

OCTOBER 2021

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# GETTING TO NET-ZERO

## THE VITAL ROLE OF GLOBAL CARBON MARKETS

REPORT PREPARED FOR INSTITUTE OF INTERNATIONAL FINANCE

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INSTITUTE OF  
INTERNATIONAL  
FINANCE

## FOREWORD

Climate change is the defining challenge of our time. Now, in 2021, the IPCC has confirmed that many climate-related impacts and damages are unavoidable, even at our current level of 1.1°C of global warming since the pre-industrial period. What's more, thanks to advancements in technical modelling, we have a much more detailed, granular and harrowing view of what life in a future of dangerous climate change could look like – massive storms, fires, extinctions and ecosystem collapse. Catastrophic climate change must be avoided at all costs, which requires us to employ all the tools at our disposal—including the power of global financial markets to support net-zero goals.

It is widely recognized that putting a price on carbon is one of the most impactful tools we have to drive economic change that can help address the risks of climate change. Carbon pricing can be accomplished through regulated compliance markets like emissions trading schemes (ETS), through the introduction of market instruments like carbon taxes, and via carbon credits traded through voluntary carbon markets. Momentum behind these ideas is building—from the introduction of new regulated schemes in countries like China, to the work of the G20 to promote global consensus on carbon pricing, to the work of the Taskforce on Scaling Voluntary Carbon Markets, an IIF-sponsored initiative which via a newly formed governance body is developing a global benchmark standard for carbon credit quality.

Perhaps the most significant progress towards net-zero is happening in the private sector – in 2020, 1,565 businesses had made commitments to align their businesses with the emissions pathway of a low-carbon future.<sup>1</sup> As companies, sectors, and governments around the world commit to

net-zero, in line with frameworks developed by entities like the Science-based Targets Initiative (SBTi) and the Glasgow Financial Alliance for Net-zero (GFANZ), we will have to collaboratively decide what role carbon credits play in delivering the 'Net', alongside the 'Zero'—ensuring that decarbonization comes first, and that credits are used only as a last-resort solution.

At the global level, there is tremendous potential to apply the logic of carbon markets to the international coordination challenge of climate mitigation. The world is looking to the UNFCCC COP26 conference for not only more ambitious Nationally Determined Contributions (NDCs) from governments, but also for progress on these market infrastructures – including under Article 6 of the Paris agreement. Going forward, a well-functioning global regulated market for international mitigation transfers will be a critical component of the global climate architecture—with important implications for how countries, and the private sector, engage and transact through the patchwork quilt of regulated and voluntary schemes currently in place.

We think that the 2020s can be the “decade of carbon markets”—so with support and analysis from Vivid Economics, the IIF produced this report to help shed light on the most important and complex questions about how global carbon markets—regulated and voluntary – can help to deliver net-zero.

### TIM ADAMS

President and CEO  
Institute of International Finance

1. This only includes net-zero targets.

## EXECUTIVE SUMMARY

**Carbon markets are expanding rapidly, as governments, companies and financial institutions increasingly commit to achieving net-zero greenhouse gas (GHG) emissions targets.** Over 70% of global economic activity occurs in countries with net-zero emissions targets. Many of these countries use compliance carbon markets (“compliance markets”),<sup>2</sup> which now cover 21% of global emissions, up from 11% in 2015. Beyond the jurisdictional level, companies are increasingly committing to net-zero emissions, by reducing direct and supply-chain emissions where feasible, and neutralizing for residual emissions with emissions removals and storage, through the purchase of high-quality carbon credits through voluntary carbon markets (“voluntary markets”), which operate in parallel to compliance schemes. Corporate initiatives such as The Climate Pledge and the UN Race to Zero campaign are gaining traction in boardrooms, alongside financial sector counterparts such as the Net-zero Asset Owners Alliance. In 2020, 1,565 companies had a net-zero target in place, double the commitments from the previous year.<sup>3</sup>

**In the coming decade every major business is likely to interact with carbon markets in some**

**way.** Many businesses currently have limited experience as active participants in carbon markets. Many also operate in sectors not covered by compliance carbon markets, while others have yet to make voluntary commitments<sup>4</sup>. As momentum for decarbonization grows, more businesses are expected to adopt **carbon neutral** (unavoidable emissions are compensated or neutralized within a given year) or **net-zero** (a state of no net impact from GHG emissions, with any residual emissions neutralized with carbon removals) targets in the next decade.<sup>5,6</sup>

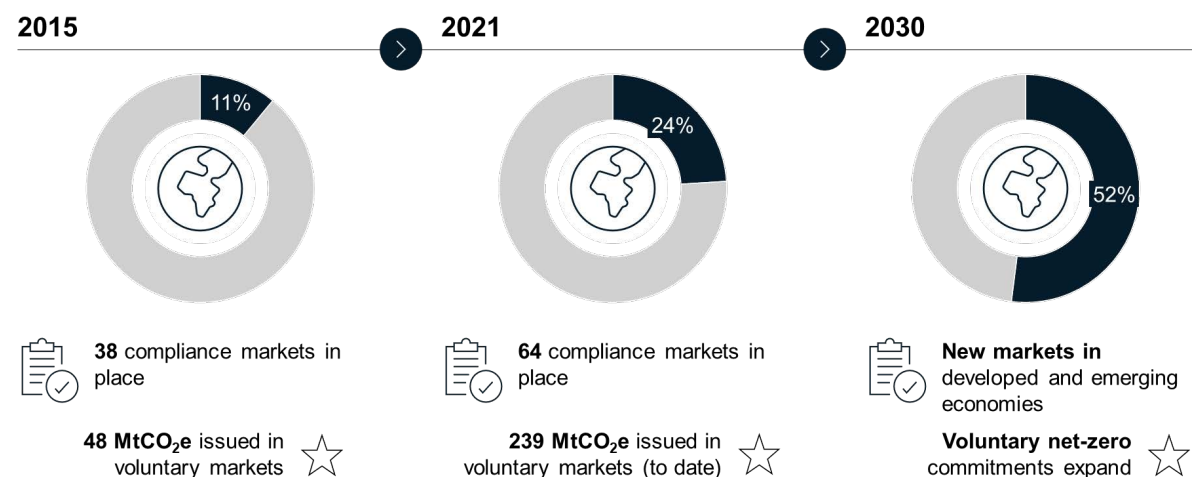
If the 2020s are the decade where carbon markets realize their potential, coverage could reach over half of global emissions by 2030.

**Continued expansion of both compliance and voluntary carbon markets could see coverage more than double, from 24% of global emissions today, up to 52% of global emissions in 2030** (see Figure 1).<sup>7</sup> Compliance market coverage could expand from 21% today to 47% in 2030, and voluntary market commitments could grow from covering 9% of corporate emissions today to

2. Oxford Net-zero (2021): [Taking Stock: A global assessment of net-zero targets](#). Note: statistic reflects additional net-zero commitments from the Russian Federation and Turkey since the report's release
3. New Climate Institute (2020): [“Navigating the nuances of net-zero targets”](#)
4. Nearly 80% of the world's 2,000 largest public companies not yet formally net-zero commitments.
5. Energy & Climate Intelligence Unit and Oxford Net-zero Project (2021): [“Taking Stock: A Global Assessment of Net-zero Commitments”](#)
6. Though there is still no consensus on these definitions, it is generally agreed that carbon neutrality is achieved when unavoidable emissions are compensated or neutralized within a given year using any type of carbon credits. A net-zero claim requires reaching a state of no impact on the climate from GHG emissions, with all residual emissions to be neutralized with the permanent removal and storage of GHG emissions (not emission reductions). This paper refers to these various company commitments as “decarbonization targets”.
7. For more information on the methodology for projected carbon market growth, see Annex: Methodology

23% of emissions by 2030 (the combined total is lower to account for potential overlaps between these markets).<sup>8</sup> Further expansion of compliance markets is likely, particularly in North America, Latin America, and Asia, and net-zero or carbon neutral commitments will likely become the norm for the world's largest companies.

**FIGURE 1**  
POTENTIAL EXPANSION OF CARBON MARKET COVERAGE (COMPLIANCE AND VOLUNTARY)



Source: Vivid Economics, drawing on State of the Voluntary Carbon Market 2021 and other sources.

**As voluntary and compliance markets expand, the interactions between these markets will likely increase and could further benefit climate mitigation.** High-integrity credits used primarily for voluntary transactions can be integrated into compliance systems. International aviation, for example, operates under a crediting system<sup>9</sup> that enables existing voluntary market standards to supply airlines with emissions reductions to meet their obligations. Looking to the future, achieving net-zero necessitates a growing pipeline of emissions removals. Voluntary markets could finance a pipeline of high-integrity removal projects that could be integrated into compliance markets in the coming decades.

This report examines the growth of global carbon markets, focusing on interactions between compliance and voluntary markets, and highlights implications for businesses, financial institutions, and policymakers. It sets out how the unlocking complementarities between compliance and voluntary markets could support greater climate ambition, and the implications of this evolution for firms seeking to navigate the carbon markets landscape.

8. Note: to minimize overlaps and double counting, the combined coverage is lower than the sum of compliance and voluntary market coverage. Double counting is avoided by excluding companies' emissions that are headquartered in countries with carbon pricing in place.  
9. The Carbon Offsetting Reduction Scheme for International Aviation (CORSIA), managed under the International Civil Aviation Organization (ICAO)

## ALIGNING CARBON MARKET EXPANSION WITH NET-ZERO AMBITION

**Compliance and voluntary carbon markets are expanding rapidly as tool for reducing GHG emissions.** Compliance markets, encompassing emissions trading and carbon taxes, now cover one-fifth of global GHG emissions and operate in major economies including China, the EU, UK, Mexico, Republic of Korea and California.<sup>10</sup> Voluntary markets have expanded four-fold in recent years as issuance grew from 48.4 MtCO<sub>2</sub>e<sup>11</sup> in 2015 to 198.3 MtCO<sub>2</sub>e in 2020.<sup>12</sup> Carbon markets can provide a highly effective way for policy makers and businesses to meet their climate goals, by incentivizing cost effective and credible emissions reductions across economies, sectors and supply chains. They enable firms with low-cost emissions reductions opportunities to sell verified emissions reductions to businesses that face higher costs. In doing so, carbon markets can reduce the overall cost of cutting emissions and enable enhanced ambition.

**While the expansion of carbon markets is promising, current policies are not yet sufficient to achieve net-zero emissions or deliver on the goals of the Paris Agreement.**<sup>13</sup> While carbon markets are rapidly expanding, only 4% of GHG

emissions are covered by a carbon price at a level consistent with limiting warming to 2°C.<sup>14</sup>

**Carbon markets would require a significant expansion in their size and ambition over the next decade to deliver on their potential.** The Task Force for Scaling Voluntary Carbon Markets (TSVCM)<sup>15</sup> finds that under a Paris-aligned scenario, voluntary markets could expand by up to 15 times from current levels by 2030. Similarly, compliance market coverage would need to expand to far more jurisdictions and deepen (through the inclusion of more sectors and/or sources of emissions) to drive decarbonization efforts.

**A wide range of stakeholders are contributing to efforts to improve and expand carbon markets.** Corporations, investors, academics and environmental NGOs are coming together through the TSVCM and other fora to support the development of high-integrity voluntary markets. These efforts complement the work of governments and international organizations seeking to support best practice in compliance markets. For example, the World Bank's Partnership for Market Implementation (PMI), seeks to support 30 developing countries to institute carbon market policies over the coming decade.<sup>16</sup>

10. World Bank (2021): '[State and Trends of Carbon Pricing](#)'  
11. MtCO<sub>2</sub>e refers to a million metric tons of carbon dioxide equivalent. CO<sub>2</sub>e is a standard unit use to convert emissions of non-CO<sub>2</sub> greenhouse gases such as methane to an equivalent amount of carbon dioxide emissions.  
12. Ecosystem Marketplace (2021) [State of the Voluntary Carbon Market 2021](#). The figure for 2021, which only includes issuance up to the 31 August 2021, is 238.5 MtCO<sub>2</sub>e. With a third of the year remaining this already exceeds 2020 issuance by 40 MtCO<sub>2</sub>e, suggesting a continued rapid growth in voluntary carbon markets.  
13. International Energy Agency, [Stated Policies Scenario](#)  
14. World Bank, [State and Trends of Carbon Pricing \(2021\)](#) based on the carbon price range (\$40-80/tCO<sub>2</sub>e) identified in the [Report of the High-Level Commission on Carbon Pricing and Competitiveness \(2017\)](#)  
15. McKinsey (2021) [A blueprint for scaling voluntary carbon markets to meet the climate challenge](#)  
16. World Bank (2019): [Partnership for Market Implementation](#)



## In coming years, compliance markets and voluntary markets could play distinct but complementary roles in incentivizing emissions reductions and removals.

Compliance markets provide a price signal such that the costs of greenhouse gas (GHG) emissions must be factored into decision-making.

Voluntary markets for carbon credits can help make net-zero commitments possible for all companies, especially in the hardest-to-abate sectors.

**Compliance markets can play a central role in providing broad-based incentives for cost-effective decarbonization.** Where compliance markets exist, they primarily focus on driving emissions reductions from major emissions sources such as power, industry, and transport. As compliance markets expand in their scope and ambition, they can incentivize the uptake of emissions reductions opportunities across the economy and provide incentives for internal abatement for those firms with direct liabilities.

Voluntary markets can help accelerate climate mitigation by supporting corporate net-zero targets in **all** sectors, including emissions reductions outside of compliance markets and incentivizing the uptake of carbon removals. While compliance markets expand their reach, voluntary carbon markets can provide an incentive for emissions reductions in uncovered sectors and jurisdictions. This builds capacity for carbon markets and supports the uptake of cost-effective emissions reductions. Furthermore, if net-zero commitments among companies become increasingly mainstream, access to high-integrity voluntary markets can supplement internal abatement measures to compensate or neutralize residual emissions even for firms who operate

in industries with challenging decarbonization pathways.

Voluntary markets already mobilize investment for carbon removals, which will become increasingly important for companies committed to net-zero within the next two decades. Removals neutralize residual emissions at net-zero and will likely be used by firms that have pledged near term net-zero emissions targets. Voluntary carbon markets can also support uptake of carbon removals through nature-based solutions such as afforestation and reforestation, or technological solutions such as direct air carbon capture and storage. In many cases, companies are pledging to achieve net-zero with fast-approaching targets. For instance, Facebook has already committed to achieve net-zero emissions from 2020 onwards and Microsoft has pledged to be carbon negative by 2030 and compensate all historical emissions by 2050. Indeed, the majority of the companies assessed by either the Transition Pathway Initiative (401 companies)<sup>17</sup> or The Climate Pledge (115 companies)<sup>18</sup> are committed to carbon neutrality or net-zero by 2040 – rather than the mid-century targets typical of national governments. Therefore, voluntary markets can support the early-stage investment in carbon removals that will be needed at scale to meet jurisdictional net-zero emissions targets in the longer term.

## CARBON MARKETS COMPLEMENTARITIES CAN FAST-TRACK AMBITION

**When compliance and voluntary carbon markets work together, they can provide** mutually reinforcing benefits that enhance and accelerate climate action. These benefits can include:

- **Voluntary markets can develop capacity in mitigation approaches that create positive spillovers for climate ambition.** Voluntary market projects deploy expertise in carbon measurement and accounting, project finance, technology deployment and verification that creates an entire ecosystem of operators and supporting service providers. This ecosystem could serve as a foundation for a future compliance market that may require similar expertise (in public and private entities) to function.
- **Voluntary markets can provide a framework for action prior to the establishment of compliance programs.** Policymaking can be a lengthy process, involving public debate and stakeholder engagement, during that period voluntary markets could provide a useful bridging instrument in markets that do not yet have compliance markets.
- **Compliance markets can move to integrate voluntary market credits and methodologies into their program design.** Voluntary markets have often served as a “testing ground” for carbon crediting methodologies and approaches to be refined and then transition for use in compliance markets.<sup>19</sup>
- **Carbon credits can provide flexibility for entities in hard-to-abate sectors.** The decarbonization pathway for some industries will require developing solutions over the long term, but companies in these sectors still want to align with a net-zero pathway. Carbon credits could offer an opportunity to do so prior to commercialization of these technologies. However, overreliance on carbon credits could dampen the price signal to mobilize investment towards internal abatement. This risk can be reduced by introducing quantitative limits on the number of credits permitted.

- **Voluntary markets can cover emissions from sectors not covered by compliance markets.** Compliance markets usually focus on major economic sectors such as power generation, transportation and industry. However, these policies typically omit other major contributors like agriculture and land use, or corporate Scope 3 emissions (such as fossil fuels burned by consumers). Voluntary market projects in these sectors therefore could provide a critical source of investment in mitigation not directly available through compliance markets.

## HOW TO ACHIEVE NET-ZERO COMPATIBLE CARBON MARKETS

**To achieve the highest potential scale and impact, carbon markets will need to transform their role in the coming decades.** This process of shifting the composition of carbon markets is already under way. The rate of transformation will depend on progress across multiple intertwined factors.

Compliance markets will likely be a key driver of decarbonization. Voluntary carbon markets fill crucial gaps by incentivizing carbon removal technologies, and addressing emissions sources not covered by compliance markets.

**Carbon markets configured to meet net-zero targets may not occur automatically.** This development will likely require continued progress in mobilizing demand for high-integrity mitigation, enabled by efficient market infrastructure and robust accounting. Steps can be taken to enhance carbon markets across each of these fronts, with the potential for a virtuous cycle whereby advances in compliance markets open opportunities for greater demand for voluntary market credits, and vice versa.

17. Transition Pathway Initiative (2021): [TPI State of Transition Report 2021](#)

18. [The Climate Pledge](#)

19. For instance, carbon credit protocols developed in California originally served voluntary markets but in 2013 became eligible for use under the state’s cap-and-trade program.

