

O MERCADO VOLUNTÁRIO DE CARBONO NO BRASIL: DESAFIOS, PERSPECTIVAS DE CONSUMO E CONTRIBUIÇÕES DO MARKETING PARA SUA CONSOLIDAÇÃO

1 INTRODUCTION

Climate change, driven by the accelerated increase in greenhouse gas (GHG) emissions, has generated severe environmental and social impacts worldwide, including heatwaves, floods, and the spread of infectious diseases (Ripple et al., 2024; Orazalin, Ntim, & Malagila, 2023). International agreements, such as the Kyoto Protocol and Paris Agreement, created frameworks for global emissions reduction and international cooperation (Broekhoff & Spalding-Fecher, 2021; Blum, 2020).

Within this context, carbon markets have emerged as mechanisms to price emissions and reward activities that reduce or sequester them (Takeuchi, 2012; Yuxian & Wang, 2023). These systems operate in two forms: the regulated market, in which governments impose caps and enable trading of allowances, and the voluntary carbon market (VCM), where companies and individuals offset their emissions beyond compliance obligations. The voluntary segment has expanded significantly, supporting projects in forest conservation, renewable energy, and other initiatives that generate certified credits (Lee, Kim & Kim, 2018; Carballo-Penela et al., 2018).

Despite this expansion, the VCM continues to face persistent challenges related to credibility, transparency, and governance. Concerns about additionality, monitoring, and verification mechanisms raise doubts about the real impact of offsets (Molthan-Hill et al., 2020; Kreibich & Hermwille, 2020). Experiences from different regions demonstrate that consolidation depends not only on institutional robustness but also on building consumer trust and demonstrating tangible benefits (Lang, Blum, & Leipold, 2020; Zhou, Gu, & Deng, 2022).

Brazil occupies a strategic position in this scenario. The country is one of the world's largest potential suppliers of carbon credits due to its vast natural resources and recent regulatory advances, including the creation of the Brazilian Emissions Trading System (SBCE) under Law 15.042 in December 2024 (Presidency of the Republic of Brazil, 2024). Projections suggest that Brazil could meet up to 22% of global demand for carbon credits (ICC Brasil & WayCarbon, 2021). Yet, despite this potential, the national VCM continues to face obstacles, particularly regarding consumer trust, limited awareness, and weak integration between voluntary and regulated initiatives (Valiergue & Ehrenstein, 2021; Adu, Flynn & Grey, 2022).

However, while the financial and governance dimensions of carbon markets are well-documented, the consumer and marketing perspectives remain underexplored, particularly in emerging economies such as Brazil. This article advances that agenda by foregrounding consumer trust, value perception, and market communication in the VCM.

The objectives are: (i) to contextualise the global and national development of voluntary carbon markets with emphasis on consumer-facing dynamics and marketing practices, (ii) to discuss the main barriers and drivers for consumer engagement, focusing on issues of trust, communication, and perceived value, and (iii) to propose a research agenda that advances academic debate and offers practical strategies for organisations to strengthen marketing approaches and foster consumer participation in the voluntary carbon market.

2 RETIONALE AND DISCUSSION

2.1 Voluntary Carbon Market

Over the past two decades, the voluntary carbon market (VCM) has evolved through innovation and standard-setting, enabling companies and individuals to offset emissions beyond regulatory obligations (Spilker & Nugent, 2022). Programs such as the Gold Standard (est. 2003) and the Verified Carbon Standard (Verra, est. 2007) emerged to ensure quality and credibility, providing methodologies and registries that certify and track credits (Gold Standard, n.d.; Thiel, n.d.).

The Paris Agreement (2015) further increased the relevance of voluntary markets by establishing frameworks for international cooperation under Article 6, reinforcing debates on transparency and double counting (UNFCCC, 2015). Since then, the VCM has gained traction as a complementary instrument to national climate commitments. Prior to COP26, more than 1,500 companies pledged to offset or reduce over 3.5 gigatons of annual emissions, signalling the scale of private sector reliance on offsets (Mountford et al., 2021; Streck, 2021).

