

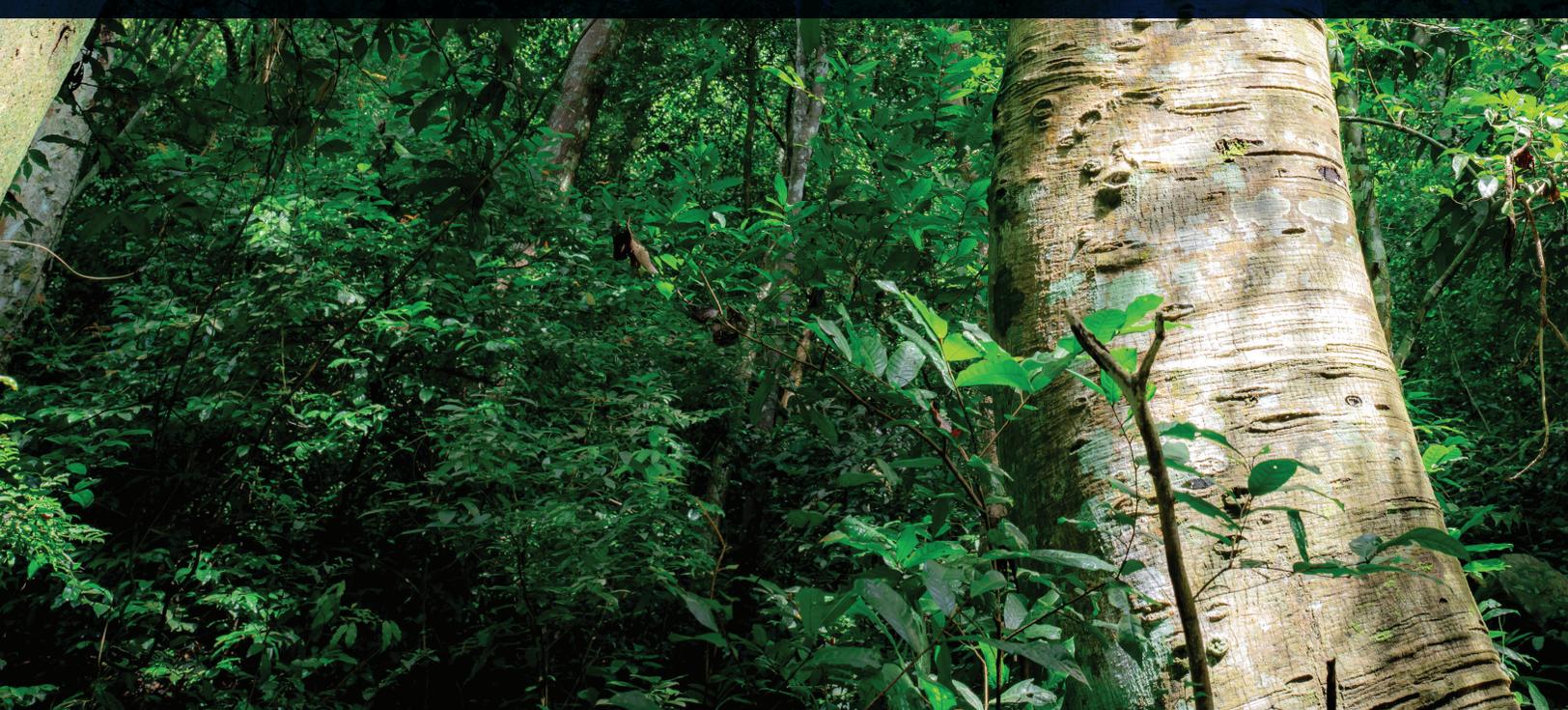


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**Business of Sustainability**  
McDONOUGH SCHOOL of BUSINESS

# *Challenges and Opportunities for the Voluntary Carbon Markets*

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# Abstract

With the increasing need to eliminate greenhouse gas emissions, the **voluntary carbon market (VCM)** provides a platform to help organizations reach net-zero emission goals through the purchase of carbon offsets.

Carbon offsets provide a means to compensate for remaining hard-to-abate emissions, incentivize sustainable development, and stimulate financing to further advance, deploy, and scale decarbonization and carbon removal technologies. Recent dramatic growth of the VCM, however, has led to **increased concerns regarding the quality of the carbon offsets**.

To examine the opportunities to improve confidence and enhance the efficiency of the VCM, the Business of Sustainability Initiative at Georgetown University's McDonough School of Business hosted **The Business of Carbon Offsets Workshop** in collaboration with the National Institute of Standards and Technology (NIST).

This report summarizes identified **challenges**: trust, quality, scaling the market, and the role of the VCM and several **opportunities**: data transparency and accessibility, science and technology, standardization, market structure, and policy landscape. These ideas are presented to spur collaboration and action among the market players.

