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Building coalitions for climate transition and nature restoration

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Building coalitions for climate transition and nature restoration

Jean Pisani-Ferry, Beatrice Weder di Mauro
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Executive summary

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This Policy Brief distils some of the main messages of the Paris Report 2025, a joint initiative by Bruegel and CEPR (Pisani-Ferry et al, 2025). This year's focus is on accelerating the energy transition and restoring nature in emerging and developing economies. We thank all Paris Report contributors, and Patrick Bolton, Kim Clausen, Ignacio Garcia Bercero, Heather Grabbe, Alissa Kleinnijenhuis, Matthias Kalkuhl, José Scheinkman and Simone Tagliapietra for comments on an earlier draft.

GLOBAL CLIMATE AND BIODIVERSITY outcomes will largely be determined in emerging and developing economies (EMDEs). We propose a four-pillar strategy to support climate and nature preservation in line with the economic interests of both developing and advanced countries. This would move beyond voluntary pledges to embed climate and nature objectives into the structures of trade, finance and industrial policy, creating a self-reinforcing system of cooperation and reducing the net costs of the green transition.

UNDER PILLAR 1, a coalition of advanced and developing countries would link tiered carbon pricing with a common carbon border adjustment mechanism (CBAM). Pillar 2 would create a climate-finance coalition to decarbonise the power sectors of developing countries. Pillar 3 would involve partnerships to develop clean energy-intensive industrial production stages in developing economies with rich renewables endowments; these would feed into the supply chains of the European Union and other energy-importing advanced economies. Pillar 4 would redesign markets to create scalable and credible mechanisms to fund carbon removals. Technology-based removals can be incentivised through the introduction of clean-up certificates into the EU emissions trading system, while nature-based removals would require improved market design centred on a new asset class: nature shares.

THE FOUR PILLARS reinforce each other. A multi-country CBAM and carbon pricing coalition (Pillar 1) would reduce the cost of financing power sector decarbonisation (Pillar 2). Linking EMDE membership of the CBAM and carbon-pricing coalition to financial support for the decarbonisation of power sectors would also make it more attractive for EMDEs to adopt carbon prices. Decarbonisation of power sectors (Pillar 2) would be a precondition for developing clean, highly energy-intensive industry in renewables-rich EMDEs (Pillar 3).

THE PILLAR 1 COALITION should include the EU, China and as many other countries as possible. Advanced countries and China could underpin the Pillar 2 financier coalition. Pillar 3 would involve the EU and potentially other energy-poor advanced countries, along with EMDEs that are richly endowed with renewables. Pillar 4 would include the main custodians of the planet's natural capital. Enabling these coalitions will require EU leadership.

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1 Introduction

The planet's future depends increasingly on emerging and developing economies. Advanced economies continue to matter because of their higher *per-capita* emissions, their shares of global trade and finance, and their influence through research, technology and diplomacy; but their share in global greenhouse gas emissions is shrinking. Success in stopping global warming and halting biodiversity loss hinges on whether countries such as India, Indonesia, Brazil and South Africa adopt low-carbon, nature-positive development paths, and if they do so quickly. The same applies to China, which is both the world's top emitter of CO₂ and the country at the forefront of the green industrial revolution.

Geopolitical fragmentation, shifting priorities and a hostile United States administration are slowing the transition to a more sustainable economic model in line with the landmark Paris Climate Agreement of 2015. With climate and nature degradation accelerating, governments that understand the importance of climate and nature actions – still in the majority – are faced with hard questions. Recent international discussions on climate change mitigation and the preservation of biodiversity have centred on ambitious targets and the closing of funding gaps. These remain important topics for negotiation but are no longer sufficient. Instead, a broader approach is required to connect mitigation with adaptation and the preservation of nature.

This calls for deeper cooperation among countries with common interests in trade, clean energy and nature. Recognising that this group will for now not include the US, we propose coalitions of the willing for climate, biodiversity, trade and finance – wherever mutual interests can still align.

The European Union will need to play a special role in the creation of these coalitions. Because of its strong consensus around climate science, an ambitious decarbonisation agenda and a functioning, expanding emissions trading system that has delivered high carbon prices, it has both the credibility and the responsibility to lead, engaging emerging markets and developing economies (EMDEs) and building financing alliances with other advanced countries.

2 The case for action

In a darkening geopolitical landscape, the pace of technological innovation is a bright spot. Renewable energy and other green technologies have rapidly gained cost competitiveness and scale. Most new renewable power is now cheaper than fossil fuel alternatives. The IEA (2024), IRENA (2024) and Lazard (2024), among others¹, have shown that the levelised cost of electricity (LCOE) of unsubsidised solar and wind is often lower than that of fossil fuel-based electricity generation, especially when considering new power plant construction.

Solar photovoltaic (PV) costs have plummeted to roughly \$0.04 per kWh, making solar power more than 50 percent cheaper than generation from fossil fuels or nuclear plants (IRENA, 2024). Even accounting for network and backup costs, this is major progress that is bound to affect the energy pecking order. This dramatic cost decline, alongside improvements in wind turbines and battery technology, means clean technologies offer better economic returns than coal or gas. In dollar terms, investment in renewables now outpaces fossil electricity investment by ten to one, with more investment in solar than in all other power

