THE LONDON SCHOOL OF ECONOMICS AND POLITICAL SCIENCE

Collaborating and Delivering on Climate Action through a Climate Club

An independent report to the G7

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October 2022

This is an independent report that was commissioned by Bundesministerium der Finanzen on behalf of the German G7 Presidency in 2022. It does not necessarily represent, nor does it purport to represent, the views of either the G7 Presidency or of other G7 members.

Preparation of the report was under the overall responsibility of Nicholas Stern, I.G. Patel Professor of Economics and Government and Chair of the Grantham Research Institute on Climate Change and the Environment at the London School of Economics and Political Science. Hans Peter Lankes led the team at the Grantham Research Institute working on the analysis and writing. The team included Amar Bhattacharya, Danae Kyriakopoulou (ch. 4), Rob Macquarie (ch. 6), Roberta Pierfederici (ch. 5), as well as Andrew Lang from the University of Edinburgh (ch. 5).

This report sets out a rationale and possible design of a Climate Club, taking its point of departure from the June 2022 G7 Leaders' *Statement on Climate Club*, as a contribution to the work programme of the German G7 Presidency. While it is an independent contribution from outside government, the team has consulted with officials involved in the G7 process.

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Contents

List of Tables

List of Tables (appendices)

List of Figures

List of Figures (appendices)

List of Boxes

List of Boxes (appendices)

Executive Summary

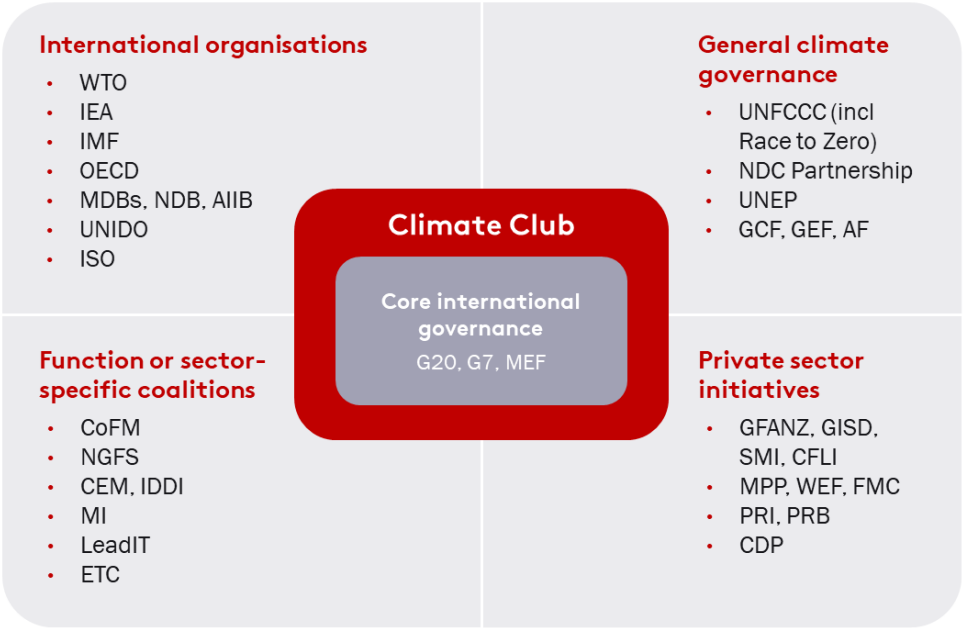
Collaborating and delivering on climate ambition through a Climate Club

A Climate Club can be part of an effective global response to the climate crisis

1. The Earth is warming at an alarming pace. Climate change is here and its impact on lives and livelihoods is already starkly evident. The world has come together behind the goals of the Paris Agreement, and made progress at COP26 in Glasgow, but actions and commitments made to date fall well short of what is needed. There is growing urgency to go much further, much faster. A Climate Club, as called for in the G7 Leaders' *Statement on Climate Club* of June 2022, can enable greater ambition by fostering commitment to collective climate goals, accelerating action, facilitating financial and technology partnerships, managing concerns around carbon leakage and competitiveness, and aligning around common interests in guiding industrial transformations.

2. A shared strategy for climate and economy. The world today is facing the urgent challenge of climate change while experiencing extreme economic and geopolitical stress. In a fractured world the climate agenda represents an important opportunity for countries to collaborate on objectives that are widely shared. The proposed Climate Club must be seen and communicated as part of a positive narrative: a global strategy to recover and rebuild in a way that places climate action at the heart of a new growth story, powered by investment, technology, policy and finance.

3. Climate architecture. Given its centrality to growth and development and its economy-wide nature in terms of causes and impacts, the climate agenda figures in many fora beyond the UNFCCC, including the G7 and the G20, the Coalition of Finance Ministers for Climate Action, Central Banks and Supervisors Network for Greening the Financial System (NGFS), Major Economies Forum, High Ambition Coalition, NDC Partnership, private sector initiatives such as the Glasgow Financial Alliance for Net Zero (GFANZ), Global Investors for Sustainable Development (GISD) Alliance, Sustainable Markets Initiative (SMI) and the Climate Finance Leadership Initiative (CFLI), and public–private coalitions focused on specific goals. Virtually every international organisation now has the climate as part of its mission. Nevertheless, there are gaps and shortcomings in the institutional architecture, which are delaying collective progress. Existing fora might have



engagement at the top, shared member ambition, critical mass, a focus on the climate agenda or comprehensive coverage of climate topics.

A Climate Club would be effective by combining all of these features. It would be designed to enhance, not duplicate, other initiatives. Supporting the UNFCCC, the Climate Club could evolve to become a powerful, cohesive and dedicated forum to drive collective ambition, translating ambition into priorities for action, and managing the cross-country complementarities and tensions that will arise. In that sense it could play a very similar role for the climate to the role originally conceived of the G20 with respect to strengthening international cooperation on the economic and financial architecture.

4. Principles of the proposed Climate Club. To be successful, the membership and design of a climate club must be firmly based on a set of principles that are consistent with those of the G7 Leaders' *Statement*:

- It must require from its members a *shared commitment* to ambition (centred on the Paris and Glasgow goals), action and collaboration.
- It must be *open* (and offer benefits) to countries with different priorities, development circumstances, and policy mixes.
- It must be *co-led and co-designed* with emerging markets and developing economies (EMDEs) from the start – which will account for most future (and are responsible for a minority of past) greenhouse gas emissions – and not the G7 alone.
- It must support and not side-line the *Paris process*, and strictly observe *international law*, including trade law; if not, the Climate Club would fail to reach its goals and could be divisive and destructive.

5. Membership. One could argue that those countries that are most important to the climate agenda should be targeted to ensure the greatest relevance. That principle guided the formation of the G20 and of the Major Economies Forum. Another approach is to embrace the full diversity of all countries, irrespective of their weight in greenhouse gas emissions: the Coalition of Finance Ministers and the NGFS are taking this approach, which is a way to ensure that the world as a whole makes the transformation that is needed and the construct is seen as open and inclusive (see also the 'high ambition coalition' at Paris COP21). The Climate Club should seek to combine these perspectives, bringing together 'systemic' as well as smaller countries united by their ambition. To enable a diverse membership, members might be expected to sign on to qualitative aspirational goals initially, combined with a commitment to rising specificity and action over time. A climate club implementing these criteria and principles is not really a 'club' in the formal sense of the term, with its exclusionary connotation. It is an 'Alliance of Leaders for Climate Action and Sustainable Growth' and would benefit from a relabelling, even though this report uses the 'club' terminology to align with the G7 discourse.

Principles and architecture of a Climate Club

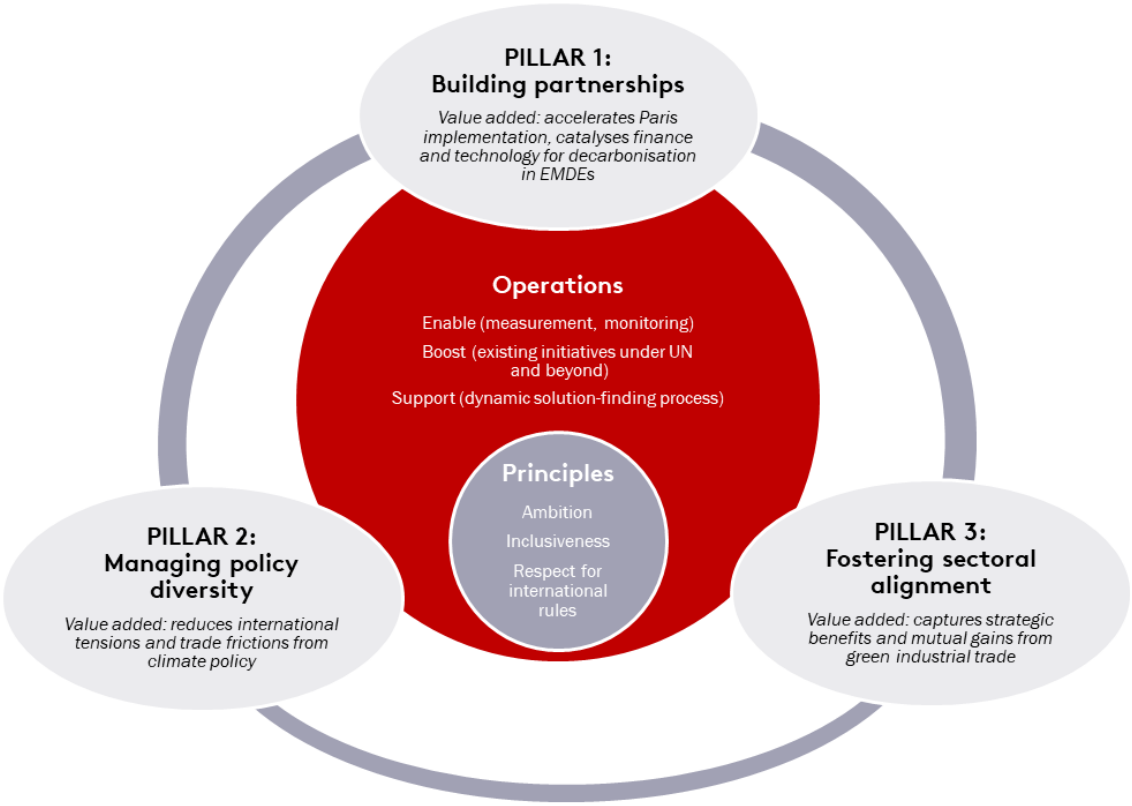
6. A Climate Club could provide a flexible framework for driving the climate agenda forward through a coordinated, collaborative approach among countries representing a large proportion of global greenhouse gas emissions. The principles set out in the G7 Leaders' Statement should drive the design of the Club but must be carefully defined.

7. Inclusiveness is crucial to ensuring that the Club achieves the necessary size and coverage to make a difference. Designing a club to be inclusive implies acknowledging differences in the rationale for joining, in countries' climate policy mix, and in what would constitute desirable benefits of membership. To be inclusive, membership in the Club should be based not on uniform policy pathways, but on the adoption of a policy mix that can deliver on climate ambition. For countries whose climate ambitions are constrained by lesser financial and technical capacity, a principal motivation is access to levels of support not otherwise available. For others it is establishing rules – in a non-confrontational manner – for dealing with the possible

implications of policy divergence (e.g. carbon border adjustment mechanisms [CBAMs], and local product preferences) and tackling measurement issues; or agreeing compatible standards for low-carbon products, processes and supply chains, and doing so in a way that ensures that all have a seat at the table in shaping rules and standards.

8. Respect for international rules, in turn, ensures that the Club does not undermine established frameworks. The Climate Club must not create an alternative to the Paris Agreement. Members should cast their ambition through progressively higher targets under the annual UNFCCC process, and work to support and reinforce initiatives under the Paris umbrella rather than creating parallel tracks. Compliance with international rules is particularly important when it comes to measures agreed under the Climate Club that have a bearing on trade. It is permissible under World Trade Organization law for WTO Members to adopt trade-restrictive measures for environmental purposes, such as addressing climate change. However, where such measures are adopted, they must be designed and applied in a manner that is non-discriminatory, well-founded and transparent.

9. Organisation. The Club would be a dynamic and flexible arrangement that supports the search for responses and solutions through the most effective fora, a platform to agree on commitments and collective action in areas of common interest, as well as for the measurement and monitoring of progress. We propose that the role and work of the club be organised based on three mutually-supporting pillars: *building partnerships, managing policy diversity,* and *fostering sectoral alignment.* Whereas there would be some broad areas of commitment and actions involving all members, other actions could be taken forward by plurilateral groups of members.



10. Institutional underpinnings. The Climate Club does not require an 'institution' but effective organisational underpinnings and technical support. The G20 and the Coalition of Finance Ministers for Climate Action (CoFM) provide important insights on the key dimensions and institutional considerations for setting up and operating the Club. Drawing on these, the Club might consider having:

- *Co-chairs*, one from an advanced and one from a developing country, to ensure broad perspective, inclusion, and a focus on the collective agenda
- Standing and ad hoc *working groups* that focus on and set the agenda on specific issues, bringing together the most relevant countries and institutional partners
- *Institutional partners* involved in the climate space, drawing on the partnerships established by the G20 and the CoFM but also extending to academic institutions and scientific bodies
- A *secretariat* drawn from relevant international institutions but organisationally independent of them
- *Ownership by countries* as a whole rather than particular departments within national administrations, with sponsorship at the top.

This report considers the architecture and rationale for the design of a Climate Club. More detailed design aspects, legal underpinnings and the mechanism for financing its Secretariat and general operations must be determined by the founding members (including G7 and partner economies). The Coalition of Finance Ministers for Climate Action can serve as a useful blueprint in terms of financial and other arrangements for the operationalisation of the Climate Club.

Although the initial impetus has come from the G7, crucially the Club should not be launched by G7 countries alone. The framework should be agreed and designed jointly with key developing countries in order to take a broader range of interests into account.

Pillar 1. Building partnerships to enable joint ambition

11. The Climate Club could be operationally structured into three 'pillars' or work areas. The first of these would seek to build partnerships, since the idea of jointly benefitting from common action is at the core of the Climate Club. The starting point must be mutual understanding and cooperation around goals, strategies and actions, complemented by partnerships around finance, capacity-building and technology.

12. Goals, strategies and actions. Given the wide range of fora and institutions promoting progress on the climate, it would be a key work programme under this pillar to assess what is being done and what issues and gaps need to be addressed with respect to ambition, long-term strategies and roadmaps. The goal would be to raise ambition and accelerate action and delivery while avoiding duplication or undermining other processes, especially that of the UNFCCC. Partnerships developed under the Climate Club umbrella will need to reflect a focus not only on climate change mitigation but also on adaptation, resilience and biodiversity, which still receive only a fraction of the planning, financial and technological support they require.

13. Country platforms. Given the urgency and scale of action on the climate and development it will require a high degree of coordination. The Climate Club can help facilitate coordination not just globally but also at the country level, for instance through helping accelerate the formation of mechanisms such as the South Africa Just Energy Transition Partnership and translating them into other countries. These efforts can build on the recommendations by the 2018 *Report of the G20 Eminent Persons Group* on Country Platforms (CPs) as a vehicle for joint action for tackling obstacles to investment upstream, supporting investment preparation, and mobilising sustainable finance. Work on CPs should also draw in various private sector initiatives, as proposed by the UN Special Envoy on Climate Action and Financing.

14. Financial partnerships. The Climate Club would offer a platform to consider approaches to scaling up bilateral and multilateral finance, and for creating conditions enabling much larger flows of private finance. Delivering on the commitment by developed countries to mobilise $100 billion a year by 2020 to support developing countries on climate action has become a crucial symbol of trust. At the same time, climate finance from official and other sources must expand much further. From its high-level vantage point the Climate Club could target the flaws and gaps in the global and local architecture for private sustainable

finance; act as a platform for linking developed and EMDE members to accelerate the growth of voluntary carbon markets; and provide a forum for its members – *as shareholders of multilateral institutions* – to align on and implement reforms to modernise the development banking system to be fit for the purpose, urgency and scale of the necessary sustainable investments. Unlocking greater financing from the multilateral development banks (MDBs) will require both a greater set of commitments from public finance and reforms on several fronts. Public finance commitments must go beyond the $100 billion commitment and can take the form of mechanisms that build on the South Africa Just Energy Transition Partnership example. Suggested reforms include encouraging adjustments to the MDB capital adequacy frameworks in line with the broad strategic shifts outlined by the G20 Panel on MDB Capital Adequacy, achieving far higher private capital mobilisation, as well as considering the need for capital increases.

15. Technology partnerships. The Climate Club can support or – where there are flaws or gaps – initiate technical cooperation on research and development, as well as strengthening project development capacity and packaging investments for clean energy and other climate-critical sectors in a way that can attract international finance. Technology partnerships are most easily implemented at the sector level and would involve significant coordination with the Club's work under Pillar 3.

Pillar 2. Managing policy diversity

16. The second proposed pillar of the Climate Club aims to enable members to accelerate and harmonise climate ambition while managing friction caused by policy differences. Members should pursue these goals, while recognising and allowing each country the flexibility to follow a range of decarbonisation strategies domestically, thus accounting for countries' different starting points and policy priorities.

17. Carbon leakage and border measures. So far, there is little evidence of carbon leakage – emissions moving abroad and production being replaced by imports due to tough climate policy requirements – but it is expected to become more significant in trade-exposed and emissions-intensive industries (EITE) as carbon prices and other policies start to bite. In this context, carbon border adjustment mechanisms (CBAMs) are gaining popularity as a tool to address leakage.

18. A forum for multilateral cooperation. The Climate Club could have a role in ensuring that any CBAMs that will be implemented over the coming years, as well as other trade-sensitive measures, operate within mutually agreed guard rails. This might include common protocols and methodologies for crediting foreign carbon pricing and related regulations or incentive structures, or forms of best practice to ensure that the various regimes work to prevent leakage without being unfair, untransparent, bureaucratic, complex, overly broad or protectionist. What is not advisable, however, is to seek to turn the Climate Club itself into a giant CBAM by creating treaty-bound club goods and penalties. A common CBAM would require a degree of policy harmonisation that is unlikely to be compatible with an open, inclusive approach.

19. Managing friction. Tackling potential instances of friction extends beyond CBAMs to the implementation of climate subsidies, local content requirements and consumption charges. It could also include the Club acting as a forum for the development of methodologies on measurement of the carbon content of complex goods as well as the carbon price equivalence of the overall stance of national policies – including future plans. That would enable the enhancement of transparency through the monitoring of countries' policy ambition and implementation. It is important that assessment of policies and strategies recognises plans for the transition process and are not just 'snapshots'.

20. Importance of World Trade Organization engagement. Measures associated with the Climate Club are likely to be subject to scrutiny from a WTO perspective, reflecting its role in operating the global system of trade rules and agreements, maintaining open trade, and settling disputes. WTO law will generally hold members to core standards of good governance. The Climate Club should consider engaging directly with the WTO itself or with other existing bodies that inform the international trade system. This can take the form of

a convening forum under the auspices of existing WTO committees and working groups that would allow non-members of the Climate Club to air their concerns and propose ideas. The Climate Club may aim to give impetus to discussions within the WTO regarding not just guidelines for the design and implementation of CBAMs, but also definitions of environmental goods and services, categorisation of green subsidies, or international standards relating to carbon emissions.

21. Convergence over time. There is a crucial opportunity for the Climate Club to reconcile the impact of policy divergence, if well-focused on a small number of EITE sectors. The Climate Club could support converging decarbonisation paths by establishing consistent timelines across the work on partnerships, the management of policy diversity and sectoral alignment while giving time to the implementation of trade measures. Progress on these fronts would make trade action ultimately redundant.

Pillar 3. Fostering sectoral alignment

22. The third pillar proposed in the design of the Climate Club is an effort to align policies across member countries to provide collective support for decarbonisation in key sectors. Coordination on industrial transformation allows Club members to pursue shared material interests – in ways that recognise the variety in country circumstances.

23. Industry focus. Cross-country coordination is especially urgent (and often lacking) for emissions-intensive heavy industries – such as steel, aluminium, cement, hydrogen and chemicals. Developments in these sectors, as well as in international transport such as shipping, are linked strongly to international trade patterns and concerns. Decarbonisation is hindered by a pronounced collective action problem in the face of costly abatement options and highly competitive global markets. Uncertainty over key technologies for low- or zero-carbon production, lack of incentives to innovate, and underdeveloped policy to support first movers would all be addressed by coordination.

24. Flexible coordination. Not every sector will attract universal interest and in some production is dominated by a small number of countries. Therefore, a Climate Club is expected to give rise to a varied geometry of plurilateral coordination. There are already numerous, mostly recent, coalitions to advance decarbonisation at the sectoral level. Alignment under a Climate Club should seek to reinforce this ecosystem and overcome flaws and fill any gaps, by galvanising momentum behind existing institutions, acting as a focal point for coordination on certain issues, and creating its own offering in areas not yet covered. The Club builds critical mass and members have an assured seat at the table.

25. Roadmaps. At the level of overarching policy frameworks, countries can agree decarbonisation targets and roadmaps in order to support investment confidence and commitment through shared expectations of the development pathway ahead. The Breakthrough Agenda, launched by the UNFCCC's Race to Zero at COP26, offers a global framework in close interplay with sector-focused groupings such as Mission Innovation (MI), the Leadership Group for Industrial Transition and the Mission Possible Partnership. In this context, the Climate Club could pursue greater harmonisation of milestones and interventions within members' national roadmaps, primarily through resolution of trade barriers and support from partnerships made possible under the first two pillars.

26. R&D and investment. As well as the targeted use of public funds on a national basis, Club members may pool resources to support innovation in chosen sectors. Mission Innovation already undertakes a wide range of activities supporting collaboration around zero-emission technologies. Apart from boosting participation in MI, a Climate Club would add value by combining finance and technology transfer and sharing under the partnerships pillar with spreading and monitoring domestic commitments to technological priorities, striking deals on knowledge sharing and coordinated funding for R&D where possible.

27. Standards. Product standards are a powerful instrument for driving low-carbon innovation, including technology-agnostic performance standards for production processes, standards directly on basic materials and those on final products. They are also a prerequisite for certain interventions and for smoothing trade. The private sector has experience with environmental standards and firms reporting on their products build skills and infrastructure for compliance. However, methodologies vary significantly, so harmonisation should go further for the necessary scale and pace of transformation measures. Club members could align by endorsing measurement standards and setting targets for products – such as promoting common thresholds and single measurement approaches for defining 'green' hydrogen or ammonia.

28. Procurement. Use of governments' purchasing power through public procurement favouring products with low lifecycle emissions can create lead markets for these products. Private procurement commitments can play a similar role and could be incentivised through fiscal instruments. A public procurement alliance already exists in the Industrial Deep Decarbonisation Initiative (IDDI), and in the private sector the First Movers Coalition consists of over 50 companies making voluntary commitments. The Climate Club can help to scale up these initiatives, by encouraging membership and sector coverage and by serving as a forum for negotiations around implications for trade or support packages that some countries would need in order to scale up their commitments.

29. State support. Members will need to set rules and understanding for public financial support to industries to advance the goals of sectoral agreements. If a group of countries in the Club agreed to jointly undertake Carbon Contracts for Difference policies or pool funds for demonstration projects, the market signal would be amplified. There is a potential role for a Climate Club in seeking to build consensus on acceptable, WTO-compliant forms of public support for green investment, complementing and sharing best practice with initiatives elsewhere, especially within the WTO. It may also be possible for a critical mass of WTO members to move ahead on a plurilateral basis.

Conclusion

30. There is a pressing need to act on climate change. The establishment of a Climate Club can give critical momentum to that shared agenda. Such a Club must be an 'Alliance of Leaders' in more ways than one. It will require government leaders to be engaged because the climate transformation cuts across departmental briefs and requires a shared, purposive, coherent national strategy. The climate transformation drives and is indeed inseparable from the economic transformation towards a new, sustainable, resilient and inclusive model of growth and development. This is a positive agenda of change. Climate leadership is growth leadership.

31. This report argues that it is fundamental for this Club to be inclusive – and to be so from the start in order to reflect a diverse membership in its design and organisation. In particular, it would be counterproductive to invite developing countries to join a 'rich countries' club' not of their making. The last few years have seen an erosion of trust: there is a need for an expressly cooperative approach.

32. A Club (or Alliance) that promotes ambition with inclusiveness would be one in which countries come together that otherwise would not, building on the momentum of countries' net zero commitments. For its institutional structure, it would draw on the experience of the G20 and the Coalition of Finance Ministers for Climate Action. It would be respectful of existing, broad-based processes, operating in support of the UNFCCC. It would therefore sit within an architecture of existing coalitions and initiatives, with a variable geometry of members' participation around specific issues. The whole set of climate, sustainability and resilience strategies for development would benefit from the attention and the traction that an alliance of leaders can bring.

1. Urgency of climate action

Climate change is real and increasingly tangible and, thankfully, the debate is no longer about the science. The Intergovernmental Panel on Climate Change's *Special Report on Global Warming of 1.5°C* (2021) documents the rapid acceleration of climate change, dramatically narrowing the window for limiting global warming to 1.5°C and underscoring the imperative to reach net zero emissions by 2050. The G7 has made a collective commitment to the net zero target, and individual countries have set emissions reduction targets towards that goal.

The climate agenda has enjoyed renewed momentum following the COP26 summit in Glasgow. COP26 forged a common understanding that global warming must be kept below 1.5°C. It created momentum around goals and targets, with 90% of global emissions now covered by mid-century net zero targets. The conference fully embraced the importance of adaptation, resilience and biodiversity; brought sectoral initiatives and innovation-focused 'breakthroughs' on power, road transport, steel and green hydrogen; new commitments on coal, methane and forests; took us a step closer to meeting climate finance commitments; tidied up Article 6 of the Paris Agreement, which should broaden the voluntary carbon markets; and, especially, it saw financial institutions taking a big leap towards alignment with net zero goals.

For the G7, a key challenge is how to help achieve these goals and raise ambition further through mutual support and by encouraging others, particularly G20 countries, who are collectively responsible for 75–80% of emissions. There are countries in and outside these groups that have made strong commitments but others much less so.

Putting a price on carbon has emerged as a central policy tool in enabling a rapid transition to net zero emissions. However, as major economies raise ambition, between-country differences in the strength of ambition and associated implementation of carbon pricing and other policies for transitioning to net zero can cause carbon 'leakage' and distort competition in some emissions-intensive trade-exposed (EITE) goods. Consequently, the issue of cross-border price adjustment mechanisms has come to the fore and with it an urgent need for international cooperation on climate policies.

The G7 has stated its intention to establish a Climate Club (G7 Leaders' *Statement on Climate Club,* June 2022), and the G7 Presidency has commissioned the present report to provide an independent perspective on this initiative. A Climate Club could give important impetus to the Paris agenda if well designed and carried through. But in order to be effective at achieving climate goals and inclusive in its membership, it would need to set its sights well beyond trade defences. Concerted climate action can be at the heart of a dynamic development agenda. Climate action reduces greenhouse gas emissions and delivers adaptation through growth-promoting investment and technology. Support for the less endowed and the vulnerable, both internationally and domestically, is a central pillar of the UN framework. International climate initiatives should therefore be designed so that they enable investment, technology and participation in support of the Sustainable Development Goals (SDGs).

> ***There is an urgent need to accelerate action on the climate and the Climate Club can be part of an effective global response.***

This is a positive agenda for people and planet, at the core of the next industrial revolution (Schwab, 2016) and indeed the growth and development story of the 21st century (IMF, 2021). It is important that the Climate Club is understood, framed and designed in this way. Too much of the climate discourse implies that climate action is a burden: this is where the Climate Club needs to shift the terms of the debate. Climate-related targets sketch out the vision behind a new model of inclusive, sustainable growth. Not *obligation* but *opportunity*; not *costs* but *capital*.

The importance of an open and inclusive approach raises the question of whether the 'Club' label, which can convey exclusion, sets the right tone. Moreover, the notion of a climate club (which deals with a global public good where action by those outside the club matters) has a weak and misleading foundation in the theory of clubs (where club goods are excludable, congestible and divisible). The terminology should be avoided politically as well as theoretically. An 'Association', 'Coalition', 'Alliance' or 'Community' might better describe the idea. This should be borne in mind even if we keep this language in the following for practical reasons – since the 'Climate Club' language is established in the public discourse.

2. Strategy: Strengthening ambition and implementation

2.1 Harnessing collective commitment and building mutual support

The world today is facing the challenge of climate change while experiencing extreme economic and geopolitical stress. Markets were already fragile and inflationary pressures building up due to demand–supply imbalances following the COVID-19 pandemic, but the Russian invasion of Ukraine and associated disruptions are exacerbating these challenges.

Wars and hardening divisions can underscore an opportunity to act together in a spirit of internationalism around objectives that are widely shared. Climate action should be seen as a key part of the energy security agenda in which most countries, in the Global South as well as North, have a shared and overwhelming interest. In a fractured world the climate agenda represents an important area where countries can collaborate. Through the IPCC and the UNFCCC summits (COPs) they have shown a remarkable ability to come together around the science and the imperative to act.

The proposed Climate Club must be seen as part of a broader global strategy to recover and rebuild in a way that creates sustained and environmentally sustainable, resilient and inclusive growth. With much of the world's growth potential – but also its future emissions – concentrated in developing economies, this strategy has to build on collaboration, avoiding divisiveness before a background of deep suspicion. Climate ambition and climate action must be at the heart of a new shared growth story, powered by investment, technology, policy and finance. This chapter briefly reviews the requirements of this broader strategy.

2.2 Centrality of investment and innovation

The future of people and the planet will be shaped by the capital investments realised over the next 10 to 20 years. As set out in a report for the G7 Presidency in 2021 (Stern et al., 2021), the agenda to deliver a strong recovery and sustainable, resilient and inclusive growth therefore should be centred on a big push on investments and innovation.

Top-down and bottom-up estimates of the investment needs – short- and long-term, public and private – are remarkably consistent (Stern et al., 2021). To drive the low-carbon transformation and promote strong and sustainable economic growth, global investment must increase by around 2–3% of GDP per year above pre-pandemic levels, during this decade and beyond, primarily in the private sector. This would reverse the damaging decline of investment ratios since the Global Financial Crisis and, importantly, it would enable combining growth with the replacement of old, carbon-intensive capital stock by green capacity at the necessary pace for a net zero emissions path.

> ***For climate and growth, the world needs good policies as well as investments, innovation and finance. An effective policy mix tackles prices, standards, regulations and complementary measures.***

Box 1: Climate ambition and systemically relevant countries and sectors

In 2019, China, the United States, India and Russia were the four biggest emitters of greenhouse gas emissions globally. On a sector basis, power generation is the largest emissions driver. Power generation and transport together accounted for over two-thirds of total emissions in 2019 and have been responsible for almost all global emissions growth since 2010. The remaining third was mainly associated with the industry and buildings sectors. After allocating electricity and heat emissions to final sectors, industry is the largest emitting sector, accounting for over 40% of global emissions in 2019 (IEA, 2022a).

