

# THE WHITE BOOK FOR DEVELOPING VOLUNTARY CARBON MARKETS IN MOROCCO

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SUSTAINABLE  
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# **The White Book for Developing Voluntary Carbon Markets in Morocco**

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**Mohamed Wail Aminou**

## Foreword by Mr. Said Ibrahimi, CEO of Casablanca Finance City Authority

It is with great pleasure that we introduce this White Book on the development of voluntary carbon markets in Morocco. This publication comes at a pivotal moment, as the Kingdom, and the African continent, seek innovative pathways to accelerate climate action while unlocking new drivers of sustainable economic growth.

Voluntary carbon markets are emerging globally as promising instruments for channeling finance into high-impact climate initiatives. Yet their full potential can only be realized when stakeholders share a common understanding of how these markets function and how they can support national and regional ambitions. In this regard, this White Book provides timely clarity. It offers a structured and accessible overview of the opportunities and challenges at stake, equipping policymakers, businesses, investors, and project developers with the insight needed to engage confidently in this evolving landscape.

Morocco is uniquely positioned to play a leading role in this transformation. The country has long demonstrated its climate leadership through ambitious national targets, pioneering renewable energy investments, and a strong commitment to sustainability. Through its Ministry of Energy Transition and Sustainable Development, Morocco also aspires to act as a catalyst for climate cooperation across the continent, notably via initiatives such as the African Task Force on Green and Sustainable Finance. With its strategic location, robust financial infrastructure, and growing expertise, Morocco has the opportunity to build a market that not only serves national objectives but also supports Africa's broader climate agenda.

As a leading financial hub on the continent, Casablanca Finance City (CFC) is committed to sustaining this momentum by providing the clarity, market infrastructure, and supportive ecosystem to channel capital toward impactful climate solutions. The establishment of the Green Assets Cluster marks an important step in shaping a collaborative ecosystem dedicated to advancing Morocco's carbon agenda. Together with our partner Caisse de Dépôt et de Gestion (CDG), CFC is actively exploring the foundations for a voluntary carbon market with an African reach: an ambition that reflects our shared vision of positioning Casablanca as a regional hub for climate finance.

Achieving this vision will require collaboration, integrity, and long-term commitment. The development of a credible and impactful carbon market depends on the engagement of all stakeholders: government institutions, private companies, financial actors, and project developers. This White Book helps build that common foundation by outlining a path forward rooted in transparency, quality, and shared responsibility.

We are confident that the insights and recommendations presented here will inspire action and foster a vibrant ecosystem for carbon finance in Morocco and beyond. We invite all stakeholders of the carbon ecosystem and beyond to engage with this work and join us in advancing Morocco's role as a leading force for climate finance in Africa.



## **Foreword by Mr. Mounssif Aderkaoui, Director of the Sustainable Business Economics Center, Africa Business School- UM6P**



The acceleration of climate change, combined with profound global economic transformations, is reshaping how countries design development pathways and how businesses create value. For Morocco, this dual challenge—high climate vulnerability alongside the imperative to sustain competitiveness and inclusive growth—calls for solutions that are not only environmentally sound, but also economically robust and strategically grounded. Voluntary carbon markets represent one such instrument, provided they are developed with integrity, aligned with national priorities, and informed by rigorous analysis.

It is in this spirit that the Sustainable Business Economics Center (SBEC), hosted at Africa Business School within Mohammed VI Polytechnic University (UM6P), has produced this White Book on Voluntary Carbon Markets in Morocco. SBEC was established to support public and private decision-makers through applied research and executive education that respond to the concrete economic challenges facing Morocco and Africa. Anchored in the realities of the region, and drawing on economic theory, advanced quantitative methods, and sustainability practice, SBEC aims to translate global transitions into actionable insights for policymakers, businesses, and investors.

Carbon markets should not be viewed as purely technical mechanisms for emissions accounting. They are economic instruments that influence investment decisions, sectoral transformation, and the allocation of capital across value chains and territories. As such, their design and governance raise critical questions that are central to SBEC's research agenda: how to ensure that carbon markets support economic diversification rather than reinforce low-value activities; how they can enhance resilience in key sectors such as energy, agriculture, and waste management; and how voluntary mechanisms can be coherently articulated with national climate strategies and Morocco's commitments under the Paris Agreement.

This White Book provides a structured and evidence-based response to these questions. It offers a clear explanation of the functioning of voluntary carbon markets, an empirical assessment of Morocco's current portfolio of projects, and a comparative perspective positioning Morocco within regional and global dynamics. Importantly, it goes beyond diagnosis by proposing concrete policy and institutional recommendations aimed at fostering a credible, transparent, and high-integrity carbon market ecosystem.

This publication aims to contribute to an informed national dialogue on carbon markets, with an emphasis on practical implementation, economic value creation, and long-term development considerations. The analysis presented reflects SBEC's broader mandate to support Morocco's sustainable economic growth through rigorous research, strategic foresight, and engagement with stakeholders across the public and private sectors.

I hope this White Book will serve as a reference for policymakers, project developers, businesses, academics, and development partners seeking to engage constructively with voluntary carbon markets. More broadly, I trust it will contribute to positioning Morocco as a credible and forward-looking actor in high-integrity carbon markets, at both the African and international levels.

