

SECTOR OVERVIEW

A. Background

1. Achieving the goals of the Paris Agreement requires global greenhouse gas emissions to be reduced by 45% by 2030, compared to 2019 levels.¹ This requires a complete carbon economy transition where corporates and public sector enterprises across sectors adjust their business models, develop credible plans for the transition to low-carbon operations, and implement those within a stipulated timeframe. This transition is one of the key drivers of carbon markets. Under the Paris Agreement, each country has communicated its plan for climate action through nationally determined contributions, which represent voluntary commitments by countries to mitigate and adapt to climate change. Globally, 4 to 5 gigatons of carbon dioxide equivalent is estimated to be traded annually by 2030 with a market volume of \$60 billion–\$100 billion per year if the existing nationally determined contribution targets were transformed into tradable emission reduction units.²

2. Several companies, particularly those in hard-to-abate sectors and industries, need to offset their (scope 1, scope 2, and scope 3) emissions³ as they achieve their decarbonization goals, and this is expected to create a surge in demand for credible carbon credits. This is primarily because in hard-to-abate sectors the technologies that would ensure 100% decarbonization are not yet available. Only 55%–66% emission reduction is feasible through energy efficiency and resource improvement measures in the steel sector, considering the existing scale of cost-effective technology.⁴ Similarly for the aviation sector, around 80% decrease is feasible through sustainable aviation fuel, new technologies and operational efficiencies.⁵ These sectors will therefore rely on carbon markets to offset their emissions while they transition to new low-emission operating models. Increase in net-zero commitments by the companies can play a major role in bringing economies of scale for emerging climate technologies, bringing these technologies to market earlier, and can be used in direct decarbonization efforts.

B. Voluntary Carbon Markets

3. The voluntary carbon market (VCM) is where private individuals, corporations, and other actors buy and sell carbon credits outside of regulated or mandatory carbon pricing instruments. The VCM operates outside of regulated or mandatory carbon pricing instruments. The compliance market includes mandatory participation by companies and governments to account for their greenhouse gas emissions. Each credit traded in the VCM represents 1 ton of carbon dioxide equivalent (tCO₂e) that is sequestered or has not been emitted. Projects in the VCM range from small community-based activities such as clean cookstoves to large industrial-style projects including high-volume hydro plants and commercial reforestation. Community-based projects typically produce smaller volumes of carbon credits but also generate more additional socio-economic and environmental co-benefits.

¹ United Nations Climate Change. 2022. [Climate Plans Remain Insufficient: More Ambitious Action Needed Now](#). Bonn.

² United Nations Environment Programme. 2021. [Emission Gap Report](#). Nairobi.

³ Scope 1 covers direct emissions from owned or controlled sources. Scope 2 covers indirect emissions from the generation of purchased electricity, steam, heating and cooling consumed by the reporting company. Scope 3 includes all other indirect emissions that occur in a company's value chain. Carbon Trust. [Briefing: What are Scope 3 emissions?](#)

⁴ The Energy and Resources Institute. 2020. [Towards a Low Carbon Steel Sector: Overview of the Changing Market, Technology and Policy Context for Indian Steel](#). New Delhi.

⁵ International Air Transport Association. [Our Commitment to Fly Net Zero by 2050](#).

4. The key players in the VCM are (i) project developers who design a project or program and register and monitor a project and sell the carbon credits; (ii) independent standards; (iii) independent verifiers which are organizations that verify that a project meets its stated objectives and volume of emissions; (iv) market intermediaries which are for-profit companies that act as traders/ or fund managers to manage carbon credit portfolios; and (v) end buyers, who typically are companies or individual consumers that have committed to offset part or all of their greenhouse gas emissions. Carbon standards are private organizations, typically international non-governmental organizations which provide requirements and rules to guide project developers in designing activities that measurably remove greenhouse gases from atmosphere or reduce greenhouse gas emissions. Standards have a series of methodologies or requirements for each type of carbon project. Standards also maintain a registry to track all the projects operating under a given standard, the number of credits each project has been issued, and who bought and retired them. The global VCM is mainly driven by 17 independent crediting mechanisms or standards, covering almost two-thirds of issuances. Verified Carbon Standard (VCS) is the largest independent carbon crediting mechanism accounting for 68.5% of total carbon credit issuances in the global VCM in 2022.⁶ The other key standards that contribute the greatest volumes of credits to the VCM are Gold Standard, with 20.1% of issuances, the Climate Action Reserve, with 8.3% of issuances and the America Carbon Registry with 3.1% of issuances.⁷

5. Trading in the VCM is dominated by over-the-counter transactions either facilitated by a service provider (i.e., broker or traders) or as direct business sales. In recent years, new exchange-based trading platforms like the Climate Impact Exchange launched in Singapore in February 2022⁸ are being developed for the VCM and are aimed at improving market and price transparency.

