



October 2025

From Principles to Practice: Operationalization of a Global Carbon Market under Article 6

Summary

While Article 6 and emerging regulatory standards have laid the structural groundwork for integrity of carbon markets, the real challenge now is operationalizing that framework. In the coming five years, project-based carbon credit markets are expected to undergo a decisive shift from voluntary and fragmented activity to large-scale, compliance-driven demand. Conservative projections indicate that annual demand for regulatory credits including for compliance use domestically and internationally will increase over fivefold between 2024 and 2030, underpinned by substantial sovereign commitments and new domestic legislation. This transition is constructive but not without its challenges.

To support this market growth and beyond, it requires a step-change in project pipelines, transparent registries, coherent legal frameworks and bankable finance to convert commitments into deliverable supply. Without timely coordination and capacity building, project-based carbon credit markets risk mismatches between regulated demand and available supply, limiting the overall potential growth of these markets and therefore the opportunity for trade to enable quicker and more cost-effective decarbonization. This Energy Insight previews both the substantial progress already made since our previous update¹ alongside the future challenges to scale, setting out the practical areas in which policy, market and financial actors must align to enable a truly liquid, global regulated carbon market by 2030.

1. Introduction: The Shift from Policy to Practice

Building upon the foundation laid by the original contribution on the taxonomy of carbon markets², this paper aims to offer a clear and pragmatic narrative around carbon pricing identifying the barriers that often impede engagement with vital aspects of the carbon market and hinders its scaling.

In the past two years, substantial developments have reshaped the carbon market landscape, including global cooperation frameworks, creation of and additions to domestic regulatory markets, and advancing legislation with regards to regulated claims for corporates on emissions accounting and offsetting alike. Most importantly, the completion of negotiations on the Article 6 Rulebook at COP29 in November 2024 has forged a clearer path for international cooperation in carbon trading, marking a significant evolution and underscoring a global commitment to enhancing transparency and consistency across policies.

The dialogue around carbon pricing has shifted focus from the question of “why” it is important to establish the foundational principles of the carbon market to the question of “how” to facilitate the execution and the development of infrastructure necessary for effective market scaling and liquidity.

¹ Hauman, H., Fattouh, B. & Muslemani, H. (2023). The creation of a global carbon market: A taxonomy of carbon pricing under Article 6. Oxford Institute for Energy Studies, Energy Insight 136. Oxford, UK.

² *ibid*



The carbon market's greatest uncertainty now comes not from its validity or its purpose, but in the practical execution and supporting infrastructure required to achieve scale.

The second whitepaper in this series will mirror the same evolution as the first one building on the core definitions and foundational structures described in the first paper. It will describe what has changed, provide descriptions of transactions and trading flows already underway, analyse the inherent challenges to scale, and finally paint a picture of the road ahead to 2030. The analysis aims to inform and engage stakeholders, fostering a shared understanding of the opportunities on the horizon as the world transitions towards a more efficient carbon market which can deliver outcomes effectively to all stakeholders.

2. Taxonomy of Carbon Markets: A Brief Background

The first instalment sought to define the landscape of carbon markets within a taxonomy to simplify what is otherwise a complex topic. To summarize, the taxonomy is framed within these core concepts:

- **Categories of carbon pricing applications:** These are categorised as a penalty, subsidy, or valuation of a carbon sink:
 - Penalties apply to 'positive' emissions, commonly as allowances, permits, or taxes.
 - Subsidies are incentives to reduce 'positive' or increase 'negative' emissions, most commonly in the form of credits but also include tax rebates. Subsidies are the widest category as they have applications beyond carbon markets, extending for example to biofuels and synthetic fuels, carbon capture including for enhanced oil recovery (EOR), and lower-carbon produced hydrogen.
 - Carbon Sinks reference activities whereby the carbon deliverable is the exclusive intent and sole revenue stream. Like subsidies, they exist for projects reducing 'positive' emissions for both industrial or nature-based solutions, such as point-source carbon capture and storage (CCS) or reduced emissions from deforestation (REDD+) as well as 'negative' emissions, such as direct air capture (DAC) or nature-based removals.
- **Design of carbon markets:** As carbon markets are a tool to price an externality, they must be framed within the context of the buyer of last resort be it a regulator, sovereign, or corporate who deem the specifications in accordance with a variety of considerations including:
 - Sectors, industry, and/or activity type.
 - Natural ecosystems including opportunities within the geosphere and/or biosphere.
 - The price, including balancing investment hurdles and economic competitiveness.
 - The impact on communities, including indigenous communities.
 - Temporal considerations reflecting technological availability and progressive ambition.
 - Nature of markets, regulated versus voluntary, with corporate voluntary buyers layering additional priorities based on their geographical operations, expertise, or customer envelope.
- **Core specifications:** These are criteria which define the eligibility and value of a carbon unit including:
 - Regulatory or voluntary registries or platforms which manage the creation, distribution, and retirement of carbon credits.
 - The country of origin.
 - Methodologies such as project types and protocols.
 - Vintage corresponding to the year of emission activity.



Further to this taxonomy, we mapped the **wide range of carbon unit types**, cost of delivery, and mitigation scale potential. This demonstrates how the goals for a 'global carbon price' would oversimplify and underdeliver on a complex asset class. Instead, the heterogeneity of the markets should be embraced if they are to deliver their full potential.

We finished our argument with the view that **Article 6 of the Paris Agreement**, which enables countries to trade carbon credits internationally against their emission reduction targets, whilst not a 'global carbon price' per se, would serve as the current standardized and uniform framework for carbon credit specifications. Our view is that despite this harmonization, Article 6 would create even greater stratification in carbon pricing and carbon markets. This is to be welcomed for this market to achieve its full potential and scale as a standalone commodity class.