*The findings in this report were produced following a workshop in Fall 2023 and are not direct proposals or policy recommendations from the Business of Sustainability Initiative at Georgetown University's McDonough School of Business and the National Institute of Standards and Technology.*

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# 01

## Introduction



*In addition to regulations and incentives, many organizations pressed by consumer, stakeholder, and corporate values are pledging net-zero emissions and carbon neutrality goals.*

Amid heightening concerns of increasing global energy demands and rising carbon dioxide emissions, consensus is growing that anthropogenic greenhouse gas (GHG) emissions must cease for the Earth to avoid the most catastrophic impacts of climate change (IPCC, 2018). Given the global impact of GHG emissions, scientists, economists, and policymakers have defined the social cost of carbon as the damage caused by 1 metric ton CO<sub>2</sub> equivalent (1tCO<sub>2</sub>e) emitted to the atmosphere, providing a measure to account for the economic and social burden of GHG emissions (IPCC, 2022). In some places, organizations are required to internalize the social cost of carbon by paying for their GHG emissions through carbon taxes or cap-and-trade programs (Peace & Ye, 2020).<sup>1</sup> Incentives such as tax credits are also now driving emission reductions (IEA, 2023). In addition to regulations and incentives, many organizations pressed by

consumer, stakeholder, and corporate values are pledging net-zero emissions and carbon neutrality goals. To meet these goals, organizations are working to reduce their emissions and compensate for remaining emissions through investments, such as by purchasing carbon offsets.

Carbon offsets fall into two broad categories, avoided emissions and carbon dioxide removal. Examples of avoided emissions include decarbonization by transitioning to renewable and/or other clean energy sources, increasing energy efficiencies, using carbon capture on point emission sources, improving waste and landfill management practices, etc. Examples of carbon dioxide removal – extracting carbon dioxide from the atmosphere – include direct air capture, reforestation/afforestation, forest conservation in emerging economies (REDD+), blue (ocean) carbon, and more.

<sup>1</sup> Other market-based approaches to internalizing the social cost of carbon are baseline-and-credit programs, clean energy standards, and “feebates” (Peace & Ye, 2020).



Along with decarbonization, carbon offsets may confer co-benefits where the offset projects incorporate additional advantages such as biodiversity restoration, employment, and the reduction of non-greenhouse gas pollution. Offsets with co-benefits are often in higher demand and can garner price premiums in marketplaces (Ecosystem Marketplace, 2023).

Carbon offsets are sold in voluntary and compliance markets. The voluntary carbon market (VCM) provides a platform for organizations to:

1. Fulfill decarbonization goals by offsetting hard-to-abate emissions from their operations.

2. Create and support positive environmental and social externalities and sustainable development through co-benefits.

3. Finance decarbonization technologies and strategies that are not yet at scale.

The VCM is largely unregulated, so ultimately those selling carbon offsets must convince the buyers, not some central authority, that their offsets are consistent with their claims. In turn, buyers must convince the public and their stakeholders across the value chain that these offsets are robust enough to contribute to that business's climate goals. Figure 1 depicts the voluntary carbon market stakeholder ecosystem\*.



Figure 1: Simplified schematic of the voluntary carbon market stakeholder ecosystem. Source: The Business of Sustainability Initiative at Georgetown University's McDonough School of Business.

The annual VCM value and the price of offsets have fluctuated over the years, driven by policies, technologies, addition of projects, and public perception, as shown in Figure 2. From 2005–2020, annual transactions averaged USD 352 million and the VCM developed alongside the compliance market as a small but growing percentage of the entire market, voluntary and

compliance combined (World Bank, 2022). Then, in 2021, there was an explosion of new transactions nearing USD 2 billion. This growth is attributed to pledges made during the United Nations' 26th Conference of the Parties (COP26) in Glasgow, in response to the 2018 IPCC report calling for the world to reach net-zero by 2050 (GFANZ, 2021; IPCC, 2018; Romm, 2023).

