the South: The higher the spill-overs from green innovation in the North, the more active the ‘imitation machine’ in the South to implement clean technologies rather than dirty ones.
- The risk of a “pollution haven” effect: the South may fully specialize in the production of the dirty good, making clean imitation unprofitable, so that the South ends up in a ‘dirty input production trap’.
- The need to help emerging market economies finance the transition.
- Suggestion to revisit the WTO rules to make the carbon threat credible.

Dani Rodrik’s case for green industrial policy and green R&D to foster green growth:

- Governments seem more prone to address the climate problem through subsidies & regulation that improve the profitability of investments in renewable energy sources, rather than pricing carbon.
- R&D externalities and carbon under-pricing provide mutually reinforcing reasons to support green technologies. However, in most countries, policy focuses more on subsidizing supply of renewable energy rather than boosting R&D.
- In the face of uncertainty, it is optimal to finance a larger group of projects than will prove viable ex post.

Danny Cullenward and David g. Victor book on “Making Climate Policy Work”:

- Prioritization of sectors matters, as the state of decarbonization technology remains at a nascent stage in nearly all of the sectors that account for the bulk of climate pollution.
 - Given that each sector has its own political economy and state of technology, treating all sectors with the same carbon price will restrain the effectiveness of any policy to the lowest common denominator.
- While institutions are key element of success for carbon markets, policy makers should not focalize just in the development of carbon markets given the strong institutional setup they require: *“only the European integrated international [carbon] market has proved sustainable. However, this one is built on the top of highly demanding conditions to be met: a powerful structure of common European economic institutions, common rule of law and administrative procedure, and common confidence that the superstructure is robust.”*
- The inconvenient problem of politics and long-term horizon: Successful climate policy requires building and sustaining political coalitions to support policies that will transform all the major emitting sectors of the economy.
 - Incumbents are powerful, the new entrants are not.

Hall, Levi, Pizer and Ueno policies for developing countries engagement:

- The need for a cooperative solution between developed and developing countries, otherwise the growth in developing country emissions will easily thwart the decarbonization efforts of developed countries.
- A wide range of options that should be pursued: including domestic policy reforms in developing countries, expanded financing mechanisms to address incremental costs, and diplomatic efforts in a variety of forums, all aimed at increasing developing country mitigation efforts over time.

Gilbert Bankobeza key learnings on incentives, institutions and enforcement mechanisms based on the “Compliance regime of the Montreal Protocol”:

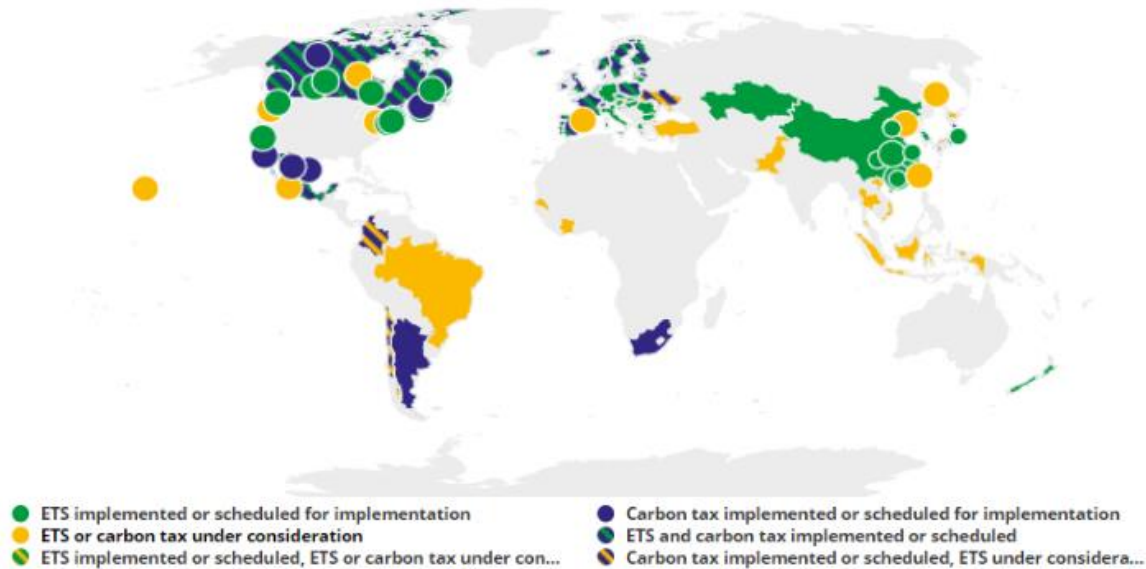
- Enforcement mechanisms under multilateral environmental agreements have shifted “from the traditional command and control to incentive-based approaches”, including the following incentives:
 - **Financial assistance** for developing countries to build the required capacity to comply with the treaty obligations.

- ***Transfer of technology***: to assist developing countries in the implementation of their environmental obligations.
- ***Common but differentiated responsibilities***: allowing for different implementation horizon for developing countries (to allow for capacity-building in development countries through the financial and technical assistance).
- Monitoring is crucial to assess compliance: irrespective of what type of non-compliance regime is agreed, its effectiveness would depend on how it is monitored.
- Compliance is enforced through different mechanisms:
 - Trade restrictions towards countries that have not yet ratified the protocol (also to discourage industries from shifting their production facilities to non-compliant countries).
 - Issuance of cautionary statements as a warning.
 - Threat of suspension or withdrawal of specific rights and privileges.
 - Dispute settlement procedures.
- In case of non-compliance, the Montreal Protocol favours a non-confrontational, conciliatory, and co-operative non-compliance regime: the Non-Compliance Procedure (NCP)
 - Such approach is considered better suited to help countries that are in breach of their obligations to return to compliance, if it is considered that the reasons for non-compliance are most likely a consequence of economic, technical, or administrative problems.
 - Includes a requirement to submit an action plan that would enable the affected party to return to compliance.

b. Carbon pricing dashboard

As indicated in the introductory part, only a minority of countries have introduced a carbon pricing mechanism. According to the World Bank “Carbon Pricing Dashboard” (World Bank, 2021): only 65 carbon pricing initiatives have been implemented, covering 11.65 GtCo2e, representing 21.5% of global GHG emissions.