Following the finalization of the Article 6 Rulebook at COP29 in 2024, this is now occurring in real time. This Energy Insight seeks to build upon our previous taxonomy with a markets-first approach particularly focusing on Article 6 international compliance markets.

3. The Fundamentals of Article 6

To understand Article 6 international trading it is important to understand the context of the balances which create the need for trade. The fundamentals of the Paris Agreement, and therefore the Article 6 market, are formed by country-level Nationally Determined Contributions (NDCs).

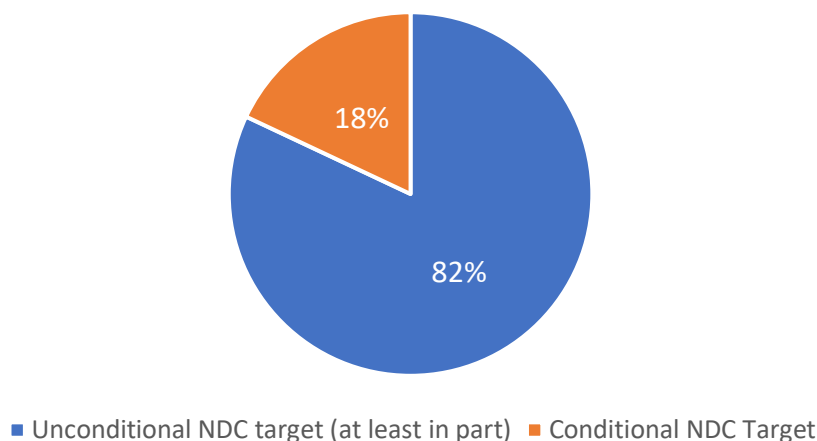
Nationally Determined Contributions (NDCs)

NDCs are the foundation of the Paris Agreement in terms of country-level targets, timelines, and modes of achievement. NDC targets and ambition levels are volunteered by the submitting country every five years which are then aggregated and on a global basis compared to the global ambitions set out by the Paris Agreement. There is naturally a wide range in the scope, specificity, and ambition of NDCs based on country emission profiles, resource endowments, economic and institutional capacity, and intention to engage in trade or collaborate towards emission reduction goals through the transfer of credits. Of the 195 signatory countries to the Paris Agreement, 93, or about half, have indicated the intent to use trade in credits.

NDCs are highly variable depending on country-level ambition and their areas of prioritization. In line with the Paris Agreement's call for developed countries to take the lead, OECD countries tend to have more ambitious targets in emission reductions domestically as well as for international trade, and these targets are unconditional by nature. By contrast, countries in the Global South tend to incorporate two components within NDC targets: one unconditional (based on domestic spending and ambition) and one conditional (subject to international finance) (Figure 1). Inclusion of conditional components within targets align well to international trade, enabling the win-win of emissions reduction and foreign direct investment where governments need it most.

There are further variations in NDCs in terms of sectoral specification (for example, targets related to power generation, or land use sectors), absolute or carbon intensity-based emission reductions, and absolute targets or 'Business as Usual' targets. Timeframes are also a factor, ranging from single- to multi-year goals. This range of expression of NDC targets can make it difficult to compare countries on a like-for-like basis and equally to create definitive numbers for implied targets and progress towards their achievement, and this is still an improving dataset. However, this range of expression remains the most accurate picture today of global progress towards net zero as a shared finish line, but from vastly different starting points.

Figure 1: Proportion of NDCs with unconditional versus conditional targets



Source: UNFCCC 2024 NDC Synthesis Report, Trafigura Research

The Fundamentals of the Paris Agreement

The goals of the Paris Agreement are to limit global warming to well below 2°C, preferably 1.5°C. This commitment represents a reduction in emissions from 57Gt in 2023 to 46Gt per annum by 2030 if we are to achieve well below 2°C, and around 32GT per annum if 1.5°C.³ This suggests a global requirement for emission reduction and/or removals of 11Gt to 25Gt from current levels, with trading occurring at least at the margin (for perspective, the global crude oil market is 5Gt per annum by volume supplied). In this way we can think about the need for emission reductions and removals, or carbon, as a commodity or a natural resource. As with any commodity with a global demand requirement, carbon benefits from utilizing international trade to solve imbalances in the most efficient and cost-effective manner.

This same approach can be applied on a country-level basis in accordance with country-level NDCs. For example, the gap between a country's commitment and its current emissions can allow us to derive its current and forecasted balance of long or short carbon to meet its goals. Countries which are short, or currently emitting more than their NDC target under Paris, have options similar to any other natural resource: to reduce consumption domestically, to incentivize production domestically (in the case of carbon, through incentivizing carbon reduction or removal activities), or to import reductions from another country to satisfy their requirement.

Whilst many countries will use a combination of tactics, the first two do not necessarily translate into carbon pricing or a tradeable market, though carbon markets can be utilized to promote domestic emission reductions. The third option of international trade is what underpins demand requirements for Article 6. This framing is important as it clearly represents the nested structure of carbon markets in terms of how governments leverage domestic regulatory markets to reduce domestic emissions and incentivize carbon reduction or removal activities, and the residual requirement which encourages them to engage in international trade, the combination of which allows them to achieve their NDCs.

Article 6 credits: ITMOs and Corresponding Adjustment

For all international trade under Article 6 of the Paris Agreement, the unit is classified as an Internationally Transferred Mitigation Outcome (ITMO) credit. While ITMO credits can take many different shapes in terms of eligible specifications such as project types, methodologies, and operational modalities, the one thing they all have in common is that they recognize sovereign rights of title in

³ UN Environment Programme (2024). Emissions Gap Report 2024.



relation to claims under the Paris Agreement. In the first whitepaper, we discussed these carbon credit specifications. Article 6 introduces a new specification in the form of a Corresponding Adjustment (CA).

