LIFE COASE

POLICY BRIEF

LIFE COASE – Collaborative Observatory for ASsessment of the EU ETS

State-of-play in international carbon markets in 2023

Highlights

- This policy brief gives an overview of existing carbon pricing mechanisms and outlines the trends of mandatory and voluntary carbon markets (VCMs) in 2023. It also reviews the integration of carbon markets.
- As of April 2023, 73 carbon taxes and emissions trading systems (ETSs) were in operation, covering approximately 23% of global GHG emissions.
- 28 of these compliance carbon pricing instruments were ETSs at regional, national or subnational levels and covered about 17% of global GHG emissions. The number of ETSs in force will likely rise in the coming years as 8 systems are currently under development and 11 are under consideration.
- After growing rapidly in 2020 and 2021, the issuance of offset credits declined slightly in 2022. Several factors contributed to this decline, including the challenging macroeconomic conditions, public

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skepticism about the quality of credits, and the absence of commonly accepted guidance on best-practice for the use of credits to support net-zero claims.

- Linked ETSs include: the EU and Swiss ETSs since 2020, the California and Québec Cap-and-Trade Programs since 2014, an evolving set of US states participating in the Regional Greenhouse Gas Initiative (RGGI) since 2009, and the Tokyo Cap-and-Trade Program and the Saitama ETS since 2011.
- Progress on the integration of compliance carbon markets via linking has not been rapid. Each system is tailored to its domestic circumstances which makes the required level of alignment for successful links difficult to achieve. Moreover, the potential increase in regulatory uncertainty and the expected negative impacts on the robustness of each system act as strong barriers to linking.
- Connecting ETSs with VCMs should be treated with great caution due to concerns about credit quality as well as monitoring, reporting and verification issues connected with offsets.

Compliance and voluntary markets: their links and connections

The global carbon pricing landscape has become increasingly complex over the years. The World Bank (2023) finds that as of April 2023 there were 73 carbon taxes and ETSs in operation, covering approximately 23% of global GHG emissions. These compliance instruments provide an explicit price signal to incentivize GHG emissions reductions. They also interact with other direct (e.g., the EU's CBAM) and indirect (e.g., fuel excise taxes) carbon pricing instruments. Some of them feature flexibility mechanisms utilizing carbon credits issued by crediting mechanisms which are also suppliers in voluntary carbon markets (VCMs). Against this backdrop, the assessment of the level of integration of the global carbon market, a key aim of this policy brief, requires the specification of certain carbon market concepts and interactions. For the purposes of this brief, the global carbon market consists of both compliance markets for allowances and VCMs and markets for credits where "allowances to emit" and "carbon credits to offset" emissions are traded. The focus of the policy brief is on compliance markets and links between them. Crediting mechanisms and VCMs feature in the publication only to the extent that they interact with compliance markets.

The defining feature of a compliance market is that covered entities are required to obtain and surrender allowances or eligible credits (sometimes referred to as "offsets" or "offset credits") against their regulated emissions.[1] This definition captures a broad range of instruments including ETSs with fixed, i.e., predetermined caps (e.g., EU ETS; California Cap-and-Trade program) and systems where the overall cap on emissions depends on the level of economic activity and may not be known in advance (e.g., China ETS; federal and provincial Output-Based Pricing System (OBPS) in Canada). The compliance units are primarily government-issued allowances, but some systems also allow the use of credits issued by crediting mechanisms. Other types of compliance markets include baseline-and-credit (e.g., Alberta Technology Innovation and Emissions Reduction (TIER) Regulation in Canada; Saitama ETS in Japan) or baseline-and-offset systems (e.g., CORSIA for international aviation) where surrender obligations of covered entities are assessed against an individual baseline. The compliance units which can be used in these markets are credits awarded to overachieving entities by the government in the former, and eligible credits issued by approved crediting mechanisms in the latter. In all cases, the government plays a central role by creating the demand for the compliance units by requiring regulated entities to surrender allowances or credits against their emissions and hence creating the demand for the compliance units.

Carbon credits offer an additional avenue to achieve net-zero goals of various government and private actors. They can reduce compliance obligations

1 Taken together allowances and eligible carbon credits are known as "compliance units". Eligible carbon credits are sometimes called "offsets" or "offset credits" and the qualifiers *eligible* and *carbon* are frequently omitted. The term compliance market can refer to ETSs, cap-and-trade programs, baseline-and-credit systems, tradable performance standards etc. and there is no established taxonomy. Occasionally, the term carbon market is used to refer to a compliance market.

under carbon pricing instruments, as mentioned above, or offset hard- or impossible-to-abate GHG emissions in sectors that are not covered by them. They also provide a source of finance for mitigation activities that are outside the scope of compliance markets, particularly in the developing world and in the near term. The market for credits is where buyers and sellers trade credits issued by domestic, international or independent crediting mechanisms. These credits are generated in projects that meet certain requirements imposed by the governments or the crediting mechanisms. The market for credits simultaneously serves both compliance demand for eligible credits in compliance carbon markets and voluntary demands in VCMs, creating an important connection between compliance markets and VCM markets for offset credits. The defining features of VCMs are that buyers purchase credits voluntarily rather than to meet a regulatory requirement and that supply is driven by crediting mechanisms rather than the government.

