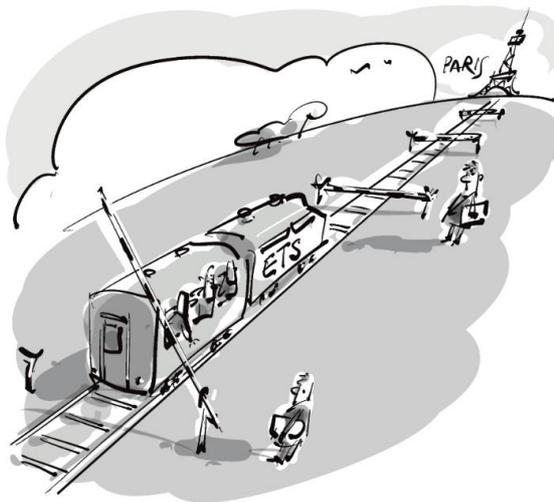


A RECIPROCAL UPDATE FOR THE EU EMISSIONS TRADING SYSTEM

Preventing Deindustrialisation while Advancing Global Carbon Pricing

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A Reciprocal Update for the EU-ETS I

by Nils Hesse

EXECUTIVE SUMMARY

The EU Emissions Trading System for power generation and industry (ETS I) remains the European Union's most effective climate policy instrument, having delivered sustained emissions reductions through a market-based and technology-neutral price signal. Yet as the ETS cap tightens and free allocation is phased out, there is increasing political pressure to protect energy-intensive industry. While the Carbon Border Adjustment Mechanism (CBAM) was introduced to mitigate carbon leakage, it seems so far insufficient to address export competitiveness and downstream leakage risks, and its complexity risks undermining political support for carbon pricing altogether.

This paper argues that the central challenge for EU climate policy is to maintain ambition in an economically sustainable and internationally credible manner. Climate change is a global coordination problem and unilateral tightening of EU carbon pricing in the absence of comparable action by major emitters risks both deindustrialisation and declining political support.

To address this challenge, the paper proposes embedding rules-based reciprocity mechanisms directly into EU-ETS I. Such mechanisms would condition the pace of further cap tightening on observable mitigation efforts by a reference group of major emitters, thereby increasing the likelihood of successful global climate coordination. Concrete design options include cap-based stop points, conditional free allocation, dynamic interaction with CBAM, and the use of high-quality international carbon credits.

Reciprocity is most effective when combined with credible pathways toward global carbon pricing. The paper therefore outlines four complementary routes: extending EU-ETS I to partner countries through aligned emissions trading systems; using an international carbon price floor as a transparent reciprocity metric; forming climate clubs that combine carbon pricing with trade incentives; and employing Article 6 crediting mechanisms as a transitional instrument.

Finally, the paper assesses ongoing EU reform debates around CBAM, EU-ETS I and free allocation, and the Clean Industrial Deal. While recent adjustments may reduce short-term frictions, the layering of exemptions and industrial-policy measures increases complexity and does little to advance a credible global pathway for emissions reductions.

The core conclusion is that EU-ETS I can remain both ambitious and resilient — but only if it is reframed as a reciprocal, internationally anchored instrument that conditions European effort on global progress. Properly designed, reciprocity protects European industry, strengthens incentives for global convergence, and preserves carbon pricing as the backbone of effective climate policy.

1. INTRODUCTION

Europe's flagship climate instrument, the EU Emissions Trading System for power generation and industry (EU-ETS I), has delivered the Union's only consistently successful, economy-wide emissions reductions. By relying on a market-based, technology-neutral price signal, EU-ETS I has reduced emissions while preserving flexibility for firms and sectors. Yet as concerns about deindustrialisation intensify, political pressure is mounting to shield energy-intensive industries through new interventions in the price mechanism and new ad hoc exemptions. These interventions risk undermining the very mechanism that has made EU climate policy effective and credible.

The Carbon Border Adjustment Mechanism (CBAM) was intended to address these tensions by mitigating carbon leakage as free allowances under EU-ETS I are phased out. However, trade unions, industrial stakeholders, and several Member States now argue that CBAM, while useful, cannot fully replace existing leakage protections. In particular, it does not sufficiently address export competitiveness or the risk of leakage along downstream value chains. As a result, scepticism toward CBAM has grown, especially in parts of Eastern Europe, where concerns increasingly extend beyond CBAM itself to the legitimacy of EU-ETS I as the EU's lead climate instrument.

This creates a genuine dilemma for EU climate policy. Heavy-handed interventions into the EU-ETS I price mechanism would weaken the leading climate instrument. At the same time, maintaining a rapidly tightening cap that is largely decoupled from global climate policy developments endangers Europe's energy-intensive industries. EU climate policy therefore stands at a crossroads: it can either reinforce market-based, technology-neutral, and internationally coordinated instruments while rolling back inefficient, fragmented, and interest-group-driven subsidies and regulations — or move toward ever more complex layers of compensation, exemptions, and industrial policy, risking both economic decline and climate-policy backsliding.

Because the atmosphere is global, EU climate policy must ultimately be judged against whether it helps to induce comparable mitigation effort by major emitters outside Europe. While nearly all countries continue to endorse the Paris temperature goals, current pledges and policies still fall markedly short. The 2025 UNEP Emissions Gap Report estimates that full implementation of unconditional NDCs would still leave a gap in 2035 of about 12 GtCO₂e relative to below-2°C pathways and about 23 GtCO₂e relative to 1.5°C pathways. The EU accounts for approximately 6–7 percent of global greenhouse gas emissions, underscoring the limited global impact of purely unilateral tightening.