# White book content

- Acknowledgement ..... 3**
- Foreword by Mr. Said Ibrahimi, CEO of Casablanca Finance City Authority ..... 4**
- Foreword by Mr. Mounssif Aderkaoui, Director of the Sustainable Business Economics Center, Africa Business School-UM6P ..... 5**
- 1. About the Morocco’s VCM white book ..... 11**
- 2. Introduction ..... 12**
  - 2.1 Background and Context..... 12**
  - 2.2 Role of Voluntary Carbon Markets in Climate Action ..... 14**
  - 2.3 Objectives and Scope of the White Book ..... 17**
- 3. Understanding Voluntary Carbon Markets ..... 20**
  - 3.1 What are carbon markets? ..... 20**
    - 3.1.1 Classifications of carbon markets ..... 20**
    - 3.1.2 Key stakeholders in carbon markets ..... 23**
  - 3.2 Additionality: a cornerstone of carbon credit integrity ..... 25**
    - 3.2.1 Institutional and regulatory additionality ..... 25**
    - 3.2.2 Financial additionality ..... 25**
    - 3.2.3 Technological additionality ..... 26**
  - 3.3 The mechanics of voluntary carbon markets ..... 26**
    - 3.3.1 Project Design ..... 26**
    - 3.3.2 Validation ..... 27**
    - 3.3.3 Project Implementation (Development) ..... 27**
    - 3.3.4 Verification..... 27**
    - 3.3.5 Credit Issuance ..... 28**
    - 3.3.6 Credit Transfer (Trading) ..... 28**
    - 3.3.7 Credit Retirement ..... 29**
    - 3.3.8 Standards and methodologies in VCMs..... 29**
    - 3.3.9 Offset claims and contribution claims in voluntary carbon markets ..... 31**
  - 3.4 The Global Dynamics Voluntary Carbon Market ..... 33**
    - 3.4.1 Scale and Distribution of Issuances and Retirements ..... 33**
    - 3.4.2 Market Imbalances and Supply-Demand Dynamics ..... 34**
    - 3.4.3 Carbon Credits Pricing ..... 35**
    - 3.4.4 Issuance Lags and Retirement Age ..... 36**
    - 3.4.5 Changing Buyer Profiles ..... 37**

3.4.6	Implications for Market Design .....	38
3.5	Linking voluntary carbon markets to Article 6 of the Paris Agreement .....	39
3.5.1	Overview of Article 6 .....	39
3.5.2	Relevance of Article 6 to VCMs.....	40
3.5.3	Convergence of Article 6.4 and the voluntary market .....	41
3.5.4	Role of governments and implications for Morocco .....	42
3.6	Benefits and challenges of VCMs .....	44
3.6.1	Benefits of voluntary carbon markets .....	44
3.6.2	Challenges .....	46
3.6.3	VCMs overcoming challenges .....	50
4.	The dynamic of Voluntary Carbon Markets in Morocco .....	53
4.1	Voluntary carbon credits issued in Morocco .....	53
4.1.1	Project Portfolio .....	53
4.1.2	Mitigation Potential .....	54
4.1.3	From Estimates to issuances: Explaining the Gap .....	55
4.1.4	Retirements and Remaining Credits .....	56
4.1.5	Summary.....	57
4.2	Morocco vs other North African Countries: Comparative Snapshot of VCM Activity 58	58
4.2.1	Number of Projects .....	58
4.2.2	Mitigation Potential (EAER).....	59
4.2.3	Credits Issued and Retired .....	59
4.2.4	Credits Remaining.....	60
4.2.5	Summary.....	60
4.3	Morocco vs leading Sub-Saharan African countries: Comparative Snapshot of VCM Activity .....	61
4.3.1	Overview .....	61
4.3.2	Number of Projects .....	61
4.3.3	Mitigation Potential (EAER).....	62
4.3.4	Credits Issued and Retired .....	63
4.3.5	Credits Remaining.....	64
4.3.6	Summary.....	64
4.4	Selection of Moroccan case studies .....	66
4.4.1	Case Study 1: Oualidia Wind Farm .....	66
4.4.2	Case Study 2: Ouarzazate IV Solar CSP Project .....	68
4.4.3	Case Study 3: Tourba Carbon farming .....	69

<b>5. VCM key opportunities and challenges for Morocco .....</b>	<b>72</b>
<b>5.1 Key Opportunities .....</b>	<b>72</b>
<b>5.1.1 Abundance of Renewable Energy Potential .....</b>	<b>72</b>
<b>5.1.2 Agriculture and Land-Based Carbon Sequestration .....</b>	<b>73</b>
<b>5.1.3 Integration with Global Markets .....</b>	<b>74</b>
<b>5.1.4 Other Emerging Opportunities .....</b>	<b>75</b>
<b>5.2 Key Challenges .....</b>	<b>77</b>
<b>5.2.1 Limited Awareness and Capacity .....</b>	<b>77</b>
<b>5.2.2 Lack of a national Verification Infrastructure .....</b>	<b>78</b>
<b>5.2.3 Policy and Regulatory Gaps.....</b>	<b>78</b>
<b>5.2.4 Other Challenges .....</b>	<b>78</b>
<b>6. Policy Recommendations to Unleash the Potential of VCMs in Morocco .....</b>	<b>80</b>
<b>6.1 Enhancing Regulatory Frameworks.....</b>	<b>81</b>
<b>6.2 Capacity Building.....</b>	<b>82</b>
<b>6.3 Facilitating Access to Finance .....</b>	<b>82</b>
<b>6.4 Integrating Carbon Markets with National Climate Goals .....</b>	<b>83</b>
<b>6.5 Other Recommendations.....</b>	<b>83</b>
<b>Conclusion and final thoughts .....</b>	<b>85</b>
<b>Appendix: Glossary of Terms .....</b>	<b>86</b>
<b>Appendix: List of carbon credits / Morocco .....</b>	<b>89</b>
<b>Appendix: List of references.....</b>	<b>90</b>