Recent market reports show, however, that volatility persists. Transaction volumes declined by over 50% between 2022 and 2023, while average prices stabilised around USD 6-7 per ton, with buyers showing a stronger preference for higher-quality credits with co-benefits such as biodiversity protection and community development (Ecosystem Marketplace, 2023; 2025).

For marketers, these global developments highlight a dual challenge: communicating credibility while simplifying complex mechanisms for consumers. The ability to translate technical integrity into clear and trustworthy signals will be central for expanding participation and legitimising the VCM.

2.1.1 Voluntary Carbon Market in Brazil

The voluntary carbon market (VCM) in Brazil shows both opportunities and challenges. The country has approximately 159 active projects, mostly certified under international standards, including the Verified Carbon Standard (VCS), the Gold Standard (GS), and the American Carbon Registry (ACR). These projects are concentrated in forestry and land use, reflecting the strategic role of the Amazon, while agriculture and livestock remain underrepresented despite their high mitigation potential (Vargas et al., 2021; Verra, 2021; GS, 2021; ACR, 2021; Assad et al., 2021; 2022).

Regulation has advanced with the creation of the Brazilian Emissions Trading System (SBCE) and the approval of Law 15.042 in 2024, which established a cap-and-trade model. Though primarily aimed at compliance, these initiatives are expected to strengthen the VCM by improving MRV practices, enhancing transparency, and aligning Brazil with international standards (Planalto, 2024; ICAP, 2024). Still, the absence of fully integrated guidelines creates uncertainty and limits broader participation.

Parallel to regulation, private platforms such as Sustainable Carbon and Carbonext have facilitated access to credits by offering emission calculators and online purchasing (Sustainable Carbon, 2021; Carbonext, 2021). However, their reach among Brazilian consumers remains limited. Studies show that, despite increasing environmental concern, adoption is hindered by knowledge gaps, mistrust in the effectiveness of credits, and perceptions of low individual impact (Vargas et al., 2022; GlobeScan, 2022; One Planet Network, 2023).

In summary, Brazil combines strong natural potential and evolving regulation with persistent barriers to consumer engagement. These consumer-facing dynamics, trust, accessibility, and communication, are particularly relevant for understanding how Brazil can convert potential supply into meaningful demand.

2.2 Marketing and Consumer Perspective on the Voluntary Carbon Market

From a marketing standpoint, international and Brazilian evidence on consumer engagement with the voluntary carbon market (VCM) converges on three themes: trust and transparency, consumer behaviour, and market devices that shape credibility and choice. Research highlights that perceived additionality, robust monitoring and verification (MRV), and risks of double counting are central to credibility (Kreibich & Hermwille, 2020; Lang, Blum & Leipold, 2020). In marketing terms, standards and registries such as Verra, Gold Standard, and ACR function as quality signals, reinforced by demand for higher-integrity credits with co-benefits like biodiversity and community development (Ecosystem Marketplace, 2023; 2024).

Behavioural studies show that environmental knowledge and perceptions of effectiveness increase willingness to pay, while complexity and high price salience reduce adoption (Kim et al., 2022; Lee, Kim & Kim, 2018). In Brazil, surveys reveal rising environmental concern, particularly among Gen Z and Millennials, but also a persistent intention-behaviour gap linked to limited knowledge, mistrust, and perceptions of low individual impact (Vargas et al., 2022; GlobeScan, 2022; One Planet Network, 2023). These results highlight segmentation opportunities and the importance of framing messages that clarify impact and counter scepticism.

Beyond attitudes, institutional arrangements, and market devices, labels, accounting rules, and certification formats play a crucial role in shaping what constitutes a “credible” offset. Certification and transparent reporting also act as social proof, reinforcing legitimacy and enabling companies to integrate VCM participation into CSR and brand positioning (Valiergue & Ehrenstein, 2021; Birchall, Murphy & Milne, 2015; Carballo-Penela et al., 2018).

Taken together, the evidence shows that effective marketing for the VCM requires credibility cues, simplified purchase journeys, and targeted communication strategies for receptive segments, particularly younger generations. However, persistent barriers, including mistrust, knowledge gaps, and price sensitivity, remain, underscoring the need for further empirical research, especially in Brazil.