In this setting, the strategic priority for the EU should not be ever tighter unilateral ambition for its own sake, but the creation of credible incentives for comparable reductions abroad. This matters not only because carbon-intensive production can relocate beyond the EU's borders, but also because lower fossil-fuel demand in Europe can free up consumption elsewhere, reducing the global effectiveness of unilateral cuts in the absence of reciprocity.

This paper argues that the effectiveness of European climate policy must be judged by a simple criterion: whether it helps advance an efficient and credible path toward global climate change mitigation. Atmospheric GHG concentration is a global quantity and requires instruments that create incentives beyond Europe's borders rather than shifting emissions geographically. Against this backdrop, this paper develops a set of policy options designed to prevent European deindustrialisation while strengthening — rather than undermining — the core climate instruments that can ultimately scale globally.

At the center of this approach are rules-based reciprocity mechanisms for EU-ETS I, which link Europe's level of climate ambition to that of its trading partners. Such mechanisms are not openly discussed in the reform debates around EU-ETS I. The underlying idea was proposed by Frontier Economics (Bothe and Reichenbach 2025) and is developed in greater detail and in several design variants in Chapter 2.1. Reciprocity, however, only works if other countries face a credible and attractive pathway to move closer to the EU system. For this reason, Chapter 2.2 examines instruments of internationalisation: the extension of EU-ETS I to partner countries as a first-best option; an international carbon price floor among major economies as both a transparent reciprocity metric and a potential off-ramp from escalating trade measures; climate clubs that combine carbon pricing with trade incentives; and voluntary carbon crediting as a transitional instrument.

Chapter 2.3 turns to the more incremental reforms that the EU has discussed or implemented to improve the functioning of EU-ETS I and CBAM and to cushion adjustment pressures on European industry. These include better harmonised data on embodied emissions, CBAM adaptations such as the extension of scope to downstream products, unresolved questions surrounding export treatment, the interaction between CBAM and the phase-out of free allocation, and complementary support measures discussed under the Clean Industrial Deal. Taken individually, these measures might improve implementation and reduce frictions. Taken together, however, they also illustrate the risk of sliding into an increasingly complex, sector-specific patchwork that does little to bring the world closer to a coherent global system of carbon pricing.

2. INSTRUMENTS

2.1. Rules-based reciprocity clauses for EU-ETS I

A rules-based reciprocity clause for EU-ETS I embeds conditionality directly into the cap trajectory in order to address the central cooperation problem of global climate policy. The core idea is straightforward: the European Union commits to continued emissions reductions along a pathway aligned with the Paris Agreement, but conditions the pace of further tightening on equivalent mitigation efforts by a defined reference group of major emitters, thereby encouraging other countries to follow the example. If that reference group fails to meet agreed benchmarks, the EU temporarily moderates the implementation of additional tightening steps. This moderation can take different institutional forms such as adjustments in the cap trajectory or a temporary flexibility in the allocation of free allowances for energy-intensive industries, while preserving the overall trajectory toward climate neutrality.

Conceptually, this approach draws on insights from game theory and the economics of cooperation, in particular on conditional reciprocity and tit-for-tat strategies. International climate policy exhibits a classic free-rider problem: mitigation efforts are costly at the national level, while their benefits are global and diffuse. As a result, unilateral ambition is fragile and prone to strategic underprovision. As emphasized by Cramton et al. (2017) and Ockenfels and Pahle (2025b), stable cooperation requires reciprocal, rules-based commitments, under which actors agree to contribute if, and only if, others do so as well. In this framework, a globally coordinated carbon price represents the theoretically cleanest benchmark, because it translates collective climate goals into observable, comparable, and enforceable effort levels across countries.

In practice, however, international climate governance has relied primarily on voluntary self-commitments through Nationally Determined Contributions (NDCs). While politically inclusive, this model allows countries to define their own level of effort and enforcement, with no direct consequences for non-compliance. The coexistence of NDC-based negotiations with steadily rising global emissions suggests that decentralised self-commitment alone is insufficient to solve the cooperation problem at the required speed. Reciprocity-based approaches, by contrast, explicitly protect actors willing to move ahead from unilateral overexposure and create incentives for reluctant countries to increase ambition by conditioning further progress on mutual compliance. Thus, a reciprocal update of the EU-ETS I provides a solution for the free-riding problem and can contribute to more ambitious emission reductions globally (cf. Ockenfels and Pahle 2025a).

Embedding reciprocity into EU-ETS I alters strategic incentives in important ways. First, it reduces the attractiveness of free riding. If major emitters fail to contribute, the global benefit of additional unilateral tightening by the EU dissipates, and a reciprocal EU-ETS I framework explicitly reflects this reality. Second, it strengthens incentives for coordinated action: mitigation efforts by large emitters have a disproportionate impact on global emissions and therefore unlock more ambitious collective pathways. This logic is reinforced by behavioural evidence suggesting that cooperation norms are conditional: unilateral climate ambition that is not reciprocated can weaken support for cooperation, whereas conditional commitments help to stabilise expectations and sustain pro-climate coalitions. Third, it prevents the EU and its industry from falling into a dilemma in which Europe deindustrialises and loses wealth on the one hand, while global climate goals fail to be achieved on the other.