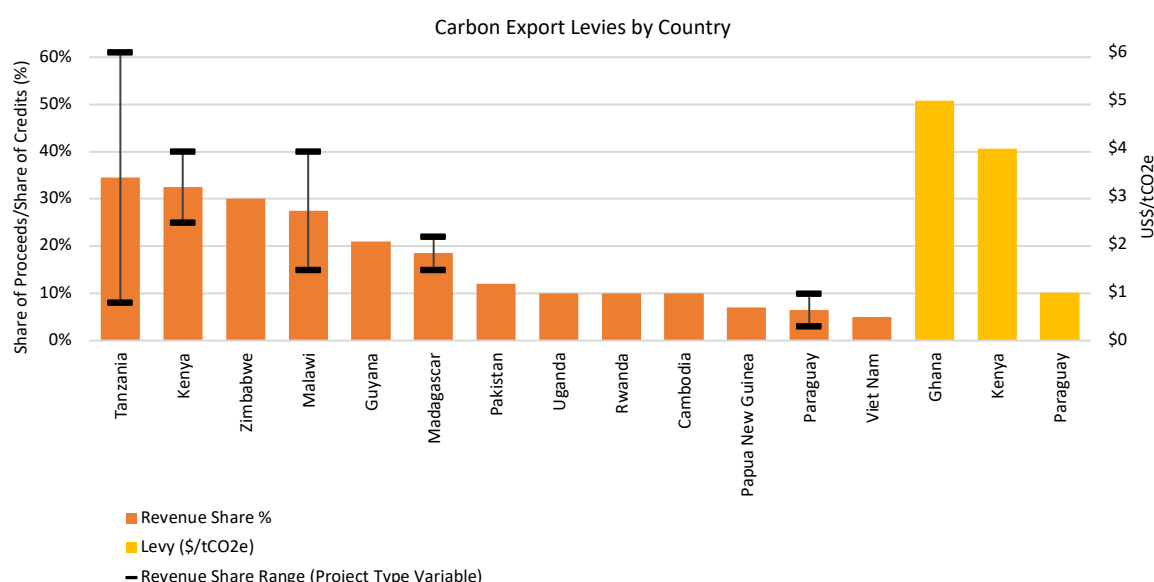
A CA is effectively the commitment that the exporting country will account for the trade in its balances against its NDC target, thus granting it regulatory status under Article 6 for various market use cases. The process for achieving a CA requires host country approvals and adequate reporting to the UNFCCC. Once this process is complete, there is an immutable record managed centrally by the UNFCCC and incorporated in individual country reporting standards for transparency of accounting. CAs are important to ensure that the level of emissions in the atmosphere theoretically balances emissions reported by each country, similar to financial accounting where in double-book entry accounting, a credit is matched by a debit – thus ensuring reconcilability and providing integrity to claims

Host Country Frameworks for Exporting Carbon Credits

Host country frameworks for authorizing CA are tending towards bespoke set ups in terms of which projects may apply for a CA, the process of how this is achieved, and the related fee to be applied. Fees or export levies can be charged as a fixed dollar per metric tonne rate, or a variable share of proceeds (revenue share) based on final sales price (Figure 2). Export approvals defining CA rights can be within a standardized national framework or as a business-to-government agreement which aligns with UNFCCC guidelines. Export approvals are now recognized by the Multilateral Investment Guarantee Agency (MIGA), the part of the World Bank group which provides political risk insurance, if they are conformant with UNFCCC and MIGA policy requirements.

To reiterate the point made in our previous paper, whilst Article 6 provides a standardized framework for credit types and global national emissions accounting, country-level preferences remain bespoke. This is based on their individual country balances as well as government's prioritization of sectors for which it prefers to attract international funding in exchange for carbon credit exports, not unlike the economic principles which apply to the traditionally traded physical commodities today. As a result, countries can exercise discretion on what project types they are interested in 'whitelisting' for export, versus what they prefer to invest in domestically. Sometimes countries adopt hybrid approaches. Examples of the hybrid approach are already being discussed in jurisdictions such as Thailand, South Africa, Indonesia, Colombia whereby some types of credits are only approved for trading in the domestic regulatory market, but more 'premium' or high-cost project types may seek approval for export rights.

Figure 2: Carbon export levies by country



Source: Trafigura Research



Exporting countries, or “host” countries, are incentivized by the ability to attract foreign direct investment, local employment and benefit shares for communities, as well as the ongoing revenue from export levies of credits. For this, the required administrative infrastructure includes everything from designating the ministry for administration, the establishment of country baselines for surety of export capacity, the analysis of approved sectors and appropriate export fees, the registries that should be used, and the digital infrastructure to enable approvals.

For example, something as simple as the designated ministry for lead administration can get quite complex, with coordination between multiple government entities necessary. For example, the Ministry of Environment is responsible for national baselines and Paris commitments, the Ministry of Finance responsible for establishing and collecting levies, and the Ministry of Trade responsible for any bilateral trade agreements with other countries. As was exemplified in June 2025 when the Kenyan National Treasury was attributed responsibility for the “development and promotion of carbon trading (carbon credit markets) as an emerging asset class within the capital markets” whilst the Ministry of Environment, Climate Change and Forestry remains responsible for “climate change/action policy”; and “promotion of low-carbon technologies to reduce emissions”⁴. Whilst there is tremendous support from Non-Governmental Organisations (NGOs) and multilateral institutions such as the World Bank and the Global Green Growth Institute (GGGI) which are actively supporting country capacity development, national legislation and operational frameworks to enable granting of CAs can take at least 12-36 months to operationalize.