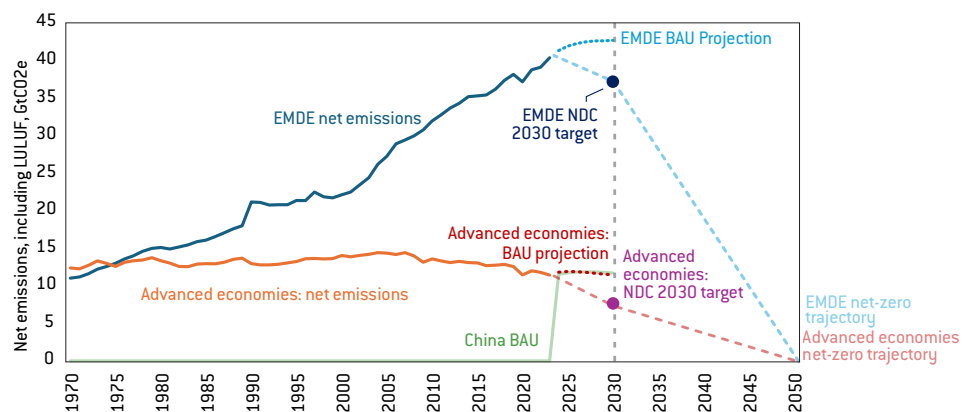
¹ See also Wood Mackenzie press release of 21 October 2024, 'Global Competitiveness of Renewable LCOE Continues to Accelerate', <https://www.woodmac.com/press-releases/2024-press-releases/global-competitiveness-of-renewable-lcoe-continues-to-accelerate>.

sources combined. Year-on-year global growth in electricity generation from solar PV was double the growth from all fossil fuels combined in 2024². Other green technologies are also scaling quickly. Meanwhile, electric vehicle sales have risen from 3 million units in 2020 to 17 million units in 2024 (IEA, 2025).

But despite these developments, investment in new coal-fired power plants continues, particularly in China, which approved 106 gigawatts of new coal power capacity in 2022 alone – four times the amount approved in 2021³. Reasons for this include concerns about supply security, local support for coal and the high upfront cost of investment in renewables that many countries find difficult to finance. Unless retired early, these coal plants will remain in operation for decades, locking in emissions far beyond 2030. Meanwhile, the global vehicle fleet remains overwhelmingly dependent on fossil fuels: in 2024, more than 95 percent of vehicles in circulation still had internal combustion engines⁴.

Consequently, climate policies and trajectories are far off the path needed to reach emissions targets compatible with the Paris Agreement’s objective of limiting global warming to 1.5 degrees Celsius above pre-industrial levels. Continuing with today’s policies is projected to lead to about 2.7°C of warming by 2100⁵. Moreover, aggregate projections mask stark differences between advanced and developing economies. Emissions in most advanced economies have already peaked and steady declines have begun. In contrast, emissions in many EMDEs are still rising, driven by economic and population growth and continued heavy reliance on coal, oil and gas.

Figure 1: Historical emissions, 1970-2023, and requirements for reaching net zero in 2050



Source: Grabbe et al (2025). Note: several countries, including China and India, have set less ambitious targets. * EMDEs includes China. The 2050 projection is given for EMDEs as a whole and not separately for China. BAU = business as usual; NDC = Nationally Determined Contribution; LULUCF = land use, land-use change and forestry.

As of 2023, EMDEs (including China) accounted for roughly two-thirds of global emissions. Their share is expected to grow further as they contribute the bulk of new emissions. Advanced economies account for a shrinking portion of annual emissions (for

- 2 Authors' calculations based on the Ember electricity dashboard (<https://ember-energy.org/data/electricity-data-explorer/?data=generation>).
- 3 Reuters, 'China's new coal plant approvals surge in 2022, highest since 2015 – research', 27 February 2023, <https://www.reuters.com/world/asia-pacific/chinas-new-coal-plant-approvals-surge-2022-highest-since-2015-research-2023-02-27>.
- 4 Hannah Ritchie, 'Tracking global data on electric vehicles', *Our World in Data*, February 2025, <https://ourworldindata.org/electric-car-sales>.
- 5 Climate Action Tracker, 'Emissions Pathways', November 2024 update, <https://climateactiontracker.org/global/emissions-pathways/>.

EMDEs also custodians of much of the planet's natural capital; climate outcomes are intertwined with how those countries manage biodiversity

example, the EU and United Kingdom together now contribute only about 8 percent of global emissions). Reaching global net zero emissions by 2050 requires a sharp break with the current emissions trend in EMDEs (Figure 1). Limiting global warming to 1.5°C would require an even more radical break, consistent with reaching global net-zero emissions by the mid-to-late 2030s rather than 2050⁶.

EMDEs are also custodians of much of the planet's natural capital, so that collective climate outcomes are intertwined with how those countries manage nature and biodiversity. Many of the world's critical carbon sinks and biodiversity hotspots (including tropical forests and wetlands) are located in developing regions across Latin America, Africa and Asia. These ecosystems bolster climate resilience by absorbing CO₂ and providing a buffer against extreme weather. Conversely, their destruction would accelerate climate change and undermine adaptation efforts. Nature-based solutions, such as reforestation and ecosystem restoration, could provide 20 percent to 30 percent of the emissions reductions needed to limit warming to 1.5°C (chapter 7 in IPCC, 2022). However, continued deforestation or ecosystem collapse (for instance, of the Amazon rainforest) would release vast amounts of carbon and destabilise regional climates. Climate change and biodiversity loss are mutually reinforcing: climate change is now a leading driver of biodiversity loss, and in turn the erosion of biodiversity undermines natural carbon sinks and ecosystem resilience. It follows that preserving nature – alongside cutting emissions – is essential for climate stability and nature sustainability.

The costs of the green transition and of restoring/protecting nature in emerging economies are often disproportionately high relative to their GDPs and fiscal capacities. Our best guess estimates of the investments needed are far above current investment levels in EMDEs (excluding China). In practice, annual clean-energy investment in developing regions would need to more than quadruple from 2022 levels by 2030. This would be unprecedented. It reflects the reality that many EMDE economies are both carbon-intensive (hence requiring more investment to decarbonise) and growing rapidly (hence needing more energy infrastructure overall).

