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POLICY BRIEF

LIFE COASE – Collaborative Observatory for the Assessment of the EU ETS

State-of-play in international carbon markets in 2024

Highlights

- Compliance carbon markets continue to be at the core of global climate mitigation efforts and raised a record USD 74 billion in revenues in 2023. In 2024, 36 Emission Trading Systems (ETSs) are in force, covering approximately 18% of global emissions. In addition, 22 ETSs are being developed or considered. Japan, Canada, Brazil, India, and Türkiye, for example, are taking important steps towards launching new ETSs.
- Major compliance markets underwent significant reforms in the past year to align them with climate- or carbon-neutrality commitments or to cover new emitters. Sector expansion and possible integration of removals are two emerging themes in key systems.
- Article 6 of the Paris Agreement establishes different market mechanisms that countries can use to cooperate in achieving their climate targets by trading emission reductions or removals with each other.

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However, these mechanisms are not yet fully developed, and technicalities still need to be negotiated under the UNFCCC.

- Several ETSs are currently linked, including the systems participating in the US Regional Greenhouse Gas Initiative, as well as those in Tokyo and Saitama; California and Québec; and the EU and Switzerland. Many of these linked systems have proven to be stable and have featured record-breaking allowance prices in recent years. New links are currently being explored.
- Sector expansion can be achieved by bringing previously uncovered emitters under an existing system (e.g. maritime emitters in the EU ETS from 2024) or by launching a new system to cover them (e.g. EU ETS2 for buildings, road transport and fuels from 2027). These two approaches have different implications for domestic and international linking of ETSs.
- Integration of carbon removals, particularly domestic ones, in the ETS is gaining traction among regulators. For example, the UK government is considering to include engineered removals in its ETS, and the provisional agreement on a certification framework for removals in February 2024 could, in the future, lead to the integration of removals in the EU ETS.

1. Introduction

According to the World Bank, there are 74 compliance carbon pricing instruments covering about 11.7 GtCO2e of GHG emissions, or 23% of the global total. The price signal delivered by these instruments ranges from less than USD1 to more than USD150.[1] At a high level, there are two types of carbon pricing instruments, namely carbon taxes and carbon markets. The latter includes compliance instruments like emissions trading systems (ETSs) with an absolute or intensity-based cap; baseline-and-credit systems; and offsetting schemes as well as voluntary carbon markets. This typology is illustrated in Figure 1.2 The goal of the current report is **to review the latest developments in compliance markets, particularly ETSs, from the perspective of global carbon market integration** through existing or potential future linkages. Credits are considered only briefly and only to the extent that they are allowed in compliance markets through the supply of offset credits approved by the government.

More specifically, we review the significant developments in the compliance markets of key jurisdictions in **Section 2** as these domestic developments and reforms can have implications for the linked markets in other jurisdictions and for assessing future linkability. The compliance markets and jurisdictions which are covered prominently in this report are indicated in the left panel of Figure 2. **Section 3** provides a brief overview of the latest status of Article 6 negotiations. State-of-play in the currently linked markets and the outlook for potential future links is the topic of **Section 4**. Two emerging themes for global carbon market integration, namely sector expansion and the role of removals in compliance markets, are covered in **Section 5**. **Section 6** concludes.