2.3 Challenges and Directions

Despite its potential, the voluntary carbon market (VCM) in Brazil faces challenges that affect both institutional consolidation and consumer engagement. Integrity and quality remain central: although MRV and additionality are technical aspects, consumers read them as signals of brand credibility. When trust is lacking, credit risk is being dismissed as greenwashing (Kreibich & Hermwille, 2020; Lang, Blum & Leipold, 2020).

A second difficulty lies in the fragmentation of standards and registries. The coexistence of multiple systems, such as Verra, the Gold Standard, and the American Carbon Registry, creates uncertainty for investors and confusion for consumers, who struggle to identify which certificates are trustworthy. From a marketing standpoint, this multiplicity dilutes the power of simple and recognisable quality signals, limiting their ability to facilitate decision-making (Verra, 2021; GS, 2021; ACR, 2021; ICAP, 2024).

The limited scale and diversity of projects further narrow the VCM narrative. Although Brazil has more than one hundred active initiatives, most are concentrated in forestry and land use, while sectors such as agriculture and livestock remain underrepresented (Vargas et al., 2022; Souza et al., 2012). This imbalance reduces the sector’s mitigation potential and restricts the stories marketers can tell about the breadth of societal benefits. Without greater diversification, consumers may view offsetting as a niche activity rather than as a systemic contribution to climate solutions.

Expanding the consumer base represents both the most significant challenge and the most incredible opportunity. Surveys indicate that Brazilians are increasingly concerned about environmental issues, but this concern rarely translates into concrete purchasing behaviour

(Vargas et al., 2022; GlobeScan, 2022; One Planet Network, 2023). Barriers such as lack of knowledge, mistrust in credit effectiveness, and perceptions of limited individual impact persist. Overcoming them requires more than information campaigns: it demands marketing strategies that combine education with aspirational branding, positioning that offsets not merely as technical tools but as part of a desirable lifestyle. Digital platforms and fintech solutions can simplify the purchase journey, reducing friction and mirroring familiar e-commerce experiences. Generational segmentation is also crucial. Younger cohorts, particularly Gen Z and Millennials, show stronger sustainability concerns yet are also more sceptical of offsetting claims, underscoring the need for transparent and authentic communication tailored to their expectations (GlobeScan, 2022; One Planet Network, 2023).

In short, the consolidation of the Brazilian VCM will depend not only on regulatory alignment and institutional robustness but also on its ability to address these marketing and consumer-facing challenges. Strengthening credibility, simplifying standards, diversifying project portfolios, and creating authentic connections with emerging consumer segments are essential steps for transforming Brazil's potential into a dynamic and legitimate market.

3 CONCLUSIONS AND RESEARCH AGENDA

The analysis shows that the consolidation of Brazil's voluntary carbon market (VCM) depends as much on consumer engagement and marketing effectiveness as on institutional and regulatory progress. Integrity and transparency remain indispensable for credibility; the fragmentation of standards complicates communication; the concentration of projects narrows the narrative; and low awareness, mistrust, and perceptions of limited individual impact constrain consumer participation. These dynamics underline the need to understand not only the supply side of the market but also how consumers interpret, value, and act upon carbon credits.

In the short term, advancing empirical studies on Brazilian consumer willingness to pay and trust is essential. Priority questions include how credibility signals, such as certification logos, MRV statements, and third-party endorsements, shape perceptions; how price framing influences adoption when presented per tonne, as add-ons, or in bundled offers; and how co-benefits, such as biodiversity or community development, affect willingness to pay. Understanding friction-reduction strategies in the purchase journey, such as one-click options or default mechanisms, is equally important, particularly when comparing novice and informed consumers, as well as generational differences between Gen Z, Millennials, and older cohorts. These questions form the empirical basis for the next stage of this research.

In the medium term, comparative studies across countries can shed light on how cultural and institutional contexts influence the adoption of new practices. Brazil, with its vast natural potential and emerging regulatory frameworks, provides a unique test case for comparison with more mature markets. Analysing how consumers engage with different purchasing channels from specialised platforms to airline checkouts and retail loyalty programs can reveal the most effective pathways for transforming environmental concern into action.