The first movers from exporting countries have already begun to see the benefits. For example, Ghana has attracted over \$1 billion USD in direct foreign investment in the first 24 months following their establishment of a domestic policy framework as it relates to Article 6 export of ITMOs. Following this, there have been many more national frameworks adopted for the ability to obtain a CA. Countries with the greatest concentration of investment are those that can provide a clear and consistent national policy, efficient administrative procedures, and competitive export fees.

Importing Countries Differentiated Requirements

Buy-side sovereigns have a different focus in engaging with Article 6 markets. Governments engaging on the buy-side often prioritize activities based on countries with whom they already have relationships and such as trading partners, often seen in the form of regional preference. Others are particularly focused on accelerating specific technologies in advantaged jurisdictions, such as technology- or nature-based removals. But generally, all are engaging with Article 6 in pursuit of reducing the cost of decarbonization via trade versus what could be achieved in their own countries.

No matter the impetus, buy-side countries exercise equal discretion on whitelisted project types, countries of origin, and other specifications they seek to procure. For example, Singapore in 2025 issued a tender to procure nature-based credits from a specific whitelist of countries and conditions, whereas Switzerland presently only purchases technology-based credits from their own list of approved countries. This type of specification and differentiation is not dissimilar to other commodity markets whereby imports may differ on quality specifications such as sulphur, flash, API gravity, or other physical attributes. This level of discretion allows sovereigns procuring Article 6 carbon credits as a form of diplomacy and influence as much as a tool for emissions reduction achievement. At time of writing, governments have already committed to purchasing 87Mt from Article 6 by 2030 alone⁵, with more commitments being added by the day, making sovereign demand a substantial part of overall demand and some of these initial commitments underpinning the balances of the Article 6 market.

⁴ Quantum Intelligence (2025) Kenya's govt. shake-up 'a boon for CO2 credit supply': developers. Available at: https://www.qcintel.com/carbon/article/kenya-s-govt-shake-up-a-boon-for-co2-credit-supply-developers-42909.html?utm_source=chatgpt.com

⁵ As communicated to date by the Governments of South Korea, Singapore, Sweden and Norway.

4. Article 6 in Transactions and Trading

Article 6 is often referenced in aggregate, however there are several transaction modes which occur under its umbrella and with a variety of models and ecosystem players which enable trade. The primary distinctions lie within Article 6.4 and Article 6.2.⁶ The key players involved include the sovereign, the private sector developer, the compliance buyer, and the voluntary buyer, as described previously.

Article 6.4 (PACM)

Article 6.4 is perhaps the easiest to understand as it offers a standardized origination and transaction procedure. Article 6.4 establishes a central, standardized crediting mechanism, now renamed Paris Agreement Crediting Mechanism (PACM), whereby private sector developers can produce credits that are verified and available in the market for both sovereign and private sector buyers alike. The governance of the mechanism is maintained by the UNFCCC to ensure traceability of credit issuances transactions, an immutable record of CAs, and no duplication or double counting. At the time of writing, over 1,000 projects have been submitted for registration under PACM, across 106 countries⁷.

There are of course many conditions to be met to issue carbon credits under PACM, including the standard registration process and required documentation, independent auditing, and annual monitoring typical of carbon credit registries (when required). In PACM, an additional layer requires host country (origin) approval – first for the activity itself, and then separately for determining whether a ton qualifies for export with a CA designation. Both types of approvals result in valid credits within PACM. However as previously described, only a ton with a CA can now be used towards international regulatory purposes, including for eligible compliance markets or by sovereigns to meet their own national targets.

In addition to sovereigns and voluntary corporate buyers being able to transact demand in the standardized market, new regulatory designs now recognize international PACM units as eligible for meeting domestic compliance obligations, as seen in the revised Korean emissions trading scheme. This development brings private sector emitters into the procurement of international PACM units for regulatory purposes at the domestic level.

Article 6.2

Article 6.2 represents trade against Paris Agreement balances but within the context of unstandardized, bilateral frameworks. These frameworks can take two forms, either as government-to-government agreements (G2G) or as establishment of bilateral trade lanes. A traditional G2G agreement is between two governments whereby the private sector may be involved in operations or development of projects but is not a direct party to the transaction. By contrast, bilateral trade lanes establish agreements between countries that define what the host country is willing to export and under what conditions, as well as what the importing country is prepared to accept and under what conditions. Once this lane is established, private sector transactions can occur on either a business-to-government (B2G) basis, or business-to-business (B2B) basis in the event the purchaser is an obligated party.

It is important to emphasize the policy layer again involved in the establishment of trade lanes. Whilst PACM is in effect “turnkey” option for countries seeking to engage with Article 6 after domestic procedures are established, Article 6.2 is bespoke and requires host country capacity to be able to create new agreements. Bilateral negotiations can take another 12-24 months to complete and are naturally high touch given their bespoke nature. As a result, there may be a first mover advantage for countries which create their trading partners early, as capacity for engagement comes with time and administrative constraints and thus future trade lanes may face constraints.