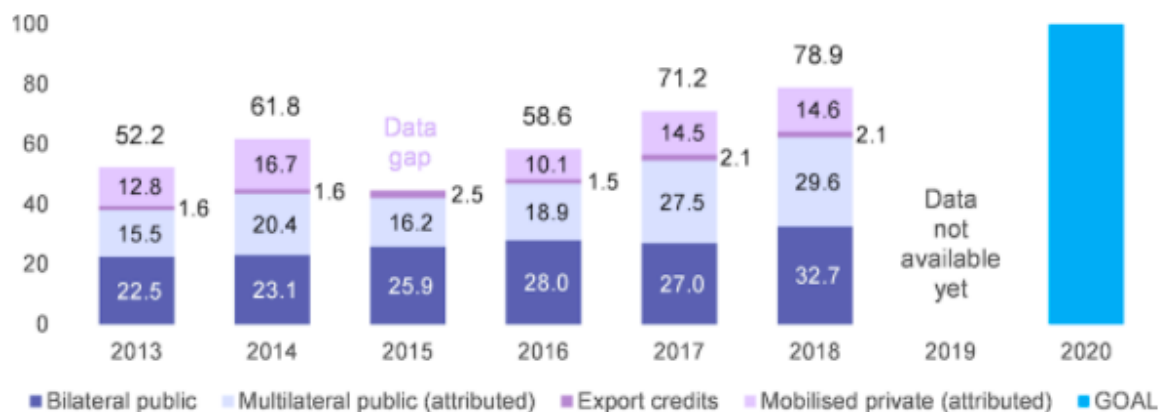
Summary map of regional, national and subnational carbon pricing initiatives



Source: World Bank Carbon Pricing Dashboard (2022).

c. Climate finance from developed to developing countries (OECD, 2018)

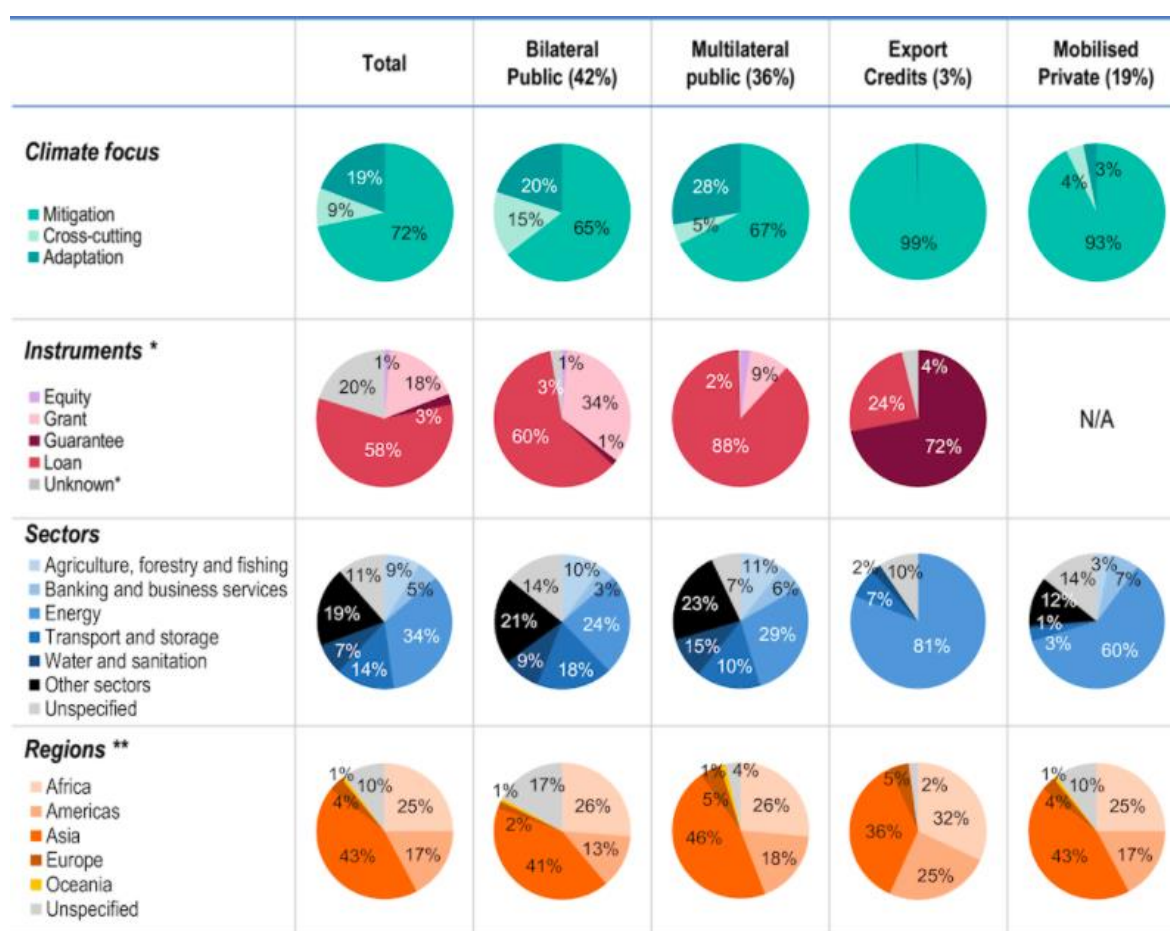
Climate finance provided and mobilized by developed countries for developing countries (USDm)



Source: OECD (2020), Climate finance provided and mobilized by developed countries

Note: The gap in the private finance time series of 2015 is due to the implementation of enhanced measurement methodologies. As a result, private flows for 2016-2018 cannot be directly compared with private flows for 2013-14

Climate finance provided and mobilized by developed countries (2016-18, %)



Source: Based on Biennial Reports to the UNFCCC, OECD Development Assistance Committee statistics, OECD Export Credit Group statistics, as well as complementary reporting to the OECD.

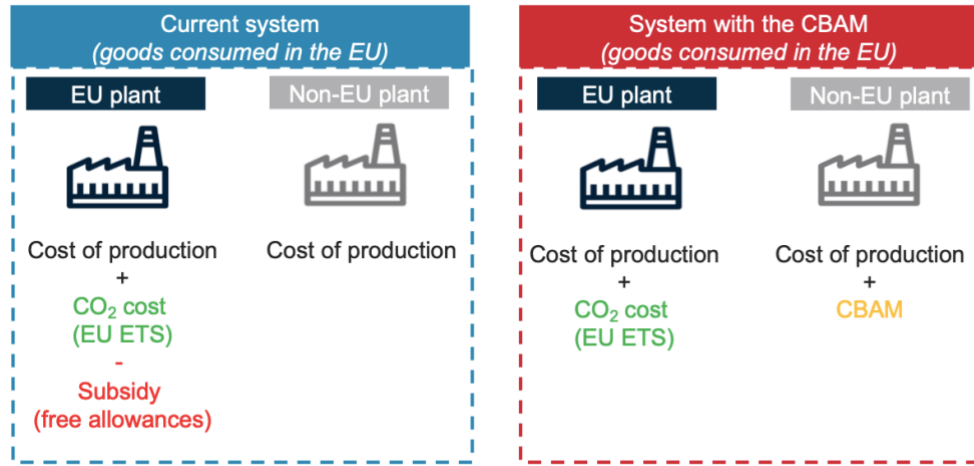
Note: (*) For financial instruments, "unknown" includes unspecified public finance as well as all mobilized private climate finance.

(**) "Developing countries", which refer to countries and territories included on the DAC List of ODA Recipients for 2018 development finance (OECD, 2020[14]) and/or on the non-Annex I list of Parties to the UNFCCC

d. CBAM and EU ETS complementarity

The CBAM is considered an essential mechanism to sustain the EU’s climate ambition, particularly as the EU plans to progressively phase out the existing free allowances under the EU ETS.