C. Key Trends in Voluntary Carbon Markets

6. The VCM market witnessed steep growth during 2018–2021 at a compounded annual growth rate of 88.58%, with the value of carbon credit transactions achieving close to \$2 billion by the end of 2021 (*Figure 1*). This was because of significant increase in the volume of transactions from 98.4 million tCO₂e in 2018 to 493 million tCO₂e in 2021⁹ and a subsequent upward trend in carbon prices for various types of projects. The key driver for this market trend was the increased demand for carbon credits by large corporates that have voluntarily decided to offset their emissions and achieve net zero or carbon neutrality targets. This resulted in more carbon credits being retired year-over-year with an average growth rate of more than 45% between 2019 to 2021. However, the VCM witnessed a slower rate of growth in 2022 as compared to 2021, with a decrease in carbon credit issuances by 18% and retirements by 9% during 2021–2022 (*Figure 2*). The economic slowdown, change in international and national climate policies, concerns regarding integrity of carbon credits, and poor transparency in the market reduced demand for carbon credits globally in 2022. During 2007–2023, a cumulative total of 1.6 billion tCO₂e were issued and cumulative total of 853 million tCO₂e were retired in the global VCM (footnote 6).

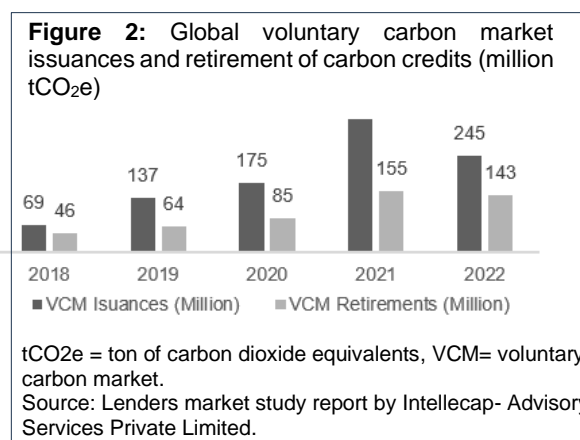
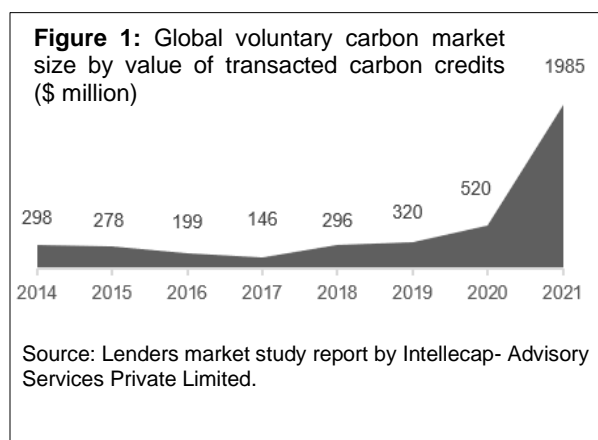
⁶ Climate Focus. [Voluntary Carbon Market Dashboard](#) (accessed 31 July 2023).

⁷ Climate Focus. [Chapter 7: What is the Role of Carbon Standards in The Voluntary Carbon Market?](#) (accessed 31 July 2023).

⁸ Climate Impact. [About](#).

⁹ Forest Trends' Ecosystem Marketplace. 2022. [The Art of Integrity Ecosystem Marketplace's State of the Voluntary Carbon Markets 2022 Q3 - Ecosystem Marketplace](#). Washington, DC.

7. India has the highest share of carbon offset generating projects globally followed by the United States of America and the People's Republic of China. Trends in India are aligned with the global VCM trends with an increase in carbon credits issued from 11 million tCO₂e in 2018 to 68 million tCO₂e in 2021, and a decline in 2022 with total issuances of 42 million tCO₂e and total retirements of 37 million tCO₂e.¹⁰ There is a strong demand signal from Indian corporates setting voluntary emission reduction targets and committing to net zero goals through various public declarations. One hundred and thirty Indian corporates that have committed to Science Based Target Initiatives,¹¹ of which 51 have also pledged net zero targets.¹² The key industries driving domestic demand are iron and steel, chemicals, textiles, cement, power, transportation, construction, software services, fast-moving consumer goods, financial services, and automobiles.¹³