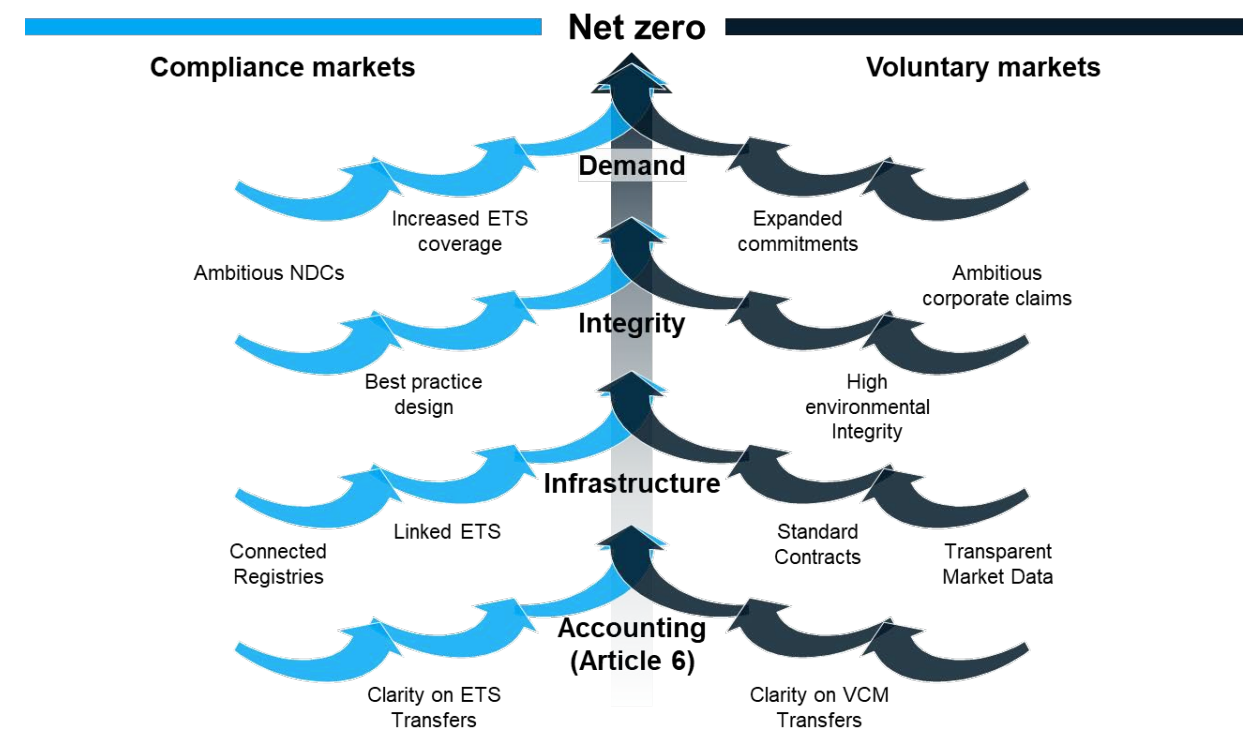
**Reaching net-zero emissions will mean not only a larger carbon market but a strategically focused carbon market.** Aligning ambition with net-zero requires incentives that span the economy, including for emissions reductions and removals that compliance markets do not currently cover. Ensuring markets address these coverage gaps can support mitigation in jurisdictions not yet ready to implement compliance markets, and for removals to neutralize residual emissions from the hardest-to-abate sources.

There are four common factors across voluntary and compliance markets that could help to unlock the scale needed to achieve net-zero by mid-century.

- 1. Demand** – broadening policy and corporate alignment with net-zero emissions, with carbon markets as an important tool within the public policy mix and within corporate strategies.
- 2. Integrity** – a continued push from all stakeholders for demand-side integrity (e.g., ambitious commitments that rely primarily on internal abatement) and supply-side integrity (e.g., applying best-practice design in accordance with the Core Carbon Principles).<sup>20</sup>
- 3. Infrastructure** – further improvements in market (e.g., transparent registries) and financial infrastructure (e.g., exchanges, standardized spot and futures contracts) in mature voluntary markets so that they can better integrate with compliance markets.
- 4. Accounting** – the development of clear, practical international guidance to govern transfers in both compliance and voluntary markets.

**FIGURE 2**

BUILDING TAILWINDS FOR NET-ZERO CONSISTENT CARBON MARKETS



Source: Vivid Economics

**The rapid expansion of carbon markets credibly aligned with net-zero emissions is possible—but so is a future with more limited progress.** An **Expansionary Outlook** realizes this potential growth by advancing these key factors, with a virtuous cycle of progress. In a **Constrained Outlook**, carbon markets still play an important role in the policy mix and corporate response, and could continue to expand, but fail to reach their full growth potential. Table 1 below summarizes how these scenarios could evolve.

20. Multilateral initiatives are being launched for both compliance markets (e.g., the World Bank PMI) and voluntary markets (e.g., TSVC) to coalesce behind best-practice design and to tackle outstanding obstacles to scaling

**TABLE 1**  
POTENTIAL DEVELOPMENTS UNDER AN EXPANSIONARY OUTLOOK AND A  
CONSTRAINED OUTLOOK

KEY FACTOR	EXPANSIONARY OUTLOOK	CONSTRAINED OUTLOOK
Demand	Compliance carbon markets align emissions caps (or carbon prices) with achieving net-zero emissions by mid-century and increase sector coverage. Decarbonization commitments become standard for major companies	Reduced ambition restricts growth in compliance markets and complementary policies. Voluntary markets continue to grow, but they do not fill gaps in market coverage
Integrity	Across compliance and voluntary markets, a consensus emerges on what constitutes demand- and supply- side integrity. This focuses carbon credit growth on priority sectors where the highest impact can occur	A patchwork of standards and criteria creates confusion for market participants about acceptable approaches, particularly within voluntary markets
Infrastructure	New market participants benefit from transparent registries and recognized standard contracts that reduce transaction costs and ease the process for buyers and sellers	Continued inconsistency of contracts across standards and markets. New entrants must familiarize themselves with multiple approaches to build a diversified credit portfolio
Accounting (Article 6)	Article 6.2 facilitates international carbon market transfers. Private sector transactions dominate. The Article 6.4 Mechanism simplifies carbon credit development, particularly in least developed countries	Unclear guidance inhibits rapid growth in carbon market transfers. Government bilateral ITMO <sup>21</sup> transfers mobilize emission reductions as a substitute for carbon market transfers. The Article 6.4 Mechanism is challenging for project developers to navigate

Source: Vivid Economics

**Progress on these factors could address existing challenges in the market and deepen carbon market integration.** Market confidence could increase by improving traceability of ownership, avoiding double-counting and safeguarding environmental integrity. Building a market-wide consensus around best practices and minimum standards could enhance credibility. The creation of standardized contracts and new exchanges will likely reduce transaction costs to meet increased carbon market demand.

21. Internationally Transferred Mitigation Outcomes (ITMOs) refer to the trading units under article 6 of the Paris Agreement, they are discussed further in section 2.

## HOW COMPANIES SHOULD NAVIGATE THE CHANGING CARBON MARKET LANDSCAPE

**Understanding the rapid expansion of carbon markets and interactions between compliance and voluntary markets is becoming a necessity for global companies and investors.** Net-zero pledges and carbon pricing systems would proliferate even under a more constrained outlook. This increases the number of new entrants who may have limited exposure to how carbon markets function. At the same time, the growing focus on climate change mitigation from governments, civil society, consumers and investors means that participation in these markets will likely come under increased scrutiny.

**Firms may not need to operate under a compliance market to be affected by carbon pricing measures.** A carbon border adjustment mechanism (CBAM), such as the one being implemented fully by the EU from 2026 onwards, places an obligation on firms outside of a carbon market's territory. Therefore, firms outside of the EU who import energy and other goods to the EU will soon be engaged in a compliance market despite their facilities being located outside of EU boundaries. Similar instruments are under consideration in Canada and the United States, which would further broaden the impact of carbon pricing on businesses.<sup>22</sup>

By the mid-2020s, any business with a substantial GHG emissions profile will likely be impacted by carbon markets in some way.

**In this dynamic and rapidly evolving landscape, companies need to remain engaged to ensure readiness.** Navigating growing voluntary and compliance markets, as well as their complex interactions, may remain an obstacle for future participation. Firms engaging in carbon markets

can benefit from a strategy which aligns with four guiding principles:

- **Comprehensiveness** – An approach that encompasses all GHG emissions within a company's control and examines both compliance and voluntary market opportunities.
- **Readiness** – Companies will be rewarded for taking proactive steps to build internal capacity for carbon pricing, risk management, accounting and reporting across their operations.
- **Integrity** – A transparent approach that emphasizes high-quality carbon credit purchases as being in the company's interest, given the reputational risks of credits with environmental integrity concerns.
- **Adaptability** – Acknowledgement that carbon markets are evolving, and that corporate strategy should therefore be flexible to move with changing circumstances.

**Firms operating through the net-zero transition cannot afford to ignore the impact carbon markets will have on their business.** Even companies not covered by a compliance market could be impacted through measures such as CBAMs that would alter how their goods are traded. By proactively engaging in carbon markets, businesses can gain the flexibility to supplement their internal decarbonization efforts with high-quality carbon credits. By following the principles listed above—embodied in the Core Carbon Principles being developed by the governance body launched by the TSVC—companies can participate in global carbon markets while minimizing exposure to damaging policy and reputational risks caused by questionable credit purchases that could harm their position in a net-zero economy.

22. See [Government of Canada](#) and [Bloomberg](#) (accessed on 10/05/2021)



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## ACRONYMS

<b>ACR</b>	American Carbon Registry
<b>CAR</b>	Climate Action Reserve
<b>CBAMs</b>	Carbon Border Adjustment Mechanisms
<b>CCAR</b>	California Climate Action Registry
<b>CCERs</b>	China Certified Emission Reduction
<b>CDM</b>	Clean Development Mechanism
<b>COP26</b>	26th UN Climate Change Conference of the Parties
<b>CORSIA</b>	Carbon Offsetting and Reduction Scheme for International Aviation
<b>ETS</b>	Emissions Trading System
<b>GHG</b>	Greenhouse Gases
<b>ICAO</b>	International Civil Aviation Organization
<b>ICROA</b>	International Carbon Reduction and Offset Alliance
<b>ITMOs</b>	Internationally Transferred Mitigation Outcomes
<b>NDC</b>	Nationally Determined Contribution
<b>OMGE</b>	Overall Mitigation in Global Emissions
<b>PAS 2060</b>	Demonstration of carbon neutrality by British Standards Institute
<b>PMI</b>	Partnership for Market Implementation
<b>RGGI</b>	Regional Greenhouse Gas Initiative
<b>SASB</b>	Sustainability Accounting Standards Board
<b>SBTi</b>	Science-Based Targets initiative
<b>TCFD</b>	Task Force on Climate-Related Financial Disclosures
<b>tCO<sub>2</sub>e</b>	Tonne of Carbon Dioxide Equivalent
<b>TSVCM</b>	Taskforce on Scaling Voluntary Carbon Markets
<b>UNFCCC</b>	United Nations Framework Convention on Climate Change
<b>VCMI</b>	Voluntary Carbon Market Integrity Initiative
<b>WCI</b>	Western Climate Initiative

# AN INTRODUCTION TO CARBON MARKETS

**Carbon markets are an increasingly significant force within the global economy, and in the next decade, every major business is likely to interact with carbon markets in some way.**

Carbon pricing programs, such as emissions trading schemes and carbon taxes, already cover one-fifth of global greenhouse gas (GHG) emissions. Support for carbon pricing is increasing as governments seek to implement policies that can enable the delivery of national-level net-zero commitments, which now span over two-thirds of global economic output.<sup>23</sup> More and more businesses are utilizing high quality carbon credits as part of their strategy to meet decarbonization targets, such as carbon neutrality or net-zero emissions.<sup>24</sup>

Compliance markets provide the price signal necessary to factor the costs of GHGs into all economic decision-making. Voluntary markets and carbon credits make net-zero commitments possible for all companies, even in the hardest-to-abate sectors.

**Compliance and voluntary markets play complementary roles in supporting global climate ambition.** Together they create an economic incentive to reduce emissions, finance new technologies, and create the technical capabilities needed to implement and replicate these activities. Integrating compliance and

voluntary markets can create a range of economic and environmental benefits, as demonstrated where they already interact. They provide technical capacity to developing countries, a pathway to early action while compliance markets are being implemented, as well as covering emissions that may be not included in a compliance market (with the option to integrate these credits to provide flexibility for covered firms). Looking forward, a future global carbon market commensurate with achieving net-zero will need to address important questions of integration between compliance and voluntary frameworks, particularly linking hard-to-abate sectors under compliance markets with the growing demand for carbon removals.

**This report examines the potential future composition of global carbon markets, and implications for the businesses, financial institutions and policymakers.** While carbon markets play a major role in driving decarbonization, many economic actors could benefit from a better understanding of how carbon markets operate and of the potential implications of future carbon market expansion. This section seeks to provide a foundation for this understanding, by introducing key concepts regarding compliance and voluntary markets and their respective roles in accelerating climate action. The remainder of the report seeks to illuminate the future of carbon markets:

23. Compliance carbon markets are predominantly emissions trading systems with tradable allowances. However, there are also carbon tax policies that incorporate market approaches through eligible carbon credits that can be used to reduce the tax burden. In this report, the term compliance carbon markets encompasses both forms of carbon pricing.
24. In this paper, decarbonization targets refer collectively to net-zero and carbon neutrality commitments made by companies. For a discussion on the differences between these two types of targets, see Figure 12.

- **Section 2** describes the rapid pace of growth in carbon markets, the outlook for continued growth, and the emerging global rules for governing international carbon markets.
- **Section 3** outlines how carbon market complementarities can fast-track climate ambition, as well as the challenges faced to ensure they remain complementary.
- **Section 4** discusses how a future carbon market should function in order to align the economy with net-zero emissions pathways, and key enabling factors to achieve this vision.
- **Section 5** offers guidance to the companies and investors who will navigate the evolving ecosystem of carbon markets.

## COMPLIANCE AND VOLUNTARY CARBON MARKETS

**Carbon pricing is an important component of the policy mix that governments could consider using to achieve GHG emission reductions.** Putting a price on carbon compels emitters to internalize the cost that their GHG emissions impose on others, thereby providing an economic incentive to reduce their emissions. Carbon pricing operates in conjunction with policies and private investments to encourage the development and commercialization of technologies to reduce or remove GHG emissions. Despite being in operation for over 15 years, many companies and investors have limited experience with either compliance or voluntary markets. Figure 3 sets out the different approaches to carbon markets, showing the operation of compliance markets, through a

cap-and-trade emissions trading system (ETS), the use of carbon credits by companies seeking to decarbonize, neutralize and compensate their emissions as they progress towards achievement of net-zero targets, and the use of carbon credits within a compliance market.<sup>25</sup>

**Carbon markets provide an incentive to reduce emissions at the lowest possible cost, regardless of the source of emissions.** By enabling firms with low-cost emissions reductions to sell these emissions reductions to businesses that face higher costs carbon markets reduce the overall cost of cutting emissions. This can occur through voluntary markets and compliance markets.

**Compliance markets operate under a regulatory authority, where covered entities trade carbon allowances and/or carbon credits to meet their obligations under an emissions trading system or carbon tax.** The most common compliance markets are emissions trading systems (ETSs), also known as cap-and-trade systems. These policies are compulsory for all facilities or emissions sources that are covered, with penalties for non-compliance. ETSs function by placing a cap on emissions. Market participants are required to surrender one allowance (worth 1 tCO<sub>2</sub>e<sup>26</sup>) for each unit of emissions (for each tCO<sub>2</sub>e emitted). Allowances are obtained by market participants in several ways such as free allocation, auctioning or trading on a secondary market.

**Policymakers have used carbon pricing to deliver multiple policy benefits.** Firstly, by increasing the cost of carbon intensive production, the carbon price incentivizes low

25. Neutralization measures remove CO<sub>2</sub>e from the atmosphere via nature-based and technology-based sequestration. Compensation measures include supporting the avoidance or reduction of emissions. Net-zero requires reaching a state where all residual greenhouse gas emissions are balanced with GHG removal and storage. Source: IIF, [High Ambition Path to Net-zero](#).
26. tCO<sub>2</sub>e refers to a metric tonne of carbon dioxide equivalent. CO<sub>2</sub>e is a standard unit use to convert emissions of non-CO<sub>2</sub> greenhouse gases such as methane to an equivalent amount of carbon dioxide emissions.



carbon innovation.<sup>27</sup> Secondly, it allows for the raising of revenues which can be used for a range of purposes. Common uses of revenues include investing in further climate action, reducing competitiveness impacts on firms or providing assistance to adversely impacted lower income households (e.g., compensating for increased energy prices).<sup>28</sup> Thirdly, carbon pricing can create multiple environmental and social benefits such as improved air quality, energy security and employment in low carbon industries.<sup>29</sup> Finally, international cooperation can be enhanced via global frameworks such as Article 6 (see section 4).