Chart on CBAM and EU ETS complementarity



Source: Garicano and Fayos, 2021

- e. Potential other sectors to be covered by the CBAM in the future

According to the EU Commission Impact Assessment report on the CBAM, the sectors to be covered by the CBAM have been selected based on: (i) carbon intensity, (ii) risk of carbon leakage, and (iii) administrative feasibility. This has allowed to shortlist the first 5 sectors to be covered by the CBAM by 2025: iron & steel, cement, fertilizers, aluminum and energy.

According to the chart below, additional sectors that could be added to the CBAM coverage in the future include: pulp & paper, lime & plaster, glass, other chemicals and ceramics.

Chart on CBAM and EU ETS complementarity

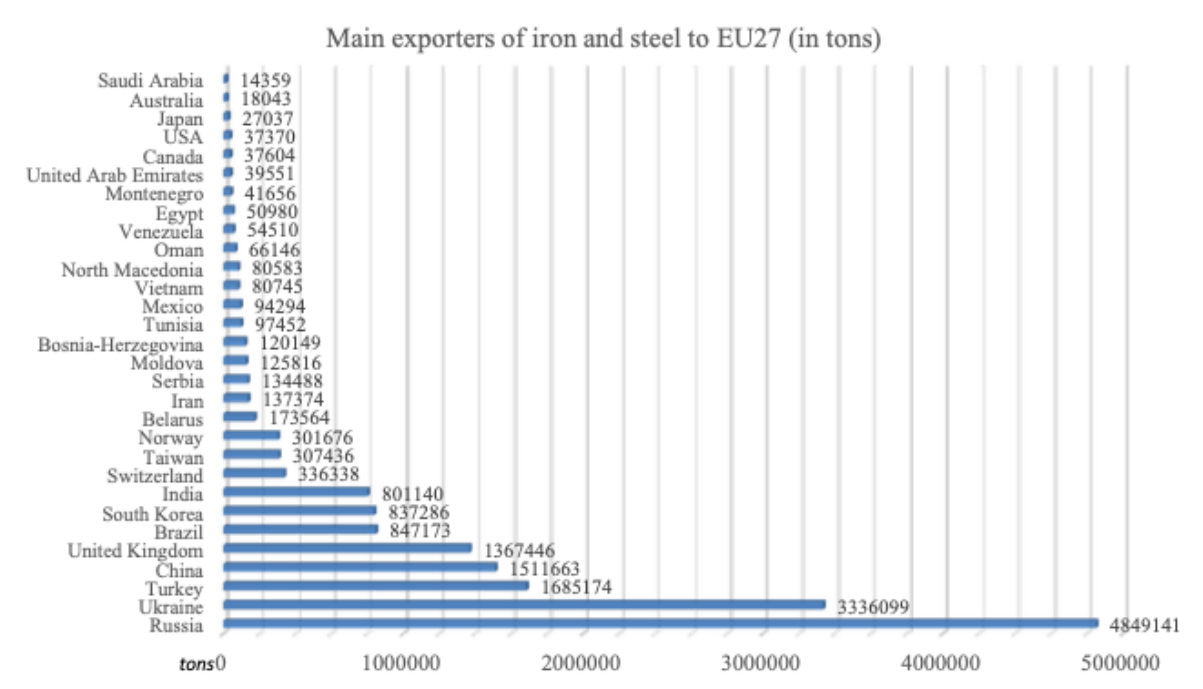
Short sector name	Number of installations	Emissions [kt CO ₂ /yr]	Cumulated emissions
Iron & Steel	485	159 861	22.8%
Refineries	130	132 164	41.7%
Cement	214	118 164	58.6%
Organic basic chemicals	331	64 877	67.8%
Fertilizers	99	36 995	73.1%
Pulp & Paper	672	27 233	77.0%
Lime & Plaster	193	26 151	80.7%
Inorganic chemicals	149	22 483	84.0%
Glass	326	18 226	86.6%
Aluminium	89	13 755	88.5%
Ceramics	350	7 810	89.6%
Polymers	121	5 655	90.4%
Other sectors	1 200	66 902	100.0%

Source: Commission Analysis

Sectoral emissions as share of the EU ETS industry sectors emissions.

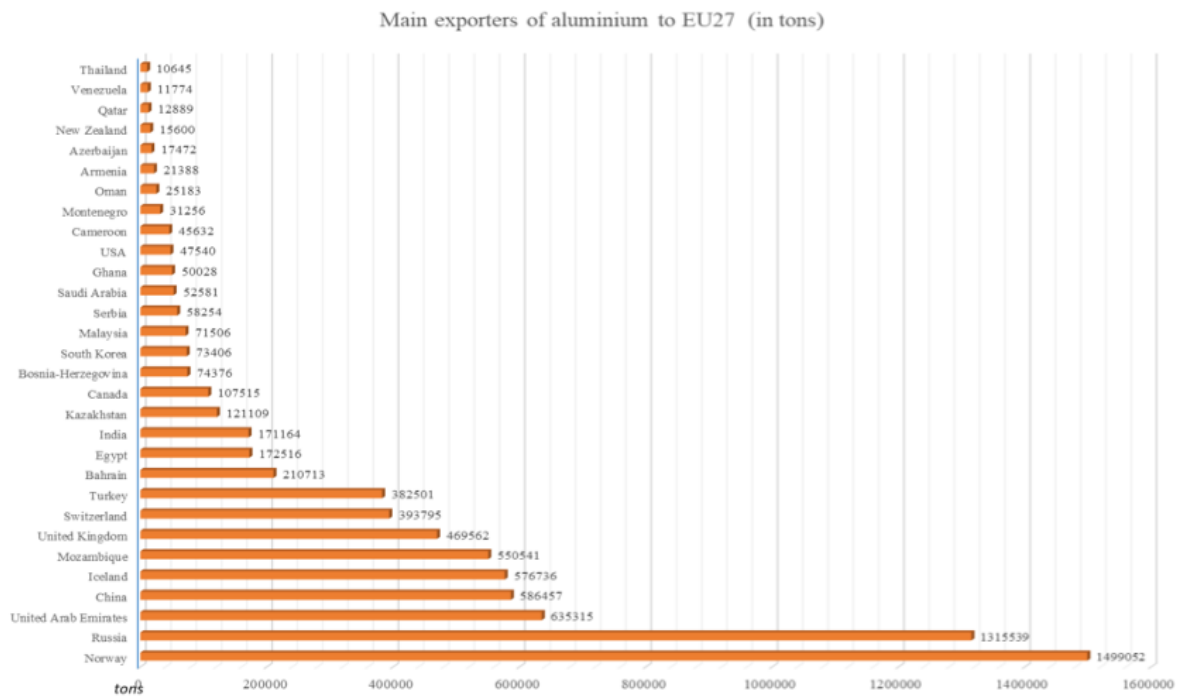
Source: EU Commission, CBAM Impact Assessment Report, Part I, 2021

f. Main exporters of iron & steel to the EU-27 (2019)