Figure 1: Carbon dioxide emissions by country, top 20 emitters 2019

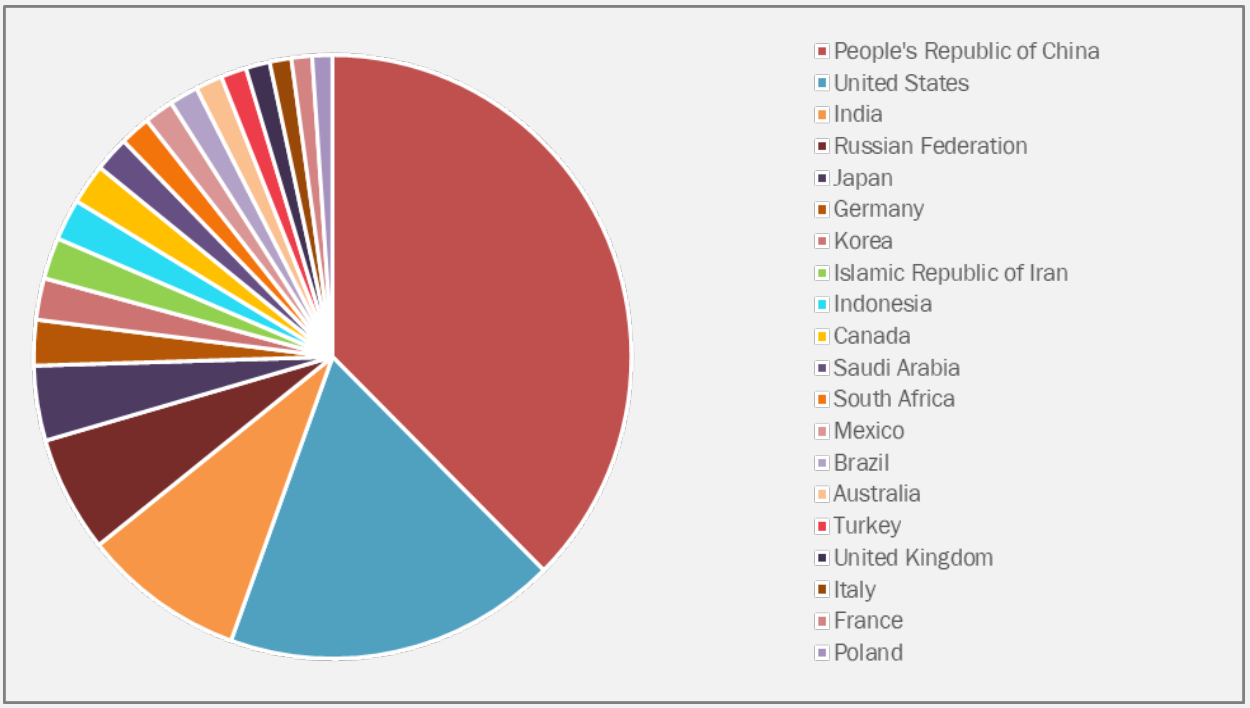


Figure 3: Carbon dioxide emissions per sector with electricity and heat allocated

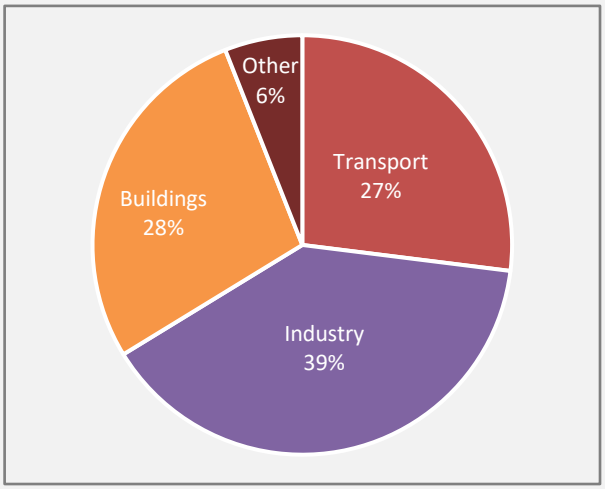
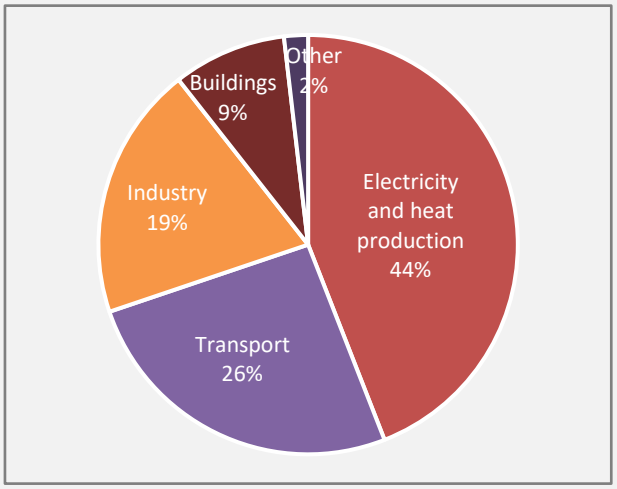


Figure 2: Carbon dioxide per sector with electricity and heat separated

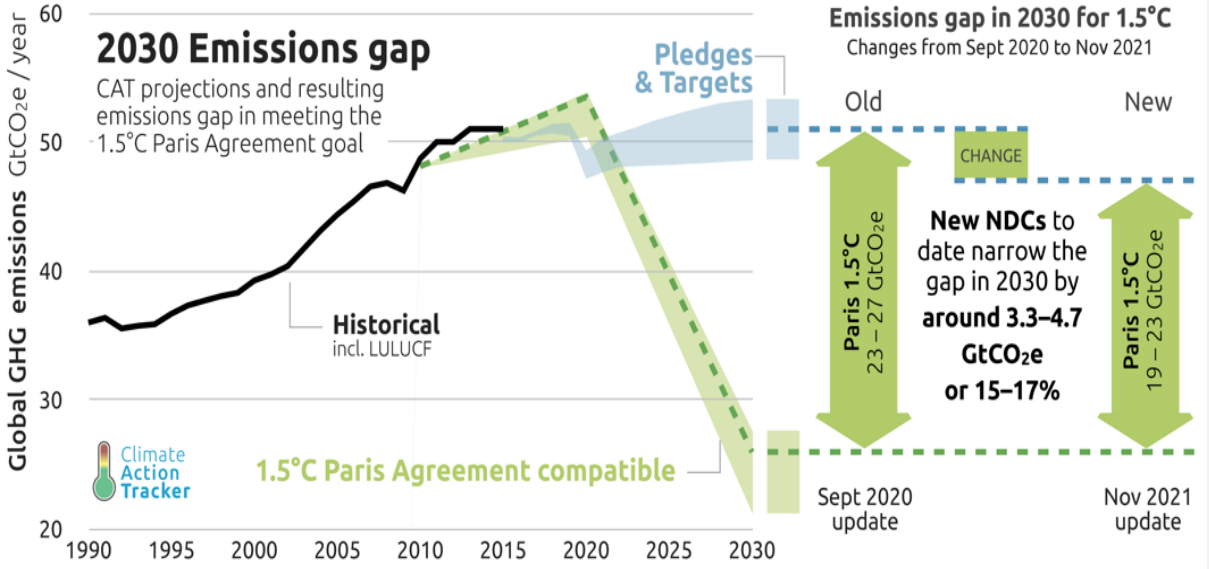


Source: Own calculation from IEA (2022a)

Looking forward, as of June 2022, 128 countries covering 83% of global greenhouse gas emissions have enshrined net zero targets in laws or policy or have proposed legislation to do so. Of the 128 countries with a net zero target, 104 have committed to achieving that target between 2041 and 2050, while 10 countries covering 55% of all emissions have committed to a longer timeframe (Net Zero Tracker, 2022).

Despite the strengthened long-term ambition, medium-term ambition lags behind. As of November 2021, a substantial gap (in the range of 19–23 gigatonnes of carbon dioxide equivalent [$GtCO_2e$]) remained between the levels of emissions in 2030 projected in the Nationally Determined Contributions (NDCs) submitted to the UNFCCC, and the lower levels that would be consistent with the 1.5°C temperature goal of the Paris Agreement (Climate Action Tracker, 2021). According to the IPCC's *Special Report on Global Warming of 1.5°C*, limiting warming to 1.5°C requires that CO_2 emissions fall to 45% below 2010 levels by 2030 and to net zero around mid-century. Collectively, the newly updated NDCs would lead to 2.4°C of heating (UNEP, 2021; Climate Action Tracker, 2021; IEA, 2021).

Figure 4: The 2030 emissions gap



Source: Climate Action Tracker (2021). *2030 Emissions gap: Projections and resulting emissions gap in meeting the 1.5°C Paris Agreement goal.* November 2021. Available at: https://climateactiontracker.org/global/cat-emissions-gaps/. Copyright © 2021 by Climate Analytics and NewClimate Institute. All rights reserved.

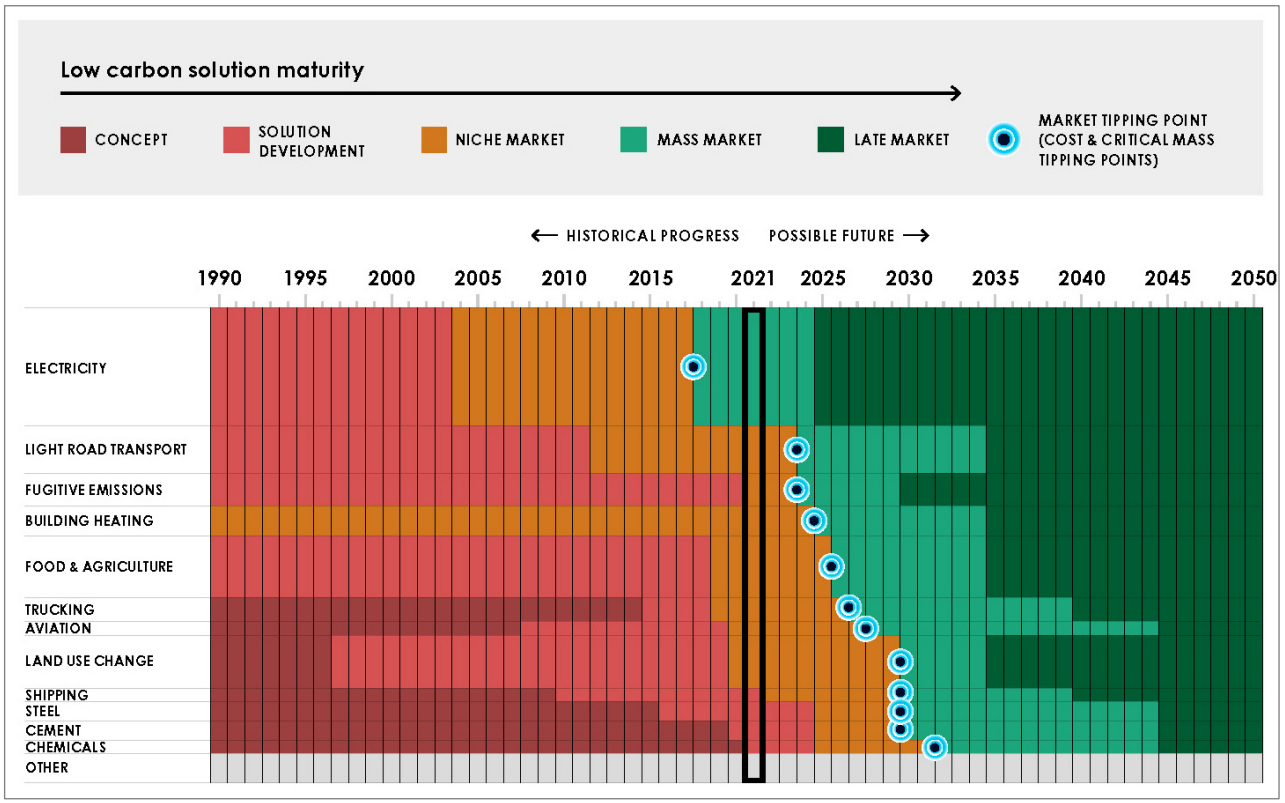
Those investments should not be misperceived as 'costs'. They can propel economic growth, create private sector opportunities and bring significant co-benefits. Green growth and transformation will be primary drivers of prosperity and employment for the 21st century, raising annual global output by about 2% above the baseline average over 2021–30, according to an IMF study, and total employment by nearly 1% net (IMF, 2021). There is solid evidence that green investments generate significant numbers of good quality jobs. For instance, solar and wind energy deliver three times more jobs per dollar invested than fossil fuels (see overview in Lankes et al., 2022). A study of the green investment potential in 21 emerging markets identifies more than 200 million new direct jobs over 10 years (IFC, 2021a). Good jobs are fundamental to social cohesion.

The Paris Agreement had a pivotal role in giving long-term direction for companies to invest and innovate; it created the conditions for industries to move towards tipping points where low-carbon technologies can

out-compete high-carbon businesses (ETC, 2020; Systemiq, 2021). The potential is immense: by 2030, low-carbon solutions could be competitive in sectors accounting for nearly three-quarters of emissions, compared with one-quarter today (electricity) and no sectors only five years ago.

Despite the progress and the potential, the speed of change is much too slow: it must accelerate. Measured against the International Energy Agency's net zero path the deployment of low-carbon technology is well off-track. Almost half of the annual CO_2 emission reductions required to reach net zero by 2050 will come from technologies that are currently in the prototype or demonstration phase. The next 10 years will be crucial to bring key new technologies to market in time – solutions such as advanced batteries, green hydrogen, sustainable bioenergy, and carbon capture, utilisation and storage (CCUS). Public-sector support and partnerships are essential for technologies that face high upfront costs and uncertain returns – initiatives such as Mission Innovation, International Solar Alliance, Climate Action Platform and the Breakthrough Agenda, launched at COP26.

Figure 5: Low-carbon solution maturity by sector – progress since 1990 and possible future to 2050



Source: Systemiq (2021)

2.3 A mix of policies

A big push on investments and innovation requires supportive policy. Implementing a price on carbon through taxes or trading mechanisms, while phasing out subsidies that favour fossil energy consumption, is an efficient mechanism for shifting production and consumption towards lower-carbon sources. At the same time, some countries have struggled to reach political agreement on carbon pricing at the national level and carbon pricing alone is unlikely to drive down emissions sufficiently and equitably.

The slow progress of investors and markets is caused by multiple market failures, of which the emissions externality is just one. Others include R&D positive externalities, capital market imperfections, network

effects, information gaps, and lack of consideration of co-benefits – such as the health benefits of cleaner air. These factors are especially prevalent in hard-to-abate industries where technology development requires both 'push' and 'pull' measures to develop the supply of near-zero emissions products and to stimulate demand for them (IEA, 2019). Both types serve the underlying goal of creating long-term predictability, so that industry players and investors have the confidence to support a shift in production.

Carbon pricing must therefore be part of a broader policy package. A well-designed and comprehensive policy mix combines carbon pricing, standards and regulations as well as complementary policies to support innovation and investments and address distributional impacts.

When comparing the policy mix countries are adopting to achieve carbon reductions by 2030, carbon pricing plans play an important role for Canada, France, Germany, Italy and the UK among the G7. All countries have various regulatory policies and targets, but they play a proportionately greater role in Japan and the United States. Among other G20 members, price-based policies are likely to have a significant impact on emissions only in Korea and South Africa. The combined effect of all declared policies and targets remains in the low single digits for several middle-income G20 members.

Beyond policies targeting individual prices or markets there is the importance of affecting broad-based change in key systems, including cities and areas such as land use, transport and logistics, and of course energy. These systems together account for a large majority of greenhouse gas emissions. Change would require vision, a strategic approach involving multiple public policy tools, and comprehensive and coordinated action by the public and private sectors.

2.4 Finance and cooperation

International cooperation around policies, technology and finance, as well as sound institutions and governance organised around country platforms, will be critical in enabling net zero transformation. In particular, supportive finance is essential to a big push on investment and innovation, and therefore a sustainable recovery and net zero pathway.

Most of the sustainable capital stock of the coming decades will be built in emerging markets and developing economies (EMDEs). Developed countries fell short on delivering on the $100 billion climate finance goal by 2020, but there is still an opportunity to step up and deliver in 2022. Climate finance needs are, however, far larger than this target. For a Paris Agreement-aligned decarbonisation path that is consistent with development goals, EMDEs will require additional annual finance (domestic and international) above recent levels, estimated at $0.8 trillion by 2025 and $1.9 trillion by 2030[1] (Bhattacharya et al., 2022).

The financing challenge exceeds fiscal capacity by far and the private sector will have to contribute most of the finance for the new capital stock, as it did for the old. These are commercial opportunities – not a call for aid. A major advance at COP26 was that private finance stepped up with widespread commitments to shift financial flows, organised under the umbrella of the Glasgow Financial Alliance for Net Zero (GFANZ).

[1] Estimates apply to EMDEs excluding China.

But concessional finance from bilateral donors remains central to international climate priorities and donors should double bilateral climate finance from its 2018 level to $60 billion by 2025. The multilateral development banks (MDBs) can play a critical role in supporting the development of country platforms and policies and in increasing the flow and lowering the cost of capital by making full use of their capacity and by reducing, managing and sharing risk (G20 Panel, 2022). MDBs will need to triple their climate-related lending from 2018 levels by 2025. Other sources of funds that will need to scale up include multilateral agencies, philanthropy and voluntary carbon markets (VCMs), each of which provide valuable and complementary forms of finance (Bhattacharya and Stern, 2021b).

3. Establishing a Climate Club to create momentum

A climate club could provide a flexible framework for a coordinated, collaborative approach among countries representing a large proportion of global greenhouse gas emissions. The G7 Leaders' *Statement on Climate Club* released on 28 June 2022 describes the goal of the proposed Club as supporting implementation of the Paris Agreement by accelerating climate action and addressing the risk of carbon leakage. It is to be an intergovernmental, inclusive, open and cooperative arrangement that acts in a manner consistent with international rules.

A wide range of international institutions and inter-governmental fora pursue the climate agenda and it is important to be clear about the value that a Climate Club can add. There are gaps and shortcomings in the institutional architecture, which are delaying collective progress. To break the logjam and make progress with urgency and at a scale that matches the size of the challenge, it is necessary to internalise the many facets of the climate and sustainable growth agenda, the 'gains from trade' embedded in the global, structural transformation of economies; and to ensure they receive the necessary high-level attention by a group of countries that is committed to this agenda. In order to do so, a Climate Club would meet five key criteria: it would combine engagement at the top, shared member ambition, critical mass, a focus on the climate agenda and comprehensive coverage of climate topics. Appendix 1 provides an overview of the current institutional architecture and how it measures up against these criteria.

This chapter first reviews the rationale and principles for the Climate Club, including the implications of these principles for the membership, organisation and focus of the club, and then discusses in more detail how a club might add value in building partnerships, managing policy diversity and fostering sectoral alignment.

3.1 Principles of a Climate Club

Table 1: Summary of the rationale for and components of a Climate Club

Purpose	Accelerate and coordinate climate action for sustainable growth and development.	
Principles	Ambition, inclusiveness, respect for rules.	
(Inclusiveness)	**Motivations**	Collective action, manage friction, strategic complementarities.
	Policies	Policy mix, political constraints, starting points.
	Policies	Partnership, managing policy diversity, industry alignment.
Membership	Commitment to ambition, action, collaboration.	
Organisation	Building partnership, managing policy diversity, industry alignment pillars.	
Operations	Enable (measurement, monitoring), boost (existing initiatives under UN), support (dynamic solution-finding process).	
Governance	Co-lead G7/non-G7; tech support; member forum; plurilateral / variable geometry.	

The principles that were set out in the G7 Leaders' Statement – ambition, inclusiveness, respect for rules – have considerable implications for the design of a Climate Club and are examined below.

3.1.1 Setting ambition

If a Climate Club is to make a meaningful contribution to climate objectives, clearly it needs both to spur ambition and to include or influence countries accounting for a large share of global emissions. The G7 proposals are for an open climate club architecture. Major emitters have begun, since the run-up to COP26, to narrow their commitment timelines for net zero, though the range remains broad and specificity around paths differs, especially for climate mitigation. The Club would need to build out through engagement with leading economies and major emitters at all income levels, opening a path to membership.

However, climate mitigation action on its own sketches an incomplete vision for a Club that would be aiming to attract a broad membership, including from countries that have pressing development needs but also richer countries in which the politics of climate change remain fraught. Climate action is still, at times, seen as being in competition with the pursuit of growth and development goals and with distributional equity.[2] Yet there has been overwhelming evidence for some time that this is a false dichotomy (Lankes et al., 2022). Inaction on climate change is already today undermining and setting back the fight against poverty and inclusive development (IPCC, 2022a). As discussed in Chapter 2, it is also increasingly clear that action on climate change, structured well, provides considerable benefits and opportunities for dynamic growth and development (Stern et al., 2021; WEF, 2021, 2022a).[3] At the same time, poorly designed climate policy can hurt development and worsen the livelihoods of those already in poverty, which, understandably, provokes opposition and undermines action.

Thus, action on climate can and must help drive inclusive growth and development if it is to succeed. This involves resources and investment domestically but also across borders. International collaboration will be essential to delivering an integrated and concerted response to the twin challenges. The Climate Club should therefore cast a broader vision, one that places climate action at the heart of a positive agenda of cooperation and mutual support for climate goals, dynamic growth and inclusive and resilient development. Its impact on the climate would materialise through the investment, finance and technological transformation enabled by such a club.

These considerations define the 'ambition' for the Club and therefore also the nature of the commitments that would be expected of members.

[2] The narrative that climate action damages economic opportunity and development has also been promulgated by fossil fuel and other vested interests to delay or curtail climate action (Oreskes and Conway, 2012).

[3] This is true not only for mitigation action but also for investment in adaptation: see, for example, the 2019 report of the Global Commission on Adaptation, which found that every $1 invested in adaptation could generate between $2 and $10 in net economic benefits. Many investments for development, mitigation and adaptation are mutually supportive.

3.1.2 Ensuring inclusiveness

Inclusiveness gives concrete shape to the idea of an open Club and is crucial in ensuring that the Club achieves the necessary size and coverage to make a difference. It is essential that the Club be inclusive from the very beginning. Founding members should reflect different starting positions in terms of their income levels and policy mix, to send the appropriate signal of openness and to ensure an inclusive design. And again, the Club must embody a commitment to helping others achieve sustainable, inclusive, resilient growth. Without this mutual commitment the Club could be divisive and destructive for the broader climate process. Unless there is clarity from the start on this, it will undermine progress.

> ***A Climate Club should require ambition, be inclusive, respect international rules and support existing climate fora.***

Designing a Club to be inclusive implies acknowledging differences in the **rationale** for joining, in countries' climate **policy mix** and in what would constitute **desirable benefits** of membership.

3.1.3 Rationale for Climate Clubs

According to the G7 Leaders' *Statement on Climate Club*, its purpose is to support implementation of the Paris Agreement by accelerating climate action while addressing risks of carbon leakage. The emphasis on joint and cooperative approaches, for instance in transforming industries to accelerate decarbonisation and in boosting partnerships, suggests that a third purpose is to capture strategic complementarities. The Climate Club therefore aims both to promote the climate agenda and to manage friction. These issues are closely linked. The added value of an international Climate Club can be as a forum for reconciling national policies. And the need to manage friction, in turn, can become particularly pressing if countries raise their levels of ambition.

A Climate Club can be approached from different perspectives that are broadly aligned with these aims.

Building 'downward' from the goals of the Paris Agreement, a Climate Club might consist of an ambitious group of countries setting higher targets. Climate mitigation is a global public good and as such, the Paris Agreement lacks the incentives and enforcement mechanisms to ensure greater ambition – there may be a perception that the pay-off to unilateral climate action is limited, while at the same time countries can free-ride on the actions of others.

The Climate Club as originally proposed by William Nordhaus (2015) would tackle non-cooperation by creating treaty-bound club goods and penalties: specifically, enforcing carbon pricing among members and tariffs on non-members. Others argue that the drivers of climate ambition are domestic rather than international collective action, that legally enforceable regimes among the major powers and shared policies are not a realistic prospect and that their divisiveness will undermine the common goals (Aklin and Mildenberger, 2020). Indeed, it is questionable whether club theory applies in this context, where the key club good is non-excludable. That analysis would support softer, more inclusive arrangements, such as normative or bargaining clubs with a more flexible range of tools (Falkner et al., 2021), through which countries can leverage the credibility of mutual external commitments to face down vested interests and tackle distributional concerns.

Building 'upward' from the climate strategies of individual countries or groups of countries, a Climate Club might offer a framework for handling the cross-border impact of differences in policies and pace both among Club members and between members and non-members. The point of departure here is the opposite of the 'collective action' quandary: countries intend to raise their climate ambition, such as carbon prices, irrespective of action by others. The expectation that doing so could damage their industries and cause carbon emissions to migrate ('leak') has led to plans such as the EU's carbon border adjustment mechanism (CBAM) and the US–EU carbon-based sectoral arrangement on steel and aluminium trade. A Climate Club might extend these schemes to willing partners, set their internal rules – importantly, around how to reconcile different policy approaches – and agree how to structure relationships with members that do not join these schemes as well as with countries outside the Club. Critiques centre on the limited evidence of carbon leakage (Eskander and Fankhauser, 2021; Grubb et al., 2022) and on the challenges of implementing the trade schemes (Dröge and Fischer, 2020): their administrative complexity, the tension between the aims of levelling competition and the Paris-mandated 'common but differentiated responsibilities' (CBDR) for poorer countries, and compatibility with WTO rules.

Building 'across' from individual players in the presence of strategic complementarities, a Climate Club might offer a framework for mutually beneficial coordination in support of both climate goals and growth and development. With strategic complementarity it is individually rational to align approaches, for instance around common technical and measurement standards for new technologies, the creation of lead markets or the regulatory basis for private finance. A large number of initiatives are already underway in these areas under the UNFCCC umbrella but often lack critical mass; a Climate Club could step in here (Shawkat et al., 2022).

These different perspectives, top-down, bottom-up and across, can lead to a similar place. Thus, one result of the CBAM might be to induce other countries to raise carbon prices, or implementing common product standards might obviate the need for border adjustments. But the principal motivations and the vision behind them are different. In the first case, countries are sitting on the fence with respect to climate action, but a Climate Club can address external constraints and support collective action. In the second, countries are ambitious, but a Climate Club helps to manage domestic political constraints. And in the third, there is a common search for pragmatic solutions.

This tension runs through the literature and the political discourse on climate clubs. A successful Climate Club design would bridge these perspectives, broadening coalitions by combining collaborative approaches with those that address trade concerns.

3.1.4 Policy diversity

Equally importantly, as described in Chapter 2, there is considerable variation in the policies and strategies for decarbonisation. It should be borne in mind that no single policy mix constitutes *the* unique path to success, and each will reflect a country's structural and political context. Systemic change occurs at scale through the effective combination of policies, setting a clear sense of direction and giving confidence to investors. The challenge is to change the composition of the whole capital stock over time by making all new investment and technology decisions consistent with a zero-carbon trajectory and encouraging retrofits where possible.

In a market economy, putting a price on carbon, through a tax or emissions trading system (ETS), is the single most powerful and economically efficient mechanism to shift demand towards lower carbon intensity, and with it investment, innovation and employment. Relative prices can also be adjusted through subsidies that ensure correct pricing of fossil and non-fossil externalities. But in many situations, price and subsidy action on their own may not be effective fast enough and may require unacceptably steep hikes in carbon prices. A more effective approach would then be regulatory action and a schedule for phasing out polluting industries and processes, or the setting of performance standards. The historical evidence is that regulatory limits have been effective not only at curtailing environmental pollutants (from SO_2 to CO_2 and heavy metals) but also at setting a powerful signal for private sector behaviour and spurring innovation.

Policies must be tightened if 2030 targets are to be achieved, and their mix may change. Nevertheless, it is unrealistic to assume that all major emitters will adopt price-based approaches. An effective policy mix will be tailored to circumstances, including endowments, distributional issues and political constraints. The economically first-best combination of measures may not always be an option, in which case we would expect, for example, a stronger regulatory stance or investment support to compensate for the absence of clear price signals. It is critical to assess the full range of climate policies required to achieve net zero 'on time and within [carbon] budget', and how each can influence the explicit or implicit price of carbon.

If it is to be effective at accelerating climate action, the bottom line is that a Climate Club must accommodate countries with different policies and recognise that, when set at appropriate levels, various combinations of policies are able to achieve the common objectives by promoting net zero-consistent investments, innovation and inclusion. This reinforces the conclusion that the criteria for membership in the Club should be defined not around the implementation of similar policy pathways, but around agreed levels of ambition and the adoption, or credible commitment to adopt, a policy mix that delivers on that ambition.

3.1.5 Club benefits

Why would countries join a Club and register higher climate commitments? It is hard to see that a purely 'normative club' which countries use to declare their intentions without enforcement mechanisms would be an advance on registering unilaterally with the UN process. Norm-setting might be enhanced by collaboration on common nomenclatures, measurement and monitoring – an 'information club'; such efforts are already underway in various fora, but a Club might be attractive if it means having a seat at the table. At the other end of the spectrum, a 'transformational club' with legal enforcement might create valuable club goods – such as trade benefits available only to members and penalties for non-performance – but those would have to be based on common or comparable policies (almost certainly requiring legislation and treaties), which would conflict with the reality of policy diversity (Falkner et al., 2021). Such agreements might be conceivable for sub-sets of countries that are willing to converge around particular policies or industry regulation but not for all major emitters.

As discussed, countries are likely to have different motivations for joining a Climate Club, and club benefits will differ accordingly:

- For countries that may be open to policy choices but whose climate ambitions are constrained by lower financial and technical capacity as well as distributional concerns, a principal motivation is to access levels of support that are not otherwise available. The **key incentive is 'partnership'** in support of a shared ambition for sustainable development.

- For countries with ambitious carbon mitigation policies, including the aim to phase out free allowances under emissions trading systems, a principal motivation is to either achieve the harmonisation of pricing across borders or agree rules of the game for dealing with divergence through CBAMs and for exports. The **key incentive is the 'management of policy diversity'**. This must be focused on emissions-intensive trade-exposed (EITE) goods, where it matters most. If too broad, untransparent or complex, CBAMs will be heavy on administration and seen as covert protectionism.[4]

- For countries that have more industry-centred policies, the principal motivation might be to achieve common standards and support compatible pathways for low-carbon products, processes and supply chains, including joined-up demand and R&D to set the direction and build critical mass for industry transformations. The **key incentive is 'alignment'** and having a seat at the table in shaping it.

These club benefits are of course not exclusive: countries may seek to manage policy diversity as well as to benefit from a sectoral framework for harmonisation; those seeking partnership may want to avoid being penalised by CBAMs.

A Climate Club with a diversity of club benefits would broaden its membership and enable trading across. There is a crucial opportunity for the Climate Club to reconcile the impact of policy divergence. Trade action through CBAMs or regulatory barriers aimed at levelling the playing field for emissions-intensive traded industries are necessary complements to ambitious domestic policy. But implementation, even if narrowly focused, creates administrative burdens and sits uneasily with the concept of 'common but differentiated responsibilities' (CBDR). The Climate Club could support converging decarbonisation paths by establishing consistent timelines across the partnership, management of policy diversity and alignment work while giving time to the implementation of trade measures. If well designed, it could make trade action ultimately redundant.

3.1.6 Respect for international rules

The third principle established in the G7 Leaders' Statement is the importance of acting in support of the Paris Agreement, and in particular the Glasgow Climate Pact, and being compliant with international rules.

To support the Paris Agreement, it is especially important that the Climate Club does not establish an alternative to the UN process, one that would be dominated by the larger and richer countries, would upset the fragile balance of interests and lead to deadlock in the Conference of the Parties. The Climate Club should therefore cast its ambition through progressively higher targets under the annual UNFCCC process and, especially, work where possible to support and reinforce initiatives under the Paris umbrella rather than creating parallel tracks. This has obvious implications for the organisation and the 'business' of the Climate Club.

[4] It is important to recognise the deep suspicion of the developing world over the experience of protectionism (from the EU and US among rich countries), and anger around COVID-19, unmet climate finance targets, Ukraine and Russia.

Respect for and compliance with international rules is particularly important when it comes to measures agreed under the Climate Club that have a bearing on trade. It is perfectly permissible under WTO law for WTO members to adopt trade-restrictive measures for environmental purposes. However, where such measures are adopted, WTO law will generally hold parties to core legal standards, in particular:

- *Non-discrimination*, necessity and non-arbitrariness. WTO law requires that goods of different origins do not modify the condition of competition between products to the detriment of imports of a particular origin, except where the measure is for a legitimate public purpose and is not applied in a way that is 'arbitrary or unjustifiable', and provided there is not reasonably available any less trade-restrictive and equally effective means of pursuing the regulatory objective. A measure is likely to meet these conditions if it is based on recognised international standards.

- *Trade-distortive subsidies.* The WTO Agreement on Subsidies and Countervailing Measures (SCM) prohibits export subsidies and subsidies conditional on local content. Other kinds of subsidies, such as state aid given as financial support, are also challengeable under WTO law if they affect competitive conditions enough that they cause harm of specific kinds (displacing imports, price undercutting, lost sales, and so on). There used to be a safe harbour in the SCM Agreement for specific kinds of environmental subsidies, but this has expired – in the climate context, it is often noted that a new safe harbour for beneficial green subsidies may be needed.