Against this backdrop, the current brief uses the description of compliance markets, markets for credits and VCMs to define linking as the possibility to trade compliance units between two or more compliance markets. Specifically, if regulated entities in one compliance market can use compliance units accepted by the regulator in another, then the two markets are linked (e.g., the link between the EU and Swiss ETSs or that between California and Québec).[2] Interactions between compliance markets and markets for credits are referred to as connections. This could involve connections with domestic, international or independent crediting mechanisms. For example, there was a connection between the EU ETS and the Clean Development Mechanism (CDM) when credits issued by the CDM were accepted under certain restrictions. A new international crediting mechanism under Article 6 of the Paris Agreement is currently being set up as the successor to the CDM and may in the future be an important foundation for future connections. Figure 1 illustrates the different concepts related to carbon markets defined and used in this brief.

In this context, we consider that the global carbon market becomes more integrated when a greater number of links and/or connections enable a greater volume of transactions in allowances and credits between and among compliance markets and markets for credits. It is important to note that both links and connections can be domestic or international.

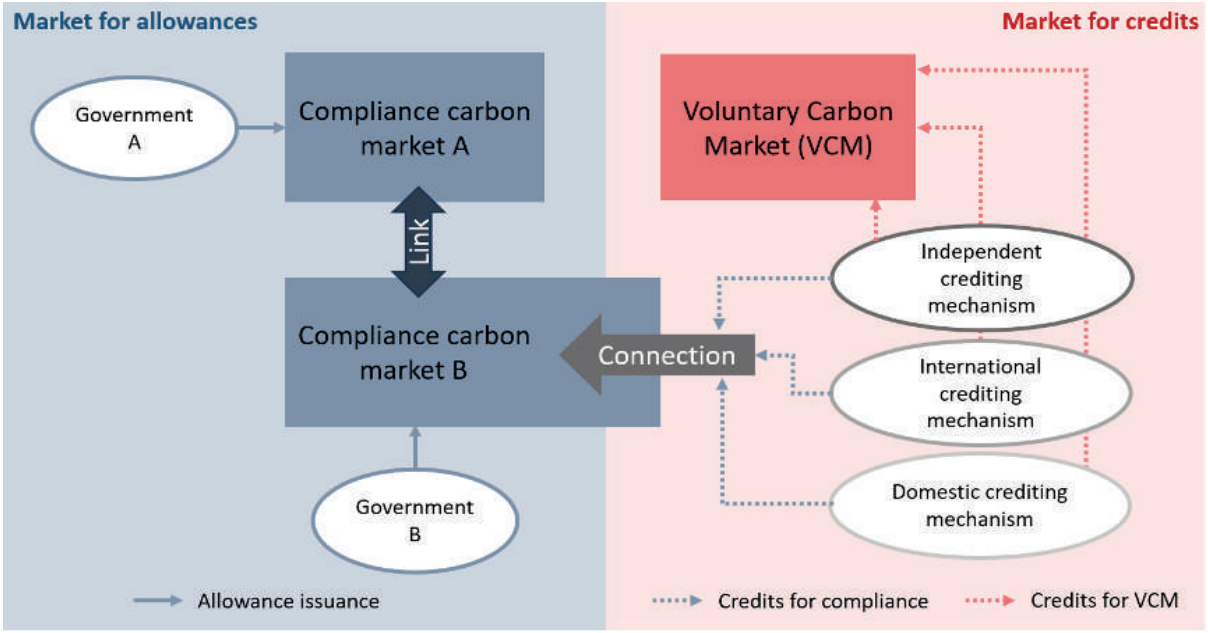

Figure 1: Overview of carbon market-related concepts.

2 Note that linking agreements may explicitly allow the use of credits deemed eligible by the partner regulator.

Review of compliance markets internationally

The diffusion of compliance markets worldwide, particularly ETSs, is developing dynamically. The number of ETSs in force has steadily increased from 13 systems in 2013 to 28 systems in 2023 (ICAP 2023). This includes ETSs at regional, national, and subnational level (see Figure 2). Together these systems cover more than 17% of global GHG emissions at present (ICAP 2023). In 2022, they generated over USD 63 billion in revenues (ICAP 2023). The latest additions include ETSs in Austria (October 2022), Washington (January 2023), and Indonesia (February 2023).

The ETSs in force differ considerably in how they approach regulating emissions. While each system has its unique design features, we can group them into five rough types. The US Regional Greenhouse Gas Initiative (RGGI), the Massachusetts Limits on Emissions from Electricity Generators, the China national ETS, and the Indonesian ETS cover only the energy sector (electricity and/or heat). These systems can be designed to have a narrow scope or be intended to expand their scope over time. The ETSs in the European Union[3], Kazakhstan, Mexico, Montenegro, Switzerland, and the United Kingdom as well as most of the Chinese pilot ETSs[4] regulate big direct emitters and hence cover electricity and heat generation, industry, and/or aviation. These two types focus on regulating point-source emissions. The subnational systems in Beijing, Saitama, Shanghai, Shenzhen, and Tokyo take a slightly different approach. They regulate big emitters in the industry, buildings, and/or transport sectors, covering both direct emissions from point sources and indirect emissions from electricity and heat downstream. The Austrian and German systems focus on smaller emitters, mainly in the buildings and transport sector and/or small industry, regulating fuel distributors upstream. The last type includes comprehensive ETSs that cover a broad range of sectors. The systems in California, New Zealand, Nova Scotia, Oregon, Québec, the Republic of Korea, and Washington fall into this category.