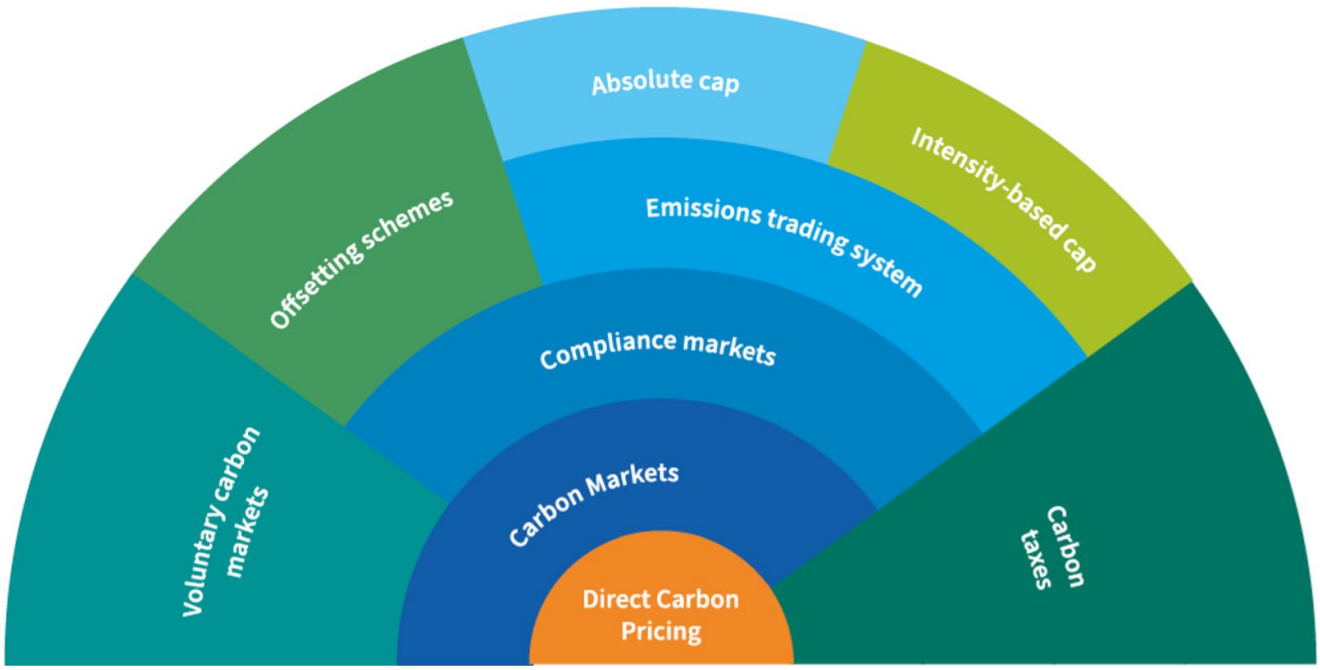

Figure 1: Typology of carbon pricing
Source: adapted from ICAP (2024)

1 For further details see the World Bank Carbon Pricing Dashboard, an interactive online tool at: https://carbonpricingdashboard.worldbank.org/. The statistics in text were obtained on 18 April 2024.

2 A detailed infographic is in ICAP (2024) and Agnolucci et al (2023) provides a taxonomy of instruments.

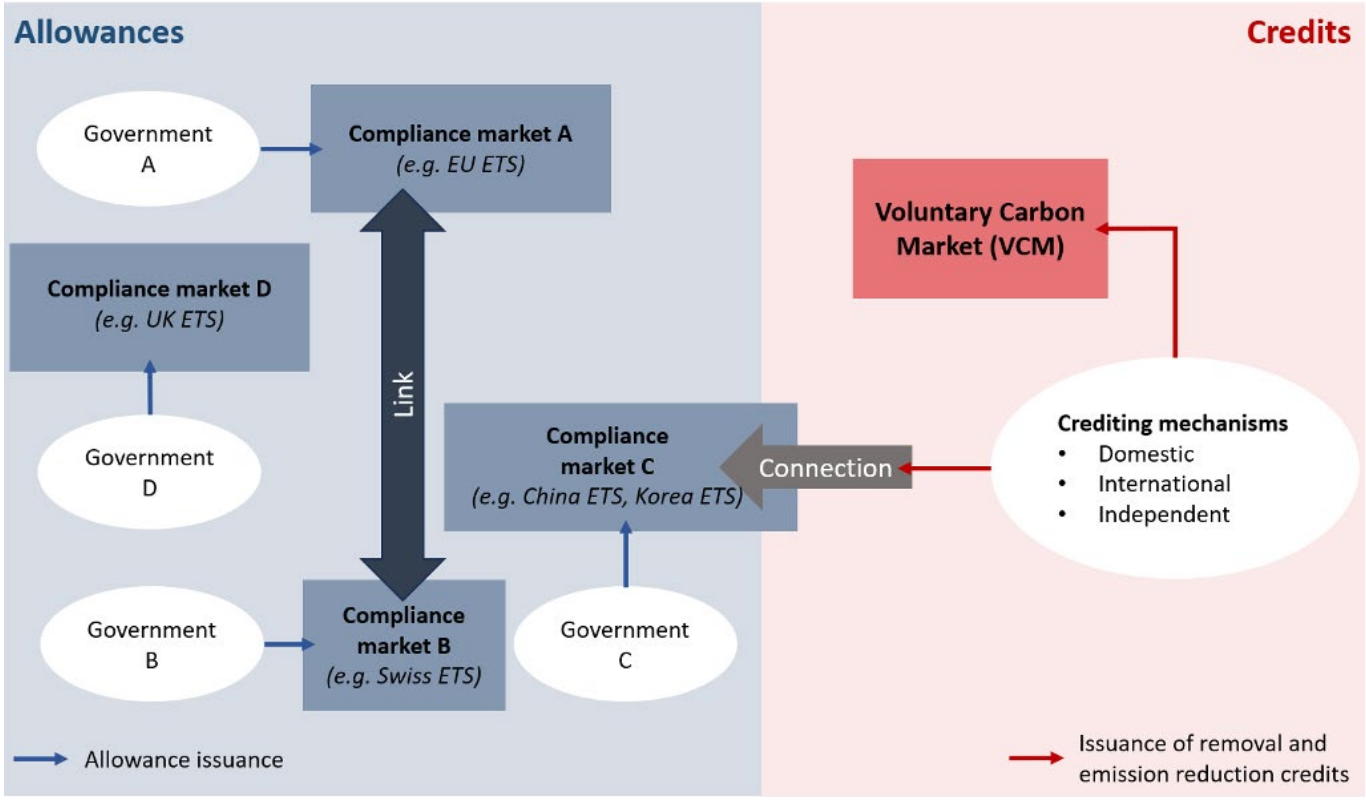

Figure 2: Overview of the carbon market concepts and key jurisdictions in the report

Note: The figure is an elaboration of Figure 1 in Doda et al (2023) and illustrates key carbon market concepts. Note the distinction between a "link" (i.e., the exchange of allowances between two compliance markets) and a "connection" (i.e., the purchases of offset credits for use in compliance markets). Governments are the primary issuers of allowances. Credits are issued by domestic (e.g., China Certified Emissions Reduction program), international (e.g., emerging Article 6.4 mechanism), and independent (e.g., Verra's Verified Carbon Standard) crediting mechanisms. Demand for credits comes from the VCMs and, when allowed, the compliance markets.