Financing these investments is challenging because of the high cost of capital in EMDEs. Capital for clean energy projects is considerably more expensive in developing markets, reflecting higher macroeconomic risks, regulatory and political uncertainty, and less developed financial systems (Berglof *et al*, 2025; Fornaro *et al*, 2025; Sen, 2025). For example, in 2021 the real cost of capital for a utility-scale solar PV project was about 3 percent in Europe and the US, but roughly 7 percent in India and Mexico, over 9 percent in Brazil and as high as 10 percent to 15 percent in sub-Saharan African countries (IEA, 2023). This steep disparity in financing costs greatly inflates the levelised cost of renewable energy in emerging economies, often offsetting their natural advantages, such as abundant solar irradiation.

International climate finance is supposed to help bridge this gap, but it remains insufficient. Support has fallen short against lofty pledges. In late 2024, advanced countries agreed in principle (the 'Baku commitment') to provide about \$300 billion per year in climate finance for developing nations, but the flows in 2022 were around \$100 billion. The gaps in nature conservation are equally mind-boggling. To reverse biodiversity decline, the Kunming-Montreal Global Biodiversity Framework (2025) calls for a financing gap of about \$700 billion per year to be closed. Of this, \$500 billion per year should come from phasing out harmful subsidies, reflecting the fact that, at present, nature conservation spending is vastly overshadowed by expenditures that harm nature.

6 According to the Potsdam Institute for Climate Impact Research's 'carbon clock,' the remaining 1.5°C-consistent carbon budget is just 173 gigatonnes (Gt) of CO₂ (about five times 2023 emissions), while the remaining 2°C-consistent carbon budget is 923 Gt. The cumulative emissions implied by the net-zero scenario shown in Figure 1 are about 525 Gt of CO₂, consistent with a global temperature rise of about 1.7°C – a dangerously high level given the risk of climate tipping points even for a 1.5°C rise (Armstrong McKay *et al*, 2022).

One of the main problems with the widely cited finance gap estimates is that they are rarely accompanied by credible strategies to close them. Instead, these figures are often presented as arguments to mobilise funding, particularly from the private sector or through blended finance mechanisms. However, as the disparity between estimated needs and actual flows increases, the effectiveness of gap estimates as mobilisation tools diminishes. Rather than galvanising action, they risk fostering resignation – or worse, a new form of denial, whereby the evidence from climate science may no longer be questioned but the policies needed to combat climate change will. In wealthier countries, particularly those in temperate climate zones, this can lead to a quiet acceptance of failure and a shift in focus to adaptation, the implicit message being that the battle has been lost.

In addition, global collective action to combat climate change faces several new problems:

- A disjointed approach to address highly connected issues: although the containment of global warming and the preservation of nature are linked in multiple ways, they are mostly tackled separately.
- The fraying of multilateralism: the previous remedy to the shortcomings of a disjointed approach would have been to embrace a more holistic strategy, yet nationalism and geo-political tensions hamper the search for encompassing solutions.
- A lack of adequate incentives: developing countries (for their mitigation efforts) and advanced countries (for their contributions to the financing of these efforts) both face collective action problems, but incentives are not adequately aligned.

To address these problems, a robust and realistic architecture is needed. In the current geopolitical context, such an architecture must be flexible, recognising that a requirement for agreement by consensus will hold the transition back and will give too much say to those that are dragging their feet. Coalitions of countries that are ready to move more quickly offer the best way forward, and are more likely to align incentives. We propose a redesign based on four pillars:

- **Pillar 1:** A tiered carbon pricing coalition with a common carbon border adjustment mechanism (CBAM);
- **Pillar 2:** A scaling-up of climate finance, conditional on effective decarbonisation commitments;
- **Pillar 3:** Green industrial partnerships between advanced and developing countries;
- **Pillar 4:** An effective market architecture for large-scale carbon removal and nature restoration, to complement public funding.

3 A four-pillar strategy

3.1 Pillar 1: a plurilateral carbon pricing coalition with a common CBAM

The 2015 Paris Agreement achieved near-universal participation, with 196 countries agreeing to commit to climate action. This broad involvement was unprecedented, particularly compared to earlier agreements such as the Kyoto Protocol, in which not all developed nations participated (Guérin and Tubiana, 2025). Unlike previous top-down approaches, Paris allowed countries to determine their own climate commitments, making it politically feasible for many countries to join and offer pledges according to their capabilities. EMDEs could present both unconditional and conditional targets, explicitly linking goals to financial support from rich countries. Subsequent climate summits have also introduced systematic transparency measures, requiring regular progress reports on emissions reductions, with peer review and pressure.

Ten years on, the Paris Agreement pledges formulated by countries (their Nationally Determined Contributions, or NDCs) make it possible to assess if they add up to the level of effort required to halt global warming (they do not). However, there is no binding enforcement mechanism to ensure that countries meet their commitments. The Paris Agreement cannot adequately address the free-rider problem associated with emissions: the benefits of emissions reductions are global, but the costs are borne by each country.

The second withdrawal of the United States from the Paris Agreement, in January 2025 at the direction of the re-elected President Trump, was a significant setback. But it is also a strategic opportunity for other nations to strengthen international climate cooperation. The absence of the US from global climate negotiations could enable the European Union and other major global economies such as China, Brazil and India to agree ambitious and coherent international climate strategies, without needing to accommodate constraints created by US domestic politics and preferences. At the same time, it is important that any agreement should be open to future US participation.

