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Unlocking the Potential of Carbon Markets to Achieve Global Net Zero

EXECUTIVE SUMMARY

BCG BOSTON
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Foreword

Climate change poses significant economic, financial, social, and environmental risks to the world. Limiting global warming to 1.5°C within the century is still within reach but requires transformational changes to the global economy, including the pricing of greenhouse gases (GHGs). Effective carbon markets based on science-based decarbonization pathways are an essential tool in enabling an efficient marketplace for deploying carbon pricing. This report outlines a vision for the evolution of both the compliance and voluntary carbon markets, and outlines key recommendations for market participants, policymakers, regulators, climate science bodies, and other stakeholders.

The recommendations in this report are intended to promote a significant expansion in the scope and coverage of carbon markets to address low coverage of global GHG emissions by regulated pricing mechanisms (~20 percent today), low carbon prices (averaging <\$5/tonne of CO₂), and a rapidly depleting carbon budget (300–500 GtCO₂e to limit warming to 1.5°C, with current annual emissions of ~50 GtCO₂e).

This report was commissioned to Boston Consulting Group (BCG) by the Global Financial Markets Association (GFMA), with active contribution by GFMA member firms representing the global capital markets industry. This report was developed based on research, interviews conducted with contributing member firms (listed on the right) during the third quarter of 2021, and input from other market participants, climate science advisors, capital markets exchanges, and law firms with particular expertise relevant to the challenges of climate change. It is being published to promote a constructive and robust dialogue on the importance of carbon markets to achieve Net Zero goals

GFMA represents the common interests of the world's leading financial and capital markets participants to provide a collective voice on matters that support global capital markets. It also advocates on policies to address risks that have no borders, regional market developments that impact global capital markets, and policies that promote efficient cross-border capital flows to end users. GFMA efficiently connects savers and borrowers, thereby benefiting broader global economic growth. The Association for Financial Markets in Europe (AFME) located in London, Brussels, and Frankfurt; the Asia Securities Industry & Financial Markets Association (ASFIMA) in Hong Kong; and the Securities Industry and Financial Markets Association (SIFMA) in New York and Washington are, respectively, the European, Asian, and North American members of GFMA.



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Executive Summary

This GFMA and BCG report, “Unlocking the Potential of Carbon Markets to Achieve Global Net Zero,” highlights the role and importance of both compliance and voluntary carbon markets to the transition to a low-carbon global economy. It provides an overview of the carbon markets ecosystem, highlights key challenges, and outlines recommendations for policymakers, market participants, and other key stakeholders to scale deep and liquid global carbon markets, while highlighting key enablers and dependencies. It is intended to serve multiple purposes, including (1) creating greater awareness on the need for carbon pricing and the use of carbon markets and their market structure by providing a summary of the current state, leveraging key data, insights, and findings; (2) establishing a vision for the evolution of carbon markets; and (3) providing a set of recommendations to achieve this vision from a practitioner’s viewpoint.

Summary of key findings

- Both **compliance markets** and the **voluntary carbon market (VCM)** can play significant and complementary roles in decarbonization of the global economy. Compliance markets provide a regulated mechanism—in addition to carbon taxes and other emissions **reduction** policies—to establish carbon pricing, thus incentivizing and/or mandating decarbonization and associated investments. However, close to 80 percent of **GHG** emissions (in excess of 40 gigatonnes (Gt) of **carbon dioxide equivalent** (CO₂e) annually) is not covered by regulated carbon pricing schemes today.¹ Price levels also need to increase from the current global average regulated carbon price of <\$5/tCO₂ to an estimated average \$50–150/tCO₂ by 2030 to drive decarbonization aligned with Paris Agreement goals.^{2,3,4,5} Considering these ambitious goals and the relatively small amount of GHG emissions subject to regulated markets today, the emerging VCM should play a complementary role to compliance markets.
- Further scaling and enhancement of **Emissions Trading Systems (ETSs)** is critical. Despite almost 200 countries having signed the Paris Agreement, the operationalization of the 1.5°C goal into policy measures, such as ETS initiatives, thus far lacks geographic scope, sectoral coverage, and sufficient decarbonization rates. In an encouraging recent development, the G7 also agreed, for the first time, to work together to consider how best to coordinate carbon pricing initiatives to mitigate emissions, and to explore international solutions to prevent

¹ World Bank Carbon Pricing Dashboard, as of April 2021.

² IMF Blog: A Proposal to Scale Up Global Carbon Pricing, June 2021.

³ CPLC Report of the High-Level Commission on Carbon Prices, May 2017.

⁴ OECD Effective carbon rates: pricing carbon emissions through taxes and emissions trading, 2021.

⁵ IEA Net Zero by 2050, May 2021; values normalized to 2020 USD, rounded for simplicity.

carbon leakage.⁶ Conservative estimates suggest a need to scale ETSs from ~\$170B today⁷ to \$1T+ in absolute size before 2030 (through increased geographic and sectoral coverage⁸ coupled with more aggressive decarbonization ambitions and hence increased price levels)—in conjunction with scaling of other GHG pricing and control-based mechanisms—to achieve Paris Agreement ambitions.⁹ ETSs should adopt (1) steep ~5 percent+ linear reductions per year in allowances,¹⁰ (2) fixed-cap (absolute emissions) systems as opposed to intensity-based systems to align with total carbon budgets, (3) classification of ETS allowances as financial instruments to safeguard markets and ensure integrity, (4) use of auctioning in lieu of free allocation, (5) consideration of Carbon Border Adjustment Mechanisms (CBAMs) when feasible to prevent leakage and maintain competitiveness, and (6) balancing market-based emissions-reduction mechanisms (such as ETSs) with other control-based mechanisms (such as technology standards) that also encourage emissions reductions and may be more suited for specific sectors.

- A clear complementary role for VCM needs to be aligned (1) as a transitional mechanism—in sectors/regions not fully covered by ETS/taxes/policies—until regulated mechanisms take over and ultimately scale down as emissions are reduced, (2) as a long-term global marketplace for carbon removals for entities to neutralize residual emissions and pursue negative emissions, and (3) as a complementary mechanism for corporates and the financial services sector to compensate for their emissions while they pursue sectoral decarbonization¹¹ to reduce emissions in their value chains. To strengthen trust in the VCM, and to enable it to grow from the current scale of <0.5 percent global emissions, it is critical to develop stringent and transparent baselines and Measurement, Reporting, and Verification (MRV) standards to ensure verifiable “additional” emissions reductions, and robust evaluation of whether MRV standards are met by third-party certifiers.¹² These standards should also regularly be strengthened and made more stringent to ensure that VCM projects remain additional. This would be supported by the work of the Taskforce on Scaling Voluntary Carbon Markets (TSVCM) and Voluntary Carbon Markets Integrity Initiative (VCMI) to develop market consensus on the role of VCM credits, a consistent

⁶ <https://www.gov.uk/government/news/g7-finance-ministers-agree-to-work-together-to-address-global-supply-chain-pressures>.

⁷ Estimated using the 2021 price and covered GHG of each ETS from World Bank Carbon Pricing Dashboard.

⁸ Coverage defined as having a mechanism to incentivize or regulate reduction of GHG emissions. Estimated size assumes 40-50%+ ETS coverage of an estimated ~30–35GtCO₂e emissions at an average price of \$75/tCO₂e+.

⁹ Estimates described in figure “Carbon markets in numbers.”