In the long term, research should explore synergies between the SBCE and the voluntary market, focusing on mechanisms that integrate regulatory credibility with consumer-facing communication. Harmonised seals, interoperable registries, and impact dashboards can serve as both marketing devices and policy tools, bridging the gap between institutional robustness and consumer recognition. Public-private campaigns that communicate these synergies in clear, accessible language may prove decisive for scaling the market and embedding offsets into broader sustainability strategies.

By advancing consumer-focused research, Brazil can consolidate its position not only as a major supplier of credits but also as a global reference in marketing sustainable solutions

that resonate with both domestic and international audiences. Real progress will depend on the convergence of academic evidence, business practice, and public policy to transform pro-sustainability attitudes into widespread and credible participation in the voluntary carbon market.

REFERENCES

- ACR – AMERICAN CARBON REGISTRY. Methodologies and standards for voluntary carbon credits. 2021. Disponível em: <https://americancarbonregistry.org/>. Acesso em: 20 set. 2025.
- ANUKWONKE, C.; ABAZU, I. Climate change and the Kyoto Protocol: mechanisms for reducing global greenhouse gases. *Journal of Environmental Management*, v. 12, n. 4, p. 55–67, 2020.
- ASSAD, E. D.; PINTO, H. S.; ZULLO, J. et al. Agricultura e mudanças climáticas no Brasil. Brasília: Embrapa, 2021.
- ASSAD, E. D.; PINTO, H. S.; ZULLO, J. et al. Low-carbon agriculture in Brazil: opportunities and challenges. *Sustainability*, v. 14, p. 1–19, 2022.
- BENJAAFAR, S.; LI, Y.; DASKIN, M. Carbon footprint and the management of supply chains: insights from simple models. *IEEE Transactions on Automation Science and Engineering*, v. 10, n. 1, p. 99–116, 2013.
- BLUM, H. The Paris Agreement and carbon market development. *Climate Policy*, v. 20, n. 3, p. 277–290, 2020.
- BROEKHOFF, D.; SPALDING-FECHER, R. What makes a high-quality carbon credit? *World Resources Institute Report*, Washington, DC, 2021.
- CARBALLO-PENELA, A.; CASTRO, R.; LEON, E.; VILLOTA, J. The role of voluntary carbon markets in corporate social responsibility: evidence from Spain. *Journal of Cleaner Production*, v. 172, p. 329–340, 2018.
- CARBONCREDITS.COM. *Carbon credits in 2024: What to expect in 2025 and beyond*. 2024.
- CARBONEXT. Calculadora de emissões e compra de créditos de carbono. 2021. Disponível em: <https://www.carbonext.com/>. Acesso em: 10 set. 2025.
- ECOSYSTEM MARKETPLACE. State of the voluntary carbon markets 2023. Washington, DC: Forest Trends, 2023.
- ECOSYSTEM MARKETPLACE. State of the voluntary carbon markets 2025: demand holding steady as turnover stabilises. Washington, DC: Forest Trends, 2025. Disponível em: <https://www.ecosystemmarketplace.com/articles/sovcm-2025-finds-the-voluntary-carbon-market-in-transition-demand-holding-steady-as-turnover-stabilizes/>. Acesso em: 20 set. 2025.
- ECOSYSTEM MARKETPLACE. *State of the voluntary carbon markets 2025: Demand holding steady as turnover stabilizes*. Washington, DC: Forest Trends, 2025.
- ECOSYSTEM MARKETPLACE. Voluntary carbon market insights 2024. Washington, DC: Forest Trends, 2024.
- EUROPEAN COMMISSION. *EU Emissions Trading System: 2023 annual report*. Brussels, 2024.
- EUROPEAN COMMISSION. *The year ahead in the EU ETS: Maritime transport and beyond*. Brussels, 2023.
- GLOBESCAN. Healthy & sustainable living report: Brazil country highlights. 2022.
- GOLD STANDARD. *Gold Standard for the Global Goals*. 2021.
- GS – GOLD STANDARD. Certified projects and methodologies. 2021. Disponível em: <https://www.goldstandard.org/>. Acesso em: 20 set. 2025.
- ICAP – INTERNATIONAL CARBON ACTION PARTNERSHIP. Emissions trading worldwide: status report 2024. Berlin: ICAP, 2024.

