# International climate cooperation for energy intensive industry

A (realistic) proposal

**IMPULSE**

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A (realistic) proposal

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# Preface

Dear reader,

As part of its 2022 G7 Presidency, Germany has put the idea of a "Climate Club" for international cooperation in industrial decarbonisation on the political agenda. This is one of many different proposals and initiatives that have emerged over the past year.

The success of the global industrial transition hinges on international cooperation, as energy-intensive materials are traded globally. The industrial transition requires truly global lead markets to guide investment decisions into low-carbon technologies. Deployment of these breakthrough technologies can be significantly accelerated through concerted efforts at an international scale. Finally, the industrial transition requires a new global "market infrastructure" and a common understanding of "rules of fair play" as countries decarbonise.

The German G7 Presidency is an important window of opportunity to accelerate the global industrial transition through a comprehensive collaborative framework.

In this study, we analyse which international framework conditions need to be put in place for energy-intensive industry to successfully decarbonise already in this decade, as well as which pitfalls to avoid. We map out the existing landscape of initiatives and show which gaps need to be addressed by the climate club agenda.

I wish you pleasant reading!

Yours
Frank Peter, *Director of Agora Industry*

## Key findings at a glance:

1. **The G7 proposal for an "open and cooperative climate club" with a focus on the industrial sector is an opportunity to enhance climate protection despite the current global energy crisis.** The international nature of markets for energy-intensive industries means there is a desperate need for coordination of national policies, technology deployment and anti-carbon leakage measures. Thus, the "club" idea should be developed as an open alliance of nations seeking to kick-start green international industrial value chains and advance this agenda.

2. **Climate alliances should complement carbon leakage tools such as the European Carbon Border Adjustment Mechanism (CBAM). Together, they can form a 'package' to accelerate industrial transition to climate neutrality in key sectors like steel, aluminum, cement, hydrogen and fertilizer production.** This way, it can be avoided that climate clubs are used as an argument to escape from obligations under the EU's CBAM and an international level playing field for green products can be created and scaled up over time.

3. **The alliance needs to focus on three key, practical priorities:** First, coordinating national policies and harmonizing standards for low carbon basic materials to rapidly scale global demand. Second, setting milestones and ensuring national policy commitments to support the roll-out of key climate neutral technologies. Third, facilitating the emergence of key enabling conditions for ambitious national policies, e.g. by agreeing on common principles for "rules of fair play" in designing carbon leakage policy.

4. **G7 leaders must now focus on establishing a sound structure for the alliance. Its architecture should build wherever possible on existing initiatives and should be backed with national policy commitments and milestones for technology deployment.** Pitfalls such as getting dissipated by trying to achieve common carbon pricing; using a climate club to punish specific trading partners or as a form of disguised protectionism for industrial sectors, must be avoided.

# Content

# 1 Introduction

The idea of climate alliances (sometimes called "climate clubs") has recently gained momentum. The original concept of an international climate club was popularised by the economist William Nordhaus. He suggested that climate clubs might a way to solve the collective action problem for climate mitigation. His solution – which has been widely critiqued on legal, political and practical grounds – was essentially that a group of high ambition club members could jointly place economic penalties (for instance, in the form of trade tariffs) on less ambitious outsiders, to motivate them to adopt higher ambition levels and ultimately join the high ambition club.

From that common ancestry has come a wide variety of proposals for different types of climate clubs. The common denominator is action by a group of countries that may be small in number, but has potential for significant climate outcomes, and which has more flexibility and speed than the multilateral regime. Many existing climate clubs focus on a sub-set of the broad climate policy agenda – for example, addressing methane emissions, sustainable energy for all, or deforestation.

This paper focuses on a sub-set that has received much attention recently: the potential for international cooperation – whether as a climate club, a climate alliance or other configuration – to make progress on decarbonising high-emitting industrial sectors such as steel, cement, aluminium, chemicals and other energy intensive basic materials. Progress in this area is exceptionally dependent on international cooperation, given that the sector's products tend to be highly traded.

One of the most important recent proposals in this space was the German government's 2021 non-paper setting out several basic principles and key elements for the design of an "open and cooperative" international "climate club" (German Ministry of Finance, 2021), and the German proposal for this sort of cooperation as a priority for its G7 Presidency. The findings of this paper are designed to be of direct relevance to those policy efforts.

But the German proposals are not the only recent efforts in this space. For instance, at COP26 in Glasgow, the US and the EU signed a new Global Steel and Aluminium Agreement. This (much less detailed) document suggested that the EU and US would cooperate as part of a "global arrangement" to "address carbon intensity and global overcapacity" in steel and aluminium production (European Commission, 2021).

Similarly, the EU's CBAM proposal seems to have spawned a great deal of interest in international cooperation on carbon pricing and industrial decarbonisation, in part to **mitigate the trade tensions** the CBAM could spark. For instance:

- → The World Trade Organisation (WTO) Director General has called for a uniform global carbon price (Okonjo-Iwaela, 2021).
- → The International Monetary Fund (IMF) has called for an international carbon price floor (ICPF) that is differentiated by country but converges over time (Parry et al., 2021).
- → The Organisation for Economic Cooperation and Development (OECD) has proposed that it could coordinate a global effort in which countries agree on a voluntary framework to find carbon price-equivalence in either price and/or non-price based climate policies, arguing that recognition of countries' differences in green policies is key to avoiding trade wars (Financial Times, 2021).

Another strand of international climate cooperation efforts for industrial decarbonisation focuses on **broad-based capacity building and market creation.** In contrast to proposals for smaller "high ambition coalitions", this vision of climate alliances would seek

to immediately include a wider range of countries, including the G20 and large developing countries. At present such efforts are dispersed across a range of initiatives. These include: LeadIT, the Industrial Deep Decarbonisation Initiative, Mission Innovation, the COP26 Steel Breakthrough Initiative, and Responsible Steel, among others.

One of the challenges currently facing the international cooperation agenda for industrial decarbonisation is that the "big picture" requirements for accelerating industrial decarbonisation are sometimes obscured by narrower objectives that focus on just one specific part of the challenge, or a specific agenda. Indeed, part of the attraction of the "climate clubs" concept in certain circles has been that it means different things to different actors.

This paper asks the reader to "take a step back" and see the bigger picture. It argues that narrow objectives such as seeking convergence in carbon pricing, or trying to avoid the inevitability of Carbon Border Adjustment policies in Europe, are unhelpful distractions from the true potential of international cooperation on industrial decarbonisation. Such narrow objectives, pursued as they are by only some actors, will always struggle to obtain broad-based support and buy-in from a critical mass of large industrial economies.

To provide some missing perspective, this paper starts therefore starts by asking:

- → What does industry need in order to reduce its emissions in line with what the science tells us is necessary?
- → What is already being done – i.e. what elements of the list of needs is already being covered by existing international and national initiatives?
- → Where are the gaps? And which of them might be effectively addressed or supported through international cooperation?

Section 3 then explores some of the pitfalls that could undermine international cooperation on industrial decarbonisation, critically assessing five proposals that are currently part of the public discourse on climate clubs. This section discusses, in particular: seeking convergence of carbon pricing; trying to avoid the implementation of the EU's Carbon Border Adjustment Mechanism; trying to define rules of policy equivalence to avoid the need to comply with the EU CBAM; and trying to create punitive and protectionist trade policies targeting perceived climate laggards. It argues that these are not only unrealistic and impractical objectives, but they could also be counterproductive and a distraction from more useful forms of cooperation, on more legitimate problems that need resolution.

Section 4 then offers a synthesis, proposing what might usefully (and realistically) be done at the international level, and exploring what sort of institutional architectures, or networks of cooperation, might be most appropriate for the job. This section argues for refocusing the objectives of the climate club discussion on three more fundamental needs:

1. Coordinating national policies and standards to **accelerate and scale up global demand for very low-carbon basic materials** (demand).

2. **Setting milestones** for the roll-out of key climate neutral technologies (supply).

3. **Creating the "enabling conditions" for nations to implement ambitious policies and invest in key technologies.** This can be done by agreeing on common principles that clarify the "rules of fair play" in designing carbon leakage policy, **to avoid unnecessary trade tensions**, and by supporting efforts at **capacity building** in least developed countries.

It is argued that these core objectives – which are common to many leading economies – should be the core of the international cooperation agenda on industrial decarbonisation. As argued in that section, these goals can be achieved by various means of looser coordination and do not require common carbon pricing, or even common implicit carbon prices or "policy equivalence" – at least initially. However, by collectively pursuing and advancing these three pillars of industrial decarbonisation, there would be spillovers to international efforts to decarbonise beyond the core group of leading nations, and gradual convergence of actual emissions intensity and the adoption of key technologies would begin to occur, thus paving the way for global $CO_2$ product requirements in the long run.