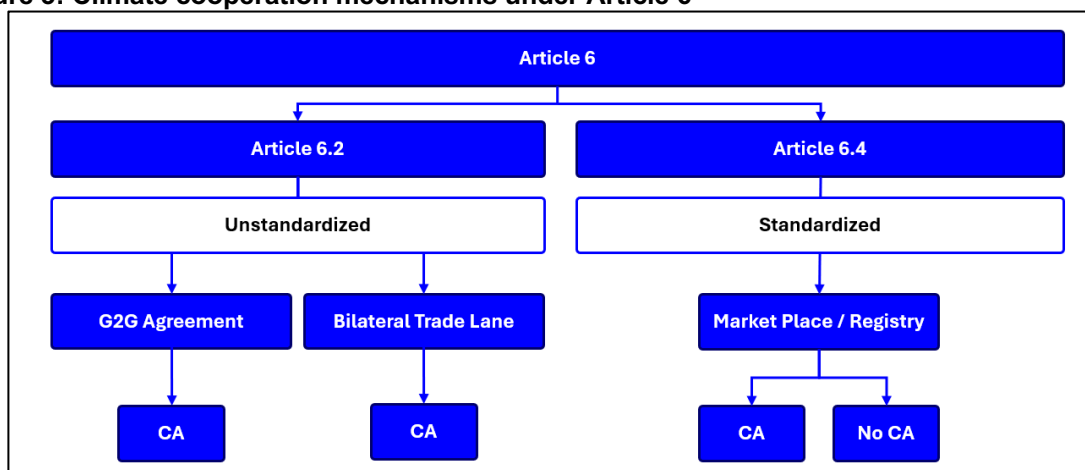
To explain the different modes of transactions and market participants in Article 6.2, we will describe the pure G2G, the B2G/G2B, and the B2B. For example, the G2G Lowering Emissions by Accelerating Forest Finance (LEAF) coalition is a jurisdictional avoided deforestation program issued by sovereigns

⁶ Article 6.8 is not covered here as this is grant-based funding with no change in the title of carbon.

⁷ UNFCCC (n.d.). Paris Agreement – prior consideration list. Available at: https://unfccc.int/process-and-meetings/the-paris-agreement/paris-agreement-crediting-mechanism/A64_prior_consideration/pc-list (Accessed: 29 September 2025)

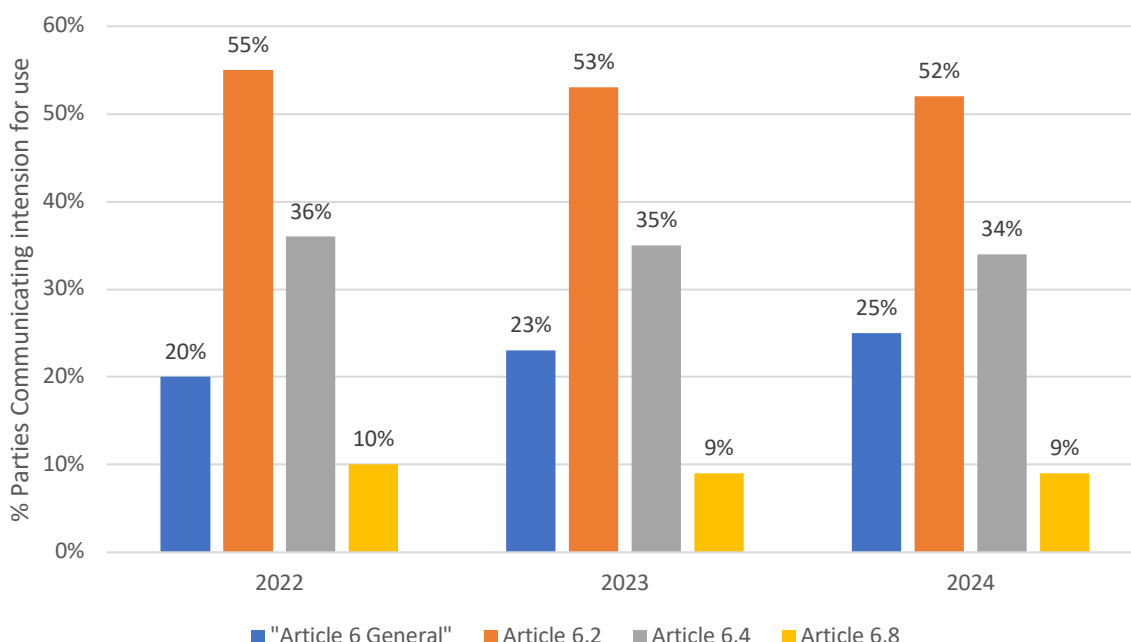
with Norway historically funding credits issues by the program. Purchases to date for LEAF credits have not included CA for Article 6 transfer, however, would be eligible for ITMO status if CAs were applied. In G2B model, Singapore released a tender in 2025 released to the private sector for supply of nature-based credits under Article 6, sourced from countries with which it has a bilateral agreement, mimicking the 'trade lane' approach. It is also under this G2B method that Switzerland purchased credits from a private sector developer in Thailand in 2024. In a B2B model, the new design of the Japanese emissions trading scheme allows for import of international credits which adhere to the Japanese methodologies and mechanism and for which there is an established Article 6.2 trade lane with the supplying country. This extends demand pools to obligated parties within the emission trading scheme, with emitters now a party to Article 6 transactions as designated by the market and the structure of B2B transactions within an Article 6.2 context (Figure 3).

Figure 3: Climate cooperation mechanisms under Article 6



Source: Trafigura Research

Figure 4: Share of Parties indicating intention to use different mechanisms under Article 6



Source: UNFCCC 2024 NDC Synthesis Report

To date, there have been 103 Article 6.2 agreements signed or in progress of signing, which involve over 60 countries. The UNFCCC's last Synthesis Report cites 78% of Parties to Paris have indicated intention to engage in at least one Article 6 mechanism⁸. Whilst transactions to this point have been defined by the first movers, there is a strong expectation of growth in both modes of engagement, especially as the administrative bottlenecks begin to clear for governments to leverage best practices for their own purposes.

5. Article 6-Adjacent Markets: Sectoral Schemes and New Domestic Programs

In addition to significant progress on Article 6 policy development, there has also been substantial advancements on adjacent regulatory markets which leverage Article 6 infrastructure for international trading.