Table 1 presents an overview of the ETSs in force and their respective type while Figure 3 illustrates the sector coverage of individual systems. The percentage values in the outer ring indicate the share of jurisdictions' aggregate emissions covered by the system and the small, encircled arrows identify sectors with upstream coverage.[5]

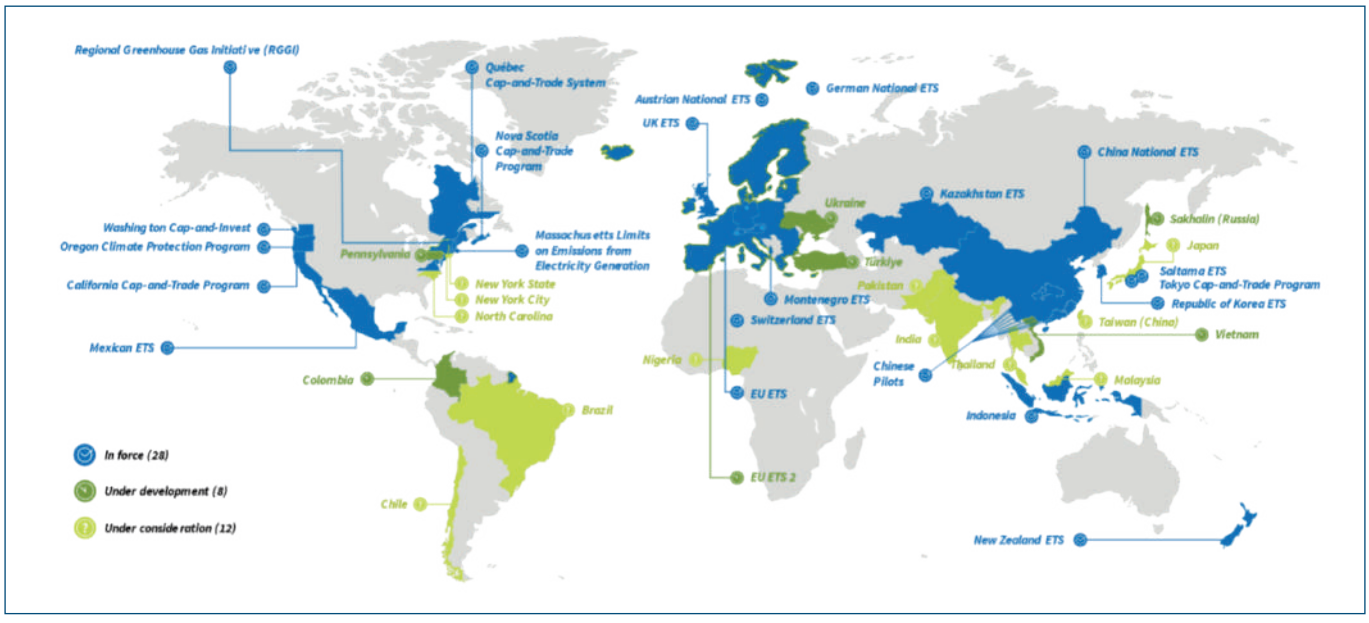

Figure 2: Status of ETSs worldwide (ICAP 2023).

3 In 2023, the creation of the EU ETS2 extended the ETS coverage in the EU to fuel combustion emissions from transport, buildings and some small industry through upstream regulation of fuel suppliers, see https://climate.ec.europa.eu/eu-action/eu-emissions-trading-system-eu-ets/ets-2-buildings-road-transport-and-additional-sectors_en.

4 Chongqing, Fujian, Guangdong, Hubei, Tianjin

5 See ICAP (2023) for additional notes regarding this infographic.

Point source ETS for electricity and heat	Point source regulation of big emitters	Point source and downstream regulation of big emitters	Upstream regulation of small emitters	Comprehensive ETSs
RGGI	European Union	Beijing	Austria	California
Massachusetts	Kazakhstan	Saitama	Germany	New Zealand
China national	Mexico	Shanghai		Nova Scotia
Indonesia	Montenegro	Shenzhen		Oregon
	Switzerland	Tokyo		Québec
	United Kingdom			Republic of Korea
	Most Chinese pilots [4]			Washington

Table 1: Overview of ETSs in force by type.