# List of figures

- Figure 1: Carbon Markets taxonomy ..... 20
- Figure 2: VCMs’ project cycle ..... 26
- Figure 3: Share of Issuances by Registry ..... 34
- Figure 4: Share of Retirements by Registry ..... 34
- Figure 5: Issuance Lag (years) by Registry / Sector ..... 37
- Figure 6: Retirement Age (years) by Sector ..... 37
- Figure 7: Changing Concentration of Buyers in VCM..... 38
- Figure 8: Benefits of voluntary carbon markets ..... 44
- Figure 9: Challenges of voluntary carbon markets..... 47
- Figure 10: carbon credit rating agency business model ..... 51
- Figure 11: Moroccan projects by registry ..... 54
- Figure 12: Moroccan carbon projects by Scope ..... 54
- Figure 13: EAER by Project Type – solar and agriculture dominate Morocco’s mitigation potential  
..... 55
- Figure 14: Credits Issued by Project Type..... 56
- Figure 15: Issued Credits: Retired vs Remaining – 32% retired, 68% available..... 57
- Figure 16: Distribution of VCM Projects Across North African Countries..... 58
- Figure 17: Estimated Annual Emission Reductions (EAER)..... 59
- Figure 18: Credits Issued and Retired by North African Countries ..... 59
- Figure 19: Credits Remaining by country ..... 60
- Figure 20: Number of VCMs projects Morocco vs SSA countries ..... 62
- Figure 21: Mitigation Potential (EAER) Morocco vs SSA countries ..... 62
- Figure 22: Credits Issued and Retired Morocco vs SSA countries ..... 63
- Figure 23: Credits Remaining by country ..... 64
- Figure 24: Key VCM opportunities for Morocco ..... 72
- Figure 25: Challenges of VCMs in Morocco..... 77

## List of Tables

- Table 1: Classification of Carbon Markets ..... 22
- Table 2: Summary of stakeholders in the VCM ecosystem ..... 24
- Table 3: Carbon Credit Validation vs Verification ..... 28
- Table 4: Comparison offset claim vs contribution claim ..... 32
- Table 5: Voluntary Carbon Market Credit Prices by Project Category, 2024 (USD/tCO<sub>2</sub>e) ..... 36
- Table 6: Summary of Morocco’s carbon credits portfolio ..... 53
- Table 7: Estimated Annual Emission Reductions for Moroccan carbon credits (VCMs)..... 55
- Table 8: Estimated carbon credits (VCMs) issued in Morocco ..... 56
- Table 9 : Statistics on Moroccan carbon credits retirements and remaining credits (VCMs)..... 56
- Table 10: Comparing Moroccan VCMs to other north African countries..... 58
- Table 11: VCMs per country comparison table (Morocco & SSA countries)..... 61
- Table 12: Key data Snapshot for carbon credits issuance by AERA Group ..... 66
- Table 13: Key Data Snapshot for carbon credits issuance by Numerco Limited..... 68
- Table 14: Key Data Snapshot for carbon credits issuance by Tourba..... 70
- Table 15: Summary of the proposed recommendations ..... 80
- Table 16: Description of the urgency of the recommendations ..... 81
- Table 17: Classification of recommendations related to enhancing regulatory frameworks..... 81
- Table 18: Classification of recommendations related to capacity building ..... 82
- Table 19: Classification of recommendations related to facilitating access to finance ..... 82
- Table 20: Classification of recommendations related to integrating carbon markets with national climate goals ..... 83
- Table 21: Classification of other recommendations ..... 83



**1. ABOUT THE MOROCCO'S  
VCM WHITE BOOK**

## 1. About the Morocco's VCM white book

Morocco is at an important stage in its efforts to address climate challenges. With its established renewable energy projects and stated commitment to sustainability, the country has the potential to utilize voluntary carbon markets as a tool to support its climate goals. This white book explores the opportunities these markets offer, focusing on their role in advancing environmental, economic, and social objectives.

This white book offers an in-depth examination of voluntary carbon markets with a specific focus on their relevance and application in Morocco. It explains the key mechanisms of these markets, their role in financing climate initiatives, and their potential for offsetting carbon emissions. By delving into the technical aspects of carbon credit generation and drawing insights from best practices, the white book aims to provide a clear and practical roadmap suited to Morocco's context.

At its core, this white book pursues three primary objectives:

- **Educating stakeholders:** This document aims to enhance understanding among Moroccan policymakers, businesses, and project developers. It offers a clear narrative on how these markets function, their benefits, and the challenges they pose, ensuring that stakeholders are well-equipped to navigate this emerging domain.
- **Showcasing success stories:** The white book highlights compelling Moroccan case studies that demonstrate the tangible benefits of voluntary carbon markets. These experiences serve as inspiration and practical guides, showing how innovative projects can create significant environmental and socio-economic impact and generate returns for project developers.
- **Proposing strategic recommendations:** Recognizing the barriers that currently hinder the growth of voluntary carbon markets in Morocco, this white book provides actionable policy recommendations. These strategies are designed to create an enabling environment for market development, facilitate access to finance, and promote robust regulatory frameworks.

Rather than serving solely as an informational resource, this white book seeks to engage stakeholders in a shared vision for Morocco. It emphasizes the need for collaboration among governments, private sector actors, and international organizations to develop scalable VCM solutions. It highlights how voluntary carbon markets can support innovation, enhance resilience, and promote a future that integrates environmental sustainability with economic development.