Scaling-up effective climate action requires a stronger link between climate policies and trade⁷. We propose, building on Clausing *et al* (2025), that international collaboration take the form of an open and inclusive 'climate coalition'. Membership obligations would include:

1. Adoption of a tiered carbon pricing mechanism; and
2. Adoption of a common carbon border adjustment mechanism (and no carbon border adjustment within the coalition).

The EU carbon border adjustment mechanism would be an incentive to join the club of climate-ambitious countries

The EU decision to introduce a carbon border adjustment mechanism (CBAM) would be an incentive for countries to join the club of climate-ambitious countries. They would gain CBAM exemption, along with possible additional incentives involving technology transfer, climate finance, technical assistance, and clean energy trade liberalisation. Club members would commit to enforce domestic carbon pricing through taxation or equivalent emissions trading systems. They would also adopt CBAMs that impose tariffs equivalent to their domestic carbon prices on imports from non-member nations. This would reduce carbon leakage and maintain competitive fairness.

Importantly, Clausing *et al* (2025) propose that participation be structured through a tiered carbon pricing system, such as that proposed by the International Monetary Fund (Parry *et al*, 2021). For example, lower-income countries could implement lower carbon price floors (eg €25 per tonne), middle-income countries would be requested to adopt a higher, but still moderate level (eg €50 per tonne) and higher-income economies would have higher rates (at least €75 per tonne), with prices adjusted regularly for inflation. Other variations, including differentiation between lower and upper middle-income countries, could also be considered.

This differentiated approach aligns with the principle of common but differentiated responsibilities, a cornerstone of previous global climate agreements, and addresses equity concerns by mitigating potential economic impacts on developing nations. The differentiated schedule should serve as a transitional measure, with carbon tax rates increasing as countries achieve higher levels of income. This expectation of carbon price convergence should reduce incentives for carbon-intensive industries to relocate to jurisdictions with lower carbon prices. Both the levels of the tiers and the pace of convergence would be subject to negotiation (Clausing *et al*, 2025).

The coalition would initially focus on the carbon-intensive goods included in the EU CBAM: aluminium, iron and steel, cement, fertilisers and hydrogen production. These industries comprise a significant share of global carbon emissions (about 20 percent), including both direct emissions and the emissions from the electricity used in their production. But the

7 G7 Leaders' Statement of 12 December 2022, <https://www.g7germany.de/resource/blob/997532/2153142/960bf2bf29ddb2253fca0c3bf8f983e7/2022-12-12-g7leadersstatement-data.pdf>.

CBAM could be enlarged if similar measures are adopted by other countries, for example in East Asia, and be broadened if other goods end up being added to the intermediate products of the initial list.

The size and economic value of the market created by the club will determine the incentives to join. The economic value would determine the club's ability to internalise the climate benefits of collective mitigation efforts.

This proposed climate club would complement the United Nations Framework Convention on Climate Change Conference of the Parties (COP) process by deepening collaboration among coalition members – primarily because it relies on reciprocity and meaningful incentives rather than voluntary commitments and peer pressure. Countries would gain economic benefits from participation and the reciprocal structure would incentivise sustained participation and climate action, while addressing carbon leakage and competitiveness concerns.

A viable coalition should quickly expand from the EU and its main suppliers to other large countries, including China, Korea, Japan, India, South Africa and Brazil. These countries are, of course, at very different stages of development, and their respective incentives will need to be calibrated carefully. In addition to a tiered schedule for carbon pricing, the design should include commitments to technology transfer and financial support for green transitions in lower-income countries. In light of concerns about industrial overcapacity in sectors such as steel, it may also require an agreement to limit or eliminate subsidies. The EU would need to play a leading role in establishing this framework.

3.2 Pillar 2: Scaled-up climate finance conditional on effective decarbonisation commitments

The current commitments of advanced countries to finance EMDE decarbonisation are insufficient and are not matched by developing country commitments to decarbonise. Therefore, the implicit contract between North and South can (and in many instances does) result in an unproductive exchange of false promises: advanced countries pretend they will finance decarbonisation in the South, while developing countries pretend that they will decarbonise.

A way out of this conundrum would be to form 'climate finance coalitions' involving subsets of advanced countries willing to fund decarbonisation in the South and subsets of developing countries willing to decarbonise their economies if given access to funding on reasonable terms (Bolton and Kleinnijenhuis, 2025). This mutual commitment would be in the self-interest of all participating countries: all would gain from the avoidance of physical, health and economic damage thanks to lower emissions in EMDEs, while economic benefits would be roughly in proportion to countries' GDP. As a result, fiscal support for the decarbonisation of EMDEs (except China) would be in the economic interest of advanced countries and China, even if EMDEs do not contribute (Bolton and Kleinnijenhuis, 2025).

The cost of funding developing country decarbonisation as a share of the GDP of the financier coalition would depend on the size of that coalition. A coalition of all advanced countries and China would pay less than 0.2 percent of GDP annually for EMDE power-sector decarbonisation consistent with the Paris 1.5°C objective. For a funding coalition that excludes the US but includes China, the EU, Canada, Japan, South Korea and some additional smaller industrial partners, the fiscal burden would be about 0.2 percent of GDP. If China is also excluded from the financier coalition, the cost would rise to 0.3 percent of GDP/year.

The greater the economic damage from climate change, the smaller the critical mass of participants would need to be for coalition financing to be profitable. But even if global economic damage (the social cost of carbon) were relatively low (\$190/tCO₂, as assumed by Rennert *et al*, 2022), a financier coalition consisting of the EU and advanced countries except the US would benefit economically from financing the decarbonisation of most of the largest developing country power-sector emitters. If the US or China were to join, the coalition would find it in its interest to finance the decarbonisation of almost all developing country emitters. If the assumed damages are significantly higher, as argued by Bilal and Känzig (2025), large entities including the EU, China (and the US) would find it profitable to embark on decarbon-

isation support alone, even if not joined by other partners.