- *Public procurement.* The Government Procurement Agreement seeks to ensure fair competition between foreign and domestic suppliers in procurement markets, and to ensure procurement decisions are made on a transparent and broadly commercial (non-discriminatory) basis. This is a plurilateral agreement and not all prospective Climate Club members are parties to it, although many are.

Furthermore, under both the Paris Agreement and the WTO, commitment obligations under a Climate Club and associated agreement would be expected to reflect members' different starting positions, in line with the principle of CBDR.

3.2 Design of a Climate Club

3.2.1 Conceptual issues

Together, the Climate Club's ambition, inclusiveness and respect for rules shape its 'architecture', i.e. the criteria for membership, organisational design, and the processes and institutions that would constitute the Club. Membership must be open but also reflect the ambition to close the gap between the Paris Agreement goals and current reality; the organisational structure must recognise the diversity of objectives of an inclusive membership; the processes need to ensure that the Club's principal contributions are supporting and supplementing initiatives and arrangements under the Paris umbrella; and its institutions should be light in order not to create a parallel machinery to the UNFCCC.

> ***"An open Club isn't really a 'club' with its exclusionary connotation. It is an 'Alliance of Leaders for Climate Action and Sustainable Growth'.***

One question is whether these principles define a 'Club' at all, in the sense of the economic theory of clubs. This is important because much of the analysis of climate clubs is concerned with the way 'club goods' or indeed penalties for non-members alter the incentives of individual players towards taking collectively beneficial action. However, in the theory of clubs, which goes back to James Buchanan (1965), 'club goods' are excludable (non-members do not benefit), congestible (growing membership reduces the individual benefit of membership), and divisible (players/countries can create separate clubs) (see Box 3.1 and Sandler, 2015). Players self-select for membership in relatively finite numbers given rivalry in consumption, and based on broadly comparable preferences since otherwise the entry price is hard to determine. None of these conditions is fully present when it comes to climate action, where the core benefit is a global public good, or indeed when it comes to action that supports sustainable, inclusive and resilient growth and development, which is generally non-rivalrous. Moreover, much or all of club theory is about people/countries acting in their narrow self-interest. Of course, interest in climate change is acting for future generations and our own, wherever we come from.

The implication is that there is no simple relationship between an entry price (commitments) and a benefit (club good) that applies to a limited and fairly homogenous membership, as is typical of clubs. Similarly, a coercive approach based on sanctions for outsiders would fail to capture the diversity of interests in and constraints on climate action and could backfire. Instead, an open and by design inclusive Climate Club, using this term loosely, will have to be based on a mosaic of incentives and on exploring mutually beneficial bargains from 'issue linkages' across disparate objectives (Sandler and Hartley, 2001; Falkner et al., 2022). And it will have to start from the premise that members are committed to act cooperatively for the global public good.

It is hard to model and estimate the incentives to join such a club, even in a stylised manner as typically has been done for combinations of carbon prices and border tariffs (e.g. Chateau et al., 2022). A rare attempt at capturing the payoffs from different climate club architectures through economy-wide CGE [computable general equilibrium] modelling concludes that "the key benefits that could structure the club are enhanced technological diffusion and the provision of low-cost climate finance, which reduce investment costs" (Paroussos et al., 2019).[5] The bottom line must surely be that the Climate Club should seek to offer potential benefits that correspond to the range of country preferences.

[5] Interestingly, although they face the highest absolute mitigation costs, China and India are the largest relative winners from club participation because the burden faced by these countries to finance their energy transition could be massively reduced following their participation in the club.

Box 2: Club goods

A club is a voluntary group deriving mutual benefits from sharing a partly rivalrous public good, characterised by excludable benefits (Buchanan, 1965). Such goods are known as club goods. Club goods are different from pure public goods for a number of reasons:

- First, the use of a club good is voluntary because sharers must join the club to receive the good's benefits, which are withheld from non-members. Despite fees, club members perceive a net gain from membership. For pure public goods, everyone within the range of spillovers automatically receives the good's benefit or cost.
- Second, the optimal number of sharers for club goods is finite, unlike that of pure public goods, where everyone can be accommodated without crowding externalities. Clubs are, therefore, exclusive collectives.
- Third, for club goods, the disposition of non-members must be addressed. Multiple clubs form, where the population is partitioned into non-overlapping identical clubs, or a single club forms, where leftover individuals do not consume the club good.
- Fourth, club goods must possess an exclusion mechanism that is virtually costless, so that non-paying individuals do not receive the good's benefits. This mechanism can collect tolls to finance the club good. In contrast, exclusion is not possible or desirable for a pure public good.
- Fifth, club goods involve a dual decision – the choice of provision and membership size. Only optimal provision is relevant for pure public goods.
- Sixth, unlike pure public goods, club goods are often optimally provided through congestion-internalising tolls. In contrast, the Nash equilibrium associated with the private provision of pure public goods is typically suboptimal.
- Seventh, club goods can be efficiently supplied through alternative institutional arrangements – e.g. member-owned clubs or for-profit firms.

Club goods do not represent all goods between the polar extremes of private goods and pure public goods. There is no linear scale between these two extremes, insofar as the properties of publicness really vary along two dimensions – rivalry and excludability. Moreover, club goods must possess some rivalry and sufficient excludability. Thus, public goods that are non-rivalrous but excludable – e.g. pay-per-view television programmes – are not club goods, because the marginal cost of additional users is zero. As such, exclusion does not achieve efficiency. Public goods that are subject to crowding but cannot be excluded (e.g. some forms of information) are not club goods. This is also true of public goods whose exclusion cost overwhelms any efficiency gains, so that exclusion is not justified under current technological realties. Hence, club goods do not encompass all impure public goods, where benefits are partly excludable and/or partly rival. The key issue is that there exists a sufficiently inexpensive exclusion mechanism to charge users for the congestion that their use causes.

Source: Sandler and Hartley (2001)

3.2.2 Membership

Membership of the Climate Club is a difficult balancing act. The Club must represent high ambition: that is its purpose. At the same time, in order to make a difference, the Club must seek to cover, over time, a large share of global greenhouse gas emissions. In considering both these requirements there will inevitably have to be a degree of flexibility in the timing and in moving from aspirations to providing firm underpinnings to these commitments.

To enable an appropriately diverse membership from the start, members might be expected to sign up to qualitative aspirational goals initially, combined with a commitment to rising specificity and action over time. The Club's entry documentation might include:

1. **A commitment to ambition** centred on the Paris and Glasgow goals, and therefore anchoring all action on a path and at a pace and with milestones consistent with these goals. Only such a commitment to delivering a global public good can legitimise policy action that might impact other countries. Consistent with the UN process, the Club would cast its ambition through progressively higher decarbonisation targets under the annual UNFCCC process to remain within carbon budgets, recognising the reality of differentiated approaches across countries. There is an analogy to the 'high ambition group' at Paris COP21.
2. **A commitment to action** through combined policies that will ensure the achievement of the climate goals in a manner that promotes inclusive growth and development. Members would spell out a credible mix of policies consistent with the NDCs and growth and development goals in a manner that is comparable and monitorable, setting benchmarks and calculating the consistency of policy effort with the targets. The common aspirations and policy efforts describe a path to Climate Club membership. Given the Club's aim to be inclusive, it should actively support potential members in building the capacity to meet its criteria.
3. **A commitment to collaboration**, tapping into the tremendous benefits that global cooperation on climate can bring by giving impetus to national actions, ensuring coherence and consistency of effort, and encouraging others to follow the Club's lead. Collaboration and helping others to achieve a new, cleaner, more resilient, more efficient and inclusive approach to growth and development must indeed be the essence and foundation of the Climate Club.

One could argue that those countries that are most important to the climate agenda should be targeted to ensure the greatest relevance. That principle guided the formation of the G20 and of the Major Economies Forum. Another approach is to embrace the full diversity of all countries, irrespective of the scale of their greenhouse gas emissions. This approach is being taken by the Coalition of Finance Ministers and Network for Greening the Financial System (NGFS), and is a way to ensure that the world as a whole makes the transformation that is needed and the construct is seen as open and inclusive (see also the 'high ambition coalition' at Paris COP21). The Climate Club should seek to combine these perspectives, bringing together 'systemic' as well as smaller countries united by their ambition.

A sensitive but politically important consideration is whether the Climate Club needs a critical mass of members before being formally launched. In this case, size matters less than the profile of founding members. It will be all the harder for a Club that is designed and launched by G7 members to gain the confidence of a wider membership, since key emerging markets and other leading countries will be presented with a *fait accompli*. It is crucial, therefore, for the Club to have participation from such countries at the design stage, and to include prominent non-G7 countries among members at the launch.

3.2.3 Organisation

The Climate Club might have several organisational components:

- The membership process itself with its normative power of defining and setting members' ambition, including entry criteria and pathways to membership.
- An information component, with technical support centred on measurement and monitoring.
- Intergovernmental arrangements under the Club umbrella for responding to concerns, boosting existing initiatives, filling gaps and agreeing new (common) approaches where necessary.

With respect to the last of these, the G7 Leaders' Statement envisages that the Climate Club is to be built on three pillars, including mitigation, measurement and leakage; industry decarbonisation; and partnerships. It makes sense to cluster motivations and subject matter in a way that brings together related departments and expertise. In this report the recommendation is to associate the pillars with the key club benefits identified earlier, and to label them accordingly: building partnership, managing policy diversity and fostering industry alignment. This approach would provide a clearer sense of the purpose of work under each pillar and how it relates to the motivation of members. The partnership pillar should be flagged up first. This is more than just a presentational matter: it sends a crucial signal of inclusiveness and support.

On that basis, the Climate Club would support three key pillars, some of which can build on existing arrangements that have developed under the UNFCCC framework that would be given impetus and added disciplines by the Club:

- **Pillar 1 on 'building partnership'**, focused on catalytic cooperation, including through technology partnerships and financing and technical assistance options in support of key systems transitions, adaptation and resilience in developing member countries. Work under this pillar would include the consideration of bilateral and plurilateral agreements (such as Just Energy Transition Partnerships), and strengthening private finance channels, voluntary carbon markets and collective action through the multilateral institutions. Action under this pillar must enhance (not detract from) climate finance under the UN framework.
- **Pillar 2 on 'managing policy diversity'**, under which members would agree how to measure and compare policies and outcomes across countries, and that would offer a forum for agreeing principles and monitoring climate-related border measures, including in relation to carbon leakage. It must be recognised, however, that in practice measures of policy can only be directional; they must not be static but should look at intended paths and their credibility; and they may inform on the risks of carbon leakage but are unlikely to be robust enough to help credibly calibrate border measures. Where possible, in order not to build parallel structures, the Climate Club might support the work of relevant fora at the WTO, such as on trade in climate-related goods or on exemptions for climate-related subsidies.
- **Pillar 3 on 'fostering sectoral alignment'**, under which interested members would review decarbonisation options for key sectors, including EITE, and agree on collective support for common standards and innovation, such as through public procurement for lead markets, as well as trade measures, including by facilitating the work of existing fora where relevant. Work under this pillar should be grounded in precedent, for instance in the work of the international standard setting bodies

or of the Technical Barriers to Trade (TBT) agreements at the WTO. Successful alignment under this pillar might offer a win-win agenda for climate, development and trade and take the sting out of CBAMs.

The opportunities, challenges and potential value added of the Climate Club under each of these pillars are discussed in greater depth in Chapters 4–6.

A coordination platform in support of the UNFCCC: Especially under the 'managing policy diversity' and 'fostering alignment' pillars, the Climate Club should define itself as a dynamic and flexible process that supports the search for solutions through the most effective fora, a platform to agree on commitments and collective action in areas of common interest as well as the measurement and monitoring of progress. These processes do not necessarily have to involve the full membership of the Club but could be taken forward by plurilateral groups of members. A key value-added would be that the Club facilitates mutual benefits through issues-linkage, including coordination and choices across pillars.

While the focus of some of the work will and must clearly be on EITE, the Climate Club should recognise from the start that net zero together with sustainable development will mean going beyond a narrow focus on traded industrial goods and will need to include energy and land systems and their implications for pricing, trade and decarbonisation.

3.2.4 Institutional considerations

The Climate Club does not require an institution. In fact, creating elaborate organisational structures would risk developing, over time, into an alternative to the UN process and should be avoided for that reason alone. But the Climate Club would be expected to engage on a broad array of subjects for which it will need resources and to create technical capacity. The operating model of the Climate Club would be to set up a small Secretariat, draw on institutional partners for technical support, and work with and through existing structures and platforms (partnership bodies, trade fora, sectoral alliances, and so on) to prepare substantive briefs and ensure follow-up. Of course, member governments would be engaged as well with the requisite departmental expertise.

There is a rich body of experience on setting up groups for cooperative and collective action that the Club could draw on. Of one kind are the 'Gs' (G7, G20 and G24), where membership is determined by broad collective goals and systemic importance in the case of the G7 and the G20. The second, more recent, experience of relevance are groups explicitly formed to foster climate ambition and action, notably the NGFS (Network for Greening the Financial System) and the Coalition of Finance Ministers for Climate Action. The G20 and the Coalition of Finance Ministers in particular provide important insights on the key dimensions and institutional considerations for setting up and operating the Club:

- **Criteria for membership.** In the case of the G20 the principal criterion for membership is systemic importance rather than any specific commitments. In the case of the Coalition of Finance Ministers, members are expected to sign up to aspirational goals embodied in the six Helsinki Principles. While there is not a strict or quantitative entry criteria, there is an expectation of commitment to rising climate ambition and action over time. This may indeed be a good model for the Club.
- **Leadership and governance.** In the G20, the Presidency of the group is on an annual basis, and the chair has a key role in determining the agenda for that year. The Presidency rotates between G7 and non-G7 countries and the troika (previous, current and next chairs) aims to provide continuity and inclusion in

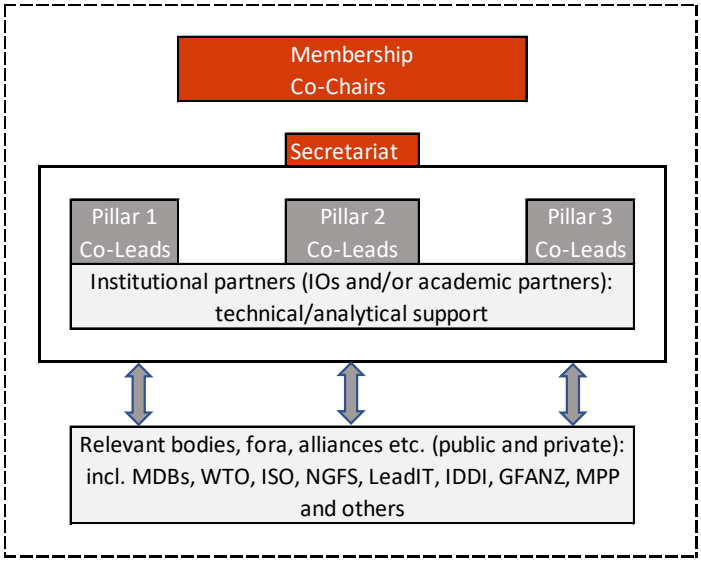
decision-making. In the Coalition of Finance Ministers, there are two co-chairs, one from an advanced and one from a developing country. As a result, there is a greater sense of inclusion and more focus on the collective agenda rather than the priorities set by the chair country. This may therefore be the better approach for the Club.

- **Working groups.** Given the breadth of the agenda, both the G20 and the Coalition of Finance Ministers have set up standing and ad hoc working groups that focus on and set the agenda on specific issues. These working groups bring together the most relevant countries and institutional partners and are typically co-chaired by an advanced and developing country. Given the breadth of its agenda, this approach would be appropriate for the Club as well.
- **Institutional partners.** The G20 has proactively sought to engage relevant institutional partners. The IMF and the World Bank have had a central role from the outset, and other institutional partners have been drawn in on specific issues based on their mandate and expertise. The Coalition of Finance Ministers has sought to engage with a much broader set of institutional partners involved in the climate space. The Club could draw on these established partnerships. For the Club, the WTO, IMF, World Bank (and other MDBs) and OECD/IEA might be the key institutional partners. But it could seek to broaden that engagement, to academic institutions and scientific bodies for example.
- **Secretariat.** In the G20, the Presidency has provided the Secretariat and continuity has been pursued through the troika. For the Coalition of Finance Ministers, the World Bank together with the IMF has provided the Secretariat. An ambitious Climate Club would need a free-standing secretariat. Such a secretariat could be drawn from relevant international institutions but would need to be organisationally independent of them.

It is worth reemphasising that, while the initial impetus has come from the G7, the Club should not be launched by the G7 alone. The framework should be agreed and designed jointly with key developing countries in order to take a broader range of interests into account.

With its broad agenda, the Group must be owned by countries as a whole rather than a particular department within national administrations. It is countries that ought to be the members of the Group, with sponsorship at the top represented by the equivalent of the G20 Sherpas at the prime ministerial/presidential level.

Figure 6: Climate Club organisational schematic



> ***The Climate Club should be a dynamic and flexible process that supports the search for solutions through the most effective fora.***

4. Pillar 1 – Building Partnerships

Partnerships represent the first pillar proposed within the overall design of the Climate Club. International cooperation to deliver on climate ambition is the Club's raison d'être.

This chapter outlines the potential role of a work programme under the Climate Club in fostering partnerships to support countries facing different circumstances in developing ambitious decarbonisation and sustainable development paths, addressing adaptation and resilience as well as mitigation needs. It explores the role of the Climate Club in supporting and accelerating the mobilisation of private and public investment, including through establishing Country Platforms that bring together development partners, and through boosting climate finance by the multilateral development banks. It also discusses how to work in partnership on financial, sectoral and technical cooperation and technology transfer, to enable leap-frogging in climate-friendly industrial development.

4.1 Supplementing the 'architecture' of global climate partnerships

There are important existing institutional structures for international climate cooperation, many of them in relation to the UNFCCC, UN, international financial institutions, the G7, G20, regional institutions etc.; as well as a wide variety of initiatives, including the Glasgow Breakthroughs, High Ambition Coalition (of which most G7 are members), private sector initiatives and others mentioned throughout this report.

Nevertheless, as mentioned earlier, there is a need to make progress with urgency and at a scale that matches the size of the challenge. The Climate Club can internalise the 'gains from trade' embedded in the global, structural transformation of economies; and it can ensure they receive the necessary high-level attention by a group of countries that is committed to this agenda.

The work programme under the partnerships pillar would be about getting the most from the existing structures and initiatives, and building on the complementarities, e.g. across breakthroughs, finance, country platforms and the opportunities for trade and investment. Whether built around finance, technology, or sector policies, they would form part of an alliance that would take a cross-cutting perspective at the highest level and reflect a defining focus on climate action. Club members can work together to consider how progress can be made on different priorities, recognising the importance and complementarities (political and economic) of advancing on different fronts simultaneously. Different members or groups might take the lead on different fronts.

> ***"The Climate Club would provide high-level support for partnerships with a singular focus on climate, raising ambition through strategy and roadmaps, and supporting EMDEs with finance and technology.***

In each case, the Climate Club would define its role strictly and explicitly as supporting the UNFCCC process, not replacing it – it would seek to build critical mass and momentum for progress to be made and registered under the UNFCCC umbrella.

4.2 Role of partnerships in the Climate Club

Partnerships can contribute to the Club's purpose of accelerating climate action, while also reducing international frictions and capturing strategic, mutual benefits. These three dimensions are interrelated.

4.2.1 Accelerating action

While 195 parties have signed up to the 2015 Paris Agreement, implementation lags behind. For many countries, particularly EMDEs, action to match this ambition is held back by a lack of technical and financial resources. It may also be impaired by misleading narratives that place climate action in competition with the pursuit of economic development.

Partnerships can provide the necessary means to match countries' commitments to decarbonise their energy and industrial sectors and deliver on key systems transitions, adaptation and resilience, aligning with the Club's purpose as an intergovernmental forum of high ambition.

Partnerships will be particularly attractive not only to those countries that are ambitious but constrained: they will also be of great value to countries that do have the resources to deliver on their own net zero ambition but recognise the criticality of a sustainable growth path in EMDEs for curtailing global greenhouse gas emissions.

4.2.2 Reducing friction

By helping to harmonise and achieve consistency in the pace of climate ambition, partnerships may, over time, reduce the need for trade measures to address concerns around carbon leakage and level the competitive playing field. Making possible the delivery of more ambitious decarbonisation targets, especially for trade-exposed sectors as outlined under Pillar 3 and for key systems transformations, would further advance the availability and reduce the cost of low-carbon technology and infrastructure.

At the same time, finance and technology partnerships that help to scale up investment for low-carbon technologies would further incentivise and enable the shift away from carbon-intensive sectors and towards low-carbon infrastructure, reducing the need for price-based measures.

In the meantime, and while price-based measures remain in place, our consultations highlighted that their acceptability among EMDEs would be enhanced if the revenues from carbon pricing and CBAMs were allocated to global environmental or development objectives rather than resulting in a fiscal windfall for rich countries.

4.2.3 Capturing strategic benefits

COP26 delivered a major advance for the climate agenda, and a wide range of fora and institutions beyond the UNFCCC have now dedicated resources across areas including climate change mitigation, adaptation and resilience, nature, and biodiversity, and across forms of support ranging from finance and regulation to investment and technology. But efforts remain largely fragmented. The Climate Club can act as a forum where coordination across these agendas is facilitated, identifying gaps as well as synergies across the different thematic tracks, members, and means of delivery, while avoiding duplication and undermining existing progress.

> ***"For partnerships to be effective, the Club must include the big emitters – current and prospective. But this is not a club for mitigation alone. Partnerships to deliver on adaptation and resilience are equally important, and the Club's membership must reflect this.***

Beyond coordination benefits, finance and technology support to deliver on common strategies can create benefits for individual members by helping match investments to where the needs are strongest and returns greatest. Roadmaps to improve EMDEs' investment climate and institutional framework, to address

weaknesses in the international financial architecture, and to facilitate finance partnerships at the country level can help enable breakthroughs on finance for sustainable investments in fast-growing EMDEs (Bhattacharya et al., 2022). These are commercial opportunities, not development aid, creating strong incentives also for developed economy members to join and capture these benefits.

4.3 Setting strategy

Each country sets its own strategy, but these are new issues for all countries, and all have to gain from converging on an overarching frame and sharing ideas and analyses in setting priorities.

Realising the opportunities from climate action and economic development as outlined in Chapter 2 requires economic transformation driven by a substantial step up in investment and innovation (Stern et al., 2021). Given the urgency and the scale of the challenge, this will not happen without strong policies and collaboration to shift incentive structures across the whole system, particularly around energy and finance. At the core of the Climate Club must be a shared vision and strategy for accelerating delivery by the key stakeholders: developed countries and EMDEs, international financial institutions, and the private sector.

4.3.1 Recognising priorities and identifying gaps

Setting strategy requires developing a common understanding of the policy and institutional architecture needed to accelerate ambition and deliver on the global transformation. It involves identifying gaps that guide the selection of areas on which partnerships should focus, while avoiding duplication or undermining existing processes. Efforts should concentrate on how best to leverage investment, policy reforms, finance and technology to deliver:

- **Investment.** A big push on investment and innovation and in all forms of capital is critical to drive the transformation to net zero and to keeping 1.5°C within reach. And as highlighted in Chapter 2, the benefits of such a push extend well beyond the climate agenda. Targeted action through partnerships can help unlock barriers and break the vicious cycle of low investment, slow growth, high debt burden and constrained public spending that is hampering economic development across many parts of the global economy. It can create valuable co-benefits, contributing to a bigger story of sustainable, resilient and inclusive development.
- **Policy reform.** Strong country ownership of policy reform must lie at the heart of delivering the big investment push. But while the reform agenda will be country-specific, Climate Club partnerships can help ensure that strategies reflect common principles, from the complementary role of mitigation measures within a wider policy mix (see Pillar 2), to the crucial role of adaptation, building resilience and ensuring just transitions, in shaping politically balanced agendas.
- **Finance.** The scaling up of finance needed to support the push on investment and innovation and underpin policy reform is unprecedented, but within reach. The Climate Club can give impetus to structured international partnerships to facilitate coordination across public and private initiatives and connect different sources of finance across the official, multilateral and private sectors. It can provide further strategic direction for a climate-lens reform of the international financial architecture, complementing the wider G20 agenda.
- **Technology.** The Climate Club can foster analytical cooperation through research and innovation partnerships, strengthening institutional capacity and supporting R&D and technology for key sector transformations. Finance and technology partnerships can support the agenda of sectoral alignment under Pillar 3 through facilitating large-scale capital mobilisation to create lead markets for climate-smart technologies.

4.3.2 Overcoming barriers

Headwinds such as the current energy crisis risk weakening countries' commitment to the climate agenda even as the long-term opportunities and underlying case for sustainable investments remain strong (Climate Action Tracker, 2022). International coordination on shared strategies via the Climate Club can act as a 'commitment mechanism', anchoring continued alignment with the long-term vision.

Clear communication of strategies and commitments, whether on setting priorities for sectoral decarbonisation or for investment in particular green technologies, can act as a powerful signal providing direction to private investment and finance. They can help galvanise investors' management of transition risks (e.g. the risk of stranded assets), or reinforce expectations of tangible returns from a green transition and sustainable development opportunities (OECD, 2021).

4.3.3 Connecting agendas through a climate lens

Climate Club strategies can support the process of strategy-setting at existing international fora including the G7 and G20, by elevating climate to a core lens through which to advance the wider economic and finance governance agenda.

At the same time, finance and other partnership decisions need to be taken as part of the broader agenda for the climate and sustainable growth, recognising the opportunity for enabling achievement of a global public good but also transformations and underpinning of an orderly trading system. The whole-of-government framing of the Climate Club would extend to agendas cutting across individual ministries, including those related to the macroeconomic environment (particularly inflation and debt dynamics), international cooperation and development, trade and industrial policy (e.g. on the critical minerals agenda), investments, and global tax cooperation.

> ***In a world of fractured geopolitics, the climate agenda represents fertile ground on which to build partnerships and collaborate on a crisis whose causes and effects cross borders, and whose solutions create opportunities for sustainable development across the world economy.***

4.4 Designing roadmaps, especially at the country level

Setting strategy and fostering alignment has much further to go. To be credible, it must be backed up by roadmaps to deliver. The Climate Club would act as a forum where commitments can be made at an international level, complemented by actionable medium-term milestones.

This would involve identifying policy challenges, investment needs and opportunities at the country and sector level. The membership process can enable the sharing of decarbonisation plans and experiences across members and facilitate their common measurement and monitoring as part of the agenda developed under Pillar 2.

4.4.1 Utilising country platforms

Building on the recommendation by the 2018 *Report of the G20 Eminent Persons Group* for the support of Country Platforms (CPs), and leveraging insights and experience from the COVID-19 pandemic on the importance of enhancing coordination among stakeholders, the Climate Club can lead on repurposing Country Platforms as a vehicle for delivering on international climate action as a global public good (Sembene et al., 2022), for accelerating in-country investments and their financing to deliver on countries' nationally determined contributions (Bhattacharya et al., 2022), and for mobilising private investment and finance to support the net zero transition (Carney, 2021; GFANZ, 2021).

CPs must differ from traditional coordination mechanisms primarily by ensuring that the national government is in the lead, and that the prioritisation of reforms and investments is fully aligned across development partners and governments. They must focus on joint action for upstream support, investment preparation, and finance for sustainable development and climate action.

So far, CPs have largely emerged on an ad-hoc basis rather than as part of a systematic strategy. The G20 has promoted their use but implementation is lacking (Bhattacharya and Stern, 2021a). Their application has faced challenges, particularly stemming from the lack of incentives for governments to take the lead, issues around complex stakeholder coordination (including among ministries and with development partners) and low technical and implementation capacity.

This is where the architecture and governance structure of a Climate Club can make a difference. By including Country Platforms systematically and continuously on its agenda, the Climate Club can provide a forum for members that are able and willing to act as development partners to come together in coordinated groups to scale up investments and finance at the country level.

Participation in Country Platforms and the development of partnerships to support them can provide valuable club benefits and act as a motivation for prospective EMDE members to join, enabling the sharing of best practice across a range of cases and facilitating accelerated implementation.

By advancing the Country Platform agenda across its wide membership, the Climate Club can build experience and know-how in developing roadmaps tailored to countries' specific needs and agendas, whether these centre on the energy transition away from coal, on support for adaptation and resilience, or the development of renewable sources of energy. The Climate Club's initial efforts should thus focus on capturing cases that can serve as blueprints for a global scale-up. This must be reflected in its membership and the focus of partnerships. Priority should be given to:

- **Energy transition of high emitters.** Accelerating energy transitions in systemically important countries should be the top priority, including current as well as potential future high emitters. The Asian Development Bank's Energy Transition Mechanism can serve as a blueprint for aligning donors and investors to accelerate the transition to clean energy, and the Climate Club can build coalitions for replicating the mechanism elsewhere (see Box 3).
- **Influencing sustainable development trajectories.** Successful implementation of the South Africa JTEP will be an important test case on the African continent (see Box 4). Choice of cases must also reflect the systemic importance of energy transitions and energy access in other African economies. Country platforms can serve as opportunities to influence sustainable development trajectories at a time of transformation and avoid locking in high-emissions paths ahead of a major expansion in energy and related infrastructure in coming decades.
- **Adaptation and climate links to nature, biodiversity, health and education.** Efforts should also be directed at countries that can serve as blueprints for prioritising adaptation and resilience, for addressing the interactions between climate and nature/biodiversity, and for addressing the links between climate, health and education. Indonesia, Vietnam and Senegal have been identified by the G7 as potential priorities (G7, 2022a).
- **Poor, vulnerable and fragile states.** Finally, efforts must ensure that 'no one is left behind', including poor, vulnerable and fragile countries. One way to develop pilots is to build on the Compact for Africa initiative (G20, 2020).

The Climate Club's key advantage is that it can 'connect the dots', and it will be crucial for CPs to draw in various private sector initiatives. The *Country Platform Action Plan*, prepared by the UN Special Envoy on Climate Action and Financing and published during COP26, outlines a model for using CPs to combine

ambitious NDCs and tailored projects to help achieve them, and to help address both upstream and downstream barriers to investment through developing a strong project pipeline and enhancing the regulatory environment for investment. GFANZ, CFLI and the Global Infrastructure Facility are also promoting Country Platforms as a key part of their efforts to scale up finance for climate investments in developing countries.

Box 3: Case study – the Energy Transition Mechanism

The Asian Development Bank (ADB) launched the Energy Transition Mechanism (ETM) at COP26, with the mission to speed up the retirement of coal-fired power plants in developing Asia. The mechanism leverages a market-based approach to accelerating the transition from fossil fuels to clean energy, through using low-cost capital from governments, MDBs, private sector investors, long-term investors and philanthropy to incentivise early retirement of coal power assets. Investments from these sources are designed to finance country-specific ETM funds to retire coal power assets on an earlier schedule than if they remained with their current owners. Proceeds from the assets are in parallel mobilised to fund clean energy investments.

In terms of its structure, the ETM Partnership Trust Fund has a steering committee representing donors and developing countries providing oversight to ensure climate credentials. The Fund's activities are also coordinated with the ADB Just Transition Facility to support just transition activities in pilot countries.

The Philippines and Indonesia were key partners in launching the pilot study for ETM, while Japan's Ministry of Finance provided the first seed financing for the mechanism at $25 million. The financing framework was complemented by an MOU with the Rockefeller Foundation, which is providing a share of support towards the mechanism.

Box 4: Case study – the Just Energy Transition Partnership

At COP26, the UK, France, Germany, EU and the US launched the South Africa Just Energy Transition Partnership (JTEP), an $8.5 billion commitment to accelerate South Africa's energy transition.

The commitment will be a crucial component of South Africa's efforts to transition its energy system, an endeavour estimated to require $250 billion, mostly for investments, over the next three decades (Blended Finance Taskforce, 2022). Calculations by Systemiq estimate that the $8.5 billion could leverage additional capital to meet around $40 billion of South Africa's just energy transition needs and that the figure could be even greater with financial innovation.