We therefore argue that the "climate club" idea could be recast a something like a **"high ambition alliance"** of nations seeking to advance this agenda and create positive spillovers for industrial transition globally, rather than becoming bogged down in narrower objectives on specific policies, such as carbon pricing. Of course, this agenda would need be given impetus by the economic clout of, inter alia, G7 nations and the COP Breakthroughs Initiatives. However, it should also build on and help to steer existing initiatives for industrial decarbonisation in key sectors, by backing them with concrete national policies.

Section 5 then concludes with concrete recommendations to the 2022 G7 on how the climate alliances agenda should be taken forward in practice.

# 2 Defining the right agenda for industrial climate cooperation

## 2.1 What does industry need from international cooperation to accelerate decarbonisation?

Before discussing the form that any climate club or alliance should take one must start by asking what the emissions-intensive industrial firms actually need to accelerate their decarbonisation. In particular: How can *international cooperation* add value? And, by extension: What agenda should be pursued as part of this cooperation? The answers fall into three categories of enabling action:

- → Creating demand for low-carbon goods to help create a business case for investment;
- → Fostering increased supply of low-carbon goods via technology deployment; and
- → Enabling the transition, especially with regard to limiting carbon leakage risks and associated trade tensions, as well as capacity building to develop robust policies and business cases for key technologies.

These objectives should be equal interest to both developed and developing countries.

### 2.1.1 Demand

The existence of markets for low-carbon basic materials plays an important role in developing the business case for investments into technologies for the decarbonisation of industry. There are two aspects to the demand question: the first is the creation of so-called ***lead markets***. Lead markets are critically important for bringing forward the first wave of investment into climate-friendly and more circular production techniques. They can be driven by early movers or niche public or private demand pull initiatives. On the public side, **green public procurement** can create guaranteed lead markets.

However, to really shift global investment strategies for whole industries, there is also a need to create ***scalable markets*** for low-carbon materials and products. Industrial companies need clear signals that demand for genuinely low carbon and circular materials will scale up, and that these markets will develop beyond small niches in one part of the globe.

These markets must be international, even if not truly "global" at the outset. International scale is essential to create a credible signal that the transition is underway at scale and therefore that all nations are affected. By achieving international scale – even if only for a minority share of current global demand – climate friendly product markets would be most likely to have the necessary spillovers into investment decisions and policy discourse in a much wider range of countries – both developed and developing. Thus, an important benefit of international cooperation among high ambition countries to jointly create such markets at home and scale them over time can be a game changer for the pace of industrial decarbonisation in all countries, not just in those creating such policies.

A foundational requirement for market creation is to put in place the necessary enabling conditions, among which are:

- → **A product-based carbon accounting protocol:** Our existing GHG accounting protocols (e.g., GHG Protocol and ISO 14064) are activity-based. To drive demand for low-carbon products, via public or private procurement or performance standards, as well as to protect markets for those products via tools like the CBAM, there is a need for a protocol that tallies the embedded carbon content in goods.
- → **Labelling standards:** Definitions are needed for what constitutes "low-carbon" or "climate-neutral"

products, such as hydrogen, fertilizer, cement and power-to-X products, based among other things on a product-based accounting protocol. (To avoid distortions these standards would need to include incentives for the enhanced use and production of recycled materials.)

Both of these foundational ingredients are critical elements of the international market "infrastructure" for low carbon materials. Clearly there is a benefit to international agreement on the standards and protocols to be used. However, such issues are too technical and also too political to be addressed reliably by the 193 nations belonging to the UNFCCC. They essentially require a high ambition coalition to set an ambitious framework and make it a de facto standard globally.

### 2.1.2 Supply

The flip-side of creating demand for climate-friendly and circular materials is generating the necessary supply of those materials so that this demand can actually be met. There is a kind of chicken-or-egg problem faced by ultra-low carbon production technologies: demand is needed to justify investments in supply, but some level of supply is needed in order for policies and regulations to induce demand to work. For instance, one cannot require large scale public procurement of green steel if it is not yet available, and not likely to be in the foreseeable future. For key sectors such as steel, aluminium, chemicals and cement, there is an urgent need to support the **first-of-a-kind and early-stage commercial deployment of key breakthrough technologies** – i.e. the first X% of the market. This is critical for demonstrating to actors in the relevant companies and sectors that these technologies work and can be viable business investments (albeit under the right policy conditions). That early-stage support is also a pathway to unsupported commercial viability, as learning by doing and increased scale lead to cost reductions and process optimization.

There is also a need to set targets and create the conditions for jointly **scaling up investment into climate neutral and ultra-low carbon technologies.** For instance, the supply-chain firms that will provide industrials with technologies, fossil-free energy, feedstocks and logistics will also need visibility about the growth of key low-carbon technologies, since they will need to invest in scaling up their own activities. In this regard, rapidly development of economies of scale will be critical for lowering the cost of green $CO_2$-intensive materials production.

Joint efforts by a critical mass of high ambition governments with the will and capacity to support early-stage commercialisation investments and to **set milestones** for the roll out of climate neutral industrial technologies could have enormous positive spillovers for the global transition to the production of climate-neutral and circular basic materials. Such milestones would likely need to be defined as most suitable to individual countries. Accordingly, they could take various forms, such as milestones for the GHG intensity of industrial products or facilities, or milestones for the deployment of low-carbon production technologies. In any case, they would serve the fundamental purpose of giving governments and industry targets to work towards – i.e. as a policy governance tool – while simultaneously promoting global technological roll-out.

Over the long term, there is also value in working to **converge the level of $CO_2$ performance of production of basic materials** (e.g. for steel, aluminium, concrete)., etc. In effect, this would amount to long-term convergence on common emissions performance values for embedded carbon in basic materials. Such goals would be impossible to achieve quickly, but could potentially inform the setting of milestones for the deployment of low carbon technologies. Indeed, the setting of milestones over the short run would be a first step to achieving the longer-term goal of convergence in common $CO_2$ performance levels.

### 2.1.3 Creating the enabling conditions for deep decarbonisation

In addition to fostering demand and encouraging the development of supply chains, a range of supporting actions could help to "grease the wheels" of the transition to climate neutral industry at the global scale.

A key example of the need for greater facilitation is on the issue of defusing trade tensions. This is partly about the issue of **carbon leakage**: as countries develop increasingly ambitious policies to price or regulate industrial emissions, there is an increasing problem, as is occurring now in the EU, of how to prevent domestic industrial companies from simply shifting emissions and production abroad. This problem is broader than the EU's CBAM. Both for CBAM policies, but also for other forms of carbon leakage prevention – such as free allocations, possible $CO_2$ cost rebates, or other subsidies – there is a need for global cooperation to ensure that such policies do not unduly distort international trade and are not misused as a pretext for protectionism. Legitimate attempts to manage carbon leakage risks must not be undermined by illegitimate attempts to pursue other trade or geopolitical agendas.

The global transition to climate neutral industry would be smoothed significantly by coordinated efforts to anticipate such risks, agree on basic rules and principles to clarify "fair play" in the design of carbon leakage policies, and to defuse unnecessary trade conflicts before they arise.

Another key "facilitation" issue relates to **capacity building**. Significant benefits are likely to accrue from **sharing policy experience and insights.** Indeed, many of the policies to be deployed for industrial decarbonisation during the coming decade will be somewhat experimental and will require "learning by doing". To be sure, industry around the globe would benefit from improved policy design.

Both developed and developing countries can also benefit from soft forms of coordination. For instance, to facilitate access to climate finance, some existing initiatives, such as LeadIT, are already working with governments and sectoral stakeholders in developing countries to elaborate detailed sector-specific roadmaps and company investment plans, as well as to disseminate policy toolkits needed to create a business case for low-carbon technologies. Such instruments can be an important first step to creating the conditions for governments and industrial companies to gain access to international climate finance for funding large scale decarbonisation projects and investment in new technologies. The Just Energy Transition Partnership with South Africa is one example of such an initiative (Élysée (France), 2021).

**Innovation partnerships** will also be important to help **disseminate key climate-friendly and advanced circular materials technologies** around the globe as well as **bring down the green premium** associated with many of these breakthrough technologies and achieve the economies of scale required to make them competitive. Joint R&D and investment into pilot and demonstration projects for key technologies for industrial decarbonisation can be used to share intellectual property and promote the transfer of low-carbon technologies to developing countries. Moreover, as explained above, coordinated commitments by governments to support investment into the deployment of similar technologies can help to achieve economies of scale and reduce the green premium associated with low-carbon materials. Initiatives such as Mission Innovation and the COP26 Steel Breakthrough can help to advance such aims.