## Value of Traded Carbon Credits

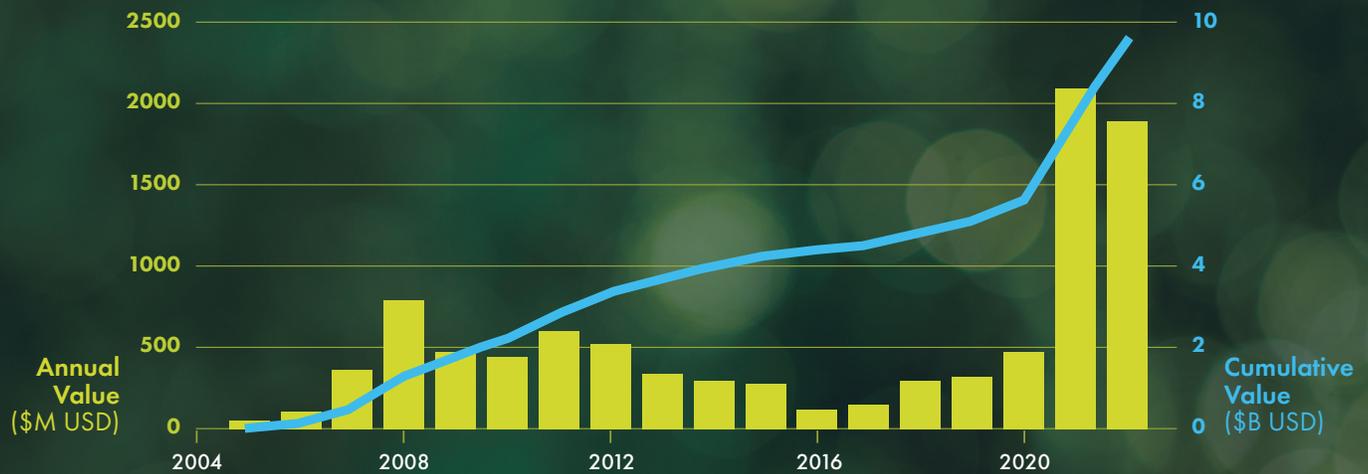


Figure 2: Annual value and cumulative value of traded carbon credits in the voluntary carbon market from 2005-2022. Source: Ecosystem Marketplace (2023).



*Government scrutiny of decarbonization claims based on offsets is also increasing.*

This dramatic market growth has led to increased scrutiny of the VCM (World Bank, 2022). Since 2021, concern has been rising from a disconnect between the VCM’s growth and its intended impact of reducing emissions (e.g., Greenfield, 2023; Rathi, 2022; West et al., 2023). Some companies have responded by stepping back from using offsets to reach their net-zero goals (Greenfield, 2023). Government scrutiny of decarbonization claims based on offsets is also increasing. For example, the U.S. Federal Trade Commission flagged “Carbon Offsets and Climate Change” as a topic under consideration for updating its Green Guides, which ensure that environmental marketing claims are fair (FTC, 2022). Similarly, the European Union’s draft Green Claims Directive would specify requirements for companies to make claims about offsets and carbon neutrality (European Commission, 2023).

Broekhoff and colleagues group the scrutiny around offsets into two categories: how carbon offsets are used and their quality (Broekhoff

et al., 2019). Critics say that the offset market creates a perverse incentive for companies to prioritize buying offsets over decarbonizing their operations. To reach net-zero, improving efficiencies and transitioning to clean energy sources, where technical means are available, should be prioritized while carbon offsets should be reserved to compensate for remaining hard-to-abate emissions. The Science Based Targets Initiative (SBTi, 2023) and Voluntary Carbon Markets Integrity Initiative (VCMI) (VCMI, 2023) are examples of organizations developing standards to overcome these criticisms. An additional criticism stems from the concern that offsets do not accurately represent the carbon avoided or removed. A number of initiatives aim to address this quality issue, including the Integrity Council for the Voluntary Carbon Market (ICVCM) (ICVCM, 2023). Furthermore, some offset buyers are updating their requirements for purchasing offsets, sending demand signals to the market (e.g., Carbon Direct & Microsoft, 2022).

# Workshop

The VCM has the potential to greatly support net-zero goals, climate finance, and sustainable development, but to achieve these goals, there must be public and stakeholder trust in carbon credits.



To this end, on September 14, 2023, the Business of Sustainability Initiative at Georgetown University's McDonough School of Business hosted the Business of Carbon Offsets Workshop in collaboration with the National Institute of Standards and Technology (NIST) to convene stakeholders and identify solutions to improve efficiency and confidence in the VCM. Sixty participants representing buyers, project developers, registries, rating agencies, NGOs, academia, and government spent the day discussing the challenges the VCM faces and the opportunities to enhance its effectiveness.<sup>2</sup>

The workshop was divided into four panel discussions, see Appendix A, with different stakeholder groups: 1) Buyers; 2) Project Developers; 3) Registries; and 4) NGOs, Government, and Rating Agencies. After the panels, participants divided into breakout groups, pre-assigned to ensure stakeholder diversity within each group. The workshop concluded with groups reporting on takeaways and an open discussion.

With this input, several categories of challenges and opportunities were identified. Section 2 discusses the challenges: trust, quality, scaling the market, and the role of the VCM. Section 3 presents several opportunities: data transparency and accessibility, science and technology, standardization, market structure, and policy landscape. None of these categories exist in silos. Many of the ideas from the workshop are intertwined and interrelated and are relevant to multiple stakeholder groups. This report presents these ideas to spur collaboration and action among the market players.

<sup>2</sup>While the workshop targeted offsets in the voluntary carbon market, many of the workshop's takeaways were relevant to carbon offsets broadly (including those in compliance markets).

# 02

## Challenges

Workshop discussions coalesced on several broad challenges that are limiting the VCM from effectively generating offsets, creating positive externalities, and financing decarbonization and carbon removal technologies, as detailed below and summarized in Figure 3. Trust among VCM stakeholders and the public and concerns around offset quality are major bottlenecks. Furthermore,

it is critical that the VCM and policies evolve to ensure a rapid transition to improved efficiency and clean energy with reduced emissions, a sufficient supply of carbon offsets to compensate for the remaining hard-to-abate emissions, and a stimulus to accelerate the development and scaling of new clean technologies.