The following sub-sections develop concrete design variants for operationalising reciprocity within EU-ETS I. Section 2.1.1 introduces cap-based stop points, trigger conditions, and criteria for composing the reference group. Section 2.1.2 explores alternative flexibility mechanisms, including conditional free allocation, dynamic interaction with CBAM, and use of international credits. Section 2.1.3 discusses the broader implications of such reciprocity clauses for EU climate policy credibility and global cooperation.

2.1.1. Stop Points and Trigger Conditions

A first and transparent way to operationalise reciprocity within EU-ETS I is through pre-defined stop points along the planned cap trajectory. At these points, further tightening of the cap is conditionally paused if observable international reciprocity benchmarks are not met. Stop points do not suspend the EU's long-term climate objectives, but introduce time-based flexibility in implementation, allowing target timelines to be extended if progress at the checkpoints requires waiting for the rest of the world or the chosen reference group. This approach recognises that unilateral cap tightening delivers little to no global mitigation benefits while imposing rising domestic costs.

Stop points should be set at close intervals. This ensures a functioning reciprocity mechanism by creating an almost immediate, mechanical response to insufficient reciprocal action by other emitters. At most, they should be five years apart. At a 2030 milestone (or earlier, via an industry-emergency trigger as soon as possible), a pause could be activated if a defined reference group has not collectively implemented policies consistent with at least a minimum level of economy-wide emissions reductions relative to a recent baseline.

“Comparable ambition” could be assessed primarily based on submitted NDCs. Where NDCs are missing or outdated, an assessment could rely on a proxy benchmark—i.e., an equivalent pathway consistent with the Paris Agreement's temperature objectives, derived from observable domestic policies and projected emissions. In the case of the US, the 2021-NDC could be used.

Once the reference group meets the agreed benchmark, EU-ETS I cap tightening would resume at the same pace as under the original (no-pause) trajectory. The next milestone could be set at 2035, which would correspond to the five-year NDC update rhythm. Again, if the reference group's average projected emissions pathway remains substantially above comparable decarbonisation trajectories, further tightening of the EU-ETS I cap could be temporarily paused. However, waiting times from previous pauses can also be made up if the reference group overachieves its targets and moves faster. Reciprocity can work in both directions. See for an illustration the period 2040-2045 in Figure 1, where emissions under EU-ETS I reduce the gap to the planned path after the emissions of the reference group overachieved their 2040 reduction target.

The same logic would apply at a 2040 milestone, which is legally anchored in the amended European Climate Law as a binding EU target of a 90 percent net reduction in greenhouse gas emissions relative to 1990. At these later stages, the rationale for stop points becomes particularly evident. If major emitters outside the EU are not contributing meaningfully to global emissions reductions, it makes no sense for the EU to unilaterally pursue the remaining and increasingly costly final 10 percent of abatement. From a global climate perspective, policy efforts should focus on the main sources of ongoing emissions rather than pushing the remaining segments of Europe's energy-intensive industry out of the EU without delivering commensurate global mitigation benefits.

Further stop points could then follow at five-year intervals until the final net-zero milestone, currently legally anchored in EU climate law for 2050, is reached. In this way, the mechanism can preserve its incentive effect

vis-à-vis third countries and its protective function for European industry even if the net-zero target has eventually been reached. At the stop points after successfully reaching net-zero emissions within the EU-ETS I, it should, at least in theory, remain possible to temporarily increase the supply of allowances within EU-ETS I to maintain an incentive for emitters outside the EU to keep reducing their emissions until global net-zero emissions are reached. Likewise, a reciprocal extension of the EU-ETS I cap should be implemented if foreign emissions rise sharply.

Institutionally, stop points should be embedded as automatic, rule-based mechanisms in the EU-ETS directive, triggered by transparent indicators and subject to regular assessments. This design avoids discretionary political intervention and strengthens the credibility of the reciprocity commitment. During pause periods, additional revenues stemming from extended allowance auction volume can be partially redirected toward adaptation and resilience, recognising that adaptation investments become increasingly important when global mitigation efforts remain insufficient.