¹⁰ Emissions reductions from IAMC 1.5°C scenario modelling across all GHG emissions.

¹¹ For this report, sectoral decarbonization represents emissions trajectories aligning with requirements as per latest climate science in order to meet the goals of the Paris Agreement.

¹² Ecosystem Marketplace data, as of August 2021.

taxonomy of additional attributes such as co-benefits to biodiversity and socio-economic development, and harmonized MRV standards and registries.¹³

- The interoperability between carbon markets is limited today. Greater interoperability, (1) among ETSs with similar rates of decarbonization and similar pathways and (2) between ETSs and the VCM through tightly controlled mechanisms, would serve to grow carbon markets while driving additional co-benefits. However, there are several prerequisites to maintaining decarbonization ambitions, necessitating stringent controls. Interoperability between multiple ETS initiatives should be pursued only where rates of decarbonization are aligned between regions to prevent dilution of decarbonization ambitions. Interoperability between ETSs and the VCM requires more stringent and continually tightening MRV standards and thresholds to ensure additionality, and limits on eligibility and the quantity of fungible VCM credits (e.g., in terms of geographic and sectoral eligibility) to prevent encroachment on ETS markets. In addition, policymakers should catalogue relevant national assets (e.g., forests) and define eligibility lists for VCM projects to fast-track interoperability.
- Banking and capital markets firms stand ready to support the market through capabilities and product offerings that help market participants in the decarbonization journey by supporting their compliance, risk management, financing, and investment needs; and to enable the establishment of carbon instruments as a mature, competitive, liquid, and investable asset class. Liquidity in mature ETS markets is strong (e.g., with 2021 average daily volumes of ~55M EUA futures and options on the Intercontinental Exchange (ICE))¹⁴. Still, there is significant room for growth in nascent ETS markets—through geographic and sectoral expansion and the emergence of associated products (e.g., expanding the China ETS to cover sectors other than power, and the emergence of derivatives instruments)—and in the VCM, which largely represents a buy-and-hold/retire market today. This growth would be facilitated by rapid action from policymakers and regulators to scale compliance markets, and from the market more broadly to develop a robust and complementary VCM.

Context

Climate change poses significant economic, financial, social, and environmental risks to the world. The 2015 Paris Agreement aims to keep the global temperature rise this century to well below 2°C compared with pre-industrial levels, and to pursue efforts to limit this rise to 1.5°C. According to the

¹³ As identified also by the TSVCM.

¹⁴ Data from the Intercontinental Exchange.

Intergovernmental Panel on Climate Change (IPCC), the world will **likely reach or exceed 1.5°C of warming within just the next two decades** in all five scenarios explored in the IPCC’s recent AR6 report. For a greater than 50 percent likelihood of achieving the 1.5°C goal, **our total “carbon budget”** would be an estimated ~300–500 GtCO₂. At current levels of GHG emissions (estimated ~50 GtCO₂e), this translates to less than 10 years for the world to use up this entire budget.¹⁵ This ambition is still within reach but requires transformation of the global economy.

As highlighted in our previous publication, “Climate Finance Markets and the Real Economy,” an estimated \$100–150+ trillion in investments across sectors and regions over the next three decades would be required to limit temperature rise to 1.5°C.¹⁶ Pricing of GHG emissions, at a sufficiently ambitious level (estimated at \$50–150+/tCO₂e), coupled with stringent long-term policies to limit GHG emissions, is a critical requirement to mobilize this investment.^{2,3,4,5,17}

Effective carbon markets that drive **science-based decarbonization** pathways are an essential tool in enabling an efficient marketplace for deploying carbon pricing. There are two key types of carbon markets: compliance and voluntary. In addition, the aviation industry has established its own bespoke sector-specific market, Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA), which primarily relies on purchases of VCM credits against a portion of emissions from international aviation.

¹⁵ IPCC, Working Group I Sixth Assessment Report (AR6), 2021; full report expected 2022.

¹⁶ GFMA-BCG publication, Climate Finance Markets and the Real Economy, Dec 2020. The investment need reflects a significant financing gap vs. current levels and includes investments across key sectors such as Power, Industry, Transportation, Agriculture, Forestry, etc. which if not met would prevent achievement of the 1.5°C target.

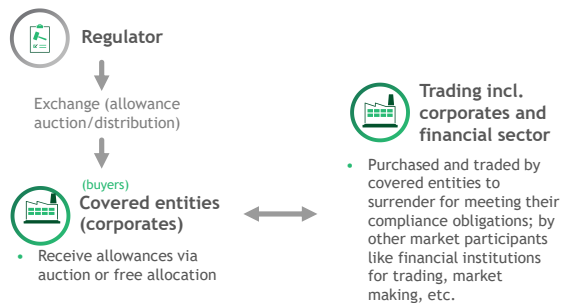
¹⁷ <https://home.treasury.gov/system/files/261/FSOC-Climate-Report.pdf>.

Both compliance and voluntary carbon markets must play a significant role in science-based decarbonization. Regulated mechanisms (e.g., compliance markets) are critical to incorporating the cost of emissions in economic activity. The VCM is not a silver bullet, since it does not provide a mandatory mechanism to reduce emissions, nor does it penalize emissions. The VCM can be a transitory tool to complement regulated emissions reduction mechanisms and can help channel capital for decarbonization. However, it requires MRV enhancements to play this role effectively and with clear additionality.

High-level description of the compliance and voluntary carbon markets

Compliance Markets

Primarily structured as emissions trading schemes wherein participants trade allowances (permits to emit supplied by regulators) - reductions in allowance supply enables emissions reductions and regulated carbon price by market

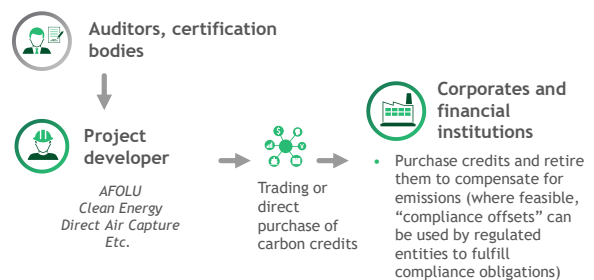


29 ETSs covering 8.7GtCO₂e (~16% of global GHG emissions); representing ~\$170B in absolute market value as of 2021, and ~\$275B in traded value as of 2020

Source: World Bank, Ecosystem Marketplace

Voluntary Markets

Buyers (e.g., corporates, financial institutions) voluntarily purchase carbon credits—issued by a third party and verified by certification bodies—that represent a tonne of emissions avoidance (estimated vs. baseline) or removal (from atmosphere)



~100MtCO₂e emissions retired in 2020 with estimated market size of <\$0.5B; on track for annual market value of \$1B+ for 2021

Carbon Markets in Numbers

Carbon Pricing (regulated) – incl. Compliance Markets

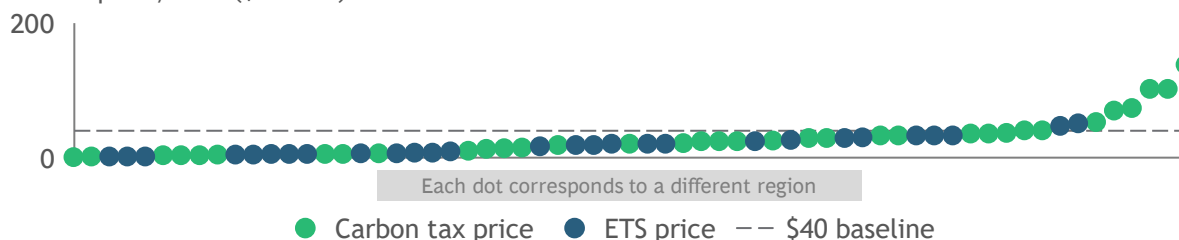
Coverage



Only ~15% of prices are above \$40/tCO₂e

Price (\$/tCO₂e)