2. Review of ETSs internationally

Compliance markets continue to be at the core of climate change mitigation efforts around the world. According to the ICAP Status Report 2024, there are 36 ETSs currently in force, imposing a carbon price on GHG emissions of approximately 10 GtCO2e, which represents 18% of global emissions.[3] The ETSs in force generated a record USD 74 billion in revenue in 2023, which represents a 17.4% year-on-year increase relative to 2022, albeit in nominal terms.[4] In addition to these systems currently in operation, there are 22 ETSs at various stages of development, both in advanced and developing countries. Figure 3 from ICAP (2024) illustrates the spread of compliance markets and indicates jurisdictions where they are in force, under development or under consideration.

Important new compliance markets were announced over the last 12 months. Japan launched a voluntary baseline-and-credit system in April 2023 with plans to make it mandatory for all regulated installations from 2026. Despite its voluntary nature, companies responsible for approximately 50% of national emissions are currently participating in the system. Canada, where a host of federal and provincial carbon pricing instruments are already in force, announced plans to introduce a federal cap-

3 All facts and figures in this section are from ICAP (2024). In addition to ETSs with absolute caps, systems with intensity-based caps are now consistently included in the ETS definition (see Figure 1). This implies the ETS headcount in ICAP (2024) is not comparable to those in ICAP (2023).

4 The increase in the inflation-adjusted, or real, value of the revenues was lower but still significant considering the 2023 inflation rate in the jurisdictions which account for most of the revenues (the EU and its member states, various US states and the UK) was in the low single digits.

and-trade system specifically designed for the oil and gas industry. Several developing countries are also turning to compliance markets. Most notable among these are Brazil, India, and Türkiye, which are building the legal, institutional, and technical infrastructure for their ETSs. During the COP28 in Dubai, Türkiye announced its plans to launch a pilot ETS in late 2024.

Several compliance markets underwent significant reforms over the last 12 months as well. Most importantly, the formal adoption of the main files of the Fit for 55 legislative package by the EU in April 2023 had significant implications for emissions trading in Europe.[5] First, it raises the ambition for emissions reduction for the sectors covered under the EU ETS by increasing the 2030 emission reduction target from 43% to 62% relative to 2005. This aligns the emissions allowed under the EU ETS with the EU's climate neutrality target in 2050. Second, it extends emissions trading to new sectors. Between 2024 and 2026, the maritime sector will be gradually included in the EU ETS and starting in 2027, a new and separate ETS (hereafter EU ETS2) will cover emissions from buildings, road transport and fuels. Third, free allowances under the EU ETS will be phased out over time and in parallel with the introduction of the EU CBAM. The reporting obligations under CBAM started in late 2023, and surrender obligations will follow suit in 2026. Fourth, the rules of the Market Stability Reserve have been revised to ensure a well-functioning market. Fifth, the EU will provide greater support for the decarbonisation of the EU ETS sectors through existing facilities, namely the Modernization Fund and the Innovation Fund. Moreover, a new fund, called the Social Climate Fund, has also been set up to protect vulnerable people and businesses from the impact of EU ETS2. Taken together these funds are critical for enhancing the political acceptability of carbon pricing in the EU.

While some aspects of these reforms are specific to the EU context, efforts to raise ambition and extend emissions trading to new sectors are under way in other key jurisdictions. They have already borne fruit in some. Reforms to the UK ETS in 2023 were also motivated with the desire to bring the cap trajectory in line with the country's net-zero strategy and triggered a 30% reduction in the total num-