### A. Trust

Organizations currently buy offsets to meet decarbonization and sustainability goals. These investments, in turn, are integrated into the organization's sustainability narrative. To be an effective marketing tool, all stakeholders, including the public, must trust that offsets are achieving what is being claimed. Workshop participants generally acknowledged that the present lack of trust in the veracity of offset claims is creating major risks for the VCM. Low trust means that buyers take on a risk of greenwashing accusations and, increasingly, legal and regulatory action when buying offsets (e.g., Davey, 2023). Furthermore, low trust decreases demand, which disincentivizes developers from creating projects. Workshop participants emphasized many times the public relations and reputational risk to buying bad credits. Specifically, participants mentioned risks of

- decarbonization projects not delivering their intended benefits, and
- an ethical dilemma when carbon removal offset purchases are prioritized over decarbonization.

The lack of trust stems in part from a knowledge gap and the need for greater transparency and improved measurement capabilities to underpin the quantification/verification of claims. Stakeholders need to understand exactly how carbon offsets are being created and the characteristics, including potential risks, associated with different types of offsets. Many stakeholders agreed that the VCM is complex and hard to navigate. Large organizations have more resources and often hire employees and/or companies dedicated to vetting offset purchases, but small- and medium-sized enterprises may not. This discrepancy severely limits participation in the markets and overall decarbonization efforts.



*Low trust decreases demand, which disincentivizes developers from creating projects.*



## B. Quality

Four components of carbon offset quality were discussed: **additionality**, **permanence/durability**, **leakage**, and **co-benefits**. While each property factors into the buyer and project developers' risk assessment, all factors suffer from challenges in measuring and quantifying these properties.

**Additionality** assessment is difficult to assess because it is largely qualitative – a counterfactual cannot be measured. For example, it is difficult to prove that some forestland would have been logged or clear cut for agriculture had a conservation project that issues offsets not been created. Most participants appeared to agree that buyers want robust additionality assurance, such as clear evidence that the emission reductions would not have occurred without revenue from offsets.

**Permanence/Durability**: The major question around this topic comes down to comprehending the permanence or durability of a given carbon removal offset. Project developers use the anticipated length that carbon is stored to differentiate themselves in the market. However, without greater understanding and transparency, there is significant risk that the carbon removal is not as durable as claimed.

**Leakage** is complex and difficult to measure. It is largely focused on the positive impact of carbon offset projects being neutralized by activities shifting elsewhere, e.g. mitigation efforts in an area lead to increased emissions in other areas (Mitchell-Larson et al., 2022). Stakeholders agreed that more should be done to measure and prevent leakage.

**Co-benefits** are valuable marketing tools because they demonstrate sustainability contributions beyond emissions reductions. Their storytelling value also makes co-benefits useful for convincing first-time buyers to invest in offsets. Tying co-benefits with specific U.N. Sustainable Development Goals (SDGs) attracts organizations whose values align with certain SDGs. However, quantitative methods for assessing co-benefits are lacking. It can be also difficult to get sufficient numbers and data due to data privacy concerns. Additionally, tracking these data over extended time periods to assess long-term trends can be challenging.



## C. Scaling

The VCM needs to scale more quickly if it is to finance and realize decarbonization solutions on the needed timescale. However, a major bottleneck to bringing offsets into the marketplace is the amount of time it takes to review and verify projects. In fact, approximately half of the workshop participants said that this was a problem, creating frustration among companies who want to buy offsets and developers who are relying on offsets to finance their projects. Another bottleneck to scaling the VCM are the high barriers to entry, both in establishing projects and buying offsets. Like the knowledge gap problem above, small- and medium-sized enterprises may lack the resources to buy offsets and attract finance for projects.

## D. Role of the VCM

Participants had different perspectives on the VCM's role in long-term decarbonization. Several suggested that the VCM is a good temporary solution for addressing negative externalities, but regulatory measures like regulated carbon markets, a cap-and-trade system, and a carbon tax are needed for long-term decarbonization. In contrast, some believed strongly that the VCM is an effective mechanism for both financing decarbonization technologies and accounting for negative externalities, and that a regulatory framework would hurt the larger decarbonization effort by impeding the pace of innovation. Moving forward, a clearer understanding is needed of how effective the different approaches—voluntary versus regulatory—are and their different roles in driving decarbonization and meeting climate goals.