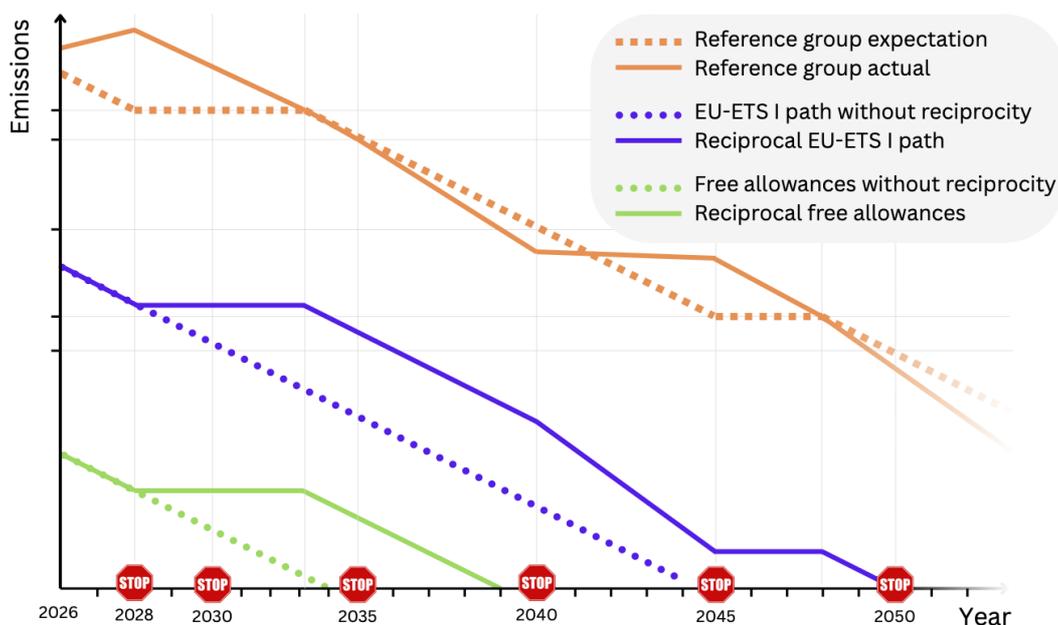


Figure 1: Illustration of the reciprocity mechanism using an example: for the reference group, an expected path and an actual path are compared; at the same time, the graph shows the EU-ETS-I path without reciprocity and a reciprocal EU-ETS-I path.

A crucial design question concerns the choice of the reference group against which reciprocity is assessed. Three options are possible:

The first alternative would be to include the rest of the world as a reference group. The rationale for this approach is that every unit of carbon emissions has the same effect on global warming, and therefore no country should, in principle, be excluded. A disadvantage, however, is that countries not committed to

climate action would automatically drag down the overall mitigation performance of the rest of the world and weaken the incentive effects of a reciprocal element within the EU framework.

A slightly smaller reference group could more closely follow the logic of the Paris Agreement by including only countries that have set their own unconditional NDCs. The advantage of this approach is that performance would be measured against the countries' own commitments. The drawback is that some countries set unambitious NDCs, so the gap between Europe and these countries remains large.

A more precise reference group could be chosen based on explicit criteria. If size, level of industrial development, and emissions are taken as the main criteria, the G20 could serve as such a reference group (see Bothe and Reichenbach 2025). Together, G20 members account for the vast majority of global emissions and comprise both advanced and emerging economies. One particularly promising additional criterion would be to include countries where participation is likely to trigger a policy response. Based on this criterion, a group of countries could be formed that perceive climate change as economically costly and are implementing reciprocal climate policy clauses themselves. As will be discussed in Chapter 2.1.2, this would allow for differentiated treatment vis-à-vis countries without mitigation efforts. A second criterion could be the degree of competitive pressure between domestic industries in the respective countries and European industry, which is particularly relevant from the perspective of carbon leakage and level playing field concerns. The composition of the group could be reviewed and adjusted continuously.

Among these options, a criteria-based reference group anchored in the G20 but refined by additional participation and competitive-pressure criteria appears most promising. It combines sufficient coverage of global emissions with a group composition that is both politically manageable and responsive to reciprocity incentives. Such a group could initially include all G20 members and be periodically revised based on observable policy effort and trade exposure.

Progress within the reference group can be evaluated using observable and already institutionalized indicators, such as emissions trajectories relative to benchmarks derived from the Paris Agreement, while also allowing for the inclusion of countries that are not, or are no longer, parties to the Agreement. Existing reporting and review mechanisms under the UNFCCC already generate much of the necessary data and could be operationalized as formal triggers for stop points and other reciprocity mechanisms within EU-ETS I.

The key advantage of stop points lies in their simplicity and clarity. They directly link the pace of EU decarbonisation to observable global action, protect the EU-ETS from being politically overloaded with ad hoc exemptions, and provide a credible signal that European ambition is conditional rather than naïvely unilateral. At the same time, stop points represent only one design option. In some circumstances, alternative flexibility mechanisms — such as conditional free allocation, dynamic interaction with CBAM, or limited use of international credits — may achieve similar stabilising effects with lower disruption to the cap trajectory. These complementary options are explored in the next section.

2.1.2. Design Options and Flexibility Mechanisms

Stop points in the cap trajectory are not the only way to operationalise reciprocity within EU-ETS I. Reciprocity can be implemented across various instruments through which the EU currently seeks to shield its industry from carbon leakage, incentivise other countries to follow the EU example, and make use of lower abatement costs in other parts of the world. These mechanisms differ in how directly they affect the cap, and how easily they can be integrated into a broader system of reciprocal climate instruments.

Conditional free allocation of allowances

One option is the temporary extension or reintroduction of free allocation of allowances during periods in which reciprocity conditions are not met. If major emitters maintain significantly higher carbon intensities or fail to adopt comparable mitigation policies, limited free allocation could be granted to the most exposed sectors to prevent excessive leakage and relocation risks. As discussed above for the cap adjustment, once peer ambition converges toward agreed benchmarks, free allocation would automatically be phased down again.

While effective in cushioning competitiveness shocks, this option risks entrenching distributional conflicts, has almost no incentive effects on the climate ambition of other countries, and is only usable while there are still enough allowances available in the market. It is therefore better understood as an additional component rather than a main pillar of a reciprocal EU-ETS I reform.