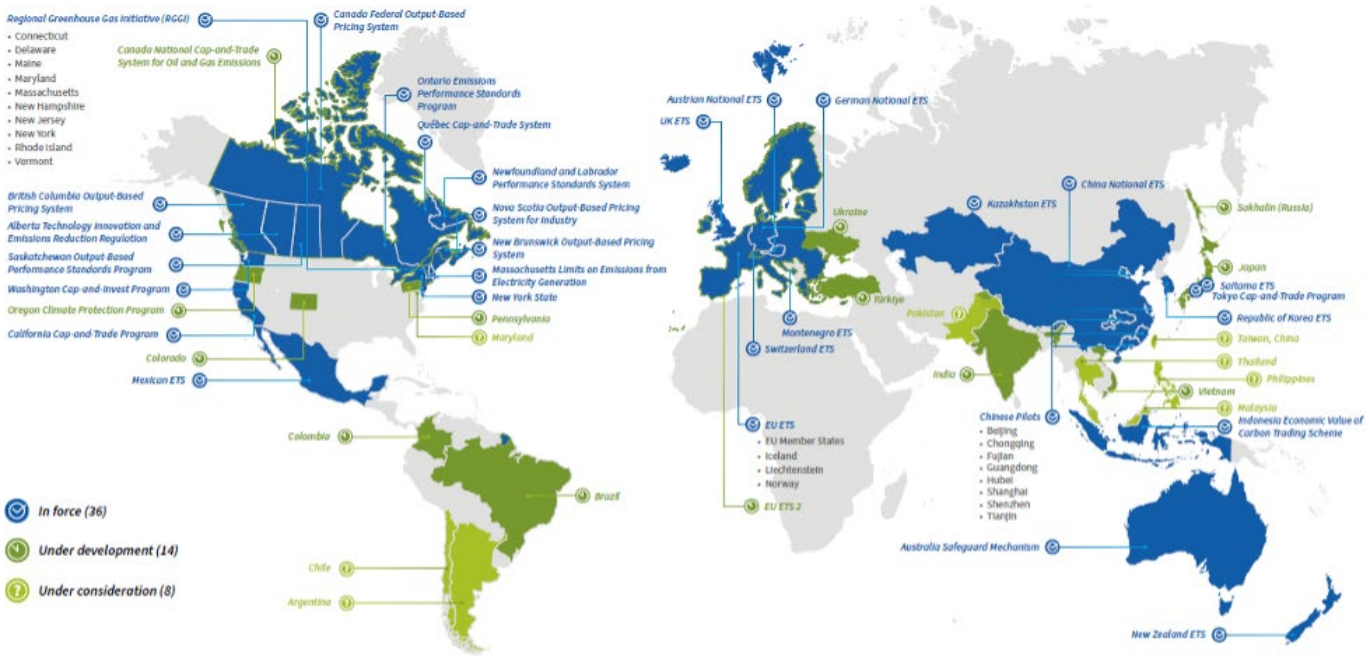

Figure 3: Status of ETSs worldwide
Source: ICAP (2024)

5 The following press release provides additional details on the package adopted: https://ec.europa.eu/commission/press-corner/detail/en/ip_23_4754

ber of allowances available over the period 2021 to 2030.[6] The supply of units to the New Zealand ETS was also tightened in 2023, aligning the cap profile with the country's net-zero target. In China National ETS, the intensity benchmarks have been significantly tightened, effectively increasing the ambition of the world's largest ETS by volume of covered emissions. Similar efforts to raise ambition are ongoing in other jurisdictions, including California and Québec.

Regarding the reforms to extend the coverage of emissions trading to new sectors and emitters, the authorities in the UK and Indonesia as well as in China are making progress.[7] Over a longer horizon, jurisdictions like the EU and New Zealand are considering whether to introduce a carbon price for emissions from the agricultural sector, possibly using emissions trading. The report briefly returns to the issue of potential interactions between sector expansion and linking/connecting carbon markets in Section 5.

The approach to the use of offset credits to reduce compliance obligations varies significantly across jurisdictions, but three clusters can be identified (see Table 1). Some jurisdictions do not currently allow offset credits at all (e.g., the EU, Germany, the UK, etc.). Others allow it but only for a small share of compliance obligations, typically in the low single digits (e.g., RGGI, California, China, etc.). A few jurisdictions permit a higher share, typically greater than 60% of compliance obligations and up to 100% (e.g., Alberta, Canada, Indonesia, etc.). Most jurisdictions that allow offset credits currently only do so for credits generated domestically. The only exception is Korea, which also accepts international credits.[8] This pattern may change in the years ahead as more countries participate in the mechanisms envisioned under Article 6 of the Paris Agreement (see Section 3).

A key development in this respect is the reactivation of the Chinese Certified Emissions Reduction scheme (CCER) in January 2024. CCER is the source of offset credits for China national ETS, as well as some regional pilots. It was suspended for six years, a period during which the scheme underwent significant reform.[9] Given the 5% limit on offset credit use in China National ETS, the compliance demand for credits generated under CCER could be as high as 250 MtCO2 per year (i.e., the volume roughly corresponding to the emissions covered by the German National ETS).

Another emerging trend for the future interaction of the markets for allowances and credits is the increasing prominence of removal credits relative to emission reduction credits. Both engineered and nature-based removal credits are critical for reaching net zero (ICAP, 2021). Jurisdictions with ETS are exploring the potential role of removal credits in their compliance markets. The UK government, for example, has consulted on the topic and already signalled its intention to include engineered removals in the UK ETS in the future.[10] The EU is also considering the option of including engineered removals in the EU ETS.[11] A key first step to that end

6 Like the EU, the UK is concerned about the impact of a tighter cap on competitiveness of UK businesses and the risk of carbon leakage. Consequently, the UK government has announced its intention to introduce a CBAM from 2027 and is currently conducting a public consultation on the topic. For details see: https://www.gov.uk/government/news/new-uk-levy-to-level-carbon-pricing; https://www.gov.uk/government/consultations/consultation-on-the-introduction-of-a-uk-carbon-border-adjustment-mechanism

7 The UK is considering extensions to domestic maritime activities from 2026, and to waste sector from 2028. In Indonesia, the set of covered entities in the power sector is expected expand to fuels other than coal and entities which are off the state electricity company PLN's grid in the next two phases of the scheme before 2030. The China National ETS which currently only applies in the power sector, is expected expand to cover seven new sectors in the coming years: petrochemicals, chemicals, building materials, steel, nonferrous metals, paper, and domestic aviation.