Sectoral Emission Trading Schemes

Since our last update, there was further progress on sectoral regulation covering international emissions from industry such as the International Civil Aviation Organization (ICAO)-operated Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA), and the International Maritime Organization (IMO). In 2024, CORSIA finalized guidance on eligible credit specifications for use towards compliance in its first phase, enabling the first transactions of ITMOs to airlines preparing for their obligations. In April 2025, the IMO approved net-zero regulations for global shipping with a first set of draft regulation setting sectoral targets and creating a market mechanism whereby the most emission-efficient ships can sell surplus units to those behind target. The current draft regulation is set to be approved in October 2025. Whilst the IMO does not utilize Article 6 infrastructure in defining the type of credits that are allowed in the same way as ICAO, this constitutes an important sectoral advancement which covers a significant element of global emissions.

We mention these two initiatives as representatives of the hard-to-abate sectors of the economy, with these sectors in particular focus due to their extraterritorial emissions in international airspace and waters. More sectoral programs are expected to emerge, especially for the hard-to-abate sectors whereby there are no alternative or affordable options for decarbonization in the medium term.

Domestic Regulatory Schemes

In addition to sectoral progress, there has been a flurry of announcements regarding new and expanded domestic regulatory markets. Some announcements have come in the form of new national regulatory markets, such as Singapore, Brazil, India, and Japan, whereas others are reflecting the evolution or the expansion of existing markets, such as Korea, South Africa, Europe and China. Most of these changes come into effect from January 2026 as countries look to further progress towards their Paris targets as well as seek protection against the European carbon border adjustment mechanism (CBAM). CBAM begins next year as a penalty for some EU imports that do not have an equivalent carbon price at origin.⁹

Further, each of the markets named above, despite being unique in application, have the shared feature which is the incorporation of regulatory credits in their design. Some markets, such as China, South Africa, Brazil, and India are focused on domestically produced credits for the time being. However, many of the new markets, such as Singapore, Japan, and Korea, leverage Article 6 infrastructure by incorporating ITMO demand in their design. Jurisdictions such as the EU have now signalled the incorporation of domestic crediting of removals within their carbon market design under the Carbon Removals and Carbon Farming Regulation (CRCF), whilst also signalling a sovereign purchasing of

⁸ UNFCCC (2024) 2024 NDC Synthesis Report. Available at: <https://unfccc.int/process-and-meetings/the-paris-agreement/nationally-determined-contributions-ndcs/2024-ndc-synthesis-report>

⁹ This will be discussed in more detail later in the paper in the context of product carbon footprints.



ITMOs for their international trade requirements. The above represents a tremendous step change in fungibility of international regulatory credits and yet another avenue for Article 6 credit demand.

Voluntary Market Claims

Finally, there is an increase in regulated claims policy, such as the current drafting of the EU's Green Claims Directive which deems legal standing of currently voluntary corporate offsetting claims, and which will likely intersect with Article 6. While not directly involved in international compliance markets, this has relevance as corporates are increasingly purchasing carbon credits while seeking nested status under Article 6 to avoid risk of dispute on claims. The first of such issues have already occurred as in the case of Cote d'Ivoire or Panama whereby there have been conflicts between corporate and government claims of ownership of title.

In effect, both a corporate and government may claim a credit when a corporate's activity falls within the jurisdictional boundary of the government, but there is then a question of the status under Paris, namely if a CA has been claimed to be applied. In the instances of current voluntary buying, a full CA or export approval is not required as it is not a use case under the Paris Agreement. However, there is also the possibility of recognition of nesting in the form of a Mitigation Contribution which leaves the Paris-level balances with the host country but enables a corporate claim which is not at odds with its sovereign producer. As Mitigation Contribution units do not require the CA or its equivalent carbon levy, this enables governments to sell more without impacting their country balances while allowing buyers to engage at a lower price. There is much to be developed in the Regulated Claims space which we will cover in the following section. However, given the potential size of the demand as well as the existing tensions between sovereign and corporate claims, this is another critical market development to monitor.

6. Designing for Scale: Supporting Policy and Infrastructure

In addition to direct policy development related to Article 6 operationalization, there are many other building blocks required to ensure full maturity and scalability of the market. Some of these items are technological in nature but the majority rely on tangential legislation which provides the proper legal basis for reporting, transacting, and managing dispute resolutions.

Emissions Reporting Regulation and Accounting Methodology

One of the most critical elements for ensuring fundamentals and scalability of global carbon markets is emissions reporting legislation such as measurement, reporting and verification laws as well as mandatory disclosure laws. As carbon accounting fundamentals for any sovereign are comprised of the sum of the parts of its land use, industry, households, transport, and operations, legislation to ensure accurate reporting of all relevant entities is critical to ensuring the strength and rigor of country-level NDCs (and therefore the global) balances are correct.

This has already begun in some forms, with the most extensive of requirements in the EU with the Corporate Sustainability Reporting Directive (CSRD) and more than 30 countries progressing International Sustainability Standards Board (ISSB) standards. CSRD requires that companies report on emissions, materiality, and reduction planning alongside financial reporting as of 2026, putting emissions accounting firmly alongside investor metrics and regulatory disclosure. Similar regulation is also coming into effect in the UK, China, Australia, and Singapore. Regulated emissions reporting ensures accountability of the private sector to its disclosures, enabling accuracy of the sovereign assessment and emission reduction trajectory and providing the fundamentals required for the global ledger of carbon trade.

One of the more controversial aspects of the latest raft of emissions reporting regulation is its inclusion of Scope 3, or supply chain emissions which are outside of a company's direct operations and are reliant on data and disclosures from its suppliers and customers to accurately quantify. This is debated for many reasons, namely the fact that Scope 3 can inherently double, triple, and infinity count emissions, creating great opacity in accountability for who is responsible, the lack of product-level standards that would allow for consistent transfer of information in the supply chain, the complexity of



the data management process for complex supply chains, and the ability (or lack thereof) of companies to influence their supply chain.