## 2.2 What is already being done?

Prior to embarking on any collaborative effort, it is important to be aware of the numerous recent international initiatives for industrial decarbonisation. These initiatives, which take many forms and feature

a variety of actors, endeavour to take important steps for the creation of lead markets – for example, by establishing procurement pledges, or by fostering agreement on methodologies and standards. They bring large emitters in key countries to the table, creating space for collaboration in the area of innovation and industrial decarbonisation roadmaps and policy.

To better understand the benefits that could be derived from a new climate club initiative, a survey of the status quo should be conducted to:

- → Understand the landscape of existing efforts;
- → Identify their contribution to the needs for industrial climate cooperation, as described in Section 2.1; and
- → Identify where there are gaps, i.e. where cooperative needs are unaddressed by existing efforts.

The most comprehensive existing international effort to address climate change is the UN Framework Convention on Climate Change (UNFCCC), which gave rise to the Paris Agreement. What added value could a climate club or alliance bring to this effort? A smaller group of ambitious countries could make more rapid progress on agreement than is allowed by the multilateral consensus-based UNFCCC (Faulkner, 2015; Hovi et al., 2016). As well as speed, smaller groupings bring the ability to pursue progress on focused important issues that are deeper than the kind of broad shallow progress that is possible multilaterally (Biermann et al., 2009). It has been suggested, for example, that a climate club could focus on reducing the risk of carbon leakage, or on enhancing collaboration to decarbonise industry (Vangenechten & Lehne, 2022). Such a vision aligns with the German climate alliances proposal and the agenda set out in Section 2.1 above.

Another intergovernmental undertaking is the Industrial Deep Decarbonisation Initiative (IDDI), launched in June 2021 by the Clean Energy Ministerial and UNIDO. As illustrated in Table 1, the stated objectives of the IDDI have a fair degree of overlap with the collaborative agenda proposed above. The IDDI is a global coalition of public and private actors that aims to **stimulate demand** for low-carbon industrial materials by facilitating collaboration in data collection and reporting framework; in the standardization of carbon assessments, including the development of material-specific standards; and in green public procurement, particularly for steel and cement. Coordinated by UNIDO, the IDDI is co-led by the UK and India, and current members include Canada, Germany and the United Arab Emirates (UAE). The work done by IDDI to stimulate demand would be strengthened if more countries – including all G7 nations at a minimum – were to sign up to it, implement its policies and standards, and communicate their activities in international fora. Endowing the IDDI with additional resources – which are limited at present – would additionally help to accelerate action.

The First Movers Coalition is essentially a "buyer's club" that has participating companies commit to buying low-carbon products before 2030 to **support demand** for the development of green supply chains, with an initial focus on shipping, aviation, steel and trucking. Such initiatives are extremely valuable. However, the next step would be for governments to bring to the table their much larger ability to create demand. This can be done both via public procurement, but also indirectly via regulatory policy, e.g. through the establishment of quotas for the purchase of low-carbon materials, or embedded carbon regulations on final products.

Responsible Steel is a global standard and certification programme designed to enable trade and transparency in the domain of low-carbon steel. This initiative is highly valuable in terms of developing some of the key standards that will be necessary to underpin demand creation initiatives, whether led by the public or private sector. However, this initiative is not sufficient by itself to foster demand; additional policy steps are required, including public procurement commitments, to achieve meaningful scale.

Another bilateral effort is the US-EU Trade and Technology Council (TTC), launched in 2021. This discussion forum aims to encourage the development of key emerging technologies and sustainable and resilient supply chains while also addressing challenges to global trade. Although the TTC is not currently working on industrial decarbonisation directly, this topic could be pursued under its mandate. In the TTC Working Group 2 on Climate and Clean Technology, for example, standards for measuring the carbon intensity of products and public procurement programs are two areas of consideration. Here, there are points of overlap with the work being performed by the US General Services Administration to develop technical standards for low-carbon steel and aluminium.

The C40 Clean Construction Forum is another public procurement initiative that features 97 member cities around the world. Membership is based on the adoption of science-based targets and milestones for mitigation and adaptation. The initiative contributes to the creation of lead markets for low-carbon basic materials by committing cities to undertake measures to reduce the embodied emissions of buildings, including the achievement of lifecycle benchmarks. The public policy focus of this initiative is extremely welcome. A next step for this initiative is to achieve larger scale through extension to additional jurisdictions, and also to promote deeper emissions cuts in embodied carbon through more ambitious public policy settings – something that national governments might be able to promote via a climate alliance of G7+ nations.

Yet another **demand-side** endeavour is the Climate Group's SteelZero Initiative, which encourages organisations to make a public commitment to procure 100% net-zero steel by 2050. The overarching goal is to send a demand signal to global markets to encourage the climate-neutral production and sourcing of steel. Once again, such initiatives could be expanded upon and strengthened through regulatory policy that fosters public and private sector demand.

Ideally, multiple governments could act in tandem, adopting similar policies at the same time, in order to provide the necessary momentum to shift investment spending.

Some initiatives also exist with a view to encouraging action on the **supply side**. Notably, the Mission Possible Partnership is a *private-sector* effort led by CEOs from carbon-intensive industries who have agreed to act on industrial decarbonisation by 2030. In the steel sector, Mission Possible's work is led by a sub-initiative called Net Zero Steel Initiative (NZSI). NZSI brings together a number of steel companies committed to developing climate-neutral steel manufacturing technologies.

Launched at the Paris Climate Summit in 2015, Mission Innovation is a global initiative that aims to scale up the deployment of clean energy technologies and which features 22 countries and the European Commission as signatories. The initiative seeks to accelerate innovation by connecting global RD&D efforts and investment and by fostering public-private partnerships that co-invest in innovation. Mission Innovation has a net-zero industries mission, led by Austria and Australia.

Furthermore, the IEA has launched the Industrial Energy-Related Technologies and Systems Programme. The objective of IETS is to encourage international collaboration to accelerate R&D on industrial energy-related technologies and systems, with a particular focus on end-use technologies – for example, iron and steel. Its member base spans ten nations, but does not include any developing countries.

Such technological initiatives are extremely valuable because they help to drive the participation of the public and private sectors, to elevate the profile of key technologies, to raise capital for funding innovative pilot projects, and to promote awareness of investment needs. There is, however, a critical challenge that private companies face in practice: *public policies are generally needed to create a business case*

*that justifies investment in such technologies at scale*. In recognition of this fact, the NZSI, for instance, has issued corresponding policy recommendations to governments. However, the gap that remains to be filled is for governments to take the next step and *set milestones or targets for the deployment of these technologies while also adopting the policies needed for final investment decisions to go ahead.*

A number of initiatives are also addressing topics related to the broader **enabling conditions** required for industrial decarbonisation. For instance, the Leadership Group for Industry Transition (LeadIT) spans 15 countries and over 20 companies from energy-intensive industries. LeadIT is developing roadmaps for industrial decarbonisation while also serving as a forum for information sharing on policy matters. LeadIT members are aiming to achieve net-zero emissions in energy-intensive industry by 2050.

Through UNIDO's Global Programme for Green Hydrogen, co-launched with the Chinese government, members collaborate on policies, technical guidelines and standards for hydrogen with the aim of promoting the industrial application and uptake of green hydrogen – particularly with respect to industries and governments in developing and transition economies.

On **trade**, the World Trade Organization convenes several bodies that have discussed the EU's CBAM. Under the Council on Trade in Goods there are 13 Committees, including the Committee on Market Access, where members have asked the EU for clarifications on its proposed CBAM and its WTO compatibility. Similar conversations have also occurred in another such Committee – the Committee on Trade and Environment. The latter might be the most appropriate forum for discussing industrial decarbonisation and leakage prevention at the level of principles and best practice, but such discussion has yet to occur.

Concurrent with the WTO discussions, a sub-group of WTO members established the Trade and Environmental Sustainability Structured Discussions (TESSD) in 2020. This forum intends to serve as a non-political and unofficial "safe" place for discussing issues, with the aim of feeding into official bodies such as the Committee on Trade and Environment. Over 70 members now participate. However, the CBAM appears to be too divisive even for this group; while it has been discussed in some regular sessions, it did not merit explicit inclusion in TESSD's workplan, as submitted to the WTO's 2021 Ministerial.[1]

At the bilateral level, the US and the EU have committed to adopting a Global Arrangement on Sustainable Steel and Aluminium by 2024. The process has begun with a technical working group that will focus on a common methodology for product-based carbon accounting. Subsequent negotiations will focus on operationalising the commitment to cooperate on lowering the carbon content of traded steel and aluminium. These talks will necessarily broach the subject of how best to cooperate to prevent leakage in the process of industrial decarbonisation.