To succeed, the climate finance provided under the partnership must be fit-for-purpose to match the needs of the energy transition, as well as other sectors dependent on fossil fuels across the entire value chain. It must be a transparent, efficient, and demand-driven process, ensuring capital is channelled towards the parts of the system where it is most needed.

Partnerships delivered through Country Platforms can also provide the space for government-led efforts within the Climate Club to align with development finance institutions, enhancing the finance elements of the partnership. For example, as part of its €700 million contribution to the JTEP, Germany will be providing a KfW development loan of €300 million for energy sector reforms (G7, 2022a).

Looking ahead, South Africa's JTEP could serve as a potential prototype for accelerating energy transitions and building back better through CPs. In June 2022, the G7 committed to initiating negotiations "on further ambitious partnerships with India, Indonesia, Senegal and Vietnam" (G7, 2022a). The architecture and governance structure of the Climate Club should facilitate the formation of such partnerships between members that can act as development partners and those that can demonstrate the need for such support to deliver on enhanced ambition.

4.5 Supporting EMDEs with finance: ambition and complementarity in official, multilateral, private sources

Emerging markets and developing economies will be at the centre of the global economic and climate transformation over the next three decades, accounting for the entirety of the world's population growth by 1.9 billion [6] and hosting the vast majority of new construction of physical capital (Our World In Data, 2021). Whether and how these investments are undertaken will determine the world's ability to reach net zero emissions by 2050 and achieve climate resilience. Research by the Grantham Research Institute and others estimates that investment to meet the requirements for EMDEs [7] in the areas that are critical to their climate goals alone will have to increase from 4.3% of GDP in 2019 to 6.9% in 2025 and 8.7% in 2030 (see Table 2).

Table 2: Investment targets in EMDEs (excluding China)

	Gross spending 2019		Spending target 2025		Spending target 2030	
	US$bn	% GDP	US$bn	% GDP	US$bn	% GDP
Sustainable infrastructure	730	3.5%	1,160	4.8%	1,840	5.7%
AFOLU (agriculture, food, land use, nature)	150	0.7%	355	1.4%	650	2.0%
Adaptation and resilience	35	0.2%	180	0.7%	325	1.0%
Total	915	4.3%	1,695	6.9%	2,815	8.7%

Source: Bhattacharya et al. (2022)

International finance will matter strongly for delivering this investment push and supporting climate action and sustainable economic development. Finance at scale will be needed to (a) facilitate a sustainable recovery for economies to 'build back better' and (b) enable the accelerated transformation required to transition to a net zero, sustainable, inclusive and prosperous future. It must be coordinated, front-loaded and fast; the more this is the case, the less costly action will be. And it should be seen as an investment, not a cost, delivering growth and development.

Domestically and internationally, both public and private finance have crucial roles to play. It is important that total finance generated is more than just the sum of its parts, and this will require an enhanced partnership between the private and public sectors to increase levels of mobilisation. Coalitions such as GFANZ have emerged on the private sector side to align interests and work cooperatively on workstreams that exchange know-how and share best practice (GFANZ, 2021). The Climate Club can function as an equivalent 'home' for public sector finance, in partnership with existing initiatives such as the Coalition of Finance Ministers for Climate Action and the Central Banks and Supervisors' Network for Greening the Financial System (NGFS).

Overall, action under this Pillar of the Climate Club must enhance (and not detract from) climate finance under the UN framework and must complement (and not crowd out) investments and finance committed under existing private, public and multilateral initiatives.

[6] EMDEs excluding China.
[7] Excluding China.

4.5.1 Setting fresh targets for official financial support

There is much to be desired in terms of the delivery of official climate finance. While there has been progress in both bilateral and multilateral public finance flows since 2013, climate finance flows attributable to developed countries fell well short of the targeted $100 billion per annum by the time of COP26 (Bhattacharya and Stern, 2021b).

Consultations with relevant stakeholders from across EMDEs during the preparation of this report stressed that delivering on the commitment by developed countries to mobilise $100 billion a year by 2020 to support developing countries on climate action is an intensely important symbol of trust and foundational to their progress on climate action.

But discussions also highlighted that developed countries must go beyond this commitment: the scale of investment needed for emerging and developing economies (excluding China) reaches an additional $800 billion per year by 2025, and close to $2 trillion by 2030 (Bhattacharya and Stern, 2021b). While developed countries will not be expected or able to fill the whole gap, concessional donor finance will be a critical component given its capacity to scale up other pools of climate finance.

This is where the Climate Club can make a difference, as an intergovernmental forum for climate ambition. Joining the club will involve sector-level engagements and commitments.[8] Members can also advance the agenda by setting fresh targets for official financial support for EMDEs. The whole-of-government framing of the Climate Club can elevate climate finance to an agenda that goes beyond the specific horizon of the development agencies. Strategies developed under the Climate Club would reflect investment and trade opportunities, cutting across a range of ministries.

An important practical focus for scaling up official finance would be country platforms, including 'Just Energy Transition Partnerships', as explored earlier in this chapter. At the same time, finance partnerships formed under the Climate Club must avoid two traps. First, they must not be restricted to members in a way that is perceived as exclusive by non-members and that undermines the UNFCCC process. And second, consultations with stakeholders from across EMDEs highlighted the need to avoid a replication of 'the existing global order' within the Club and ensuring that finance is delivered in a way that responds to concerns around foreign support. For example, stakeholders from India shared that while the Climate Club conversation has not featured prominently in India so far, the preparation of the South Africa Just Transition Energy Partnership was received at the time with scepticism, reflecting mistrust of the motivations behind foreign support.

4.5.2 Supporting the global and local architecture for private finance

The Climate Club may function as a forum giving further impetus to the global and local architecture for private sustainable finance. Building on strong momentum in recent years, sustainable finance is projected to grow into the mainstream over the next decade. Where rules are set and which approaches become industry standard will matter hugely.

The precise contribution of the Climate Club in this context would need further exploration. A plethora of initiatives already exist at a regional (e.g. the EU taxonomy) or even global level (e.g. the Financial Stability Board's Task Force on Climate-related Financial Disclosures). To the extent that there is the need for a coordinated political push on particular aspects of the agenda, the Climate Club might provide a relevant forum for high-level discussion and guidance, in a manner that is supportive or complementary to existing initiatives.

[8] See 'Pillar 3: Fostering sectoral alignment'.

In particular, the Climate Club can provide a forum for discussing the appropriate and proportionate design of international standards, so that they do not impose unintended barriers to capital flowing to the investments that need it the most. For example, while mandatory climate risk disclosures may be immediately possible for large developed-economy-based financial institutions, imposing such requirements for Small and Medium Enterprises, particularly in EMDEs, without providing resources and support to enable compliance, would result in unintended damage. In advancing the agenda around sustainable finance regulation and supervision, a heterogeneous membership structure of the Climate Club will be critical in ensuring different contexts and financial sector country profiles are accommodated.

4.5.3 Finance for adaptation, resilience and sustainable development

Even in the scenario of strong progress on climate change mitigation delivered in the Climate Club, some effects of the climate crisis remain unavoidable – the question is one of frequency, intensity, scale and geographical spread. This is a reality the Climate Club cannot afford to overlook, and its design will need to reflect the importance of supporting EMDEs as they seek to adapt and build resilience to changing and more volatile climatic conditions.

Finance partnerships developed under the Climate Club umbrella will need to reflect a focus on adaptation and resilience as well as biodiversity, which still only receive a fraction (around 7%) of total climate finance (Buchner at al., 2021). But support will need to go beyond finance, to include analytical support, climate modelling and insurance solutions. Risk transfer instruments such as contingent credit lines, insurance and catastrophe bonds, regional risk-sharing facilities and state-contingent debt instruments can be nurtured and scaled up as part of partnerships developed under the Climate Club.

4.5.4 Voluntary Carbon Markets and scaling up sustainable finance in EMDEs

The Climate Club can further act as a platform for linking developed and EMDE members to accelerate the growth of Voluntary Carbon Markets. Following agreement on Article 6 of the Paris Agreement at COP26 in Glasgow, VCMs are becoming more accepted as an effective and credible tool to help deliver finance to projects that reduce emissions. Strong demand for carbon credits, especially for those generated by carbon removals, can also create enough confidence for early developers to invest in green technologies that would otherwise lack access to finance. To effectively leverage their potential, mechanisms need to be put in place to ensure the quality and integrity of such finance, and this is where the potential of the Climate Club to act as a forum promoting standard-setting could further be leveraged, complementing existing efforts by the Integrity Council for Voluntary Carbon Markets and Voluntary Carbon Markets Integrity Initiative.

While there is significant scope to increase financial flows from VCMs and international private finance, relying solely on financial transfers from advanced economies to EMDEs will not be a sustainable strategy given the scale of the climate challenge. The Climate Club must therefore ensure that partnerships are also in place to facilitate the know-how and sharing of best practice, and the provision of technical and analytical support to help deepen and upgrade domestic financial markets in EMDEs with a view to enabling local investors (particularly long-term investors such as pension funds) to fund sustainable development assets. Multilateral institutions can be critical partners in delivering the technical assistance and capacity building to help local investors diversify into sustainable investments, as well as offer practical support using instruments such as guarantees and local currency solutions.

4.5.5 Enabling multilateral institutions to scale up and mobilise the private sector

The Climate Club can act as a forum for its members – as shareholders of multilateral institutions – to align on and drive the implementation of reforms to modernise the development banking system to be fit for

purpose and scale up sustainable investments. At COP26, ten MDBs[9] issued a joint statement committing to support developing economies' Nationally Determined Contributions and to aligning their financing flows with the Paris Agreement. Translating the investment needs outlined in Table 2 above into financing requirements yields an expectation for the MDBs to triple their financing by 2025 (Bhattacharya et al., 2022).

Unlocking this level of financing will require reforming the development banking system on several fronts, in particular encouraging adjustments to the capital adequacy frameworks for MDBs in line with the five broad strategic shifts outlined by the Panel on MDB Capital Adequacy established by the G20 (G20 Panel, 2022), as well as considering the need for capital increases.

MDBs can stretch their current balance sheets by giving more credit to callable capital, reforming statutory lending limits, balance sheet optimisation, greater risk pooling, and turning over assets faster (World Bank, 2015; World Bank, 2021; Chakrabarti et al., 2022). Simulations of the MDB lending capacity that such reforms and innovations might enable typically point to hundreds of billions of US$ in additional capacity – probably the most straightforward and least costly way for climate- and development-related finance to grow.

Reforms must also be geared towards increasing private sector capital mobilisation. MDBs currently mobilise less than $1 of private capital for every public dollar, with scope to increase this significantly (Blended Finance Taskforce, 2019). One way to increase mobilisation is to mandate MDBs to spend money more catalytically by scaling up the use of instruments such as guarantees. Such instruments currently account for less than 5% of MDB sovereign financing despite mobilising around 30% of their private co-finance (Blended Finance Taskforce, 2019). The MDBs could also scale up the use of blended finance facilities to improve private sector multipliers (Lankes, 2021).

Outcomes can be supported by a closer partnership across the official sector (represented by the Climate Club), the MDBs, and the private sector. On the latter, a number of private-sector led initiatives have been launched over the past two years to mobilise finance for sustainable investments in EMDEs, including the Climate Finance Leadership Initiative (CFLI), the Sustainable Markets Initiative, FAST-Infra, the Global Investors on Sustainable Development Alliance, and most recently GFANZ.[10]

4.6 Supporting sectoral decarbonisation paths and scaling up green technologies

Beyond 'greening finance' and 'financing green' projects, the Climate Club can initiate and host partnerships for sector-specific and technology-specific solutions. Countries can participate in analytical and technical cooperation on R&D, as well as supporting project development capacity and packaging investments for clean energy and other climate-critical sectors in a way that can attract international finance.

Analytical cooperation might be facilitated within the architecture of the Climate Club in two important ways: finance and capacity building. In the case of finance, this could take the form of a dedicated research and innovation funding programme developed by the members to support R&D and technology partnerships in key sector transformations. These can further be nurtured through connections across universities throughout the Club's membership, building on existing initiatives such as the UN Climate Change and Universities Partnership Programme, the International Universities Climate Alliance and the Global Alliance of Universities on Climate (GAUC).

[9] The statement was signed by the African Development Bank, Asian Development Bank, Asian Infrastructure Investment Bank, the Council of Europe Development Bank, the European Bank for Reconstruction and Development, the European Investment Bank, the Intra American Development Bank Group, the Islamic Development Bank, the New Development Bank and the World Bank Group: https://ukcop26.org/mdb-joint-climate-statement/.

[10] See Appendix 4 for a comprehensive overview of relevant finance initiatives.

Financial and technical packages at the country level can be structured in ways that advance sectoral priorities agreed under Pillar 3. Investments in physical and human capital can support recipient countries' ability to meet emerging standards for green products, thereby easing trade concerns, boosting investors' confidence in a smooth and rapid transition, and leading to a conducive investment climate. Provided with the right support, a range of countries could step up the ambition of their decarbonisation plans in key sectors and thereby claim a share of green lead markets, benefitting from other sectoral measures adopted or promoted by the Club, such as buyers' clubs for near-zero emissions exports.

The Climate Club can leverage member capacity to directly support the creation of such lead markets for climate-smart technologies that are essential for the low-carbon transition but which are capital-intensive in nature and require large-scale capital mobilisation. Ensuring the affordability of such technologies, particularly among developing country members of the Club, may hinge on lowering the cost and improving the availability of financing. Risk sharing and blended finance facilities can build international or local currency financing systems to support at-scale adoption of these new technologies, by ensuring their affordability and financeability.

In advancing this agenda, the Club can build on existing initiatives such as the Leadership Group for Industry Transition (LeadIT) for public–private collaboration on the decarbonisation of key industries, and the private-sector-led Mission Possible Partnership (MPP), which connects stakeholders from across the value chain to accelerate the net zero transformation of key industrial sectors.[11] Financial and technical support through the Club can assist countries to update, fortify and implement roadmaps, through collaboration with LeadIT on key industries, while networks such as MPP can support partnerships developed within the Climate Club by providing a powerful initial source of private co-financing for demonstration projects, offtake commitments to support for new green production capacity, or participation in programmes for innovation knowledge sharing or for skills redevelopment of the workforce.

In addition, finance partnerships can be designed to speed up technological change by pooling resources to support innovation in chosen sectors. For example, governments can coordinate to create policy and regulatory frameworks that provide finance incentives that decrease costs and accelerate the uptake of promising energy vectors such as clean hydrogen. Aside from incentives, partnerships can also leverage institutional capacity to provide technical assistance. Where technologies are already mature, partnerships can focus on financing, project preparation, and regulation. The European Investment Bank's Green Hydrogen Fund and the World Bank's Scaling Solar platform can serve as potential blueprints for leveraging development institutions as valuable partners in these two dimensions.

> ***"Finance partnerships can be designed to speed up technological change by pooling resources to support innovation and deployment of solutions in chosen sectors.***

4.7 Conclusion

The centrality of partnerships within the Club's architecture reflects the recognition of the need for an "open, cooperative, international Climate Club, consistent with international rules and with participation beyond the G7" (G7, 2022b). It underscores a commitment for the Club to be inclusive from the start, accounting for members' different starting positions in terms of income levels and policy mix, reflecting the principle of

[11] See Section 6.3 for more detail on the two initiatives.

'Common but Differentiated Responsibilities and Respective Capabilities (CBDR)' (as per the Paris Agreement).

The partnerships pillar offers a strong value proposition for EMDEs to join. Unlike Pillar 2, where benefits are more relevant to high emitters in the form of managing policy diversity in climate mitigation, or Pillar 3 where benefits are stronger for those participating in the decarbonisation of existing high-emitting sectors and investment in the scaling up of new green technologies, partnerships under Pillar 1 centre on support for those with a strong ambition but more limited resources, enabling them to deliver.

Financial and technical capacity support, access to new markets for green products, the sharing of experience and best practice in just transition processes, and technology development and deployment, can all act as strong motivations for EMDEs to join a forum where these can be developed and shared at scale.

The Partnership Pillar would further enable and encourage (chiefly developed country) members to scale up their climate finance commitments and deliver on them, whether regarding official climate finance or the capitalisation of MDBs. It would also underpin collaboration under other club pillars, in particular partnerships to accelerate the decarbonisation of industry and key sector transformations.

At the same time – and this is crucial in ensuring broad engagement by the membership under each pillar – members have goals, asks and 'assets' across pillars. Partnerships are part of the overall 'package' of actions for climate and growth.

5. Pillar 2 – Managing policy diversity

An inclusive Climate Club means each country should have the flexibility to follow a range of decarbonisation strategies domestically, accounting for different starting points and policy priorities. But differences in policies and stringency create the risk of carbon leakage and of subjecting industries in countries that lead on climate policies to competitive disadvantages compared with those in climate laggard countries. The second proposed pillar of the Climate Club is designed to enable countries to accelerate climate ambition, while managing possible friction arising from the diversity of climate policy approaches implemented in different jurisdictions. Approaches might range from facilitating agreement on principles for smoothing the implementation of autonomous carbon border adjustment mechanisms (CBAMs), to sharing best practice on alternative anti-leakage measures, and improving the development of methodologies for measuring the carbon content of complex goods.

5.1 Role of managing policy diversity in the Climate Club

Managing policy diversity can contribute to the Club's purpose of accelerating climate action, while also reducing incidences of international friction arising from carbon leakage, and capturing strategic, mutual benefits. These three dimensions are interrelated.

5.1.1. Accelerating action

As noted in Chapter 2, putting a price on carbon has emerged as a central climate mitigation policy tool in correcting the market failure of environmental externalities and enabling a rapid transition to net zero emissions (Cannan and Pigou, 1921; Stiglitz et al., 2017; Boyce, 2018). However, currently only about one-fifth of global emissions are covered by carbon pricing programmes, with some countries struggling to reach political agreement on carbon pricing, especially in the current environment where consumers are faced with an energy and cost of living crisis. More worryingly, the global average price of carbon is around $3 per ton, well below the $75 a ton that the IMF estimates is needed to reduce emissions enough to keep global warming below 2°C (Gaspar et al., 2019).

> ***The Climate Club should aim to enable members to pursue a mix of policies to accelerate climate ambition while managing frictions caused by policy differences.***

In light of these constraints, carbon pricing alone is unlikely to drive down emissions sufficiently and equitably (Patt and Lilliestam, 2018). Shifting production and consumption towards lower-carbon energy sources could and should also involve regulatory and other measures. The Climate Club could seek to advance a coordinated commitment to accelerate and harmonise ambition.

5.1.2. Reducing friction

One feature holding back progress is the lack of an international framework to protect those 'pioneers' ready to move ahead with ambitious climate mitigation policies (whether pricing or equivalent) from being at a disadvantage in the international marketplace (BMF, 2021). In terms of climate outcomes, the fear is that if countries are not equally ambitious in their climate policies, production will move to jurisdictions with weaker environmental measures and a higher carbon intensity of production. This would limit the intended objective of reducing domestic emissions, by moving emissions to countries with less stringent climate policies (so-

called 'carbon leakage' [12]), while also distorting international trade in the process. The risk of carbon leakage concerns primarily emissions-intensive, trade-exposed (EITE) sectors. So far, there is no empirical evidence of policy-driven carbon leakage (Eskander and Fankhauser, 2021), largely because EITE industries have been shielded from the effects of climate policies (e.g. through exemptions and free allocation of ETS permits), while carbon prices never reached sufficiently high levels. This is changing.

Over the long run, coordination on the level of ambition would remove the need for a framework to protect disadvantaged industries. In the meantime, the lack of convergent climate policy is prompting 'pioneers' to consider measures to manage carbon leakage and competition losses, including CBAMs at the national or regional level. This is true for countries or blocs with carbon pricing policies, such as the UK and EU, as well as for countries pursuing regulatory more than price-based approaches, such as the United States.

Action under this pillar thus also focuses on addressing temporary divergence in the level of ambition until harmonisation is achieved, through for example agreeing the rules of the game for measures designed to manage carbon leakage, chiefly carbon border adjustments but also subsidies and sector agreements. These will need not only to ensure compatibility with WTO rules but can go beyond, to create productive synergies between the Climate Club and WTO, enabling the effective management of potential disputes and reducing legal risks.

5.1.3. Capturing strategic benefits

The agenda around managing policy diversity also presents opportunities for members of the Climate Club to capture strategic benefits when it comes to alignment of views and approaches on matters lying at the intersection of trade and climate change issues.

Specifically, the Climate Club, with support from the WTO, could advance a shared understanding among members on taxonomies and categorisation of 'shades of green' for green subsidies. There are a number of precedents here, including the recently concluded negotiations on fisheries subsidies. Additionally, to the extent that the Climate Club develops as a 'thought leader' in setting standards for the environmental goods trade and facilitates trade among countries that align with them, the incentives for members to join can become material and significant.

5.2 Approaches to addressing carbon leakage [13]

The risk of carbon leakage is especially high in EITE sectors such as cement, steel and aluminium, where international competition prevents firms from passing costs downstream (Mehling et al., 2019). Table 3 shows bilateral trade flows for steel, one of the most heavily traded sectors in which leakage and competitiveness concerns have been prominent. The figure provides initial pointers at trade relationships that might be impacted by domestic climate action.

So far, carbon leakage concerns have been mostly addressed unilaterally, for instance through the provision of subsidies or by shielding EITE industries from the full impact of carbon prices, through exemptions and free allocation of permits. [14] However, free allocation has been widely criticised as hindering the industrial transition to climate neutrality, by dimming the incentives to switch to climate-neutral production processes, material efficiency and recycling. The need to phase out free allocation, combined with the recently observed spikes in carbon pricing, especially under the EU and UK Emissions Trading Systems, are making carbon

[12] A situation where international differences in climate policies prompt companies to relocate emissions-intensive operations to jurisdictions with weaker emission regulations. This practice can undermine the effectiveness of mitigation policies as well as the legitimacy of claimed national emissions reductions.

[13] See Appendix 3 for a comprehensive overview of anti-leakage measures.

[14] There are different approaches for allocating permits. The most common are: grandfathering, i.e. allocating permits based on historical emissions; fixed-sector benchmarking, i.e. based on a product or sector's historical or current emissions; and current output-based allocation.

leakage and potential competitiveness losses more material and urgent to address as a means to support deep industry decarbonisation and manage friction due to different levels of climate ambition.

In this context, CBAMs are gaining popularity as more countries are raising climate ambition and commit to much stronger NDCs. CBAMs are designed to 'equalise' the carbon costs for domestic and foreign producers, by imposing a charge on imported goods based on the amount of greenhouse gases emitted during their manufacture that is equivalent to explicit or implicit domestic carbon prices. CBAMs, by acting as a market signal, can also encourage decarbonisation in third countries to which the mechanisms may apply (Agora Industry, 2022).

Table 3: World trade in steel by area, 2019

	Europe	CIS	Americas	China	Other Asia	Other	Total imports
Europe	131.3	20.6	1.9	3.9	10.6	2	**170.3**
CIS	2.3	10.2	0	2.5	0.5	0	**15.5**
Americas	9.5	2.3	28.2	8.2	12.8	1.4	**62.4**
China	1.2	0.2	0.2	--	13.8	0.1	**15.5**
Other Asia	4.2	7.5	1.3	37.6	61.1	6.1	**117.8**
Other	14.6	8.2	0.6	6.9	7.8	11.9	**50**
Total exports	**163.1**	**49**	**32.2**	**59.1**	**106.6**	**21.5**	**431.5**
Net exports (exports - imports)	**-7.2**	**33.5**	**-30.2**	**43.6**	**-11.2**	**-28.5**	

Source: 2020 World Steel in Figures, World Steel Association.

The announcement made by the EU [15] on the adoption of a CBAM has been an important milestone, with the UK, [16] US [17] and Canada [18] exploring similar mechanisms. While most G7 countries have already proposed or are considering implementing a CBAM, G20 countries appear more cautious and several have expressed concerns over WTO compliance and respect of the principles of common but differentiated responsibilities (CBDR), if CBAMs are implemented in advanced countries (Ecologic, 2022).

Formation of a Climate Club has been mentioned prominently as a strategy to advance this agenda by creating treaty-bound club goods and penalties, specifically, target carbon pricing among members, complemented by a CBAM applied to non-members (Mehling et al., 2019; Tagliapietra and Wolff, 2021).

In addition to CBAMs, other policies have been identified as potential tools to incentivise decarbonisation and address carbon leakage. The IMF proposed an International Carbon Price Floor (ICPF), where countries implement a minimum carbon price, while accommodating equity considerations by setting lower price floor requirements for emerging market economies. To facilitate negotiation, the price floor would initially be applied to a small number of countries responsible for the majority of global emissions (Parry et al., 2021).

[15] In July 2021, the European Commission adopted a proposal for a CBAM that requires importers of aluminium, cement, iron, steel, electricity and fertiliser to buy certificates at the ETS price for emissions embedded in the imported products (European Commission, 2021).
[16] https://committees.parliament.uk/committee/62/environmental-audit-committee/news/171544/ministers-to-consult-on-implementing-cbam-following-eac-recommendation/
[17] https://carboncredits.com/congress-introduces-us-cbam-clean-competition-act/
[18] https://www.canada.ca/en/department-finance/programs/consultations/2021/border-carbon-adjustments/exploring-border-carbon-adjustments-canada.html

Other instruments to tackle carbon leakage include the application of consumption charges (Munnings et al., 2019; Neuhoff et al., 2015; Grubb et al., 2022) and a climate excise contribution (Neuhoff et al., 2021; Climate Strategies, 2021; Grubb et al., 2022). [19]

5.3 Limitations of CBAM coordination

Notwithstanding the potential for CBAMs as a means to manage the lack of harmonisation of climate ambition, there have been significant concerns about the risks that they could pose in terms of unwarranted trade distortions, WTO compliance, retaliatory actions from trade partners, and general diplomatic tensions (e.g. Bierbrauer et al., 2021; Okonjo-Iweala, 2021; Parry et al., 2021). Some have argued that the formation of a Climate Club and establishment of a CBAM for the Club membership *as a whole* could help manage and internalise these tensions (Hagen and Schneider, 2021; Tagliapietra and Wolff, 2021). However, there are questions relating on the one hand to the political sensitivity of restricting trade with some countries; and on the other, to the feasibility of such an approach in the light of important challenges associated with the implementation of a CBAM, by individual countries or blocs and – even more so – across a range of countries with diverse policies that might constitute the desired Club membership (Grubb et al., 2022). Chief among the issues are: [20]

> ***The need to phase out free allocations of certificates and recent spikes in carbon prices are making carbon leakage and competitiveness losses more material, underpinning calls for action.***

- **Complexity of regulatory choices**. For example, on which policies, goods, sectors, countries, types of emissions to include, how to set prices, as well as questions around how to treat export-related leakage.

- **Administrative burdens.** CBAMs are administratively challenging, even if limited to a small range of EITE goods as is the case under the EU proposal. In the context of a Climate Club where they would need to be enforced among a range of countries with distinct structural and policy profiles, the CBAM would have to be aligned with the respective carbon pricing system of each club member to ensure WTO compliance. If the perimeter of carbon content had to be extended to the Scope 2 (energy input) and Scope 3 (supply chain) emissions of a product, as might need to be the case to ensure non-discrimination, the difficulties would multiply.

- **Accommodating different starting points.** Given that CBAMs are already planned in countries like the EU members states and the US, any CBAM integrated or developed within the Climate Club would have to introduce a process for these to be amended in order to align them with the requirements of the Club (Agora Industry, 2022).

- **Balancing commitments to CBDR.** CBAMs could prove difficult to reconcile with members' commitments to the principle of common but differentiated responsibilities (UNCTAD, 2021), as carbon tariffs can create adverse distributional effects for countries subject to the measure (Branger and Quirion, 2014) and exacerbate regional inequality (Böhringer et al., 2012), including worsening the GDP gap between developing and developed countries (UNCTAD, 2021; TCD-IMF, 2022).

[19] See Appendix 3 for a comprehensive overview of anti-leakage measures.
[20] For a comprehensive treatment of these limitations see Appendix 3.

- **Determining carbon price equivalence.** The introduction of a CBAM, coupled with the need for the Club to honour members' freedom to choose their own policy mix according to their economic and social circumstances, create a need for metrics that determine the level of equivalence across them. Theoretically it is possible to estimate the associated equivalent monetary value per ton of carbon for many non-price based policies (World Bank, 2019). However, such methodologies can be complex and hard to implement in a way that is transparent and that all parties would recognise as non-discriminatory. These methodological aspects are likely to generate claims of discrimination by some countries, with a material risk to be challenged at the WTO level.

- **Legal challenges related to trade.** A CBAM could be abused or perceived as a protectionist measure violating the principle of non-discrimination under WTO regulations, giving rise to legal challenges (see next section).

Box 5: Comparison of price- and non-price-based policies

One of the biggest challenges in the implementation of a CBAM is the development of a robust methodology for estimating price adjustments. This is particularly hard when the goal is to account for different mitigation policies, including both price-based instruments (i.e. explicit carbon prices, such as carbon taxes, and other price-based instruments, such as fuel taxes or feed-in tariffs) as well as non-price-based measures (i.e. subsidies, standards and regulations). Two different methods have been proposed for this purpose: an outcome-based approach and an input-based approach.

Outcome-based approach

This approach focuses on the outcome of a policy already implemented, by assessing its effect on the carbon content embodied in the imported goods. Carbon content measures reflect the impact of past policies on current emissions. In this case a CBAM would only charge border carbon prices on the actual embedded carbon. The effect of non-price policies would be already accounted for by the CBAM, if those policies contributed to reducing the embedded carbon in the imported products. This approach is followed by the current EU proposal of a CBAM.

The main challenge of this approach is that estimating the embedded emissions of products requires reliable data on the greenhouse gas content of products along the value chain of the imported good. In addition, it would be hard to assess a carbon price that has already been paid by the exporting company before the product entered the country implementing the CBAM. Nevertheless, this is an important aspect to consider in order to avoid a situation similar to a double taxation (Grubb et al., 2022).

Input-based approach (Carbon Price Equivalence)

This approach focuses on estimating ex-ante the effects of policies on reducing emissions. Theoretically it is possible to estimate the associated equivalent monetary value per ton of carbon for many non-price-based policies (World Bank, 2019), known as implicit carbon price. This can enable a comparison of the stringency of different price and non-price-based policies.

Currently the OECD, under the newly established Inclusive Forum on Carbon Mitigation Approaches (IFCMA), is working towards the double objectives of: stocktaking of mitigation policies and mapping of policies into their emission bases; and, estimating the impact of these policies on emissions. This work can play an important role in providing better data and improving the comparison of policies in terms of their effectiveness in reducing emissions. On the other hand, it could also serve as a basis for future work

on developing a metric to compare price and non-price-based policies, based on their economy-wide carbon price equivalent (ECPE). This is the carbon price that would be needed to trigger the same amount of emission reductions of a given policy.

Methodological issues

The methodology for calculating the carbon price equivalent and comparing the policies' impacts has raised concerns, as it can be extremely complex and hard to implement in a way that is transparent and non-discriminatory.

1) For instance, the stocktaking of policies requires making difficult choices on which policies to include. This is not trivial, as some non-climate policies, like air pollution policies, can still have an impact in reducing emissions. Other choices concern which emissions and jurisdictions to cover and the sectoral aggregation, as the composition of a sector's products may differ across countries, making the comparison problematic.
2) Other issues relate to the estimation of abatement impacts of different policies, which requires choosing the baseline against which to compare future greenhouse gas emissions, as well as how to treat overlapping measures, as it can be extremely challenging to disentangle the contribution of individual measures to emissions reductions.
3) Additional challenges include how to account for the variability of values of some factors, like changes in relative energy prices, offsets, relative purchasing power technology costs, exchange rates, etc. that impact the relative costs of producing lower carbon goods to comply with different regulations. These factors will need to be updated in real time to ensure reliable and current measures of shadow carbon pricing in different jurisdictions (Agora Industry, 2022).
4) Also, divergences across the mitigation models employed – in terms of modelling assumptions, parameters, uncertainties, etc. – could become a source of controversy when concrete financial consequences are attached to their projections.
5) All those different methodological aspects for measuring equivalent levels of ambition to avoid 'punishment' via a CBAM are likely to generate claims of discrimination by some countries, with a material risk of challenge at the WTO level. For developing countries, the methodology may need to account for differentiated historical responsibility. At the very end, the comparison process will be more of a political process than a technical one.