**Companies can supplement internal abatement measures by purchasing and trading carbon credits to contribute towards decarbonization goals.** Companies with decarbonization targets are expected to follow the mitigation hierarchy, where all feasible internal abatement of GHG emissions from their operations and value chain should take priority. Any remaining GHG emissions can be compensated or neutralized by carbon credits. A carbon credit is a verified emissions reduction unit that can be bought by countries and companies or are available for retail purchase. Carbon credits are generated by projects that follow a specific methodology that produces verifiable emission reductions. Carbon credits can be split into two broad categories: they either avoid future GHG emissions (e.g., deploying clean cookstoves to replace charcoal) or remove and store carbon dioxide (e.g., afforestation or direct air capture).<sup>30</sup>

**In voluntary markets, there is currently no overarching body that regulates the market – purchasing credits is at the discretion of**

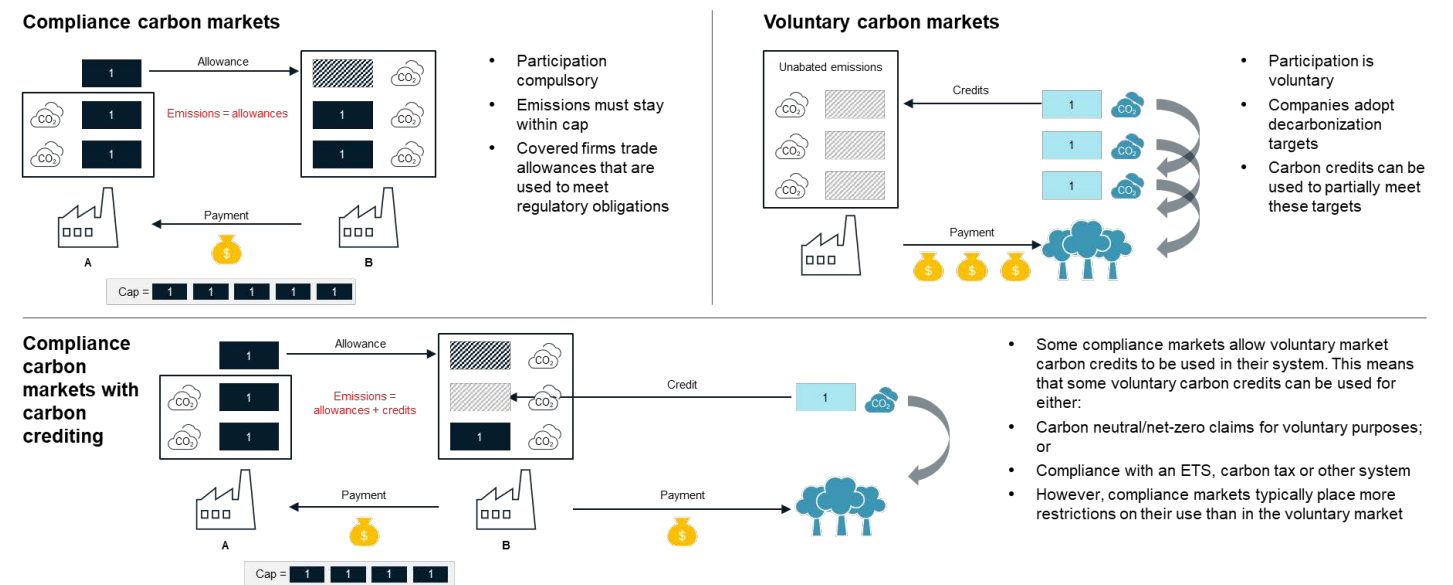
**companies.** Voluntary markets are self-regulated by an ecosystem of independent standards, third party verification and multilateral initiatives to build common principles for market transactions. Each standard applies their own guidelines and processes for developing methodologies and approving projects to be issued credits under that standard for each metric ton of GHG emissions reduced, avoided, sequestered or removed.

**Demand for carbon credits is not restricted to the voluntary markets.** There are four main sources of demand. The first, as described above, covers companies who use voluntary markets to meet a portion of their internal decarbonization targets. In this report, the term “voluntary market” refers to this source of demand. Carbon credits are also incorporated in two forms of compliance markets – jurisdictional compliance (a specific emissions trading scheme or carbon tax) or sectoral compliance programs (for international aviation, for example). These demand sources integrate both compliance and voluntary market approaches and are elaborated upon throughout this paper. Finally, financial institutions are increasingly investing in carbon credits as an asset class.

**Despite being in operation for over 15 years, many companies and investors have limited experience with either compliance or voluntary markets.** Figure 3 sets out the different approaches to carbon markets, showing the operation of compliance markets, through a cap-and-trade emissions trading system (ETS), the use of carbon credits by companies seeking to decarbonize, neutralize and compensate their emissions as they progress towards achievement

of net-zero targets, and the use of carbon credits within a compliance market.<sup>31</sup>

**FIGURE 3**  
COMPLIANCE AND VOLUNTARY CARBON MARKETS



Source: Vivid Economics

**Compliance and voluntary markets can both support achievement of climate goals.** The advantages of each approach are elaborated in Table 2. Overall, both compliance and voluntary markets support cost effectiveness, innovation and technology, capital deployment, enhanced capacity, and economic and environmental co-benefits. They achieve these benefits in different ways. Compliance markets set a regulatory market signal that obligates a shift in behavior from covered industries. Voluntary markets offer

an incentive for approaches that can generate real and verified emission reductions and attract investment from voluntary market participants.

**The distinction between compliance and voluntary markets is not strictly binary.** A new crediting mechanism established under Article 6.4 of the Paris Agreement, for example, would be voluntary for host countries to participate but would also include regulatory requirements for projects developed under this mechanism. This mechanism is elaborated later in this report.

27. The effect of carbon pricing has already been displayed for existing policies, see for example [Calel and Dechezlepretre \(2014\)](#)

28. The choice of revenue use is dependent on local context and varies between jurisdictions. For more information see World Bank, [Using Carbon Revenues \(2021\)](#)

29. For more information see World Bank, [Beyond Mitigation: Quantifying the Development Benefits of Carbon Pricing \(2021\)](#)

30. [TSVCM \(2021\)](#)

31. Neutralization measures remove CO<sub>2</sub>e from the atmosphere via nature-based and technology-based sequestration. Compensation measures include supporting the avoidance or reduction of emissions. Net-zero requires reaching a state where all residual greenhouse gas emissions are balanced with GHG removal and storage. Source: IIF, [High Ambition Path to Net-zero](#).

**TABLE 2**  
ROLE OF COMPLIANCE AND VOLUNTARY MARKETS IN SUPPORTING CLIMATE ACTION

	<b>ROLE OF COMPLIANCE MARKETS</b>	<b>ROLE OF VOLUNTARY MARKETS</b>
<b>Cost Efficiency</b>	Compliance markets provide incentives for firms to reduce emissions where it is lowest economic cost to do so. This can achieve emission reductions at lower costs than other approaches such as command and control regulations	Voluntary markets incentivize the purchase of carbon credits to compensate or neutralize emissions, particularly in hard-to-abate sectors, and enable greater overall GHG reductions than relying on internal abatement only.
<b>Technology development</b>	Compliance markets create a market signal for covered industries to develop, adopt and commercialize new technologies which generate fewer GHG emissions	Innovative mitigation activities (e.g., soil carbon or blue carbon) can generate revenues by marketing a stream of voluntary market credits to potential buyers
<b>Capital Investment</b>	Introducing a market price for GHG emissions rewards capital investment in less emissions-intensive sectors, and reduces the profitability of high emitting firms, industries and projects	Demand for voluntary market credits incentivize project development, particularly in emerging markets. Voluntary markets are an important source of international capital in developing countries
<b>Capacity Building</b>	Companies covered by a compliance market are rewarded by building internal capacity and responsibility for a strategy that both minimizes compliance costs and meets high integrity regulatory standards	Voluntary markets encourage local project development which empowers communities, particularly in developing countries, to develop future projects and interact in carbon credit markets.
<b>Co-benefits</b>	Reduced air pollution accompanies reduced GHG emissions in sectors such as power and transport	Many buyers of voluntary market credits seek out projects that generate environmental and socioeconomic co-benefits. For example, nature-based solutions interventions can also be certified for biodiversity benefits

Source: Vivid Economics

## ALIGNING CARBON MARKET EXPANSION WITH NET-ZERO AMBITION

**Carbon markets are expanding rapidly as a core tool to meet climate ambition.** Carbon pricing, either through emissions trading or a carbon tax, now operates in major economies spanning the globe and cover 21% of global GHG emissions, with 26 additional systems implemented since 2015.<sup>32</sup> Voluntary markets have expanded four-fold in recent years as issuance grew from 48.4 MtCO<sub>2</sub>e<sup>33</sup> in 2015 to 198.3 MtCO<sub>2</sub>e in 2020.<sup>34</sup>

**Although this expansion is promising, it is currently insufficient to reach net-zero emissions by mid-century.** Stated policies are not yet compatible with the goals of the Paris Agreement according to the International Energy Agency (IEA). Carbon markets are increasing in coverage yet, according to the World Bank, only 4% of GHG emissions are covered by a carbon price in the range required to limit warming to 2C (\$40-80/tCO<sub>2</sub>e<sup>35</sup> in 2020), with a similar pricing trend evident in voluntary markets.

**Therefore, to align with long-term targets such as net-zero emissions, carbon markets will need to grow significantly.** According to the

Task Force for Scaling Voluntary Carbon Markets (TSVCM)<sup>36</sup>, voluntary markets could expand by up to 15 times current levels by 2030 under a Paris aligned scenario. Similarly, compliance market coverage would need to expand to more jurisdictions and deepen (through the inclusion of more sectors and/or sources of emissions). For example, the World Bank recently launched Partnership for Market Implementation (PMI) to work with 30 developing countries on instituting carbon market policies. The initiative's rationale is that carbon markets should expand into emerging markets over the coming decade.<sup>37</sup>

If the 2020s are the decade where carbon markets realize their potential, coverage could reach over half of global emissions by 2030.

**This section outlines the accelerating growth in carbon markets and describes the state of international market governance surrounding them.** It first discusses the rapid expansion of carbon markets in recent years, outlining both

32. World Bank (2021): '[State and Trends of Carbon Pricing](#)'

33. MtCO<sub>2</sub>e refers to a million metric tonnes of carbon dioxide equivalent. CO<sub>2</sub>e is a standard unit use to convert emissions of non-CO<sub>2</sub> greenhouse gases such as methane to an equivalent amount of carbon dioxide emissions.

34. Ecosystem Marketplace (2021) [State of the Voluntary Carbon Market 2021](#). The figure for 2021, which only includes issuance up to the 31 August 2021, is 238.5 MtCO<sub>2</sub>e. With a third of the year remaining this already exceeds 2020 issuance by 40 MtCO<sub>2</sub>e, suggesting a continued rapid growth in voluntary carbon markets.

35. World Bank, [State and Trends of Carbon Pricing \(2021\)](#) based on price range from the [Report of the High-Level Commission on Carbon Pricing and Competitiveness \(2017\)](#)

36. McKinsey (2021) [A blueprint for scaling voluntary carbon markets to meet the climate challenge](#)

37. World Bank (2019): [Partnership for Market Implementation](#)

voluntary and compliance markets in turn, and points out the drivers for their continued growth. It then outlines the emerging rules for the governance of international carbon markets, notably the rules being negotiated under Article 6 of the Paris Agreement and their interaction with sector-based carbon markets such as the Carbon Offsetting and Reduction Scheme for International Aviation (CORSA).

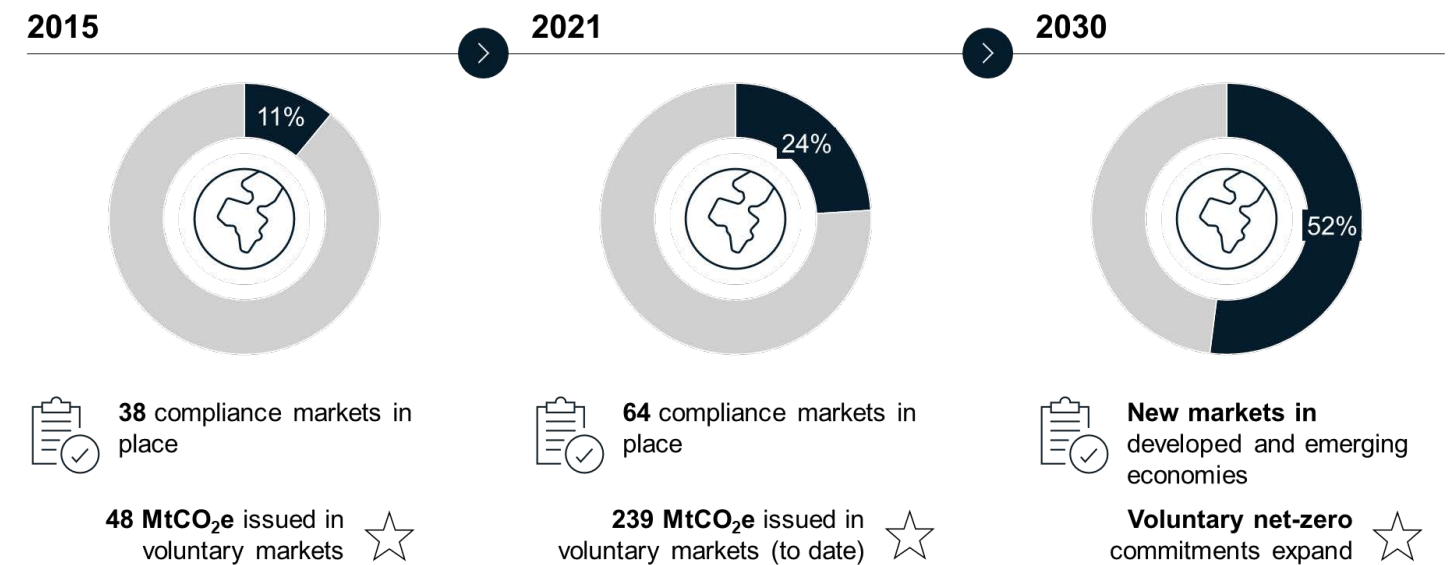
## THE RAPID EXPANSION OF CARBON MARKETS

The world is already experiencing an expansion of carbon markets. Since the adoption of the Paris Agreement in 2015, coverage of carbon markets – **both compliance and voluntary** – across countries and companies **increased from 11% of global GHG emissions to approximately 24% today**.<sup>38</sup> This has been driven by an expansion of compliance markets in existing and new jurisdictions (often linked to national-level net-zero goals), and an increase in private-sector carbon neutral/net-zero commitments. There are now 64 compliance markets in place and 164 MtCO<sub>2</sub>e voluntary market credits issued so far in 2021.

**By 2030, carbon markets could cover 52% of global GHG emissions.**<sup>39</sup> Compliance market coverage could expand from covering 21.5% of global emissions today to 47% in 2030, and voluntary markets could grow from 9% to 23% by 2030 (the combined total is lower to account for potential overlaps between markets).<sup>40</sup> For this growth to materialize, however, policymakers would need to continue to implement compliance markets and companies would need to continue to demand voluntary market credits. Successfully scaling demand relies on common key factors across voluntary and compliance markets: integrity, infrastructure and accounting; these are further discussed in section 4.

## FIGURE 4

HISTORICAL AND POTENTIAL EXPANSION OF CARBON MARKET COVERAGE (COMPLIANCE AND VOLUNTARY), 2015 TO 2030



Source: Companies' sustainability reports; World Bank Carbon Pricing Dashboard; State of the Voluntary Carbon Market 2021; Vivid Economics graphic

## COMPLIANCE MARKETS

**Compliance markets continue to expand their reach across countries and subnational jurisdictions.** In the past year, six new compliance markets have been launched, including the world's largest: China's national ETS,<sup>41</sup> which came into force in February and covers around 4 GtCO<sub>2</sub>e. Compliance markets vary in size from the continent-wide EU ETS to a city-sized ETS in Tokyo covering just 20 MtCO<sub>2</sub>e.<sup>42</sup>

**This growth is likely to continue as new**

**jurisdictions consider implementing compliance markets, especially in emerging markets.**

Ninety-seven countries under the Paris Agreement indicate that they are planning or considering using carbon pricing in some form to meet their climate target in their Nationally Determined Contributions (NDCs).<sup>43</sup> In addition to the World Bank's PMI, some emerging markets are already following the example of China, Colombia, Mexico and others. For instance, regulation by the Indonesian Ministry of Energy mandates

38. Vivid Economics estimates. For more information, please see Annex: Methodology

39. For more information on the methodology used, please see Annex: Methodology

40. Note: to minimize overlaps and double counting, the combined coverage is lower than the sum of compliance and voluntary market coverage. Double counting is avoided by excluding companies' emissions that are headquartered in countries with carbon pricing in place.

41. Emissions Trading Systems (ETSs), further discussed later, place a limit on total GHG emissions in a jurisdiction and participants are required to surrender one allowance for each unit of emissions.

42. The International Carbon Action Partnership (ICAP) website provides details on each CCM around the world, see [ICAP](#) (2021).

43. World Bank (2021) [State and Trends of Carbon Pricing 2020](#). Note that this figure only indicates a likely growth of carbon pricing coverage and is not intended to provide an exact future number of jurisdictions with a domestic carbon pricing mechanism. The World Bank authors indeed do caveat this number: a mention of carbon pricing in an NDC does not necessarily mean a domestic carbon pricing initiative is formally under consideration, and not all parties that already have a carbon pricing initiative implemented or under consideration report it in their NDC.



the creation of a national compliance market by 2025, following a trial ETS in the power sector run earlier this year.<sup>44</sup> Vietnam has passed similar legislation requiring a pilot ETS to start in 2025 and becoming fully operational by 2027.<sup>45</sup> The governments of Pakistan, Thailand and Turkey have each published plans to introduce pilot ETSs in the coming years, and others like Morocco are building up their capacity to introduce a system in the future.<sup>46</sup>

**New compliance markets are also being considered in developed economies.** For example, Pennsylvania is expected to join nine other U.S. states as part of the Regional Greenhouse Gas Initiative (RGGI)<sup>47</sup> from 2022 onwards, and Japan is pursuing discussions on implementing a carbon pricing mechanism of its own.

**In jurisdictions where a carbon pricing policy already exists, the scope of compliance markets is expanding.** The EU has announced the expansion of the EU ETS to include maritime shipping and intra-European aviation,<sup>48</sup> as well as the creation of a new ETS for building and transport emissions. Alongside greater coverage, the ETS has been internationalized through the introduction of a Carbon Border Adjustment Mechanism (CBAM), which places a carbon price on certain emissions-intensive imports into the

EU.<sup>49</sup> These measures would both effectively double the size of the European carbon market and extend its reach beyond EU borders.