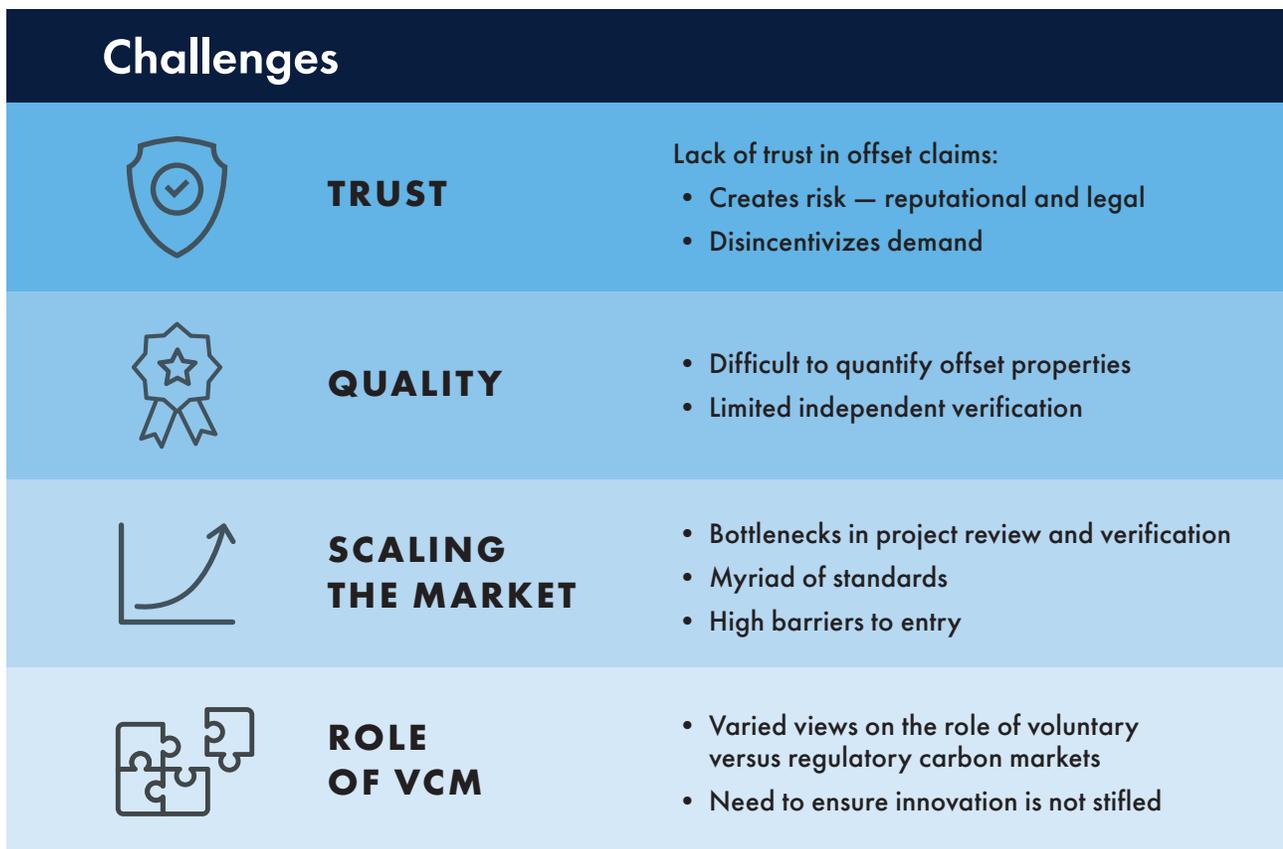


Figure 3. Four major challenges to creating a more efficient voluntary carbon market.

# 03

## Opportunities

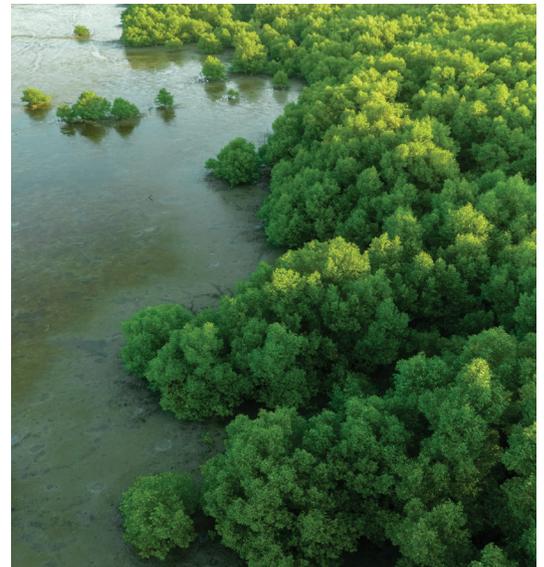
In light of these challenges, the workshop participants identified opportunities to strengthen the VCM. Of the key opportunities highlighted, some apply to the marketplace itself while others would strengthen both the market and emissions avoidance and carbon dioxide removal projects.

Both areas can benefit from increased information transparency and accessibility, and advances in science and technology, standardization, and policies, as detailed below and summarized in Figure 4.

### A. Data transparency and accessibility

The workshop discussed how greater data transparency and accessibility across the VCM ecosystem is critical to increase trust among stakeholders and the public. Many organizations are waiting until these trust issues are resolved to participate in the VCM. This stymies the financial infusions needed to scale the VCM. Current practices limit data access through paywalls or other means to protect intellectual property, data privacy, and security. As a result, without full access to project data and methodologies, it is difficult to review projects independently and evaluate how well projects deliver on their claims.

To build trust, confidence, and market efficiency, data accessibility to demonstrate process integrity is needed, while balancing transparency with sufficient confidentiality. Participants suggested increasing data accessibility through anonymizing data and developing transparent and secure data flow with tools such as blockchain technology. With new measurement systems being deployed, an exponential growth in the data volume is anticipated. Therefore, assuring the data quality and accessibility is even more critical, see section 2B. Ultimately, public databases are a stabilizing platform. New initiatives, such as the recently developed National Strategy to Advance an Integrated U.S. Greenhouse Measurement, Monitoring, and Information System, are additional avenues for increasing data transparency and accessibility (The White House, 2023).