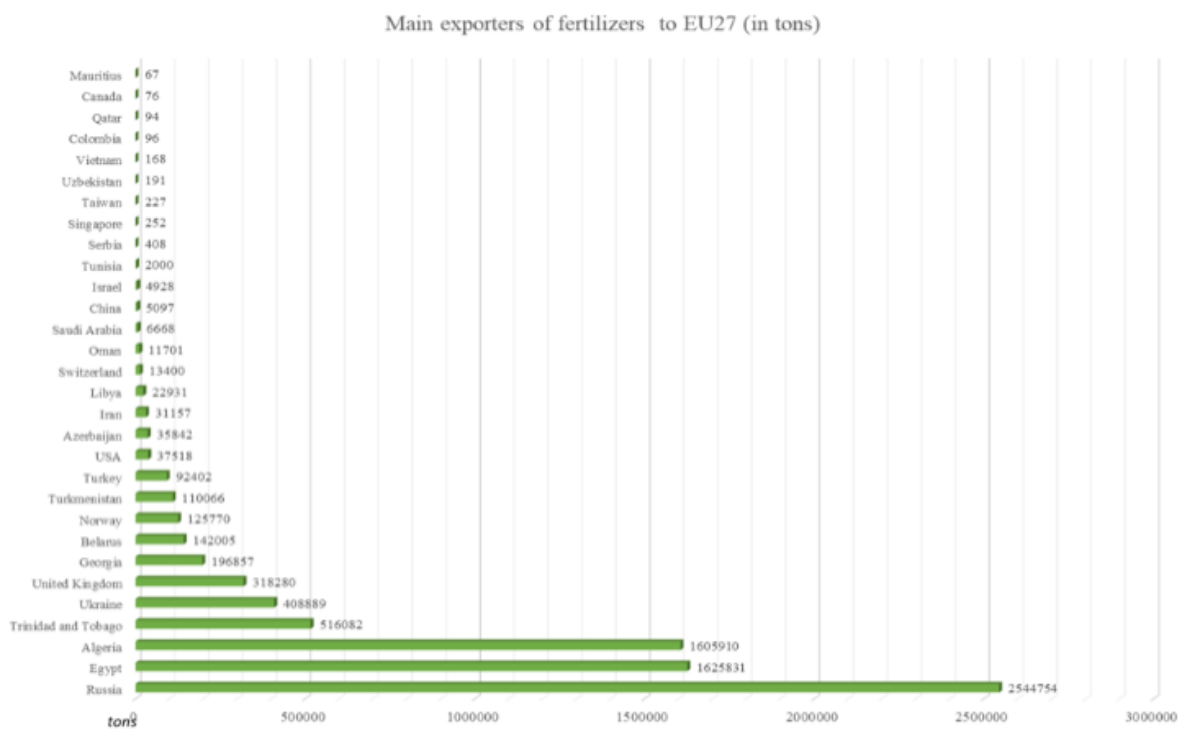
Source: Commission analysis based on data from Eurostat COMEXT

g. Main exporters of aluminum to the EU-27 (2019)



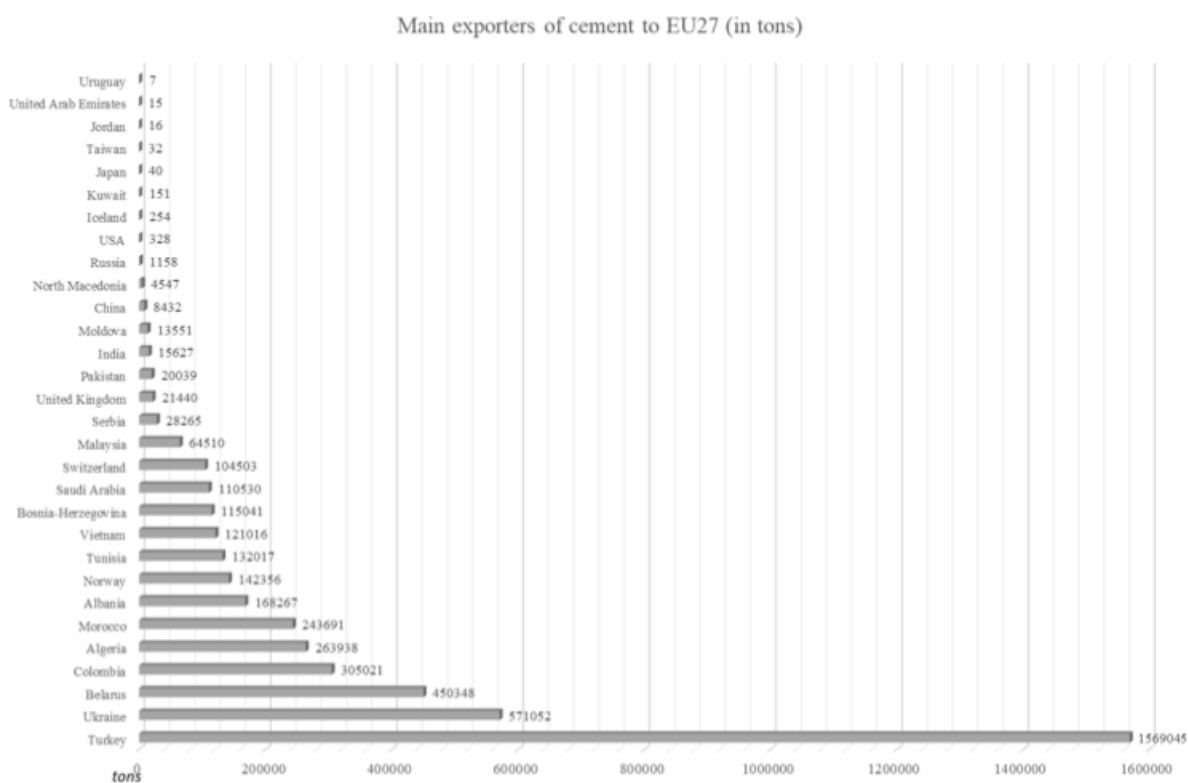
Source: Commission analysis based on data from Eurostat COMEXT

h. Main exporters of fertilizers to the EU-27 (2019)



Source: Commission analysis based on data from Eurostat COMEXT

i. Main exporters of cement to the EU-27 (2019)