This raises the question of **governance** in these initiatives and how they can achieve **effective follow-through**, from private-sector engagement and research and development actions to policy development and on-the-ground delivery of investment and deployment of key technologies at scale.

One of the more interesting initiatives from this perspective is the Glasgow Breakthrough Agenda. This was launched by the United Kingdom as part of COP26, but has garnered increasing buy-in from national governments who have agreed to champion its sub-initiatives. Members span 41 countries plus the EU and, importantly, key emitters such as China, India and the United States, who collectively represent 70 percent of global GDP. Rather than to create a

1 See https://docs.wto.org/dol2fe/Pages/SS/directdoc.aspx?filename=q:/WT/MIN21/6R2.pdf&Open=True.

new self-standing initiative, the Glasgow Breakthrough on Steel seeks to coordinate and enhance the effectiveness of and synergies between different initiatives that already exist. Similarly, the Glasgow Breakthrough on Hydrogen aims to make renewable and low-carbon hydrogen affordable and globally available by 2030.

The Steel Breakthrough brings together a number of international initiatives that have been progressing towards the stated goal of making near-zero emission steel the preferred choice in global markets by 2030, among them the Mission Possible Partnership, LeadIT and IDDI (as outlined above). This coordinating role makes the Steel Breakthrough potentially quite interesting, since there is a need for an actor who monitors progress and identifies gaps and barriers to delivery in the political statements of intent. To do this most effectively, however, there would need to be some expansion of the Breakthrough Agenda to other industry sectors, such as cement and concrete, as well as to core issues such as trade (to prevent carbon leakage). There is also a need for specific countries to be willing to drive the agenda forward over the medium term. This may be a role best suited to nations such as Germany, the US, and other G7 countries interested in the climate clubs idea, since the goals would be overlapping. Indeed, it is worth noting that Germany is no pioneer in using their G7 Presidency for the goal of collaboration on industrial decarbonization: Last year, the UK's 2021 G7 Presidency and the United States have jointly proposed the G7 Industrial Decarbonization Agenda (IDA) to collaborate on activities around market regulation, decarbonisation standards, investment flows, procurement strategies and possible joint research.

## 2.3 Where are there gaps?

Section 2.2 drives home an important point: there are many existing efforts aimed at addressing industrial decarbonisation. However, if we consider the survey of what's needed, as described in Section 2.1, it is clear that there are **critical gaps** and that a number of issues remain unaddressed.

For example, the entire supply side effort – cooperation on pre- and **especially early-commercial support for new technologies** and **joint setting of national milestones and policy frameworks** – is more or less unaddressed. There is also **little coverage in the area of reducing trade frictions** by looking for agreement on principles and best practice in leakage prevention, or in **coordinated R&D**.

One set of issues that is addressed by many different efforts is the development of carbon accounting protocols for products, and labelling and standards to define low-carbon products. In this case, however, the intensity of effort itself gives rise to a gap; **when dealing with standards and measurement protocols, a diversity of approaches is undesirable.** There is a need to try to somehow coordinate or harmonise the existing efforts, or as a fall-back scenario facilitate mutual recognition.

There are also **missing sectors**. A great number of efforts focus on low-carbon steel, and a few also address cement. This leaves out a wide range of energy-intensive industrial activities and products, including non-ferrous metals, chemicals, plastics, nitrogen fertilizers, refined fuels, pulp and paper, ceramics/glass and others. Not all have the same urgency in terms of emissions profiles or challenges to abatement, so focusing efforts makes sense, but by any reasonable standard the current coverage is lacking.

There is also an issue of **missing membership**. It has been argued above that any successful international efforts at industrial decarbonisation need to include a critical mass of members, accounting for a significant share of global production. Of the existing efforts described above, only the Glasgow Breakthrough Initiative has a reasonably broad membership of major economies. Of course, there is in reality a trade-off between the degree of ambition and breadth

of membership. Thus, breadth of membership must not be placed above all other considerations. This is often a challenge with G20-based fora, for example. However, even the full set of G7 major economies are not party to most of the initiatives mentioned above.

One primary limitation to many initiatives is **missing commitment and follow-through from policymakers**. Deploying **commercial scale ultra-low carbon industrial technologies is typically commercially unviable for the private sector alone.** The technologies are often significantly more expensive than conventional ones and without subsidies, carbon pricing or regulatory policies to ensure that this green premium is paid, these investments will not happen at meaningful scale. Similarly, since the products are more expensive and entail new kinds of supply chain challenges, and since data and labelling on embedded carbon are often not reliable under existing voluntary reporting schemes, only a relatively select and small share of global companies are likely to be willing to pay that green premium and create demand. In some cases, other non-price barriers exist to creating demand, such as overly restrictive product certification standards, or a lack of experience and expertise by end users in relation to more innovative products, etc. Thus, policies are desperately needed to intervene here to unlock these barriers to creating demand at the necessary scale to shift patterns of production and investment in a meaningful way (Agora-CISL, 2021).

A key challenge with many existing initiatives is therefore that they do not obtain the necessary commitment to such policies upfront. Even where this kind of commitment is obtained, it can often come in a relatively vague form (e.g. an announcement to "buy green steel or cement if it is supplied") and there is a need for follow up and an iterative process to review policy adequacy and rachet up effectiveness and ambition over time. This is made challenging by the limited resources and short planning horizons of many initiatives.

Indeed this leads to another key gap identified in the above-mentioned initiatives: there is a clear need for some sort of **overarching governance structure**. The need here is not for an effort that exerts authority over existing initiatives, but rather for something that could take account of those efforts and identify gaps, could act, or facilitate action to fill those gaps, could help exploit synergies among the existing disparate efforts, and could review and assess progress and act accordingly.

In other words, there is ample need for a climate alliance that can help accelerate industrial decarbonisation and to strengthen the role of governments in leading the transition via concrete policy commitments. The remainder of this paper explores how the new German-proposed climate alliance could most viably play that role.

# 3 Potential pitfalls that could undermine industrial climate cooperation

In setting out an agenda for constructive industrial climate cooperation, it is important to avoid some of the pitfalls involved in the ideas sometimes offered by proponents of climate clubs. Here are some of the main pitfalls that must be avoided:

## 3.1 Pitfall 1: Seeking convergence in carbon prices

As an aspirational goal, few would argue against widespread adoption of carbon pricing – one of the key tools in the fight against climate change. But as a predominant goal of any new international climate cooperation institution, this idea has serious problems.

First, industry needs more than just "higher carbon prices" to shift to climate neutral and advanced circular production of basic materials. A range of conditions need to be in place along the full value chain to really enable the transition to climate neutrality and this will require integrated policy packages, not just the "magic bullet" of common high carbon prices.

For instance, in the upstream part of the value chain, there is a need to develop large amounts of affordable clean power, hydrogen, high-quality circular materials and CCS infrastructure. The barriers to investment here go beyond carbon prices. In the mid-stream part of the value chain, there is a need to further develop, de-risk and demonstrate extremely capital-intensive breakthrough technologies. In the downstream part of the value chain, there is a need to create scalable markets and demand pull for ultra-low-carbon and genuinely circular basic materials. There is also a need to overcome non-price barriers to demand for cleaner and more circular materials, such as missing data on embedded carbon, new product standards to facilitate clean procurement, revision of outdated product industry standards that bar new innovative material formulas, etc. What is needed is therefore policy packages, potentially including but by no means limited to just carbon pricing. Since every country is different, it will also need to have the policy freedom to address such concerns in its own context-appropriate manner.