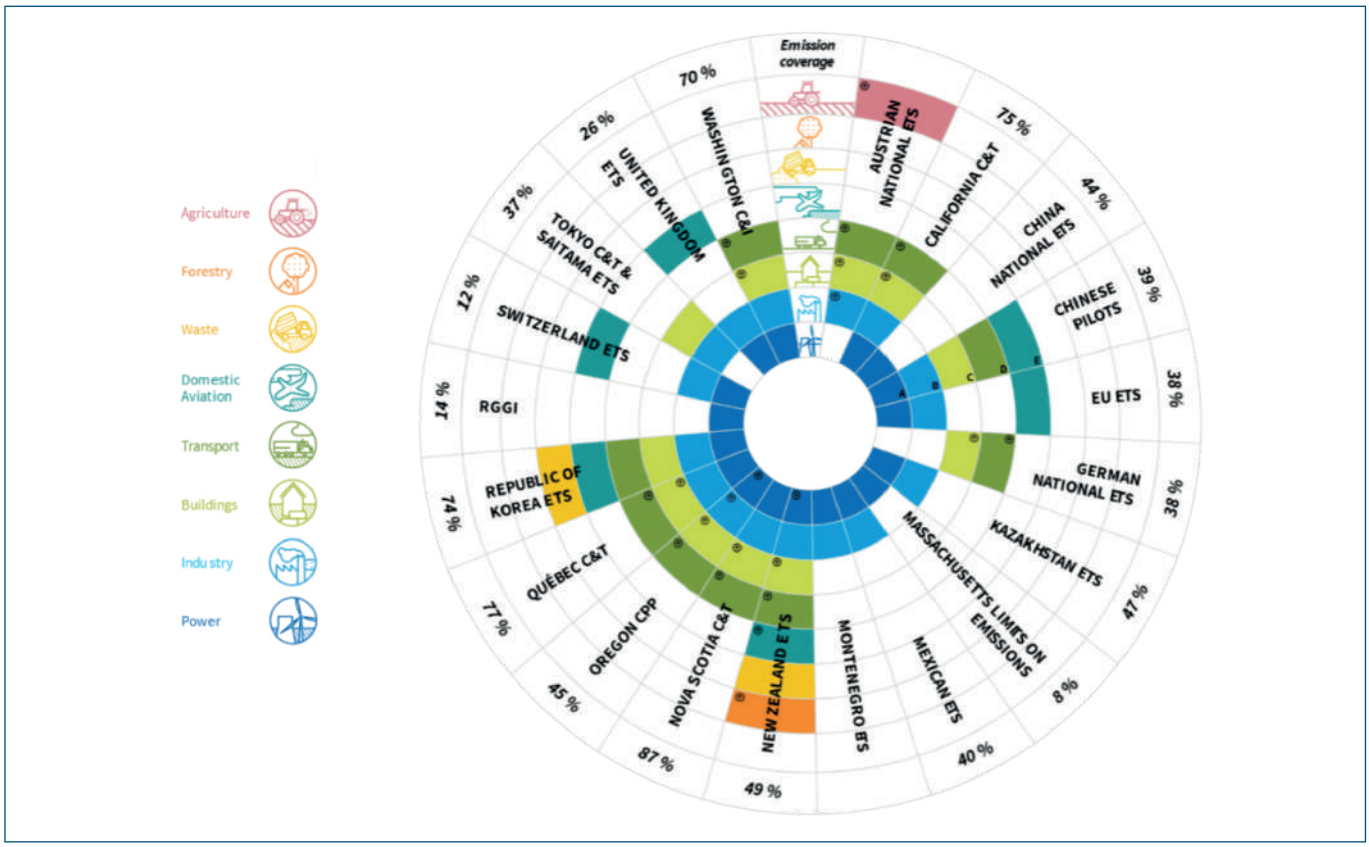

Figure 3: Sectoral coverage of ETSs in force (ICAP 2023).

The potential for ETS linking is particularly big within each of these five types as the scope and regulatory framework will likely be more similar.

Eight ETSs are currently under development. This concerns jurisdictions in which a clear decision has been made, in the form of a law for example, to implement an ETS and authorities are in the process of developing regulation and infrastructure for the ETS. This is the case in Colombia, New York State, Pennsylvania, Sakhalin, Türkiye, Ukraine, and Vietnam. The European Union has developed a second ETS that will cover buildings, transport and small industry and regulate fuel distributors. This system will follow an upstream approach. Eleven other jurisdictions have publicly signalled that they are considering the introduction of an ETS. These jurisdictions are Brazil, Chile, India, Japan, Malaysia, New York City, Nigeria, Pakistan, Taiwan, and Thailand. These systems, which are at different stages of development, are also included in Figure 2 (ICAP, 2023).

Review of markets for credits

Credits for emission reductions and removals can be used to meet compliance obligations of regulated entities under carbon pricing instruments. Indeed, many of the compliance markets mentioned in the previous sections allow credits to be used as offsets, albeit often with strict limits. Credits can also be used by governments to achieve Nationally Determined Contributions (NDCs) or by various public and private actors to set against formal or informal net-zero commitments. To serve demand from these various sources and create a source of financing for mitigation and adaptation activities, there is a large and growing number of (sub)national crediting mechanisms with many more under development, particularly in developing countries, as well as international mechanisms created under multilateral treaties such as the CDM, and independent mechanisms including, among others, the Verified Carbon Standard (Verra) and Gold Standard.[6] After growing rapidly in 2020 and 2021, credit issuance declined slightly in 2022 (see Figure 4). The World Bank (2023) cites three contributing factors to this decline: the challenging macroeconomic conditions; public scepticism around the issuance of low-quality credits, particularly in the forestry sector; and the absence of commonly accepted guidance on best-practice use of credits to support net-zero claims by public and private actors. The issuance of almost 500 million tCO_2e worth of credits in 2022 was largely dominated by independent and international crediting mechanisms which together accounted for 58% and 32% of this volume, respectively. While the 2022 volume is double the number of credits issued in 2018, it continues to be relatively small compared to the current volume of allowances being issued in compliance markets. The International Carbon Action Partnership (ICAP), which tracks the caps of ETSs over time, estimates the volume of allowance issuance to be around 9 billion tCO_2e which implies that the issuance in markets for credits is only 6% of allowance issuance in the same year (ICAP, 2023).