Given these methodological (and political) challenges, getting countries to agree on methods to measure policy equivalence could prove to be an extremely difficult exercise.

5.4 WTO aspects and implications for border regimes

5.4.1 Climate Club measures and the WTO

The WTO is likely to give particularly close scrutiny to certain measures associated with the Climate Club, such as sectoral agreements and treatment of technologies and products as 'sustainable' or otherwise, green subsidies, the possibility of differentiated carbon prices for different jurisdictions, decisions on the equivalence between price-based and non-priced-based regimes, and concessions such as free allowances to legacy industries (see Table 4). This reflects the organisation's role in operating the global system of trade rules and agreements, maintaining open trade, and settling disputes.

At the core of the WTO's approach to climate measures that may have an impact on trade lies the idea of protecting "members' autonomy to determine their own environmental objectives", enabled through Article XX of the General Agreement on Tariffs and Trade (GATT), which lays out the instances in which WTO members may be exempted from the Agreement's rules (WTO, 1947).[21] This enables members to adopt trade-restrictive measures for environmental purposes, shifting the issue from being purely a trade one (whether discrimination against imported goods occurs), to an environmental and trade one (whether the restrictive effects of the measure in question are adequately justified by its environmental objectives) (WTO, 2020).

While members are free to decide on their level of ambition and on which environmental issues this ambition applies to, WTO law will generally hold members to core standards of good governance. Specifically, it will seek to ensure that the measures are rationally designed, evidence-based, non-discriminatory, reasonably justifiable (non-arbitrary) and transparent.

Table 4: Climate Club proposal elements likely to invite WTO scrutiny

Area	Climate Club relevance	WTO relevance
Sectoral definitions of sustainability	The sectoral agreements under Pillar 3 of the Club will be based on agreed understandings among members regarding which technologies and products are treated as 'sustainable' and given favourable treatment.	Questions around whether the definitions of 'sustainable' products are objective, evidence-based and transparent, as any doubts over the above may amount to arbitrary or unjustified discrimination between environmentally-equivalent products.
Common but differentiated responsibilities	Possibility of different carbon prices applicable in different jurisdictions.[1]	Potential source of arbitrary or unjustified discrimination between products from jurisdictions taking different approaches.
Equivalence	Agreement on methodologies for assessing the equivalence of different approaches to climate change mitigation.	Potential source of arbitrary or unjustified discrimination between products from jurisdictions taking different approaches.
Green finance	Financial support and subsidies to green technologies, industries and enterprises.	Potential risk of treatment as challengeable (prohibited or actionable) subsidies.
Concession to legacy industries and technologies	Free allowances and other concessions.	Where they distort competition, such concessions may amount to either challengeable subsidies, or arbitrary or unjustifiable discrimination in favour of domestic legacy industries.

Note: 1. See, for example, the IMF's International Carbon Price Floor proposal: https://www.imf.org/en/Publications/staff-climate-notes/Issues/2021/06/15/Proposal-for-an-International-Carbon-Price-Floor-Among-Large-Emitters-460468. **Source:** Authors' elaboration.

Notwithstanding the norm of non-discrimination, discrimination is exceptionally permitted where measures serve a legitimate public purpose, provided they are not applied in ways that are 'arbitrary or unjustifiable' and provided there is no less trade-restrictive, or equally effective, means of pursuing the regulatory objective reasonably available.[22]

[21] Particularly XX(b) and XX(g).

[22] https://www.wto.org/english/res_e/booksp_e/gatt_ai_e/art20_e.pdf

The WTO's Subsidies Agreement also places limits on the use of subsidies to domestic industries and producers. Both export subsidies and domestic content subsidies are prohibited, but other trade-distortive subsidies can also be challenged where they cause injury to foreign producers.

5.4.2 Ensuring free and fair trade: anticipating and addressing WTO risks

WTO dispute settlement can be a time-consuming process, with many disputes taking three years or more to complete. Importantly, remedies are forward-looking, which means no retrospective compensation is payable for breaches of WTO law. Failure to comply with a WTO ruling can lead to retaliatory trade restrictions from the complaining country. [23]

In practice, the likelihood of WTO risks materialising in the context of measures taken by members of the Climate Club or indeed by the Club itself will depend on whether countries (members or non-members of the Climate Club) decide to raise the issue at the WTO level. A case cannot be brought by the WTO itself or by a private party, but only by a WTO member.

While it is possible, it is less likely that a WTO dispute would be initiated by a Climate Club member against another member on issues relating to measures taken in the context of the Climate Club. This reinforces the importance of an open, inclusive and broad-based approach to the Club's membership. The broader the membership, the lower the risk of a dispute materialising.

The possibility of WTO claims against fellow Club members would be further reduced in the presence of well-functioning processes for the resolution of disputes and friction within the Club itself, minimising the need to resort to the WTO for such purposes. This aligns with the Club's principles as outlined in Chapter 3 of ambition and inclusiveness, in ensuring that the Club focuses on finding routes to convergence among members.

Still, the prospect of concerns arising across members cannot be ruled out. In those cases, the Committee on Trade and Environment of the WTO is designed to function as a forum for discussion and potential space for airing disputes and moving them forward (WTO, 2020). Additionally, consideration may be given to a moratorium on intra-club WTO disputes of certain kinds.

Experience suggests that measures backed by significant international consensus may attract more legitimacy within the WTO than purely unilateral measures. To that end, measures adopted by the Climate Club could be aligned as far as is practicable with international standards where they exist, or where they are under development.

5.4.3 Preserving dynamic change

Overall, concerns about WTO compatibility should not in and of themselves impact the level of ambition of the Climate Club initiative and indeed, they must be weighed against the urgency of climate action that might call for some level of tolerance of such risks. Instead, the Climate Club design and architecture must anticipate and address such risks and have in place mechanisms for responding and adapting to evolving risks to ensure that these decrease over time.

There are three broad ways in which the Climate Club can embody dynamic change:

- First, through adaptation and revision mechanisms. Such mechanisms, if built directly into the Club's institutional structure, would enable the Club to identify, respond to, and correct misjudgements or unexpected events. This would help reduce WTO/legal risk, and other risks that international rules

[23] https://www.wto.org/english/tratop_e/dispu_e/disp_settlement_cbt_e/c6s1p1_e.htm

might be breached, in enabling Club members to manage disputes and address unexpected competitive impacts internally.

- Second, through a dynamic, flexible and inclusive approach to membership. As highlighted earlier, the more open and inclusive the membership of the Climate Club, the lower the risk of a WTO dispute in practical terms. While recognising the challenges of bringing together a large number of countries from the start, the Club must remain open and inclusive, enabling dynamic change over time in terms of its membership.
- Third, through inclusive processes for setting standards. Given the dynamic nature of Club membership, there will be a strong interest for the Club to take into account the interests of non-members, including prospective members, in its activities. This applies particularly to the setting of standards. While on the one hand, an exclusive 'seat at the table' can strengthen incentives for members to join the Club, the benefits of an inclusive approach to standard-setting should not be ignored. This can be reflected in the design of the Club more strongly (for example through a formal mechanism for addressing concerns of non-members in the process) or less strongly (for example through crafting a role for non-members as observers or through consultation and discussion mechanisms).

In particular, rather than viewing the WTO only through the lens of potential trade disputes, the Climate Club should consider engaging on trade- and standard-related topics directly with the WTO itself or other existing bodies that inform the international trade system. This can take the form of a convening forum under the auspices of existing WTO committees and working groups that would allow non-members to air their concerns. In the case of discussions around proposed CBAMs, the WTO is already fulfilling this role, with WTO members joining the relevant committees to discuss and raise concerns and clarifications. [24]

A convening forum can also serve as a space to hear discussions around standards (including carbon accounting methodologies) and shared views on 'green' subsidies. [25] An important goal for the Climate Club may be to encourage, and give impetus to, discussions within the WTO regarding, for example, definitions of environmental goods and services, categorisation of green subsidies, international standards relating to carbon emissions, guidelines for the design and implementation of CBAMs, and so on.

5.5 Summary: the contributions a Climate Club can make to this agenda

Analysis presented in this chapter has highlighted the challenges associated with differences in the pace and depth of climate policies as well as with efforts to manage these differences. These range from administrative complexity and difficulties with calculating policy equivalence to accommodating membership from countries with different policy mixes.

Softer, more inclusive arrangements, in combination with progress across other pillars making up the architecture of the Climate Club, may provide a more productive way forward in creating a forum that enhances multilateral cooperation on a robust policy package to support industrial decarbonisation.

Specifically, the Club could seek to provide a forum for managing diversity in climate policy ambition in the short term, while aiming to align members' policy stringency, hence making anti-leakage measures unnecessary in the long term.

[24] The dialogue has also been taking place in public: e.g. China's Ministry of Commerce issued a statement in March 2022 expressing "hope" that the "EU's legislative measures should be in keeping with WTO rules". http://english.mofcom.gov.cn/article/newsrelease/press/202204/20220403302934.shtml

[25] See Pillar 3, 'Fostering sectoral alignment' and also: https://www.wto.org/english/news_e/news21_e/clim_03nov21-6_e.pdf

5.5.1 Managing friction around autonomous CBAMs

The Climate Club could take a role in smoothing the implementation of autonomous CBAMs, by facilitating agreement on principles and best practice. This could include the creation of joint institutions and common protocols, the development of methodologies for crediting foreign carbon pricing and commonly agreed approaches to attributing the carbon content of complex goods at the border (Agora Industry, 2022); it could also involve the identification of best practice to ensure that the various regimes work to prevent leakage without being unfair or protectionist (Cosbey et al., 2019). Here the Club could benefit from close collaboration with WTO institutions to manage friction in trade and ensure equitable CBAM design.

5.5.2 Improving measures for managing policy diversity

The Climate Club could also act as a forum for members to agree on additional measures to manage friction linked to different levels of climate ambition. Different approaches, other than CBAMs, have been proposed in the literature to address carbon leakage and competitiveness losses (see Appendix 3). These might range from cooperation on carbon pricing (e.g. by linking ETSs) to implementation of carbon price floors, consumption charges or climate excise contributions, and other approaches. Among those, each jurisdiction should be free to choose the approach that seems more appropriate, given its political, economic and social circumstances. The Club in this context could act as a forum for supporting discussions around principles and best practice for different anti-leakage measures to minimise friction; it could also promote better measurements that can smooth the implementation of tools directed at managing policy diversity – e.g. through the development of methodologies for measuring the carbon content of complex goods as well as by improving the comparability of different types of policies. The OECD's Inclusive Forum on Carbon Mitigation Approaches can play a role in this by providing better data as well as improving comparability of policies in terms of their effectiveness in reducing emissions. Here the Club could collaborate with the IFCMA to help countries identify concrete applications of the IFCMA's analytical work, including for the design of better climate policies. The Club should promote capacity-building, analytical support and information sharing, especially to developing countries, and ensure transparency and better data availability for measuring both policy effectiveness and the carbon content of products. Agreed measurements would also enable a dynamic path to membership, taking into account the different starting points of countries.

5.5.3 Dynamic re-evaluation of the need to manage policy diversity

The actions described so far in this chapter can contribute to solving trade tensions around national-level implementation of CBAMs and other anti-leakage measures, and could result in reduced risk of carbon leakage. However, our analysis highlights that a CBAM implemented in the context of a Climate Club would be technically challenging and politically elusive.

Ultimately, over the long term, the most feasible way for countries to achieve convergence in policy ambition would be through the adoption of harmonised regulations across different jurisdictions, which would obviate the need to adopt a CBAM and other complex carbon leakage policies. In this context a key role for the Climate Club would be to improve coordination across different sectoral trade agreements and more generally to accelerate the implementation of sectoral level decarbonisation measures (see next chapter).

6. Pillar 3 – Fostering sectoral alignment

Sectoral approaches provide finer granularity for the Climate Club's ambition than economy-wide decarbonisation goals, by driving joint investment and innovation and enabling Paris-aligned development in specific systems and industries. Dynamic and flexible coordination on industrial transformation can shape and amplify the impact of wider partnerships for financial, technical and technological support. And where it seeks to complement the Club's management of policy diversity, sectoral coordination is best targeted at emissions-intensive and trade-exposed industries, where fixing common standards, technology deployment, market creation and trade infrastructure would all provide substantial shared benefits.

This chapter outlines the advantages of including sectoral alignment within the wider architecture of a Climate Club. It then addresses the scope, features and actions it could include, and opportunities for progress in specific sectors. The Club should not detract from existing fora that are able to deliver results, but rather leverage available policies and existing international governance and initiatives.

6.1 Role of sectoral alignment in the Climate Club

Alignment on sectoral measures can contribute to the Club's purpose of accelerating climate action, while also reducing international friction arising from carbon leakage, and capturing strategic, mutual benefits. Each of these three dimensions are interrelated.

6.1.1 Accelerating action

The UNFCCC and the Paris Agreement contribute to five overarching governance functions – guidance and signal, rule-setting, transparency and accountability, means of implementation, and knowledge and learning (Oberthür et al., 2021a) – on a broad, cross-sectoral basis. However, they do not contain much in the way of sector-specific governance. For example, the Agreement does not contain any explicit breakdown of global goals to sector level; its rules about NDCs and long-term strategies do not include requirements to have a sectoral breakdown; and Parties are not required to report transparently or comprehensively on indicators, other than emissions, that could illuminate and promote transformation in specific sectors (Rayner et al., 2021).

It is important that any additional multilateral arrangements do not side-step the existing system but integrate and promote it from within (von Lüpke et al., 2022). The goal of rendering sector-specific goals into a multilateral frame is to solidify the high-level ambition of the Paris Agreement. In keeping with the Agreement's emphasis on national climate policy, countries must remain free to set their policy packages in accordance with their circumstances and preferences. However, as members of an alliance countries can decide to align their policy decisions in specific sectors in order to give them greater effect. A coordinated transition in systems for industrial production, energy, transport and land use will be foundational for sustainable development and are all areas that a Club could consider supporting over time.

> ***Policy alignment would provide collective support for the transformation of key industries – a win-win for climate and economies.***

6.1.2 Reducing friction

Sectoral alignment can also reduce the negative consequences of trade measures adopted to address concerns around competitiveness and carbon leakage. Reaching agreement on mitigation commitments,

targets or actions can decrease the likely discrepancy between the level and pace of sector-level decarbonisation across participating countries. Furthermore, the actions taken and benefits enjoyed by participants in the agreement can strengthen buy-in from industry and encourage alignment in non-member countries, while partnerships under the Club's first pillar will offer financial and technical support to enable those countries to join the alliance and enable heightened ambition at the sectoral level. Governments will be encouraged to implement more ambitious national policies if they are confident that this will not lead to a disadvantage in competitive international markets.

Countries could align on standards in traded industries, with complementarities for the other Club pillars, including measurement methodologies and labelling that would enable to develop rules for carbon pricing and trade measures (WTO, 2021). Coordinated action to stimulate innovation and investment would increase the supply of and demand for products meeting low-carbon thresholds. This would lower the incidence of price-based policies to limit carbon leakage and perhaps even remove the need for carbon border adjustments.

6.1.3 Capturing strategic benefits

Sectoral measures undertaken by a group of countries promote the global public goods of sustainable development and managing climate change. However, to the extent that they can regulate access to certain benefits from this collective effort, such as from increased trade in green industries, they also create incentives to join the alliance. Steps taken jointly to promote innovation, to provide certainty, incentives and support for first movers, and to grow the available supply of essential materials and infrastructure, will have positive externalities that aligned countries will be best placed to exploit.

Through this incentive effect, alignment at the sector level can lead to a more inclusive alliance. Only Club members will have a seat at the table to shape the focus and nature of alignment. The prospect of capturing economic surplus from new markets for green products will attract countries to join and will reduce the number and significance of unaligned, non-member countries.

6.2 The substance of alignment

6.2.1 Form: a process for coordination

Since broad multilateral accords are thought to be superior for achieving compliance (Barrett and Dannenberg, 2022), it could be most effective to seek strong consensus on a single industry. However, not all countries that join the broader alliance will have interests in collaborating on the same sectors. On grounds of inclusivity, sectoral measures should not unduly favour a subset of prospective member countries. Arguably, some sectors would not need universal affirmation to be effective at driving progress, because only a few countries account for the majority of production. For example, an estimated 90% of steel is produced in around ten key countries (Clean Energy Ministerial, 2022). However, the importance of ensuring that countries beyond the G7 accede to the agreement is clear: for example, while G7 countries produce 17% of steel, 8% of cement and 28% of primary chemicals globally, China has larger heavy industry sectors than the G7 combined (IEA, 2022b).

Therefore, a Climate Club is expected to give rise to a varied geometry of plurilateral coordination. In recognition of common but differentiated responsibilities and the need to support lower income countries that have reduced means to promote decarbonisation, partnerships (the Club's first pillar) will also be needed in support of alignment measures.

Two paradigms for alignment can be considered here:

1. **Fixed sectoral agreements,** interpreted as the *outcome* of diplomacy (Bodansky, 2007). The core would likely be a shared target, including a relevant metric and timeframe (for instance, a Paris-aligned

trajectory for the average emissions intensity of key goods in covered sectors). An agreement might prescribe certain policies, such as regulation or price-based measures, or leave it to individual governments to set appropriate policies to achieve the target. Any agreement must include a common understanding on methodology and acceptable approaches to monitoring and measuring progress. For reaching agreement to be possible, goals and any prescribed policies must be calibrated so that they are perceived as achievable and fair.

2. **Dynamic coordination**, by contrast, would see the Climate Club embody a *process* for alignment. There are already numerous coalitions to advance decarbonisation at sectoral level (discussed in more detail below) – several of which have appeared as recently as COP26 in 2021, such as the Breakthrough Agenda, which covers power, road transport, steel, hydrogen and agriculture. However, the form and extent of sector-specific governance remains uneven across the major emitting sectors, and key governance functions are fulfilled to varying degrees (Rayner et al., 2021). Alignment under a Climate Club should seek to reinforce this existing ecosystem, either by amplifying the work of existing initiatives or by filling gaps in their collected functions. This approach would be responsive to the current distribution of green technologies among countries, the current and anticipated costs of deployment and building enabling infrastructure, and the ability of the public and private sectors to absorb those costs.

The flexible approach would enable greater bargaining and synergy across the different pillars of the Club. Moreover, it would avoid the challenge of balancing all trade-offs in striking a fixed agreement, and enable the alliance to tackle multiple sectors at once. Several sectors share certain preconditions and drivers for effective decarbonisation, so concerted action on these cross-sectoral enablers could drive investment and innovation across the economy. The Breakthrough Agenda itself provides a model for just such an approach through variable geometry: the broader commitment to collaboration is endorsed by 45 countries, but fewer than this participate in alignment towards each sectoral goal (HMG, 2022). Provided the Club becomes a stable entity, this dynamic, multi-dimensional sectoral alignment would give a wider range of actors confidence in the medium- and longer-term pathway for sustainable development.

> ***A dynamic process for coordination focused on emissions-intensive, trade-exposed (EITE) industries and international transport would maximise the Club's potential to add value.***

6.2.2. Focus: identifying sectoral opportunities

For an ambitious alliance, focus sectors should represent substantial abatement potential, in terms of their contribution to current global emissions and reductions under reasonable scenarios aligned with Paris goals. The major systems, including energy, land and transport, are all vital for net zero and sustainable development, and possible sites of action by the Club. These sectors link to the Club's secondary purpose of easing international friction through their role as inputs into traded goods, where discrepancies in emissions intensity will feed through into trade friction under carbon border policies. Actions could include commitments to joint investments in R&D for enabling technologies (such as sustainable fuels) or common infrastructure (such as interconnectors for green electricity).

Emissions-intensive heavy industries would especially benefit from international governance and coordination. This is partly because of a pronounced collective action problem in the face of uncertain and very costly abatement options. High operational and investment costs, long investment cycles (upwards of 25 years), and trade in highly competitive global markets are common features across most heavy industries,

such as production of steel, cement and chemicals (IEA, 2022b; Oberthür et al., 2021b). Under the status quo, low- or zero-emission basic products do not stand to capture a dedicated share of the market, and policy to support first movers is underdeveloped. Consequently, firms have little incentive to invest in converting their production processes. Developing and scaling up solutions also requires available materials and enabling infrastructure (WEF, 2022b).

Coalitions of countries could target all of these barriers to investment by agreeing shared standards, jointly implementing policies to create demand for green products, as well as coordinating finance to accelerate innovation and deployment of solutions on the supply side. In addition, trade-exposed industry is likely to be the main target of border policies to address carbon leakage, as reflected in previous proposals for an alliance (e.g. Shawkat and Sartor, 2022). Moves to agree rules that manage policy diversity under the second pillar would boost confidence to invest among Club members' domestic firms and increase the incentives for exporters overseas to do so to comply with new trade controls. Measures on EITEs under the third pillar could amplify this positive shift, while also helping to forestall tensions arising from climate policy divergence in the first place.

International transport also represents a potential focus area for Pillar 3 measures, owing to its distributed governance and relatively limited suite of cost-effective abatement options at present (IPCC, 2022b) – while not 'traded' in the same sense, it provides crucial enabling infrastructure for low-emissions trade and contributes to the cost profile of decarbonisation in other sectors.

A further area in which to pursue cooperation may be in materials and supply chains that span sectors, such as those for minerals and rare earth metals that are essential for scaling up deployment of low-carbon technologies. Club members could identify fragilities and bottlenecks and seek to close these, through measures like trade concessions and joint investment, which will have mutual benefits for sustainable, low-carbon, resilient development.

Box 6 examines key dynamics and opportunities in sectors that the Climate Club could target in the near term. Part of the political logic driving the Club – based in part on fears around carbon leakage – implies a focus on hard-to-abate sectors. However, over the years to come, countries might also coordinate through the third pillar's apparatus on mutually supportive actions for zero-emissions power, agriculture or domestic transport. Ultimately, the choice of specific industries will result from diplomacy during the Club's formation and the dynamic process of bargaining once it is established, but it should also be based on evidence, including in relation to relative probabilities of carbon leakage.

Box 6: How can coordination unlock decarbonisation in hard-to-abate sectors?

Investment decisions in all sectors over the next few years will be critical for achieving the Paris temperature goals, since relevant capital assets endure for decades; in heavy industry, 2050 is just one investment cycle away (IEA, 2022b). There are strong actions available to a coalition of influential countries to drive a development pathway that meets these goals. The analysis here covers properties of three heavy industries (steel, ammonia and cement) and shipping, outlined in Table 5, exploring the development of near-zero emissions hydrogen as a cross-cutting enabler.

Table 5: Features of selected hard-to-abate sectors

Sector	Share of global CO_2 emissions (%)[1]	Technology for decarbonisation	Major sectoral initiatives	Largest producers[2]	Exports as share of production (%)
Steel	8	Electrolytic iron ore reduction using hydrogen, plus electric arc furnace; CCUS	worldsteel; ResponsibleSteel; SteelZero; Net Zero Steel Initiative	China 54% India 7% Japan 5% US, Russia, South Korea each 4% (G7 17%)	20
Ammonia	1.3	Electrolysis with hydrogen; CCUS	International Fertilizer Association	China 30% US, EU, India, Russia 8-10% each	10
Cement	7	CCUS	Global Cement and Concrete Association; Cement Sustainability Initiative; Concrete Action for Climate	China 52% India 6% EU 5% US 2% (G7 8%)	5
Shipping	2.9	Low-emission hydrogen, ammonia, biofuels, and other synthetic fuels	Getting to Zero Coalition; Sustainable Shipping Initiative; International Chamber of Shipping	N/A	N/A

Sources: GCCA (2022a), IEA (2022a, 2022b), IMO (2020), IPCC (2022b), worldsteel (2022)

Notes: 1) Latest available data: 2018-2019. 2) Steel figures for 2021; ammonia cited in IEA (2022b), no date given; cement figures for 2018.

The discussion below focuses mainly on technological options for decarbonisation to identify cross-sectoral complementarities, particularly around near-zero emissions fuels. However, material efficiency, circular practices and energy efficiency will all play a role in industrial decarbonisation (IPCC, 2022b).

Hydrogen: a cross-cutting resource

Hydrogen is recognised as an important energy vector where electrification is unsuitable for decarbonisation. The Energy Transitions Commission estimates hydrogen could account for 15-20% of global final energy demand by mid-century, attributing particularly high certainty over hydrogen's future role in steel, ammonia, methanol, shipping, and aviation (ETC, 2021). For clean hydrogen to play this role, its production must switch from carbon-intensive processes involving natural gas to production via electrolysis using renewable electricity ('green' hydrogen) or be reformed with carbon capture and storage that provides near-total CO_2 capture and very low methane leakage ('blue' hydrogen). Green hydrogen uptake will largely depend on decreases in end-to-end cost, which the Hydrogen Council (2020) estimates will need to reach $1.8/kg to achieve 15% of global energy demand. However, the point at which hydrogen becomes viable is not homogenous across sectors, because of differences in capital expenditure and transportation costs required for hydrogen to be deployed at scale.

A wide range of policy levers and coordination among multiple types of actors will be needed to accelerate hydrogen uptake (ETC, 2021). Furthermore, a growing hydrogen economy will likely result in a reorientation of value chains, including since "regions with abundant low-GHG energy and feedstocks have the potential to become exporters of hydrogen-based chemicals and materials processed using low-carbon electricity and hydrogen" (IPCC, 2022b). Clean hydrogen is likely to become a globally traded commodity, with significant consequences for resource and monetary flows.

A Climate Club could therefore accelerate international collaboration based on countries' shared national interests in the growth of clean hydrogen production and conditions for smooth trade. Governance is emergent: an overarching goal is already provided by the Breakthrough Agenda; Mission Innovation and the IEA's Technology Collaboration Programmes give international support to research and development; and hydrogen features in national decarbonisation strategies among well over 30 countries (Royal Society, 2021). However, there remains a need for stronger agreement on clear and near-term targets for deployment, more ambitious interventions in support of hydrogen projects in end-use sectors, and a full portfolio of international standards that include emission measurement methodologies and safety and operational protocols (see 6.3.3). Progress in these key areas, paired with international finance for projects in EMDEs, would both stimulate demand and galvanise a supply chain for clean hydrogen that would have benefits across multiple hard-to-abate sectors.

Steel

Decarbonising steel production will require several technological solutions, with hydrogen and CCUS-based approaches both likely options. However, although various companies are piloting prototypes, most technologies are not yet commercially viable for the industry. Utilisation of scrap in place of iron ore – recycling for material efficiency – offers another route to near-zero emissions, but encounters challenges with regard to final product quality, meaning not all demand can be met through recycling.

Solutions will vary internationally with patterns of production methods. US production is estimated to be 75-320% more carbon-efficient than the global average, depending on which products are measured (CRU, 2021), owing to the country's larger fleet of electric arc furnaces, which are the most compatible with hydrogen-based direct reduced iron. Supporting hydrogen-based methods could help drive down the cost of zero-carbon hydrogen production, benefitting its use in other sectors. However, some 60% of all steel plants globally still use the most carbon-intensive approach, the blast furnace-basic oxygen furnace; the share is 77% in China and 63% in India (Swalec and Shearer, 2021). China is by far the largest global producer and the largest exporter of finished and semi-finished products (IEA, 2022b). Blast furnaces need CCUS to remove residual emissions,

which will become less cost-competitive as hydrogen costs decrease. China and India have many new plants and are continually adding new capacity, so both have an interest in reducing costs for CCUS to bring down their overall sector emissions.

Out of EITE industries, steel is paid the most attention by existing international initiatives (see 6.3), but many observers still see opportunities for improvement (e.g. Hermwille et al., 2022). One of the Breakthrough Agenda's goals is dedicated to near-zero emissions steel, and the US and EU have agreed, under the 'Global Arrangement on Sustainable Steel and Aluminium', to negotiate to avoid mutual tariffs on steel and aluminium products. However, there is currently no global alignment on the definition of green steel, and developers are not incentivised to monitor emissions. Some initiatives, such as the World Steel Association (worldsteel) or industry coalition ResponsibleSteel, aim to harmonise measurement standards; the IEA (2022b) has also proposed steps towards this goal.

The Climate Club could devote political capital towards wide uptake of credible standards, involving a coherent approach to emissions measurement, a technology-agnostic threshold for green steel, and requirements for monitoring and auditing. The OECD convenes stakeholders through the Steel Committee and Global Forum on Steel Excess Capacity, both of which are increasingly focused on steps for decarbonisation, and as such could provide analytical and operational support. A related step is to empower public procurement or buyers' clubs to support early movers. The Industrial Deep Decarbonisation Initiative (IDDI) already mobilises government commitments to green steel procurement (see 6.3.4); the Club could thereby facilitate the expansion of IDDI's membership through incentives for countries to join the broader alliance. The transatlantic Green Steel Deal's principles must be opened to participation from other countries if it is to have a real impact on the global steel industry. The US and EU will gain from explosive growth of lead markets for green steel and for relevant technologies, while other producer countries would benefit from avoiding near-term tariffs and longer-term stranded assets.

Ammonia

Ammonia is a potential zero-carbon fuel in its own right, and also the primary ingredient in nitrogen fertiliser production: 70% is used for this purpose (IEA, 2022c). In this role ammonia produced using different methods is substitutable, meaning the emissions intensity of fertiliser can be reduced without affecting the quality of the final product. However, most ammonia is produced using natural gas steam reforming. Similarly to steel, available routes for decarbonisation include the use of clean hydrogen as a feedstock, or CCUS to reduce emissions from fossil fuel inputs. In fact, ammonia can be used as a carrier to transport hydrogen, since it has a higher volumetric energy density and can be 'cracked' back to hydrogen or a mixture of the two (Royal Society, 2021). China is the largest producer of ammonia worldwide, followed by the US, EU, India and Russia. However, China, the US and the EU are all net importers (IEA, 2022c).

The first companies are now starting production plans for green ammonia and countries with significant renewable energy resources, like Australia, have provided initial funding for projects aiming to manufacture ammonia from hydrogen produced from renewable electricity. However, ammonia is subject to fewer substantial commitments or agreements at the international level. An indirect high-level target exists in the form of the International Fertilizer Association's ambition to reduce greenhouse gas emissions from nitrogen fertiliser production by at least 30% per tonne by 2040.

The Climate Club could provide a forum in which to negotiate and set harmonised, long-term emission reduction mandates for fertiliser among members, which would stimulate demand for lower-emissions ammonia and, in turn, for clean hydrogen as an input (see 6.3.3). Coordinated action would contribute to managing trade friction, and as such should be conducted in parallel with negotiations over carbon prices and border policies under the Club's second pillar. Mobilising investment is also essential: in one IEA scenario, 80% of cumulative capital investments are in near-zero emissions capacity. To go further on this critical factor, governments could collaborate to fund the early, highest-risk ventures or subsidise enabling infrastructure;

or, to galvanise private investment, a club of countries could commit to tender for low-emissions production of ammonia, nitrogen fertilisers, or other nitrogen products (see 6.3.4).

Cement

The cement and concrete industry represents one of the most challenging areas of the economy to decarbonise and could account for around 60% of the global costs of industrial decarbonisation (McKinsey & Company, 2018). A substantial rise in production is projected until at least 2050 to meet construction needs for the built environment, particularly in EMDEs (Imbabi et al., 2012). The associated process emissions arise primarily from the chemical reactions involved in production, making CCUS a central part of the solution. Cement is therefore largely separate to the hydrogen grouping that unites the other case study sectors in this report. However, hydrogen or electricity can be used for the heat required by kilns to tackle remaining emissions from fuel use in supply and production chains. Other solutions include substituting clinker, the main raw material in cement and the source of most emissions, for alternatives such as fly ash or ground limestone.

Industry stakeholders have already engaged with the necessary changes for net zero and shown support for ambitious policy. Firstly, the Global Cement and Concrete Association (GCCA) has collaborated with the World Economic Forum to form the Concrete Action for Climate Initiative to call for collective action beyond the industry, and additionally has published a net zero roadmap with recommendations for policy. This followed a low-carbon technology roadmap from the Cement Sustainability Initiative (CSI), which joined the GCCA in 2018 and brings together 24 major cement producers representing over 30% of the world's cement production, with operations in more than 100 countries. Key policy asks include carbon pricing mechanisms; changes to standards and public procurement to create demand for low-carbon concrete and cement products; support for R&D through public funding and risk sharing; support for CCUS including enabling transport and storage infrastructure; and strong lifecycle CO_2 performance standards for the built environment (GCCA, 2022b).