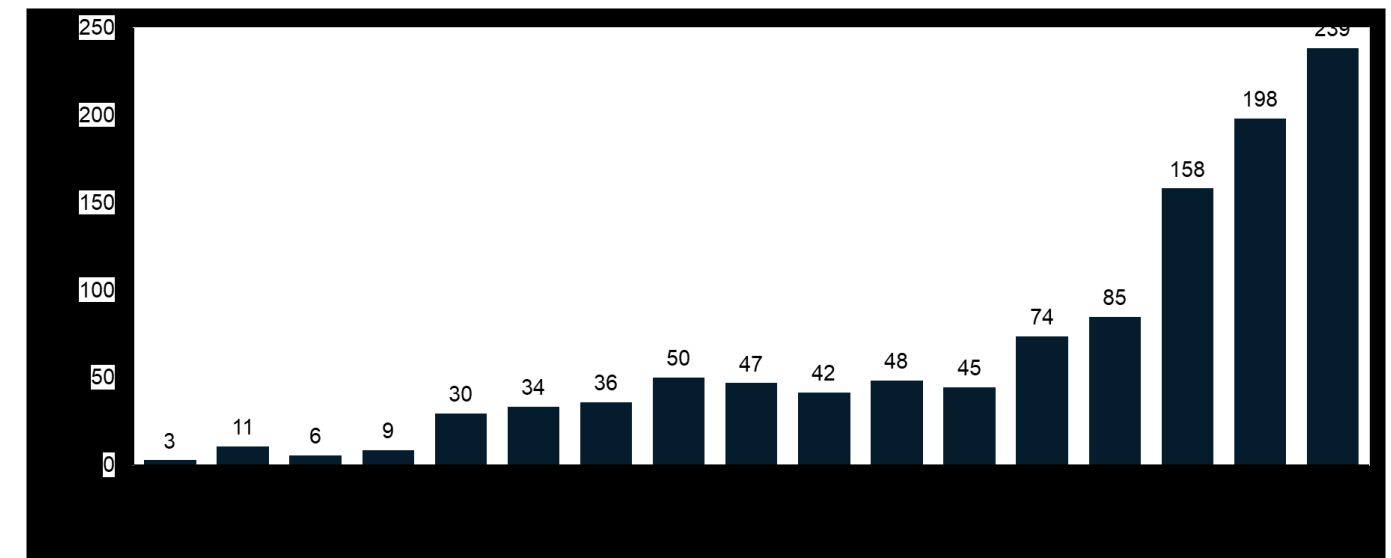
**Compliance market expansion is also occurring in North America.** The U.S. states of Connecticut, Massachusetts and Rhode Island (and the District of Columbia), who are already members of a compliance market in the electricity sector under the RGGI, have announced their participation in a new ETS covering transport fuels as part of the Transportation and Climate Initiative.<sup>50</sup> The first compliance period is expected in 2023 and will permit the use of carbon credits generated from those states.

## VOLUNTARY MARKETS

**Increased corporate ambition, voluntary markets have been growing rapidly.** Pressure from investors and consumers has underpinned strong momentum in corporate commitments. According to the New Climate Institute,<sup>51</sup> as of 2020, 1,565 companies with a combined revenue of \$12.5 trillion had adopted net-zero pledges. As shown in Figure 5, carbon credit issuances have increased every year since 2016 and they have already reached a record high of over 200 MtCO<sub>2</sub>e in 2021 only partway through the year. Issuances in 2020 were 25% higher than in 2019 and 570% higher than a decade previously.

**FIGURE 5**

VOLUNTARY MARKET ISSUANCES 2005-2020, MTCO<sub>2</sub>E



Note: Includes American Carbon Registry (ACR), Climate Action Reserve (CAR), Gold Standard, Verified Carbon Standard, ProClima, EcoRegistry, Climate Forward, City Forest Credits, and Coalition for Rainforest Nations

Source: Ecosystem Marketplace: State of the Voluntary Carbon Markets 2021 Instalment 1; Vivid Economics graphic

**Emerging markets are a significant source of credit supply in voluntary markets.** Emerging markets provided 73% of all issued carbon credits by volume in 2020, compared to 45% ten years previously.<sup>52</sup> India has the highest credit issuance, with 23.1 MtCO<sub>2</sub>e in 2019 and China (10.2 MtCO<sub>2</sub>e), Indonesia (7.0 MtCO<sub>2</sub>e), Peru (5.8 MtCO<sub>2</sub>e) and Kenya (5.5 MtCO<sub>2</sub>e) are also major voluntary market credit issuing countries. This is partly driven by demand – corporate buyers in Europe, for example, primarily source credits from emerging markets such as Brazil, India and Peru, with domestically sourced credits only a small fraction of credit demand.<sup>53</sup>

**Credit supply can also serve domestic programs rather than the voluntary market.** Australia's

Emission Reduction Fund, for example, uses public funds through the national government to purchase GHG reduction units generated from qualifying projects on a price per metric ton basis. In FY2021, over 16 million units were issued.<sup>54</sup> In emerging markets, firms covered under Colombia's carbon tax have access to domestic credits developed through eligible independent standards. Since the policy's inception through the end of 2020, 42.8 MtCO<sub>2</sub>e of credits have been retired for compliance under that program.<sup>55</sup> In these instances, the presence of a domestic policy accelerates project development to serve alternative sources of demand from the voluntary market.

44. [ICAP \(2021\) Indonesia](#)

45. [ICAP \(2021\) Vietnam](#)

46. See [ICAP website](#) for information on each of these countries.

47. The RGGI is a regional ETS in the power sector covering the states of Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Rhode Island, Vermont, and Virginia.

48. The EU ETS covers aviation within the European Economic Area (EEA)

49. For more details on CBAMs, see Vivid Economics (2020) [Border Carbon Adjustments and Industrial Competitiveness in a European Green Deal](#)

50. [Transportation and Climate Initiative](#)

51. New Climate Institute (2020) [Navigating the nuances of net-zero targets](#)

52. Vivid Economics research based on issuances from ACR, CAR, Gold Standard, Plan Vivo and Verra

53. Ecosystem Marketplace, State of the Voluntary Carbon Market 2020 (latest data available)

54. Australia Clean Energy Regulator, [Reports on total number of Australia carbon credit units issued.](#)

55. IETA (2021) [Carbon Market Business Brief Colombia](#)

**Many firms supplement internal abatement measures by purchasing carbon credits sourced from voluntary markets to reach their internal decarbonization targets.**

Some of the world's largest corporations purchase carbon credits. For example, bp acquired a majority stake in project developer Finite Carbon with the aim of providing carbon credits towards meeting their 2050 net-zero target.<sup>56</sup> Delta Airlines, who has committed to carbon neutrality from 2020 onwards, plans to purchase \$30 million of credits to mitigate 13 million tons of its 2020 emissions.<sup>57</sup> Procuring voluntary market credits is not restricted to heavy industry or hard-to-decarbonize sectors; technology companies and financial institutions such as Facebook, Google, Microsoft and JPMorgan are also using voluntary market credits to meet internal decarbonization goals. In some cases, carbon credits are being bundled with products to provide customers with carbon neutral products. For example, Shell purchased Europe's first shipment of carbon neutral liquefied natural gas where credits covered all value chain emissions associated with the shipment.<sup>58</sup>

**Net-zero commitments before 2050 are driving demand for carbon sequestration and removals credits.**

Facebook has already committed to achieve net-zero emissions from 2020 onwards and Microsoft has pledged to be carbon negative by 2030 and compensate all historical emissions by 2050. The majority of the companies assessed by either the Transition Pathway Initiative (401

companies)<sup>59</sup> or The Climate Pledge (115 companies)<sup>60</sup> are committed to carbon neutrality or net-zero by 2040 – rather than the mid-century targets typical of national governments. This urgency has already sparked investment in carbon removal technologies. For example, in 2020 Microsoft purchased carbon removals credits from biochar and a DACCs project developers, citing the need to support these nascent technologies.<sup>61</sup>

**The current pace of decarbonization commitments is accelerating, but there is still room to grow.**

Of the world's 2,000 largest public companies, only 21% currently have instituted a net-zero commitment.<sup>62</sup> According to analysis from the TSVCM,<sup>63</sup> to align with a 1.5°C scenario, demand would need to increase by 15 times by 2030 and up to 100 times larger by 2050 - representing up to 13 GtCO<sub>2</sub>e per year, more than China's current annual GHG emissions.

**As voluntary market demand has grown, there is increased interest in ensuring credits are high integrity.**

The environmental integrity of carbon credit projects is currently evaluated based on established criteria from independent standards, such as Verra's Verified Carbon Standard and the Gold Standard. Broader initiatives such as the TSVCM and the Carbon Credit Quality Initiative aim to provide a cross-market consensus on which credits are high integrity. Critically, it is possible for both compliance and voluntary markets to scale without sacrificing quality.<sup>64</sup> Indeed, a larger voluntary market which is tasked with contributing

towards climate targets will likely merit greater attention to ensuring high integrity.

## THE EMERGENCE OF GLOBAL GOVERNANCE FOR INTERNATIONAL CARBON MARKETS

**Both voluntary and compliance markets span international borders.** The development of common guidelines applicable to compliance and/or voluntary markets could therefore help to accelerate the scaling-up of carbon markets needed to achieve Paris Agreement goals.

**International decisions will influence future international carbon trading within and between compliance and voluntary markets.**

Specifically, the guidelines, rules, modalities and procedures being established under the Paris Agreement under the United Nations Framework Convention on Climate Change (UNFCCC) could serve as the basis for further international compliance carbon markets to evolve. The Paris Agreement includes provisions under Article 6 that guide cooperation between countries to achieve their Nationally Determined Contributions (NDCs). Box 2 provides an overview of the cooperation framework detailed in the Paris Agreement.

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56. Finite Carbon (2020) [bp Acquires Majority Stake in Largest US Forest Carbon Offset Developer Finite Carbon](#)
  57. [Delta news hub](#) (accessed 10/06/2021)
  58. Center on Global Energy Policy (2021) [The Carbon-Neutral LNG Market: Creating a Framework for Real Emissions Reductions](#)
  59. Transition Pathway Initiative (2021): [TPI State of Transition Report 2021](#)
  60. [The Climate Pledge](#)
  61. [Microsoft carbon removal: Lessons from an early corporate purchase \(2021\)](#)
  62. Energy and Climate Intelligence Unit (2021): [Taking Stock: A Global Assessment of Net-zero Targets](#)
  63. McKinsey (2021) [A blueprint for scaling voluntary carbon markets to meet the climate challenge](#)
  64. TSVCM (2021) [Final Report](#)

## BOX 1

### DEFINING CARBON CREDIT INTEGRITY

Ensuring carbon credit integrity and quality are priorities for carbon market participants. To ensure the creditability of their decarbonization strategy and reduce reputational risks, carbon market participants must be confident in the integrity of the credits they purchase. However, this is complicated because quality and integrity manifest throughout a project's life cycle. Individual methodologies from independent standards develop processes for measuring "integrity and quality". In general, credits must meet several strict criteria to be considered of high integrity and/or quality<sup>65</sup>:

- **Additionality.** Credits are generated by emissions reduction/removal projects that would otherwise not have occurred without the added incentive created by carbon credits.
- **Permanence.** Emissions reductions/removals must be permanent and the risk of GHGs re-entering the atmosphere minimized.
- **Robust GHG accounting (including baselines).** Emissions reductions/removals must be calculated accurately, conservatively and relative to a credible baseline. GHG accounting is verified by an independent third-party.
- **No double counting.** A single credit must not be issued more than once for the same project, used more than once by a single entity or claimed by more than one entity
- **Addressing leakage.** The risk that emissions reduction/removal projects lead to increased GHG emissions outside the project boundary must be considered and minimized.

Avoiding environmental and social harm. Projects must consider and take action to mitigate related environmental and social risks.

These criteria only encompass the broad requirements for "high integrity" credits. For some project types or methodologies additional criteria could be applied based on the standard and methodology followed. For instance, when there is a risk of non-permanence as is the case with forestry projects, a share of credits is left unsold and set aside in a buffer pool. The buffer credits can then be cancelled when emissions from a project are re-released into the atmosphere such as during forest fires.

Historically, certain carbon credits faced criticism due to concerns over their environmental integrity.<sup>66</sup> For example, one study suggested that 85% of UN Clean Development Mechanism (CDM) projects used for compliance in the EU ETS between 2013 and 2020 had a low likelihood of environmental integrity.<sup>67</sup>

Environmental integrity is also achieved by adhering to rigorous, mature and verified standards for generating voluntary market credits to serve company targets or compliance market obligations. Systems for monitoring, reporting and verifying emissions (known as MRV) are a critical component in both compliance and voluntary markets. Covered entities in compliance markets are required to monitor and report their annual GHG emissions. These are then independently verified to avoid over- or underestimation. Carbon credits eligible under compliance systems must also have their emission reductions independently verified and validated before those credits are eligible for companies to use. Independent standards that accredit voluntary market projects also set out verification and validation processes for projects to adhere to.

## BOX 2

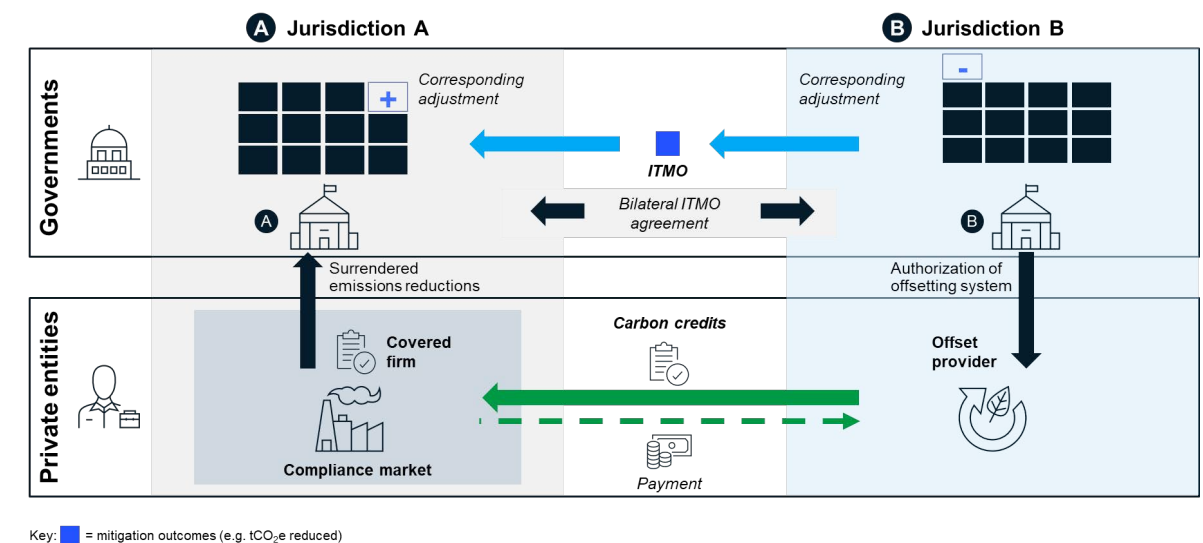
### EXPLAINING ARTICLE 6 OF THE PARIS AGREEMENT

The costs of emissions reductions can vary substantially across economic sectors and countries. Recognizing this, the Paris Agreement provides a framework for international cooperation which includes enabling cooperation through carbon markets. Box 2 provides an overview of these mechanisms.

**Article 6.2** establishes a mechanism by which countries can cooperate using "internationally transferred mitigation outcomes" (ITMOs). This means that a country can sell progression towards its own NDC target to a buyer country wishing to further progress towards its NDC target. Underlying this mechanism is the requirement that emissions reductions are not counted twice. To avoid this, the seller nation must make a "corresponding adjustment" by adjusting its own greenhouse gas inventory to reflect the sale of the ITMO. The sold ITMO does not count towards the seller country's climate targets.

**Article 6.4** supplements this by creating a new, UN-governed crediting mechanism, that will enable the generation of carbon credits recognized under the Paris Agreement and their trade by both the public and private sectors. This Article 6.4 mechanism would replace the Kyoto Protocol-era CDM.

FIGURE 6



Source: Vivid Economics

65. Based on definitions from the TSVC, VCM and Carbon Credit Quality Initiative

66. Concerns have typically focused on reversals in carbon reductions or removals (i.e., non-permanence), overestimated baselines leading to over-crediting (i.e., inaccurate measurements), double counting across mechanisms, and questionable additionality.

67. Cames et al. (2016): 'How additional is the Clean Development Mechanism?'



## COMPLEMENTARY MARKETS FOR CLIMATE AMBITION

**Carbon markets do not operate in siloes.** Carbon markets overlap, with many firms having both voluntary carbon reduction targets and liabilities under compliance markets. Additionally, credits generated for the voluntary market could become fungible with compliance markets or cover GHG emissions outside the scope of compliance markets.

**This section makes the case that enhanced interaction between compliance and voluntary markets produces positive synergies that would be unavailable if each approach remained siloed.** Voluntary markets can broaden the geographic footprint of low carbon investment beyond developed countries, into emerging markets. Further, voluntary markets offer an early investment channel in jurisdictions considering a compliance market and provide stable investment for sectors not covered in compliance systems. There are continued challenges to enhanced integration, from managing the risk of oversupply to maintaining high integrity emission reductions that both market frameworks are addressing.

### INTERACTIONS BETWEEN COMPLIANCE AND VOLUNTARY MARKETS

**Formal linkages between compliance markets and voluntary markets exist through the eligibility of carbon credits in compliance systems.** Almost all emissions trading systems operating globally have allowed the use of carbon credits during their implementation. Typically, however, there are restrictions on the use of these

credits in the form of quantitative limits (usually between 5 and 10% of an entity's compliance obligations) and/or qualitative requirements (e.g., only accepting certain project types or methodologies). The interaction of voluntary markets with carbon taxes is more limited<sup>68</sup> but certain jurisdictions do allow entities to purchase carbon credits to reduce their tax obligation (e.g., Colombia's carbon tax).