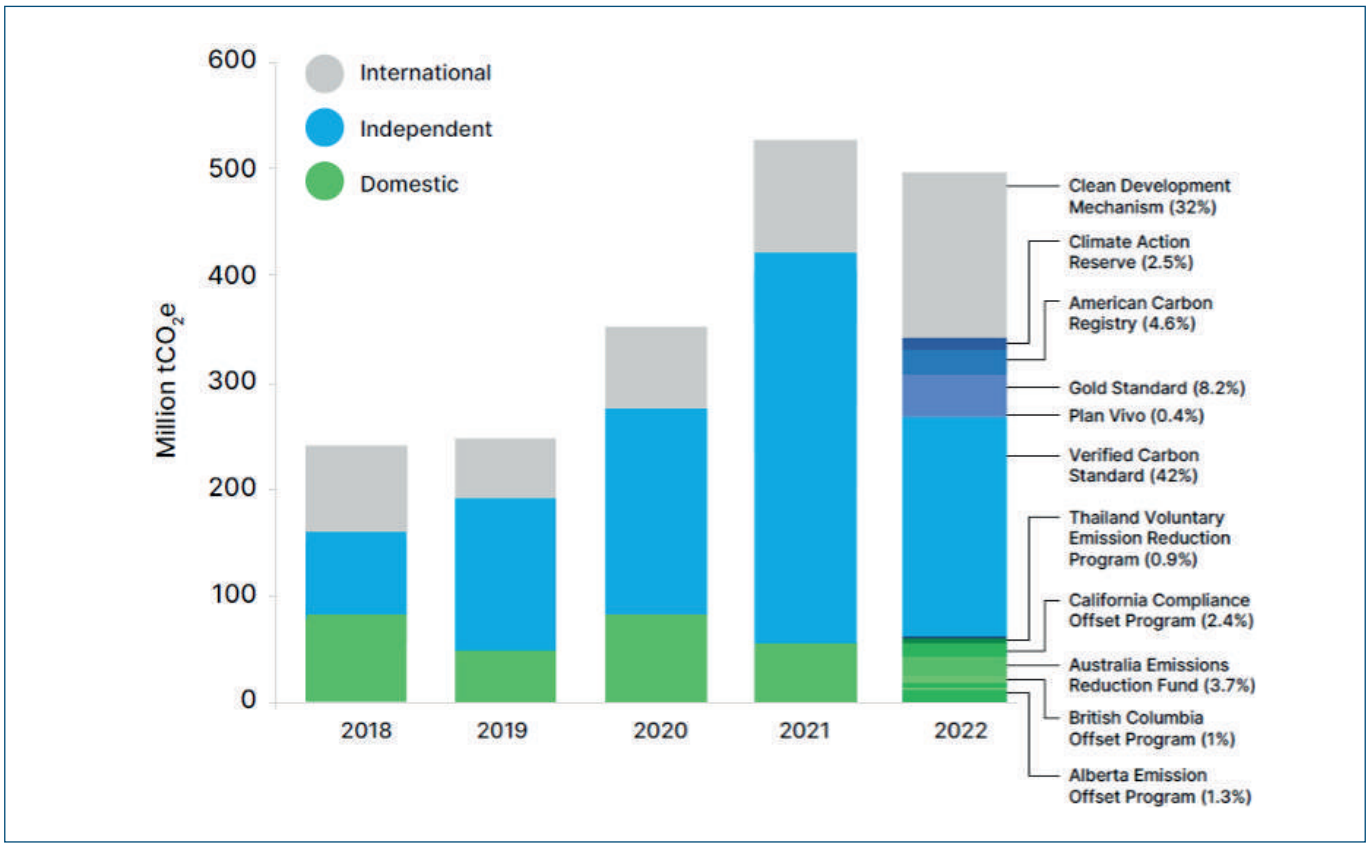

Figure 4: Global volume of issuances by crediting mechanism type, 2018—2022 (World Bank, 2023).

6 See Figure 12 in World Bank (2023) for an overview of national and subnational jurisdictions where crediting mechanisms are currently implemented or under development, noting that it largely overlaps with Figure 2 of jurisdictions with a compliance market.

Based on data from Ecosystem Marketplace and various government sources which track the use of credits for compliance purposes, the World Bank (2023) concludes that the demand side of the market for credits is dominated by voluntary retirements to support private entities' net-zero or similar claims. Just over 43 million credits were retired in 2022 to meet obligations under domestic compliance programs including both compliance markets and carbon taxes.[7] Considering the fact that several large European systems including the EU, UK and German National ETSs do not allow offset credits and those which do place severe restrictions on it, it is not surprising that this figure is small relative to the surrender volume of allowances, which in the EU ETS alone was equal to 1.2 billion in 2022.[8]

There is, however, reason to expect important changes in the market for credits in the coming years, both on the supply and demand side. First, several new domestic compliance markets come into force with plans in place to develop and use domestic crediting mechanisms to feed these compliance markets (e.g., Vietnam and Türkiye). Second, credit demand by airlines regulated under CORSIA is set to increase with the scheme moving into its first phase in 2024 (voluntary) and second one in 2027 (mandatory). Third, the number of bilateral agreements under Article 6.2 of the Paris Agreement to exchange credits is increasing. These so-called Internationally Traded Mitigation Outcomes (ITMOs) refer to the exchange of bilateral mitigation outcomes and can be counted towards the nationally determined contributions (NDCs). Singapore, Japan and Switzerland are the leading acquiring countries with Vietnam and Papua New Guinea, among many others, acting as the host countries for Article 6.2 pilots (see Figure 5).[9] Fourth, since the adoption of the Article 6 rulebook in COP26 in Glasgow in 2021, progress has been made on the details of the international crediting mechanism for the validation, verification and issuance of high-quality carbon credits established under Article 6.4 of the Paris Agreement. Although the adoption of a methodology for implementing the mechanism has been deferred by a year at COP28, the anticipated key functions are as follows. In the future, credits issued by this mechanism can be used in compliance markets outside the host country (similar to how CDM credits were used in EU and New Zealand ETSs in the past), international compliance markets like CORSIA and for NDC achievement. These use cases require that the host country for the credit-generating projects authorizes the credits so that corresponding adjustments are applied to the host and acquiring countries' NDCs. In addition to these ITMOs under Article 6.4, the mechanism can also issue so-called "mitigation contribution A6.4ERs" that do not require corresponding adjustments. These credits can be used for compliance with domestic carbon pricing instruments or to serve domestic voluntary demand in the host country. They can also form the basis of evaluation for international donors who wish to provide finance through results-based climate finance initiatives. Since the associated emissions reductions would only contribute to the host country's NDC, no corresponding adjustment would be necessary. Moreover, under the current rules, the mitigation contribution A6.4ERs can also be sold to buyers outside the host country in VCMs, although there is no clarity yet on what claims the buyers may make since these units are not authorized by the host country governments and therefore do not have corresponding adjustments.