Dynamic interaction with the Carbon Border Adjustment Mechanism (CBAM)

A second flexibility channel lies in linking reciprocity triggers to CBAM parameters. CBAM already transmits the EU-ETS I carbon price to selected imported products, while the precise scope of product coverage is still evolving. These CBAM requirements can be adjusted vis-à-vis individual countries depending on their mitigation efforts. For example, if a country fails to meet its NDC commitments, CBAM coverage could be extended to additional downstream products. Conversely, for countries with harmonised reduction trajectories CBAM requirements could be simplified or relaxed. Over time, the group of countries pursuing ambitious climate targets and applying reciprocal clauses could expand. As CBAM becomes redundant within this group, it could be increasingly confined to countries that continue to resist meaningful climate action (see the discussion of climate clubs in Section 2.2.3).

This approach externalises pressure onto trading partners and reduces the need for direct intervention in the EU-ETS I cap. However, it may increase administrative complexity and trade-policy sensitivity vis-à-vis non-cooperative countries, while reducing burdens for cooperative partners. Used cautiously, CBAM-based reciprocity can reinforce incentives for convergence and reduce the administrative burden associated with CBAM. In the longer term, if an increasing number of countries adopt ambitious NDCs and reciprocal clauses, such mechanisms could even function as an alternative to CBAM itself.

Intersectoral perspective

In this setup, in the short term, it is possible that foreign countries achieve their NDC targets by reducing emissions that are outside of the scope of the EU-ETS I, e.g. by regulatory requirements in other sectors such as housing or transport. In such a scenario, the foreign industry might be subject to less pressure to abate emissions compared to the EU-ETS I carbon price. This would constitute a competitive disadvantage for producers within the EU-ETS I. In the long run, however, implementing such a policy is increasingly costly for a foreign country with decreasing total emissions underway to net-zero, so that at least eventually a level playing field is reattained. Structurally, policies of foreign countries to redistribute carbon abatement costs can be viewed as equivalent to direct monetary subsidies. If, just like with any other internationally traded good, these foreign subsidies appear politically unacceptable, a level playing field could be re-established by equivalent counter-subsidies; in this case it might be appropriate to allocate emission allowances freely to affected industries. Another approach is to use only the foreign emissions in the EU-ETS I sectors as a reciprocity benchmark. This, however, falls short of providing effective incentives to reduce carbon emissions of non-covered sectors in countries outside the EU-ETS, it merely provides a negative incentive to reduce these emissions relative to emissions in the EU-ETS I sectors. The first-best solution to this problem would be to extend the scope of the EU-ETS to cover more kinds of GHG emissions, as planned under EU-ETS II. This would allow an intersectoral search for least-cost abatement and would provide intersectoral dividends equivalent to the ones discussed in Le Moigne et al. (2024). If that is politically not feasible, another approach would be to set up different reciprocal mechanisms, e.g. one for the ETS sectors and one for the total emissions.

Conditional expansion of international credit use

A third option is the conditional expansion of international carbon credit use. Rather than pausing cap tightening, the EU could temporarily allow a higher share of compliance to be met through high-quality international credits when reciprocity conditions are not met. This introduces geographical flexibility while preserving the aggregate emissions target.

This approach builds on the amended European Climate Law that allows the use of high-quality international credits from 2036 onwards for up to 5 percent of 1990 EU net emissions. From a reciprocity perspective, the allowable credit share could increase temporarily up to a clearly defined ceiling if peer ambition remains low and automatically decline once convergence improves. Credits would thus function as a temporary safety valve.

Experience with voluntary carbon markets highlights serious integrity risks, including weak additionality and baseline manipulation. The expansion of credit use can therefore only play a minor role in a broader system of reciprocal instruments. This role, however, could expand once more stringent quality standards are implemented and the risk of contaminating trust in the EU-ETS through low-integrity voluntary carbon markets diminishes.

Comparative perspective

All flexibility mechanisms involve trade-offs. Stop points affect the cap directly and are the cleanest of all options presented here; free allocation redistributes costs internally; CBAM adjustments shift pressure externally; and international credits reallocate mitigation geographically. The key challenge is not to pick a single instrument but to combine them in a disciplined, rule-based manner that avoids the drift toward ad hoc exemptions. Without clear limits and automatic triggers, reciprocity risks degenerating into a patchwork of exemptions. Properly designed, these mechanisms can protect European industry while preserving the market-based logic that makes EU-ETS I scalable beyond Europe.

2.1.3. Implications for EU Climate Policy and Global Cooperation

Reciprocity embeds the EU's long-term climate objectives in a cooperative framework that better reflects the global nature of climate change mitigation. By conditioning the pace of EU-ETS I implementation on peer performance, the EU shifts from a model of unilateral leadership to one of conditional ambition. This approach reduces the risk of overexposure for European industry while contributing to a credible pathway toward global emissions reductions and the gradual convergence toward global carbon pricing.

Internally, reciprocity can strengthen the political sustainability of carbon pricing. Transparent, rule-based triggers reduce the appeal of ad hoc interventions, exemptions, or discretionary compensation once competitiveness concerns intensify. In this sense, reciprocity does not dilute the EU-ETS I; it protects it from being politically eroded when global cooperation falls short.

Externally, embedding reciprocity into EU-ETS I boosts the EU's bargaining position. It creates a clear incentive for major emitters to adopt comparable pricing or mitigation policies in order to unlock further EU ambition and avoid being treated as outliers. Rather than escalating trade measures, reciprocity reframes EU climate policy as an invitation to coordinate — increasing the chances that market-based carbon pricing can evolve from a regional instrument into a scalable element of global climate governance.