## B. Science and technology

Along with increased data transparency and accessibility, a great need for improved measurements, more data, and validated models was recognized. Furthermore, it was acknowledged that the scientific understanding of these complex systems is still evolving, and that additional science is needed to underpin climate goals and minimize risks. Advances in technology are needed to expand current measurement capabilities, enabling the acquisition of high-quality data, at appropriate spatial and temporal resolutions, over sufficient time to quantify the carbon uptake and verify that the carbon remains sequestered over the period claimed. Better measurements and science will increase data veracity through higher quality data and objectivity. Moreover, to be economically viable, the measurement and monitoring capabilities must be available at reasonable costs to deploy, scale, and maintain.

The use of satellite imagery in forest conservation was an example discussed. Satellite data is currently not at sufficiently high resolution to correlate the imagery with specific carbon sequestration projects. Combining satellite measurements with expanded ground measurements is needed to establish a more comprehensive and quantitative understanding of these systems, such as the carbon uptake and/or emissions below the tree canopy. Higher quality and more comprehensive data will also enable improved and validated modeling tools, which in turn would, in the long term, decrease the amount of ground monitoring data that must be collected and thus ultimately reduce costs.

Evaluating and documenting the uncertainties within the measurement systems is also critical information for assessing the quality of carbon offsets. Thus, participants suggested that registries set standards around how much measurement uncertainty is acceptable and communicate that uncertainty in the marketplace; this transparency will help buyers make better-informed decisions. One proposal for making offset uncertainty more transparent was advertising “practical permanence” in marketplaces by expressing offset permanence in 10- to 15-year increments. Making offset claims more conservative and the use of buffer pools for nature-based projects were other ways participants suggested reducing uncertainty and creating higher-quality offsets. More broadly, a clear need emerged for establishing criteria for evaluating co-benefits such as those outlined in the U.N. SDGs. The science for evaluating and assessing co-benefits, is nascent, and yet is necessary for achieving decarbonization and other sustainable development goals.

There was clear agreement that improved science, measurements, quantification, validated models, and associated uncertainty evaluations are needed across the various decarbonization approaches, the carbon dioxide removal pathways, and the wide variety of co-benefits. This will provide more confidence in carbon credit claims, and therefore increase market interest.



## C. Standardization

The workshop discussions revealed several different perspectives on standardization with respect to the VCM. Some participants felt that there were already too many standards, some felt that the number of existing standards is sufficient, whereas others felt there are opportunities to improve on or develop more generally accepted standards. There was also debate about the level of specificity required with some advocating for more generalized widely adopted approaches while others believed a one-size-fits all approach is impractical and that different standards for specific types of projects and even project specific standards are needed. Other identified concerns included 1) poorly conceived standards can stifle innovation and 2) it is hard to keep standards up-to-date in rapidly developing areas.

While standards development does take time and resources, standards provide a foundation to build confidence in the market. A number of organizations are developing standards including SBTi (SBTi, 2023), VCMi (VCMi, 2023), ICVCM (ICVCM, 2023), and the CCS+ Initiative (CCS+ Initiative, 2024) to set science-based targets, standards, and best practices. Additionally, different stakeholders including project developers, verifiers, registries, and rating agencies are also developing standard practices and methodologies. Given the myriad of activity, it is difficult to identify the best approaches, especially for organizations with fewer resources. Opportunities for improvements include harmonizing the existing standards into industry-wide consensus standards, such as management, terminology, performance, and product standards. Analogous to data transparency and accessibility, consensus standards would provide greater accessibility to methodologies and streamline project approval processes across the supply chain. Moreover, consensus standards developed under an internationally recognized process can be used to underpin a conformity assessment system to further instill confidence in the market and facilitate global trade (Carnahan & Phelps, 2018; ISO, 2022).



*While standards development does take time and resources, standards provide a foundation to build confidence in the market.*

## D. Market structure

Participants agreed that the VCM structure and stakeholder relationships within the VCM are complex, creating barriers to entry especially for newcomers. Making the VCM market structure more transparent can lead to more participation, and therefore increase business opportunities.

Participants also noted that some companies are involved in multiple roles within the VCM, creating concern about conflicts of interest. For example, some companies act both as a verifier that approves offsets and as a registry that sells offsets. This means that such companies generate income from both approving projects and selling the offsets of those projects. Conflict of interest not only weakens trust in the market but also creates risk. One verifier acting irresponsibly can cause reputational damage across the market. Separating the roles within the VCM, particularly project-funder, verifier, and registry roles would improve market confidence and operations.

Another risk created by the current market structure is the time between offsets being sold by the marketplace and retired by the buyer. Some credits have a retirement date, others do not. There is the risk of speculators holding onto credits in the hope they will increase in value, or that companies will hold onto offset credits until 2050, when their net zero goals are due.