8 The voluntary baseline-and-credit system in Japan also accepts international credits generated under the Joint Crediting Mechanism (JCM) and is expected to continue doing so when the system becomes mandatory.

9 The following news article provides additional details: https://icapcarbonaction.com/en/news/china-launches-domestic-offset-market-align-national-ets-goals

10 For further details on the consultation and the UK government's current position, see: https://www.gov.uk/government/consultations/greenhouse-gas-removals-ggr-business-models

11 For further details, see Section 4.3 of the EU communication titled "Towards an ambitious Industrial Carbon Management for the EU" available at: https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=COM:2024:62:FIN and recent comments by the Commission: https://carbon-pulse.com/278868/

	Compliance Market	Maximum allowed offset limit (% of compliance)
High offset cluster	Tokyo Cap-and-Trade Program	100
	Saitama Target Setting Emissions Trading System	100
	Kazakhstan Emissions Trading System	100
	Indonesia Economic Value of Carbon Trading Scheme	100
	Australia Safeguard Mechanism	100
	Canada Federal Output-Based Pricing System	75
	Alberta Technology Innovation and Emissions Reduction Regulation	60
Low offset cluster	Mexican Emissions Trading System	10
	Washington Cap-and-Invest Program	8
	Québec Cap-and-Trade System	8
	Republic of Korea Emissions Trading Scheme	5
	China National Emissions Trading System	5
	California Cap-and-Trade Program	4
	RGGI (Regional Greenhouse Gas Initiative)	3.3
No offset cluster	Austria National Emissions Trading System; EU Emissions Trading System; German National Emissions Trading System; Montenegro Emissions Trading System; Switzerland Emissions Trading System; United Kingdom Emissions Trading Scheme; Massachusetts Limits on Emissions from Electricity Generation; New Brunswick Output-Based Pricing System; Newfoundland and Labrador Performance Standards System; Ontario Emissions Performance Standards Program; Saskatchewan Output-Based Performance Standards Program; New Zealand Emissions Trading Scheme	0

Table 1: Allowed offset credit use across select compliance markets
Source: ICAP (2024)

is the establishment of a robust certification framework for removals on which the EU Parliament and the Council reached a provisional agreement in February 2024.[12] The report briefly returns to the issue of potential interactions between removal credits and linking/connecting carbon markets in Section 5.

3. Review of Article 6 developments

The objective of Article 6 of the Paris Agreement is to facilitate international cooperation to raise ambition. To that end, Articles 6.2 and 6.4 provide distinct market-based mechanisms for countries to utilise. Article 6.2 allows countries to voluntarily cooperate in implementing their Nationally Determined Contributions (NDCs) through "Internationally Transferred Mitigation Outcomes" (ITMOs). This enables countries to transfer emission reductions amongst themselves, promoting flexibility and cost-effectiveness. Bilateral and multilateral cooperation under Article 6.2 can encompass not only the exchange of credits generated in a host country to be used towards NDC achievement in a recipient country (i.e., international connections in Figure 2) but also the exchange of allowances between two compliance markets (i.e., international links in Figure 2). Both need to be subject to corresponding adjustments to be consistent with the Paris Agreement.[13] Article 6.4 establishes a centralised mechanism to generate credits for sale in international markets. The mechanism is to be overseen by a UN body to support emission reductions and sustainable development

12 The text of the provisional agreement can be found at: https://www.europarl.europa.eu/meetdocs/2014_2019/plmrep/COMMITTEES/ENVI/DV/2024/03-11/Item9-Provisionalagreement-CFCR_2022-0394COD_EN.pdf

13 For an overview of the issues involved in linking compliance markets under Article 6.2 and potential options going forward, see ICAP (2023b).

in host countries, akin to the Clean Development Mechanism under the Kyoto Protocol. The key difference lies in the level of central oversight, with Article 6.2 mechanism involving a "decentralised" oversight mostly by countries voluntarily participating and Article 6.4 mechanism featuring centralised UN oversight and tracking.[14]

No agreement was reached in the Article 6 negotiations in COP28 with key decisions being postponed to COP29.[15] At the time of writing neither mechanism is yet in full-fledged operation. COP28 in the UAE did take some steps towards the utilisation of the Article 6.2 mechanism. The focus was on establishing a cooperative framework for the direct trading of Internationally Transferred Mitigation Outcomes (ITMOs) between countries. Key aspects such as the authorisation processes for countries and ITMOs were discussed, along with the need for standardised and transparent reporting procedures. However, several specifics remain unresolved. These include differing perspectives on the need for a formal definition of "cooperative approaches" for ITMOs under Article 6.2 and, if a formal definition is needed, what it should entail; refining the details of authorisation processes; and enhancing the specifics of reporting requirements. These are significant issues, and they are yet to be fully addressed in a way that is acceptable to countries with diverse interests.