## 2.INTRODUCTION

## 2. Introduction

### 2.1 Background and Context

Effective climate action spans both mitigation and adaptation perspectives and increasingly emphasizes their synergy. Mitigation refers to efforts that reduce greenhouse gas (GHG) emissions or enhance carbon sinks, while adaptation involves adjusting natural or human systems to current or expected climate impacts to moderate harm or seize benefits<sup>1</sup>. Rather than viewing mitigation and adaptation in isolation, recent climate strategies stress a nexus approach—integrated measures that deliver both outcomes simultaneously. For instance, carbon projects that generate credits often embed strong co-benefits, providing a model of how mitigation and adaptation reinforce one another.

In Morocco, large-scale solar and wind energy projects not only displace fossil fuel emissions but also strengthen energy security and reduce exposure to volatile fuel imports—an adaptive advantage in times of global energy price shocks. Similarly, soil carbon projects such as Tourba’s regenerative agriculture initiatives combine mitigation, by sequestering carbon in soils, with adaptation benefits like enhanced water retention and improved drought resilience, directly supporting farmers facing increasing aridity.

Forestry and land-use projects also embody this dual impact. While Morocco does not have the vast tropical forests of Central Africa, initiatives in dryland afforestation and agroforestry can yield verified carbon credits while reducing soil erosion, restoring degraded land, and creating microclimates that protect crops and biodiversity. A parallel can be drawn to Kenyan and Ugandan cookstove projects, which issue credits by cutting emissions from biomass combustion while simultaneously reducing household air pollution, lowering health risks, and curbing deforestation pressures—illustrating the human development co-benefits that resonate in Morocco’s rural context.

Even waste management projects highlight this synergy: a landfill methane capture project not only generates emission reduction credits but also improves air quality, lowers fire risk, and creates jobs in recycling and waste sorting. Ultimately, these examples show how comprehensive climate responses harness synergies between mitigation and adaptation, reducing trade-offs and advancing sustainable development simultaneously. This holistic view of climate action is especially pertinent for Morocco, which must curb emissions growth even as it braces for climate shocks. By embedding

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<sup>1</sup> Intergovernmental Panel on Climate Change. (2018). Annex I: Glossary [Matthews, J. B. R. (Ed.)]. In V. Masson-Delmotte et al. (Eds.), *Global Warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels* (pp. 541–562). Cambridge University Press.

co-benefits in carbon projects, Morocco can use voluntary carbon markets not just as a source of finance, but as a lever for a resilient, inclusive low-carbon transition<sup>2</sup>.

Morocco's commitment to climate action is driven by both its vulnerability and its responsibility, even as the country's own emissions are relatively low. Morocco contributes only around 0.2% of global GHG emissions<sup>3</sup> – a minor share by international standards – yet it faces visible climate impacts such as shifting rainfall patterns, severe droughts, and increased heatwaves<sup>4</sup>. These climate stresses threaten Morocco's water security, agriculture, and infrastructure, underscoring that proactive adaptation is as critical as mitigation. In other words, although Morocco is a low emitter, it has a high stake in climate action to safeguard its development against climate risks. This imperative aligns with global calls for all nations to strengthen climate resilience while pursuing low-carbon growth<sup>5</sup>.

Morocco has accordingly set ambitious climate goals under the Paris Agreement framework. Morocco has significantly strengthened its climate ambition under the Paris Agreement through the submission of its Nationally Determined Contribution (NDC) 3.0, covering the period 2026–2035. While remaining a relatively low emitter globally, the Kingdom has committed to a 53% reduction in greenhouse gas emissions by 2035 compared to a business-as-usual scenario. This target is composed of an unconditional reduction of 21.6%, to be achieved through domestic resources and secured financing, and an additional conditional reduction of 31.4%, which is contingent upon the mobilization of international financial, technological, and capacity-building support.

The NDC 3.0 adopts an economy-wide approach, covering all major sectors—including energy, transport, industry, agriculture, forestry (AFOLU), and waste—and integrates both mitigation and adaptation priorities. In parallel, Morocco has identified a large portfolio of bankable mitigation and adaptation projects, reflecting a strategic effort to

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<sup>2</sup> Pörtner, H.-O., Roberts, D. C., Poloczanska, E. S., Mintenbeck, K., Tignor, M., Alegria, A., Craig, M., Langsdorf, S., Löschke, S., Möller, V., Okem, A., & Rama, B. (2022). Summary for Policymakers [H.-O. Pörtner, D. C. Roberts, and others (eds.)]. In *Climate Change 2022: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change* (pp. 3–33).

<sup>3</sup> Climate Change Tracker. (n.d.). Morocco: Progress and recent impact – Greenhouse gas emissions. Climate Change Tracker. Retrieved November 25, 2025, from <https://climatechangetracker.org/nations/greenhouse-gas-emissions/morocco/progress-and-recent-impact>

<sup>4</sup> Rim, B., Chami, A., Derj, A., Hammi, I., Morazzo, M., Naciri, Y., & Zarkik, A. (2021). Morocco's Decarbonization Pathway: Part II – Updated Decarbonization Scenarios (Policy Brief No. PB-21/19). Policy Center for the New South & Enel Green Power Morocco, with technical support from AFRY.

<sup>5</sup> World Bank & Bank Al-Maghrif (BAM). (2024). Double trouble? Assessing climate physical and transition risks for the Moroccan banking sector. World Bank Group. <https://documents1.worldbank.org/curated/en/099040924013528667/pdf/P175074139948c00a1ae591466b51bbb4d6.pdf>

align climate ambition with investment planning, public budgeting, and private-sector engagement. The NDC explicitly recognizes the potential role of carbon market mechanisms under Article 6 of the Paris Agreement, particularly as a tool to help mobilize international support for the conditional component of Morocco’s climate targets, while safeguarding environmental integrity and avoiding double counting<sup>6</sup>.