**Compliance markets established for hard-to-abate sectors have deepened integration with voluntary market credits.** International aviation, for example, has a long-term decarbonization pathway that requires commercializing new technologies.<sup>69</sup> Access to carbon credits along this pathway creates the potential for greater impact prior to new technologies becoming available. Therefore, the International Civil Aviation Organization (ICAO) established the Carbon Offsetting Reduction Scheme for International Aviation (CORSIA) to provide access to carbon credits alongside internal abatement measures for the sector. Rather than creating new standards, CORSIA benefited from the existing development of independent standards and international market mechanisms to supply covered airlines with carbon credits. ICAO relied upon carbon crediting standards developed for the voluntary market to supply airlines with the credits required to meet their obligations (see Figure 7).

**FIGURE 7**

CARBON CREDIT STANDARDS ACCEPTED UNDER CORSIA (SUBJECT TO SPECIFIC CORSIA REQUIREMENTS)



Source: Vivid Economics

**CORSIA shows the potential interoperability between compliance markets and voluntary markets.** Credits previously available only for voluntary market purposes are now eligible compliance credits under a regulatory regime. Achieving fungibility required accepted independent standards to update their systems for tracking credits to ensure there is no double counting for credits used in either CORSIA or for voluntary purposes.<sup>70</sup> ICAO also specified further eligibility criteria to be upheld associated with e.g., project types and vintage<sup>71</sup>.

**Despite these interactions, compliance and voluntary markets are not fully integrated.** As previously noted, compliance markets primarily serve a regulatory function for a particular jurisdiction, whereas voluntary markets provide credits to supplement goals set internally by a company or organization. Section 4 of the report will elaborate how deeper integration between compliance and voluntary systems could enable carbon markets to play a greater role in achieving net-zero emissions.

### CARBON MARKET INTERACTIONS CAN CREATE POSITIVE SYNERGIES

**Carbon markets can function better when integration is built into system design.** The market benefits either through formal integration of voluntary market credits into compliance regimes, or an informal structure where compliance and voluntary markets provide complementary functions in service of achieving net-zero. The additional benefits beyond each market framework operating in isolation are detailed below.

### VOLUNTARY MARKETS DEVELOP CAPACITY FOR EXPANDING COMPLIANCE MARKETS

**The international nature of voluntary markets enables carbon crediting projects to be developed globally.** This is highlighted by the regional variation in issuance by independent standards (see Figure 8). Nearly three-quarters of voluntary market credits issued in 2020 were generated from projects hosted outside of developed countries.

68. To date, according to the World Bank, the following carbon taxes allow using carbon credits: Colombia, Liechtenstein, Mexico, Slovenia, South Africa and Switzerland.

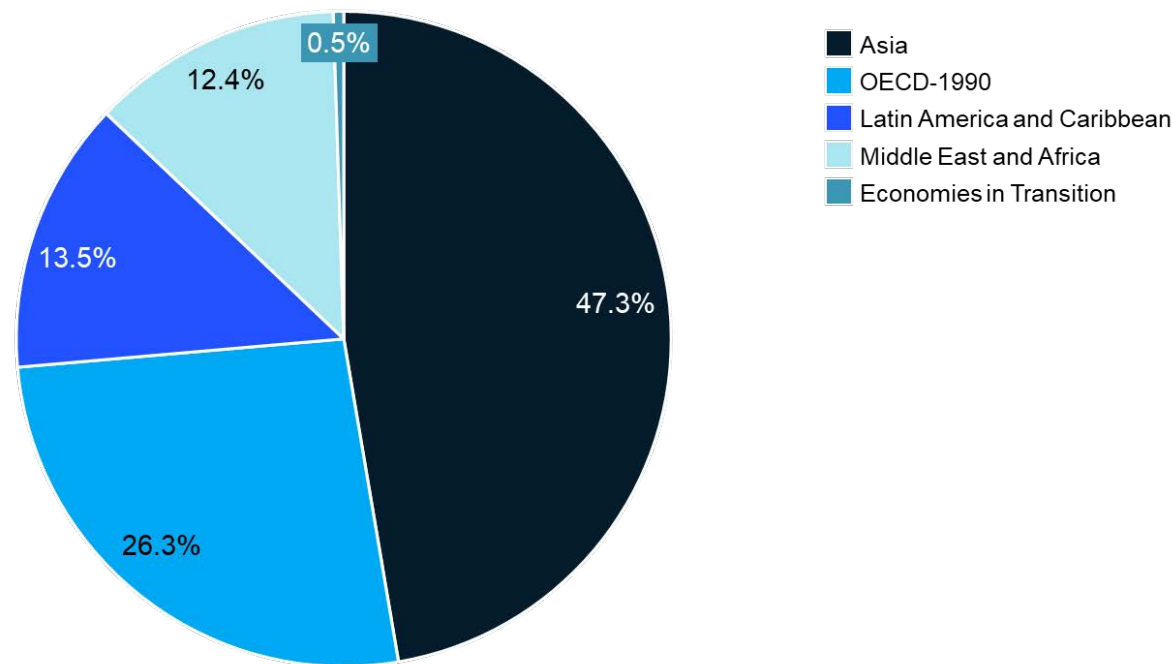
69. World Economic Forum (2021), [Aviation's flight path to a net-zero future](#)

70. For more information on CORSIA, see [International Civil Aviation Organization](#)

71. Vintage refers to the timing of when emission reductions took place.

**FIGURE 8**

REGIONAL BREAKDOWN OF VOLUNTARY MARKET CREDITS ISSUED BY INDEPENDENT STANDARDS IN 2020



Notes: OECD-1990 includes: Andorra, Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Greenland, Iceland, Ireland, Italy, Japan, Liechtenstein, Luxembourg, the Netherlands, New Zealand, Norway, Portugal, Spain, Switzerland, Sweden, Turkey, the United Kingdom, and the United States.

Source: Verra, Gold Standard, American Carbon Registry, CAR and Plan Vivo registries data; Vivid Economics graphic

**Generating credits through voluntary markets mobilizes a business ecosystem, whether for voluntary or compliance purposes.** Voluntary market projects deploy expertise in carbon measurement and accounting, project finance, technology deployment and verification that creates an ecosystem of operators and supporting service providers. This ecosystem is a foundation of expertise that could serve a future compliance market that requires similar expertise (in public and private entities) to function.

**Creating broad access to the technology, capital and expertise necessary to implement**

**mitigation approaches enables replicability.** Successful investment in carbon crediting projects creates a blueprint for future project development, including learning-by-doing to increase project effectiveness and investor confidence that projects can be delivered successfully. A virtuous cycle is possible where replication reduces cost and enhances technical capacity to enable further replication.

**Voluntary markets benefit project hosts as well as credit purchasers.** Project developers can finance technology deployment that would not be supported without revenues from voluntary

market credits. This finance is particularly valuable when used to complement other capital sources or enabling policy levers. For example, the use of voluntary market credits can help reduce deforestation in tropical countries, where economic pressure can sometimes contribute to environmental issues such as forest loss. Indeed, voluntary market projects in developing countries often align with broader UN Sustainable Development Goals, for example by seeking additional recognition for biodiversity benefits through the Climate, Community and Biodiversity (CCB) standards. Efforts such as the Voluntary Carbon Market Integrity Initiative (VCMI) and the TSVCM's Attribute Taxonomy seek to systematically capture these co-benefits and create visibility for market participants.<sup>72, 73</sup>

**These activities set the scene for future compliance markets to emerge.** The access to finance and capacity building gained through voluntary markets can enhance the ability of a future market to uncover and implement technical, on-the-ground mitigation efforts. Countries within the World Bank PMI such as Colombia and Mexico that are implementing compliance markets had a previous pipeline of carbon crediting under the CDM and independent standards.<sup>74</sup>

**Not all jurisdictions may choose to establish a compliance market, however.** For example, Least Developed Countries may not use carbon pricing because of lack of local administrative capacity or to address other policy priorities. Voluntary market projects in that reduce or avoid emissions in these countries therefore provide a critical source of investment in mitigation not directly available through compliance markets.

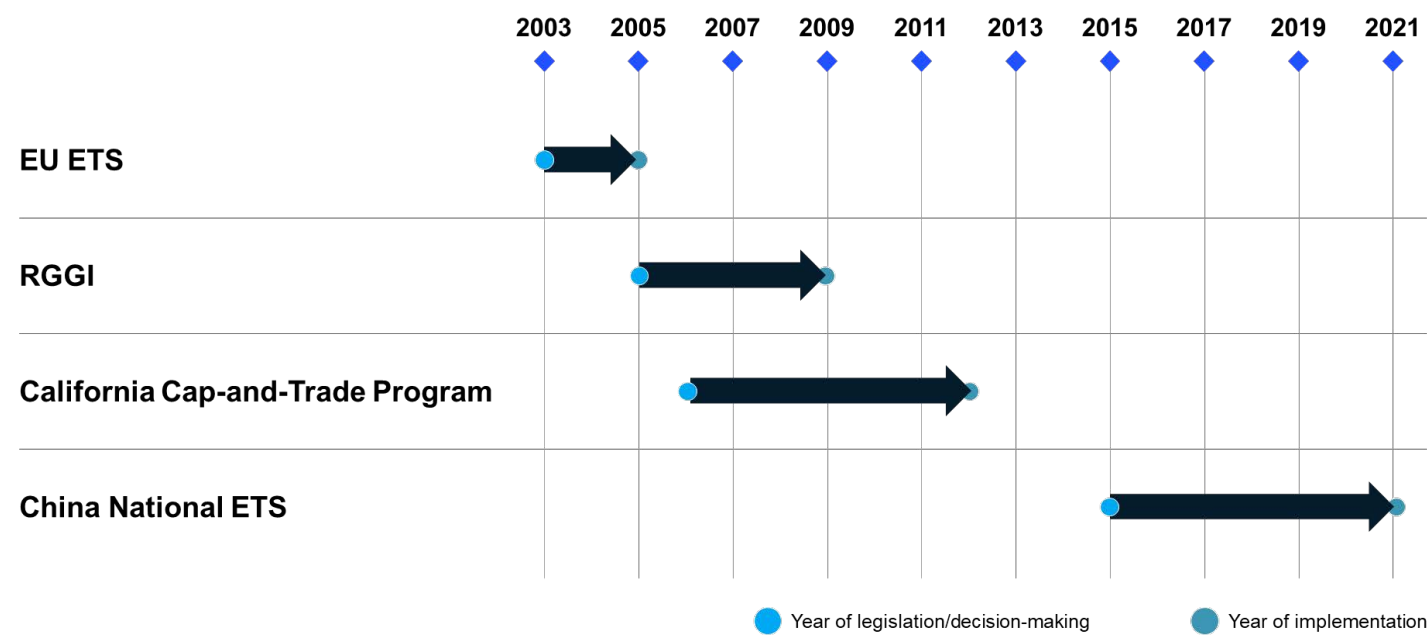
### **VOLUNTARY MARKETS CAN PROVIDE A FRAMEWORK FOR EARLY MITIGATION**

**Even once a jurisdiction chooses to proceed with a compliance market, voluntary markets continue to play an important role in encouraging mitigation.** Policymaking can be a lengthy process, given the need for deliberation and stakeholder engagement on policy design to create a fit-for-context carbon market. For example, China commenced seven regional pilot ETSs were implemented 2013 to test the mechanics of compliance markets. After a formal announcement in 2015 and an official launch in 2017, the national system started operations in 2021. Figure 9 provides examples of the lag between compliance market policy announcements and entry into force.

72. See [VCMI \(2021\) Aligning Voluntary Carbon Markets with the 1.5°C Paris Agreement Ambition: A global consultation report of VCMI](#)  
73. TSVCM (2021) [Final report](#)  
74. International Carbon Action Partnership (2021), [Status Report 2021](#). CDM and independent standards participation by Colombia and Mexico verified by data from Vivid Economics.

**FIGURE 9.**

YEAR OF ADOPTION AND IMPLEMENTATION OF SELECTED EMISSIONS TRADING SYSTEMS



Source: ICAP; Vivid Economics graphics

**Voluntary markets offer a bridging solution.**

Prior to compliance markets being operational, voluntary markets offer companies not subject to regulatory requirements to reduce emissions the opportunity to use market mechanisms to reach internal voluntary targets. The absence of access to voluntary markets would limit voluntary mitigation by companies to internal abatement. This is critical but not sufficient to achieve necessary climate ambition given the technological and economic constraints of internal abatement faced by companies in some sectors.

**Voluntary markets can be available where compliance markets do not exist.**

For jurisdictions that do not create a compliance market (or will not cover certain sectors), voluntary markets can provide access to flexibility mechanisms for companies and investors with internal targets. If a country does not wish to pursue a compliance

market, creating a pipeline of voluntary market projects can facilitate domestic or international investment into emission reductions that might not otherwise occur absent a market incentive.

**COMPLIANCE MARKETS CAN CREATE DEMAND FOR CREDITS GENERATED IN VOLUNTARY MARKETS**

**Voluntary markets also establish an early-stage investment channel for projects and carbon crediting protocols that could transition to a compliance market in the future.**

Voluntary markets have often served as a “testing ground” for carbon crediting methodologies and approaches to be refined and then transitioned for use in compliance markets. For example, carbon crediting protocols developed in California originally served voluntary markets but in 2013 became eligible for use under the state’s cap-and-trade program (see Table 3).

**TABLE 3**

THE EXPANSION OF VOLUNTARY MARKET STANDARDS IN CALIFORNIA

2001: CALIFORNIA CLIMATE ACTION REGISTRY (CCAR)	2008: CLIMATE ACTION RESERVE (CAR)	2013: INCLUSION IN WESTERN CLIMATE INITIATIVE (WCI)
CCAR established GHG accounting and verification standards to quantify the emission reductions from GHG mitigation projects. Members committed to voluntarily calculate and report emissions according to these standards.	CAR, which evolved from CCAR, established standards for carbon credit projects. It issues carbon credits, oversees independent verifiers, and serves as a registry for transactions. After a project has been approved and verified by a third-party verification body, carbon credits known as Climate Reserve Tonnes (CRTs) are issued and can be traded on the registry.	The California Cap and Trade program was launched in 2013, and soon after linked with Quebec under the WCI carbon program. CAR was authorized to issue carbon credits as part of the Compliance Offsets Program of this program. By relying on a transparent external crediting mechanism such as CAR, the Cap-and-Trade Program reduces the administrative burden within the participating governments.

Source: Climate Action Reserve, Western Climate Initiative Inc.

**In addition, the China Voluntary Emission Reduction Program provided a platform for carbon crediting projects to gain recognition within the country.**

These credits, known as CCERs, provided companies with access to trading infrastructure ahead of the development of a national carbon market. Indeed, CCERs were accepted for the seven subnational carbon market pilots in China that operated from 2013 until the establishment of a national ETS in 2021. As of June 2020, 287 projects had issued CCERs under the system.<sup>75</sup>

**Regulators for compliance markets examine how carbon credits will function during program design or during periodic program reviews.**

If carbon credits are included, regulators can weigh in on acceptable standards for credits

used in the system. For example, during Phases I and II of the EU ETS<sup>76</sup>, credits from the Clean Development Mechanism could be used to meet compliance obligations. However, during Phase III the European Union limited the use of credits to specific geographies and credit types. These decisions taken within a compliance market system impact the shape of voluntary markets. To increase the potential demand, carbon credit providers are incentivized to develop projects that are acceptable within that compliance market. Acceptable projects may be limited by accreditation standard, location, vintage and by project type (e.g., emission removal or emission reduction/avoidance).

75. Environmental Defense Fund (2021) [The status of China’s voluntary carbon market](#)

76. The EU ETS has undergone four different phases. It started with a pilot, phase 1 (2005-2008) followed by the first mandatory period, phase 2 (2008-2012) and two subsequent phases, 3 (2013-2020) and 4 (2020-2030). Sectoral coverage has expanded over time and different phases are characterized by different requirement (e.g., around the use of credits).



## CARBON CREDITS PROVIDE ADDITIONAL FLEXIBILITY FOR ENTITIES COVERED BY COMPLIANCE MARKETS

In addition to which credits to include, compliance market regulators may also wish to assess how many credits should be eligible for compliance. When compliance markets accept carbon credits into their systems, this increases the overall supply of mitigation opportunities and reduces the market price. Unlimited access to carbon credits could substantially reduce prices below the level necessary to incentivize mitigation in covered sectors. Typically, policymakers have sought to limit the flexibility that credits provide for entities by restricting carbon credit use to ensure that covered firms have sufficient incentives to undertake internal abatement.

Compliance markets have addressed oversupply concerns by placing limits on the use of carbon credits, both quantitative and qualitative. For example, in Phase III (2013-2020) of the EU ETS, carbon credits generated through the CDM were restricted based on methodology and country of origin (to Least Developed Countries), and the

total permissible credits across Phases II (2008-2012) and III were limited to 50% of the reductions achieved through the ETS. This equated to approximately 1.6 GtCO<sub>2</sub>e. Nevertheless, the oversupply of CDM units continued to contribute to low allowance prices, and these credits were no longer accepted for use in the EU ETS from Phase IV (which commenced in 2021) onwards.<sup>77</sup>

Carbon markets in emerging markets are increasing their interactions with voluntary markets, even as the use of carbon credits are become more restrictive in existing compliance markets. As Table 4 shows, newer compliance markets tend to allow using carbon credits for compliance obligations both to stimulate local climate action and to allow covered firms flexibility for program compliance. In addition, Chile, Japan, the Philippines, Turkey, and Pakistan are considering carbon pricing systems that allow carbon credits to be used for compliance.<sup>78</sup> Conversely, more established systems are increasingly limiting or eliminating the use of carbon credits to strengthen the abatement incentive of their systems.