7 The China national ETS and a few Chinese pilots permit the use of Chinese Certified Emissions Reductions (CCERs) and other eligible credits for compliance purposes, however, there is no publicly available data on the extent of retirements for compliance purposes in China. This suggests that the figure quoted in the main text is probably an underestimation. Note that China's GHG Voluntary Emission Reduction Program which generates CCERs was suspended in 2017 but had generated 53 million credits since its inception in 2012.

8 See Dibattista et al. (2023) on the recent trends in VCM, with particular focus on nature-based solutions.

9 Article 6.2 provides the accounting basis compliance unit transactions between linked compliance markets.

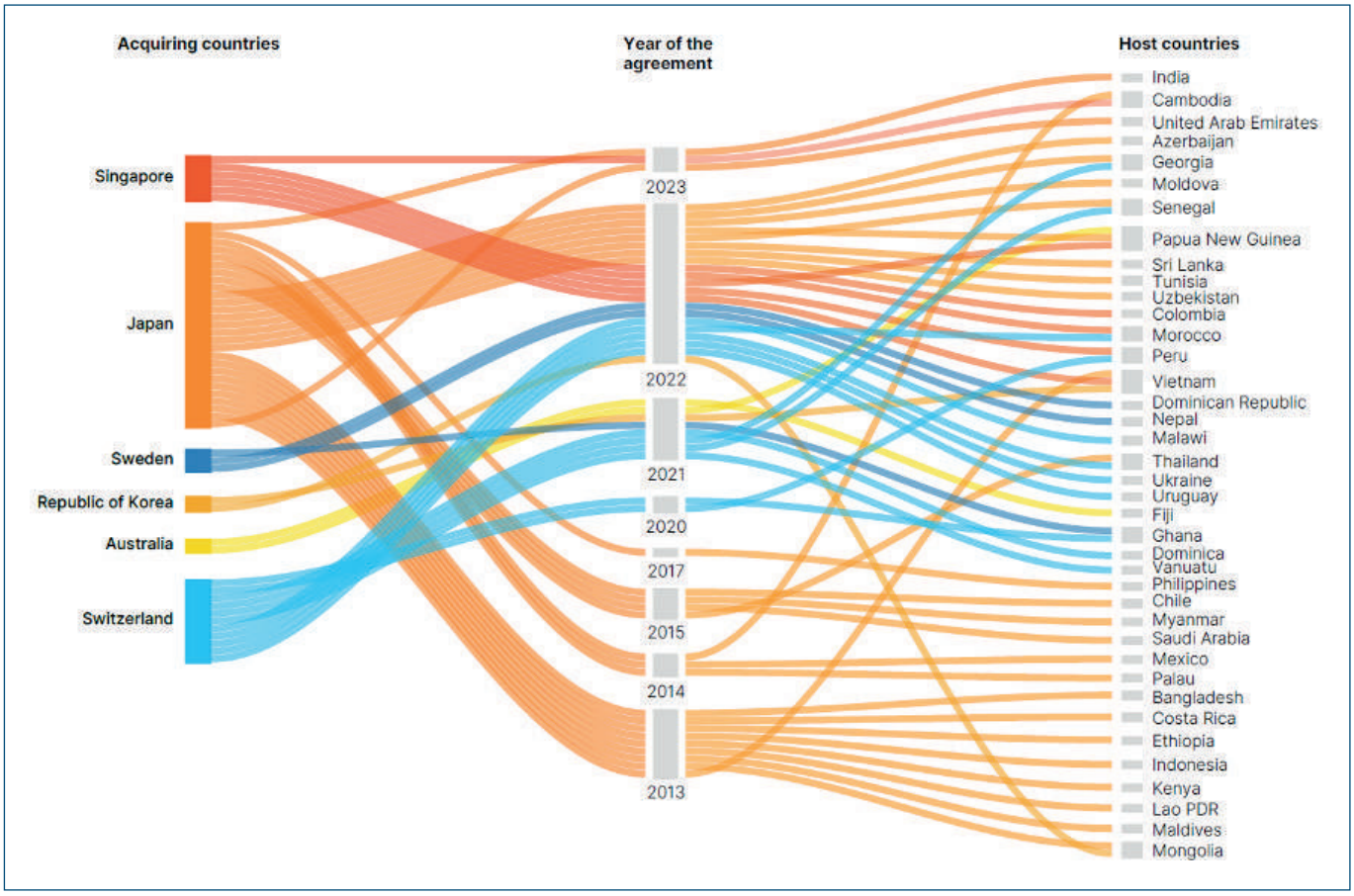

Figure 5: Article 6.2 bilateral agreements as of April 1, 2023 (World Bank, 2023)

First credits under the new Article 6.4 mechanism are expected to be issued in 2024, but the lack of consensus at COP28 concerning the operationalisation of the mechanism may lead to further delays. Important obstacles remain, which may increase delays before the market is fully functioning. These include the lack of a registry for tracking the credits; institutional and technical capacity constraints in host countries for participation in international markets; outstanding questions around the process for giving and revoking authorization; and slow progress on agreeing on the requirements for methodologies of Article 6.4 activities, particularly emissions removals. These topics were high on the agenda during the negotiations at the COP28 in the United Arab Emirates, but no agreement was reached regarding international carbon crediting, delaying the operationalisation of the mechanism for another year.

On balance these changes suggest that the number of links and connections as well as the volume of credits exchanged will pick up in the coming years. There are encouraging signs for greater integration of global carbon markets, specifically for markets for credits via new connections. However, much work remains to be done to ensure that the institutional and technical infrastructure supporting integration is in place, particularly in developing countries.