This cooperative framing is especially relevant in the context of rising geoeconomic tensions. By anchoring its climate ambition in conditional rather than unilateral terms, the EU can avoid being perceived as imposing regulatory costs on trading partners and instead position itself as offering a structured pathway toward mutual benefit.

2.2. Credible Ways for the Internationalisation of Carbon Pricing

The reciprocity clause outlined in Chapter 2.1 directly addresses the global cooperation problem underlying climate policy by protecting early movers from persistent free riding and by creating incentives for reciprocal action. However, this conditional mechanism is more effective when complemented by credible and transparent pathways toward global carbon pricing.

This is the case for two reasons. First, global carbon pricing lowers the cost of climate mitigation by directing abatement toward those abatement options where emissions reductions can be achieved at the lowest marginal cost; Le Moigne et al. (2024) describe this as environmental gains from trade. Second, the scope of reciprocity instruments can be concentrated on a smaller group of countries, thereby strengthening their incentive effects. Where multiple countries are covered by a common emissions cap through linked emissions trading systems, or at least subject to a shared minimum carbon price, opportunities for free riding and carbon leakage within this group largely disappear. Reciprocity can then focus on countries not yet covered by a common cap or carbon price and contribute to the gradual expansion of the group of cooperating countries.

Taken together, reciprocity clauses and cross-border carbon pricing can reinforce each other and form a coherent policy menu. The following section presents four pathways toward more internationalised carbon pricing. They differ in institutional depth and political feasibility, but all are compatible with a reciprocity-based EU-ETS design and with each other.

2.2.1. Extending EU-ETS I to partner countries through aligned emissions trading systems

The economically most efficient and institutionally most robust pathway toward global emissions trading is deep market integration. The conceptual endpoint is a shared emissions trading architecture in which emissions are capped, and allowances are traded across jurisdictions. Such an architecture ensures that abatement occurs where it is cheapest, while environmental integrity is safeguarded through a binding and declining cap.

Building on the proposal by Andritzky and Hesse (2025), one concrete route toward this endpoint is the extension of the EU-ETS framework to non-EU partner countries that adopt aligned rules, sectoral coverage, and monitoring, reporting and verification (MRV) standards. In an initial phase, participation would focus on the power sector and energy-intensive industry, mirroring the core of the EU-ETS I and the sectors covered by CBAM. A domestic institution—such as a national ETS authority or a development finance institution—would act as a central counterpart, distributing allowances domestically and ensuring compliance.

From the EU's perspective, this approach directly addresses competitiveness and trade concerns. Where a partner country demonstrably applies a comparable carbon pricing regime with equivalent MRV standards, the economic rationale for border adjustments weakens. Existing EU practice already reflects this logic:

countries effectively integrated into the EU carbon market architecture, such as EEA members and Switzerland, are exempt from CBAM obligations (EU 2025). More recently, the Commission has clarified that nominal alignment alone is insufficient and that exemptions require effective market integration, including the possibility of linking carbon markets.

Beyond efficiency considerations, ETS extension has broader strategic value. By offering access to a credible and liquid carbon market, the EU would provide a global public good while anchoring climate cooperation in a shared, rules-based institution. In an environment of increasing geoeconomic fragmentation, such institutional integration carries value beyond climate policy alone.

Crucially, ETS extension and reciprocity reinforce each other. A reciprocal EU-ETS design, as outlined in Section 2.1, increases incentives for partner countries to join a common carbon pricing framework. Conversely, each additional partner integrated into the EU-ETS strengthens the credibility of reciprocity clauses and increases pressure on remaining major emitters to either raise their mitigation ambition or participate in existing carbon pricing schemes. In this sense, market integration is not merely an efficiency strategy, but a central lever for scaling carbon pricing beyond Europe.

2.2.2. An international carbon price floor as a reciprocity metric

Not all countries can adopt a complex cap and trade system in the short run. A second-best pathway is therefore to operationalise reciprocity through an international carbon price floor. Under this approach, countries commit to a minimum effective carbon price, which can be implemented through a carbon tax, an emissions trading system, or a transparent price-equivalent regulatory package.

The key advantage of a price floor is that it transforms abstract climate ambition into a measurable and comparable metric. This makes it particularly suitable as a trigger for reciprocity mechanisms. The International Monetary Fund's proposal for an International Carbon Price Floor explicitly incorporates differentiated responsibilities by suggesting different minimum prices for low-income, middle-income, and high-income countries, commonly discussed as 25, 50, and 75 US dollars per ton of CO₂ respectively (Chateau et al. 2022, Black et al. 2021). Differentiation is central for political feasibility, as a uniform global price, while efficient in theory, risks deterring participation by countries with lower income levels and higher development needs.

In the context of a reciprocity-based EU-ETS, a price floor can serve two complementary functions. First, it strengthens incentives to engage in climate mitigation by promoting carbon pricing as a more efficient instrument than alternative approaches such as regulation or subsidies. Second, it offers a structured pathway away from escalating border measures. If trading partners credibly meet minimum effective carbon price levels, CBAM can be narrowed, simplified, or partially replaced by mutual recognition mechanisms. In this sense, the price floor serves not only as a climate policy instrument, but also as a coordination device that reduces the risk of trade conflict and unnecessary bureaucratic burdens.