**TABLE 4**

COMPLIANCE MARKETS ARE ALLOWING GREATER CREDIT USE IN SOME CASES, AND BECOMING MORE RESTRICTIVE IN OTHERS

COMPLIANCE MARKETS ALLOWING GREATER CREDIT USE	QUANTITATIVE LIMIT	COMPLIANCE MARKETS RESTRICTING CREDIT USE FROM PREVIOUS LEVELS	QUANTITATIVE LIMIT
China national ETS	Up to 5 % of compliance obligations	California Cap-and-Trade Program	Reduced use limit from 8% to 4% for 2021-2025, 6% thereafter
South Africa carbon tax	Up to 10 % of compliance obligation	EU ETS	Use of credits not accepted since 2021
Colombia Carbon Tax	No quantitative limit on credit use	New Zealand ETS	Use of credits not accepted since 2015
Mexico Pilot ETS	Up to 10 % of compliance obligation	Switzerland ETS	Use of credits not accepted since 2021
Kazakhstan ETS	No quantitative limit on credit use	South Korea ETS	Permitted use of credits decreased from 10% to 5% of compliance obligations in 2021

Source: International Carbon Action Partnership (ICAP), World Bank Carbon Pricing Dashboard

77. Carbon Market Watch (2014): [‘What’s needed to fix the EU’s carbon market’](#)

78. World Bank, [Carbon Pricing Dashboard](#) Accessed: 20<sup>th</sup> October 2021

## VOLUNTARY MARKETS CAN COVER EMISSIONS FROM SECTORS NOT COVERED BY COMPLIANCE MARKETS

**Compliance markets typically focus on major economic sectors such as power generation, transportation and industry.** They often omit major contributors to GHG emissions, most notably agriculture and land-use (except through carbon credits, as discussed above). These are sectors where it is typically more difficult to define the boundaries of an entity and to measure emissions.<sup>79</sup> Within covered sectors, ETSs typically define threshold values exempting smaller entities, in which the administrative burden would be disproportionate to the benefit of covering that emissions source.

### **Voluntary markets are a vital investment channel for carbon removals (nature-based solutions and carbon removal technologies).**

Country-level emission reduction targets typically encompass all GHG sources, and therefore incentives to reduce agriculture and land-use emissions are necessary. Furthermore, at the date at which net-zero emissions should be achieved (by a government or company), a market for removals is critical to neutralize any residual GHG emissions in hard-to-abate sectors (such as aviation or heavy industry) that cannot be abated. Given that compliance markets typically omit these sectors under their emissions caps, developing carbon credits for carbon removals provides a price signal to mobilize investment.

**A company can use voluntary markets to address emissions occurring downstream from compliance markets.** One option is a process known as insetting. For example, if production of raw materials occurs in a jurisdiction lacking a

compliance market, access to voluntary markets can allow companies to develop or invest in projects that reduce these GHG emissions. An alternative approach is to offer consumers a carbon neutral product by compensating downstream emissions through voluntary market credits. For example, an oil and gas company can offer carbon credits to consumers of transportation fuels whose emissions (categorized as Scope 3<sup>80</sup>) are not included in the local jurisdiction's compliance program. It is important to note, however, that compliance markets such as California/Quebec include GHG emissions from transportation fuels in their ETS, and the European Union is considering expanding coverage of the ETS to include this sector also. This points to an increasing trend of compliance markets covering a greater proportion of their GHG emissions within their carbon market.

## THE FUTURE OF COMPLIANCE AND VOLUNTARY MARKETS

### **The landscape for carbon markets is shifting.**

To become compatible with a net-zero world, a transition in the role of carbon markets is likely. The process of shifting the composition of carbon markets is under way but the extent of the transformation remains unclear.

For the next decade and beyond, compliance markets could be a key driver of decarbonization and could be a central pillar of the policy mix to achieve net-zero.

However, voluntary carbon markets are filling crucial gaps – by creating incentives to scale up carbon removal technologies, as well as addressing emissions sources not covered by compliance markets.

**Reaching net-zero emissions would mean not only a larger carbon market but a carbon market focused on obtaining the broadest emissions coverage.** Aligning ambition with net-zero requires incentives that span the economy, including for emission reductions and removals that compliance markets do not cover. Ensuring markets address these coverage gaps can support mitigation in jurisdictions not yet ready to implement compliance markets, and for removals to credit against residual emissions from the hardest-to-abate sources.

### **Increasing market maturity, particularly for voluntary markets, could also support accelerating growth.**

Enabling market infrastructure, from registries to standard contracts, can match increasing demand, including new entrants who expect a highly sophisticated marketplace, with a pipeline of high-integrity credits to scale investment. Through these mechanisms, jurisdictions and firms could credibly use carbon markets to help achieve high ambition NDCs and corporate commitments.

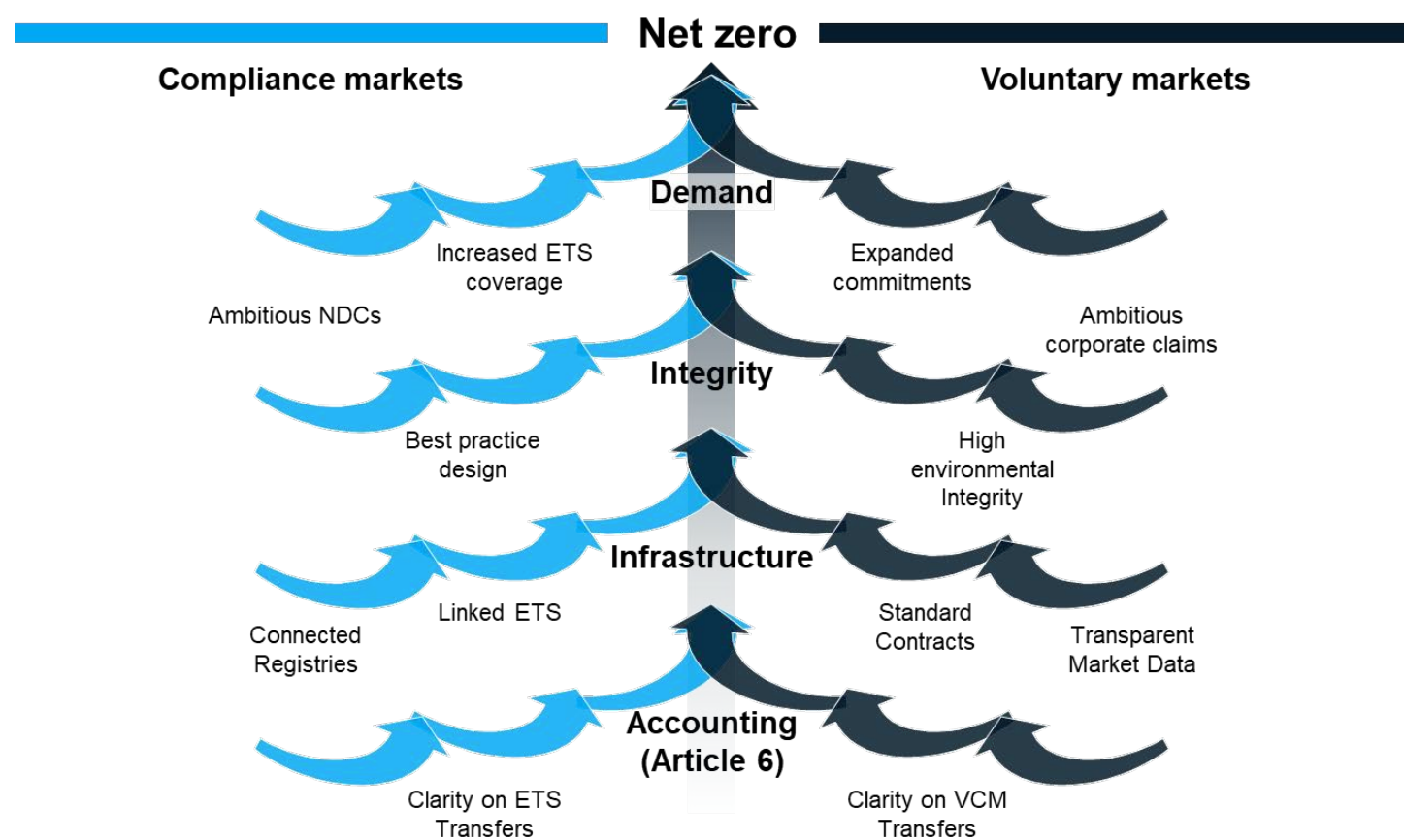
### **This vision of a high-integrity, scaled and integrated carbon markets relies on four enabling factors: demand, integrity, infrastructure and accounting.**

Together, these factors ease the navigability of carbon markets and promote market participation, thereby facilitating the scaling of the market. Figure 10 below summarizes the contribution of these key factors towards a long-term vision of net-zero emissions. This vision is intended to represent what is achievable if an enabling environment is created through sound decisions – namely a fully effective carbon market ecosystem, considering both compliance and voluntary markets.

79. Carbon leakage refers to the situation that may occur if, for reasons of costs related to climate policies, businesses were to transfer production to other countries with laxer emission constraints. Since farmers largely produce a homogeneous product that is sold on an international market, they cannot pass on carbon costs to their customers without suffering from the international competition.

80. For further information on Scope 1, 2 and 3 GHG emissions, see [GHG Protocol Corporate Standard](#)

**FIGURE 10**  
BUILDING TAILWINDS FOR NET-ZERO CONSISTENT CARBON MARKETS



Source: Vivid Economics graphic

**Across these four factors “end to end” transparency is essential.** This is especially the case for voluntary markets where disclosure is not required under regulation. It begins with transparency from companies about their decarbonization target and the role credits will play in achieving that goal (**claims**). Second, transparency from market participants about the credits that are purchased and their price (**ownership**), and the impacts that they generate on the ground (**impacts**). Finally, transparent accounting within markets demonstrates that double counting has been avoided when those credits are used to fulfil a target (**accounting**). This section elaborates how transparency impacts each of these key factors.

**Rapid growth of carbon markets is achievable, but so is a future where progress is limited.** An **Expansionary outlook** fully realizes the potential growth by advancing across all key factors, with a virtuous cycle of progress. In a **Constrained outlook**, carbon markets are still an important component of the policy mix and corporate response, and could continue expanding, but fail to reach their full growth potential. The outlook under each scenario is summarized in Table 5.

**TABLE 5**  
KEY FACTOR DEVELOPMENTS UNDER EXPANSIONARY AND CONSTRAINED SCENARIO

KEY FACTOR	EXPANSIONARY OUTLOOK	CONSTRAINED OUTLOOK
<b>Demand</b>	Compliance carbon markets align emissions caps (or carbon prices) with achieving net-zero emissions by mid-century and increase sector coverage. Decarbonization commitments become standard for major companies	Reduced ambition restricts growth in compliance markets and complementary policies. Voluntary markets continue to grow, but they do not fill gaps in market coverage
<b>Integrity</b>	Across compliance and voluntary markets, a consensus emerges on what constitutes demand- and supply- side integrity. This focuses carbon credit growth on priority sectors where the highest impact can occur	A patchwork of standards and criteria creates confusion for market participants about acceptable approaches, particularly within voluntary markets
<b>Infrastructure</b>	New market participants benefit from transparent registries and recognized standard contracts that reduce transaction costs and ease the process for buyers and sellers	Continued inconsistency of contracts across standards and markets. New entrants must familiarize themselves with multiple approaches to build a diversified credit portfolio
<b>Accounting (Article 6)</b>	Article 6.2 facilitates international carbon market transfers. Private sector transactions dominate. The Article 6.4 Mechanism simplifies carbon credit development, particularly in least developed countries	Unclear guidance inhibits rapid growth in carbon market transfers. Government bilateral ITMO <sup>81</sup> transfers mobilize emission reductions as a substitute for carbon market transfers. The Article 6.4 Mechanism is challenging for project developers to navigate

Source: Vivid Economics

**Scaling carbon markets to achieve net-zero will not occur automatically.** It will require mobilizing demand for high-integrity mitigation, enabled by efficient market infrastructure and robust accounting. Steps can be taken to enhance carbon markets across each of these fronts, with a potential virtuous cycle where advances in compliance markets open opportunities for greater demand for voluntary market credits, and vice versa.

81. Internationally Transferred Mitigation Outcomes (ITMOs) refer to the trading units under article 6 of the Paris Agreement, they are discussed further in section 2.



## DEMAND

**Scaling up compliance and voluntary markets ultimately requires ratcheted ambition to unlock greater demand.** Compliance markets cover over one-fifth of global GHG emissions, but this coverage would need to continue to increase rapidly over the coming decade to provide a market signal across global industries. As noted by the TSVCM, voluntary credits need to expand by as much as fifteen times current levels to reach a scale commensurate with net-zero emissions by mid-century.<sup>82</sup>

**Voluntary and compliance carbon markets are each necessary but not sufficient to meet net-zero emissions.** The increase in demand for voluntary market credits and compliance market coverage would need to occur. If carbon markets are a part of the tool mix to meet climate commitments, then more ambitious targets imply a greater need for both compliance and voluntary markets. However, it is important not to overlook the important role for complementary policies and private incentives aside from carbon markets that mobilize emission reductions across the global economy.

**Achieving the Paris Agreement's goals requires ratcheting ambition from countries, which could generate demand for new compliance markets.** This potential new role could take three forms. First, compliance markets could be established in new geographies (such as members of the World Bank PMI). Second, existing ETSs could expand to cover new sectors and tighten the caps on existing sectors, as the European Commission recently proposed in its Fit for 55 policy package. Third, compliance markets could formally link across jurisdictions. Across these three options for ratcheting carbon markets alongside ratcheting ambition through enhanced NDCs, prices can be

elevated to align with the High-Level Commission on Carbon Prices.<sup>83</sup>

**Ratcheting voluntary market demand will be driven by an acceleration of net-zero commitments to more companies and more ambitious deadlines.** The aim is a positive “race to net-zero” where the impact of corporate commitments grows in two ways. First, commitments broaden across companies, investors and other private actors so that a decarbonization commitment becomes standard business practice. These commitments would take the form of transparent claims, as detailed in section 4.2. This includes increased commitments from existing voluntary market buyers and investments from new entrants globally. Second, those with an existing net-zero commitment can ratchet their ambition to reach that goal earlier, following the lead of initiatives such as The Climate Pledge to reach net-zero by 2040. Net-zero commitments should be expected to follow the mitigation hierarchy (prioritizing the internal abatement of emissions over the purchase of carbon credits). The High Ambition Path to Net-Zero offers a helpful guide for companies and investors to examine the practical role voluntary markets can play in achieving ambitious targets.<sup>84</sup>

**The ratcheting of ambition in compliance and voluntary markets can create a virtuous cycle enabling more rapid action.** Policy to accelerate action at a jurisdictional level can help reduce the cost of adopting more ambitious voluntary targets. Ambitious compliance markets drive down the costs of green technologies for businesses to adopt, which in turn makes a more ambitious net-zero commitment more economically feasible for businesses. This could entail either committing to reach a decarbonization target earlier or including a new category of emissions (such as Scope 3 emissions) under an existing commitment.

Conversely, private sector efforts to reach net-zero early could encourage policymakers to align their decarbonization targets with businesses operating in their jurisdiction.

**The recent growth in both compliance and voluntary markets demonstrates that there is a greater demand signal for both approaches (see Section 2.1).** Greater demand is the end point of the pathway to scaled-up voluntary and compliance markets commensurate with achieving net-zero emissions. The challenge, however, is to develop the enabling factors that give governments and the private sector the confidence, tools and infrastructure to commit to scaling up carbon markets.

## INTEGRITY

**Carbon markets are only valuable if they uphold integrity.** Integrity encompasses both the supply and demand sides of carbon markets:

- **Supply-side integrity** occurs when emission reductions are real and verified. This incorporates robust methodologies for addressing issues such as additionality, permanence, leakage, accurate GHG measurements, and double counting.<sup>85</sup>
- **Demand-side integrity** is fulfilled if buyers of voluntary market credits and governments establishing compliance markets align carbon markets with credible and comprehensive climate commitments.

**There are multilateral initiatives working to enhance supply-side integrity that are coalescing behind best-practice design acquired through past experiences.** Initiatives such as the World Bank PMI can assist developing countries to design

effective compliance markets.<sup>86</sup> At the international level, multilateral initiatives such as the San Jose Principles, a 32-country pledge to high integrity carbon market cooperation, highlights a common goal of international transfers that aim to mitigate integrity concerns.<sup>87</sup> In voluntary markets, efforts of the TSVCM, the International Carbon Reduction and Offset Alliance (ICROA) and the Carbon Credit Quality Initiative will also be important to define a common integrity standard (see Figure 11).<sup>88</sup> For example, the TSVCM is establishing the Core Carbon Principles (CCP) overseen by a Governance Body to act as a threshold standard to identifying high-quality carbon credits. Regarding any claimed co-benefits, supply-side integrity will also benefit from increasing transparency on the actual impact of the crediting projects in the country of implementation. This will streamline trading by allowing market entrants to trade in high quality products without the need for significant expertise nor due diligence.

82. TSVCM (2021)

83. Carbon Pricing Leadership Coalition (2017) [Report of the High-Level Commission on carbon prices](#)

84. Institute of International Finance (IIF): [Calling for a High Ambition Path to Net-Zero](#)

85. For more information on principles for supply-side integrity, see VCM (2021) [Aligning Voluntary Carbon Markets with the 1.5 °C Paris Agreement Ambition](#)

86. See the World Bank's [Partnership for Market Implementation website](#)

87. Government of Costa Rica (2019) [Press release: 32 leading countries set benchmark for carbon markets with San Jose Principles](#)

88. International Carbon Reduction and Offset Alliance

There are also initiatives working to enhance demand-side integrity by building consensus around standardized decarbonization claims for companies involved in the voluntary market. It is essential that companies are transparent about their decarbonization target and the role credits will play in achieving that goal. With a plethora of decarbonization claims in existence today (e.g., carbon neutral, climate neutral, climate negative, net-zero, etc.), some companies' claims are complex to interpret. This could increase the reputational risk of perceived greenwashing. The VCMI is currently developing guidance on ensuring demand-side integrity, for example.<sup>89</sup> This is related but separate to whether a proposed pathway is commensurate with achieving net-zero emissions. Initiatives such as Science-Based Target Initiative (SBTi) go further by establishing specific pathways with interim targets to assess corporate climate ambition.