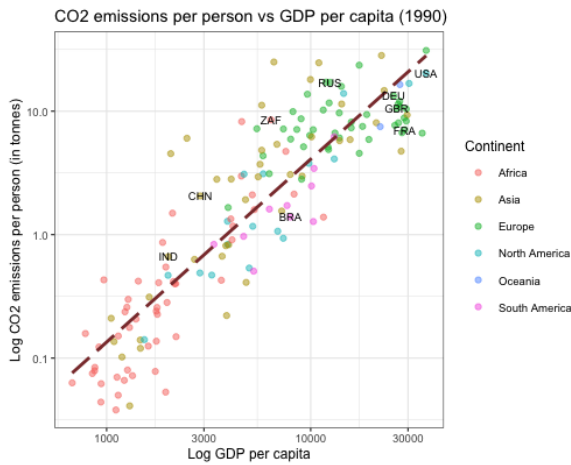


Source: Commission analysis based on data from Eurostat COMEXT

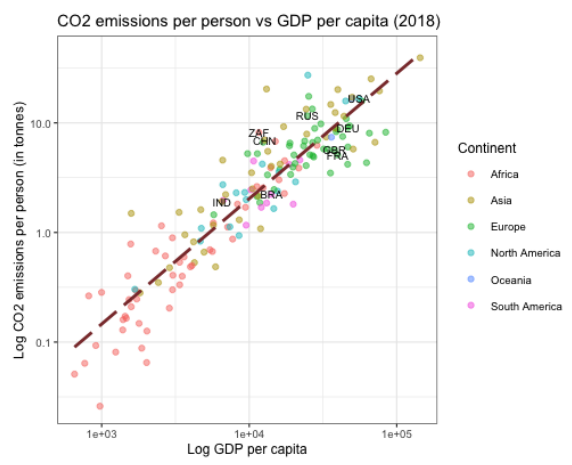
j. Empirical evidence of the “environmental Kuznet curve”

While the two first set of charts below show a very high correlation between the level of GDP per capita and the level of emissions per capita, the following two set of charts indicate that some countries, such as Germany, France, Great Britain, or Sweden, have been able to follow a decreasing trend in emissions per capita, while GDP per capita has been increasing.

CO2 emissions vs GDP per capita (in 1990)

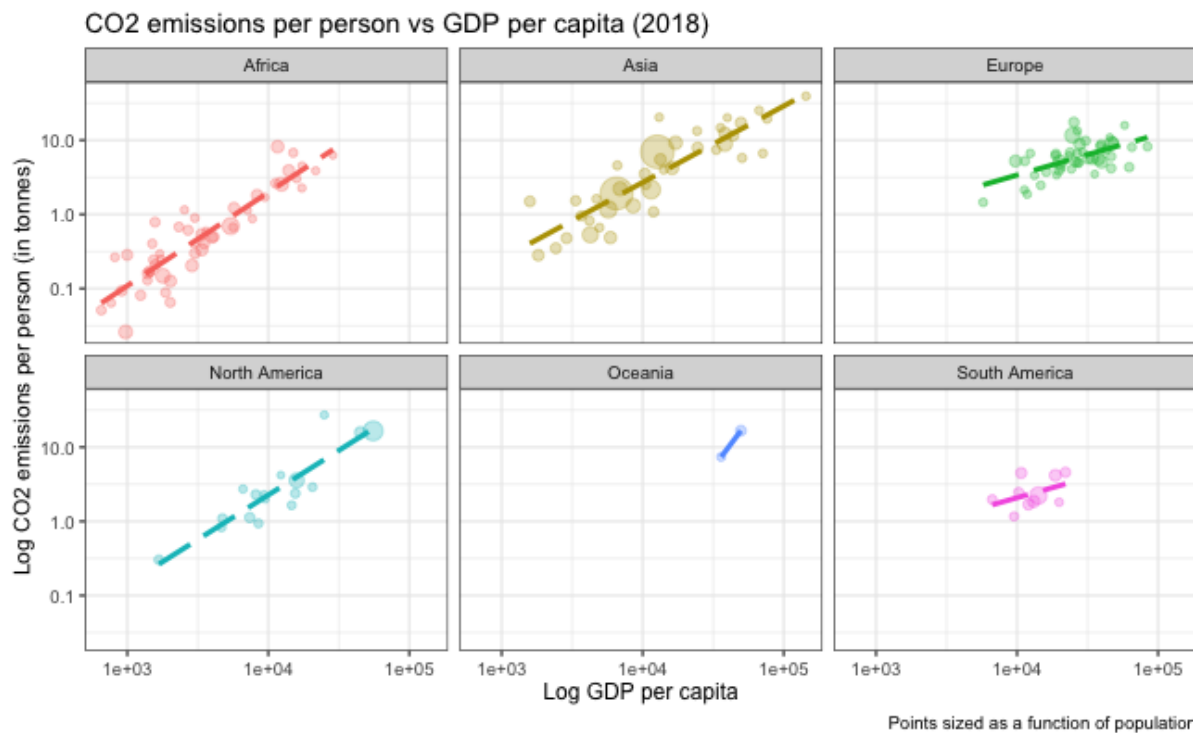


CO2 emissions vs GDP per capita (in 2018)



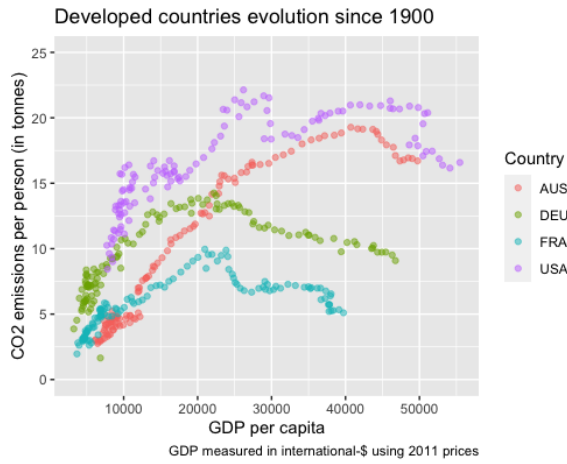
Source: Our World in Data, Carbon Database

CO2 emissions vs GDP per capita (2018) – per continent

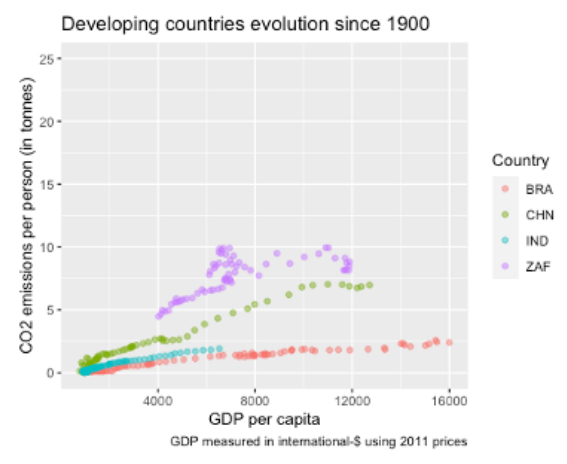


Source: Our World in Data, Carbon Database

Environmental Kuznet Curve of some developed countries (1900-2020)