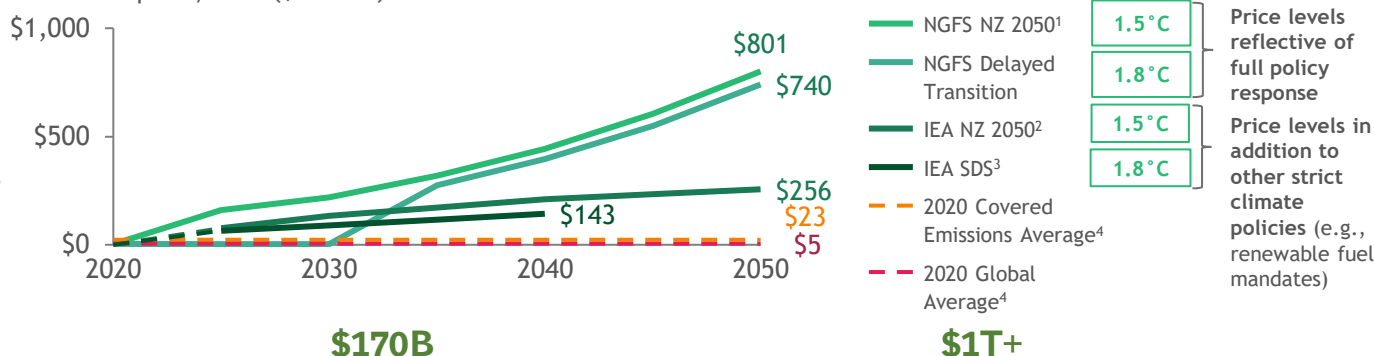
Carbon price, 2020 (\$/tCO₂e)



Immediate and significant growth in carbon pricing needed across scenarios

Modeled price for 1.5-2 °C

Carbon price, 2020 (\$/tCO₂e)



\$170B

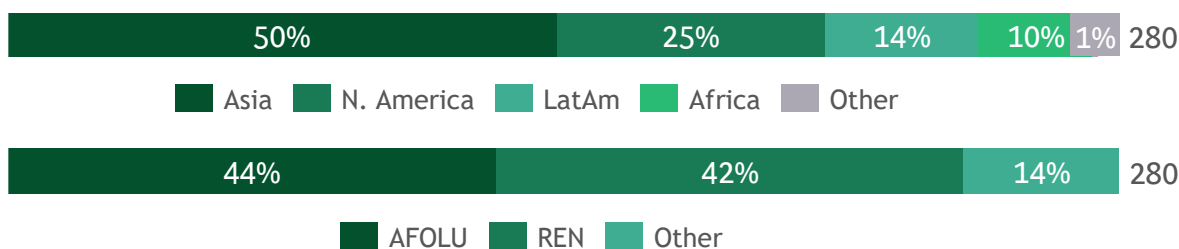
Value of ETS market allowances in 2021
(\$275Bn trading volume in 2020)

\$1T+

Potential ETS market size by 2030, assuming
40-50%+ coverage of global GHGs; price levels of \$50-150

Voluntary Market

Total voluntary credit issue
in 2020: 280 MtCO₂e



\$3.1

Average VCM credit
price in 2021 YTD
(~\$0.8B trading volume)

Up to \$50+B

Potential voluntary market size
by 2030, assuming ~1-2Gt+ credits
at \$25-50+

3-10%

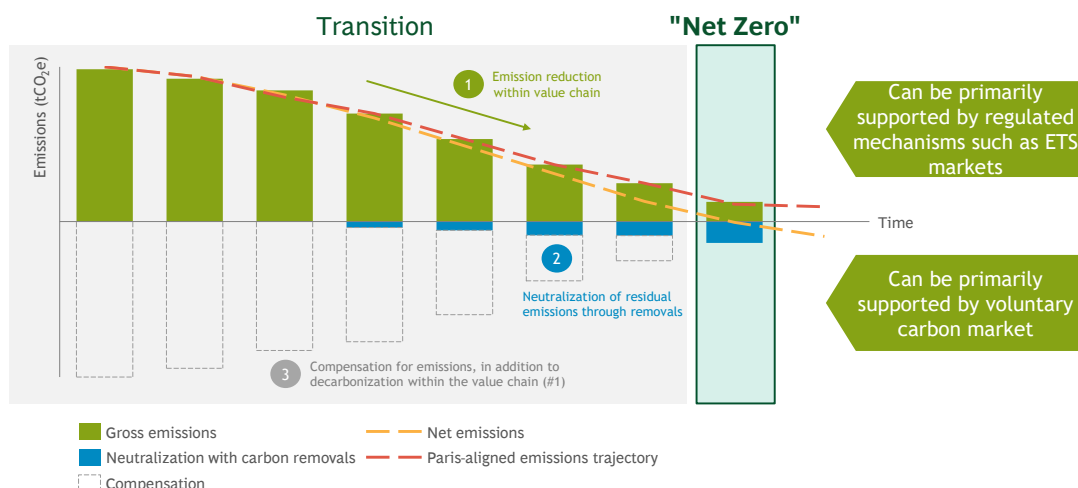
Coverage of compliance
obligations from VCM credits
allowed by 18 ETSs today

1. REMIND-MagPIE model prices from NGFS Scenario Explorer hosted by IIASA (release 2.2); 2. Future prices for advanced economies from IEA's Net Zero by 2050 Roadmap for the Global Energy Sector, with prices between '20 and '25 estimated; 3. Future prices for advanced economies from IEA's World Energy Model Sustainable Development Scenario, with prices between '20 and '25 estimated; 4. Weighted average of global carbon prices for covered emissions from the World Bank in August 2021 and price of uncovered emissions (\$0), normalized to 2020 USD
Note: All prices provided in USD from sources, and normalized to 2020 USD using the Bureau of Labor Statistics' CPI inflation calculator
Source: World Bank, ICAP Emissions Trading Worldwide Status Report 2021, TSVCM, Ecosystem Marketplace, IEA, NGFS, Refinitiv, BCG Analysis

Current guidance on decarbonization from leading organizations such as the Science Based Targets Initiative (SBTi) proposes a **preferred approach for corporates composed of (1) reduction of emissions within their value chains with trajectories that are aligned with the goals of the Paris Agreement, (2) neutralization of residual emissions through carbon removals, and (3) compensation for emissions during the process of decarbonization** through supporting or financing emissions reductions outside the value chain.^{18,19} In-value-chain emissions reductions are incentivized and/or mandated by regulated carbon pricing mechanisms such as compliance markets; neutralization can be enabled through verified carbon removal credits from the VCM, and compensation for emissions can be enabled through the purchase of **high-quality credits** from the VCM. The additional cost of purchasing high-quality VCM credits will likely also motivate corporates to further explore in-value-chain decarbonization.