Second, national carbon pricing is not easy to achieve (Belausteguigoitia et al., 2022; Dolphin et al., 2016; Jenkins, 2014) and it may be made even harder if the politics of new carbon prices becomes identified with the agenda of what is for most voters a very distant and little understood international club of countries. Those countries that have implemented carbon prices fought long and hard against powerful vested interests, and even model jurisdictions like the EU arguably took the better part of two decades to get it right. In other countries critical to global progress on climate change, like the US, there seems to be no viable route to a carbon price in the foreseeable future. Some countries also have ideological objections to carbon pricing. For instance, some Latin American and other developing countries consider the idea of carbon pricing – rightly or wrongly – to be a manifestation of Western-led capitalism that they are trying to resist: a "pricing of nature". Thus, a risk of making common carbon pricing a core agenda of any new climate club, IMF, WTO or OECD initiative, is that it could easily backfire politically – e.g. it could be argued by (disingenuous) local opponents that a "neo-liberal, neo-colonialist, economic agenda of foreign countries is pushing its agenda upon foreign countries". Indeed, for many developing countries, the term "climate club" already has a "neo-colonialist" flavour to it (even if this is not the intent of its proponents). Thus, a heavy focus on carbon pricing (even if

National carbon pricing regimes

| Country/Region | Instrument | Scope | Notes |
|---|---|---|---|
| **Argentina** | carbon tax | liquid fossil fuels | replaces existing fossil fuel excise taxes |
| **Canada** | carbon tax | fossil fuels | |
| **Canada** | output-based pricing system | large industrial emitters | |
| **China** | ETS | electricity producers | based on emisisons intensity, not a cap on actual emissions |
| **Colombia** | carbon tax | fossil fuels for combustion | |
| **Denmark** | carbon tax | fossil fuels mainly in buildings and transport | complements EU ETS |
| **EU-27 (plus Norway, Iceland, Lichtenstein)** | ETS | industry, power (all gases) | |
| **Estonia** | carbon tax | thermal fossil fuels in industry, power | |
| **Finland** | carbon tax | fossil fuels in industry, transport, buildings | complements EU ETS |
| **France** | carbon tax | fossil fuels in industry (non-EU-ETS), buildings, transport | complements EU ETS |
| **Germany** | ETS | fossil fuels in buildings, road transport | complements EU ETS |
| **Iceland** | carbon tax | liquid and gaseous fossil fuels in non-EU-ETS sectors | |
| **Indonesia** | carbon tax | coal-fired power plants | comes into effect April 2022 |
| **Ireland** | carbon tax | fossil fuels in non-ETS sectors | |
| **Japan** | carbon tax | fossil fuels | |
| **Kazakhstan** | ETS | sectors: oil & gas; power; cetralized heating, some industry; cement; lime; gypsum; bricks | |
| **Korea** | ETS | sectors: industry, power, buildings, domestic aviation, public sector, waste sectors (all gases) | |
| **Latvia** | carbon tax | fossil fuels in non-ETS industry and power | complements EU ETS |

Source: https://carbonpricingdashboard.worldbank.org/map_data

Tabelle 1-a

| Exemptions/offsets | Price | Price/t (USD) |
|---|---|---|
| exports of fuels; fossil fuels as feedstocks | ARS 542/tonne; schedule: rising to ARS 542/tonne by 2028 | 5.00 |
| some exemptions (e.g., farm use) | CAD 50/tonne; schedule: rising to CAD 170/tonne by 2030 | 39.00 |
| output-based allocation | CAD 50/tonne; schedule: rising to CAD 170/tonne by 2031 | 39.00 |
| free allocation | market based: curent estimate USD 10/tonne | market-based current: 10.00 |
| offsets from Colombian projects | USD 5/tonne | 5.00 |
| some exemptions (e.g., trains, shipping, aviation) | Kr. 178.5/tonne ($CO_2$); Kr. 150/tonne (F-gases) | 27.00 |
| free allocation to sectors at risk of leakage | market-based: current EUR 93 | market-based current: 105.00 |
| | EUR 2/tonne | 2.00 |
| fuel use in refineries, CHP; coal and gas as feedstocks | EUR 62 (transport fuel); EUR 53 (other) | 70.00, 60.00 |
| partial for industrial feedstocks, electricity, public transport, freight transport | EUR 45/tonne | 51.00 |
| compensation for leakage-prone sectors | EUR 25/tonne - market-based as of 2026 | 28.00 |
| EU ETS sectors, aviation | ISK 4,400/tonne ($CO_2$); ISK 2,500/tonne (F-gases) | 20.00, 5.00 |
| | IDR 30,000/tonne | 2.00 |
| partial for some industry, export of fuels, power | EUR 33.5/tonne; increases to EUR 100/tonne in 2030 | 38.00 |
| some exemptions in industry, power, transport, agriculture and forestry sectors | JPY 289/tonne | 2.50 |
| small emitters; almost complete free allocation | KZT 500/tonne | 1.00 |
| small emitters; free allocation up to 100% | KRW 21,250/tonne | market-based current: 30.00 |
| EU ETS sectors | EUR 12/tonne | |

National carbon pricing regimes

| Country/Region | Instrument | Scope | Notes |
|---|---|---|---|
| **Luxembourg** | carbon tax | fossil fuels in buildings, transport | complements EU ETS |
| **Mexico** | carbon tax | fossil fuels (except natural gas); GHGs from sectors: power, industry, road transport, aviation, shipping, buildings, waste, forestry, waste, agriculture | covers differential between natural gas emissions and higher emissions from other fossil fuels |
| **Netherlands** | carbon tax | ETS-covered industry; waste incinerators; high NO2 emitters | allows for trading of tax obligations; credit given for beating benchmarks |
| **New Zealand** | ETS | Sectors: industry, power, waste, transport and forestry (all gases) | agriculture to be brought in by 2025 |
| **Norway** | carbon tax | liquid and gaseous fossil fuels in non-EU-ETS sectors; mineral products | |
| **Poland** | carbon tax | fossil fuels in non-ETS sectors | |
| **Portugal** | carbon tax | non-EU-ETS industry, plus electricity and co-generation, plus buildings and transport | surcharge over ETS for electricity generators |
| **Singapore** | carbon tax | large industry and power | |
| **Slovenia** | carbon tax | fossil fuels in building, transport | complements EU ETS |
| **South Africa** | carbon tax | fossil fuels in industry, power, buildings and transport | |
| **Spain** | carbon tax | recharge of F-gases | |
| **Sweden** | carbon tax | fossil fuels in industry (non-EU-ETS), buildings, transport ($CO_2$) | complements EU ETS |
| **Switzerland** | carbon tax | Sectors: industry, power, buildings and transport, $CO_2$ | complements the ETS |
| **Switzerland** | ETS | industry, power (all gases) | linked with the EU ETS |
| **United Kingdom** | ETS | industry, power (all gases) | similar to the EU ETS |
| **Ukraine** | carbon tax | industry, power, buildings, fuels ($CO_2$) | environmental tax, on air pollution |

Source: https://carbonpricingdashboard.worldbank.org/map_data

Tabelle 1-b

| Exemptions/offsets | Price | Price/t (USD) |
|---|---|---|
| EU ETS sectors | EUR 34/tonne (diesel); EUR 32/tonne (gasoline); EUR 20/tonne (other) | 104.00 |
| uncapped use of some international and domestic offsets | bounded: upper is MXN 65/tonne, lower is MXN 7/tonne, capped at 3% of fuel price | 0.035 - 3.15 |
| | EUR 30/tonne | 34.00 |
| free allocation to sectors at risk of leakage | market-based:<br>current NZD 83/tonne | market-based<br>current: 55 |
| EU ETS sectors (except offshore oil production); export of fuels | Range: NOK 591 to NOK 33 | 3.75 to 67.00 |
| EU ETS sectors | PLN 0.31/tonne | 0,08 |
| EU ETS sectors (other than electicity) | EUR 24/tonne | 27.00 |
| non-industrial refrigeration, A/C | SGD 5/tonne | 3.70 |
| EU ETS sectors; small emitters can use up to 11% international offsets | EUR 17.3/tonne | 20.00 |
| tax relief of 60%, with performance-based incentives, offsets, available to reach 95% | ZAR 134/tonne | 8.80 |
| some uses exempt, including for export | EUR 15/tonne | 17.00 |
| export of fuels, freight transport, partial for agriculture, forestry and power production | SEK 1,200/tonne | 128.00 |
| ETS-covered sectors; large fossil fuel power plants; some sectors at risk of leakage; transport fuel importers can use domestic offsets to offset some scope 3 obligations | CHF 96/tonne | 104.00 |
| small emitters; free allocation to sectors at risk of leakage, up to 100% of benchmarks | market-based:<br>current EUR 93 | market-based<br>current: 100.00 |
| free allocation to sectors at risk of leakage | market-based:<br>Dec 2021 at USD 95/tonne | market-based<br>current: 95.00 |
| small emitters (<500t) | UAH 10/tonne | 0.36 |

it is a desirable policy to advance in the abstract) could potentially slow down national efforts to price carbon, rather than speeding them up as intended.

Third, even if every country successfully implemented carbon pricing, it is hard to imagine an international regime somehow coordinating harmonisation. That would be methodologically tough, even given political will. Table 2 catalogues the national-level carbon pricing regimes in force, and they differ in every respect imaginable, for reasons with strong roots in the unique national politics, history, and economies of the countries involved. Some prices are market-driven and not amenable to pegged commitments. Some regimes differ in ways that make commonality hard to define: different scope of sectors, different gases, different offsets and competitiveness protections, even different fundamental accounting units – total emissions or emissions intensity. Moreover, it might be difficult to muster political will; the Paris Agreement was ultimately only possible because parties abandoned a top-down approach in favour of sovereign control of the details of climate policy.