Article 6.4 of the Paris Agreement also received considerable attention during COP28. The negotiations set out to finalise the technical and administrative architecture needed to operationalise this mechanism, which could provide the platform for a global carbon market. Key aspects of these discussions included the methodologies and process for project development, particularly for removal projects, and host country authorisation. Without an agreement on these and other issues during COP28, the generation and trade of ITMOs and Article 6.4 Emission Reductions (Article 6.4ERs) has not started.

The upcoming COP29 conference, to be held in Baku, Azerbaijan, is expected to tackle these unresolved matters. However, it is prudent to approach this with measured optimism, recognising that these complex issues require careful negotiation and consensus among the participating countries in a difficult geopolitical context. The effectiveness of Article 6.2 and Article 6.4 as tools for international cooperation depends critically on the swift and successful conclusion of these discussions.

4. Review of latest ETS linking developments

The global carbon market landscape includes several compliance markets which are currently linked, including the compliance markets in several US states participating in the Regional Greenhouse Gas Initiative (RGGI) since 2009; in Tokyo and Saitama since 2011; in California and Québec since 2014; and EU and Switzerland since 2020. With the 15th and 10th anniversaries of RGGI and the linked systems of California and Quebec respectively, 2024 is a milestone year for linking.

As the first compliance market in the US and the oldest operational linked system, the membership of RGGI continues to evolve. The system is currently in force in Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Rhode Island, and Vermont. Virginia, which had joined the Initiative in 2021, chose to leave in 2023 with the decision taking effect at the beginning of 2024. There are ongoing state-level efforts in Pennsylvania and North Carolina to join RGGI, but they have not borne fruit so far and face strong opposition.[16] RGGI allowance prices have continued their increase since 2023 and reached an all-time high of almost USD 18 in March 2024

14 There are also provisions under Article 6.8 which complement the market mechanisms by providing a framework for non-market approaches, promoting sustainable development and environmental integrity without the transfer of mitigation outcomes.

15 For a review of the discussions and outstanding issues, see: https://www.carbonbrief.org/cop28-key-outcomes-agreed-at-the-un-climate-talks-in-dubai/

16 For the latest on Pennsylvania's participation in RGGI see: https://www.rggi.org/program-overview-and-design/new-participation

in the first auction of the year.[17] This suggests that the market participants have confidence in the resilience of the linked system around a set of core members.

The linked compliance markets of California and Quebec also experienced record-high allowance prices in 2024, which exceeded the USD 40 level for the first time in the 38th joint auction in February 2024.[18] The jurisdictions are holding joint and individual workshops to evaluate potential amendments to the regulations that underpin their cap-and-trade programs as well as the link between them.[19] 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 during the year with the intention of adopting the amendments in 2024.

There have also been some positive signs regarding the potential expansion of the linked system to include Washington State, which launched its cap-and-invest program in January 2023 and announced its intention to link it with the compliance markets in California and Quebec in November 2023.[20] In a joint press release in March 2024, the jurisdictions have "officially express[ed] their interest in the potential formation of a shared carbon market between the three jurisdictions."[21] While this is a significant step forward regarding an expanded market, there is ongoing uncertainty on the future of the compliance market in Washington due to a voter-led initiative to be voted on in November 2024. If adopted, the initiative would lead to a repeal of the 2021 Washington Climate Change Act that underpins the cap-and-invest program and effectively end emissions trading in the state.[22]

The link between the EU and Swiss ETSs continues to operate smoothly. An important implication of the link is that it exempts Swiss companies from the reporting obligations under the EU CBAM, which began in 2023, and from the surrender obligations CBAM starting in 2026. This is an important benefit of the linking agreement between the jurisdictions. It obviates the urge to intervene to level the playing field and addresses the perceived or real concerns of producers whose competitors are subject to regulation under different ETSs. 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.[23] 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 weekly in 2023 to daily in 2024.[24]

The topic of linking the EU ETS with other compliance markets is receiving growing attention. In a comprehensive report published in January 2024, the European Scientific Advisory Board on Climate

17 RGGI Allowances are expressed in units of short tonnes of CO2. The metric tonne conversion requires multiplication of allowance prices by a factor of 1.1. For recent auction results see RGGI Inc website: https://www.rggi.org/auctions/auction-results/prices-volumes

18 For recent auction results see WCI Inc website: https://wci-inc.org/services/auctions

19 For details on California and Quebec respectively, see: https://ww2.arb.ca.gov/our-work/programs/cap-and-trade-program/cap-and-trade-meetings-workshops https://www.environnement.gouv.qc.ca/changementsclimatiques/evaluation-parametres-fonctionnement-spede-en.htm