Current guidance from SBTi on preferred approach to reach Net Zero

Emissions reductions, neutralization of residual emissions and compensating through the transition



Source: SBTi

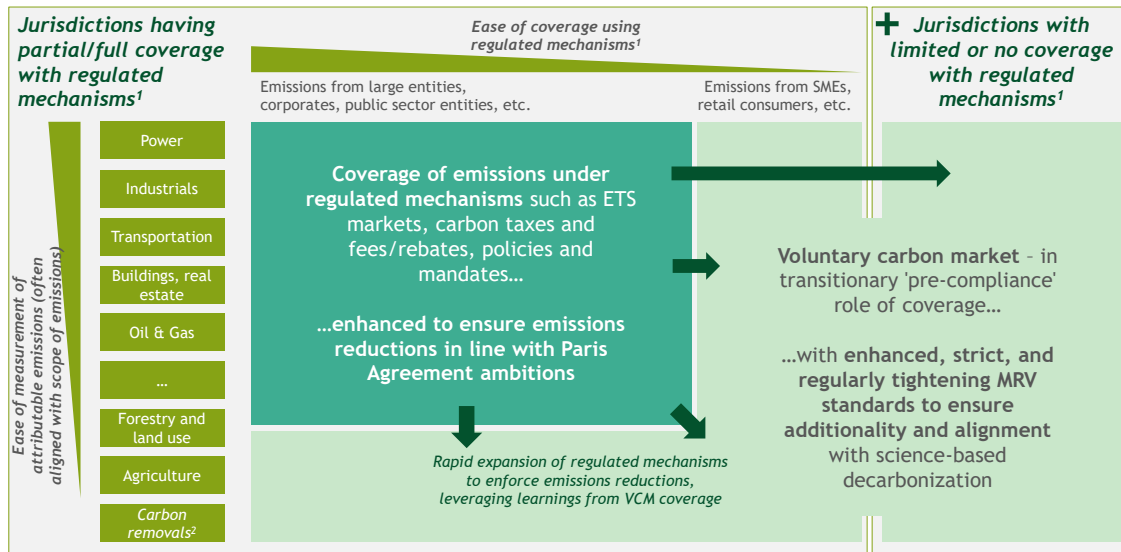
From a jurisdictional perspective, where regulated mechanisms already exist at scale, the VCM can serve as a transitional tool for sectors or entities yet to be covered under these mechanisms. In jurisdictions with limited regulated coverage of GHG emissions, the VCM can act as a starting point to incentivize emissions reductions until regulated mechanisms develop and scale.

¹⁸ SBTi, "The SBTi Net-Zero Manual & Criteria (Version 1.0)," September 2021.

¹⁹ This approach is subject to change as SBTi's September 2021 proposal was open to public consultation.

Proposed framework for jurisdictional coverage of emissions with regulated and voluntary mechanisms

Illustrative framing



1. Including ETS initiatives, carbon taxes, fees/rebates, and other policies/regulations that mitigate emissions such as technology standards/mandates
2. Given new sector and role, limited current coverage under regulated mechanisms; potential long-term role in voluntary markets given global nature

Key challenges to overcome

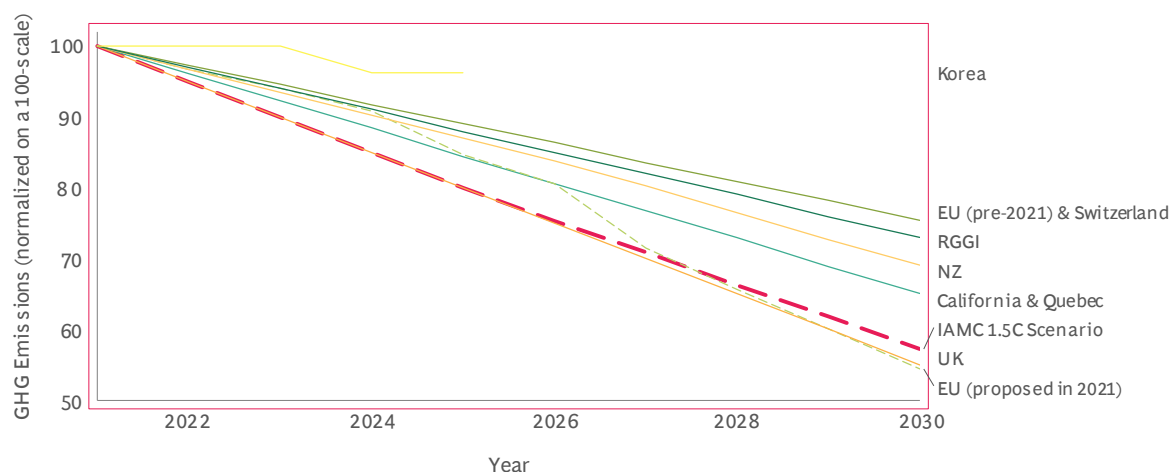
1. Low coverage, price levels, and decarbonization ambitions of regulated carbon pricing

Close to 80 percent of GHG emissions (in excess of 40 GtCO₂e annually) are not covered by regulated carbon pricing today. In addition, most carbon pricing schemes cover less than 40 percent of GHG emissions within a jurisdiction. Further, carbon price levels in several existing compliance markets have remained low because of insufficient carbon emissions reduction goals and overly liberal or free allocation of allowances. A vast majority (>90 percent) of compliance markets have price levels of less than \$40/tCO₂e. The global average regulated carbon price is <\$5/tCO₂e, with significant disparity in price levels across regions.^{1,2}

By contrast, IEA's Net Zero 2050 scenario estimates the need for a price of ~\$75/tCO₂e by 2025, increasing to ~\$130/tCO₂e by 2030 in advanced economies along with stringent climate policies, such as renewable energy mandates, efficiency standards, and the elimination of fossil fuel subsidies.⁵ Other organizations, including the International Monetary Fund (IMF), the High-Level Commission on Carbon Prices, and the Organization for Economic Co-operation and Development (OECD), have estimated that carbon pricing would have to be in the range of ~\$50–150/tCO₂e by 2030 to meet Paris Agreement ambitions.^{2,3,4} Significant differences between today's prices and target price levels can be addressed through an expanded coverage of GHG emissions and higher

decarbonization ambition levels, as evidenced by the results from the EU ETS, where carbon price levels rose rapidly to >EUR 60/tCO₂e in 2021.

Most regional ETS cap projections are less ambitious than IAMC's 1.5°C projection



Source (data retrieved August 2021): World Bank; IAMC 1.5°C Scenario Explorer and Data hosted by IIASA; EU 2021 Directive 2003/87/EC
 BCG Analysis: IAMC 1.5°C Scenario - 1.5°C pathways were reported for N₂O, CO₂, and CH₄ separately on IAMC's Scenario Explorer. Data for 1.5°C pathways with low or no overshoot were collected and averaged to create one pathway for each gas. The average pathways were converted to CO₂e and then combined to create a single 1.5°C pathway scenario for total GHG emissions. Regional scenarios - derived from regional ETS disclosures reporting future allowance cap plans / projections. All pathways were normalized on a 100-scale to the 2021 value.

2. Credibility of existing VCM

The VCM faces challenges to the “quality” and credibility of credits, including a skepticism in their emissions impact (additionality, prevention of leakage and **double counting**, and permanence). This is exacerbated by inconsistent MRV standards, as well as fragmentation of registries and registry standards.

The VCM credits themselves also are heterogenous by nature given their wide variety of attributes, such as project type, credit type (removal vs. **avoidance**), vintage, co-benefits to other Sustainable Development Goals (SDGs), etc. **The lack of a taxonomy to define these additional attributes leads to low transparency in the market** regarding the credits being bought. Furthermore, **the absence of a widespread reference index**—that would represent a standard against which credits could be compared and consequently traded with spreads—also leads to **limited trading in the market**, making it mostly a buy-and-hold market with limited liquidity and velocity.