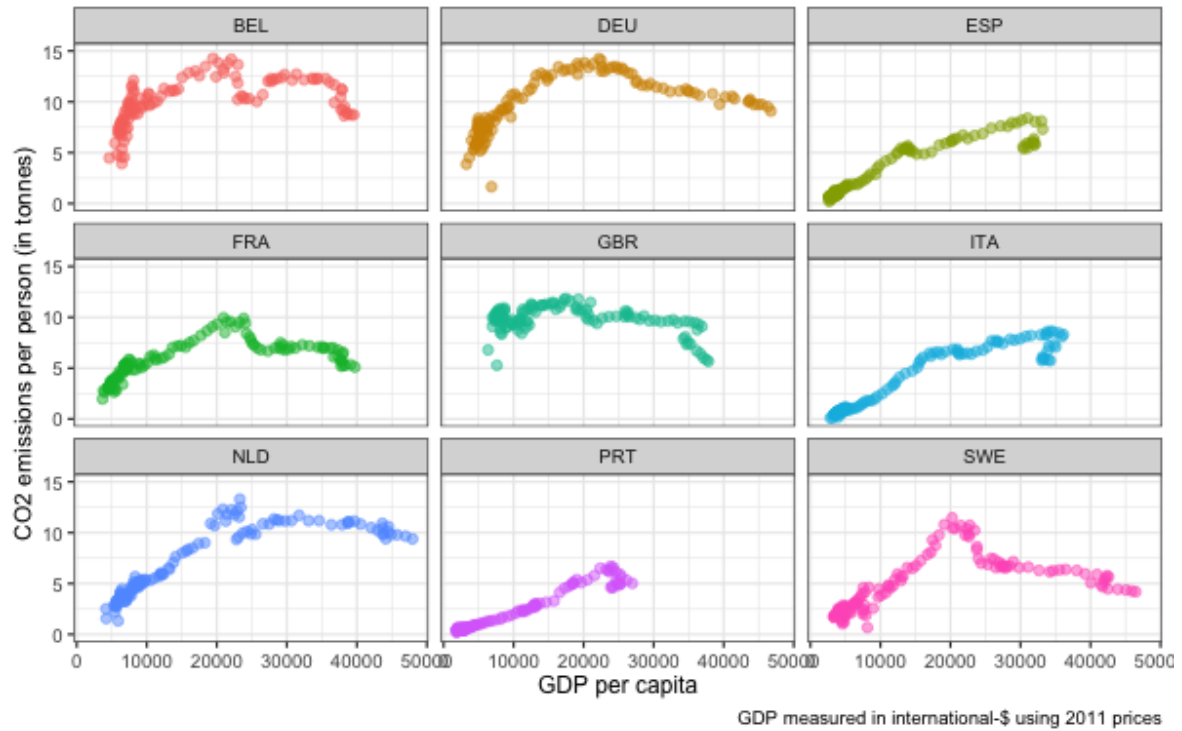


Environmental Kuznet Curve of some developing countries (1900-2020)



Source: Our World in Data, Carbon Database

Western European countries “Environmental Kuznet Curve” (1900-2020)

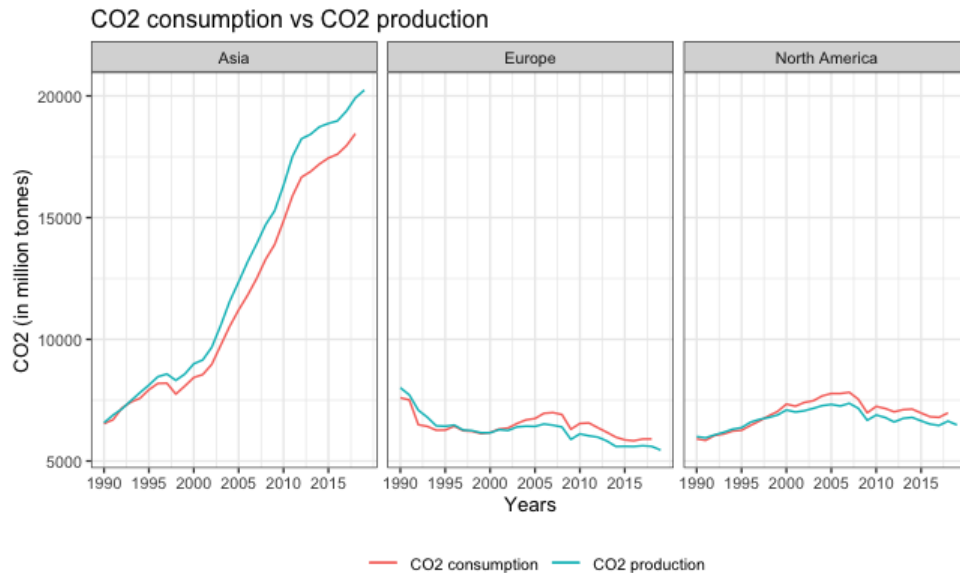


Source: Our World in Data, Carbon Database

k. Carbon emissions vs carbon consumption

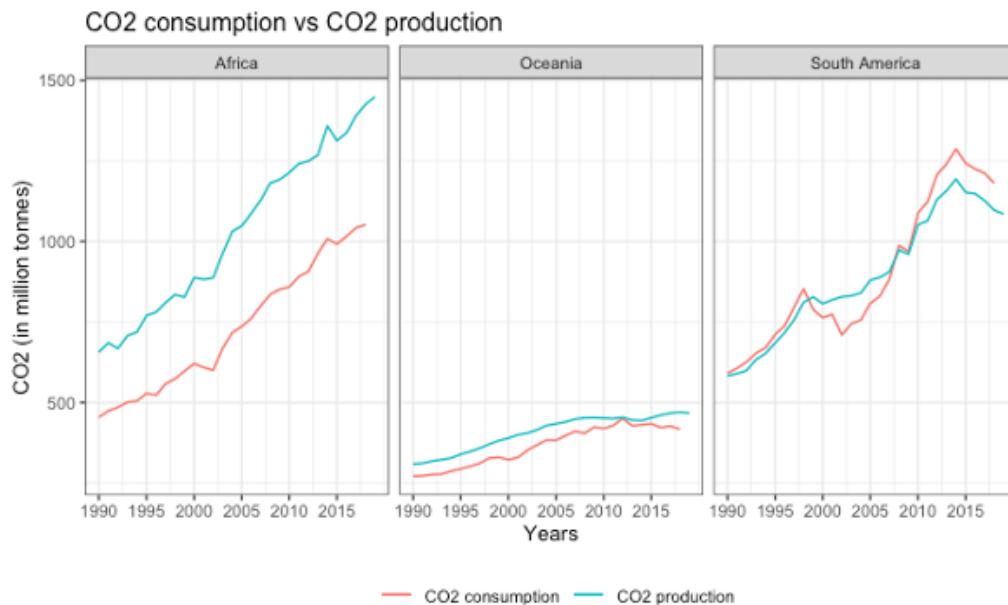
The charts below show that most developing regions are net exporters of CO₂ emissions (ie. they produce more carbon content than they consume), while richer regions such as Europe or North America are net importers of CO₂ emissions, evidencing the carbon content embedded in trade.

How much carbon is embedded in trade?