Finally, it was suggested that the VCM structure be reconsidered to enable better financial models. Such models could help ensure that project developers are making sufficient money to finance their next project without yielding windfall profits that would create perverse incentives. Such a model would have to ensure a higher internal rate of return for high-risk projects to attract necessary capital.

## E. Policy landscape

Many workshop participants suggested that the U.S. government should play some role in the VCM.<sup>3</sup> However, like standardization, the government's role should support market efficiency without establishing prohibitive regulations that would discourage innovation. One potential role is establishing guardrails that make the VCM more trustworthy and its prices more stable. Several specific models of government engagement were put forward.

- The Growing Climate Solutions Act 2021 directs the U.S. Department of Agriculture (USDA) to create a clearing house for farmers to participate in carbon markets; the law also directs the U.S. government to provide farmers with guidance on how to generate carbon credits through agriculture practices.
- The government could create a "Carbon Star" program that certifies high-quality offsets, similar to the U.S. Environmental Protection Agency (EPA) and U.S. Department of Energy's (DOE) Energy Star program.<sup>4</sup>
- The U.S. Securities and Exchange Commission (SEC) could securitize the credits.
- The National Institute of Standards and Technology (NIST) could convene the community to develop voluntary consensus standards and a conformity assessment system for the VCM through an internationally recognized standards body.

The U.S. government is already supporting offsets and decarbonization technologies by creating demand for them in several ways. The following are the programs mentioned during the workshop.<sup>5</sup>

- The U.S. Federal Buy Clean Initiative directs the federal government to prioritize buying low-carbon construction materials; several states also participate in this or similar state initiatives (Office of the Federal Chief Sustainability Officer, 2023).
- The U.S. Department of Energy is making substantial investments in both clean energy and carbon capture and carbon removal technologies (U.S. DOE, 2023).
- Section 45Q of the Internal Revenue Code provides tax credits for carbon oxide sequestration (Section 45Q of the Internal Revenue Code) (IEA, 2023).

Nevertheless, participants noted that the politicization of U.S. climate change policies creates uncertainty over the role the U.S. government will play; participants saw the European Union as more of a leader in carbon markets and decarbonization solutions.

On the international stage, impending rules around Section 6.4 of the Paris Agreement<sup>6</sup> also garnered some discussion. Considerable uncertainty exists around the rules and their potential implications for the VCM, such as whether the U.N.-certified offsets will undercut VCM offsets since the former may be perceived to be more robust. Several project developers saw U.N. certification as an opportunity since certified offsets could garner higher prices than the VCM and create a framework for projects. It could pose a challenge, though, since U.N. offset markets could draw buyers away from the VCM.

<sup>3</sup> The U.S. government already has several pending and active programs regarding carbon accounting and carbon markets, including the EPA's Greenhouse Gas Reporting Program (GHGRP) (U.S. EPA, 2014) and anticipated rulings from the Securities and Exchange Commission (proposed "Rules Enhance and Standardize Climate-Related Disclosures for Investors") (U.S. SEC, 2022), and the Commodity Futures Trading Commission (Prentice, 2023).

<sup>4</sup> Broberg and colleagues (2023) also suggests that the U.S. government could approve certifications for quality by either a) creating its own standard based on advice from industry (like Energy Star) or b) support the private sector's creation of a certification (similar to the ANSI/ISO international standardization process).

<sup>5</sup> More exist, including in state, local, and tribal governments.

<sup>6</sup> From Carbon Market Watch (Crook, 2022): "Article 6.4 will create a global carbon market overseen by a United Nations entity, referred to as the "Article 6.4 Supervisory Body" (6.4SB). Project developers will request to register their projects with the Supervisory Body. A project must be approved by both the country where it is implemented, and the Supervisory Body, before it can start issuing U.N.-recognized credits. These credits, known as A6.4ERs, can be bought by countries, companies, or even individuals. However, 'voluntary' credits purchased by private companies do not have to go through the Article 6 system. This means that largely unregulated private schemes can still allow double counting, even though this defies logic and environmental integrity. It remains unclear whether buyers will even want double-counted credits when properly adjusted credits will be available" (Crook, 2022).

# Opportunities



## **DATA TRANSPARENCY & ACCESSIBILITY**

- Builds trust
- Increases demand



## **SCIENCE & TECHNOLOGY**

- Expands measurements and access to objective data
- Enables validated models
- Enhances knowledge and confidence
- Stimulates innovation



## **STANDARDIZATION – HARMONIZATION**

- Streamlines approval process
- Builds quality and confidence
- Enables trade with globally accepted standards



## **MARKET STRUCTURE – TRANSPARENCY**

- Avoids conflicts of interest
- Increases market accessibility
- Attracts capital



## **POLICY – ALIGNMENT**

- Enhances marketplace integrity
- Increases demand
- Stabilizes prices

Figure 4. Five categories of opportunities to strengthen the voluntary carbon market.