8. Renewable energy and energy efficiency contributed more than 45% share of carbon offsets issued cumulatively during 2016–2019 (footnote 10). In the recent years, there has been a growing trend by corporates to purchase carbon credits from projects of nature-based solutions in agriculture, forestry and land use, community or household devices and waste disposal as these areas include sustainable development benefits (such as biodiversity conservation, community economic development, improved health, livelihood generation, and gender equality, among others). Buyers increasingly prefer carbon credits that offer sustainable development benefits. As a result, projects with these benefits tend to fetch a higher price in the market. Carbon prices are highest across agriculture, forestry, and land-use (afforestation-related projects); household devices; and waste disposal. For instance, in 2021 projects pertaining to nature-based solutions in agriculture yielded average prices of \$8.8/tCO₂e, forestry and land use yielded average prices of \$5.8/tCO₂e, and household devices yielded average prices of \$5.4/tCO₂e. These were higher than the average price of \$2.3/tCO₂e for renewable energy projects in the global VCM.¹⁴ Household devices which includes improved cookstove (ICS) projects, are one of the areas with an increase in issuances to around 26 million tCO₂e in 2022 from 14 million tCO₂e in 2021, despite the slower growth in the VCM globally. Moreover, this area witnessed an increase of more than 30% in retirement of credits between 2021 and 2022.¹⁵ This showcases a rising

¹⁰ Intellecap Advisory Services Private Limited. 2023. *Voluntary Carbon Market Ecosystem: Trends, Risks and Policy*. New Delhi.

¹¹ The Science Based Targets initiative (SBTi) defines and promotes best practices in emissions reductions and net-zero targets in line with climate science.

¹² Science Based Targets. [Companies Taking Action](#).

¹³ Intellecap Advisory Services Private Limited. 2023. *Voluntary Carbon Market Ecosystem: Trends, Risks and Policy*. New Delhi.

¹⁴ Ecosystem marketplace database (accessed April 2023).

¹⁵ World Bank. 2023. [Publication: State and Trends of Carbon Pricing 2023](#). Washington, DC.

interest by buyers to purchase credits from projects with sustainable development benefits including cook-stove projects. In 2023, carbon credits generated from household devices (including ICSs) have been trading in the price range of \$7–\$9/tCO_{2e} on voluntary market spot exchanges (such as Xpansiv and AirCarbon Exchange).

D. Sector Challenges, Evolving Policies, and Role of the Private Sector

9. **Challenges in the cookstove industry.** While efforts in India to design and implement ICSs programs date back to the 1930s, very low demand discouraged large rollouts, with past ICS programs by government plagued by problems of faulty installation, poor performance, non-durability, lack of repair services, and cultural resistance to change to traditional forms of cooking practices from end users.¹⁶ End users cite that some ICSs are designed in a way which makes cooking preparation more difficult (for example having to reduce the size of wood) with different end meal (taste) outcomes (footnote 16). Cook-stove improvements have been seen as additions to rather than replacements of existing traditional stoves, a situation often called “stove stacking”, which can make measurement of actual positive health and climate impacts difficult. The up-front cost of ICSs is also cited as a barrier, given that the average rural household income is estimated at the equivalent of \$136.00¹⁷ annually versus an ICS market price of \$35.40. There are several standards, each with their own methodology. While effort is made by the standards to update the methodologies from time to time, it becomes challenging for participants to compare the quality of carbon credits.

10. Recent negative press and public information on the stringency of methodologies for baseline estimation, scope of additionality and permanence of a few types of projects, and “greenwashing” by corporates through offsetting have raised concerns about the quality of carbon credits in the VCM. Verra (which is the registry for VCS) has also been the subject of negative press coverage in January 2023 in relation to the methodologies for calculating carbon issuances, particularly those related to projects that claim avoidance of deforestation and agricultural projects. The methodologies of these projects have come under scrutiny with respect to overstating the threats leading to overestimation of carbon credits. There has been no specific adverse media on issuances from non-forestry projects, including cookstove projects. To address concerns on methodologies employed, Verra has updated its certification methodology for the concerned sector. The updated rules are currently being reviewed by an external auditor and targeted for final approval towards the end 2023.