There is growing support from private sector and regulators alike for a new system of emissions accounting which would rely on product carbon footprint emissions and disclosures (akin to product specifications as with other physical attributes) that would clarify accounting, reporting, and responsibility, especially as it relates to cross-border trade.¹⁰ There are already product-specific regulations such as Europe's CBAM, the European Methane Reporting (EUMR), California's Low Carbon Fuel Standards, and future Emissions Trading System (ETS2) that are based on this concept and require product-level carbon accounting for imports, and in some instances with also a price penalty (CBAM, ETS2).¹¹ In September, the Greenhouse Gas Protocol (GHG Protocol) and International Organization for Standardization (ISO) announced a partnership to align their existing portfolios of standards to harmonize for standardized product carbon footprint methodologies and other initiatives are also emerging. As net zero targets are inclusive of Scope 3, any impacts to the accounting methodology and a change in approach altogether would be extremely meaningful to how we think of global carbon accounting fundamentals.

Regulated Claims Policy

The next layer of legislation to enable scale of these markets is around the concept of regulated claims for corporates, specifically the legal definition of what determines the specifications and conditions for recording an offset of emissions. This is important due to the sheer number of corporates with net zero targets, many with interim targets that have begun or will begin this decade. Many companies have met targets via internal decarbonization efforts thus far. However, as the cost curve steepens, the lack of availability of renewable power and low emission fuels to meet ambitious targets, and macroeconomic pressures all imply that hard-to-abate emissions will become far more difficult to address. Today, there is not a standardized legal recognition of corporate offsetting. This implies that if corporates are delayed on their in-house decarbonization efforts or seeking to be overly ambitious in their programs, they must either make their own rules and criteria for offsetting through carbon credits, which risks media headlines or legal blowback (as in the case of Apple in the state of California or KLM in the Netherlands), or reduce ambition to ensure suitability of targets with available technologies and mitigation pathways.

One area to watch on this topic is the Voluntary Carbon Market Integrity (VCMI) Initiative, led by founding partners UK, Singapore and Kenyan governments and with many more governments having joined since the launch, and which established the Coalition to Grow Carbon Markets at London Climate Week 2025. One of the goals of the coalition is to provide legal standing to offsetting claims for corporates that can be standardized across jurisdictions. This would ground voluntary corporate action into regulatory context with clear legal status and create clear demand signals for the market whilst enabling greater corporate ambition.

Infrastructure Developments

Since the first instalment in this series, there have been strong steps forward in infrastructure development. Whilst there are too many to mention in total, we would highlight progress with the Integrity Council for the Voluntary Carbon Market (ICVCM) on publishing their first labels which serve as international registry governance for methodologies, which is especially critical in a multi-registry Article 6.2 world. There has also been further development of ratings agencies which assess and publicly rate the quality of credits against their methodologies and the launch of the first social integrity financial payments platforms for benefit sharing. Finally, there has been progress in the practical applications for operationalization such as maturation of the Climate Action Data Trust and the legal frameworks to support, such as UNIDROIT guidance on the legal definitions of carbon title.

¹⁰ Hauman, H., Fattouh, B. & Terazawa, T. (2024). Carbon intensity: This overlooked metric is key to the green transition. World Economic Forum.

¹¹ For the purposes of this topic, it is worth noting that "Net Zero" officially includes Scope 3 emissions, with 87% of emissions now covered by a Net Zero pledge between countries and companies.



While this brief description surely does not give the appropriate weight of their impact within the market, it is important to recognize the many legs of the stool that a functioning market stands on. Beyond the fundamentals of policy, it also requires digital, technological, methodological, and legal infrastructure which is fit for purpose and able to scale. It is important to highlight this aspect, as there has been identifiable progress in the means by which to strengthen project quality assurances, registry infrastructure, and the emerging financial and legal foundations that are positioning to meet market needs. This area does not often receive the same level of attention as country policy advancements or trade agreements but is, in effect, the critical plumbing which enables the market to scale.

Finance and Insurance

Finally, there has been strong progress within the financial products space. There have been exceptional strides forward on first transactions specifically in the form of non-recourse project finance, project risk insurance, and sovereign risk insurance which enables a space previously reliant on equity or equity-like financing to now leverage cheaper cost of capital and greater scale. Notable examples of this include commercial banks offering non-recourse project finance on removals projects in particular, often against a bankable corporate offtake. Nowadays, there is a multitude of insurance providers able to write policies on everything from project risk to volume underperformance to buyer replacement tons, to finally the first MIGA insurance being granted to private sector developers to protect CA status. Whilst the transactions remain few, these landmarks are important foundations for what will enable the future scale in terms of capital deployment and risk sharing and are critical blueprints for what others will follow.

7. Looking Forward: The Road to 2030

While there will undoubtedly be many new announcements of supportive policy and market infrastructure in the coming years, we will focus only on what is already known and/or legislated in terms of demand to show a conservative scenario. Regulatory credit demand (for domestic and international compliance use) is already set to increase by fivefold in the years from 2024-2030, dramatically changing the investment required in the supply side of the market but also changing the paradigm of how credits are governed (and perceived).