The geographical pattern of production is heavily skewed, but unlikely to affect coordination. China produces over half of the world's cement, with no other single country or region coming close to China's total output. However, this is likely to shift dramatically towards other EMDEs, particularly in South Asia and Africa, as China's construction boom tapers off. Owing to their weight, cement industry products are traded in smaller volumes and across shorter distances than other industrial materials (IEA, 2022b) – so trade concerns will be a less significant factor affecting international coordination than in other sectors. A more important consideration will be ensuring that all countries have access to low-emissions basic materials and relevant technologies.

The Climate Club could promote and accelerate a two-pronged strategy towards cement decarbonisation. Firstly, particularly across the US, Europe, and China, members could agree to set strong and harmonised standards for final products (such as embodied carbon in building codes) and render these into green public procurement targets (through participation in the Industrial Deep Decarbonisation Initiative, which targets cement as well as steel). These steps would encourage high-quality data on the emissions-intensity of production, create lead markets for near-zero emissions concrete, and incentivise recycling as well as private investment in technological solutions. Secondly, particularly in EMDEs and in tandem with the first pillar, the Club could forge partnerships to fund the roll-out of large-scale demonstration projects, particularly CCS-equipped plants and key shared infrastructure, which may include transport for CCUS or facilities for recycling. These solutions should link to priorities, such as R&D programmes, outlined by other governance initiatives (see 6.3.2).

Shipping

New mitigation technologies are particularly important for shipping, although efficiency can still deliver some mitigation potential (IPCC, 2022b). Clean ammonia also has potential as a marine fuel. However, many technological options still require significant R&D to be commercially viable. For instance, compared with uses

in industry, hydrogen production costs must decline even further for alternative fuels to be competitive in international transport: an H2 price of $2/kg implies a 170% cost premium over hydrocarbon shipping fuels, compared with around 40% for steel and ammonia, against fossil fuel-based production (ETC, 2021). There is an additional and simultaneous need to invest in ships that are able to use sustainable fuels and in fuelling infrastructure (Mission Innovation, 2022). Progress will be incremental at first, before accelerating; for instance, modelling suggests that only 5% of the international shipping fuel mix needs to be sustainable by 2030 to induce a tipping point and align with the Paris Agreement (Osterkamp et al., 2021).

New public–private coalitions of the willing have been formed, such as the Getting to Zero Coalition, which accounts for over a quarter of the industry's market share by revenue and has backing from 14 governments. The industry association International Chamber of Shipping (ICS) has endorsed a stronger target by the International Maritime Organization (IMO) – the UN body that regulates the shipping sector – than its existing goal of reducing emissions by 50% from 2008 levels by 2050 (ICS, 2021). However, political and policy actions to date are limited in ambition. IMO members rejected a net zero target for 2050, despite 14 countries (including four G7 members: France, Germany, the UK and the US) signing a declaration at COP26 in support of such a goal.

It is possible to move faster. Stricter efficiency and carbon intensity standards would create stronger incentives for investment in solutions. The Climate Club could provide a forum for trading off progress on these goals against other concessions and support in the form of partnerships under the first pillar. It could also strengthen the political will behind knowledge sharing and joint innovation activities under Mission Innovation's zero-emission shipping work (see 6.3.2) and extend these to more countries, or agree a new innovation fund capitalised through mandatory contributions from shipowners globally, as endorsed by the International Chamber of Shipping (ICS, 2021). A further, potentially powerful tool would be to agree 'green corridors' – "specific trade routes between major port hubs where zero-emission solutions have been demonstrated and are supported" – as sites to jointly promote favourable regulation, subsidise sustainable fuel use, coordinate on refuelling infrastructure, and convene partnerships between customers, vessel operators and fuel producers (Mission Possible Partnership, 2021). Potential targets include the iron ore route between Australia and Japan, and containers between Asia and Europe, implying broad international scope for bargaining.

6.3 Policies and initiatives to advance sectoral decarbonisation

Beyond a carbon price, a diverse package of policies can be used to catalyse innovation and investment for climate action and sustainable development. The detail will vary according to which industry Club members choose to prioritise, but in general the use of a suite of available policies will have reinforcing effects. For example: shared standards allow segmentation of market demand to create lead markets for green products and incentivise R&D investment; and governments forming buyers' clubs to guarantee offtake of green output will make publicly-funded projects more attractive for private co-finance. Concerning lead markets – to which standards, procurement and state support all can contribute – the Club has an important role to play to break down perceived zero-sum competition over innovations (Quitzow et al., 2014) and to seek, where possible, mutually beneficial growth of new industries and approaches – through smooth trade in a wide range of green products and necessary materials, technology diffusion and financial support.

Most important for the Club's approach to Pillar 3 is how to pursue policy change in a way that adds value to existing international coordination efforts. For several years there have been a growing number and variety of collaborative mechanisms relevant to energy technology innovation, with different institutional frameworks, mandates, scopes of activities and technology focus areas (IEA, 2019). By contrast, international governance is relatively new for emissions-intensive industry (Oberthür et al., 2021). Nevertheless, it is an increasingly crowded space, with various coalitions of governments, private-sector initiatives, and some public–private groupings all contributing to setting goals and driving progress. Table 6 displays the ecosystem

of initiatives for our case study sectors, and a selection of available policies, to reveal hotspots and gaps in the current supply of international governance. In addition to the specialised organisations and initiatives, the Club could draw on support from the IEA for the technical work to coordinate definitions and discuss relevant policies. [26]

A Climate Club should exploit and galvanise this landscape. By serving as a high-level, strategic forum that connects international development, trade and sectoral policies, the Club could drive momentum in three ways: attracting more countries to join existing institutions and encouraging more active participation; acting as a focal point for collaboration to align priorities and get ahead of overlaps; and pushing for progress on areas that are currently underserved.

6.3.1 Targets and roadmaps

At the level of overarching policy frameworks, countries can agree to targets for decarbonisation or other sustainable development objectives that promote the goals of the Paris Agreement in focus sectors. Ideally, any target is accompanied by interim milestones, as well as by national roadmaps that outline the policy actions governments intend to take. These frameworks can provide confidence to all players in relevant sectors and set shared expectations of the development pathway ahead, which can lead private actors to bring forward investment in anticipation of the proposed changes.

The Breakthrough Agenda, launched by the UNFCCC's Race to Zero at COP26, offers a framework for international targets at the highest level in five 'sectors'. [27] The targets ('Glasgow Breakthroughs') are defined for 2030 and represent goals to develop and rapidly scale up broad categories of low-carbon technology (for example, 'near-zero emission steel').

> ***The Climate Club has a range of powerful policies to draw on, but it must navigate – and generally support – the existing governance and initiatives to ensure it adds the most value.***

[26] The focus is primarily on cross-sectoral institutions comparable in nature to an intergovernmental or private sector alliance. Apart from under standards, the analysis does not address sector-specific coalitions, more of which are covered in Box 6 for selected sectors. Appendix 4 provides further details of cross-sectoral institutions and sectoral initiatives.

[27] The five are power, road transport, steel, hydrogen and agriculture. Note that these overlap and do not all correspond to the same level of analysis: for instance, hydrogen will have applications in both the steel industry and road transport. Further Breakthrough goals for additional sectors are under consideration.

Table 6: Sectoral coverage of selected major initiatives

	SECTOR					
POLICY	**Hydrogen**	**Steel**	**Cement**	**Ammonia**	**Shipping**	**Aviation**
Targets	Breakthrough Agenda Mission Innovation	Breakthrough Agenda	-	-	Mission Innovation	-
Roadmaps	Leadership Group for Industrial Transitions Mission Possible Partnership	Leadership Group for Industrial Transitions Mission Possible Partnership International Energy Agency	Leadership Group for Industrial Transitions Mission Possible Partnership	Leadership Group for Industrial Transitions Mission Possible Partnership (under 'Chemicals') International Energy Agency & International Fertilizer Association	Leadership Group for Industrial Transitions	Leadership Group for Industrial Transitions
Joint R&D	Mission Innovation	Mission Innovation (under 'Net-zero' Industries)	Mission Innovation (under 'Net-zero' Industries)	Mission Innovation (under 'Net-zero' Industries)	Mission Innovation	-
Standards	International Partnership for Hydrogen and Fuel Cells in the Economy	Worldsteel ResponsibleSteel	Global Cement and Concrete Association	Sustainable Agriculture Initiative Platform (indirectly)	International Maritime Organization	International Civil Aviation Organization
Procurement	-	First Movers Coalition Industrial Deep Decarbonisation Initiative	Industrial Deep Decarbonisation Initiative	-	First Movers Coalition	First Movers Coalition Sustainable Aviation Buyers Alliance
State support	World Trade Organization	World Trade Organization	World Trade Organization	World Trade Organization	World Trade Organization	World Trade Organization

The Agenda itself represents an umbrella and has begun to orchestrate efforts by convening dialogues between other international initiatives working towards shared sectoral goals. Among those are international groupings that support the development of ambitious roadmaps. The Leadership Group for Industrial Transition (LeadIT), consisting of governments and companies, facilitates public–private dialogue and develops evidence (including a database of national and regional roadmaps across the energy, transport and industrial sectors (Johnson et al., 2022) to promote high-level leadership and speed up technological change. The Mission Possible Partnership (MPP) is a private sector initiative, backed by the World Economic Forum and Energy Transitions Commission, that has also carried out deep analysis towards the formation of Paris-aligned pathways in heavy industry and international transport. Many industry-specific associations and institutions have also published their own roadmaps (see Box 6). Another participant is Mission Innovation, an intergovernmental coalition that sets objectives for technology progress in key sectors (see *R&D investment*).

The Climate Club need not set high-level sectoral signals but should endorse progress towards the Breakthrough goals and seek to support the Agenda's orchestrating role. It should draw on LeadIT and the MPP to facilitate members' drafting of new roadmaps or enhance existing ones to align milestones and interventions (such as the timing of investment and interim objectives to deploy new technology). This would serve to deliver the strongest possible signals to international markets. Cross-pillar linkages could encourage alignment, such as the prospect of new partnerships to finance sectoral priorities and share key technologies, or through the second pillar, addressing trade concerns that other initiatives identify as barriers to progress. Value could also be added in fostering commitment to common monitoring and reporting on progress towards the Breakthrough goals. Through its wider incentives to join the alliance, the Club could also drive a boost in the membership of these related initiatives, which is currently insufficient, particularly if it made doing so a condition for participation in other aspects of its third pillar.

6.3.2 R&D investment

As well as the targeted use of public funds on a national basis, Club members may pool resources to support research, innovation and development. However, there are complications. Firstly, the surplus from innovation will not be captured proportionately by those who do the most to innovate (Oxley and Sampson, 2004). Secondly, many innovations that will benefit hard-to-abate sectors will be in cross-cutting areas, such as carbon capture or hydrogen. Coordinating an ambitious approach to investment in innovation is essential.

Mission Innovation (MI) undertakes a wide scope of activities on R&D. Dating back to 2015, it has a broader membership (of 22 countries plus the European Commission) than more recent institutions and outlines innovation priorities in its focus sectors, including hydrogen, shipping and 'net zero industries'. Members commit to National Innovation Pathways that set out how they will meet their energy and climate goals and pledge to collaborate internationally through participation in missions and a platform for tracking, knowledge-sharing, and incubating solutions. For example, in shipping, MI aims to ensure that ships capable of running on zero-emission fuels make up at least 5% of the global deep-sea fleet by 2030, which would contribute to the 'tipping point' of demand for those fuels (hydrogen, ammonia, etc.; see Box 6). The Net-Zero Industries Mission was launched in September 2022; progress is envisioned under three pillars: demonstrations, enabling conditions (such as feasibility studies and regulatory frameworks), and R&D in breakthrough technologies.

A Climate Club could add value by driving technology diffusion, especially to EMDEs, bolstered by finance and technology transfer under the first pillar. The Club could provide an additional forum and resources for raising R&D investment and structuring finance for demonstration projects towards the priorities identified by MI. Furthermore, it may contribute to deepening knowledge-sharing: extending the offer of collaboration to EMDEs with material interests in sectors like hydrogen or steel but which are not members of MI; seeking agreement of common mandates for minimum knowledge-sharing requirements from joint projects; and

encouraging members to include participation of experts and companies from partner countries in national research programmes.

6.3.3 Support for common standards and production mandates

Product standards are recognised as a powerful alternative instrument to market-based carbon prices for driving low-carbon innovation (Grubb et al., 2022). Performance standards have the potential to phase out inefficient production processes and are technology-agnostic. For instance, both green and blue hydrogen are expected to be able to meet a low-carbon threshold, depending on the emissions of the electricity used for electrolysis or the effectiveness of carbon capture during production, respectively. Standards directly on basic materials (e.g. steel or ammonia) and on final products (e.g. embodied carbon in buildings, or fertiliser) differ in their impacts. Standards on materials themselves create direct incentives for improved processes and deployment of new technologies, but not for efficiency through recycling. Final standards incentivise circular practices, which can dilute the impact on green production technologies. However, they also cut across sectors – for instance, certificates for embodied carbon in buildings would benefit green production of both steel and concrete.

The private sector has experience with environmental standards. Broad approaches to measuring Product Carbon Footprints and Environmental Product Declarations are endorsed by international standards bodies, such as the International Organization on Standards, the Greenhouse Gas Protocol, and building certifications like LEED or BREEAM. They provide metrics for measuring embodied emissions in products, including for specific steel, cement and concrete products, and firms reporting on their products build skills and infrastructure for compliance with environmental regulation. However, methodologies vary significantly, so harmonisation must go further for truly transformational measures (Grubb et al., 2022). In the existing large industries, trade associations are making efforts to define near-zero emission standards, such as worldsteel, which is defining CO_2 emission measurement methodologies for discrete product types. In international shipping and aviation, energy efficiency and carbon intensity standards are already governed by UN bodies (IMO and ICAO, respectively) – although these do not supersede or require enforcement through national-level regulations (Bodansky, 2018; ICAO, 2022). Broad criteria for sustainable fuels in these sectors are relatively new, although a range of such measures have recently been defined at national, regional and global levels (e.g. SSI, 2021).

Importantly, if the Climate Club aims to accelerate the definition and uptake of new international standards, the processes by which those are developed must be transparent, open, inclusive and consensus-based. The importance of these principles in the context of international standard-setting has consistently been affirmed by the WTO membership (WTO, 2022). The technological agnosticism of performance standards is advantageous here for not discriminating between countries on the basis of their best options for decarbonisation.

Therefore, Club members could align on near-zero emissions measurement standards in choice sectors, and set targets for products to meet minimum thresholds according to those measurements. The IEA could support this work, as it has already begun for the G7 in proposing thresholds for steel and cement (IEA, 2022b). For example, countries could promote a common threshold defining ‘green’ ammonia according to a single methodology, while also applying an emissions intensity requirement to buyers of fertiliser. Another opportunity is to harmonise regulations on embodied carbon in new buildings, which would stimulate demand for low-carbon products across the steel and cement sectors. Finally, seeking alignment on low-carbon hydrogen could see the Club collaborating with the International Partnership for Hydrogen and Fuel Cells in the Economy and other stakeholders, like the Hydrogen Council, to agree a common standard for clean hydrogen. The EU has already taken steps to recognise low-carbon fuels and remove cross-border tariffs to facilitate trade (EC, 2021), which could become the basis of discussions to harmonise with further countries.

6.3.4 Green procurement

Public procurement is the use of governments' purchasing power, which could be directed to favour products with low lifecycle emissions. Its advantage is that it can create lead markets for these products even before the comprehensive implementation of subsidies, carbon pricing or standard-based regulation. Green public procurement initiatives must define the type of target purchased goods have to meet (ranging from adoption of environmental reporting through to product-level performance targets) and set rules on enforcement mechanisms for suppliers that do not meet their obligations (Hasanbeigi et al., 2021). There is synergy between procurement and endorsement of standards, because governments will need to determine relevant metrics and methods for identifying which types of products are eligible for purchase. The use of procurement can therefore encourage firms in relevant industries to develop capacity to measure embodied emissions of their goods and thereby, indirectly, engender transparency that also furthers climate action. Private procurement commitments can play a similar role to create demand for burgeoning green products; governments could incentivise companies to make such commitments through fiscal instruments.

A public procurement alliance already exists: the aforementioned Industrial Deep Decarbonisation Initiative (IDDI), convened by members of the Clean Energy Ministerial. However, its membership is narrow at only five country governments (as of July 2022) and its sectoral focus is limited to steel and cement. In addition, the First Movers Coalition consists of over 50 companies making voluntary commitments, with nine country governments involved as 'partners' committed to creating an enabling environment, although with no clear binding obligations.

The Climate Club's added value could be to help scale up these initiatives: through attracting more countries to join the IDDI and to support the First Movers Coalition, thereby catalysing more companies to join the latter; potentially by serving as a forum for negotiations around further complementary measures to incentivise companies to join; and generating political momentum and resolving any barriers to expand green public procurement to more industries, such as ammonia.

6.3.5 State support for near-zero emissions production

Members will also need to set rules for public financial support to industries to advance the goals of sectoral agreements. Public finance could target demonstration projects (to accelerate innovation) or the deployment of more mature technology among market participants. Subsidies are also available to support lead market creation, such as several countries have achieved for electricity generation from renewables (e.g. Nicolini and Tavoni, 2017).

Carbon contracts for difference (CCfD) are a promising mechanism for supporting roll-out: governments would guarantee to pay any difference in the cost of production for greener products – with the advantage of greater certainty for recipients that their investments would be covered over time than afforded by a short-term, fragmented use of untargeted subsidies (IEA, 2022b). If a group of countries in the Club agreed to undertake aligned CCfD policies or pool funds for joint investment to support new demonstration projects, they would achieve more available finance and a stronger market signal than would a single country doing so alone.

Where governments provide public investment that affects the cost of production, there may be consequences for competitiveness and trade patterns, which could create political tension and impact coordination negatively in the medium term. For instance, the Inflation Reduction Act passed in August 2022 by the US Senate has provisions for new and enhanced tax credits to incentivise domestic production of products throughout the clean energy value chain, including CCUS and hydrogen, and as such may have consequences for diplomacy with trading partners (Ji et al., 2022). As noted in previous chapters, trade-distortive subsidies may be subject to challenge (or unilateral remedies) under WTO law, where they have sufficiently serious adverse effects on foreign competitors. In addition, export contingent subsidies and local content subsidies are prohibited under WTO law, regardless of their environmental purpose. There is therefore a potential role for a Climate Club in seeking to build consensus on acceptable forms of green public investment, in terms of a common understanding on the types of activities or firms that could receive finance. Specific public investment modalities could also feature as conditional uses of financial support provided under the Club's first pillar.

> ***The Climate Club should seek alignment on roadmaps, standards, and public finance interventions to create lead markets and drive investment and innovation in key sectors.***

Efforts within the Climate Club to build consensus on acceptable forms of green public investment should complement initiatives elsewhere, especially within the WTO. The WTO's Committee on Trade and Environment is an important venue for multilateral discussions of this kind, with which the efforts of the Climate Club should be closely coordinated. The WTO's notification procedures – including its Environmental Database – can also play an important role in ensuring transparency of relevant measures, offering an opportunity for sharing experiences of and best practice in efficient policies, and for addressing eventual trade concerns through relevant WTO committees and bodies (WTO, forthcoming). It may also be possible for a critical mass of WTO members to move ahead on a plurilateral basis – there has been progress on plurilateral initiatives within the WTO, for example in the areas of digital trade and trade in information technology products (e.g. Hoekman and Sabel, 2021), though it is recognised that rules on subsidies are difficult to progress plurilaterally. To complement these efforts, and to reduce the potential threat to the stability of the international trade regime posed by reactions to divergent climate policy, there is potential for the Club to host a holistic political debate, seeking to balance and navigate trade-offs across a suite of policies affecting competitiveness and trade. This activity could be carried out through a working group explicitly linking the second and third pillars (see 5.4).

6.4 Summary and recommendations

Policy alignment for the transformation of heavy industry or other sectors represents a different value proposition compared to the Climate Club's first two pillars. Whereas partnerships require members with greater means to assist those without, and managing policy diversity involves a give and take over the incidence of different policies and border measures, under sector approaches countries primarily stand to enjoy mutual benefits from strategic complementarities. Here, the value of the Climate Club is revealed in its potential to create *linkages*, both internally – across the different pillars of the Club and the diversity of national interests that they represent, and externally – with existing multilateral and plurilateral institutions set up to drive climate action and sustainable development across a number of sectors.

Rather than seeking to forge new agreements that would bind countries to decarbonisation targets (and which therefore face significant political hurdles), the pillar would likely function best as a dynamic, multidimensional forum where countries are free to form sub-groups on industries of importance to their

national strategies. In the near term, heavy industries like steel, cement or ammonia and ascendent resources like hydrogen represent a clear target for coordination. Once the Club has been established and its institutional form stabilised, member countries may also turn their focus to other sectors across energy, land use or transport, and align on a similar mixture of push and pull policies to scale up key innovations, investment and infrastructure.

Policymakers seeking to initiate a Climate Club, including the G7 members, should therefore identify and prepare proposals for internationally coordinated action in sectors salient to their own country's national interest. They should also create an institutional framework open enough to accommodate initiatives in other sectors that may not hold the same value from their own perspective, but that will nevertheless be instrumental in creating a broad, inclusive alliance to deliver the global public goods of robust climate action, innovation, investment, trade and sustainable growth.

7. Conclusions

Action on climate change is urgent. It must be at scale and across all countries and sectors. The science is clear. Step by step, the world has been coming together behind the climate and temperature goals of the Paris Agreement and a common vision of transformation. But progress is too slow. *Collective ambition* must match the size and urgency of the challenge, and ambition must translate into more rapid action. The establishment of a Climate Club, as announced in the G7 Leaders' Statement of 28 June 2022, can give critical momentum to that shared agenda.

Such a Club must be an *alliance* of leaders in more ways than one. It will require government leaders to be engaged because the climate transformation cuts across departmental briefs and investor confidence will depend on clarity of commitment at the highest level. The climate transformation drives and is indeed inseparable from the economic transformation towards a new, *sustainable, resilient and inclusive* model of growth and development. This is a positive agenda of change, not retrenchment. Climate leadership is sustainable growth leadership.

As the G7 statement rightly stresses, this is a Club that *must* be inclusive. An initiative that does not aim for ambition lacks rationale and legitimacy and would add little to existing processes. But an initiative to accelerate climate action that does not include countries accounting for most future greenhouse gas emissions would lack relevance. In fact, the 'Club' label, which conveys exclusion, is misleading. '*Alliance of (Climate) Leaders*' would better project the spirit of this initiative.

An inclusive Club/Alliance must be so from the start so that it can reflect a diverse membership in its design and organisation. In particular, *it would be counterproductive to invite developing countries to join a 'rich men's club' not of their making*. The last few years have seen a deepening loss of trust, in part stemming from the handling of the COVID-19 pandemic and the symbolically important failure to deliver on the $100 billion climate finance target. There is a need for an expressly, intensely cooperative approach. Membership criteria must reflect this inclusiveness, recognising different starting positions, capabilities, and paths. It is the change in ambition that matters.

An inclusive Club/Alliance must also accommodate countries with a *range of different climate policies*. Various combinations of policies, corresponding to country-specific circumstances, can be effective at delivering climate ambition. It would be wrong, therefore, to focus the Club/Alliance's purpose solely on establishing common carbon pricing, important though that is, and carbon-related trade barriers. Such an approach would not capture the full range of climate policies and exclude important partners, and it would risk splitting the global community on the one goal on which it should (and can) come together.

A Club/Alliance would be respectful of international rules, as emphasised in the G7 statement. It should operate *in support of the Paris Agreement and the UNFCCC process*, not displace it. It would seek to reinforce rather than duplicate the deliberations and commitments on climate action across a wide range of fora and institutions. And it should, in its decisions or the actions it encourages, observe international trade rules. The rules-based international system has been the bedrock of global progress for more than half a century. It remains central to international cohesion. Climate goals can be pursued within the rules-based system, taking great care to avoid their misuse or the perception of misuse for protectionist ends.

A Club/Alliance that promotes ambition with inclusiveness would be one in which countries come together in a way that otherwise they would not. It would be an aspirational, cooperative structure, building on the momentum of countries' net zero commitments and where everyone recognises the urgent need to act. The Club/Alliance would be an arrangement for discussing mutual challenges and finding mutually beneficial responses and solutions. It would have a dynamic purpose. It would not seek to agree international treaties – that would not be a realistic aim with a diverse membership and broad dimensions for action. This

Club/Alliance is an altogether different proposition than a club for insiders that is based around sanctions for outsiders.

Instead, the Club/Alliance would sit within an architecture of existing coalitions and initiatives, but in combining top-level political engagement with shared ambition, critical mass, an exclusive focus and comprehensive coverage of the climate, it would fill a crucial gap in that architecture. The whole set of climate, sustainability and resilience strategies for development would benefit from the attention and the traction that an alliance of leaders can bring. Recognising the different interests of a diverse membership, the work of the Club/Alliance would be organised around three pillars:

- **Building partnerships.**The agenda under this pillar is about collective ambition and enhancing the ability of countries to deliver on their ambition, to solidify and reinforce commitments. The focus would be on finance, technology, market access and analytical and action partnerships in support of climate change mitigation, adaptation and resilience, plus biodiversity objectives.
- **Managing policy diversity.** The agenda under this pillar is to help unblock policy ambition by offering a framework for handling concerns related to diversity in policy stringency, especially around carbon leakage and competitiveness in high-emission traded industries. The focus would be on metrics and on mutual principles, which might be pursued under the WTO umbrella. The principles would include foundation in evidence; simplicity; focus; and transparency.
- **Fostering sectoral alignment.** The agenda under this pillar is the acceleration of decarbonisation of high-emission sectors by placing the combined weight of the membership behind mutually agreed standards and technological pathways. The focus would be on cooperation in fostering change and overcoming obstacles to discovery and innovation largely through existing public and private initiatives.

Progress in each of these areas, and throughout the climate and development agendas, will materialise through investments and technologies. The governance of investments and of technology adoption in each country, including the investment climate and institutions, are therefore a crucial aspect of the common endeavour. The Climate Club/Alliance is also a governance alliance.

With respect to the Club/Alliance's institutional structure, the Club should draw on the experience of the G20 and the Coalition of Finance Ministers for Climate Action (CoFM). On membership, the CoFM model does not set strict or quantitative entry criteria but has an expectation of commitment to rising climate ambition and action over time. On leadership, the CoFM's co-chairing by an advanced economy and an emerging market/developing economy provides a sense of inclusion and of a focus on the collective agenda. With its broad agenda, the Club/Alliance needs *sponsorship and commitment from the top*, rather than from a particular department within national administrations.

Institutional partners play an important role in the functioning both of the G20 and the CoFM, which have set up working groups bringing together relevant countries and institutional partners to cover the breadth of their agendas. The Club/Alliance must ensure that its institutional partners have the trust of the diverse membership. Finally, an ambitious Climate Club would need a continuous secretariat drawn perhaps from international institutions but that is organisationally independent of them.

Table 7 on the following page provides an overview of the different building blocks of the Club, with their core components or focus areas. This report does not presume to provide an exact blueprint for design features that would be the outcome of diplomatic engagement and bargaining over the foundation of a Club, and indeed evolve through learning-by-doing. However, Table 7 does propose additional design considerations to guide the foundational work and future direction of the Club in its first few years.

Table 7: Overview of action areas for the Climate Club

Block	Components	Considerations
Membership criteria	• Ambition (progressively stronger NDCs) • Action (mix of policies, comparable and monitorable) • Collaboration (clear commitment to cooperate)	• NDC and policy requirements will respect differentiated approaches across countries. • Through initial diplomacy, explore options or combine: 1) prioritising a core of the largest countries with most significant impact on emissions and trade; 2) embracing full diversity and enabling a transformation across wider international community.
Governance	• Co-leadership by G7 and non-G7 members from inception • Member forum as central decision-making forum • Working groups (standing and ad hoc) for specific issues	• Variable geometry of sectors and policies under consideration will require careful planning and guidelines for commitments by members to ensure coherence. • Ministerial forum should be convened at a time and location to complement other international groupings, e.g. G20, Coalition of Finance Ministers, Clean Energy Ministerial.
Operations	• Core secretariat provided by IOs and/or founding member countries but organisationally independent • Participation from academic institutions and scientific bodies	• Establish an organisational core capable of analytical and logistical support for the member forum, centred on measurement and monitoring. • Teams to work closely in step with each other, to maximise cross-pillar benefits. May require dedicated staff to ensure coordination. • Agenda must be dynamic and responsive, setting interim targets and longer-term working goals in conjunction with other initiatives (e.g. UNFCCC Breakthrough Agenda).
Pillar 1	• Strategy, roadmaps, priorities • Climate and development finance • Technology partnerships • Technical assistance	*Initial workstreams could include:* • Bilateral and plurilateral agreements, such as country platforms. • Agreements on trajectories for sustainable private finance regulation. • Voluntary carbon market access strategies for host countries and regulatory principles for buyer countries. • Collective action through multilateral institutions.
Pillar 2	• Measurement and monitoring of climate policy impacts • Forum for agreeing principles for setting and updating climate-related border measures	*Initial workstreams could include:* • Establishing adaptation and revision mechanisms to reduce legal risk: mechanisms to include non-member concerns. • Agreeing assistance required to meet administrative burdens for CBAMs (in line with WTO compliance). • Standing WG to support WTO negotiations on subsidies.
Pillar 3	• Incentives to align roadmaps • Agreements on low-carbon standards, knowledge sharing, public spending • Contribution to orchestration efforts among other initiatives	*Initial workstreams could include:* • Endorsement of key standards developed in conjunction with specialist organisations: hydrogen, ammonia, steel, buildings. • Standing working groups to seek wider member engagement with LeadIT, MI, IDDI. • Agreements on aligned public finance policies for a specific time period, such as contracts for difference. • Standing working group to support WTO talks on subsidies.

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Appendix 1. Profile of key existing institutions in the climate arena

The climate challenge is pervasive and a wide variety of international fora and institutions, public and private, are creating climate objectives. Nevertheless, and despite notable progress, commitments and action are far from sufficient to meet the Paris climate goals. Existing arrangements may lack the top-level engagement to break through logjams; they may be held back by members who lack ambition; they may not have the critical mass, in terms of control over greenhouse gas emissions, to make enough of a difference; they may deal with a variety of topics and urgent developments can side-line the climate; and/or they may have responsibility for only one or a few climate and sustainable-growth related subjects, which makes it harder to internalise 'gains from trade' across different areas and opportunities.

To be effective at driving collective ambition with greater urgency and scale, arrangements would need to combine strengths in each of these five areas. Specifically, they would need:

- Engagement at the top leadership level
- Shared member ambition
- Critical mass
- A focus on the climate agenda
- Comprehensive coverage of climate topics.

The heat map on the next page classifies key existing international fora and institutions by the degree to which they satisfy these criteria, with the scoring factors set out beneath the heat map. Darker colours reflect a stronger match, lighter colours indicate lesser strength. It is left implicit in this table that a Climate Club, to be effective and add value to the existing institutional architecture, would need to score strongly on all these dimensions.

Heat map showing the degree to which international institutions and fora satisfy criteria for driving climate ambition

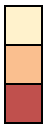
Institution/ forum	Top political engagement	Shared ambition	Critical mass	Focus on climate	Comprehensive coverage of climate
G20					
NDC Par'ship					
UNEP					
UNIDO					
OECD					
IEA					
IMF					
COFM					
WTO T&E Committee					
NGFS					
GFANZ	n/a		n/a		
Breakthrough Agenda					
Mission Innovation					
Clean Energy Ministerial					
LeadIT					
Mission Possible Partnership	n/a		n/a		
First Movers Coalition	n/a		n/a		

The scoring criteria used to generate the heat map and respective colour coding are as follows.

Top-level political engagement: relates to the political level in key member states at which agendas are set and agreements reached.