# 04

## Conclusion

Carbon offsets are one tool in a portfolio of strategies to transition to an equitable carbon neutral economy. The voluntary carbon market (VCM) provides a platform for organizations to trade carbon offsets and thus a means to reach net-zero goals by compensating for hard-to-abate emissions, generate positive externalities, and fund decarbonization technologies and their advances. The VCM is a nascent market that has been evolving over the last 20 years. The VCM has recently been projected to grow to \$10–\$40 billion by 2030 over the \$2 billion 2021 market value (Reuters, 2023). However, more recently, there are indications that organizations are reducing their reliance on carbon offsets (Temple, 2023; World Bank, 2022). Simply allowing the VCM to develop through normal market forces poses risks. In particular, the VCM must overcome major trust and quality concerns.

The VCM is largely self-regulated. Market stakeholders should come together to build an infrastructure to increase confidence in the market. It is critical that the VCM and policies evolve to ensure both rapid decarbonization and a sufficient supply of carbon offsets to compensate for the remaining hard-to-abate emissions. The Business of Carbon Offsets Workshop identified several opportunities to improve the market efficiency including increasing data transparency and accessibility, standardization, and better defining the market structure. More broadly, improved science, measurements, validated models, and associated uncertainty evaluations will provide the critical foundation needed to underpin carbon offset claims. Finally, U.S. federal, state, and local governments are driving demand for offsets and decarbonization strategies in several ways. Governments can support the VCM's development while maintaining its unique role as a self-regulated market that rewards innovation.

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# Appendices



## Appendix A

Agenda for the Business of Carbon Offsets Workshop at Georgetown University's Rafik B. Hariri Building, September 14, 2023.

### **SESSION 1: BUYERS** 9:00 – 10:00 AM

In the first session of the day, we will hear the perspectives of buyers of voluntary carbon offsets. What are their primary considerations for choosing which offsets to purchase? How do they trade off between the price, the project type/location, vintage, and availability? Do additional project attributes, such as contribution to United Nations' Sustainable Development Goals, affect purchase decisions? By discussing these questions in detail, we will establish a unified understanding of the demand side of the market for voluntary carbon offsets.

### **SESSION 2: PROJECT DEVELOPERS** 10:15 – 11:15 AM

In this session, we will focus on the perspective of project developers, who design, implement, and operate emissions-reduction projects. What are the most recent challenges and opportunities in different types of projects, such as clean cookstoves, forestry and land use, and renewable energy? What market considerations are the most important in determining which projects to invest in? Our primary goal is to understand the supply side of the market for voluntary carbon offsets.

### **BREAK** 11:30 – 12:30 PM

### **SESSION 3: CARBON REGISTRIES** 12:30 – 1:30 PM

In the two-sided marketplace for voluntary carbon offsets, carbon registries play a significant role in tracking offsets projects, as well as establishing standards. In this session, we will hear from executives in carbon registries to learn more about their perspectives. How do they determine eligibility for new project types? What are the most recent approaches to maintaining market integrity by addressing additionality, permanence, and leakage? What are the most recent trends that they observe in project development, credit issuance, and retirements?

### **SESSION 4: NGOS, GOVERNMENT, AND RATING AGENCIES** 1:45 – 2:45 PM

In order for the market for voluntary carbon offsets to function properly, several non-governmental organizations issued best practices and recommendations. In this session, we will first hear their perspectives to identify best practices for purchasing voluntary carbon offsets. With the increased importance of the use of voluntary carbon offsets for compliance purposes, we also will discuss what the government can bring to the table in terms of regulatory frameworks. We will finally discuss the emerging trend of rating agencies that assess the quality of carbon offsets.

### **BREAKOUT SESSIONS: IDENTIFY NEEDS AND OPEN QUESTIONS** 3:00 – 4:00 PM

We will assign the participants from various parts of the industry into different groups for a breakout session. Each group will focus on different issues in the market for voluntary carbon offsets to identify needs and open questions. The groups are encouraged to discuss their current challenges in a candid fashion. Georgetown faculty will be available to engage with the groups.

### **CONCLUDING DISCUSSION AND TAKEAWAYS** 4:00 – 5:00 PM

## Appendix B

### Acronyms

<b>EPA</b>	Environmental Protection Agency (U.S.)
<b>DOE</b>	Department of Energy (U.S.)
<b>GHG</b>	Greenhouse Gas
<b>ICVCM</b>	Integrity Council for the Voluntary Carbon Market
<b>IPCC</b>	Intergovernmental Panel on Climate Change (U.N.)
<b>NGO</b>	Non-government Organization
<b>NIST</b>	National Institute of Standards and Technology (Dept. of Commerce)
<b>REDD+</b>	Reduce emissions from deforestation and forest degradation
<b>SBTi</b>	Science Based Targets Initiative
<b>SDGs</b>	Sustainability Development Goals (U.N.)
<b>SEC</b>	Securities Exchange Commission (U.S.)
<b>tCO<sub>2</sub>e</b>	metric ton carbon dioxide equivalent
<b>USDA</b>	U.S. Department of Agriculture
<b>VCM</b>	Voluntary Carbon Market
<b>VCMI</b>	Voluntary Carbon Markets Integrity Initiative

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