A core underlying challenge is also the lack of market consensus on the eligibility of these credits vis-a-vis climate commitments by corporates and financial institutions. For example, leveraging the credits to assert that an organization is “carbon neutral” is discouraged by leading environmental

groups, such as the SBTi and World Wildlife Fund (WWF). This also raises more fundamental questions about the role of the VCM and the demand driver for VCM credits.

Hence, effective participation in VCM and usage of VCM credits is challenging —except for more sophisticated buyers who understand the intricacies of the market—leading to **low demand and several sub-par credits that sell at low prices. The average price level in this market has remained below \$5/credit for several years.** This also leads to **challenges in terms of both supply of high-quality credits that require stronger price levels and long-term demand** for development of projects that deliver robust emissions avoidance or removal.

3. Both compliance and voluntary markets remain fragmented, leading to inefficiencies in decarbonization and smaller, less-liquid markets

Compliance markets are policy-driven and jurisdictional in nature. While some systems are linked—that is, allow fungibility of allowances from other ETSs—most are not. While it is beneficial (from the point of view of efficiency, scale, and liquidity) to ultimately have a large-scale global carbon market, at the same time, **interoperability between ETSs is likely to be productive only between systems with similar rates of decarbonization.** This should still be pursued where feasible, but only with due consideration given to preventing dilution in emissions reduction goals and minimizing disruptions to established ETSs.

VCM markets are also fragmented, with divergent standards and the lack of a single taxonomy with a comprehensive coverage of all relevant attributes. This has also contributed to limited interoperability between voluntary and compliance markets, although there is a small cadre of ETSs that allow for a portion of compliance obligations to be met through **compliance offsets.** This limited interoperability between compliance markets and the VCM often stems from the potential risks of diluting ETS ambitions, since it is difficult to ensure VCM credits are of "high quality".

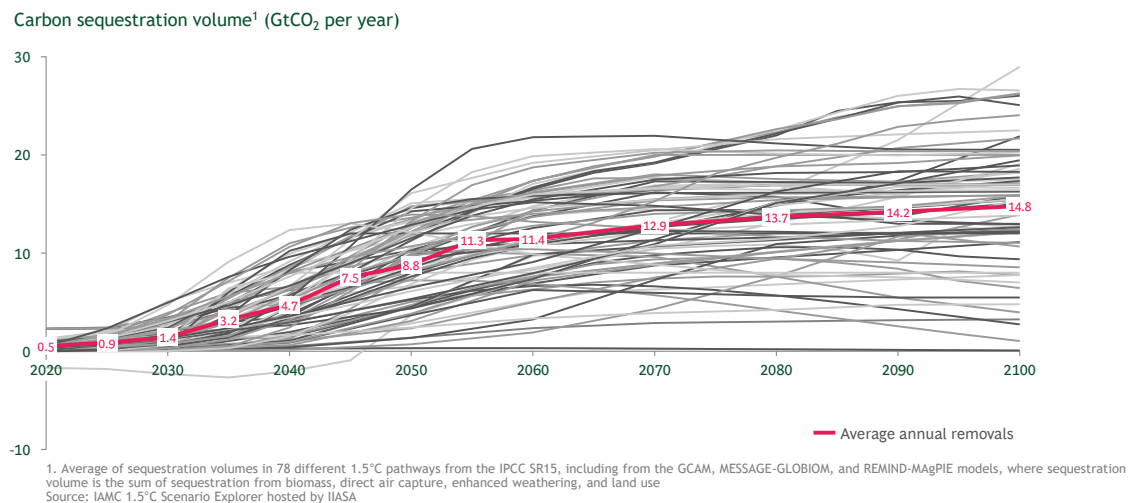
4. Carbon removals are necessary, but the market mechanism remains unclear

Carbon removals are essential for global emissions reduction goals. IPCC-modelled scenarios that restrict global warming to 1.5°C, with limited or no overshoot, **project that on average ~1–10 Gt of annual CO₂ removals** will be needed over the 21st century.²⁰ At the same time, currently there is **no clear revenue source for removals given the limited use for physical products and an unclear marketplace to connect global buyers and sellers. Without a scaled marketplace to trade carbon**

²⁰ IPCC Special Report: global warming of 1.5°C, October 2018.

removals and generate revenue, significantly less financing will be channeled toward carbon removal projects and technologies. In turn, this will lead to fewer carbon removal projects, making it difficult to achieve the 1.5°C global warming ambition. Additionally, without a clear marketplace, there are likely to be persistent inefficiencies given the multitude of available removal technologies and their geographic dispersion, as well as a lack of common understanding within corporations of these technologies and solutions.

~10 Gt annual removals needed by mid-century to maintain the 1.5°C pathway



There are a few different options for establishing a carbon removals market mechanism, including (1) ETSs allowing removals as fungible instruments in lieu of carbon allowances, essentially feeding additional permits to emit up to the verified amount of carbon removed; and (2) the VCM taking on an additional role as a marketplace for removals, with ETSs allowing interoperability between verified removal credits from the VCM and their compliance allowances.

5. Lack of standardization of certain dimensions further limits scale and liquidity in both compliance and voluntary markets

Given the rapid yet fragmented development of carbon markets globally, there are certain challenges involving standardization—of product features, contracts, financial accounting and reporting

guidelines, carbon accounting, financial and prudential regulations, etc.—resolution of which could enable more rapid evolution and scaling of carbon markets.

Aside from templates for EU and U.K. allowances from the International Swaps and Derivatives Association (ISDA) and the European Federation of Energy Traders (EFET), **there's limited broad contract standardization for other ETS instruments and voluntary credit trades**, and limited transparency on standardized set of VCM credits attributes. VCM credit taxonomy definitions and standardization are being pursued by industry activities such as the TSVCM, which has proposed the definition of core carbon principles (CCPs) and the creation of a taxonomy with additional attributes. There is also a lack of harmonized financial accounting and reporting guidelines, which hinders comparability between companies and creates uncertainties with respect to tax treatment of carbon instruments, including allowances and credits.

While the GHG Protocol²¹ serves as a strong foundation for carbon accounting, it is **limited by a lack of clear guidance for all sectors on scope 1–3 emissions** and attribution to relevant stakeholders. While sector-specific initiatives such as the Partnership for Carbon Accounting Financials (PCAF) and International Petroleum Industry Environmental Conservation Association (IPIECA) help set guidance for their industries, they need further refinement and consensus to be considered established standards. **Such clarity could be helpful in introducing scope 3 emissions wherever needed under ETS initiatives or other coverage mechanisms, thus enabling them to effectively scale.**

Furthermore, there are open questions about the **appropriate financial and prudential regulations for carbon instruments and derivatives trading**, including the implications of proposed changes under Basel III's Fundamental Review of the Trading Book (FRTB), which penalizes banks for holding carbon instruments (through a high risk weight for carbon trades, and high capital charges for carry positions, as per ISDA) and could have negative impacts on their participation in carbon markets.⁶⁵

Finally, there is **no standard "playbook" or set of guidelines for designing ETSs based on lessons from past ETSs and to ensure alignment with Paris Agreement ambitions**. This leads to fragmentation and heterogeneity across multiple ETSs, however initiatives such as the International Emissions Trading Association contribute to standardization.