Fourth, *common* carbon pricing may not be fair or even desirable. If the proposal is to have a single carbon price, that runs squarely against the principle of common but differentiated responsibility and respective capabilities (CBDR-RC). Facing this challenges, some have proposed not a common price, but an agreed minimum price: an international carbon price floor (Parry et al., 2021). This addresses the CBDR concern, but it still does not eliminate the first three problems described above. With respect to the fourth – CBDR-RC – if the idea is to have different floor prices for countries in different circumstances, it raises yet another challenge. How would carbon pricing obligations be differentiated? On the basis of what criteria? Experience in the WTO, the UNFCCC and elsewhere shows how hard it is to find agreement on such questions (Pauw et al., 2014; Ukpe & Khorana, 2021).

If carbon pricing is to be advanced as one goal of an industrial climate alliance, then it may be more reasonable for such efforts to respect certain caveats. First, any efforts should be based on national choices and requests for support (e.g. technical support in setting up carbon pricing or taxation systems), rather than external efforts to persuade or advance a carbon pricing agenda in third countries. Second, it must respect principles of CBRD. Third, it must not distract from other policies that are extremely important for the industrial transition – that is, it must not be sold as a magic bullet for industrial decarbonisation. Instead, it must be advanced as part of a policy package that addresses the various conditions for industry to decarbonise, including market creation, investment support, infrastructure planning and investment, setting milestones and targets, etc. In our view, there is a high risk that carbon pricing can distract from these other policy needs (as occurred in the EU for over a decade).

## 3.2 Pitfall 2: Measuring the carbon price equivalence of non-price climate policies

In response to the implementation of the EU's CBAM proposal, some countries have requested that they should be given credit – in the form of reduced border charges – not only for pricing policies but also for non-price policies that reduce emissions. This reflects a concern in particular from some actors in the United States who, aware that the US is unable to develop carbon pricing for political reasons, would nevertheless like crediting recognition for regulatory policies. The United States and Australia have thus asked the OECD to begin working on a methodology to potentially help the EU determine carbon price equivalents for different kinds of regulatory climate policies.

However, it must be recognised that any attempt to develop such approaches on crediting for non-price policies is not only extremely unlikely to succeed, but also risk being completely unnecessary.

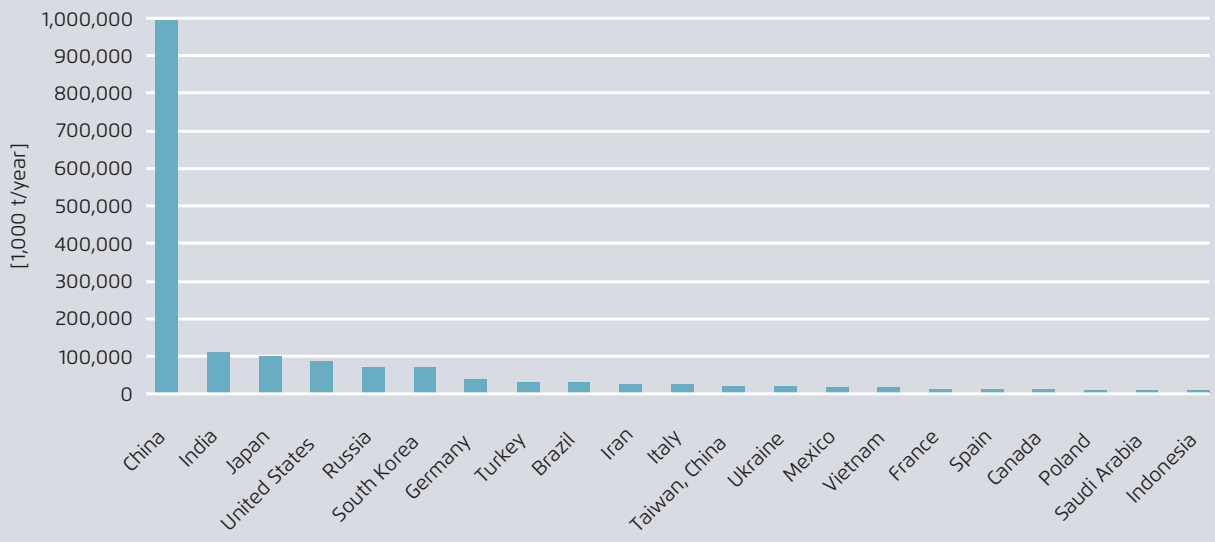
The development of methods to calculate implicit carbon prices for the sake of EU CBAM crediting are unnecessary at a very basic level because the proposed EU CBAM has been designed to only charge border carbon prices on actual embedded carbon. Thus, to the extent that non-price policies are effective at reducing embedded carbon in CBAM products, they will already be taken into account de facto by the third country's CBAM mechanism.

It might be argued that in theory the total cost of compliance with a given country's non-carbon pricing policy could be higher than the value of the reduction in foreign carbon border adjustments. But this remains a somewhat theoretical question – it is not clear that it would empirically be the case, let alone that that additional compliance cost with domestic regulations would necessarily be economically significant enough to disadvantage a given country's trade competitiveness. On the contrary, at the present moment, at 70-90 EUR/t$CO_2$, the EU's carbon prices remain significantly higher than those anywhere else in the world – suggesting that the monetary value of reduced embedded emissions for products entering the EU would likely outweigh any costs of regulatory compliance in the country of origin. Yet it is difficult to have such conversations about such policy proposals and methodologies in the abstract.

Measuring the implied carbon costs of non-price policies in a simple, transparent and non-discriminatory way is also extremely difficult methodologically – if not impossible. For instance, which kinds of "non-price" policies should count? How could such a line be drawn without already creating claims of discrimination by some countries? If non-carbon price policies are credited by, say, an EU CBAM at import, then in fairness the EU would also have to raise the CBAM charge to reflect the EU's own non-carbon price policies (a move that would likely contravene WTO law). If so, then how many of them would count, as there are literally dozens of them, and they vary across the EU? How would variable factors in the equations be updated to ensure shadow carbon price equivalence? For instance, changes in relative energy prices, technology costs, subsidies, taxes, transport costs, recycled scrap, exchange rates, etc. can all impact the relative costs of producing lower carbon goods to comply with different regulations. How would these factors all be updated in real time to ensure reliable and current measures of shadow carbon pricing in different jurisdictions?

Ultimately, the most plausible way for countries to achieve convergence in relative policy ambition is via the adoption, in the long run, of common $CO_2$ product requirements – that is, to eventually arrive at harmonised national regulations that effectively ban the production of certain basic materials using more than X kg $CO_2$/tonne of material. To accelerate the transition to this state of affairs, willing countries might seek to set differentiated milestones that aim to ultimately converge in the long run. However, in the

Global steel production by country (top 20 producers in 2019) in thousands of tonnes per year Figure 1




Agora Industry (2022), based on data from WorldSteel.org

short run, efforts to achieve policy equivalence risk only to consume vast amounts of political and technical resources that might otherwise be spent more productively.

## 3.3 Pitfall 3: A "climate club" replacing the need for an EU Carbon Border Adjustment Mechanism

If a global carbon price or common $CO_2$ product requirements were achieved, then the EU's CBAM or other similar national policies would be unnecessary – there would be no risk of leakage. But, for all the reasons argued above, that is an unrealistic scenario, at least in the foreseeable future.

A climate club, as a nimble sub-set of state actors, cannot address this problem unless it contains a critical mass of producers. Figure 1 shows the size of the gap that would result from not having China or India in the club, using the steel sector as an example.

If there is significant productive capacity outside the club, or even the prospect of ramping up production in new or existing producer countries outside the club, there is risk of leakage, and a CBAM may be needed.

Moreover, if it is unrealistic to hope for a common club carbon price, then risk of leakage will still exist not just between club members and non-club members, but also within the club. That is, even if the club encompasses all significant producers, unless there is a common carbon price among members, there is still risk of intra-club leakage.

Ultimately, the hope that a climate club might obviate the need for a CBAM depends on the club achieving what was argued above to be highly unlikely: common carbon pricing across a broad range of countries.

## 3.4 Pitfall 4: Punishment of "low-ambition" actors

The classic conception of a transformational club involves both club goods – benefits for members – and penalties for non-members (Faulkner et al., 2021). Indeed, some visions of the possible form that the EU-US Steel and Aluminium Agreement might take (at least from the US perspective) would also involve punitive tariffs being imposed on steel and aluminium imports that exceeded a certain level of embedded $CO_2$ intensity.