Looking further ahead, Morocco has articulated a vision for mid-century decarbonization. It launched a National Low Carbon Strategy 2050 aimed at achieving a net-zero carbon economy by 2050. This long-term strategy (submitted as its Long-Term Low Emissions Development Strategy) outlines pathways for deep emissions cuts across seven key sectors, from energy and transport to agriculture and waste<sup>7</sup>. This comprehensive strategy is not just about emissions. A 2024 SEI assessment estimates the LT-LEDS could reduce over 2.6 billion tons of CO<sub>2</sub> equivalent cumulatively by 2050, generate a 4–15% GDP gain, and create 100,000–350,000 new jobs across rural and urban sectors<sup>8</sup>.

In summary, even as an emerging country with modest emissions (~0.2 % of global emissions), Morocco views robust climate action – integrating mitigation, adaptation, and more broadly sustainable development – as vital. The stage is set for innovative tools like carbon markets to support these objectives.

## 2.2 Role of Voluntary Carbon Markets in Climate Action

Market-based mechanisms have long been recognized as a powerful tool in the climate action toolkit. Carbon markets, in general, enable the trading of emissions reductions (carbon credits) to direct resources toward the most cost-effective mitigation opportunities. The rationale behind such markets is to put a price on carbon, incentivize innovation, and channel finance into emissions-cutting projects worldwide. In practice, high-integrity carbon markets can be a game changer for climate action—providing not only cost efficiency but also much-needed funding and sustainable co-benefits. Notably, international carbon crediting mechanisms offer significant potential for host countries: they mobilize climate finance, create jobs and livelihoods, support ecosystem

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<sup>6</sup> Kingdom of Morocco. (2025, September 30). Morocco Nationally Determined Contribution (NDC 3.0). United Nations Framework Convention on Climate Change. [https://unfccc.int/sites/default/files/2025-10/MOROCCO%20NDC%203.0%20\\_30.9.25.pdf](https://unfccc.int/sites/default/files/2025-10/MOROCCO%20NDC%203.0%20_30.9.25.pdf)

<sup>7</sup> United Nations Environment Programme (UNEP). (2021, November 4). Morocco launches its national low-carbon strategy: 2050 roadmap to net zero. UNEP. <https://www.unep.org/ndc/news-and-stories/story/morocco-launches-its-national-low-carbon-strategy-2050-roadmap-net-zero>

<sup>8</sup> Stockholm Environment Institute. (2024, May 28). Roadmap for a low-carbon transformation in Morocco. SEI. <https://www.sei.org/features/roadmap-for-a-low-carbon-transformation-in-morocco/>

conservation, and improve local air quality, while revenues from credit sales can be reinvested in communities for sustainable development<sup>9</sup>.

At the same time, it is important to recognize that carbon markets are not a silver bullet. Their effectiveness depends on the integrity of credits, the robustness of monitoring systems, and the degree of alignment with national climate strategies. Poorly regulated markets can create risks of double counting, greenwashing, or inequitable benefit-sharing. They may also divert attention away from urgent domestic emission reductions if used as a substitute rather than a complement.

In short, carbon markets align economic incentives with climate goals, turning emissions reductions into tradable assets and thereby catalyzing climate-friendly investment at scale—but they must be designed and governed carefully to ensure that they enhance, rather than undermine, long-term decarbonization and adaptation pathways.

Within the landscape of carbon markets, voluntary carbon markets (VCMs) play a distinct and complementary role alongside compliance markets. Under the Paris Agreement's Article 6, countries will trade emissions reductions through internationally regulated mechanisms – for instance, governments exchanging carbon credits to help meet their NDC targets (Article 6.2) or generating credits via a UN-overseen program (Article 6.4). These Article 6 mechanisms facilitate government-to-government cooperation and are subject to formal accounting rules (e.g. corresponding adjustments to avoid double counting). By contrast, the voluntary carbon market operates outside of this compliance framework, enabling companies, organizations, and individuals to offset their emissions on a voluntary basis. Importantly, the voluntary market is not governed by UNFCCC rules, yet it is increasingly aligning with them on quality and transparency. Rather than replace or contradict Article 6, voluntary markets complement official mechanisms. They allow private actors to go beyond regulatory requirements in cutting or compensating emissions, thereby contributing additional climate action on top of national pledges. As one oversight body notes, independent voluntary market standards are designed to complement Article 6 and support companies and individuals to go further in their climate action<sup>10</sup>. In practical terms, a business in Morocco (or abroad) can purchase verified carbon credits from, say, a Moroccan renewable energy or reforestation project to neutralize its carbon footprint voluntarily. Such transactions channel extra finance into climate projects that might not attract funding through government channels alone. The voluntary market thus acts as a flexible, bottom-up avenue for climate ambition, running

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<sup>9</sup> World Bank. (2022). Navigating Decisions on Carbon Markets. World Bank Group. <https://documents1.worldbank.org/curated/en/099741211072431295/pdf/IDU190e6edbe1d5ea1413c195781f644b2a5ebca.pdf>

<sup>10</sup> Integrity Council for the Voluntary Carbon Market (IC-VCM). (2023). Article 6 of the Paris Agreement and the Integrity Council's work. IC-VCM. <https://icvcm.org/article-6-of-the-paris-agreement-and-the-integrity-councils-work/>

in parallel to the top-down Article 6 exchanges between nations. Ensuring coherence between the two – for example through high-integrity standards – will maximize their combined impact in achieving Paris goals. When well-aligned, compliance and voluntary markets together create a virtuous cycle, scaling up overall investment in emission reductions globally.