²¹A climate science body that provides standards, guidance, and training for businesses and governments to measure their GHG emissions.

Vision for the evolution of carbon markets

This report lays out a vision for a future for carbon markets—from a practitioner’s perspective—that supports efficient science-based decarbonization aligned with Paris Agreement ambitions. The report describes how carbon markets can leverage lessons from past experiences to overcome key challenges (noted in Section 1), and evolve and expand over the next three decades in support of global carbon neutrality, ultimately scaling down to the level of unavoidable emissions and required carbon removals once Net Zero is achieved globally by 2050.

Vision for Evolution of Carbon Markets to support global decarbonization in line with Paris Agreement ambitions

Topic	Short-term (within 1-2 years)	Medium term (~5 years)	Long term (~10 years)	End-state goal (global Net Zero achieved/exceeded)
Policy-based coverage of global GHG emissions with regulated mechanisms aligned with 1.5°C ambition	<ul style="list-style-type: none"> Carbon pricing (ETS / tax) established in majority of carbon-intensive jurisdictions Planned coverage of >50% 	<ul style="list-style-type: none"> Majority (>50%) of GHG emissions covered, allowance retirement aligned with 1.5°C pathway (>5% linear reductions) CBAMs in effect where needed until globally consistent emissions ambitions 	<ul style="list-style-type: none"> Near-full coverage of GHGs by pricing or control mechanisms Absolute ETS market value exceeds \$1T+ Interlinking of similarly ambitious ETS markets, incremental moves toward regional/global carbon markets 	<ul style="list-style-type: none"> Emissions allowances equivalent only to unavoidable emissions... ...balanced by carbon removals, achieving global Net Zero or global carbon neutrality
Robust global voluntary market for supply of high-quality credits	<ul style="list-style-type: none"> Standardized taxonomy for classifying credits, reference contracts and indices Stricter, science-aligned, harmonized MRV processes Market consensus on use of VCM credits (and accounting) — driven as per climate science and standard-setting bodies Selective VCM interoperability in ETS markets with strict limits and eligibility as per climate science to ensure additionality 	<ul style="list-style-type: none"> VCM market supplying high-quality carbon credits as per taxonomy and MRV standards, supported by technology-based verification Large-scale demand as compensation for emissions and neutralization purposes Large-scale interoperability once VCM integrity established 	<ul style="list-style-type: none"> VCM supplies at-scale carbon removals for neutralization purposes Avoidance credits plateau given coverage instead by regulated mechanisms (ETS, tax, or control mechanisms) 	<ul style="list-style-type: none"> No avoidance credits since all avoidance measures already in effect VCM continues as global marketplace for carbon removals to neutralize residual emissions and to pursue negative emissions as needed for climate trajectory
Scaled market demand and improved market maturity	<ul style="list-style-type: none"> Awareness and clarity for corporates and financial sector on use of ETS and VCM carbon instruments Standardized universal carbon accounting framework, clarity across sectors on scope 1-3; incl clarity on terminology of claims (e.g., “Net Zero”, “Carbon Neutral”, etc.) 	<ul style="list-style-type: none"> Carbon instruments established as mature and investable asset class with suite of financial products from financial sector to support corporate and investor needs on compliance, risk management, and investment 	<ul style="list-style-type: none"> Seamless interoperability between (1) ETS markets that have aligned climate ambitions and pathways; and (2) high-quality VCM credits maintaining stringent eligibility and quality considerations 	<ul style="list-style-type: none"> Scaled-down but efficient markets dealing only with residual emissions and requisite carbon removals to meet climate goals

Recommendations to support the achievement of this vision

#1 (detailed in Section 4.1): We recommend that policymakers and regulators expand the scope of geographic, sectoral, and activity coverage of compliance ETS markets, and strive toward near-full coverage by one or more GHG pricing and/or GHG control mechanisms within the next five years. High-impact ETSs should be designed by incorporating key learnings from other ETSs and stringent allowance reductions aligned with emissions pathways that achieve 1.5°C ambitions.

- ⇒ Policymakers should aim for near-full coverage of GHG emissions within their jurisdictions through one or more mechanisms (ETSs, carbon taxes, fees/rebates, and control-based mechanisms). These should be designed while considering interactions with other environmental, fiscal, and monetary policies that influence emissions (e.g., eliminating fossil fuel subsidies, introducing clean energy mandates, etc.), and supported with long-term policies that promote Paris-aligned decarbonization of the economy.
- ⇒ For ETS initiatives, policymakers should apply learnings from successful ETSs, including **(1) steep ~5 percent+ linear reductions per year in allowance levels**, aligned and updated with latest climate scenario modeling; **(2) establishment of fixed-cap (absolute emissions) systems** as opposed to intensity-based systems to align with total carbon budgets; **(3) classification of allowances as financial instruments;**²² **(4) use of auctioning** in lieu of free allocation to maintain sufficient price levels and drive decarbonization; **(5) consideration of CBAMs** to prevent leakage and maintain competitiveness; and **(6) consideration of other emissions-reduction mechanisms** (e.g., taxes, fees/rebates, and policies) when designing ETSs.

#2 (detailed in Section 4.2): We recommend that standard-setting bodies, in coordination with the broader ecosystem, facilitate the transformation and scaling of the VCM to ensure its integrity, role, and additionality.

- ⇒ **Clarify role of the VCM.** This report envisions 3 key roles:
 - Serve as a **transitional coverage mechanism for sectors or regions that are not covered by ETSs, carbon taxes, fees/rebates, or mandates** until regulated mechanisms take over and ultimately scale down as emissions are reduced
 - Serve as a **core long-term global marketplace for carbon removals**, thereby supporting the growth and funding of critical new technologies, and supporting neutralization of residual emissions
 - Offer a **complementary mechanism for corporates to compensate for their emissions**, in a way that can help channel capital to the markets with the greatest need (e.g., underdeveloped economies) while entities continue to pursue decarbonization within their value chains
- ⇒ Develop a set of **stringent baselines and MRV standards across certifiers** that ensure VCM credits can drive **verifiable emissions reductions that are “additional,”** and establish a **regular process to make these standards increasingly stringent with tighter thresholds to ensure that VCM projects maintain additionality** while also ensuring permanence and preventing leakage.

²² As already done for EU allowances, where they are recognized under MiFID II.

- ⇒ The VCM governance body should work to harmonize MRV standards and leverage new technologies such as satellite mapping for verification, and blockchain/DLT for establishing robust registry systems.²³
- ⇒ As part of its mandate to develop and host a set of CCPs, the VCM governance body should establish a **consistent taxonomy with additional attributes characterizing VCM credits**²³ with clear gradations of quality, type of credit (removal vs. avoidance), linkages with broader SDGs goals, etc.; **creation of reference index grades in the VCM.**
- ⇒ The VCM governance body should help achieve market **consensus on the role of VCM credits in claims** (e.g., “carbon responsible,” “net zero,” “carbon neutral”).²³
- ⇒ Set up of a **global meta-registry** to be overseen by the VCM governance body to serve as a common global marketplace and, in the future, interoperate with multiple ETSs.²³

#3 (detailed in Section 4.3): We recommend that policymakers and regulators, over time, enable selective interoperability among compliance markets with similar ambitions; and permit the use of limited quantities of high-quality verified VCM credits in compliance markets after their credibility and additionality are established.