Review of latest ETS linking developments

The global carbon market landscape includes several compliance markets which are currently linked:

- EU ETS and Swiss ETS since 2020;
- California and Québec Cap-and-Trade Programs since 2014;
- An evolving set of US states participating in the Regional Greenhouse Gas Initiative (RGGI) since 2009;
- Tokyo Cap-and-Trade Program and Saitama ETS since 2011.

This section reviews the developments in these links over the last few years and assesses the outlook for links that may take place in the future.[10]

As the oldest and one of the largest emissions trading systems in the world, the EU ETS has been at the center of many important linking events since 2005. In recent years, the link with the Swiss ETS has worked well. The departure of the UK from the European Union in 2020, which resulted in the UK withdrawing from the EU ETS in 2021, was a major shock to which the linked systems proved resilient. One important implication of the link between the Swiss and the EU systems is that the relevant goods produced by Swiss companies will be exempt from the EU's CBAM when reporting obligations begin in 2023, followed by compliance obligations to surrender CBAM certificates for emissions associated with imports following suit from 2026. This is an important benefit of the linking. It obviates the urge to intervene in order to level the playing field and address the perceived or real concerns of producers whose competitors are subject to regulation under different ETSs.[11] Given the flexibility that the EU-Swiss linking agreement provides, the Swiss government has decided not to introduce an equivalent border mechanism at least until 2026.[12] An additional and relatively minor technical development in relation to the operation of the link has been the increased frequency with which the distinct registries of the two systems are aligned to reflect allowance transactions, changing from twice monthly in 2022 to twice weekly in 2023.[13]

Looking ahead, there are two tracks at the end of which future links to the EU ETS may become operational. First, the UK and EU may decide to link their ETSs. Since the UK ETS is modelled after the EU ETS and given the experience of UK regulated entities with the EU ETS, the technical hurdles to linking are relatively easy to overcome. Both jurisdictions have ambitious and comparable net-zero targets enshrined in law, making legal and economic hurdles relatively easy to tackle as well. The political will also appears to be in place as expressed in Article 392.6 of the EU-UK Trade and Cooperation Agreement of December 2020 stating "The Parties shall cooperate on carbon pricing. They shall give serious consideration to linking their respective carbon pricing systems in a way that preserves the integrity of these systems and provides for the possibility to increase their effectiveness."[14] The recent divergence between EU and UK allowances prices and divergent policy developments, are however making a future link more complicated.

Second, the EU decided to set up a separate ETS for buildings, road transport, and small industry, hereafter EU ETS2, to complement the (existing) EU ETS which covers energy, industry, aviation, and the maritime sectors. The EU ETS2 will start operations in 2027 or 2028, depending on energy price developments prevailing at the time. The flexible start date is an acknowledgement by the EU Commission of the social and political sensitivities around heating and transportation costs. These may have important ramifications for the public acceptability of the EU ETS2 and carbon pricing more broadly.[15] Similarly, one of the main reasons for a separate system is the high uncertainty regarding the price of allowances in the EU ETS2, particularly relative to the price of allowances in the EU ETS at the time. The EU Commission probably wanted to avoid this uncertainty creating price volatility in the EU ETS. However, the EU recognizes that a linked

10 Table 9.1 in ICAP (2021) provides a more detailed account of the key linkage events between 2005 and 2021.

11 The topic of "competitiveness and carbon leakage" is a key theme of LIFE COASE and was explored in the "First International Conference on Ex-Post Evaluation of Emission Trading". See https://fsr.eui.eu/event/international-conference-on-ex-post-evaluation-of-emission-trading/ for further details.

12 The following press release by the Swiss Federal Council (in French) provides additional details: https://www.admin.ch/gov/fr/accueil/documentation/communiques.msg-id-95765.html

13 The following news article provides additional details on this change: https://climate.ec.europa.eu/news-your-voice/news/2023-arrangement-execution-transfers-between-emission-trading-registries-eu-and-switzerland-2022-11-29_en

14 The full agreement text is available at https://commission.europa.eu/strategy-and-policy/relations-non-eu-countries/relations-united-kingdom/eu-uk-trade-and-cooperation-agreement_en

15 The topic of "Social impacts and acceptability of emission trading" is another key theme of LIFE COASE and was explored in the "First International Conference on Ex-Post Evaluation of Emission Trading". See https://fsr.eui.eu/event/international-conference-on-ex-post-evaluation-of-emission-trading/ for further details.

or integrated system would be more cost-efficient.[16] The reformed EU ETS Directive tasks the EU Commission to assess by October 2031 – once the EU ETS2 is fully established – the feasibility of integrating the sectors covered by the EU ETS2 into the EU ETS (European Union, 2023).

A related issue is the future of German and Austrian national ETSs. These two systems are already in force and broadly cover a very similar set of regulated entities to those which will be covered by the EU ETS2. Whether the two countries will opt-in different sectors to the EU ETS2 or continue operating separate or possibly linked systems to the EU ETS2 remains to be seen. The risk of potential double regulation will likely be an important consideration for the EU Commission and these member states when making their decisions.

The resilience of the link between the California and Québec cap-and-trade programs, similar to the link between the EU and Swiss ETSs, was tested by the departure of an important linking partner, Ontario, in 2018. With the aid of joint and individual workshops, both programs are in the process of evaluating potential amendments to the regulations that underpin their cap-and-trade programs as well as the link between them.[17] There will be further consultations on the topics which have significance for the linked system and where amendments will need to be considered jointly. These include cap setting towards carbon neutrality; price control and market oversight mechanisms; and the approach to offsets, Carbon Capture and Storage (CCS) and removal technologies. The jurisdictions are expected to publish draft regulations and documents for stakeholder feedback with the intention of adopting the amendments in summer 2024.