Voluntary carbon markets also serve as a catalyst for sustainable projects on the ground, especially in developing countries. They unlock funding for a spectrum of low-carbon and nature-based initiatives that deliver not only emissions cuts but also local socio-economic benefits. Projects financed through VCM channels in Africa and Morocco include renewable energy farms, forest conservation and reforestation, methane capture from waste, climate-smart agriculture, and more. By monetizing the carbon savings these projects achieve, the voluntary market makes them more financially viable. The development dividends are considerable: revenues from carbon credit sales provide additional capital for “climate-smart” interventions, which in turn improve livelihoods, create jobs, spur sustainable industries, and foster technology transfer<sup>11</sup>. For example, the sale of credits from a community forestry program can fund expanded conservation efforts and support local employment in tree planting and monitoring. Similarly, carbon credit income from a solar farm or wind park supplements its revenue, encouraging further clean energy investment that brings construction and maintenance jobs. Morocco’s own experience bears this out – its flagship Noor Ouarzazate solar complex, initially registered under the CDM carbon market, demonstrated how carbon finance can enable large-scale clean energy deployment with economic co-benefits. More recently, Moroccan enterprises are exploring innovative voluntary market projects; one example is a sustainable agriculture carbon project by the OCP Group in partnership with an American start-up, aiming to generate soil carbon credits through improved farming practices<sup>12</sup>. Such initiatives illustrate how voluntary carbon mechanisms can drive private-sector engagement in sustainability. In essence, VCMs provide the spark and funding for bottom-up climate solutions – from rural landscapes to city grids – that align emissions mitigation with community development.

Equally important, voluntary carbon markets act as a bridge to greater climate ambition globally. They encourage and enable actors to take responsibility for emissions beyond what is mandated, thus pushing the frontier of climate action. When companies

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<sup>11</sup> United Nations Africa Renewal. (2022, June). New revenue streams: Using Africa’s vast renewable energy and natural resources for premium carbon markets. Africa Renewal. <https://africarenewal.un.org/en/magazine/new-revenue-streams-using-africas-vast-renewable-energy-and-natural-resources-premium>

<sup>12</sup> Pagop, S. C., & Savard, L. (2024). Carbon markets and the green transition: Opportunities for Morocco and Africa (Policy Paper No. PP-05/24). Policy Center for the New South. [https://www.policycenter.ma/sites/default/files/2024-04/PP\\_05-24%20%28Sabrina%20Camelia%20Pagop%20%26%20Luc%20Savard%29.pdf](https://www.policycenter.ma/sites/default/files/2024-04/PP_05-24%20%28Sabrina%20Camelia%20Pagop%20%26%20Luc%20Savard%29.pdf)

voluntarily commit to carbon neutrality or net-zero targets and use credible offsets to compensate remaining emissions, it contributes to closing the emissions gap left by current government policies. Crucially, these voluntary efforts can support countries in over-achieving their NDCs and even raising future targets. Analysts observe that if leveraged strategically, the VCM can “drive climate action and increase confidence among countries to raise their climate ambitions and communicate more ambitious NDCs”<sup>13</sup>. In other words, a robust voluntary market signals that additional mitigation potential is being realized, which can embolden policymakers to tighten official goals. For Morocco, engagement in voluntary carbon projects may help attract international climate finance and build experience that feeds into Article 6 readiness, thereby informing more ambitious national pledges down the line. Furthermore, voluntary credits can be structured to ensure no double counting – for instance, by not claiming them toward the host country’s NDC, making them a pure extra contribution to global emissions reduction<sup>14</sup>. This way, voluntary offset purchases (when not counted toward NDCs) deliver a net atmospheric benefit, effectively channeling finance from climate-conscious corporations or individuals into mitigation outcomes beyond what countries have promised. Overall, high-integrity voluntary markets represent a valuable support to global climate action: they mobilize additional resources, accelerate emissions cuts in the near term, and foster public-private collaboration toward the Paris Agreement’s objectives. Indeed, despite the challenges in governance that need addressing, the potential rewards of scaling up voluntary carbon markets are immense – they offer developing countries like Morocco a “unique opportunity...to contribute substantively to global climate objectives while advancing sustainable development”<sup>15</sup>.

### 2.3 Objectives and Scope of the White Book

Given this context, *The White Book for Developing Voluntary Carbon Markets in Morocco* is conceived as more than just a reference – it is a practical roadmap to realizing the opportunities of carbon markets in service of Morocco’s climate and development goals. This white book has three core objectives. First, it aims to educate and build understanding among key stakeholders. There is a recognized need to demystify carbon market concepts in the Moroccan context, as many policymakers, businesses, and

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<sup>13</sup> VCM Global Dialogue. (2021, September 14). Draft Narrative and Action Agenda: The Voluntary Carbon Market as a Catalyst of Climate Ambition in Developing Countries. VCM Global Dialogue. <https://vcm-gd.org/wp-content/uploads/2021/09/20210926-VCM-GD-Draft-Narrative-and-Action-Agenda.pdf>

<sup>14</sup> Nordic Environment Finance Corporation (NEFCO). (2025, June). Linkages between Article 6 of the Paris Agreement and voluntary carbon markets. NEFCO. <https://www.nefco.int/wp-content/uploads/2025/06/linkages-between-article-6-of-the-paris-agreement-and-voluntary-carbon-markets-june-2025.pdf>