2.2.3. A climate club of the willing combining carbon pricing and trade incentives

A climate club represents an intermediate institutional solution between unilateral border measures and fully integrated global carbon markets. Since its core logic is explicitly reciprocal, it institutionalises and extends the logic of the measures proposed in Chapter 2.1 to the global level. Members commit to minimum carbon pricing standards and compatible MRV frameworks and, in return, receive tangible benefits, typically in the form of reduced trade frictions or mutual recognition of standards.

As emphasized by Wolf (2026), the effectiveness of such a club hinges only on a limited set of shared core principles rather than full policy harmonisation. These include a common understanding of minimum ambition levels and sectoral coverage in carbon pricing, shared market rules and technical standards, and a coordinated carbon border adjustment mechanism to safeguard the club against external free-riding.

The appeal of the club approach lies in its modularity. Participation can begin with a small number of high-capacity jurisdictions and expand gradually, while maintaining clear and transparent entry (and exit) conditions. Importantly, climate clubs can accommodate substantial heterogeneity in domestic policy instruments. Members may rely on emissions trading systems, carbon taxes, or hybrid regimes, as long as minimum effective pricing and credible enforcement are ensured.

Institutional coordination is central to this approach. Harmonised emissions accounting, consistent embedded emissions data, and agreed dispute-resolution mechanisms are prerequisites for stable cooperation. Experience summarized by the International Carbon Action Partnership shows that such governance structures are essential for linking emissions trading systems and managing policy adjustments over time (ICAP 2023). Reciprocity clauses can serve as a key binding element within a climate club, structuring cooperation among participating countries. A climate club can therefore function as an institutional incubator for deeper market integration, including eventual ETS linking where feasible (see Burtraw et al. 2013).

For the EU, the club approach offers a way to reframe the CBAM. While it is now widely perceived as administratively burdensome and particularly challenging for exporters in developing countries, a club can shift the focus toward partnership. By bundling MRV assistance, reciprocity clauses, simplified compliance, and clearer benefits, the EU can present climate alignment as an opportunity rather than a punitive trade barrier.

2.2.4. Article 6 mechanisms and voluntary carbon crediting as a transitional bridge

Where explicit carbon pricing is politically obstructed, international cooperation can proceed through carbon crediting mechanisms. Article 6 of the Paris Agreement provides the formal basis for such cooperation,

including the Article 6.4 mechanism, often referred to as the Paris Agreement Crediting Mechanism, which establishes centralised governance, methodological standards, and oversight structures (UNFCCC 2023).

The political attraction of crediting lies in its unilateral implementability and its potential to mobilise financial means for mitigation projects in low- and middle-income countries. It can also help countries build experience with cross-border accounting and MRV, thereby lowering barriers to future adoption of explicit pricing instruments.

However, the limitations of voluntary crediting are well documented (see Weimann (2023) for a discussion). Environmental integrity often hinges on counterfactual baseline scenarios and additionality assessments that are vulnerable to manipulation. Empirical evidence shows that voluntary carbon markets have frequently been characterized by oversupply and weak demand, undermining scarcity and credibility (World Bank 2025). For a reciprocity-based strategy, this implies that crediting can only play a constructive role if it is strictly bounded and governed by robust integrity safeguards. In practice, this requires quantitative limits on credit use, stringent eligibility criteria, conservative baselines, and alignment with Article 6 governance to avoid double counting.

Credit mechanisms should be framed explicitly as a transitional bridge toward the carbon pricing mechanisms described above, not as a permanent substitute. Without such discipline, crediting risks becoming a politically convenient alternative to building real pricing and enforcement capacity, while eroding trust in market-based climate policy more broadly.

Sequencing toward global carbon pricing

Taken together, these pathways form a coherent ladder. Deep ETS alignment is the first-best option because it maximizes efficiency gains under a binding cap and provides the clearest off-ramp from unilateral border measures. An international carbon price floor offers a scalable and politically feasible second-best by supplying a simple reciprocity metric. Climate clubs add an institutional shell that bundles pricing commitments with trade benefits and gradual market integration. Article 6 crediting can support cooperation where political constraints remain binding, but only under strict integrity rules and as a transitional step.

The urgency of this approach is underscored by the current state of global carbon pricing. According to the World Bank, explicit carbon pricing instruments now cover roughly 28 percent of global greenhouse gas emissions and generated more than 100 billion US dollars in revenues in 2024 (World Bank 2025). This progress is significant but still leaves the majority of emissions outside robust pricing regimes. A reciprocity-based EU-ETS I design can therefore be framed not as a unilateral tightening device, but as a structured offer: the EU sustains ambition under cooperation and provides multiple entry points for partners to join a global carbon pricing architecture that supports development, reduces trade frictions, and enhances the effectiveness of global mitigation.

2.3. Current Reform Debates in the EU: CBAM, EU-ETS I Reform, Clean Industrial Deal

From 1 January 2026, the Carbon Border Adjustment Mechanism (CBAM) has entered its definitive regime, replacing the transitional reporting phase. In this regime, importers of covered goods must be authorised, register with national authorities, and surrender CBAM allowances reflecting embedded emissions based on the EU-ETS I price. This aligns CBAM with the phase-out trajectory of free allowances under EU-ETS I through 2034. At the same time, the CBAM architecture remains subject to ongoing debate and adjustment. Several targeted adaptations have already been implemented, and further refinements are under discussion as practical implementation unfolds. The following section reviews the most relevant of these measures.

CBAM simplification, scope extension and export treatment

The simplification package adopted in 2025 made CBAM more operational without fundamentally weakening its climate rationale, notably by expanding exemptions for small importers and introducing temporary procedural fixes. At the same time, European industry continues to push back against the current design and to call for further adjustments and a lower administrative burden.