20 For details see: https://ecology.wa.gov/blog/november-2023/stronger-together-the-promise-of-connecting-north-america-s-clean-energy-leaders

21 For details see: https://ecology.wa.gov/about-us/who-we-are/news/2024-news-stories/mar-20-shared-carbon-market

22 For additional details relating to Initiative 2117, see: https://ballotpedia.org/Washington_Initiative_2117,_Prohibit_Carbon_Tax_Credit_Trading_and_Repeal_Carbon_Cap-and-Invest_Program_Measure_(2024)

23 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

24 The following news article provides additional details on this change: https://climate.ec.europa.eu/news-your-voice/news/2024-arrangement-execution-transfers-between-emission-trading-registries-eu-and-switzerland-2023-11-21_en

Change makes recommendations on the potential future relationship between EU ETS and other compliance markets.[25] Specifically, the Advisory Board underlines the urgent need to start a discussion on carbon pricing in the sectors covered by the EU ETS to provide certainty for long-term investments in the lead-up to the next legislative proposal by the European Commission as required by the revised EU ETS Directive before 31 July 2026. "The relationship between EU ETS and other carbon markets, such as the EU ETS2 and potentially third-country carbon markets" are mentioned among the topics that need clarification, according to the Advisory Board.

Considering third-country compliance carbon markets that may be linked to EU ETS, the first jurisdiction that comes to mind is the UK. This is primarily because the UK and the EU committed to cooperation on carbon pricing and to seriously considering linking their ETSs in the international treaty which provides the framework for the jurisdictions' relationship following the UK's departure from the EU.[26] The technical and institutional barriers to linking are relatively minor since the UK ETS is modelled after the EU ETS. Moreover, linking would minimise the risk of undermining the long-standing and extensive trade relationship between the jurisdictions as each jurisdiction introduces its own CBAM, creating additional uncertainties and transaction costs. The prospect of linking also has the support of the private sector in both jurisdictions.[27] These favourable circumstances and arguments for linking notwithstanding, the divergence of prices in the two systems has increased starting in the second half of 2023 due largely to the steeper decline in the UKA prices relative to the EUA prices. In addition, system features, such as market stability mechanisms, leakage protection etc., are also diverging as the jurisdictions respond to their evolving circumstances. Together, these reduce the likelihood of a link between UK and EU ETSs soon.

5. Emerging themes for global carbon market integration

Sector expansion and the role of removals in compliance markets are two themes which come up repeatedly in the preceding sections. Both themes are critical for the contribution domestic compliance markets can make to cost-effective decarbonisation. As such, they also affect the operation and future evolution of the links and connections between markets. This section briefly outlines the emerging considerations in this context.

Regarding sector expansion in compliance markets, it is helpful to distinguish between two different types of expansion. First, an existing compliance market can be reformed to cover entities which were previously not covered. This requires an adjustment to the cap and brings new participants with compliance obligations to an existing market. A recent example of this type of expansion is the EU ETS, which, as of January 2024, regulates the domestic and international maritime emissions in journeys involving EU ports. The anticipated expansion of the China National ETS to include emissions of selected industrial sectors is likely to be a significant development as well. A key economic advantage of this type of sector expansion is that covered entities immediately face the same allowance price, the key condition for cost-effectiveness.

Second, a new and separate compliance market can be introduced alongside another, pre-existing market. Such a new market can adapt or adopt the legal, institutional, and technical infrastructure from the existing compliance market or develop them anew. Recent examples of this type of sector expansion are German and Austrian national ETSs, which cover emissions outside the scope of the EU ETS. Their fate following the launch of EU ETS2, largely covering the same emitters in the buildings and road transport, is yet to be decided by the governments of Germany and Austria. Multiple systems offer flexibility to the government in implementing different design features which reflect the circum-

25 For more information about the Advisory Board, see: https://climate-advisory-board.europa.eu/about. The report titled "Towards EU climate neutrality: progress, policy gaps and opportunities" is available at https://climate-advisory-board.europa.eu/reports-and-publications/towards-eu-climate-neutrality-progress-policy-gaps-and-opportunities.

26 See Article 392.6 of the EU-UK Trade and Cooperation Agreement of December 2020 at: https://commission.europa.eu/strategy-and-policy/relations-non-eu-countries/relations-united-kingdom/eu-uk-trade-and-cooperation-agreement_en

27 See for example a recent letter to the UK government as reported by the Carbon Pulse: https://carbon-pulse.com/272701/

stances and specific needs of the sectors covered. This would most likely result in different prices for GHG emissions within the same jurisdiction. In addition to its adverse impact on cost-effectiveness, this may also be perceived as unfair by regulated entities and citizens.