- ⇒ Interoperability between multiple ETS initiatives **should be pursued only where ambition levels (i.e., rates of decarbonization) are aligned between markets to prevent dilution of decarbonization ambitions.**
- ⇒ Policymakers should consider interoperability for certain high-quality VCM credits within ETS markets for sectors difficult to cover in the short term by ETS/tax/fees/rebates/mandates (e.g., **forestry and agriculture**) and **verified carbon removals**. In doing so, policymakers should catalogue relevant national assets (e.g., forests) and define eligibility lists for VCM projects to fast-track interoperability and to enable development of nature-based solutions. A key prerequisite would be to **ensure additionality as per #2, without which interoperability would be counterproductive.**
- ⇒ Policymakers should be mindful of the benefits and challenges of interoperability, and put into place appropriate conditions (e.g., **stringent caps on the portion of compliance obligations** that can be met through high-quality VCM credits, **clarity on specific VCM credits that are eligible and additional**, and **stringent quality requirements with high-quality MRV standards**).

#4 (detailed in Section 4.4): We recommend that market participants and infrastructure providers, policymakers, regulators, standard-setters, and climate science bodies drive standardization of carbon market products, accounting, and legal frameworks, and develop best practices for regulating both carbon markets and associated trading activities for allowances, credits, and derivatives.

- ⇒ Regulators should collaborate with market participants and trade associations such as ISDA to **standardize contracts for different ETS carbon products across markets and refine the application of Basel III and the FRTB to carbon instruments and derivatives.**
- ⇒ As per TSVCM, the VCM governance body should work swiftly to **set standards such as the Core Carbon Principles (CCPs), define a taxonomy with additional attributes, and oversee the market,**

²³ As identified also by the IIF TSVCM.

<p>all while driving toward harmonized MRV processes and common VCM registry standards, as described in recommendation #2.</p> <p>⇒ International accounting bodies (e.g., the International Accounting Standards Board (IASB) and Financial Accounting Standards Board (FASB)) should establish a common financial accounting framework for carbon instruments and derivatives.</p> <p>⇒ Policymakers and regulators in compliance markets should collaborate to leverage best practices for regulating ETSs, including development of a standard framework for developing allowance registry systems²⁴ for ETSs.</p>
<p>#5 (detailed in Section 4.5): We recommend that—as a key enabler for carbon markets—leading climate science and standard-setting bodies develop a universal carbon accounting framework that includes policies for measuring and reporting scope 1–3 emissions across different sectors and drives consensus on nomenclature and the definitions of claims such as “net zero” and “carbon neutral.”</p>
<p>⇒ Leading climate science bodies should drive the development of a universal carbon accounting framework in collaboration with sector-specific associations and corporates to expand the scope of measurement to a broader set of entities (including smaller corporates and private companies), enable disclosures, and facilitate application of GHG pricing mechanisms such as ETS markets to mitigate emissions.</p> <p>⇒ Sector-specific accounting methodologies should continue to be refined and aligned as a prerequisite to accurate disclosures of emissions.</p> <p>⇒ Policymakers, standard-setters, and climate science organizations should agree on such a framework against which entities should report on their emissions. This carbon accounting framework should also provide guidance and consensus on terminology and definitions for climate-related claims and the usage of VCM credits toward those claims.</p>
<p>#6 (detailed in Section 4.6): Banking and capital markets firms are supportive of these recommendations and committed to building a suite of capabilities and product offerings—for both compliance markets and the VCM—to help market participants address their compliance, decarbonization, investment, financing, and risk management needs, thereby supporting robust, competitive, liquid, and mature markets.²⁵</p>
<p>⇒ Build out capabilities to provide corporate and investor clients access to trading infrastructure, advisory services for use of carbon market solutions, risk management and hedging solutions, a suite of carbon market products, and collective action, partnership, and thought leadership on carbon markets.</p> <p>⇒ Scale derivatives markets associated with new ETS schemes, building exchange-traded and over the counter (OTC) futures, forwards, options, swaps, etc. to meet the risk management and investment needs of clients with exposures to carbon markets.</p>

²⁴ Registry systems are used to account for carbon instruments such as allowances in ETSs.

²⁵ Based on broad representation across global banking and capital markets sector that participated in or was interviewed during the development of this report.

- ⇒ **Develop new investment products** (using ETS carbon instruments and derivatives as an asset class) such as carbon-index-tracking exchange-traded funds (ETFs) and **integrate carbon derivatives as hedging solutions in existing funds** with carbon exposures.
- ⇒ **Develop new investment products (using VCM credit retirements)** as "carbon responsible" funds (aligning terminology with market-guidance on claims that are allowed) to meet demand from ESG-focused investors and ensure that they do not claim to drive "net zero" as per current guidance and definitions.
- ⇒ **Facilitate long-term offtake agreements** between corporate/investor clients and high-quality project developers (as determined by stringent MRV standards and a taxonomy as aligned in earlier recommendations) and facilitate both **vanilla and innovative financing solutions** aligned with the risk-return profiles for these projects.

It has been nearly three decades since 150 states signed, in 1992, the UN Framework Convention on Climate Change (UNFCCC), an international treaty to combat climate change with the goal of stabilizing atmospheric GHGs to a level that would prevent further global warming. In that time, annual GHG emissions have increased by more than 50 percent from ~30 GtCO₂e to over 50 GtCO₂e.¹ The world has warmed by approximately 1°C already, with 1.5°C anticipated as inevitable within the next few decades. With 300–500 Gt of total carbon budget left, a swift decline in emissions must occur during the next three decades, down from the current 50 GtCO₂e per year to a global net zero on GHG emissions.^{1,15} Action can no longer be delayed. All levers must be pulled immediately, including a rapid scaling of carbon pricing and all carbon markets, in terms of both their GHG emissions coverage and their decarbonization ambitions.

Please see further details on the recommendations in the consolidated report, [Unlocking the Potential of Carbon Markets to Achieve Global Net Zero](#), that includes:

- *The **MAIN BODY (pages 25-123)** of the report with background and context; definitions; data analyses/ charts; key challenges to overcome; a vision for the evolution of carbon markets; and analyses on each of the recommendations; and*
- *The **SUPPLEMENTARY ANNEX (pages 124-173)** with the history and evolution of carbon markets; details on current state of carbon markets; key lessons from the EU ETS; details on carbon border adjustment mechanisms; use of market stability mechanisms in ETSs; details on agriculture/forestry/ other land use; role of carbon markets for corporates; and role of carbon markets for investors.*

"Unlocking the Potential of Carbon Markets to Achieve Global Net Zero"

Summary of recommendations



1 We recommend that policymakers and regulators expand the scope of geographic, sectoral, and activity coverage of compliance ETS markets, and strive toward near-full coverage by one or more GHG pricing and/or GHG control mechanisms within the next five years. High-impact ETSs by incorporating key learnings from other ETSs and stringent allowance reductions aligned with emissions pathways that achieve 1.5°C ambitions.

(detailed in section 4.1)

2 We recommend that standard-setting bodies, in coordination with the broader ecosystem, facilitate the transformation and scaling of the VCM to ensure its integrity, role, and additionality.

(detailed in section 4.2)

3 We recommend that policymakers and regulators, over time, enable selective interoperability between compliance markets with similar ambitions, and permit the use of limited quantities of high-quality verified VCM credits in compliance markets, after their integrity and additionality are established.