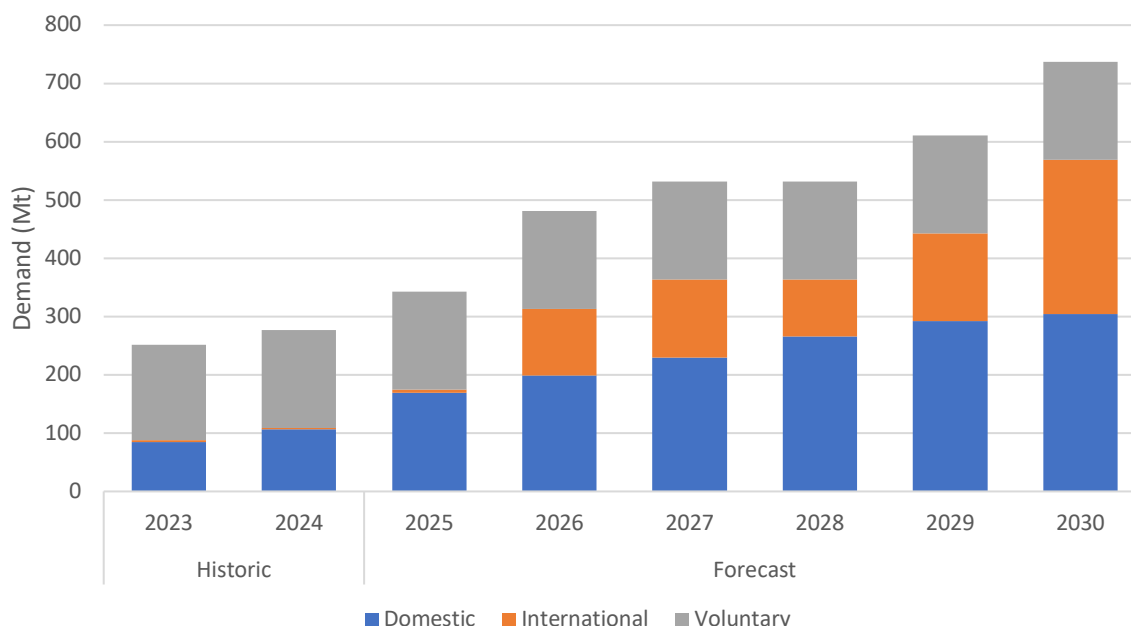
Historically, the term carbon credits have been associated with the voluntary market, which has struggled with integrity challenges on both the supply and demand side with high media scrutiny. This is not surprising given voluntary demand on an annual basis has outsized regulatory demand by measure of volume. One of the most significant changes going forward is this paradigm being flipped on its head, whereby most credits required will now be regulatory grade instead of voluntary. This is a substantial change in terms of the governance and infrastructure required to deliver and retire credits but will undoubtedly have an impact on the psychology of the value and integrity of these credits even as it relates to the voluntary market.

As we look to 2030 based on existing regulation, our most conservative forecast for global demand of credits (including voluntary) is over 700Mt per annum (Figure 5), signified here across global voluntary, domestic compliance, and international compliance. Part of this substantial growth is in advancement of individual markets, such as the CORSIA aviation market increasing its demand in Phase II from 2027. However, the predominant source of demand growth is coming from new, disparate domestic and international regulatory markets marking a strong growth in not just the total demand for credits, but the stratification of specifications likely to be seen therein.

Even in our most conservative demand scenarios, the current pipeline of projects is insufficient to meet the growing demand due to sheer volume growth. There is also a mismatch between current project types and specifications compared to the designated regulatory specifications. In some instances, this is related to project type or methodology, but in most it is due to the requirement of CA. As with seemingly everything in the carbon markets, new project developments take time. On average, it takes 24 months from a project inception to its first production in the form of an issuance. This production lag time means there is a real risk of lack of available eligible credit supply, limiting the growth of the market if administrative operationalization further delays and price signals remain opaque.



Figure 5: Annual demand for project-generated credits from voluntary, domestic compliance, and international compliance markets



Source: Authors' own calculations based on various sources

8. Conclusion

While the Article 6 Rulebook and emerging regulatory standards have established the structural foundation for integrity, the key challenge now lies in operationalizing this framework, including the practical execution and infrastructure required to achieve scale. Current Paris commitments outline a minimum of 11Gt of emission reductions or removals required for 2°C, reaching 25Gt if we are to achieve 1.5°C warming goals by 2030 alone¹², with a cost curve that steepens further from there. While carbon markets will not be the sole mechanism for achieving emission reductions and with penalties remaining the dominant form of global carbon pricing now and likely through 2030, international trade in Article 6 regulatory credits will still play a critical role. Host countries can now leverage Article 6 to enable foreign investment and ongoing revenue streams for exports, whilst buy-side sovereigns can reduce their overall cost of target achievement, with both benefitting from enhanced trade relationships and influence in an increasingly multipolar geopolitical context. The private sector remains critical to this engagement as the drivers of investment once the necessary regulatory, technological, and financial infrastructure has been put in place to enable scale. There have been tremendous steps in the supply side governance as the project-based credit market changes its paradigm from a predominantly voluntary use case to one defined by regulatory use cases. However, we are now witnessing a growing demand emerging through forward regulatory requirements—an impact that can be easily overlooked if not considered in aggregate.

Our conservative global carbon credit demand forecasts already point to >700 Mtpa by 2030 – yet supply pipelines, bespoke host-country CA frameworks, and project lead times create a real risk of governance and delivery bottlenecks. Meeting this challenge requires a few concurrent priorities:

- Interoperable, transparent accounting and registry infrastructure (PACM, meta-registries, clear CA protocols);

¹² UN Environment Programme (2024). Emissions Gap Report 2024.

- Robust legal and reporting frameworks;
- Continued fine tuning of credit quality assessments frameworks, MRV and accounting;
- Scaled financial solutions and risk-transfer instruments; and
- Focused capacity building in exporting countries.

If policymakers, developers, and financiers can deliver on these building blocks, whilst preserving the necessary heterogeneity of credit types and national preferences, Article 6 can deliver cost-effective decarbonization at scale and transform carbon into a truly transparent global commodity.

Acknowledgements

The authors would like to thank Paul Zakkour, Andrea Bonzanni and Julie Mulkerin-Ortiz for their valuable inputs and review of this paper.