In fairness to proponents of "penalty-based" climate clubs, it is true that there can be limits – especially in international relations problems such as climate change – to approaches structured only around notions of mutually reinforcing positive cooperation. "Free-riders" can effectively exploit such systems by talking tough, but ultimately failing to live up to their commitments in practice. In some circumstances, a combination of both positive incentives for cooperation ("carrots"), and some form of punishment – even if an indirect form – ("sticks") for free riding is arguably a more realistic strategy.

However, in designing an optimal set of incentives for international cooperation, one must be extremely careful about two parameters. Firstly, the balance of positive versus negative incentives must be carefully calibrated. Punishment of countries by other countries is a complicated and fraught business. Trust and good faith cooperation between governments are also required as a practical matter to resolve a problem as complex as industrial decarbonisation. For this reason, the first emphasis should be on positive incentives for good faith cooperation – such as enhanced access to global markets for green products, technology transfer, foreign direct investment, capacity building and employment opportunities, the ability to have a seat at the table as future rules for trade in green materials are written, etc.

A good example of this balance between positive and negative incentives is exemplified by the Montreal Protocol for reducing Substances Depleting the Ozone Layer (SDOLs). That agreement essential provides a global schedule for the phase out of relevant SDOLs, but including additional time and financial support for technology investment by developing countries in the form of the Multilateral Fund. However, the regime does contain trade measures that ban trade in SDOLs with non-parties – a provision that is widely regarded as uncontroversial, given that such trade would fundamentally undermine the parties' reduction commitments. This is judiciously used negative provision that protects the integrity of the regime, while also incidentally incentivising membership

An equivalently balanced approach between positive and negative incentives for cooperation in the context of industrial decarbonisation might relate to the risk of indirect punishment. For instance, for a free rider, an effective system would gradually create growing risks of eventually having one's basic materials and related products unable to access global markets due to the gradual implementation of policies such as CBAMs, green market creation and eventually $CO_2$ product standards. However, the intent and balance of primary vs. secondary objectives is important here: these negative incentives might best be viewed rather as a by-product of coordinated national policies to decarbonise these sectors while protecting the integrity of the regimes by avoiding carbon leakage, rather than as an intentional and targeted punishment of any specific country or actors.

Secondly, the nature of any punishment system must be goal appropriate and widely perceived as fair. In the context of the Montreal Protocol, the punishment system is uncontroversial because it was signed onto by all parties via an open, inclusive and free process of negotiation, and it was clear to all that allowing trade in SDOLs with non-parties would fundamentally undermine the effectiveness of the treaty's commitments. The danger for some visions of climate

clubs is there would be an uneven process whereby members of the club (insiders) would likely be setting the conditions of punishment for non-members (outsiders). This raises several problematic issues:

First, as soon as there are penalties for non-members, the fairness and legitimacy of the membership criteria are catapulted to a higher order of importance. That challenge – already fraught with political and legal risk – becomes much more critical if non-membership incurs penalties.

Second, penalties for non-membership in a climate club are arguably a case of poor instrument fit.[2] If countries are unambitious because they are strategically free riding on the climate ambition of others, then penalties may be appropriate to force them to change. However, there are many countries for which there are other obstacles to climate ambition, and for them penalties arguably do not fit the problem; facilitative measures – such as the Montreal Protocol's Multilateral Fund – are more appropriate.

A final argument against penalties as a club feature is the important issue of how non-members will react to punishment. To be effective, a climate club must gradually bring on board a critical mass of producer countries and also deepen its level of cooperation between members on sensitive issues of national industrial policy and trade. If the club is perceived as exclusive, or as an attempt to "gang up" on non-members, that critical mass and deepening of trust will be much harder to achieve.

2 For a discussion of the concept of "fit" in international environmental governance, see Galaz et al. (2008).

# 4 Proposal for a new industrial climate alliance to coordinate and fill key gaps in existing initiatives

It was argued above that the German-proposed climate alliance might be a useful tool – or at least a starting point – for accelerated industrial decarbonisation at the international level. It was also noted that several existing initiatives exist, but that there are also gaps. The specifics of that effort can be broken down to two questions, both of which are informed by above discussion of what is needed, what is already being done, where the gaps exist, and what an alliance should not aspire to:

- → What should be the alliance's areas of focus? (the agenda)
- → What should be the architecture of collaboration and governance? (the governance structure)

## 4.1 A new industrial decarbonisation agenda

The alliance should be focused on industrial decarbonisation. More specifically, it should focus on those areas where international cooperation can help advance national efforts, on areas of the agenda that are being under-addressed by existing initiatives, and on finding synergies among existing efforts.

In the area of **creating demand for low-carbon goods**, the alliance should focus on creating the enabling conditions for scalable markets for low-carbon materials and products. This includes working to formulate an accounting protocol to calculate embedded carbon in goods, as well as definitions and standards for low-carbon goods such as hydrogen.

Section 2.2 notes that some initiatives are already doing work along these lines. These include the Industrial Deep Decarbonisation Initiative (IDDI), the Steel Breakthroughs Initiative, the US-EU Trade and Technology Council (TTC), and the Industrial Decarbonisation Agenda of the G7 (IDA). One challenge the alliance should address is helping ensure that these and other efforts do not result in a diversity of accounting and reporting standards with which producers must comply in global markets.

The alliance should also broaden the scope beyond steel and cement to cover other sectors. While the IDDI and COMET are facilitating collaboration on reporting frameworks, and IDDI is working to achieve public-procurement targets for steel and cement, global industrial decarbonisation efforts are less developed in other industrial sectors.

Another challenge is that policy discussions in these fora have tended to have a bias towards green public procurement as the main vehicle for creating climate-neutral or low-carbon product markets. While necessary as a first step, truly scalable markets for climate neutral and circular materials will require the creation of reporting and regulation for embedded carbon requirements in final products sold in private markets (e.g. buildings, vehicles, and packaging products). Experience in Europe has also demonstrated that quotas for recycled content can be highly effective at kickstarting value chains for closed loop and high-quality recycling of $CO_2$-intensive materials, such as plastics (Agora Industry, 2022). The value of such quotas for virgin materials is more questionable, however (Agora-CISL (2021).

In the area of **fostering increased supply of low-carbon goods**, the alliance should fill the considerable gaps in existing international cooperative efforts. That would involve garnering international commitments to support **pre-commercial and especially early commercial technologies** to lower industrial emissions, and support for non-industrial technolo-

gies, goods and services necessary for industrial decarbonisation, such as low-carbon electricity, green hydrogen and low-carbon transport.

While necessary, however, much of that agenda must be defined at the national level. Accordingly, a better candidate for the focus of the alliance would be to facilitate international agreement on milestones for ambitious reductions in the GHG intensity of basic materials production.

Milestones can address the "chicken or egg" problem – in which demand needs supply and supply needs demand – insofar as demand-creation policies and tools are backed up with parallel commitments by governments to achieve milestones for the deployment of climate-neutral and advanced circular materials technologies.

Of course, the possibility for setting differentiated milestones is key. It is unlikely that governments could agree – at least initially – to set the exact same $CO_2$ intensity requirements per unit of steel or cement produced by, say, 2025 or 2030. The local context in every country, including the development stage of the economy, resource endowments, technical capacity, state of existing plant, stock of supporting infrastructure, and availability of finance, will affect the speed and depth with which decarbonisation is possible. This is not a stumbling block; there is nothing essential about equivalent commitments across countries if the goal is to send signals to industry that will drive long-term investment decisions consistent with low-carbon trajectories.

Moreover, governments will need to retain a degree of technological neutrality in their approach to decarbonisation, since technology portfolios will evolve over time.

Such milestones should avoid being technology-specific where possible, focusing instead on outcomes. The main purpose would be to signal that governments from the alliance are politically committing to the transition to climate neutrality in key industrial sectors and are therefore undertaking necessary policy action, including financial, regulatory and planning measures to push new technologies to market.

Consequently, milestones could take different forms for different governments and for different sectors. For instance, some governments may wish to commit to fossil-free steel production by a certain date, while others, with less abundant possibilities for clean hydrogen in the short term, may wish to commit simply to phasing out coal-based steel production, or raise the share of secondary to primary steel production, depending on the local context.

If milestones are embraced by a critical mass of national governments under a climate alliance, they could have the additional benefit of creating de facto global standards: that is, export-oriented producers would find it more efficient to respect those higher standards across all of their production lines, as producing to more than one standard is costly. Moreover, these de facto standards could, once enough countries and companies apply them, turn into common global regulated $CO_2$ product limit requirements in the longer run – thus obviating the need to adopt a CBAM and other complex carbon leakage policies over the long term. This possibility also demonstrates that common carbon pricing is not necessarily the only long-term solution to avoiding carbon leakage and a proliferation of different national carbon leakage policies.

In the area of **facilitating the transition**, the climate alliance should focus on several under-addressed needs where international cooperation is key.