**FIGURE 11**  
INITIATIVES AND CHARTERS ESTABLISHED TO ELABORATE HIGH-INTEGRITY PRACTICES



Sources: TSVCM, VCMI, ICROA, The Carbon Credit Quality Initiative

89. Standards include PAS 2060, Certified Carbon Neutral, VCMI

Nevertheless, there is a lack of consensus regarding the use of carbon credits for corporate decarbonization claims. Under some initiatives the use of credits is permitted whereas in others it is discouraged or even banned. Given the important role of financial institutions in driving corporate climate ambition, building a common framework for these claims will be critical to avoid confusion that deters companies from announcing ambitious targets. The range of existing approaches are summarized in Table 6.

**TABLE 6**  
USE OF CREDITING IN SELECTED NET-ZERO INITIATIVES IN THE FINANCE SECTOR

INITIATIVE	TREATMENT OF CREDITING
Race to Zero <sup>90</sup>	Permitted. Reducing emissions should be prioritized, limiting credit use for residual emissions.* By the time net-zero status is achieved, any neutralization of residual emissions must transition to permanent removals.
UN-Convened Net-Zero Banking Alliance <sup>**91</sup>	Permitted to supplement decarbonization in line with climate science. Only removal carbon credits can be used to neutralize residual emissions at net-zero.
UN-convened Net-Zero Insurance Alliance <sup>**92</sup>	Permitted to supplement decarbonization in line with climate science. Only removal carbon credits can be used to neutralize residual emissions at net-zero.
Net-zero Asset Manager Initiative <sup>**93</sup>	Permitted. Signatories commit to prioritize the achievement of real economy emissions reductions within the sectors and companies in which they invest. If using credits, they commit to invest in long-term carbon removal.

90. Race To Zero is a global campaign mobilizing a coalition of leading net-zero initiatives, representing 733 cities, 31 regions, 3,067 businesses, 173 of the biggest investors, and 622 Higher Education Institutions. For more information on credit use, see Race to Zero (2021) [Race to Zero Criteria](#)
91. Launched in 2021, this industry-led alliance brings together 55 banks from 28 countries, which are committed to aligning their lending and investment portfolios with net-zero emissions by 2050. It represents over US\$37 trillion. For more information on credit use, see the [NZBA Commitment Statement](#)
92. Launched in 2021, NZIA brings together eight of the world's leading insurers and reinsurers committing to individually transition their underwriting portfolios to net-zero greenhouse gas (GHG) emissions by 2050. For more information on credit use, see the Net-Zero Insurance Alliance's [Statement of commitment by signatory companies](#)
93. Group of asset managers committed to supporting net-zero goal by 2050 and to support investing aligned with net-zero. Launched in 2020, it represents US\$43 trillion in assets. For more information on credit use, see their [Net-zero Asset Managers Commitment](#)

Climate Action 100+ <sup>94</sup>	Discouraged. The use of carbon credits should be avoided and limited, if applied at all. It should not be used in sectors where viable decarbonization technologies exist. Greater transparency on the use of credits is encouraged.
Science Based Targets – Financial Institutions <sup>95,96</sup>	Forthcoming. Revised guidance for net-zero targets for financial institutions is forthcoming, including the use of credits. Currently, the use of credits is not counted towards the progress of financial institutions’ science-based targets. SBTi guidance for non-financial institutions supports the use of removal credits for residual emissions.

Notes: \*Residual emissions are emissions that cannot be eliminated due to the limited technologically or financially viable alternatives. \*\*The UN-Convened Net-Zero Banking Alliance, the UN-convened Net-Zero Insurance Alliance, the Net-Zero Asset Manager Initiative and the UN-convened Net-Zero Asset Owner Alliance<sup>97</sup> are part of the Glasgow Financial Alliance for Net-zero, a strategic forum bringing together the leading net-zero initiatives across the financial sector. The UN-convened Net-Zero Asset Owner Alliance has not stated a position on the use of credits.

Sources: Multiple

**It is important to recognize the emerging distinction between carbon neutrality and net-zero commitments.** As shown in Figure 12, carbon neutrality is achieved when unavoidable emissions are compensated or neutralized within a given year using any type of carbon credits. A net-zero claim requires reaching a state of no impact on the climate from GHG emissions, with all residual emissions to be neutralized with the permanent

94. Investor-led initiative launched in 2017 to ensure the world’s largest corporate greenhouse gas emitters take necessary action on climate change. For more information on credit use, see Climate Action 100+’s [FAQ](#)

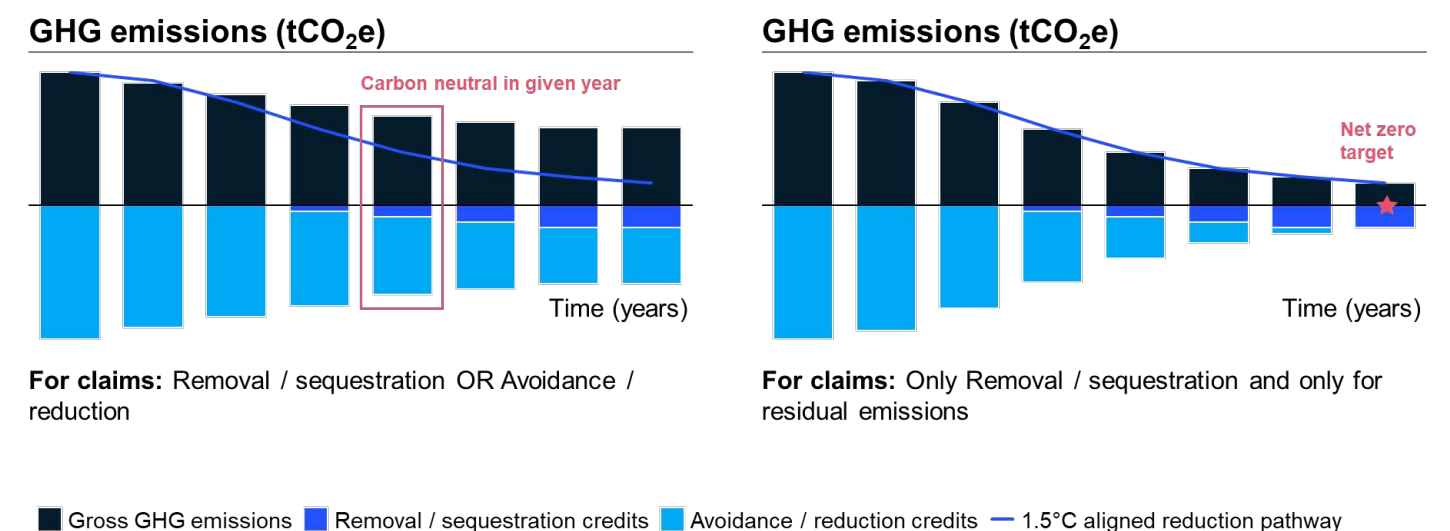
95. Framework launched by SBTi for financial institutions to align their lending and investment activities with the Paris Agreement. For more information on credit use, see SBTi (2021) [Financial sector science-based targets guidance](#)

96. See SBTi (2020) [Foundations for Science-based net-zero target setting in the corporate sector](#)

97. International group of over 40 institutional investors committing to transition their investment portfolios to net-zero by 2050. Representing US\$6.6 trillion in assets. For more information, see the [Commitment Document for Participating Asset Owners](#)

**FIGURE 12**

DISTINCTION BETWEEN CARBON NEUTRAL CLAIM (LEFT) AND NET-ZERO CLAIM (RIGHT)



Source: Vivid Economics

**Low-integrity credits risk limiting future carbon market growth.**

These credits may not uphold environmental integrity of emissions reductions and therefore carry reputational risks to credit purchasers. Similarly, poorly designed policies may undermine a program’s effectiveness at reducing GHG emissions and public confidence in compliance markets. New entrants without prior experience with carbon markets will need to be confident in their integrity to enter and participate.

**Conversely, maintaining high integrity standards builds confidence across compliance and voluntary markets.**

Improved standards adopted in the voluntary market can be transferred into compliance markets, particularly as more compliance systems integrate carbon credits into their policy design. A regulatory requirement to collect company-level GHG emissions data, which is a prerequisite for a compliance market, could also provide the baseline data for a company to build an abatement strategy that culminates in a net-zero commitment.

98. Double issuance (when more than one credit is issued for the same emissions reduction/removal), double use (when a credit is counted twice by the same entity) and double claiming (when the same credit is counted by several entities) are all forms of double counting. [VCMI \(2021\)](#).

**INFRASTRUCTURE**

**Market integrity and market infrastructure are intertwined across compliance and voluntary markets.** Infrastructure incorporates a broad suite of tools that make trading within carbon markets straightforward and increase transparency of ownership.

- **Market infrastructure** - This includes registries, managed either by regulators or voluntary carbon standards, that oversee asset ownership. The TSVCMI identifies the need for greater transparency in voluntary market registries to provide financial markets with data relevant to market analysis (credit retirement, retiring entity, etc.). Traceable serial numbers and transparent reporting can also reduce the risk of double issuance, double use and double claiming as well as enhance comparability and provide clearer price signals.<sup>98</sup> The business intelligence company IHS Markit established the Global Carbon Index, an index tracking



carbon allowances in leading compliance markets (e.g., EU, California and RGGI), and is now preparing to launch a Global Carbon Credit Meta-Registry to connect voluntary market registries.<sup>99,100</sup>

- **Financial infrastructure** - Building mature financial arrangements, from structured finance to standard contracts, will be important for scaling voluntary market credits. The experience in compliance markets such as the EU ETS or California, where standard financial (spot and futures) contracts were developed to encourage trading and price risk management via exchanges could provide lessons for developing voluntary market-specific contracts and exchanges.<sup>101</sup> Establishing standard financial contracts, would also increase transparency in over-the-counter markets, providing a foundation from which bespoke contracts can be negotiated. Similarly, unlocking new financial structures such as blended or structured finance could unlock new sources of capital to invest in voluntary market projects and assets.<sup>102</sup>

**The absence of infrastructure in both voluntary and compliance markets risks eroding market confidence and limiting market size, and thus undermines their ability to play a full role in achieving net-zero.** Limited access to market information by market participants impedes robust analysis to understand market dynamics. This could create potential integrity concerns such as unclear opaque credit ownership or double claiming. It could also create market frictions due to illiquidity (elongated trading processes) caused by high due diligence requirements (such as establishing legal ownership). Existing

compliance and voluntary markets already have in place systems to guard against these risks, but increased scale may necessitate creating additional infrastructure, including automated verification checks on ownership and accounting.

**Connected infrastructure benefits the overall carbon market.** The case for common market infrastructure is clear—it would reduce reputational risks, transaction costs and ease entry into carbon markets for new participants. Market infrastructure development also generates a virtuous cycle in the absence of formal connectivity. Professional and technical services offered in compliance markets can be transferred to voluntary markets. This includes third-party verifiers, registry service providers, market exchangers or brokers, and other supplemental services. Growing this common market for infrastructure providers reduces the transaction costs for carbon markets and increases the technical capacity available to provide environmental or financial services to market participants.

## ACCOUNTING (ARTICLE 6)

**Both compliance and voluntary markets can benefit from the scaling made possible by international carbon markets.** Coherent, practical guidance for voluntary markets and cross-border compliance markets can help to increase linkages, mobilize demand and increase flows of mitigation investment in line with net-zero.

**Article 6 negotiations are an opportunity to provide market confidence across compliance and voluntary markets.** Common guidance for international transfers clarifies the “standard operating procedure” that companies should follow. The framework under Article 6 is therefore

an important factor to determine the future form of carbon markets. While the broad rules governing Article 6 are agreed upon, the specific provisions are yet to be finalized and will be a major point of discussion at COP 26.

Key outstanding issues include:<sup>103</sup>

- **Defining how to account for ITMOs across the different types of NDC targets.** For instance, the guidance might provide specific processes for NDCs which use a single year mitigation target (e.g. 55% below 1990 levels by 2030) to avoid countries acquiring ITMOs to reduce their emissions only in the target year rather than across the entire NDC period. An additional technical issue is how to account for ITMOs from sectors not covered under a country’s NDC, given the need to conduct a corresponding adjustment.
- **Whether trade using the Article 6.4 mechanism requires a corresponding adjustment under Article 6.2 to avoid double counting.** To date, Article 6 negotiators have not been able to find consensus on whether the corresponding adjustment applies only to bilateral transfers or also encompasses the new centralized mechanism which serves as a successor to the Kyoto Protocol’s CDM.
- **Options to ensure that international cooperation provides an “overall mitigation in global emissions” (OMGE).** An OMGE, referenced in Article 6.4 but not Article 6.2, could require the cancellation of a share of traded credits to ensure that overall emissions decrease instead of only transferred between market participants.

- **The extent to which existing projects and credits developed under the UN Clean Development Mechanism are transitioned to the Article 6.4 mechanism.** The CDM served as a mechanism to generate emission reduction credits for compliance under the Kyoto Protocol. Negotiators must consider whether existing CDM credits will be eligible to meet NDCs, and whether projects and/or methodologies will be transferred to generate credits under the new mechanism.

**Depending on negotiation outcomes, there are practical consequences for how carbon markets are structured.** These include accounting requirements, potential substitutes to carbon market transactions from bilateral ITMOs or the Article 6.4 mechanism, and new market infrastructure needs.

- **Voluntary standards may align with Article 6 and require a corresponding adjustment.** As such, projects from countries where corresponding adjustments are not implemented may lose market access for sources of demand that require a corresponding adjustment. However, because corporate and national emissions accounting remain separate, it may be possible for companies to use international credits provided they are transparent that those reductions remain part of the national balance of the host country. Whatever the outcome, it is crucial that regulators and market participants transparently disclose the accounting approach used to prevent double counting.

99. IHS Markit: [Global Carbon Index](#)

100. IHS Markit (2021) [IHS Markit to Launch Global Carbon Credit Meta-Registry](#)

101. Voluntary market-specific exchanges are already being established, such as Xpansiv’s trading in Global Emissions Offsets (GEOs), AirCarbon Exchange’s CORSIA Eligible Tokens (CETs), or the upcoming launch of Climate Impact X in joint operation by DBS, SGX, Standard Chartered and Temasek.

102. For more information on voluntary market infrastructure, see TSVCM(2021) [Final report](#)

103. For additional information on technical issues under Article 6 that are unresolved ahead of COP 26, see for example Kizzier, Levin and Rambharos (2019), [Making Sense of Article 6: Key Issues and What’s at Stake](#).

Although corresponding adjustments are outside the scope of the TSVM, the Taskforce underlines the key requirement that carbon credits remain unique regardless of Article 6 negotiation outcomes.

- **The potential transition from the CDM to Article 6.4's new mechanism could alter voluntary market dynamics. For example, if previously issued credits under the CDM are carried over into Article 6.4's new mechanism, prices could be permanently depressed due to significantly greater supply. By contrast, if nothing from the CDM is carried over (including registered projects and methodologies), prices could increase due to delays in new supply as new methodologies are developed and projects launched, validated and verified.**
- **Article 6 guidance may create a role for common market infrastructure across voluntary market credits and compliance markets. This is particularly relevant to provide market assurance, where traded assets should avoid being claimed towards multiple NDCs. This could require centralized infrastructure such as a registry to determine asset retirement across voluntary market standards and compliance markets. This is particularly relevant for programs where the overlap is explicit, such as CORSIA (a compliance market served by voluntary market credits).**

**Robust and transparent accounting frameworks for compliance or voluntary markets can increase overall market confidence.** Voluntary market credits can reach across multiple jurisdictions. Therefore, the presence of accurate accounting and transparent reporting reduces the reputational and environmental risk of double counting. These systems could aid emerging compliance markets to permit credits into their policy design, because there is high confidence that the accounting will integrate with the standards used for covered entities under the program. Given the benefits of further carbon market integration, robustly applied accounting can provide policymakers confidence that voluntary carbon credits do not present risks to policy integrity.

### BOX 3

#### POTENTIAL IMPACTS OF THE TREATMENT OF ITMOs ON CARBON MARKET COMPOSITION

**The rules and design choices surrounding ITMOs will influence the future carbon market in different ways:**

- **At one extreme, only government-to-government bilateral transactions would be counted as ITMOs, which could lead to increased prices.** In this case, for an ITMO traded under Article 6.2 to count towards an NDC, it would have to be owned by the acquiring company's government as part of agreement with the selling country's government. The implication is that carbon market transactions would play a smaller role than in the absence of government-facilitated ITMOs.
- **Alternatively, privately held ITMOs could count towards the acquiring country's NDC, which would increase demand for carbon market transactions.** Any ITMO held (such as a carbon credit) by companies in an acquiring country would count towards the acquiring country's NDC, and not the selling country's NDC, even though the credit is not directly held by the acquiring country's government. Whether a corresponding adjustment would be needed remains unclear.
- **Finally, if no agreement is reached on Article 6, it is likely that the market dynamic will remain unchanged.** If no consensus outcome is reached on Article 6, and neither Article 6.2 nor 6.4 mechanisms come into force there would be no ITMO trade under Article 6 and no change from the status quo in carbon markets.

# NAVIGATING THE CHANGING CARBON MARKET LANDSCAPE

**The acceleration of carbon markets makes understanding compliance and voluntary markets a necessity for global companies and investors.** As net-zero pledges and carbon pricing systems proliferate, business previously uninvolved in carbon markets will likely become new entrants. They will discover a complex ecosystem of policies, standards and markets that require careful navigation, but which offer critical opportunities to contribute towards meeting climate targets.

By the mid-2020s, any business with a substantial GHG emissions profile will likely be impacted by carbon markets in some way.

**The vision presented in this report suggests a larger carbon market, where compliance markets drive decarbonization while voluntary markets fill important coverage gaps.** This multi-faceted composition of carbon markets on the pathway to net-zero therefore requires considerable examination by companies who may not be familiar with the technicalities of how these markets operate.