Source: Our World in Data, Carbon Database

How much carbon is embedded in trade? (ii)

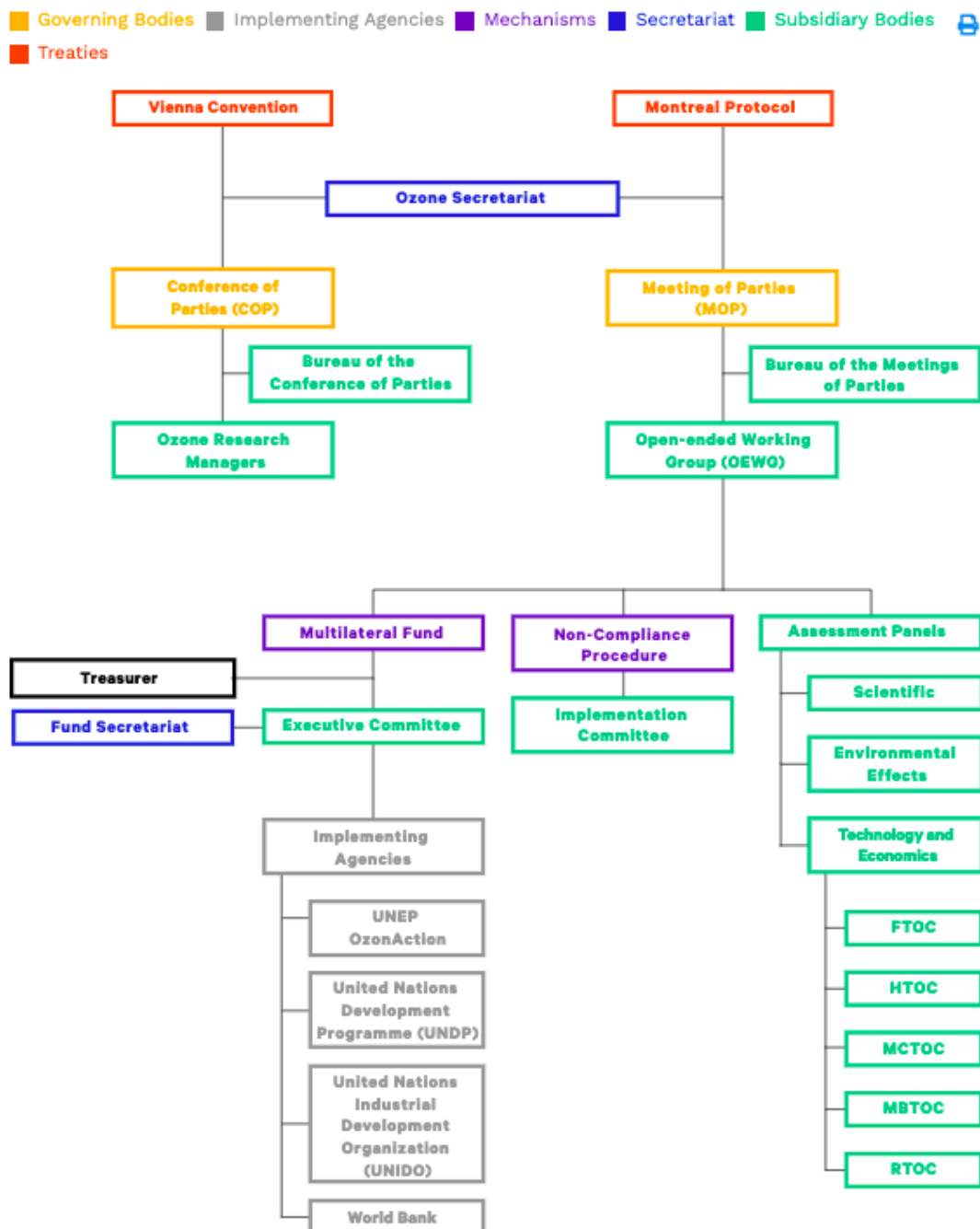


Source: Our World in Data, Carbon Database

1. Ozone treaties institutional framework

It would be relevant to reflect on the Ozone treaties institutional framework, and in particular the way implementing agencies such as the World Bank or the United Nations have been involved in the framework, as it could also be relevant for this policy proposal.

Ozone treaties institutional Framework



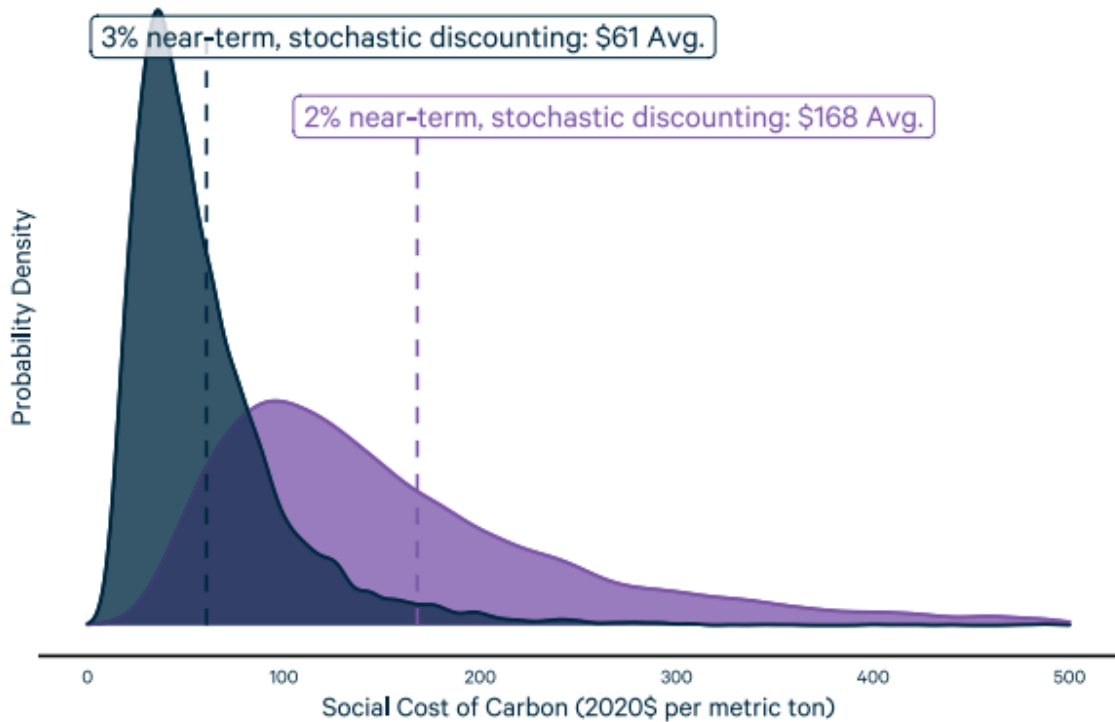
Source: Ozone Secretariat Website

m. Social Cost of Carbon (SCC) calculations

To assess the social cost of carbon of the carbon emissions “saved” through the BCD-induced (hypothetical) decarbonization path, I have used the RFF SCC central estimates of \$61 and \$168/ton CO₂ under 3 and 2 percent near-term stochastic discounting rates.

Illustrative Probability Distributions of Social Cost of Carbon (2020\$/ton CO₂) under Alternative Socioeconomic Inputs and Discounting Approaches, with FaIR Climate and DICE Damage Modules

SCCs under RFF-SPs, Stochastic Discounting



Source: Resources for the Future (RFF), Working Paper 21-28, October 2021

The tables below present the calculations to obtain the overall social cost of carbon emissions saved through to the BCD-induced (hypothetical) decarbonization path in the two countries. Key assumptions being:

- Constant level of production in terms of tons produced.
- Decarbonization path characterized by reaching the world average level of carbon intensity for direct emissions by 2035, and the EU current top 10% best performers by 2050.
- Utilization of the 2% and 3% yearly constant discount factors to the flow of carbon emissions “saved” per year.