It should work to defuse trade tensions by finding agreement on what constitutes best practice in leakage prevention for instruments such as CBAM. As argued above, it is unrealistic to expect that members of the alliance could have a common CBAM-type instrument, so members – including those that will be on the receiving end of those regimes – should come

to agreement on what best practice looks like. At many points in the elaboration of a CBAM regime there are decisions about design elements that will determine the final shape of the instrument (Marcu et al., 2020). The final result will sit somewhere on a spectrum from blatant protectionism to purely environmental. Club-level agreement on principles and best practice in elaboration and implementation of CBAM would help ensure that members harmonise at least at the level of principle, and that their various regimes work to prevent leakage without being punitive or protectionist (Cosbey, 2021).

Club members could also create shared institutions, such a jointly operated registry of foreign producers, complete with emissions-intensity data, certified once and valid in all member countries, and a common accounting regime for embedded carbon in products. Members could develop common protocols for crediting foreign carbon pricing, and common databases of default values for exporter country sectoral emissions intensities. These sorts of shared institutions would not only greatly reduce the administrative burden of implementing CBAM in the club members, but they would also reduce transactions costs for non-club producers, hopefully reducing diplomatic tensions in the process.

The alliance should also work on agreed GHG performance standards – that is, on developing target levels of GHG intensity that can be used as a basis for policies, such as green government procurement or milestones that distinguish between high and low carbon products and industrial processes. Agreed standards for goods such as low-carbon hydrogen, for example, will create transparency in traded goods, and powerful incentives for low-carbon producers.

The alliance should focus on garnering international commitments on shared R&D, particularly where upfront costs are significant, and where pooling resources might create synergies. Alliance members might, for example, undertake joint international pilot projects for a portfolio of key technologies in order to transfer intellectual property and know-how to many countries at once.

The alliance should coordinate the efforts of members to build capacity for industrial decarbonisation in developing countries, pooling resources in a coordinated and focused fashion, for greater effectiveness. This could take place either via a club-based independent institution, or in association with the several existing efforts aimed at industrial decarbonisation, such as the UNIDO-coordinated Industrial Deep Decarbonisation Initiative, or the Glasgow Breakthrough Initiatives on steel and hydrogen.

## 4.2 What form of collaborative architecture and governance?

Beyond addressing relevant sectors and featuring the membership of key countries, a climate alliance with the ambition to enable and accelerate the global industrial transformation needs to be endowed with a governance structure that generates buy-in from industrialised and developing countries alike.

Fortunately, there are a number of existing efforts to advance various parts of the overall agenda. The role of the climate alliance in this space should be to:

- → Identify they key gaps in the existing efforts and work to fill them. The new industrial decarbonization agenda laid out in the previous section aims to describe what that might look like.
- → Work to identify and help exploit synergies among the existing efforts.
- → Review progress and reassess the workplan in an iterative fashion (e.g. every 3 years).

The alliance should be an effort launched and given a kickstart by the G7, under the umbrella of its 2021 Industrial Decarbonization Agenda (G7 Leaders, 2021). Indeed, this IDA should clearly set out the goals based on the agenda outlined in this paper (Section 4.1). The IDA of the G7 could also outline the various constitu-

ent elements necessary to achieve them, while explicitly acknowledging that many of those efforts will be led by others and that the fora for solving certain parts of the agenda must include other non-members of the G7. The alliance in that context should act as the champion of the broader agenda, ensuring that the final effort is comprehensive and effective, but not the sole implementer of every single part of it.

To ensure that a critical mass of likeminded and ambitious major economies buy into the industrial decarbonisation agenda, the membership of the alliance should start with the G7. However, as noted, it would necessarily have to extend beyond the G7 over time to achieve some of its aims. This might eventually mean spinning it out to an existence independent of the G7 context.

Of the existing efforts, the alliance might initially partner with the Glasgow Breakthrough on Steel – an effort that has broad membership and an agenda that significantly overlaps with the alliance's as described here (see Section 3). However, as noted in Section 3, the Breakthrough Agenda would need to meet some preconditions to be appropriate to take on this role. Notably, it would to expand coverage beyond steel and hydrogen to cement and eventually other materials such as aluminium and chemicals. It would need to have a modification to its mandate from its members to address the full set of issues outlined in this paper (including the trade question, for instance). It would also need to have willing and motivated champions in terms of specific member countries (or blocs, such as the EU), in order to fulfil its function effectively.

While the G7 is the best place to start, other configurations might be possible if such efforts fail. In general, participation in the alliance ("membership") should be defined by "high ambition", and a willingness to undertake alliance commitments in the substantive areas listed above. It should not feature a common carbon price, penalties for non-members, or the non-application of CBAMs as among members, though membership would make it easier to comply with and get credited under other members' BCAs, and common ambition would ensure minimal trade impacts.

Another key initiative to build on must be the Industrial Deep Decarbonisation Initiative (IDDI) supported by UNIDO. This initiative is well advanced in defining ambitious standards for low-carbon materials, reporting frameworks and public procurement policy objectives for member countries. IDDI is a neutral platform (is not just a developed country club) and also has a link to the Clean Energy Ministerial (CEM) including many of the world's largest developing and developed economies, offering the possibility to globalise the results of the IDDI work programs over time. The G7 (and other alliance members) could boost this initiative by having all its members officially sign up.

Benefits of participation ("club goods") would include:

- → A seat at the table when agreement is reached on milestones for decarbonisation, and for protocols on carbon accounting, on green public procurement, on best practice in leakage protection;
- → Easier pooling of resources for assisting affected countries, or for helping decarbonise prospective member countries;
- → Reduced risk of leakage to other members, who will boost their ambition in industrial decarbonisation;
- → Defused trade tensions around national-level implementation of BCA by members;
- → Facilitation of compliance with members' BCAs, through joint institutions, registries, crediting protocols, etc.;
- → For prospective members, the prospect of assistance in industrial decarbonization; and
- → Reputational benefits;
- → The possibility for bilateral or multilateral partnerships to be established between devellopedand developing countries to achieve specific transition aims, such as establish value chains for green hydrogen, materials or technology production.

These benefits should be of interest to countries of all types, including both developed and developing countries.

# 5 What is needed from the 2022 G7 Summit in Germany

The foregoing discussion highlighted the need for an international climate alliance of high ambition countries focused on cooperation to enable industrial decarbonisation in energy-intensive trade-exposed sectors. This is one of the last frontiers in sector-based climate policy, and for good reason: it is challenging. It necessarily involves a variety of efforts, undertaken at different levels, many with international dimensions, but somehow coordinated to ensure that no gaps undermine the larger undertaking.

As noted above, the constituent elements of that project include:

→ Creating scalable markets for low-carbon industrial goods:
- Fostering lead markets through efforts like government procurement
- Fostering markets at scale through agreed standards for green industrial goods and their downstream products
- Agreed accounting standards for embedded carbon at the product level

→ Supporting ramped up supply of low-carbon goods:
- Providing early and pre-commercial support for key technologies
- Supporting dissemination of related underlying technologies, goods, services
- Setting (differentiated) milestones in the deployment of decarbonized technologies

→ Efforts at facilitation:
- International agreement on principles and best practice in leakage prevention
- Agreed GHG performance standards
- Coordinated R&D on key technologies
- Capacity building for industrial decarbonisation in developing countries

No existing institution has the mandate or capacity to undertake all of these efforts. But, as described above, many promising efforts are underway to address pieces of the whole. A climate alliance focused on industrial decarbonisation should weave together these strands, helping to strengthen those that are incomplete and coalesce those that overlap. At the same time, such an alliance should initiate from scratch necessary activities yet to be undertaken while also monitoring the overall effort.

This alliance should be the agreed path forward for the G7's Industrial Decarbonization Agenda, an initiative launched in 2021 but not yet fully conceived. G7 Members should agree at their June 2022 meeting to advance this agenda both through common policy commitments such as milestones, and via their influence and support for existing initiatives that pursue elements of the agenda. In this regard, the G7 should fulfil a coordinating role, helping to ensure comprehensive coverage of the various agenda items so that a coherent and effective international effort for industrial decarbonisation can take shape.

Ultimately, the goal must be to broaden the group of countries involved well beyond the G7, which may eventually mean spinning it out to an existence independent of the G7 context.

Successful alliance efforts in the climate space to date have been led by one or several national champions who have ensured that efforts have sufficient credibility and staying power. This was the case, for example, with the International Renewable Energy Conferences, and the Clean Energy Ministerial, started and driven initially by Germany and the United States, respectively (Weischer et al., 2012). Germany has a unique opportunity during its Presidency of the G7 to act in that capacity, though a successful effort will necessarily be the product of buy-in by many countries.

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