Both California and Québec participate in the Western Climate Initiative (WCI) that provides a regulatory framework for cooperation and implementation of compliance carbon markets. Another member jurisdiction of WCI is the US State of Washington, which launched its Cap-and-Invest Program in January 2023. The State has made a preliminary decision to pursue linking Washington's cap-and-invest carbon reduction program to those in California and Québec. The three jurisdictions will now begin discussing a linking agreement and the required revisions to program regulations. This process is expected to take at least a year during which further input from the public will be sought. Any eventual program linkage will therefore not happen before 2025.[18]

RGGI is the first compliance carbon market in the US. Having started operations in 2009 with linked emissions trading programs in 10 participating states, its membership evolved over time. New Jersey withdrew from the Initiative in 2011 and rejoined in 2020. Virginia joined the Initiative in 2021 becoming its 11th member. However, significant opposition to the State's participation in RGGI is ongoing and it may leave at the end of 2023.[19] Attempts in Pennsylvania and North Carolina to join have not been successful so far. In Pennsylvania, where the program was due to start in July 2023, the regulation underpinning RGGI is being challenged in courts and the State will not enforce it until the case is concluded.[20] The Senate in North Carolina approved legislation in May 2023 to prevent the State's participation in RGGI, ending a two-and-a-half-year quest by environmental groups pressuring the State to join RGGI.[21] These developments notwithstanding, the participating States

16 We suggest distinguishing between linking and integrating to account for the possibility that linking can also have restrictions, for example, on the direction or magnitude of allowance flows from one system to the other.

17 Additional details can be found at: https://ww2.arb.ca.gov/our-work/programs/cap-and-trade-program/cap-and-trade-meetings-workshops

18 Additional details can be found at: https://ecology.wa.gov/blog/november-2023/stronger-together-the-promise-of-connecting-north-america-s-clean-energy-leaders

19 Additional details can be found at: https://icapcarbonaction.com/en/news/virginia-prepares-regulation-repeal-ets-and-withdraw-rggi

20 Additional details can be found at: https://icapcarbonaction.com/en/news/update-pennsylvania-court-enters-injunction-temporarily-halting-rggi-link

21 Additional details can be found at: https://icapcarbonaction.com/en/news/north-carolina-legislature-defeats-hope-joining-rggi

are undertaking the third major review of the Model Rule informed by modelling results and input from stakeholders.[22] The review is expected to conclude in December 2023.

By the standards of its European and North American counterparts, the link between the two baseline-and-credit systems of Tokyo and Saitama in Japan has been functioning relatively uneventfully. The outlook for the linked system will be heavily influenced by the implementation of the GX Plan, a ten-year roadmap for carbon pricing adopted by Japan's Cabinet which includes initial arrangements for a mandatory ETS at the national level from 2026.

Conclusion

The landscape of compliance carbon markets, and particularly ETSs, has been changing dynamically with an increase from 13 to 28 ETSs in force over the past ten years. This includes ETSs at regional, national, and subnational levels. These systems can be grouped into five types: point source ETSs for electricity and heat; point source ETSs for all big emitters; point source and downstream regulation of big emitters; ETSs with upstream regulation of small emitters; and comprehensive ETSs. The number of ETSs in force will likely rise over the future years as 8 systems are currently under development and 11 are under consideration.

Similarly, there have been important changes in the markets for carbon credits. Over the last few years new domestic and independent crediting mechanisms have entered the stage, and the volume of credits issued doubled from 2018 to 2022. As the mechanisms under the Article 6 of the Paris Agreement are developed further and technical as well as institutional capacity is built in their use, particularly in developing countries, it is likely that new connections to compliance markets will emerge and underpin some greater carbon market integration. However, there is an urgent need for reliable carbon credits, given considerable current scepticism towards them, due to the absence of established guidelines to ensure their quality. Many open questions remain relating to the authorization process, dispute settlement and capacity gaps in developing countries.

The further integration of carbon markets through new links between compliance markets has not been very dynamic. Since each system is tailored to its domestic circumstances, linkage is challenging and is only feasible between markets with similar characteristics. More integrated global carbon markets are theoretically desirable, but two important preconditions for linkage and integration are aligned ambition and consistent market regulations. Many questions arise as to the benefits of linking when these conditions are not met. In the last few years, only the links between the EU and Swiss ETSs, and Virginia's program and RGGI were established. Moreover, the UK left the EU ETS when it exited the EU, and Virginia may leave RGGI soon. There is, however, potential for further linking of compliance markets in the near term, for example between the EU and UK ETSs; Washington and the already linked systems of California and Québec; and Pennsylvania, North Carolina and RGGI. Further ahead, the EU will also need to consolidate its carbon pricing framework once the new EU ETS2 covering buildings, road transport and small industries enters into force. This EU ETS2 will likely replace the upstream systems in Austria and Germany. Future editions of this brief will provide updates on these potential links between compliance carbon markets. A focus will also be put on the potential for connections between compliance and voluntary carbon markets. The inclusion of offsets in compliance carbon pricing systems is indeed being discussed as a potential avenue to expand the lifetime of ETSs in the future. Crucially, voluntary carbon credits will also be needed to offset remaining emissions of hard-to-abate sectors.

22 RGGI website defines the Model Rule as the "set of regulations that form the basis for each RGGI state's CO2 Budget Trading Program." The current version of the model rule can be accessed at https://www.rggi.org/sites/default/files/Uploads/Design-Archive/Model-Rule/2017-Program-Review-Update/2017_Model_Rule_revised.pdf

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