Under the Paris Agreement, all signatories must offer new NDCs at COP30 in Brazil in November 2025. With the next versions not due until 2030, this set of NDCs represents the last chance to put emissions on a net-zero consistent path. The EU and its climate finance coalition partners should offer conditional fiscal support to all developing countries (except China and oil and gas producers) that are willing to commit to net-zero consistent decarbonisation of their power sectors. While only accounting for about 40 percent of developing countries' emissions, power-sector decarbonisation is a necessary step for the decarbonisation of industry and transport.

3.3 Pillar 3: Green industrial partnerships between the EU and developing countries

Europe currently imports most of its oil and gas at relatively high cost. The continent's transition to clean energy will end its dependency on imported fossil fuels, but not its relative energy scarcity (McWilliams *et al*, 2025). Europe is not well-endowed in green energy. Limited land availability and a relatively poor solar potential (except in Southern Europe) imply that the cost of producing electricity will be higher than in countries on the other side of the Mediterranean, in the Middle East or in Africa. Nuclear power can help, but not to the point of eliminating Europe's structural cost disadvantage, as nuclear is relatively expensive compared to renewables once the possibility of electricity storage is factored in.

As a result, Europe will remain an energy importer in the medium and possibly long terms. However, transporting electricity is much more costly than transporting fossil fuels, even taking into account the possibility of producing hydrogen and transporting it by sea or through pipelines. In contrast, energy-intensive intermediate products in the value chains of the chemical and steel industries, such as ammonia, fertilisers, methanol and reduced iron, can be easily and cost-effectively transported by sea.

For this reason, the green transition is bound to transform the international division of labour along value chains. Developing country exporters of primary products such as iron ore are likely to move down the value chain and export processed products, such as direct reduced iron, instead of raw commodities. Consequently, some upstream segments of European energy-intensive industries (EIIs) would move South. This restructuring of global value chains would be economically efficient and would help the industrialisation of the South. To the extent that energy-intensive intermediate inputs, such as ammonia or direct reduced iron, are produced with green electricity or green hydrogen, it would also lead to significant greenhouse gases emission reductions.

This leaves two important questions unanswered:

1. How to ensure that the migration of energy-intensive production supports Europe's own green industrialisation goals and, more broadly, its efforts to improve its competitiveness and its economic security; and
2. How to ensure that it results in global emissions reductions, rather than simply carbon leakage from the EU to the Global South.

McWilliams *et al* (2025) seek to answer both questions. On the first, they argue that the direct value added and employment loss of the relocation of energy-intensive intermediate products to the South would be modest. In Germany, EIIs account for most industrial energy demand but only 5 percent of manufacturing wages and 6 percent of the value added. The upstream segments of those industries represent a fraction of those numbers. At the same time, relocating these production stages should not only boost the competitiveness of downstream EII segments, but also industrial competitiveness more broadly, by reducing energy costs. Substituting domestic production of ammonia, methanol and reduced iron by imports could reduce EU electricity demand by around one-quarter of today's green electricity production in the EU, and around one-tenth of 2050 projected demand (McWilliams *et al*, 2025).

The ensuing impact on EU energy prices would benefit industrial consumers, households and the public purse.

The policy implications are two-fold.

First, while subsidies to modernise and protect European heavy industry can be justified both by the green transition and by the need to retain potentially competitive industry in a context of possible Chinese overcapacity, public money should *both* be conditional on abatement efforts *and* go to less-energy-intensive downstream industries, rather than highly energy-intensive intermediate products. This requires a revamping of the EU Clean Industrial Deal, which does not presently discriminate between production stages that should remain in the EU in the long term and those that need not.

Second, EU industrial policy must be linked to trade, investment and climate policies that embed low-cost energy intensive production in developing countries into EU value chains. The two pillars of EU climate policy discussed above – an EU-led carbon pricing and CBAM coalition, and an EU-led coalition to fund decarbonisation of power sectors in developing countries – are critical in this regard. In addition, Clean Trade and Investment Partnerships, as announced by the European Commission (Jütten, 2025), would need to be set up to both improve market access to the EU and transfer technology to those developing countries that have the potential to be reliable suppliers of green-energy-intensive intermediate products.

Conceptually, the same reasoning could apply to the decarbonisation of other advanced countries. We have presented it for Europe because it is where the policy question arises.

3.4 Pillar 4: Effective markets for carbon removal and nature restoration

It is almost certain that the world will overshoot climate targets. This makes investment in negative emissions essential. Limiting global warming to below 1.5°C does not rely only on the containment of emissions, but also on large-scale deployment of carbon dioxide removal (CDR) technologies of all kinds. Some models project gross CDR volumes of 10 to 20 GtCO₂ per year by the second half of the twenty-first century, equivalent to one-quarter to one-half of today's global emissions (Hoegh-Guldberg *et al*, 2018).

Negative emissions can be achieved through natural sequestration, which relies on photosynthesis and ecosystem processes (eg afforestation, soil carbon, carbon stored in coastal and marine ecosystems), and technological solutions that extract CO₂ from the atmosphere, such as direct air capture and storage (DACS), which does not yet exist at scale.

This pillar proposes two market innovations:

1. A market mechanism for negative emissions: integrating clean-up certificates into compliance markets (starting with the EU emissions trading system, ETS) for carbon removals that are reliably permanent; and
2. Credible markets for long-term nature-based carbon capture that also value the broader ecosystem services and co-benefits of nature restoration – not just the carbon.