The central reform debate now concerns the implementation and timing of scope extension. The European Commission's December 2025 proposals aim to broaden CBAM coverage to steel- and aluminium-intensive downstream products — machinery, vehicle components, appliances, construction equipment and similar goods — adding roughly 180 products and thousands of importers to the scheme. While this closes gaps in value chains and reduces carbon leakage risk beyond primary goods, it also adds complexity and costs for importers and customs authorities, and risks turning CBAM into a product-by-product regime.

Despite multiple proposals and sustained industry pressure through 2025, CBAM still lacks a comprehensive export adjustment mechanism. Discussions continue around potential legal and WTO-compatible solutions, such as the allocation of dedicated export adjustment certificates, but by early 2026 these debates have not resulted in adopted legislation. However, the Commission has tabled a Temporary Decarbonisation Fund that would provide targeted and temporary support to operators facing a remaining carbon leakage risk, conditional on demonstrable progress in decarbonisation.

As reviewed by Wolf (2026), all design options for export rebates or compensation schemes generate unintended trade effects, which limit their effectiveness in fully addressing carbon leakage. At the same time, introducing an export adjustment mechanism remains necessary to ensure a level playing field for EU producers in export markets and, if designed appropriately, need not entail higher reporting or administrative burdens than a purely import-based CBAM.

EU-ETS I reform interactions – free allowances

One further measure currently under discussion is a partial reconsideration of the phase-out of free allocation and revise the Market Stability Reserve, should CBAM prove insufficient to prevent carbon leakage in the

short to medium term. In this context, policymakers are exploring targeted adjustments to benchmarks and compensation mechanisms within EU-ETS I to alleviate excessive cost pressure on highly electrified, energy-intensive industrial sectors.

Compared to a reciprocity-based adjustment of free allocation explicitly linked to mitigation efforts in other countries or regions (as described in Section 2.1), this approach relies more indirectly on observed competitiveness pressures faced by European industry as the criterion for extending free allocation. In practical terms, both approaches may result in similar levels of protection for exposed sectors. However, while the incentive effect on other jurisdictions to reduce emissions is already limited under reciprocity-based mechanisms, it is almost absent under competitiveness-based free allocation. By shielding EU industry irrespective of foreign climate ambition, such an approach may even disadvantage third countries that impose higher decarbonisation pressure on their domestic industries and thereby weaken incentives for international policy alignment (Wolf 2026). In effect, unconditional free allocation risks undermining the EU's ability to use market-based climate policy as a lever for cooperative international convergence.

Clean Industrial Deal: targeted support rather than core pricing reform

The Clean Industrial Deal does not primarily reform the carbon-pricing core of EU climate policy. Rather, it combines lower-energy-cost measures, financing instruments and targeted industrial support to accelerate decarbonisation while cushioning competitiveness pressures. Such measures may be justified as transitional support in sectors facing high energy costs and tight investment constraints. At the same time, they confirm the central diagnosis of this paper: absent a reciprocity-based international framework, the EU is likely to rely increasingly on discretionary and sector-specific interventions around the EU-ETS I rather than on a simpler and more scalable path toward global carbon pricing.

Overall evaluation

The EU reform debate has become substantially more concrete since 2025. CBAM is now operational in its definitive phase, simplification rules have been adopted, downstream extension is on the table, a temporary fund proposal addresses part of the remaining leakage risk, and the 2040 climate framework has been legally tightened while incorporating limited flexibility.

Taken together, these developments may reduce short-term frictions. But they also reveal a structural tension. The more the EU tries to repair unilateral carbon pricing through sector-specific additions, the greater the risk of ending up with a complex and politically fragile patchwork. A reciprocity-based architecture would not replace all these measures overnight, but it would provide the strategic logic that current reform proposals still lack.

3. CONCLUSION

EU climate policy faces a strategic choice that will define its credibility for the coming decade. Continued reliance on unilateral tightening combined with ad hoc compensation risks eroding both economic competitiveness and political support for carbon pricing. At the same time, retreating from market-based instruments would undermine the EU's most successful climate policy tool.

This paper has argued that rules-based reciprocity offers a credible path forward. By conditioning the pace of EU-ETS I implementation on observable action by key emitters, the EU can protect itself against persistent free riding while increasing the effectiveness of its climate policy. Reciprocity transforms EU-ETS I from an internal instrument into a strategic lever for international cooperation.

Internationalisation of carbon pricing is essential to this strategy. Extending emissions trading to partner countries, anchoring reciprocity in transparent carbon price floors, and embedding cooperation in climate clubs all provide structured pathways toward global carbon pricing. Where political constraints persist, tightly governed crediting mechanisms can serve as a temporary bridge, but not a substitute for pricing and enforcement capacity.

In contrast, current reform debates around CBAM, extended free allocation, and industrial policy support highlight the limits of incremental fixes. While such measures may alleviate short-term pressures, they risk entrenching complexity and fragmenting incentives if they are not embedded in a broader reciprocity-based architecture.

Ultimately, global climate stabilisation requires scalable, market-based instruments. A reciprocal and internationally anchored EU-ETS I offers the EU the opportunity to strengthen the resilience of its ETS, prevent deindustrialisation, and shift the focus of climate policy from unilateral leadership toward cooperative ambition.

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