**Even when compliance market gaps remain, firms don't even need to operate under a compliance market for carbon pricing to impact their business model.** A carbon border adjustment mechanism, such as that being implemented by the EU from 2026 onwards, places an obligation on firms outside of a carbon market's territory. Therefore, firms outside of the EU but who import energy and other goods will soon be engaged in a compliance market despite their facilities being outside their boundaries.<sup>104</sup> Similarly,

pressure from investors and stakeholders to establish a corporate decarbonization commitment could require businesses to enter voluntary markets even in the absence of local compliance markets that establish a regulatory obligation.

**There are important lessons which companies and investors can take on board to successfully navigate both voluntary and compliance markets.** Companies and investors will need to navigate the future carbon market strategically, given the central role that it could play in achieving a net-zero economy. This section offers four guiding principles organizations may consider for effective use of both frameworks as part of a firm-wide aligned climate strategy.

- **Readiness** – Companies will be rewarded for taking proactive steps to build internal capacity for carbon pricing, accounting and reporting across their operations.
- **Adaptability** – Acknowledgement that carbon markets are evolving, and that corporate strategy should therefore be flexible to move with changing circumstances.
- **Comprehensiveness** – An approach that encompasses all GHG emissions within a company's control and examines both compliance and voluntary market opportunities.
- **Integrity** – A transparent approach that emphasizes high quality credit purchases as being in the company's interest, given the reputational risks of credits with environmental integrity concerns.

**This section elaborates how these four principles can help position companies and investors to successfully navigate compliance and voluntary markets.** This means having the flexibility of carbon credits to supplement their internal decarbonization while minimizing exposure to damaging policy and reputational risks that could harm their market position in a net-zero economy.

## READINESS

**Internal abatement will require long-term planning from businesses.** Companies with decarbonization commitments or covered by compliance markets need to plan for decarbonization. Prioritizing internal abatement, consistent with the mitigation hierarchy, requires planning for technology development, deployment or commercialization. This is especially true of hard-to-abate sectors where zero-carbon technologies such as green hydrogen are nascent or not cost-competitive.<sup>105</sup> Both compliance and voluntary markets will play a role in channeling investment into these technologies and increase their competitiveness.

**Establishing internal processes is important to prepare for carbon pricing.** Vigilance is needed to ensure readiness in a dynamic and rapidly evolving landscape. Companies that envisage engaging in carbon markets can take steps to ensure readiness:

- **They should assign clear internal responsibility for the abatement strategy,** involving senior management, and assign a technical lead for tracking the GHG footprint across the supply chain.

- **The decarbonization strategy should both include long-term targets and elaborate on available internal abatement options, describing the costs and risks involved.** The company should develop and disclose scenarios for how climate transition risks may impact company operations and develop strategies to manage those.
- **If a compliance market is forthcoming, the company should ensure internal familiarity with carbon trading mechanics.** Participation in voluntary markets can help companies and investors understand the methodologies, rules and processes necessary for acquiring carbon credits, a knowledge that can then be applied in future compliance markets.

**The optimal approach will be company specific.** It will depend on the company's business lines, climate strategy, geographical location (including their supply chain) and technical capacity for uncovering internal and external mitigation opportunities. The commonality across companies is the need to take readiness steps within the company's organization to prepare for the impacts of compliance markets and voluntary markets on its business and across the supply chain.

## ADAPTABILITY

**The future development of carbon markets is uncertain.** The scenarios presented in section 4 highlight the potential range of outcomes possible for carbon pricing in the coming decades. The future composition is dependent on multiple elements that could accelerate carbon market growth or provide obstacles to their expanded usage. Considering how future scenarios may play out and their effects should be a core part of a corporate decarbonization strategy.

**The frameworks governing voluntary markets**

104. Similar instruments are under consideration in Canada and the United States. See [Government of Canada](#) and [Bloomberg](#) (accessed on 10/05/2021)

105. According to BloombergNEF (2021), the levelized cost of renewable hydrogen production ranged in 2019 between \$2.5-4.5, against \$1-1.75 for fossil fuel based-hydrogen. See BNEF (2021), "Hydrogen: The Economics of Production from Renewables".



**and compliance markets are not static.** This report posits that carbon markets will evolve so that voluntary markets focus on emissions not covered by a growing compliance market. This means that a portfolio of credits purchased today may have a different composition than one purchased in future decades.

**Voluntary market credits for renewable energy deployment highlight the potential for eligibility to evolve over time.** As the TSVCM identifies, some voluntary market methodologies require updating to allay concerns about whether the reductions achieved are additional.<sup>106</sup> For instance, for many years renewable energy projects provided access to a relatively cheap and scalable source of carbon credits. However, the increasing cost-competitiveness of renewable generation means that projects receiving credits may have otherwise occurred without crediting (i.e. are not additional). Due to this erosion of additionality, these projects are being phased out by independent standards such as Verra and Gold Standard except in Least Developed Countries. A corporate strategy therefore needs to be flexible to changing policy or market circumstances.

**The growth in net-zero commitments is expected to drive a shift away from avoidance towards carbon removals credits.** Carbon removals activities, either through nature-based solutions such as afforestation/reforestation or technologies such as direct air carbon capture and storage, will be necessary to neutralize residual emissions at net-zero. As the distinction between net-zero and other decarbonization claims is cemented and the requirement for carbon removals made explicit, companies should be ready to maintain the credibility of their carbon market strategy.

**Interoperability rules between compliance and voluntary markets also evolve over time.** These include changes to the volumes (due to use limit

changes) and types (due to eligibility specification changes) of voluntary carbon credits accepted into compliance systems. This will mean that credits used for compliance today may not be eligible in the future. For example, from 2021 the California Cap-and-Trade Program will require that at least half of any entity's credit usage limit can come from credits provide direct environmental benefits within California.

**Companies must be adaptable to these changes.** Companies failing to adapt may expose themselves financially through purchases of low-integrity credits, including those that become ineligible for use in compliance systems. They may also suffer from reputational damage or accusations of 'greenwashing' if their credit purchase strategies are not deemed credible by the public – for example if a target is over-reliant on credits, or includes low-integrity credits in its portfolio.

**Adaptability offers companies and investors the possibility to grasp new business opportunities such as carbon neutral products.** These carbon neutral products include flights or natural gas for home heating, where carbon credits compensate the emissions embedded in those activities. Nevertheless, establishing a carbon neutral product should follow a rigorous internal process. For instance, firms should evaluate whether a zero-carbon alternative could be made available to consumers, rather than neutralizing a product's emissions through credits. Nevertheless, in hard-to-abate sectors such as aviation, a carbon neutral product that uses high-integrity credits could be an option that businesses examine.

## COMPREHENSIVENESS

**Many companies and investors have a GHG footprint that is not fully covered by compliance markets.** Their emissions may occur in jurisdictions lacking a compliance market, or in sectors excluded from the scope of an existing market. However,

as carbon markets continue to expand, both with the extension of the scope of existing markets and the creation of new compliance systems, a greater proportion of these emissions will be covered.

**Recent trends suggest that compliance markets are likely to increase in stringency in the coming years to meet country-level targets.** Long term decarbonization targets from major economies such as China, the European Union, Japan, South Korea, the United States and the United Kingdom point to a ratchet of ambition in the coming decades. This has implications for carbon markets, since all these countries have compliance markets at the national or subnational levels. The entry into force of China's national ETS and the recent Fit for 55 policy package reforms to the EU ETS demonstrate the linkage between increased long-term ambition and measures to reinforce compliance markets within major economies. This raises a regulatory obligation for companies to ramp up decarbonization efforts over time, both within their operations and across their supply chains.

**As carbon markets expand, companies that currently interact with carbon markets could see the percentage of their emissions covered grow.** Strategies that overlook emissions not currently covered by compliance market could face policy risks from a future ETS or other policy instrument that would enact compliance costs for newly covered facilities. Similarly, if decarbonization claims such as carbon neutrality or net-zero are expected to cover a greater percentage of a company's direct or indirect (e.g. Scope 2 or 3) GHG emissions over time, a narrow focus on current target coverage would fail to anticipate future inclusion of new emissions sources.

**An effective strategy that takes advantage of market efficiency should encompass both compliance and voluntary markets.** Companies may engage in both voluntary and compliance markets to maximize emissions reductions. For example, an airline operator may engage in CORSIA for its international aviation emissions, the EU ETS for intra-European operated flights, and the voluntary market for residual emissions not covered under CORSIA. This would occur supplementally to corporate actions taken to abate emissions within their operations, products and supply chain. This mix of approaches may provide companies with flexibility and remain effective and credible when combined with transparency.

**Comprehensiveness also means looking beyond GHG emissions reductions when considering carbon markets.** For example, voluntary markets can play a useful role in corporate strategies aligned across the broader UN Sustainable Development Goals through the development and socio-environmental co-benefits that projects can generate. In the voluntary market, 62% of carbon credits demanded in 2019 had associated co-benefits.<sup>107</sup> Therefore, engaging across a corporate sustainability team will uncover the overlaps between carbon credit purchases and achieving broader company environmental and social goals.

## INTEGRITY

**Investments in high integrity voluntary market credits can benefit companies and investors.** They minimize reputational risks with consumers and stakeholders. Credits recognized by bodies and organizations that track corporate climate targets (e.g., TCFD<sup>108</sup>, SASB<sup>109</sup>, SBTi etc.) would reduce these risks, especially if credits are linked to a decarbonization claim by the company.

**Credits that are later integrated into compliance**

106. TSVCM (2021) [Summary pack](#)

107. [Ecosystem Dashboard](#) (includes both independent and regulatory standards)

108. Task Force on Climate-Related Financial Disclosure

109. Sustainability Accounting Standards Board

**markets will be high integrity.** Therefore, investing in low integrity voluntary market credits is a particularly poor strategy when looking to invest in pre-compliance credits, because policymakers are highly unlikely to allow disputed or questionable credits to be used in compliance markets. A sounder strategy is to invest in high integrity credits with recognition from specialist bodies and certification from established standards. Doing so in practice, however, can be challenging. The TSVCM has identified a lack of buyer clarity on credit quality as a key market concern that could hinder scaling up voluntary markets.<sup>110</sup>

**Market participants can make use of available resources on best practice and innovative techniques being developed tailored to these needs.** Industry-led bodies such as the ICROA provide guidance on how to act with integrity as a buyer and seller within the voluntary market. For example, their Code of Best Practice defines key criteria that carbon credits must follow as well as a list of acceptable standards.<sup>111</sup> The voluntary market is also moving towards applying CORSIA-eligibility criteria as a quality benchmark for credits

in some instances<sup>112</sup> and some marketplaces<sup>113</sup> offer risk ratings behind projects.

**Scaling up compliance and voluntary markets could also be aided by transparent reporting by companies and investors about their interactions in these markets.** Indeed, the TSVCM recommends that “companies should publicly disclose commitments, detailed transition plans, and annual progress against these plans”<sup>114</sup>. Public disclosure is an important component towards achieving a functioning carbon market that is open to scrutiny and verification by third parties. Companies should not limit disclosure to “charismatic” projects with high socioeconomic or biodiversity benefits, but rather disclose the entire portfolio of credits purchased to meet internal GHG targets. More broadly, companies and investors should use voluntary markets where a trusted registry and tracking system is in operation. This will reduce the potential for double counting, for example with units interoperable between compliance markets and voluntary markets (e.g., credits eligible for compliance under CORSIA).

## CONCLUSIONS

**Every business will likely be impacted by carbon markets over the coming decade.** The ambitious goal of net-zero emissions points to accelerating future growth in carbon markets and credits, particularly in emerging markets. Around 52 percent of global GHG emissions could be covered by a compliance market or corporate net-zero targets by the end of the decade – up from 24% today. **Put another way, if a company is a significant emitter of GHGs, it is more likely than not that those emissions will be covered by a carbon market.** An even larger proportion of companies may be impacted by carbon border adjustments in key export markets. Many companies currently have little or no experience with carbon markets, but this future growth makes understanding compliance markets and voluntary markets compulsory for global companies and investors.

**For businesses new to carbon markets, grasping the complexity of compliance and voluntary markets – and the significance of their future integration – is key.** Voluntary markets offer innovation, agility and geographical reach for market incentives to reduce emissions. Compliance markets provide a potential market for voluntary credits while reducing costs for entities covered under an ETS. The future carbon market will encompass both approaches, with deeper integration between them likely.

**A future carbon market that can support achievement of Net-zero goals will depend on progress on four common key factors.** Clarity on international transfers, mature financial infrastructure, transparent high integrity credits pave the way for demand commensurate with achieving net-zero emissions. These elements are already emerging, but further progress is necessary for a fully realized carbon market to emerge. Nevertheless, businesses should plan for a carbon market that advances in this direction over the coming decade.

**Companies and investors must navigate a multi-faceted carbon market.** By progressing the factors above, new entrants will be mobilized into either compliance or voluntary markets. Nevertheless, operating in accordance with guiding principles – comprehensiveness, readiness, integrity and adaptability – will contribute towards a positive engagement across carbon market frameworks.

**As COP26 approaches<sup>115</sup> there is an opportunity for governments, companies, investors and stakeholders to build a future vision for carbon markets.** The vision could encompass the benefits provided by both compliance and voluntary frameworks with strong governance (as articulated by the TSVCM). This report makes clear that both frameworks are necessary, and will complement each other as significant contributors to the toolkit required to meet net-zero emissions.

110. TSVCM (2021) [Summary pack](#)

111. ICROA (2021) [The ICROA code of best practice](#)

112. E.g., [Xpansiv's Global Emissions Offsets \(GEOs\)](#)

113. E.g., the upcoming [Climate Impact X](#)

114. [TSVCM \(2021\)](#)

115. The 26<sup>th</sup> UN Climate Change Conference of the Parties (COP26) brings parties together to accelerate action towards the goals of the Paris Agreement and the UN Framework Convention on Climate Change. It will take place in Glasgow from October 31st to November 12th.

## ANNEX: METHODOLOGY

**This report provides a projection of potential carbon market coverage in 2030 that encompasses both compliance and voluntary markets.** Note that this is an indicative calculation that seeks to identify the likely coverage of these carbon markets at a high level, it is not a forecast of future growth. To calculate the percentage of global GHG emissions covered by carbon markets, **the emissions covered under voluntary and compliance carbon markets are calculated separately** and then summed. To minimize the potential for emissions to be double counted (i.e. included in both compliance and voluntary markets), voluntary market commitments are excluded using an assumption based on where the company's headquarters are located. Data availability prevents a full accounting of corporate emissions to determine actual overlaps with compliance carbon markets, so this approach provides a total coverage estimate.

**Estimating compliance market (both emissions trading and carbon taxes) coverage in 2015 and 2021** uses data from the World Bank's Carbon Pricing Dashboard<sup>116</sup>, which includes data on carbon pricing systems across the globe. We examined the following data available through the dashboard:

- A.** Whether it is under consideration or already implemented;
- B.** If implemented, year of implementation;
- C.** GHG emissions coverage in MtCO<sub>2</sub>e; and
- D.** Any overlap in coverage with other compliance system (also in MtCO<sub>2</sub>e).

Considering only ETS' and carbon taxes already implemented (identified from A above), the level of emissions covered is calculated (identified from C above) in the year in question (i.e. 2015 or 2021, identified from B above). Any overlap in coverage across compliance systems in a given jurisdiction (identified from D above) is subtracted to avoid any double counting of emissions coverage.

**Compliance market coverage in 2030** assumes countries will have carbon pricing if they either a) currently have a system implemented, b) are marked as having carbon pricing 'under consideration' by the World Bank under A above, or c) participated in the Partnership for Market Readiness<sup>117</sup>. Using data from Climate Watch<sup>118</sup>, we assume carbon pricing in these countries covers emissions from electricity/heat, industrial processes, and transportation sectors, which reflect the direction of travel in terms of carbon pricing coverage. The analysis uses the following exceptions: a) the European Union, where building sector emissions are also included to reflect plans to introduce a new ETS for this sector<sup>119</sup>, and b) using existing coverage data where the sum of emissions from the three sectors is less than the known coverage level.

**Voluntary market coverage assesses the emissions of 201 companies.** The company sample is comprised of the "Focus Companies" under the Climate Action 100+ initiative<sup>120</sup> and the top 50 public companies globally by market capitalization<sup>121</sup>.

We collected the following data on these companies:

- Scope 1 and 2 emissions (and Scope 3 emissions for oil and gas sector companies);
- whether they have a carbon neutral/net-zero target; and
- if they do, the year this was implemented.

Data was obtained through external sources such as company sustainability reports.

**Voluntary market coverage in 2015 and 2021** considers Scope 1 and 2 emissions from companies that have implemented carbon neutral or net-zero targets by the given year. For 2021, this is supplemented by Scope 3 emissions from oil and gas companies that have explicitly stated their targets include these emissions (e.g., Shell, Eni, bp, Equinor).

**Voluntary market coverage in 2030** assumes the remaining companies (from the 201 assessed) without a carbon neutral/net-zero target in 2021 will adopt one by 2030. In terms of Scope 3 emissions from oil and gas companies, these are included only for companies headquartered in North America and Europe & Central Asia, which is consistent with the location of companies that include Scope 3 emissions in their targets today.

**The estimate of carbon market coverage combines compliance and voluntary market estimates in a way that minimizes double counting.**

These are the values presented in Figure 1 and Figure 4. For each year, the covered emissions across the two sub-markets are aggregated, subtracting emissions from companies headquartered in jurisdictions that already have a compliance market in place (e.g., all emissions from companies with carbon neutral/net-zero commitments headquartered in South Korea are excluded from the combined metric to avoid double counting with the South Korea ETS). This means that the combined values do not reconcile with the separate values for compliance and

voluntary market coverage. This was undertaken to minimize double counting of emissions coverage across these markets to provide a projection of total carbon market coverage in 2030.

116. See [Carbon Pricing Dashboard](#)

117. See [Partnership for Market Readiness](#)

118. See [Climate Watch](#)

119. See [European Commission](#)

120. See [Climate Action 100+](#)

121. See [PwC Global Top 100 Companies 2021](#)