The goal is to prepare for a future in which net-negative emissions will be necessary in the second half of the century, to compensate for temperature overshoot and restore a safer climate trajectory.

3.4.1 A market mechanism for negative emissions: clean-up certificates

Following Edenhofer *et al* (2025), we propose a new market-based instrument in the form of clean-up certificates, designed to embed CDR into the EU ETS and make the financing of net-negative emissions feasible at scale. The certificates would offer firms a legal right to emit beyond their allowances today, in exchange for an obligation to remove the equivalent amount of CO₂ from the atmosphere in the future. This creates a form of carbon debt, explicitly linked to future removals.

The EU ETS is approaching a structural turning point. Under current rules, the last allowances for energy and industrial sectors will be auctioned around 2039. Yet some residual

emissions – particularly in hard-to-abate sectors such as cement – will remain too costly or infeasible to eliminate. Without a mechanism to offset these emissions, carbon prices could spike in the 2040s, undermining the predictability and effectiveness of the EU ETS. Moreover, firms are already making forward-looking investment decisions and are banking certificates. Introducing clean-up certificates now would enable regulated entities to anticipate future compliance costs, while generating demand and finance for removals today.

The institutional redesign would involve two steps:

1. Issuance of clean-up certificates: these certificates would authorise emissions today but create a carbon debt obligation to remove the equivalent CO₂ in the future.
2. Creation of a European Carbon Central Bank (ECCB), which would oversee the issuance, verification and enforcement of carbon debt contracts. It would act as a regulatory and financial anchor, ensuring transparency, risk management and intertemporal consistency in carbon markets.

Clean-up certificates introduce intertemporal flexibility into emissions trading – analogous to allowing not just banking but also borrowing. Firms can emit now and remove later if they expect future innovations to lower CDR costs. However, if they are pessimistic about future CDR potential, they will avoid incurring carbon debt and prefer immediate abatement.

Time-inconsistency is obviously a major concern. Without safeguards, firms might bet on an excessively high pace of technological progress, become overindebted and end up defaulting on their carbon debt. To prevent such outcomes, Edenhofer *et al* (2025) propose to grant the European Commission the option of intervening in the market by limiting the amount of clean-up certificates. In addition, reducing the issuance of conventional allowances would increase overall ambition levels as a result of the overall cost reductions from introducing clean-up certificates. To insure against corporate bankruptcy, Edenhofer *et al* (2025) propose that firms issuing carbon debt post collateral in the form of security deposits at the ECCB. If the firm delivers the expected certified removals, the deposit is released. If it defaults, the ECCB retains the funds and uses them to procure equivalent removals elsewhere.

The EU ETS should thus evolve from a pure mitigation instrument into a tool that manages the entire carbon cycle. Over the longer run, negative emissions from nature-based removals could be integrated, potentially as a separate category of clean-up certificate. The potential for such removals is particularly high in EMDEs and in low-income countries, which also host significant biodiversity. However, two conditions must be met: nature-based removals must be additional and permanent. Achieving this requires a fundamental redesign of nature markets, which we address next.

3.4.2 A market for natural provision of negative emissions and nature restoration

Cantillon *et al* (2025) propose a novel design for nature markets to scale up carbon removals and nature restoration in the Global South. The aim would be to overcome the high transaction costs, low credibility and short-termism that characterise the current voluntary carbon markets. The proposed mechanism would address these design flaws through four innovations:

1. Jurisdictional scale: projects would be defined at regional or provincial level rather than small-scale private projects. This scale would reduce leakage, improve monitoring and enhance additionality by aligning with regulatory boundaries. Jurisdictions would compete to attract capital.
2. Equity-based instruments: instead of issuing credits, jurisdictions would sell shares in a portfolio of nature-based projects. These shares would entitle holders to receive ‘dividends’ in the form of measured carbon and biodiversity benefits (eg a quantity of avoided CO₂, increase in biodiversity). Dividends would be released prudently over time, with buffers to account for ecological risk. This would allow for permanent claims without

assuming permanence in ecological systems.

3. Primary market as a crowdfunding mechanism: jurisdictions would list projects with detailed descriptions and minimum funding thresholds. Investors would allocate capital across proposals. Prices would form endogenously, with projects that attract excess demand seeing rising share prices, while underfunded projects would be delisted. This competitive mechanism would incentivise jurisdictions to improve project quality and additionality.
4. Public market governance: to ensure integrity and reduce fragmentation, the market infrastructure – project vetting, registry management – would be publicly governed. This structure should reduce certification costs and resolve conflicts of interest inherent in today's privately run systems.

The proposed share-based model would address the main shortcomings of credit markets by realigning incentives and embedding long-term commitment. Unlike credit buyers, share-holders would internalise ecological risk, fostering better stewardship and accounting for the impermanence of natural systems. Jurisdictional project scope and competitive pricing would enhance additionality and minimise leakage. By pricing a bundle of project attributes, the model would generate implicit values for biodiversity alongside carbon. Centralised governance and larger project scale would reduce transaction costs, while the secondary market would ensure liquidity. Overall, the approach should shift the market from transactional offsetting to long-term ecological investment.

To scale up, the market would require reliable demand. Rather than relying solely on offsets, a boost to demand could come from mandating institutional investors to align the carbon footprints of their portfolios with the Paris-aligned trajectories (and to do the same with their biodiversity footprints when such standards are established) and authorise them to use nature shares (on top of any other asset reshuffling) to meet this goal. A major advantage of acting at the level of funds, rather than the underlying companies, is that it would not release these companies from any existing or upcoming obligations to decarbonise and reduce their biodiversity impacts.