Each type of sector expansion has different implications for linking. For markets that are linked to start, sector expansion in one compliance market may trigger a similar expansion of coverage in the other market. At a minimum, it requires the (explicit or tacit) agreement of the governments of the markets participating in the linked system. This may not be taken for granted as the allowance demand characteristics in the new sectors and policy decisions regarding cap setting for the new sectors, among others, will have implications for the entire linked system (see, for example, how the Swiss ETS may be affected by the inclusion of the maritime sector in EU ETS in Figure 2). Launching a new compliance market for sectors previously not covered by a carbon price expands the set of 'linkable' markets. As mentioned in the previous section, the European Scientific Advisory Board has already highlighted the importance of considering the future relationship between EU ETS and other compliance markets, including EU ETS2. Note that linking two separate compliance markets, which are both regulated by the same government, may be easier than inter-jurisdictional linking.

The role, if any, of removals in compliance markets also has implications for the links and connections between carbon markets. The government may choose to include removal activities within the sector coverage of the compliance market. In essence, this would confer some allowance issuance power to actors other than the government. This is already possible in the New Zealand ETS where allowances can be generated in the forestry sector by non-government actors. To date, no compliance market allows the engineered removal activities to issue allowances. However, the logic of nature-based removals generating allowances can be extended to engineered removals where covered entities 'producing' negative emissions are authorised to issue allowances, expanding the cap for emitting covered entities.

Compliance and voluntary carbon markets have long incorporated credits from both removal and reduction projects. The crucial distinction lies in their impact on atmospheric GHG concentration. Removal projects (e.g., afforestation, Direct Air Capture and Carbon Storage (DACCS)) actively lower atmospheric GHGs, while reduction projects (e.g., landfill methane capture, renewable energy) prevent new emissions and the rise in concentrations that they imply. Provided they represent a verifiable and permanent removal or reduction of GHG emissions that would not have happened otherwise, both types of credits can make genuine contributions to climate action. Due to several factors, removal credits have gained more prominence relative to reduction credits in recent years. First, compliance carbon pricing instruments and other climate regulations cover more and more emitters, raising the bar for proving regulatory additionality of emissions reduction credits. Second, technological progress, particularly for renewable energy projects, has reduced costs and improved the business case for low-carbon alternatives to traditional carbon-intensive methods. This makes it more challenging to prove financial additionality for emissions reductions projects. Finally, as the world advances along the decarbonisation path, abatement opportunities in sectors generating emission reduction credits will become increasingly scarce. However, the need to offset emissions from hard-to-abate sectors will continue. Even if all GHG emissions could be reduced to zero, it is likely that negative emissions globally will be necessary in the second half of the century to reach the goals of the Paris Agreement. Therefore, in the long run, credits from removal projects will probably be necessary even when there are no longer any feasible emissions reduction projects.

An expanding role for removals in compliance and voluntary markets can incentivise the scaling up of these activities. Furthermore, stronger linkages and connections across global carbon markets can amplify this effect. However, robust certification and Monitoring, Reporting, and Verification (MRV) of removals is crucial. This is because removals of low quality in one market can significantly damage the integrity of linked markets where allowances and credits freely trade.

6. Conclusion

The global landscape of compliance carbon markets is evolving rapidly. New ETSs are being designed and launched across advanced and developing economies, while existing systems undergo significant reforms to raise ambition, expand sectoral coverage as well as to ensure that carbon pricing remains an effective climate policy tool despite changing circumstances. The use of offset credits varies significantly across jurisdictions, with some allowing them liberally while others severely restricting or precluding their use for compliance. The reactivation of the Chinese Certified Emissions Reduction (CCER) scheme is another no recent development. Multilateral efforts to operationalise the cooperative approaches and international market mechanisms envisioned under Article 6 of the Paris Agreement are ongoing, though key details remain unresolved after COP28.

Several existing links between ETSs have been operating well despite some challenges, while the prospect of potential new links is actively being explored. A future link between the EU and UK ETSs remains a possibility despite recent divergence in prices and design features. With the expected launch of the EU ETS2 in 2027, the potential linking of the EU ETS and EU ETS2 has already started attracting attention. In North America, the 15th and 10th anniversaries of RGGI and the linked markets of California and Quebec were reached, respectively. The latter may grow soon as concrete steps toward linking Washington State's compliance market have recently been taken by the three jurisdictions' governments. However, a voter-led initiative casts doubt on the future of the compliance market in Washington. The uncertainty is expected to be resolved following a November 2024 referendum.

As carbon markets continue to evolve and expand, two emerging themes have significant implications for their effective integration through links and connections (see Figure 2) for the distinction between the two in this report). The first theme relates to the sector expansion of compliance markets. Jurisdictions have traditionally included new sectors under an existing ETS. Recently, some jurisdictions have introduced a separate ETS alongside an existing one to cover new sectors. Each approach has its pros and cons and can imply different paths for the further integration of carbon markets.

The second theme centers around the role of carbon removals in compliance markets and their implications for links and connections. Options range from no role to full integration of entities producing carbon removals in the compliance markets. An intermediate option is a greater role for removal offset credits in compliance markets, particularly for engineered removals. In all cases, allowances or credits issued based on removal activities must be subject to robust and strictly enforced certification and MRV requirements to ensure they are real, additional, and permanent. This is crucial to protect the integrity of linked markets, and can have a decisive impact on future linkability, because allowances and credits are freely traded across all linked markets.

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