11. Community-based projects have a very high implementation risk. Issuances of carbon credits is a function of usage of the product which requires the developers to ensure that the product is well accepted by the community and is maintained regularly. Project developers, especially in the area of household devices, are small players and often lack financial capacity to generate a pipeline of high-volume projects. Since the VCM is developing, and relies on voluntary corporate commitments, there is uncertainty on the prices and revenue visibility. As a result, this area lacks access to private finance. Having a clear link between compliance markets and the VCM will help reduce this risk.

12. **Policy initiatives in India.** The carbon market policy landscape is at an evolving stage in India and is being led by the Ministry of Environment, Forest and Climate Change. The voluntary carbon mechanism is being developed which would allow non-obligated entities to register their

¹⁶ University of Iowa College of Liberal Arts and Sciences. 2016. [Why Have Improved Cook-stove Initiatives in India Failed?](#) Iowa City.

¹⁷ Centre for Policy Research. 2021. [Agricultural Households and Farming Income: An Initial Analysis of Variations in Income from Farming and Other Sources Among Agricultural Households in India](#). New Delhi.

projects for emission reduction or removal and issuance of carbon credit certificates across specific sectors identified by the nodal agency. The compliance mechanism will set greenhouse gas emission intensity reduction targets across sectors for obligated entities. The Energy Conservation (Amendment) Bill, 2022 has been passed by the Parliament to establish a carbon market in India. The bill has provisions to initiate carbon trading, deploy renewable energy sources, and authorize the use of renewable energy sources to achieve the goals agreed upon in the Paris Agreement. A national designated authority is being established to develop processes and frameworks under Article 6 of the Paris Agreement for international carbon trading in India. The strengthening of these national legislations on emission reduction could generate demand for offsetting carbon credits in the domestic market, improve the supply of carbon credits in specific sectors, and establish a framework for supplying mitigation outcomes to the international market. The Government of India is also committed to reducing the emissions intensity of its gross domestic product by 45% by 2030¹⁸ and has allocated \$4.26 billion for priority capital investment towards energy transition, net zero objectives and energy security,¹⁹ which will further boost growth in this area.

13. **Role of the private sector.** The financial gap between the cost of improved cooking options or any high-impact community-based commodity and the willingness or ability of households to pay provides an opportunity to use carbon finance mobilized from international carbon markets to bridge that gap while contributing to climate benefits.²⁰ However, projects must first be financed, implemented, and operated, often for a year or more before the results can be verified and carbon credits issued. Finding solutions to overcome this timing mismatch, where such projects need funding up-front to finance capital and operating expenses to be implemented are essential. To meet the expected increased demand for this offtake of carbon credits, there will be the need for additional financial tools to provide up-front financing to support the origination and operation of projects globally, and particularly in emerging markets and developing countries.

14. The private sector, led by multilateral institutions and development finance institutions, has a very critical role to play in the development of community-based projects related to the VCM. There has been limited participation from impact funds (as equity investors to project developers), micro-finance institutions (which finance the cost of the commodity purchase upfront), and off-take contractors (which provide some advance funding to projects but not all the required financing). The Asian Development Bank through its carbon funds—the Asia Pacific Carbon Fund, the Future Carbon Fund,²¹ and the Japan Fund for the Joint Crediting Mechanism²²—has provided carbon finance support by signing the offtake agreements for procuring carbon credits generated from more than 100 projects across 13 developing member countries²³ since 2009. ADB's financing to the Greenway Carbon Credits Gender Finance Project will help bridge part of the private sector financing gap to the sector. The transaction structure design, including drawdown conditions and monitoring parameters, can be used by future private financiers in structuring similar transactions.

¹⁸ Government of India, Ministry of Environment, Forest and Climate Change. 2022. [India Stands Committed to Reduce Emissions Intensity of its GDP by 45 Percent by 2030, from 2005 Level](#). New Delhi.

¹⁹ Government of India, Ministry of Finance. 2023. [National Green Hydrogen Mission to Facilitate the Transition Towards a Low Carbon Economy; India Sets a Target of Annual Production of 5 Mmt By 2030](#). New Delhi.

²⁰ O. Freeman and H. Zerriffi. 2015. [Energy for Sustainable Sustainable Development: Complexities and Challenges in the Emerging Cookstove Carbon Market in India](#). Amsterdam: Elsevier. pp. 33–43.

²¹ ADB. 2017. [Future Carbon Fund Delivering Co-Benefits for Sustainable Development](#). Manila.

²² ADB. [Japan Fund for the Joint Crediting Mechanism](#).

²³ Bangladesh, Bhutan, Cambodia, Fiji, Georgia, India, Maldives, Nepal, the People's Republic of China, the Philippines, Sri Lanka, and Thailand, and Uzbekistan.