While the model is well suited for provision projects, conservation is harder to finance because it delivers no flow of carbon and no added biodiversity dividends. The benefits of conservation are in the preservation of stocks of carbon and biodiversity. Cantillon *et al* (2025) discuss different ways to address this: 1) conservation projects could be integrated into the mechanism, which would facilitate private funding but complicate the design, or 2) it would require a separate funding mechanism, as proposed for the Amazon (see Box 1). In addition, nature-harming subsidies should be eliminated.

Box 1: reforestation and conservation of the Amazon

The Amazon rainforest is crucial for both capturing carbon and preserving biodiversity. Assunção and Scheinkman (2025) explore two complementary approaches to finance tropical forest protection in the Amazon: (1) reforestation of previously deforested areas, and (2) conservation of standing forests.

Reforestation – especially through natural regeneration – is shown to be a low-cost and high-impact carbon-removal strategy. In the Brazilian Amazon, approximately 50 million hectares of currently deforested land could capture up to 23 gigatonnes (Gt) of CO₂ over the next three decades. Assuming international payments of \$25/tonne of CO₂, this reforestation could generate \$572 billion in gross transfers. After adjusting for land-use change costs, lost cattle production and discounting, the net benefit to Brazil is estimated at \$282 billion in present value over 30 years, while delivering 18 Gt in net carbon capture, and avoiding 16 Gt of currently foreseen emissions.

This reforestation strategy would be notably cost-efficient: the effective cost per tonne of

carbon is just \$13.25, significantly lower than most engineered carbon capture and storage (CCS) technologies currently supported in high-income countries. This reflects the low agricultural productivity (mainly extensive cattle ranching) of much of the deforested land in the Amazon. The policy simulation assumes that payments are tied to net carbon capture, meaning countries would be rewarded only for increasing carbon stocks (eg through reforestation) rather than for maintaining existing ones.

In contrast to reforestation, conserving standing forests focuses on preventing future emissions and biodiversity loss. Tropical Forest Forever Facility (TFFF), a Brazilian initiative, proposes annual payments of \$4 per hectare of standing forest, but only for countries with annual deforestation rates below 0.5 percent. Penalties apply for any new deforestation. The TFFF is designed to reward countries such as Guyana, Suriname and French Guiana, which have high forest cover but limited restoration potential and where deforestation rates are low. Because these countries have little scope for additional net carbon capture, TFFF offers a way to include them in results-based finance by compensating them for protecting high-integrity forests.

Simulated payments under TFFF vary across countries. For example, in a 'zero-deforestation' scenario, Brazil would receive \$28.7 billion via TFFF, compared to \$282 billion from reforestation payments. Guyana and Suriname, with minimal deforestation, would benefit primarily from TFFF, and Colombia and Peru would receive intermediate levels from both mechanisms.

4 Robust governance

A common thread throughout this Policy Brief is the need to define templates for new, variable-geometry patterns of collective action that will offer alternatives to the severely damaged post-war order and help tackle global commons without resorting to traditional global governance solutions.

For eight decades, the management of global commons has relied on a more-or-less stable template of almost all countries signing up to multilateral treaties, the implementation of which rested on global institutions. For example, international trade was governed by the multilateral General Agreement on Tariffs and Trade rules, guided by the 166-member World Trade Organisation. Similarly, rules for international capital flows and exchange rate policies were enshrined in the Articles of Agreement of the IMF (191 members), which is also in charge of enforcing them. The same has applied to many other fields, including climate action (195 signatories) and the protection of biodiversity (also 195 signatories).

Those agreements and institutions remain in place, but new patterns of international cooperation have developed:

- Participation in global governance arrangements increasingly departs from the principle that sovereign states have exclusive control over their territory and their citizens and, accordingly, no right to interfere in another sovereign state's affairs, except through international agreements, while private and subnational actors can only intervene in the affairs of others through their national governments. However, the Paris Agreement relies to a great extent on non-state actors such as subnational entities (regions and cities) (Guérin and Tubiana, 2025). Many subnational governments have adopted targets and implemented policies that exceed the national ambition. Moreover, civil society, business associations and major private corporations all play a role in the climate governance process.
- Beyond the climate field, ways have been found to ensure the effectiveness of cooperation

without relying on mandatory global rules. For example, international cooperation on banking regulation takes place within the framework of the Basel Committee on Banking Supervision, but standards set by this committee are not legally binding on financial institutions or national supervisors. Each country remains free to legislate on financial safety matters, though knowing that the Basel Committee regularly assesses national regulatory frameworks and publishes its findings. This mechanism has so far proved effective in ensuring global financial oversight and improving financial stability.

- Specialised public agencies, such as central banks and regulatory authorities, have developed new forms of cooperation that do not directly involve national governments but rest on the similarity of the mandates of institutions to put in place effective arrangements. A particularly telling example is that of competition authorities, which have found a tacit understanding on their respective scope of extraterritoriality and have accordingly developed new modes of cooperation⁸.

Patterns of effective international cooperation have become much more diverse, and further innovations can be proposed

Patterns of effective international cooperation have therefore become much more diverse, and further innovations can be proposed. Examples include the suggestion by Guérin and Tubiana (2025) to give formal status to the involvement of subnational actors by involving them in periodic climate change mitigation assessments; the proposal by Cantillon *et al* (2025) that subnational jurisdictions issue shares that depend for their value on nature preservation performance in their territory; and the plan by Edenhofer *et al* (2025) to entrust a carbon central bank with the mandate of overseeing the market for carbon removals.