(detailed in section 4.3)

4 We recommend that market participants and infrastructure providers, policymakers, regulators, standard-setters, and climate science bodies drive standardization around carbon market products, accounting, and legal frameworks, and develop best practices for regulating both carbon markets and associated trading markets for allowances, credits, and derivatives.

(detailed in section 4.4)

5 We recommend that—as a key enabler for carbon markets—leading climate science and standard-setting bodies develop a universal carbon accounting framework, with policies for measuring and reporting scope 1-3 emissions across different sectors, and drive consensus on nomenclature and the definitions of claims such as net zero and carbon neutral.

(detailed in section 4.5)

6 Banking and capital markets firms are supportive of these recommendations and committed to building a suite of capabilities and innovative product offerings (for both compliance markets and the voluntary market) to help market participants address their compliance, decarbonization, investment, financing, and risk management needs—thereby supporting robust, competitive, liquid, and mature markets.

(detailed in section 4.6)

Effective collaboration is essential to achieve Net Zero (1/2)

Recommendations by market participant



Policy-makers

- Aim for near-full coverage of GHG emissions within their jurisdictions through one or more mechanisms (ETS markets, carbon taxes, fees/rebates, and control-based mechanisms), while considering other environmental, fiscal, and monetary policies that influence emissions, (e.g., eliminating fossil fuel subsidies, introducing clean energy mandates, etc.), and supported with long-term policies that promote Paris-aligned decarbonization of the economy (4.1).
- For ETS markets, apply learnings from successful ETSs, including: (1) steep ~5 percent+ linear reductions per year in allowance levels, aligned and updated with the latest climate scenario modeling; (2) establishment of fixed-cap (absolute emissions) systems as opposed to intensity-based systems to align with total carbon budgets; (3) classification of allowances as financial instruments; (4) use of auctioning in lieu of free allocation to maintain sufficient price levels and drive decarbonization; (5) considering CBAMs to prevent leakage and maintain competitiveness; and (6) consideration of other emissions-reduction mechanisms (e.g., taxes, fees/rebates, and policies) when designing ETSs (4.1).
- Consider selective interoperability between ETS initiatives; and selective use of high-quality verified VCM credits within ETS markets (as compliance offsets) for sectors difficult to cover in the short-term by ETS/tax/mandates (e.g., forestry and agriculture) and verified carbon removals. Catalogue relevant national assets (e.g., forests) and define eligibility lists for VCM projects to fast-track interoperability to enable development of nature-based solutions. Remain mindful of the benefits and challenges of interoperability, and put into place the appropriate conditions, such as stringent caps on the portion of compliance obligations that can be met through high-quality VCM credits, clarity on specific VCM credits that are eligible and additional, and stringent quality requirements with high-quality standards and MRV (4.3).
- Collaborate with regulators to leverage best practices for regulating ETSs, including development of a standard framework for developing allowance registry systems (4.4).

- Build out capabilities to provide corporate and investor clients access to trading infrastructure, advisory services for use of carbon markets solutions, risk management and hedging solutions, a suite of carbon markets products, and collective action, partnership, and thought leadership on carbon markets (4.6).
- Scale derivatives markets in new ETS schemes, building exchange-traded and OTC futures, forwards, options, swaps, etc. to meet clients risk management and investment needs of clients (4.6).
- Develop new investment products (using ETS instruments and derivatives as an asset class) such as carbon-index-tracking ETFs and integrate carbon instrument derivatives as hedging solutions in existing funds with carbon exposures (4.6).
- Develop new investment products (using VCM credit retirements) as "carbon responsible" funds (aligning terminology with market-guidance on claims that are allowed) to meet demand from ESG-focused investors and ensure that they do not claim to drive "net zero" as per current guidance and definitions (4.6).
- Facilitate long-term offtake agreements between corporate/investor clients and high-quality project developers (as determined by stringent MRV standards and a taxonomy) and facilitate both vanilla and innovative financing solutions aligned with the risk-return profiles for these projects (4.6).
- Work with regulators and trade associations to standardize contracts for different ETS carbon products across markets and refine the application of Basel III and the FRTB to carbon instruments and derivatives (4.4).



Banking & Capital Markets firms



Industry trade associations

- Work with climate science bodies to develop universal carbon accounting framework that expand the scope of measurement across entities, scopes of emissions, etc. (4.5)
- Work with regulators and banks to standardize contracts for different ETS carbon products across markets and refine the application of Basel III and the FRTB to carbon instruments and derivatives (4.4).

Effective collaboration is essential to achieve Net Zero (2/2)

Recommendations by market participant

- Collaborate with policymakers to **enable the selective linking of compliance markets to the VCM over time** while ensuring stringent verification processes and eligibility criteria to maintain additionality (4.3).
- Work with banks and trade associations to **standardize contracts for different ETS carbon products across markets and refine the application of Basel III and the FRTB** to carbon instruments and derivatives (4.4).
- **Facilitate the efforts of the new VCM governance body** to set standards such as the core carbon principles, define a consistent taxonomy with additional attributes characterizing VCM credits, and oversee the market, while driving towards harmonized MRV processes and common VCM registry standards, as per TSVCM (4.2).
- Collaborate with trade associations and capital markets participants on **best practices for leveraging financial markets infrastructure** for carbon asset trading (4.4).
- Collaborate with policymakers to **leverage best practices for regulating ETs**, including development of a standardized template for developing allowance registry systems (4.4).



- **Clarify the role of the voluntary market:** (1) serve as a **transitional coverage mechanism for sectors or regions that are not covered by ETs, carbon taxes, feebates, or mandates** until regulated mechanisms take over and ultimately scale down with reducing emissions, (2) serve as a **core long-term global marketplace for carbon removals**, thereby supporting the growth and funding of critical new technologies, and supporting neutralization of residual emissions, (3) offer a **complementary mechanism for corporates to compensate for their emissions**, in a way that helps channel capital to markets with the greatest need (e.g., underdeveloped economies) while entities continue to pursue in-value-chain decarbonization (4.2).
- Work with the new VCM governance body to develop a set of **stringent baselining and MRV standards** that ensure VCM credits can drive **verifiable emissions reductions that are “additional,”** and establish a **regular process to make these standards increasingly stringent with tighter thresholds to ensure that VCM projects maintain additionality** while also ensuring permanence and preventing leakage (4.2).
- **Work with the new VCM governance body to harmonize MRV standards** and leverage new technologies such as satellite mapping for verification, and blockchain/DLT for establishing robust registry systems (4.2).
- Establish a consistent **taxonomy with additional attributes characterizing VCM credits**, with clear gradations of quality, type of credit (removal vs. avoidance), linkages with broader SDG goals, etc.; **creation of reference index grades in the VCM** (4.2).
- As per the TSVCM, **set up a global meta-registry** to be overseen by the governance body to serve as a common global marketplace and, in the future, interoperate with multiple ETs (4.2).
- **Develop a universal carbon accounting framework in collaboration with sector-specific associations and corporates to expand the scope of measurement to broader entities (including smaller corporates), enable disclosures, and facilitate application of GHG pricing mechanisms such as ETs markets to mitigate emissions.** Sector-specific accounting methodologies should continue to be refined and aligned as a prerequisite to accurate disclosures of emissions, and this framework should **provide guidance and consensus on terminology and definitions for related claims** and the usage of VCM credits towards those claims (4.5).
- Accounting bodies: **establish a common financial accounting framework for carbon instruments and derivatives** (4.4).



Standard-setters and climate science bodies¹

1. Including accounting standard bodies, sustainability standard organizations, industry associations, climate science community

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