ICC BRASIL; WAYCARBON. O mercado de carbono no Brasil: oportunidades e desafios. São Paulo: ICC Brasil, 2021.

INTERNATIONAL CHAMBER OF COMMERCE (ICC). *The role of the carbon market in achieving global climate goals*. Paris, 2021.

KIM, Y.; HWANG, J.; YOON, S. Consumer environmental knowledge and willingness to pay for carbon offsets. *Journal of Business Research*, v. 139, p. 123–134, 2022.

KREIBICH, N.; HERMWILLE, L. Caught in between: credibility and expectations of voluntary carbon markets. *Climate Policy*, v. 20, n. 4, p. 422–438, 2020.

LANG, S.; BLUM, H.; LEIPOLD, S. Voluntary carbon markets and the Paris Agreement: towards a new era. *Climate Policy*, v. 20, n. 3, p. 276–289, 2020.

LEE, J.; KIM, Y.; KIM, M. Voluntary carbon offsets and consumer behaviour: evidence from South Korea. *Sustainability*, v. 10, p. 1–14, 2018.

LEE, S.; CHOI, J. Greenhouse gases, climate change, and corporate strategies. *Journal of Business Ethics*, v. 159, n. 1, p. 11–25, 2019.

MICHAELOWA, A.; et al. *Voluntary carbon markets: Global volume and issuance* (short brief). 2019.

MOLTHAN-HILL, P.; WADDELL, C.; LONGHURST, J. et al. Can voluntary carbon offsets deliver integrity? *Sustainability*, v. 12, n. 6, p. 1–15, 2020.

ONE PLANET NETWORK. Healthy and sustainable living initiative: consumer information for sustainable consumption. Paris: UN Environment, 2023. Disponível em: <https://www.oneplanetnetwork.org/>. Acesso em: 20 set. 2025.

ORAZALIN, N.; NTIM, C.; MALAGILA, J. Climate risk disclosure and corporate behaviour. *Business Strategy and the Environment*, v. 32, p. 1–15, 2023.

PLANALTO. Lei nº 15.042, de 19 de dezembro de 2024. Institui o Sistema Brasileiro de Comércio de Emissões – SBCE. Brasília: Presidência da República, 2024.

RIPPLE, W. J.; WOLF, C.; NEWSOME, T. M. et al. World scientists’ warning of a climate emergency 2024. *BioScience*, v. 74, n. 1, p. 8–12, 2024.

SOUZA, G. M.; PEREIRA, P.; COSTA, A. Agricultura e mitigação de emissões no Brasil: lacunas e oportunidades. *Revista de Economia e Sociologia Rural*, v. 50, n. 2, p. 203–222, 2012.

SPASH, C. L. The brave new world of carbon trading. *New Political Economy*, v. 15, n. 2, p. 169–195, 2010.

SUSTAINABLE CARBON. Calculadora de carbono e projetos certificados no Brasil. 2021. Disponível em: <https://www.sustainablecarbon.com/>. Acesso em: 10 set. 2025.

TAKEUCHI, W. Carbon markets and voluntary offsets: comparative perspectives. *Energy Policy*, v. 50, p. 691–698, 2012.

THIEL, A. *Verified Carbon Standard (VCS) statistics*. n.d.

UN ENVIRONMENT. Clean Development Mechanism: overview and impacts. Nairobi: UNEP, 2019.

UNFCCC. COP 29 outcomes: global stocktake and carbon market mechanisms. Bonn: UNFCCC, 2024.

UNFCCC. *Paris Agreement (COP21)*. Bonn, 2015.

UNFCCC. United Nations Framework Convention on Climate Change. New York: UN, 1998.

VALIERGUE, B.; EHRENSTEIN, V. Market devices and the shaping of voluntary carbon markets. *Economy and Society*, v. 50, n. 1, p. 45–69, 2021.

VARGAS, C.; SOBRINHO, J.; MORGADO, R. O mercado voluntário de carbono no Brasil: estado da arte e perspectivas. *Revista de Administração da FGV*, v. 57, n. 3, p. 221–240, 2022.

VERRA. Verified Carbon Standard: project database. Washington, DC: Verra, 2021.

WORLD BANK. *State and trends of carbon pricing 2024*. Washington, DC: World Bank, 2024.