- Respective application of the associated social cost of carbon to those “saved” emissions, ie. US\$61 per ton of carbon under the 3% discount factor scenario and US\$168 under the 2% discount factor scenario.

Case of Mozambique

Year	Mozambique aluminum production				Carbon saved (tons)		Social cost of carbon (SCC) saved (€m)	
	Aluminium production (tons)	Carbon intensity (t CO ₂ eq / t produced)	Direct carbon emissions (tons)	Carbon emissions saved with respect to baseline (tons)	Using 2% discount factor	Using 3% discount factor	Using 168 €/ton SCC	Using 61 €/ton SCC
2025	550 541	4,00	2 202 164	0	0	0	0	0
2026	550 541	3,93	2 163 626	38 538	37 041	36 326	6	2
2027	550 541	3,86	2 125 088	77 076	72 630	70 535	12	4
2028	550 541	3,79	2 086 550	115 614	106 809	102 721	18	6
2029	550 541	3,72	2 048 013	154 151	139 620	132 972	23	8
2030	550 541	3,65	2 009 475	192 689	171 103	161 374	29	10
2031	550 541	3,58	1 970 937	231 227	201 297	188 009	34	11
2032	550 541	3,51	1 932 399	269 765	230 242	212 955	39	13
2033	550 541	3,44	1 893 861	308 303	257 974	236 289	43	14
2034	550 541	3,37	1 855 323	346 841	284 530	258 082	48	16
2035	550 541	3,30	1 816 785	385 379	309 946	278 406	52	17
2036	550 541	3,18	1 750 720	451 444	355 960	316 633	60	19
2037	550 541	3,06	1 684 655	517 509	400 051	352 398	67	21
2038	550 541	2,94	1 618 591	583 573	442 276	385 811	74	24
2039	550 541	2,82	1 552 526	649 638	482 691	416 978	81	25
2040	550 541	2,70	1 486 461	715 703	521 351	446 003	88	27
2041	550 541	2,58	1 420 396	781 768	558 310	472 983	94	29
2042	550 541	2,46	1 354 331	847 833	593 618	498 013	100	30
2043	550 541	2,34	1 288 266	913 898	627 328	521 183	105	32
2044	550 541	2,22	1 222 201	979 963	659 487	542 582	111	33
2045	550 541	2,10	1 156 136	1 046 028	690 144	562 292	116	34
2046	550 541	1,98	1 090 071	1 112 093	719 345	580 393	121	35
2047	550 541	1,86	1 024 006	1 178 158	747 136	596 963	126	36
2048	550 541	1,74	957 941	1 244 223	773 560	612 075	130	37
2049	550 541	1,62	891 876	1 310 288	798 661	625 801	134	38
2050	550 541	1,50	825 812	1 376 353	822 480	638 207	138	39
Total	14 314 066		41 428 210	15 828 054	11 003 589	9 245 983	1 849	564

Source: Author calculations

Under Mozambique’s proposed decarbonization path, we find that:

- Carbon emissions saved between 2025 and 2050 amount to 15.8 million tons, representing 38% of the total emissions generated (41.4 million tons of carbon emissions for the production of 14.3 tons of aluminum).
- Those 15.8 million tons of carbon “saved” would represent between €564 million and €1.8 billion in social cost of carbon, using respectively the 3% and 2% discount factors.

Case of Ukraine

Year	Ukraine iron & steel production				Carbon saved		Social cost of carbon	
	Aluminium production (tons)	Carbon intensity (t CO ₂ eq / t produced)	Direct carbon emissions (tons)	Carbon emissions saved with respect to baseline (tons)	Using 2% discount factor	Using 3% discount factor	Using 168 €/ton SCC	Using 61 €/ton SCC
2025	3 336 099	1,70	5 671 368	0	0	0	0	0
2026	3 336 099	1,67	5 571 285	100 083	96 197	94 338	16	6
2027	3 336 099	1,64	5 471 202	200 166	188 621	183 180	32	11
2028	3 336 099	1,61	5 371 119	300 249	277 384	266 767	47	16
2029	3 336 099	1,58	5 271 036	400 332	362 593	345 330	61	21
2030	3 336 099	1,55	5 170 953	500 415	444 354	419 090	75	26
2031	3 336 099	1,52	5 070 870	600 498	522 769	488 260	88	30
2032	3 336 099	1,49	4 970 788	700 581	597 939	553 045	100	34
2033	3 336 099	1,46	4 870 705	800 664	669 960	613 642	113	37
2034	3 336 099	1,43	4 770 622	900 747	738 926	670 240	124	41
2035	3 336 099	1,40	4 670 539	1 000 830	804 930	723 021	135	44
2036	3 336 099	1,32	4 405 474	1 265 894	998 149	887 873	168	54
2037	3 336 099	1,24	4 140 410	1 530 958	1 183 480	1 042 508	199	64
2038	3 336 099	1,16	3 875 346	1 796 022	1 361 160	1 187 382	229	72
2039	3 336 099	1,08	3 610 282	2 061 086	1 531 418	1 322 933	257	81
2040	3 336 099	1,00	3 345 218	2 326 151	1 694 475	1 449 580	285	88
2041	3 336 099	0,92	3 080 153	2 591 215	1 850 549	1 567 728	311	96
2042	3 336 099	0,84	2 815 089	2 856 279	1 999 851	1 677 763	336	102
2043	3 336 099	0,76	2 550 025	3 121 343	2 142 586	1 780 058	360	109
2044	3 336 099	0,68	2 284 961	3 386 407	2 278 955	1 874 972	383	114
2045	3 336 099	0,61	2 019 897	3 651 472	2 409 153	1 962 846	405	120
2046	3 336 099	0,53	1 754 833	3 916 536	2 533 368	2 044 011	426	125
2047	3 336 099	0,45	1 489 768	4 181 600	2 651 786	2 118 782	446	129
2048	3 336 099	0,37	1 224 704	4 446 664	2 764 587	2 187 464	464	133
2049	3 336 099	0,29	959 640	4 711 728	2 871 944	2 250 348	482	137
2050	3 336 099	0,21	694 576	4 976 792	2 974 028	2 307 712	500	141
Total	86 738 574		95 130 865	52 324 711	35 949 160	30 018 871	6 039	1 831

Source: Author calculations

Under Ukraine’s proposed decarbonization path, we find that:

- Carbon emissions saved between 2025 and 2050 amount to 52.3 million tons, representing 55% of the total emissions generated (95.1 million tons of carbon emissions for the production of 86.7 tons of iron and steel).
- Those 52.3 million tons of carbon “saved” would represent between €1.8 and €6.0 billion in social cost of carbon, using respectively the 3% and 2% discount factors.