<sup>15</sup> Pagop, S. C., & Savard, L. (2024). Carbon markets and the green transition: Opportunities for Morocco and Africa (Policy Paper No. PP-05/24). Policy Center for the New South. [https://www.policycenter.ma/sites/default/files/2024-04/PP\\_05-24%20%28Sabrina%20Camelia%20Pagop%20%26%20Luc%20Savard%29.pdf](https://www.policycenter.ma/sites/default/files/2024-04/PP_05-24%20%28Sabrina%20Camelia%20Pagop%20%26%20Luc%20Savard%29.pdf)

project developers are new to this domain. The guide will therefore clarify fundamental concepts and mechanisms of voluntary carbon markets – explaining how carbon credits are generated from projects (e.g. through emissions avoidance or removals), the difference between compliance and voluntary markets, how verification and certification processes work, and how trading and credit retirement function. By breaking down technical jargon and illustrating the mechanics with clear examples, the book will ensure readers are well-grounded in how VCMs operate. This educational foundation is crucial for informed decision-making and for fostering local participation in carbon market activities. In essence, the first part of the guide will serve as a comprehensive primer on carbon markets tailored to Morocco’s policy landscape and climate action plans.

Second, the white book seeks to showcase best practices and success stories to inspire and inform action. Theory is important, but seeing real-world results drives the point home. Thus, the guide will highlight compelling case studies – with an emphasis on Moroccan experiences – that demonstrate the tangible benefits of engaging with voluntary carbon markets. These examples will cover projects that not only reduced or offset carbon emissions, but also delivered economic and social co-benefits aligned with Morocco’s sustainable development priorities. For instance, the document will profile initiatives like Oualidiya wind farm and Ouarzazate IV Solar CSP Project. It will also examine emerging voluntary market projects in Morocco such as the OCP Group’s carbon farming initiatives, where improved agricultural practices are being translated into certified carbon credits – an innovative model linking climate mitigation with agricultural resilience and productivity gains<sup>16</sup>. By spotlighting these success stories, the white book provides practical illustrations of how voluntary carbon markets can work on the ground. These cases serve as both proof-of-concept and sources of lessons learned (e.g. how hurdles were overcome, which financing models worked, what social safeguards were needed). The goal is to motivate Moroccan stakeholders by showing what is possible – how climate entrepreneurship and carbon finance can yield win-win outcomes for the environment and communities. Such inspiration is paired with concrete guidance, so that these examples can be replicated and scaled within Morocco’s context.

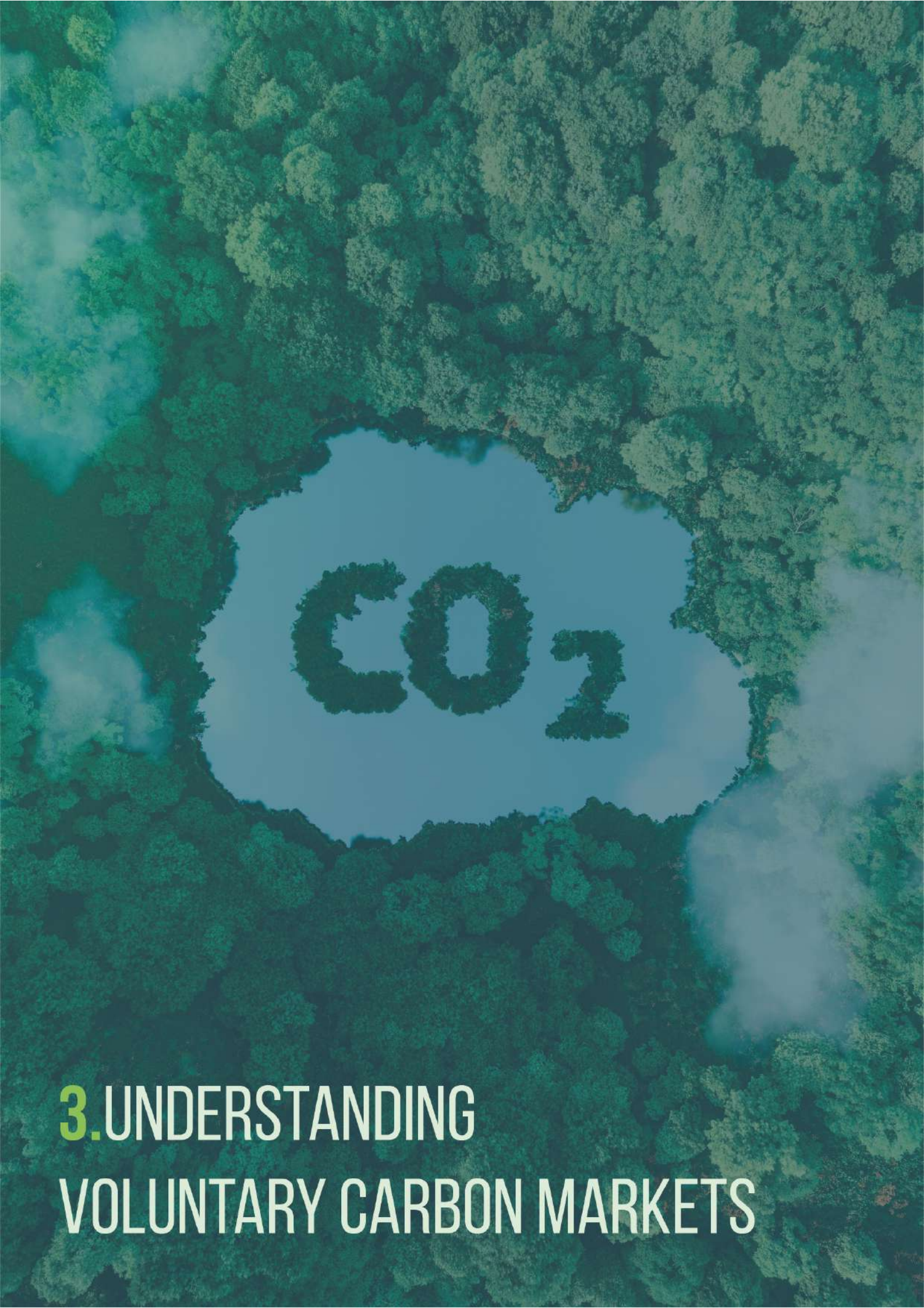
Third, the white book sets out actionable recommendations to strengthen Morocco’s participation in voluntary carbon markets. Although the potential is significant, current engagement remains limited by regulatory uncertainty, capacity gaps, constrained access to buyers, and concerns around credit integrity. Addressing these barriers requires a coordinated set of policy and institutional measures tailored to Morocco’s