Since President Trump took office on 20 January 2025, however, his administration has repeatedly expressed hostility towards the prevailing global governance regime, even going so far as to call it “*a weapon being used against us*”⁹. The US has withdrawn from the World Health Organisation and the Paris Agreement and is actively undermining other multilateral institutions by flouting their principles – in particular the WTO. The US administration is also pushing for a reversal of what it describes as the “*mission creep*” of the Bretton Woods institutions into fields such as climate action, for which the US administration claims they have no mandate¹⁰.

In the context of accelerating deterioration of climate and nature, waiting until the US resumes its participation in global governance arrangements would imply accepting irreversible damage, and likely catastrophe. Against this backdrop, there is growing interest in new forms of international cooperation, such as coalitions of the willing (Blanchard and Pisani-Ferry, 2025), which seek to preserve cooperation among countries that want to safeguard global commons. Such coalitions are also necessary to develop new collective action schemes among subsets of players.

Making coalitions of the willing feasible and effective requires two distinct, but related, problems to be solved. The first is how to address the free-riding problem inherent to action in fields such as climate and biodiversity, where the rationale for cooperation is to ensure proper governance of the commons. The second is how to prevent leakage resulting from the transfer of footloose industries and activities to jurisdictions with less stringent regulatory or taxation frameworks (which would compound the free-rider problem).

The solution to these problems is partly political, but it also rests partly on the design of the coalition. To get a coalition off the ground requires cooperation by a critical mass of countries that have internal governance mechanisms (such as members of the European

8 For a recent review of global governance arrangements, see Papaconstantinou and Pisani-Ferry (2024).

9 ‘Secretary-designate Marco Rubio, SFRC Confirmation Hearing Opening Remarks’, 15 January 2025, https://www.foreign.senate.gov/imo/media/doc/6df93f4b-a83c-89ac-0fac-9b586715afd8/011525_Rubio_Testimony.pdf.

10 U.S. Department of the Treasury press release of 23 April 2025, ‘Treasury Secretary Scott Bessent Remarks before the Institute of International Finance’, <https://home.treasury.gov/news/press-releases/sb0094>.

Union) or are sufficiently politically aligned and economically integrated to punish free-riding. Once critical mass has been achieved, coalitions must minimise leakage by creating incentives for other countries to join.

The four pillars of climate action detailed in section 3 imply a ‘variable geometry’ of intersecting coalitions within the universal membership of the UNFCCC and the UN Convention on Biodiversity. From broadest to narrowest, they are as follows:

1. The potentially widest is the climate coalition corresponding to Pillar 1 of the previous section, members of which would adopt carbon pricing differentiated by the level of development and establish a common CBAM of the type being implemented by the European Union (Clausing *et al*, 2025). Membership should include all countries that have adopted or consider adopting carbon pricing, including China.
2. Next comes a climate finance alliance of advanced industrial countries, plus China, to promote the decarbonisation of the power sectors of as many developing countries as possible (Pillar 2). This coalition could be linked to the architecture of the Paris Agreement by offering sufficient financial support to fund the phase-in of a renewable energy pipeline to all countries that are willing to commit to: (1) net-zero consistent power-sector transformation in their 2025 conditional NDCs; (2) milestones for the phase out of fossil-fuel power sources; and (3) a governance structure to identify and monitor renewables projects and the early closing of fossil-fuel power assets.
3. Green industrial partnerships (Pillar 3) would at a minimum require participation by the EU and a set of developing trade partners endowed with large renewable energy potential. But this coalition should welcome the entry of additional advanced energy importers of steel, chemical and other energy-intensive industries, such as Japan, South Korea, and the UK, and their main developing trade partners. The partnership should be open to both advanced and developing countries, and could significantly overlap with other coalitions. But there will be differences, at least initially. While it is essential that China belongs to the plurilateral CBAM (point 1 above and Clausing *et al*, 2025), and while it is desirable that it belongs to the climate finance coalition, climate finance could go ahead without it. More importantly, adopting a carbon price should not be a condition for advanced country financial support for power sector decarbonisation, but it would be a condition for membership of the plurilateral CBAM.
4. Creating nature finance at scale will require a coalition of countries that are custodians of the world’s most biodiverse ecosystems (Pillar 4). Together, they would participate in a credible mechanism to support large-scale nature restoration and carbon removal by offering nature shares. To succeed, the issuance of these shares should be matched by stronger demand for them – ideally led by a group of advanced countries. The EU could play a pivotal role by fostering the decarbonisation of investment portfolios.

These four coalitions do not just intersect; they also interact and are mutually reinforcing. This is particularly true for the first three pillars:

- Membership of the plurilateral CBAM/carbon price coalition (Pillar 1) would create a price-based incentive to decarbonise the power sector that reduces the need for fiscal subsidies, thereby lowering the fiscal burden shouldered by the members of the financier coalition in supporting decarbonisation in the Global South (Pillar 2);
- Financial support for power sector decarbonisation (Pillar 2) and trade and investment partnerships between EMDEs and the EU (Pillar 3) could make membership of the CBAM/carbon price coalition (Pillar 1) more attractive for EMDEs;
- The decarbonisation of EMDE power sectors, envisaged in Pillar 2, is a pre-condition for the outsourcing of highly energy-intensive production stages to EMDEs with abundant renewables endowments, as envisaged in Pillar 3.

Because they will be mutually reinforcing, these coalitions should be initiated simultaneously and without delay. In this, the EU has a major role to play: because it will likely be part of all coalitions, it should outline a plan, propose a comprehensive agreement, seek alliances and work out the conditions for its international partners to take part. As the driving force of the Paris Agreement and a key sponsor of the Kunming-Montreal Global Biodiversity Framework, the EU has the legitimacy and the resources to promote such an initiative.

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