1. Technical / sub-ministerial level responsibility
2. Ministerial (or equivalent) level responsibility
3. Responsibility at level of head of state or government

Shared member ambition: relates to the extent to which membership is conditioned on (or aligned with) an express commitment or ambition to meet climate stretch targets explicitly aligned with the most ambitious Paris goals – i.e. going beyond existing NDCs towards achieving 1.5°C pathways or aligning supportive policies or financial portfolios with net zero.

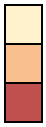


1. Membership is not conditioned on ambition, and reflects varying levels of commitment
2. Membership reflects shared ambition but is not conditioned on commitment to specific targets
3. Membership limited to countries and entities with credible commitment to ambition defined by specific targets

Critical mass: relates to the extent to which decisions by the membership would impact global climate outcomes.

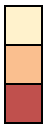
1. Membership represents < 20% of global greenhouse gas emissions
2. Membership represents 20-50% of global greenhouse gas emissions
3. Membership represents >50% of global greenhouse gas emissions

Focus on the climate agenda: this reflects the extent to which climate (and sustainable development and growth) represents the core of the agenda.



1. Climate is one of several priorities and may be side-lined depending on events
2. Climate and sustainable development and growth is one of a small number of priorities
3. Climate and sustainable development and growth is the exclusive focus

Comprehensive coverage of climate topics: this relates to the breadth of the climate agenda for which the forum/institution/initiative takes responsibility, including sectoral topics and considering process goals.



1. Focus is on one particular or a small set of climate-related topics
2. Fairly wide range of topics covered, but nevertheless excluding important aspects
3. In principle, full range of climate topics covered (i.e. unrestricted by sector, government function, etc.)

Appendix 2. Carbon pricing and leakage

Internalising the cost of greenhouse gas emissions has been considered by many economists and policymakers as the most cost-effective way to mitigate emissions. Carbon pricing captures what are known as the external costs of carbon emissions, costs that are paid by the public – e.g. in the form of impacts from climate change – and shift the burden for the damage back to the polluters who are responsible for it (Pigou, 1920; Stiglitz et al., 2017; Boyce, 2018). In addition, it provides incentives to reduce energy use and shift to cleaner fuels and it is an essential price signal for redirecting new investment to clean technologies.

In the case of explicit carbon pricing, it can also generate useful public revenues during the transition to a green and sustainable economy (World Bank, 2019a). When the resulting revenues are sensibly deployed, carbon pricing can be part of a tax system that is progressive overall and therefore contribute to addressing the distributional issues associated with the low-carbon transition (Klenert and Mattauch, 2016).

Article 6 of the Paris Agreement provides a basis for facilitating international recognition of cooperative carbon pricing approaches. Many of the plans submitted to the UNFCCC recognise the important role of carbon pricing, with about 100 countries planning or considering carbon pricing mechanisms in their intended NDCs (United Nations, 2021).

Carbon pricing regimes and models

Different types of policies and measures put an explicit or implicit price on greenhouse gas emissions. Examples of explicit carbon pricing instruments include:

- Carbon taxes and emissions trading systems (ETS)
- Crediting mechanisms
- Shadow carbon prices and internal carbon fees.

Examples of implicit carbon pricing include:

- Renewable energy and energy efficiency support measures
- Codes and standards
- Fossil fuel energy taxes
- Fossil fuels subsidies (that act as a negative carbon price).

Below we provide a brief overview of the main carbon pricing instruments.

Explicit carbon pricing

Carbon taxes and emissions trading systems (ETS)

Explicit carbon pricing mechanisms are usually enacted by a government mandate and take the form of either a carbon tax or an ETS. In the case of a carbon tax, the government determines the price on greenhouse gas emissions, generally by levying a tax, levy or charge on fossil fuels, and lets market forces determine the quantity of emissions reductions. In the case of an ETS, a market price for greenhouse gas emissions is established, by creating supply and demand for emissions units. The two main types of ETS are cap-and-trade and baseline-and-credit:

- Cap-and-trade systems apply a cap on the emissions within the ETS. Emissions allowances are allocated, for free or through auctions, for the amount of emissions equivalent to the cap. It provides certainty about the emissions reduction, but the price remains flexible and determined by the market.

- Baseline-and-credit systems define baseline emissions levels for individual regulated entities, with credits issued to entities that have reduced their emissions below this level. These credits can be sold to other entities exceeding their baseline emission levels.

Compared to an ETS, a carbon tax is administratively less complex, but can often face strong social opposition.

Crediting mechanisms

Crediting mechanisms create tradable credits from voluntarily implemented emission reduction or removal activities. Credits can be issued by governments or alternatively under international mechanisms, like the Article 6.4 mechanism under the Paris Agreement. They can also be generated through independent standard-setting organisations.

Credits can be used by companies to meet their obligations under a carbon tax or ETS or as part of a company's net zero strategy. The sum of credit transactions used for voluntary commitments is commonly referred to as the 'voluntary carbon market'.

Internal carbon pricing

Internal carbon pricing is a tool used voluntarily by different organisations to guide investment decisions and raise revenues for other mitigation/adaptation programmes. An increasing number of organisations are using internal carbon pricing:

- Private companies use internal carbon price – often as an internal carbon fee where different units pay a carbon price – to support corporate investment decisions and shift to lower-carbon business models (CDP, 2021).
- Some governments use internal carbon pricing as a tool in their procurement process or assess the costs and benefits of policies. Multilateral development banks, including the World Bank, use an internal carbon price when evaluating public investments.
- Financial institutions have also begun using internal carbon pricing to assess their project portfolio.

Climate governance initiatives and the resulting corporate climate commitments encourage the adoption of an internal carbon price.

Implicit carbon pricing

Greenhouse gas emissions can also be implicitly priced through other policy instruments such as the removal of fossil fuel subsidies, energy taxation, support for renewable energy or standards and regulations. Theoretically it is possible for many non-price-based policies to estimate the associated equivalent monetary value per tonne of carbon (World Bank, 2019; OECD, 2019), known as the implicit carbon price. This could enable a comparison of the stringency of different mitigation policies across countries. Nevertheless, the debate around the quantification approach and the methodology for estimating implicit carbon pricing and comparing price-based and non-price-based policies is still open (see Box 5, Chapter 5 on equivalences).

Table A1: Carbon pricing initiatives implemented at national/federal level

Jurisdiction covered	Type	Share of jurisdiction's GHG emissions covered	Sectors and/or fuels covered
Argentina	Carbon tax	20%	All sectors with some exemptions; almost all liquid fuels and some solid products (mineral coal and petroleum coke).
Austria	ETS	40%	Power, Industry, Buildings, Road Transport; Coal, Natural Gas, Gasoline, Diesel, Other (LPG, kerosene etc).
Canada	ETS	7%	Industrial facilities that emit 50 ktCO_2e per year or more and are engaged in specific activities in emissions-intensive and trade-exposed sectors; industrial facilities that emit above 10 kt CO_2e per year can apply to participate voluntarily. It is a baseline-and-credit ETS that comes into effect, in whole or in part in any province or territory that requested it or that does not have a price on carbon in place that meets the federal standard.
Canada	Carbon tax	22%	21 types of fuel delivered, transferred, used, produced, imported or brought into a province and territory where the federal fuel charge applies; plus combustible waste (e.g. tyres, asphalt shingles).[1]
Chile	Carbon tax	29%	Power and industry sectors (installations with an installed thermal power exceeding 540 MW between boilers and turbines); all fossil fuels.
China	ETS	33%	Power sector, including combined heat and power and captive power plants from other sectors.
Colombia	Carbon tax	23%	All sectors with some minor exemptions; all liquid and gaseous fossil fuels used for combustion.
Denmark	Carbon tax	35%	Buildings and transport sectors; all fossil fuels.
EU, Norway, Iceland, Liechtenstein	ETS	41%	Power sector, manufacturing industry, and aviation (including flights from the EEA to the UK).
Estonia	Carbon tax	6%	Industry and power sectors; all fossil fuels used to generate thermal energy.
Finland	Carbon tax	36%	Industry, transport and buildings; all fossil fuels except peat.
France	Carbon tax	35%	Industry, buildings and transport sectors; all fossil fuels.
Germany	ETS	40%	Buildings and road transport; all fossil fuels.
Iceland	Carbon tax	55%	All sectors with some exemptions; liquid and gaseous fossil fuels.
Ireland	Carbon tax	40%	All sectors with some exemptions; all fossil fuels.
Japan	Carbon tax	75%	All sectors with some exemptions.
Kazakhstan	ETS	46%	Power, centralised heating, certain industry sectors.

[1] Canada implements carbon pricing nationally through a mix of federal, provincial and territorial carbon pricing systems. The Government of Canada sets minimum national stringency requirements that all pricing systems in Canada must meet. This table only reports on Canada's federal carbon pricing system, which only applies in those jurisdictions that do not have a provincial or territorial system in place. Analyses have found that across Canada, approximately 78% of total greenhouse gas emissions are covered under carbon pricing systems.

Korea, Republic of	ETS	73%	GHG emissions from the industry, power, buildings, domestic aviation, public sector and waste sectors.
Latvia	Carbon tax	3%	Industry and power sectors not covered under the EU ETS; all fossil fuels except for peat.
Liechtenstein	Carbon tax	81%	Industry, power, buildings and transport sectors; all fossil fuels.
Luxembourg	Carbon tax	65%	Fossil fuels used for transportation and heating.
Mexico	Carbon tax	44%	All sectors; all fossil fuels except natural gas.
Mexico	ETS	40%	Power and industry sectors.
Netherlands	Carbon tax	12%	Industry, waste; All fossil fuels.
New Zealand	ETS	49%	GHG emissions from the industry, power, waste, transport and forestry.
Norway	Carbon tax	63%	GHG emissions from all sectors with some exemptions; liquid and gaseous fossil fuels.
Poland	Carbon tax	4%	GHG emissions from all sectors with some exemptions; all fossil fuels and other fuels leading to GHG emissions.
Portugal	Carbon tax	36%	Industry, buildings and transport sectors with some exemptions; all fossil fuels.
Singapore	Carbon tax	80%	Direct emissions from facilities emitting 25 $ktCO_2e$ or more in a year, covering all sectors.
Slovenia	Carbon tax	52%	GHG emissions from buildings and transport sector; natural gas and all liquid and solid fossil fuels.
South Africa	Carbon tax	80%	Industry, power, and transport sectors.
Spain	Carbon tax	2%	Fluorinated GHG emissions only from all sectors with some exemptions.
Sweden	Carbon tax	40%	Transport and buildings sector; all fossil fuels.
Switzerland	ETS	11%	GHG emissions from the industry and power sectors.
Switzerland	Carbon tax	33%	All fossil fuels used in heating and industrial processes.
United Kingdom	Carbon tax	21%	Power sector; all fossil fuels.
United Kingdom	ETS	28%	Energy-intensive industries, power sector, and aviation within the UK and European Economic Area.
Ukraine	Carbon tax	71%	Industry, power, and buildings sectors; all fossil fuels.
Uruguay	Carbon tax	11%	Gasolines for any use.

Notes: In classifying carbon pricing initiatives we follow the approach of the World Bank's Carbon Pricing Dashboard: initiatives are classified as ETSs and carbon taxes according to how they operate technically; the local terminology may differ from this classification. ETS does not only refer to cap-and-trade systems, but also baseline-and-credit systems such as in British Columbia.
The table covers only carbon pricing initiatives implemented at the national level. As of 1 April 2022, the World Bank had mapped a further 36 subnational initiatives, implemented in the US, Canada, China, Japan and Mexico.

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

Global trends in carbon pricing

Carbon taxes and emissions trading systems (ETS)

As of 1 April 2022, a total of 68 carbon pricing initiatives (ETSs and carbon taxes) were in operation around the world (including 46 countries and 36 subnational jurisdictions), covering over 20% of global greenhouse gas emissions, 36 of which are carbon taxes and 32 of which are emissions trading schemes (World Bank, 2022).

In 2020 the carbon pricing instruments generated globally $53 billion in revenue, a 17% increase in revenue from the previous year, mostly due to the increase in the EU allowance price. However, the full potential of carbon pricing remains largely untapped (World Bank, 2021).

Within the G7, the EU countries, Japan, Canada and the UK have national carbon prices. The US has a partial carbon pricing system.

G20 economies priced 49% of CO_2 emissions from energy use in 2021, up from 37% in 2018. The increase was mostly driven by new emissions trading systems (ETS) in Canada, China and Germany, new carbon levies in Canada, and a new carbon tax in South Africa, as well as Mexico's introduction of carbon taxes at the subnational level. Currently, 13 G20 economies have explicit carbon pricing instruments in place or participate in the EU ETS. The share of emissions covered by carbon prices varies substantially across G20 economies with Korea in the lead at 97% of emissions priced. G20 emissions pricing is highest in road transport, where 94% of emissions are covered by fuel excise taxes) (OECD, 2021).

New carbon pricing initiatives:

- China launched its national ETS in February 2021, becoming the world's largest carbon market, initially covering 30% of its national greenhouse gas emissions.
- The UK and Germany both launched national carbon markets and carbon taxes in the Netherlands and Luxembourg came into operation.
- Some significant changes have been proposed to the EU ETS, including the reduction of the emissions from the EU ETS sectors by 61% by 2030, compared to 2005 levels; the extension to emissions from maritime transport and the introduction of a carbon border adjustment mechanism (CBAM).
- In March 2022, Indonesia established the legal framework for a domestic emissions trading system.
- Pilot ETSs are being considered in a number of countries, including Colombia and Thailand.

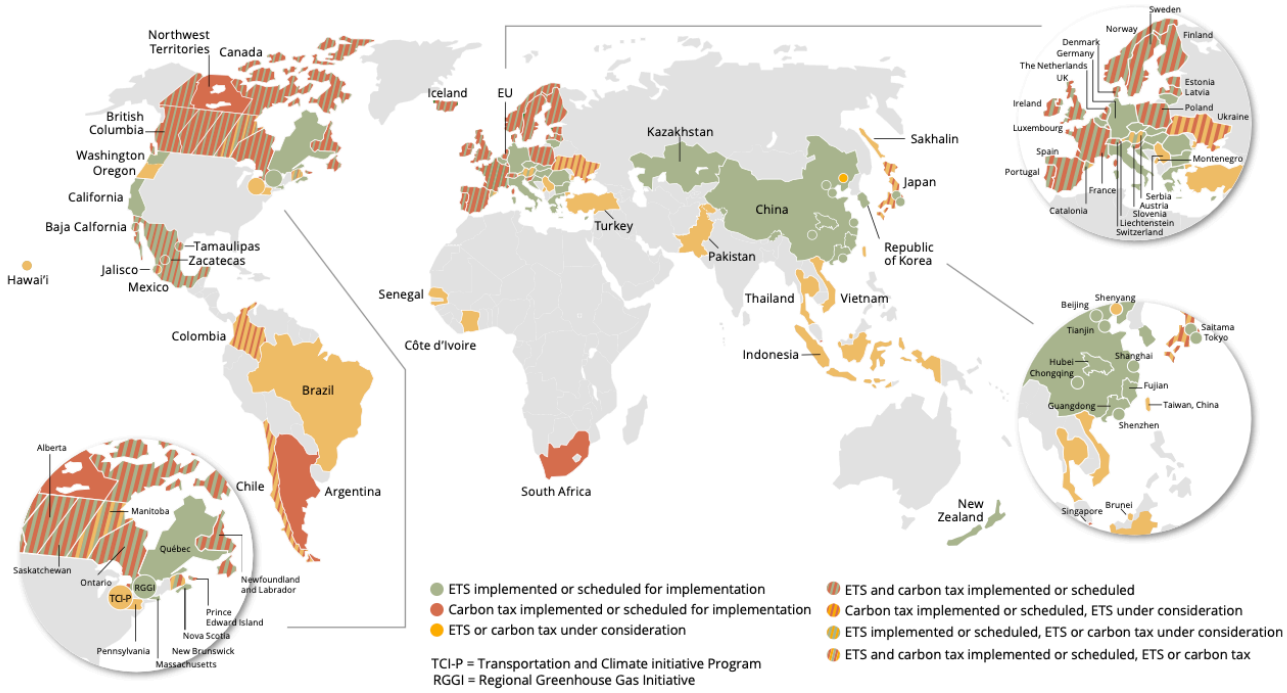
Crediting mechanisms

As of 1 April 2021, there were 26 carbon crediting mechanisms under implementation, while five carbon crediting mechanisms were under development. The year 2020 has seen significant growth in carbon credit markets, with the number of registered projects increased by 11% in 2019–2020. The number of credits issued also increased by 10% over the same period (World Bank, 2021).

Internal carbon pricing

At the corporate level, more than 850 companies globally across different sectors are using an internal carbon price. Nearly half of the largest 500 companies in the world by market value already have an internal carbon price or intend to adopt one in the coming two years. While internal carbon prices fall short of Paris Agreement aligned prices, it often exceeds regulatory prices (World Bank, 2021).

Figure A1: Carbon pricing map (2021)

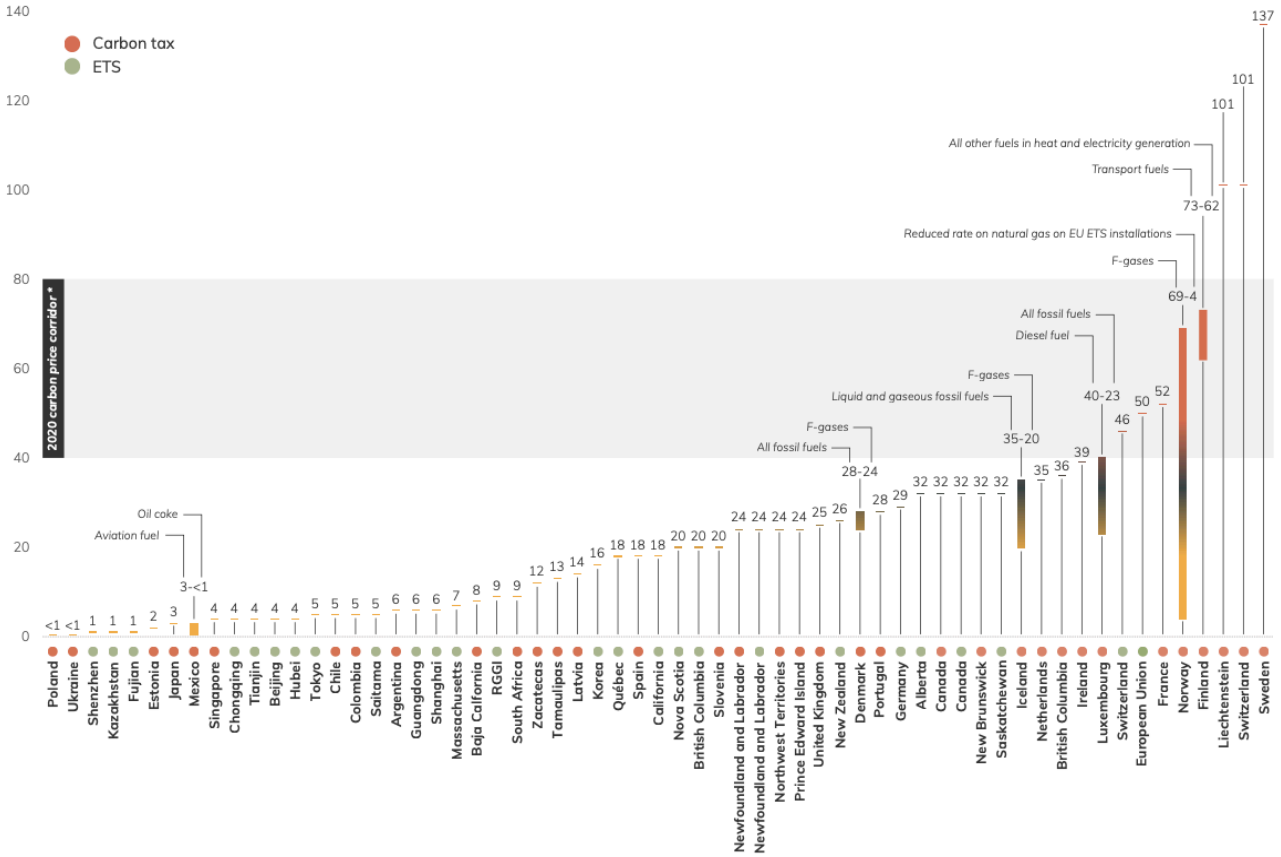


Notes: The large circles represent cooperation initiatives on carbon pricing bet ween subnational jurisdictions. The small circles represent carbon pricing initiatives in cities. In previous years, Australia was marked as having an ETS in operation. However, the Safeguard Mechanism functions like a baseline-and-offsets program, falling outside the scope of the definition of ETS used in this report. Therefore, the system was removed from the map. Rio de Janeiro and Sao Paolo were marked as considering the implementation of an ETS based on scoping work done in 2011 and 2012 respectively. Given there have been no updates since, the these were removed from the map.

Carbon pricing initiatives are considered "scheduled for implementation" once they have been formally adopted through legislation and have an official, planned start date. Carbon pricing initiatives are considered "under consideration" if the government has announced its intention to work towards the implementation of a carbon pricing initiative and this has been formally confirmed by official government sources. The carbon pricing initiatives have been classified in ETSs and carbon tax es according to how they operate technically. ETS not only refers to cap-and-trade systems, but also baseline-and-credit systems as seen in British Columbia. The authors [World Bank, 2021] recognise that other classifications are possible.

Source: World Bank (2021)

Figure A2. Carbon prices as of 1 April 2021



Notes: Nominal prices on April 1, 2021, shown for illustrative purpose only. China national ETS, Mexico pilot ETS and UK ETS are not shown in this graph as price information is not available for those initiatives. Prices are not necessarily comparable between carbon pricing initiatives because of differences in the sectors covered and allocation methods applied, specific exemptions, and different compensation methods. *The 2020 carbon price corridor is the recommendation of the World Bank's 2017 High-Level Commission.

Source: World Bank (2021).

Recommendations on carbon pricing

For a carbon pricing mechanism to work, there are some conditions that need to be met: it must be sufficiently ambitious; account for distributional issues; be adapted to the different countries' context; and be part of a broader policy package.

Ambition and equity

The High-Level Commission on Carbon Prices (Stiglitz et al., 2017) suggested that prices would need to be in the \$40–\$80/tCO_2e range by 2020 and \$50–\$100/tCO_2e range by 2030 to meet the 'well below 2°C' temperature goal of the Paris Agreement. So far, the observed carbon prices in the recommended range cover less than 5% of global emissions (World Bank, 2021). Among the carbon pricing schemes implemented worldwide, only 13 have carbon prices above \$40. These include ETS implemented in the EU, UK, Switzerland and New Zealand, as well as carbon taxes implemented in some European countries (World Bank 2022).

Although necessary for transitioning to a carbon neutral world, higher carbon prices are likely to pose social equity issues and resistance (Huang et al., 2019; Wang et al., 2019; Hourcade et al., 2018). When designing a carbon pricing mechanism, it would be important to assess the distributional impacts of the policy and adopt measures that account for distributional effects. A sensible allocation of revenues from carbon pricing or from anti-leakage measures can increase the fairness of the instrument and allow for higher political and social acceptability.

Country context

To be effective, carbon pricing needs to be adapted to the different countries' context. The choice of which carbon pricing instrument to implement – and whether to implement it at all – should be based on a country's economic and social circumstances and be aligned with the broader policy priorities. ETSs and carbon taxes are increasingly being used in complementary ways within the same country, with features of both types often combined. Some initiatives also allow the use of credits from offset mechanisms as flexibility for compliance.

The country context should also be factored in when identifying the appropriate carbon price levels. In some developing countries the appropriate price range might be lower than in advanced economies, partly because complementary policies may be less costly than carbon pricing and distributional issues more prominent (Stiglitz et al., 2017).

Some countries have struggled to reach political agreement on carbon pricing at the national level. It is important then to acknowledge the difficulty of achieving social and political consensus on carbon pricing and recognise the possibility for different jurisdictions to follow different avenues in the achievement of climate goals. This might entail combining price- and non-price-based measures in a broader policy mix.

A broader policy package

There is a broad agreement that carbon pricing alone is unlikely to drive down emissions sufficiently and equitably. Instead, carbon pricing should be part of a broader policy package. A well-designed and comprehensive policy mix could combine carbon pricing, standards and regulations as well as complementary policies to support innovation, investments and address distributional impacts.

Impacts of carbon pricing

Impact on emissions

The full effectiveness of climate policies in the industrial sector is still poorly known as the sector has been largely sheltered from the impacts of mitigation measures due to concerns on competitiveness and carbon leakage.

Nevertheless, some analysis of carbon pricing mechanisms show that they generally lead to emissions reductions, even in sectors that receive free allocation (Bayer and Aklin, 2020; Narassimhan et al., 2018; Martin et al., 2016; Haites et al., 2018; Metcalf, 2019). However, those emissions reductions might be modest, due to low carbon prices (Dechezleprêtre et al., 2018). As shown above, most carbon prices are still well below the levels needed to reach net zero emissions.

Impact on technology development

In terms of technology development, there is evidence that long-term carbon pricing can incentivise investment and low carbon innovation (Calel and Dechezleprêtre, 2016; Rogge, 2016), with higher innovation occurring in developing countries, where carbon pricing can help correct some of the energy inefficiency (Pigato, 2019). Nevertheless, some studies show that carbon pricing promotes mainly incremental low-cost technologies, rather than investments in radical technical change (Rosenbloom et al., 2020; Stiglitz 2019; Vogt-Schilb et al., 2018; Grubb, 2014).

Impact on competitiveness and carbon leakage

Carbon leakage

Fragmentation of carbon pricing mechanisms and climate policies across countries has been raising concerns about competitiveness and carbon leakage.

Policy-related carbon leakage refers to the situation where, due to international differences in climate policies, companies relocate emissions-intensive operations to jurisdictions with weaker emission regulations. This practice can undermine the effectiveness of mitigation policies as well as the legitimacy of claimed national emissions reductions. [2]

The risk of carbon leakage is mainly linked to the carbon intensity of production and the ability to pass through carbon costs to product prices (Sato et al., 2014). Carbon intensive activities are highly concentrated, with two-thirds of industrial emissions, or roughly 25% of global greenhouse gas emissions, linked to the production of basic materials. Consequently, the risk is considerably higher in emissions-intensive, trade-exposed (EITE) sectors – e.g. cement, steel, and aluminium – where highly emitting industries are unable to pass costs downstream due to international competition (Mehling et al., 2019).

Despite widespread concerns, studies continue to find no evidence that domestic climate legislation has increased international carbon leakage over the past two decades (Eskander and Fankhauser, 2021). This is primarily because key industrial sectors remain largely shielded from significant CO_2 costs through exemptions, free allocation and historically low carbon prices, like in the case of the EU ETS (Naegele and Zaklan, 2019; Verde 2020; Branger et al., 2016; Dechezleprêtre et al., 2018). It must be noticed that most studies on the EU ETS have focused on the first and second trading period of the EU ETS, and that even studies using recent data have not factored in the much higher current EU ETS prices (Verde, 2020).

Competitiveness

Empirical literature on the EU ETS shows that firms have experienced minimal impact on competitiveness or profitability (Verde, 2020), though a few sectors have faced some impacts (Dechezleprêtre et al., 2018). One main explanation is again the large (over-)allocation of emissions allowances. Moreover, firms were able to pass costs on to consumers in some sectors which partly generated windfall profits (Joltreau and Sommerfeld, 2018). Nevertheless, results from empirical studies on cost pass-through and competitiveness, can differ widely (see World Bank, 2019b for a summary of empirical analyses).

While the majority of studies focus on short-term competitiveness and leakage impacts associated with trade flows, very little is explored on whether the EU ETS has had long-term effects on the economy via investment leakage or firm dynamics (Verde, 2020). Indeed, energy-intensive sectors are characterised by high fixed plant costs and immobile physical capital, which make it hard to relocate factories. What seems more realistic is leakage occurring through shifting new investments abroad, but this process is harder to detect due to the challenge of getting firm-level data and the fact that the impact of investment decisions can take several years to occur. In terms of impact of investment decisions, these impacts were also found to be small and concentrated in only a few sectors. Furthermore, some studies conclude that other factors – including access to raw material or transport costs – have played a more significant role than carbon pricing on a firm's profits and competitiveness (Dechezleprêtre and Sato, 2017).

Export-related leakage

A form of leakage that is often overlooked is export-related leakage, which occurs when carbon leakage results from lack of competitiveness in export markets, where the exported product is replaced by more carbon-intensive products from jurisdictions with less stringent carbon constrains. Ex-ante literature has shown higher leakage rates if exports are not addressed (Branger and Quirion, 2014). An EU survey showed that exports are material in terms of their share of total EU production in each related sector, and that by

[2] According to the 'production emission accounting', in principle a country can take credit for territorial emissions reductions by outsourcing the production of goods that are consumed domestically. This poses questions around allocating the responsibility of emissions increases in some developing countries that are exporting to advanced economies. Some suggested a consumption-based accounting as a way to address the fairness concerns in allocating responsibility for current emissions.

not addressing exports there is a high likelihood that foreign production replacing EU exports may result in carbon leakage (ERCST, 2022).

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Appendix 3. Policies to address carbon leakage

As noted in Appendix 2, so far there has been little evidence of an impact of environmental policies on carbon leakage and competitiveness. Nevertheless, as countries seek greater climate ambition, higher carbon price levels could potentially lead to more significant impacts for EITE industries. This revives the need to find viable policy options to address carbon leakage. On the other hand, as more countries implement climate policies and create linkages between carbon markets, differences in carbon prices should narrow, lowering carbon leakage risks.

Several policies have been identified as potential tools to address carbon leakage. Here we review the main approaches proposed by the literature.

Exemptions and free allocation of emissions allowances

To date, the most widely used anti-leakage measures are exemptions or free allocation of emission allowances for sectors at high risk of carbon leakage. EITE industries are typically allowed exemptions and receive provisions that shelter them from any significant cost increase in virtually all pricing schemes (Haites, 2018).

The absence of observed carbon leakage tends to suggest that free allocation is effective. Domestically, free allocation enhances the political feasibility of emissions trading because it avoids imposing burdens on highly mobilised producer groups.

However, free allocation hinders the industrial transition to climate neutrality, by removing incentives to switch to climate-neutral production processes, material efficiency and recycling. Another downside is that it can result in over-compensation and consequent windfall profits (Anger et al., 2016) while it forgoes auction revenues to potentially fund climate action. According to some studies, free allocation will become unsustainable beyond 2030, since the higher carbon prices will make it prohibitively expensive (Sartor et al., 2022). Some questions have also been raised about whether this is an 'actionable subsidy' under WTO law, which could lead trade partners to challenge the measure (Rubini and Jegou, 2012), though in practice no complaints have yet been brought to the WTO.

Carbon border adjustment mechanism (CBAM)

CBAMs are trade-based mechanisms designed to 'equalise' the carbon costs for domestic and foreign producers. They are increasingly being considered by policymakers to address carbon leakage and competitiveness losses for products produced in jurisdictions with no, or lower, carbon price. CBAMs could take on the form of a tax, a tariff, or an obligation to procure emissions permits (Mehling et al., 2019).

On 14 July 2021, the European Commission adopted a proposal for a CBAM that requires importers of aluminium, cement, iron and steel, electricity and fertiliser to buy certificates at the ETS price for the emissions embedded in the imported products (European Commission, 2021).

The CBAM has been welcomed by many as an effective tool to allow for the phase down of free allocation (like in the case of the EU ETS), while addressing the risk of leakage. It can contribute to a significant source of revenue that can be channelled to support decarbonisation. CBAMs could also play a role in incentivising decarbonisation in third countries that are affected by the border adjustment (Sartor et al., 2022).

Nevertheless, CBAMs have shortcomings that could undermine their effective implementation (Grubb et al., 2022). These include the numerous challenging regulatory choices (i.e. which policies, goods, sectors, countries to include), technical challenges around the methodology for estimating the price adjustments (see Box 5, Chapter 5, on equivalences), how to treat export-related leakage (see Box A1) and the high administrative burden.

Another challenge is the potential risk of resource shuffling. If the CBAM is based on the use of actual embodied emission values, producers could export high-carbon products to countries that do not price the carbon content of imports and sell low-carbon products to countries implementing a CBAM. The result would be that countries implementing a CBAM would lose domestic market share, while the global greenhouse gas emissions would not change (Grubb et al., 2022; Sartor et al., 2022).

There are also legal challenges associated with WTO compliance, as a CBAM could be perceived as a protectionist measure violating the principle of non-discrimination under the regulations of WTO. To increase the likelihood that a CBAM will be compatible with international trade law, studies suggest that CBAMs would need to have a clear environmental rationale (i.e. reduce carbon leakage) and exclude export rebates.

Box A 1: Export-related leakage

A key design question is whether a CBAM should only be applied to imported products, or whether it should also address carbon leakage occurring when exporters lose market share to more carbon-intensive foreign competitors. From a purely climate-related perspective, including exports in CBAMs reduces global emissions, compared to a CBAM considering only imports (Monjon and Quirion, 2011). In line with this, the European Commission finds that the EU CBAM proposal, which does not address exports, would be associated with a 6.8% export market loss (European Commission, 2021). Different solutions have been proposed to date to address carbon leakage related to exported goods, ranging from exemptions to export rebates in the form of monetary reimbursements or free allowances for exported goods, with multiple variants for each option.

Export rebates

One option would be to provide an explicit rebate for carbon costs at the border. A meta-analysis (Branger and Quirion, 2014) finds that for exporters, rebates are important for addressing leakage: for example, without export refunds, at a carbon price of €30/t, around 30% of EU exports would face cost increases exceeding the criteria used internally to define sectors eligible for free allowances to address carbon leakage risks in the EU ETS.

However, the legal literature suggests that such measures are likely to run afoul of international trade law, as a 'prohibited subsidy' under the WTO Agreement on Subsidies and Countervailing Measures (SCM) (Mehling et al., 2019; Holzer, 2014). An export rebate could also be seen as reducing the incentive for industry to decarbonise production dedicated to exports, with the unintended consequence of producers dedicating 'dirty products' to exports (ERCST, 2022).

Free allocation for exports

A second, and probably administratively simpler alternative to an export rebate might be to provide free allocation to installations producing CBAM products for an amount equivalent to their exported products each year. Some studies show that free allocation could help support the cost competitiveness of domestic products that are exported outside the CBAM area. While combining an import CBAM with free allocation for exports can increase the risk of legal challenges, such risks may be reduced with an appropriate design (Evans et al., 2020).

Some countries, including China, Brazil, India and South Africa, have noted that the CBAM could also be seen as conflicting with the principle of common but differentiated responsibilities and the architecture of the Paris Agreement grounded in Nationally Determined Contributions. Therefore, some have highlighted the need to implement special treatment for the least developed countries (UNCTAD, 2021).

Potential reactions from trading partners

A range of responses to the introduction of CBAMs are possible, and Ecologic (2022) found many of these are under consideration. Trade partners might accept the CBAM; retaliate against imports coming from the country implementing the CBAM; challenge the CBAM at the WTO level; or negotiate exemptions, e.g. by acknowledging the costs of climate policies on the exported good. Another potential reaction could be trade partners adopting their own CBAMs. Following the EU announcement, the US recently introduced a form of CBAM through the Clean Competition Act, [30] while Canada [31] is considering it.

Common global carbon price

These challenges have persuaded some experts to find alternatives to the CBAM as a measure to address carbon leakage. For many years, economists argued that a common global carbon price would be the most effective way to incentivise decarbonisation, while addressing concerns about WTO compliance, competitiveness and carbon leakage.

However, such a policy would run into political constraints and face significant implementation challenges. It would also go against the principle of common but differentiated responsibilities and preclude participation of countries where explicit carbon pricing is currently difficult to implement. And as poor households spend more of their income on energy, it would be a regressive instrument, between and within countries.

Carbon price floor

To tackle those issues, the IMF proposed an International Carbon Price Floor (ICPF), where countries implement a minimum carbon price, while having the flexibility to set higher prices if needed to achieve mitigation pledges. The proposal would accommodate equity considerations, by setting lower price floor requirements [32] for emerging market economies (EMEs) and allowing emissions-equivalent non-pricing approaches to be used to meet the requirements. To facilitate negotiation, the price floor would initially be applied to a small number of countries responsible for the majority of global emissions (Parry et al., 2021a).

The proposal faces many challenging design issues (e.g. choice of initial set of countries, emissions coverage, price levels, equivalences) that might make it very difficult for countries to agree on it. But according to proponents, an initial CBAM approach could be a lever to induce global cooperation on a carbon price floor, with the potential to eventually make the CBAM superfluous (Parry et al., 2021b).

Consumption charges and climate excise contribution

Another alternative is the application of consumption charges (Munnings et al., 2019; Neuhoff et al., 2015; Grubb et al., 2022), whose implementation, however, is challenged by the need for product emissions traceability. A solution put forward to deal with emissions tracking is the application of default values, with the option for importers to prove their higher performance (Grubb et al., 2022). Another instrument to address carbon leakage is a climate excise contribution (Neuhoff et al., 2021; Climate Strategies, 2021; Grubb et al., 2022). This could be attractive as it maintains free allocation at the full benchmark for longer than the CBAM while offering the option of an export rebate. However, it has been argued that this instrument would add enormous administrative complexity and would be less effective at preventing carbon leakage, due to its dependence on continued free allocations (Sartor et al., 2022).

[30] https://carboncredits.com/congress-introduces-us-cbam-clean-competition-act/

[31] https://www.canada.ca/en/department-finance/programs/consultations/2021/border-carbon-adjustments/exploring-border-carbon-adjustments-canada.html

[32] A 2030 price floor of $75 a ton for advanced economies, $50 for high-income emerging market economies such as China, and $25 for lower-income emerging markets such as India would keep warming below 2°C with just six participants (Canada, China, European Union, India, United Kingdom, United States) and other G20 countries meeting their Paris pledges.

Impacts of CBAMs on leakage, international trade and equity

Although CBAMs have yet to be implemented at the country level, there is already a substantial body of modelling literature that has attempted to estimate their potential implications in terms of carbon leakage and distributional and equity consequences.

Impact on carbon leakage

Many studies have analysed the effect of implementing a CBAMs to prevent carbon leakage. Meta-analyses of different studies have found that introducing a border adjustment tax results in carbon leakage reductions (Monjon and Quirion, 2011; Branger and Quirion, 2014; Böhringer, et al., 2012). In terms of coverage and efficiency, the extension of CBAMs to all sectors and the inclusion of export rebates would seem to be the most efficient ways to reduce the leakage ratio (Branger and Quirion, 2014). In the case of the EU, relative to a carbon tax-only scenario, the CBAM could reduce carbon leakage and enhance European Union exports (UNCTAD, 2021).

In terms of empirical findings, the only real-world experience with a CBAM is in California's electrical sector. In this case one study argues that the system has not reduced carbon leakage due to "resource reshuffling" (Pauer, 2018).

Impacts on international trade and equity

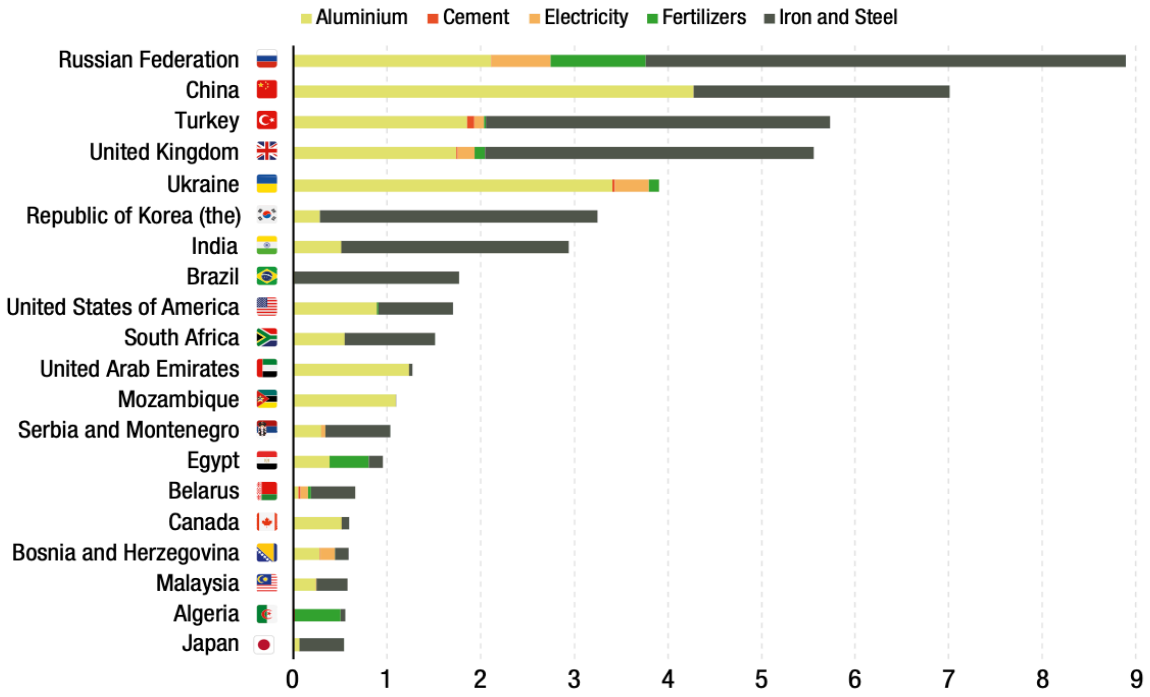
The effects of CBAMs on international trade and equity will depend on trade patterns, countries' carbon intensity of production, and the carbon policies of trade partners.

Studies show that carbon tariffs can create adverse distributional effects for countries subject to the measure (Branger and Quirion, 2014) and exacerbate regional inequality (Böhringer et al., 2012). In the case of the EU CBAM, estimates indicate that if the CBAM was applied to all the goods covered by the ETS, up to $16bn of developing country exports to the EU could face an additional charge. Given that the emissions imported from these economies represents only a small proportion of the carbon embodied in the total imports of the EU, a study suggests exempting these economies from the CBAM (Lowe, 2021).

In the case of steel, China and Russia would be more affected due to high carbon intensity in production. At the same time, Turkey and India would become more attractive due to low-carbon production processes in this sector (Boston Consulting Group, 2020).

Figure A3 shows the list of countries with the highest levels of exports to the EU in sectors included in the CBAM. Russia, China, Turkey and the UK are the countries most exposed to the mechanism. While among developing countries the most exposed to the CBAM would be India, Brazil and South Africa, Mozambique would be the most exposed LDC (UNCTAD, 2021).

Figure A3. Exports to the EU in selected sectors likely to be considered in the CBAM, 2019 (billion $)



Source: UNCTAD (2021), *A European Union Carbon Border Adjustment Mechanism: Implications for developing countries*, by Durant et al., © 2021 United Nations. Reprinted with the permission of the United Nations.

In terms of lower-income countries, an analysis found that the economies most affected by the EU CBAM would be African fuel-exporting countries such as Cameroon, Egypt and Nigeria. Other African economies such as DR Congo, Ghana, Morocco and Zimbabwe would also be affected due to the relative importance of their exports affected by the CBAM (Zimmer and Holzhausen, 2020).

Some analysis also indicates that the CBAM generates a gap between developing and developed countries in terms of GDP and welfare (UNCTAD, 2021; TCD-IMF, 2022).

While those studies seem to reach the same conclusion that the EU CBAM may worsen the income distribution between advanced and poor economies, it should be noticed that these analyses were conducted before the release of the EU plan for the CBAM and therefore do not reflect the detailed specifications of the proposal.

Use of revenues in a CBAM

Using the revenues from a carbon price and CBAMs to address the socioeconomic impacts of the two instruments could be a way to ensure acceptability. Some developing countries indeed have indicated that they may be more willing to accept the EU CBAM if the revenues were to benefit them (Germanwatch, 2021).

In 2017/18 the majority of global carbon pricing revenues were allocated to either environmental or development objectives (53%). Other revenue allocations included assigning revenues to the general budget (38%), cuts to other taxes (6%) and direct transfers to households and businesses (3%) (World Bank, 2019).

In the context of CBAMs, the equity implications could be partly addressed by allocating the revenues generated by the CBAM to accelerate technology transfer and capacity-building, as well as returning the revenues to less developed countries in the form of international climate finance.

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Appendix 4: Selected existing partnerships and initiatives in support of climate goals

Scaling up finance to deliver on climate ambition can be supported by a closer partnership across the official sector (represented by the Climate Club), the MDBs (and Climate Club members in their capacity as shareholders), and the private sector. Strategic alignment across target sectors among Climate Club members will be best delivered by supporting and building on existing initiatives for sectoral governance. These include intergovernmental, public–private, and private-only groups. This Appendix presents existing finance and sectoral initiatives across several realms that the Climate Club can look to leverage and partner with.

Public institutions and initiatives

Table A2: Official finance institutions and initiatives

Name	Founders	Date	Objective	Approach	Impact
Green Climate Fund (GCF)	Formally established at COP16 in Cancun as a fund within the UNFCCC framework. Headquarters in Incheon, South Korea	2010	To support developing countries raise and realise their Nationally Determined Contributions (NDC) ambitions towards low-emissions, climate-resilient pathways. Achieved through investing in four transitions: environment; energy and industry; human security; livelihoods and wellbeing and land-use, forests and ecosystems.	Four-pronged approach: Transformational planning and programming (promoting integrated strategies, planning and policymaking to maximise the co-benefits between mitigation, adaptation and sustainable development) Catalysing climate innovation: investments in new technologies, business models and practices to establish a proof of concept. De-risking investment to mobilise finance at scale: aimed at crowding-in private finance at the	The GCF works with National Designated Authorities (NDAs) from across 147 countries, and aims for a 50:50 balance between mitigation and adaptation investments over time. As of May 2022, a total of 45 countries, 3 regions and 1 city had made a pledge to the GCF during the Initial Resource Mobilisation (IRM) period for a total of $10.3bn, with $8.31bn confirmed.

				'frontier' (adaptation, nature-based solutions LDCs and SIDS). Mainstreaming climate risks and opportunities into investment decision-making to align finance with sustainable development: promoting methodologies, standards and practices that foster new norms and values.	
Global Environment Facility (GEF)	Established ahead of the Rio Earth Summit as a $1bn pilot programme by the World Bank, with the WB, United Nations Environment Programme and the United Nations Development Programme as the three initial projects. It now brings together 184 member governments in addition to civil society, international organisations and private sector partners. Headquarters in Washington DC, USA	1991	To enable developing countries to invest in nature and to support the implementation of major international environmental conventions including on biodiversity, climate change, chemicals and desertification.	Focus on six areas of work: ♦ Biodiversity ♦ Climate Change (mitigation and adaptation) ♦ Chemicals and waste ♦ International waters ♦ Land degradation ♦ Sustainable forest management/REDD+	The GEF is the largest multilateral trust fund focused on enabling developing countries to invest in nature. It has provided more than $22bn in grants and blended finance and mobilised an additional $120bn in co-financing for more than 5,200 projects across 162 countries over the past 30 years. It acts as the financial mechanism for three of the UNEP's11 Multilateral Environmental Agreements, and to a further two.
Adaptation Fund (AF)		2010	To finance projects and programmes that help vulnerable communities in developing countries adapt to climate change.		

Coalition of Finance Ministers for Climate Action	Governments from 39 countries	2018	To promote cohesion between domestic and global action on climate change, boost ambitions, reaffirm commitments and accelerate actions to implement the Paris Agreement.	Five working areas based on the Helsinki Principles: ♦ Alignment of policies with the Paris Agreement commitments ♦ Sharing of experience and expertise to promote collective understanding ♦ Carbon pricing measures ♦ Embedding climate change in macroeconomic policy, fiscal planning, budgeting, public investment management and procurement practices ♦ Preparation of Nationally Determined Contributions	Publication of reports and guides
Central Banks and Supervisors Network for Greening the Financial System (NGFS)	The central banks and supervisors of the UK, France, Germany, the Netherlands, Sweden, China, Singapore and Hong Kong Now 116 members and 19 observers.	2017	To share best practice and contribute to the development of environment and climate risk management in the financial sector, and to mobilise mainstream finance to support the transition towards a sustainable economy.	Six areas of work: ♦ Supervision ♦ Scenario design and analysis ♦ Monetary Policy ♦ Net Zero for Central Banks ♦ Nature-Related Risks ♦ Capacity Building and Training	Publication of reports and guides

Table A3: Selected multilateral development bank finance initiatives and instruments

Name	Initiated by	Date	Objective	Approach	Impact
MCPP One Planet	IFC	2013	To attract institutional capital and support the achievement of the UN SDGs.	Offers investors access to the IFC pipeline. Connects investors to IFC's global origination capacity. Alignment of interests through co-investment approach. Long-term partnership and ease of administration. Risk-return diversification. Enhanced sustainability and impact reporting.	$10bn total MCPP funds raised 11 investors 8 facilities
Scaling Solar	World Bank and IFC	2015	To create viable markets for solar power in client countries.	Creates a 'one stop shop' to enable collaboration between project developers and governments, offering fair execution, cost optimisation and security through coordination and management by the World Bank and IFC.	Projects across developing economies including in Zambia, Senegal, Togo, Madagascar, Uzbekistan and Ivory Coast.
Green Bond Programme	IFC	2010	To help catalyse the market and unlock investment for private sector projects that support renewable energy and energy efficiency.	Projects eligible for green bond financing selected from the IFC's climate-related loan portfolio, and following the IFC's investment and due diligence process. Proceeds	Over $10.6bn across 178 bonds in 20 currencies.

				set aside in a special sub-portfolio within the IFC Treasury and invested in eligible projects including renewable energy, energy efficiency and other climate-related projects in developing countries.	

Table A4: Official sectoral decarbonisation initiatives

Name	Initiated by	Date	Objective	Approach	Impact
Breakthrough Agenda – Race to Zero	UNFCCC Race to Zero, Climate Champions, UK COP26 Presidency	2021	A framework international clean technology plan for all actors to follow	Five goals, each focused on achieving 'tipping points' in a broad sector: 1. Clean **power** the most affordable and reliable option for all countries to meet their power needs efficiently by 2030. 2. Zero emission vehicles are the new normal for **road transport** – accessible, affordable and sustainable in all regions by 2030. 3. Near-zero emission **steel** the preferred choice in global markets, with efficient use and near-zero emission steel production established and growing in every region by 2030. 4. Affordable renewable and low carbon **hydrogen** globally available by 2030.	Brings together over 40 countries, representing over 70% of global GDP, around common ambitions. Countries commit to work together on near-term actions in the crucial decade of 2020-2030, including a global policy framework and domestic action towards the targets.

				5. Climate-smart, sustainable **agriculture** the most attractive and widely adopted option for farmers everywhere by 2030. A 'global checkpoint process', beginning in 2022, will track, measure and review progress. Signposts other leading global initiatives that will contribute to achieving the goals.	
Energy Transition Council	United Kingdom COP26 Presidency	2020	Enable effective dialogue between countries that require support for energy transition and major international actors offering support.	Country dialogues at working and senior levels. Regional discussions on common energy transition issues at roughly quarterly Ministerial meetings. 'Rapid Response Facility' (RRF) enables existing programmes and some additional resources to respond rapidly to requests for technical, commercial, regulatory or policy assistance.	Positive feedback from countries and partners led to extension until at least COP30 in 2025. Between March and November 2021, the RRF responded to 24 requests.
Industrial Deep Decarbonisation Initiative (IDDI)	Clean Energy Ministerial, led by United Kingdom and India, other members include Germany, Canada and the United Arab Emirates	2021	Create market demand for low-carbon industrial materials, especially steel and cement.	Objective for 10 countries to commit to green public procurement in these sectors by 2024.	Milestones are set out to achieve within a three-year timeframe, including: ♦ Standardised reporting mechanisms

				IDDI is housed under the Clean Energy Ministerial (CEM) and coordinated by UNIDO. MPP, LeadIt, IRENA, and World Bank all participate to facilitate the coalition. Collaboration on a set of targets by 2030 to be launched by mid-2022.	♦ Evaluation processes and tools ♦ Consistent minimum standards Limited membership to date, compared to CEM membership of 29 country governments and the European Commission, with 25 further 'participants'.
Mission Innovation (MI)	Twenty countries at COP21	2015; 2021 re-launched as 2.0	Accelerate public and private global clean energy innovation with the objective to make clean energy widely affordable, attractive and accessible to all.	During its first phase, countries committed to: ♦ double governmental or state-directed clean energy R&D investment ♦ work closely with the private sector ♦ collaboration with each other and international institutions ♦ transparent, effective, and efficient implementation, including roadmaps and annual information on R&D efforts. The second phase expanded MI's mandate, including to catalyse	Two countries (Austria, Finland) and the European Union joined as members, and Mexico joined as observer, between initial launch and 2.0. Members now represent 90% of global public investments in clean energy investment. Collective public R&D investment rose from $8.1bn to $13bn by 2020. However, a majority of members did not achieve the doubling target. Subsequent increases have been slower, likely owing to the pandemic.

				global action through public–private 'missions'. Members are intended to describe National Innovation Pathways setting out: ♦ energy transition scenarios and innovation needs ♦ plans to address needs ♦ measurement of innovation outcomes ♦ preferred modes and methods of collaboration. Missions include: ♦ renewable power generation ♦ zero-emissions shipping ♦ clean hydrogen ♦ carbon dioxide removal ♦ urban transitions ♦ net zero industries.	
Leadership Group for Industry Transition (LeadIT)	India and Sweden, supported by the World Economic Forum	2019	Provides an arena for public–private collaboration, evidence and leaning on industrial transitions	Supports governments and industries to co-produce roadmaps and pathways for transformation of specific industries, including through an interactive tool.	Now includes 18 countries and 19 companies. LeadIT analysis shows that 85% of parties that submitted an updated NDC prior to COP26 included industry transition in the scope of the NDC, compared to 69% in the first round.

				Convenes high-level dialogues between policymakers and stakeholders. Analysis and tools, including trackers for national, regional and global roadmaps, and case study insights on specific industries and geographies, aim to promote transparency and knowledge sharing on policies.	

Private sector-oriented initiatives

Table A5: Private sector-oriented sustainable finance initiatives

Name	Founders	Date	Objective	Approach	Impact
Glasgow Financial Alliance for Net-Zero (GFANZ)	Led by Mark Carney and Nigel Topping	2021	Bring together the financial sector to accelerate the transition to a net zero economy.	GFANZ covers 7 key areas: ♦ Sectoral pathways ♦ Real economy transition plans ♦ Financial institution transition plans ♦ Portfolio alignment measurement ♦ Mobilising private capital ♦ Policy ♦ Building commitment.	♦ GFANZ is a whole financial sector umbrella that unites for the first time leading sub-sectoral net zero initiatives that are in the UN's Race to Zero campaign. ♦ Members include nearly 300 financial firms responsible for assets of roughly $90 trillion.

Finance to Accelerate the Sustainable Transition-Infrastructure (FAST Infra)	Started under the auspices of the One Planet Lab as a collaboration between HSBC, the OECD, the IFC, GIF (World Bank) and CPI Evolved as a broad-based private-public partnership involving banks, asset managers, governments, MDBs, NDBs, academics and NGOs	2020	♦ Develop sustainable infrastructure into a deep liquid asset class. ♦ Scale-up investment in sustainable infrastructure in EMDEs.	Develop a consistent, globally applicable labelling system for sustainable infrastructure assets. Develop 4 market mechanisms to mobilise private investment at sale for the financing of labelled projects: ♦ Technology-Enabled Platform ♦ Global Revenue Guarantee ♦ Open-sourced Managed Co-Lending Portfolio Programme ♦ Sustainable Financing Facility for National Development Banks	Rally over 50 global entities, representing governments at all levels, the financial sector, investors, DFIs, insurers, rating agencies and NGOs are now actively participating in developing the FAST-Infra initiative.
Integrity Council for the Voluntary Carbon Market (IC-VCM)	Established as governance body for carbon credit standards by the Taskforce for Scaling Voluntary Carbon Markets (initiative established by Mark Carney and Bill Winters, 2020)	2022	Establish 'Core Carbon Principles' (CCPs) that will act as a benchmark for high-integrity carbon credits	A group with varied expertise from across the voluntary carbon market ecosystem including scientific, financial, corporate, NGO, policy, indigenous, local representatives. CCPs and an Assessment Framework (AF) are drafted by an expert panel and put to public consultation, for planned release in Q4 2022.	Public consultation on the CCPs and AF concluded in September 2022.

				Existing, private voluntary standards will need to align with the CCPs, as will individual projects, to be deemed compliant by IC-VCM.	
Voluntary Carbon Markets Integrity Initiative (VCMI)	Co-funded by the Children's Investment Fund Foundation (CIFF) and the UK Government Department for Business, Energy and Industrial Strategy (BEIS)	2021	Multi-stakeholder platform to drive credible, net zero aligned participation in voluntary carbon markets. Aim to ensure carbon offsets are underpinned by real actions to reduce GHG emissions and help developing countries access climate finance generated by the market.	Immediate priorities are to: ♦ Develop high integrity guidance for buyers of carbon credits, including on climate claims by businesses. ♦ Support access to high integrity voluntary carbon markets and monitor broader supply-side integrity efforts.	Public consultation on a Code of Practice for net zero claims concluded in August 2022.
Climate Action 100+	Coordinated by five partner organisations: Asia Investor Group on Climate Change (AIGCC); Ceres; Investor Group on Climate Change (IGCC); Institutional Investors Group on Climate Change (IIGCC) and Principles for Responsible Investment (PRI)	2017	Engage with the world's largest corporate GHG emitters to curb emissions, strengthen climate-related financial disclosures and improve governance on climate change.	In signing up to Climate Action 100+, investors commit to engaging with at least one of 167 focus companies that are strategically important to the net zero emissions transition and to seek commitments on the initiative's key asks: ♦ Implement a strong governance framework on climate change ♦ Take action to reduce greenhouse gas emissions across the value chain	♦ 615 investors engaging the world's largest GHG emitting companies. ♦ $60 trillion in assets managed by investors participating in the initiative. ♦ 167 companies being engaged through the initiative across the planet. ♦ 80%+ global industrial emissions estimated to be covered by focus companies.

				♦ Provide enhanced corporate disclosure.	
Climate Finance Leadership Initiative (CFLI)	Michael R. Bloomberg formed the CFLI at the request of the United Nations Secretary-General António Guterres	2019	Convene leading companies to mobilise and scale private capital for climate solutions.	Areas of work: ♦ Supporting policymaking to mobilise private climate finance ♦ Mobilising investments for sustainable infrastructure in emerging markets.	Members of the CFLI include Allianz Global Investors, AXA, Bloomberg, Enel, Goldman Sachs, Japan's Government Pension Investment Fund (GPIF), HSBC, and Macquarie.
Global Investors for Sustainable Development (GISD)	GISD's work is supported by UN system partners (DESA, UNCTAD, Global Compact, PRI, UNEP FI, UNDP, UNCDF and the Regional Commissions) and others like the World Bank Group	2019	Deliver concrete solutions to scale-up long-term finance and investment in sustainable development.	Areas of work: ♦ Mobilise finance and investment ♦ Scale-up investment solutions in developing countries ♦ Enhancing the impact of private investment on sustainable development. Key accomplishments include creating a Sustainable Development Investing (SDI) definition, and launching the UNDP-GISD SDG Investor Platform (digital portal that enables investors to identify investment opportunities in developing and frontier markets	Rally 30 leaders of major financial institutions worth $16 trillion.

				that support sustainable development).	
Sustainable Markets Initiative (SMI)	Former HRH The Prince of Wales	2020	Its vision is a sustainable future for Nature, People and Planet. Its mission is to build a coordinated global effort to enable the private sector to accelerate the transition to a sustainable future	The Terra Carta, a charter for change, provides a roadmap to 2030 for businesses to move towards sustainable markets. It aims to encourage three major transformations: 1. A dramatic shift in corporate strategies and operations 2. A reformed global financial system 3. An enabling environment that attracts investment and incentivises action.	The initiative is gathering a 'coalition of the willing' who share its vision. This is organised across three strands: 1. Task Forces of private sector CEOs that set priorities and oversee progress made by working groups. 2. Country engagement, linking countries to expertise and investment. 3. Founding and Strategic Partnerships, including representatives from across public, private and philanthropic sectors to help accelerate a sustainable future.
Task Force on Climate-related Financial Disclosures (TCFD)	**Financial Stability Board**	2015	To develop consistent climate-related financial risk disclosures for use by companies, banks and investors in providing information to stakeholders.	Publication of recommendations and encouragement of wide adoption by companies in the financial and non-financial sectors.	The TCFD has grown to over 450 members from over 85 countries, covering almost half of global banking assets and a quarter of global insurance premia.

Table A6: Private sector-oriented initiatives for industrial or sectoral decarbonisation

Name	Initiated by	Date	Objective	Approach	Impact
First Movers Coalition	United States State Department and World Economic Forum	2021	Send a market signal to commercialise zero-carbon technologies in hard-to-abate sectors.	Assembles ambitious corporate purchasing pledges across heavy industry and long-distance transport. Actions include: ♦ Supplier workshops to connect members with suppliers ♦ Hosting best practice sharing sessions, creating templates for offtake agreements, and engaging with financial institutions for de-risking purchase agreements ♦ Tracking infrastructure, where possible through existing frameworks. Country governments may also join and commit to enabling sector-specific efforts. So far 9 countries have joined as 'partners'.	Since founding by 35 companies, at least 20 companies have joined as new members. Companies have a collective market value of approx. $8.5 trillion. Example commitments include: ♦ Steel purchasers set a target that at least 10% of their annual primary steel procurement volumes by 2030 meets or exceeds the First Movers Coalition definition for low-CO_2 primary steel ♦ Technology firms Alphabet, Microsoft and Salesforce collectively pledged $500m to CO_2 removal.
Mission Possible Partnership	World Economic Forum, Energy Transitions Commission, Rocky Mountain Institute, We Mean Business Coalition;	2021	Accelerate several pathways for decarbonising heavy industry and transport.	Developing sector transition strategies for seven sectors across industry and transport. Builds on work since 2019 (as Mission Possible Platform).	Sectoral transition strategies published or forthcoming for multiple sectors, and platforms created with industry associations (e.g. Global

	Funded by Bezos Earth Fund and Breakthrough Energy			400 company members, as well as stakeholders among financiers, customers, and suppliers.	Cement and Concrete Association). New coalitions facilitated (e.g. Getting to Zero Coalition in shipping, Clean Skies for Tomorrow in aviation).
Steel Zero	Climate Group, Responsible Steel	2020	Harness purchasing power and influence of members to shift global markets and policies	Member organisations make a commitment to procure 100% net zero steel by 2050 and an interim commitment to procuring, specifying or stocking 50% of its steel requirement by 2030. Policy position supports: ♦ Global standard and definition on low-emission and net zero steel ♦ Support public sector demand for low emission and net zero steel ♦ Measure and report carbon emissions ♦ Encourage recycling ♦ Set expectations ♦ Create a level playing field	Commitments from 25 large companies.
Concrete for Climate Action	Global Cement and Concrete Association, World Economic Forum	2021	Make low-carbon production investable, stimulate demand for low-carbon cement and	A platform for stakeholders to align on a net zero transition pathway for the industry and	Published a net zero industry roadmap, under the auspices of the GCCA.

			concrete, and advance a circularity approach	shape a favourable environment for investment in decarbonisation solutions. Advocating for policy levers to support all three goals. 40 manufacturers pledged to CO_2 emissions by 25% by 2030 from 2020 levels.	Member companies have committed to advocate for policies, contribute to 2030 milestones and targets, and report on progress.
Getting to Zero Coalition	Global Maritime Forum, World Economic Forum	2019	Commercially viable deep sea zero emission vessels powered by zero emission fuels into operation by 2030	Industry insights and analysis including mapping of pilot and demonstration projects and cost profiles of alternative fuels. Call for policy actions, such as contracts for difference, and lobbying the IMO for a net zero 2050 target. Insights identifying specific country opportunities. Over 200 organisations, including 160 companies within the maritime, energy, infrastructure and finance sectors.	Published the first net zero industry roadmap. Reports published on major EMDE (Indonesia, Mexico, South Africa) opportunities.