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<sup>16</sup> Pagop, S. C., & Savard, L. (2024). Carbon markets and the green transition: Opportunities for Morocco and Africa (Policy Paper No. PP-05/24). Policy Center for the New South. [https://www.policycenter.ma/sites/default/files/2024-04/PP\\_05-24%20%28Sabrina%20Camelia%20Pagop%20%26%20Luc%20Savard%29.pdf](https://www.policycenter.ma/sites/default/files/2024-04/PP_05-24%20%28Sabrina%20Camelia%20Pagop%20%26%20Luc%20Savard%29.pdf)

governance and development context, but informed by international best practices such as UNFCCC guidance, IC-VCM and VCMi standards, and development finance institutions' expertise.

In summary, the scope of this white book is comprehensive – it spans from fundamental concepts to real-world applications to forward-looking policy action. Rather than serving solely as an informational compendium, it is meant to engage stakeholders in a shared vision for scaling up voluntary carbon markets as a pillar of Morocco's climate response. The document emphasizes that achieving this vision will require collaboration across government ministries, the private sector, and civil society, as well as alignment with international frameworks. By equipping readers with knowledge, showcasing what success can look like, and outlining a clear path of reforms and initiatives, the white book endeavors to empower Morocco to harness voluntary carbon markets in a way that supports innovation, enhances resilience, and harmonizes environmental sustainability with economic development. This guide thereby contributes to Morocco's journey toward a low-carbon and climate-resilient future, in which market-based climate finance complements public efforts and the country emerges as a regional leader in high-integrity carbon market participation. The chapters that follow delve into each of these aspects in detail, laying out the roadmap for turning the promise of voluntary carbon markets into reality on Moroccan soil.



### **3.** UNDERSTANDING VOLUNTARY CARBON MARKETS

## 3. Understanding Voluntary Carbon Markets

### 3.1 What are carbon markets?

#### 3.1.1 Classifications of carbon markets

Carbon markets are systems that allow for the trading of greenhouse gas (GHG) emission reductions or removals, quantified in the form of carbon credits, each typically representing one metric ton of CO<sub>2</sub> equivalent (tCO<sub>2</sub>e) avoided, reduced, or removed. These markets channel climate finance toward mitigation projects across sectors such as renewable energy, reforestation, waste management, and industrial efficiency.

Carbon markets can be broadly classified into two categories based on the degree of regulation and obligation for participation:

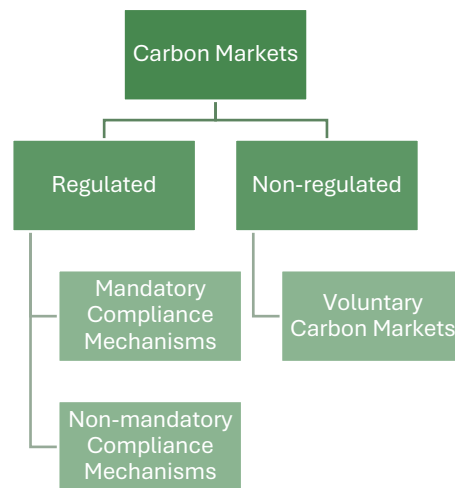


Figure 1: Carbon Markets taxonomy

#### 3.1.1.1 Regulated Carbon Markets

These markets are established by international treaties or domestic laws and impose varying levels of compliance obligations on participants.

##### ➤ Mandatory Compliance Mechanisms

In these systems, entities (e.g., companies, sectors, or countries) are legally required to reduce or offset a portion of their emissions. Examples include:

- **Emissions Trading Systems (ETS)** such as the EU ETS, California Cap-and-Trade, and Korea ETS, where entities must hold allowances equal to their emissions or face penalties.
- **CORSIA** (Carbon Offsetting and Reduction Scheme for International Aviation), a sector-specific international mechanism adopted by ICAO, requires airlines to offset growth in emissions from international flights beyond 2020 levels. Under CORSIA, credits must come from approved programs, many of which also operate in the voluntary market but must meet additional eligibility criteria set by ICAO <sup>17</sup>.

➤ **Non-Mandatory Regulated Mechanisms**

These mechanisms are regulated and guided by international agreements but do not yet impose binding offset obligations on private buyers. Instead, they enable cooperation between countries and optional engagement by the private sector, subject to government authorization:

- **Article 6.2** of the Paris Agreement allows countries to transfer Internationally Transferred Mitigation Outcomes (ITMOs) to help meet their Nationally Determined Contributions (NDCs). These are bilateral or multilateral agreements between countries, governed by UNFCCC reporting rules and subject to corresponding adjustments to avoid double counting<sup>18</sup>.
- **Article 6.4** establishes a centralized UN-supervised crediting mechanism, where emissions reductions from authorized projects can be issued as Article 6.4 credits (A6.4ERs). This system builds on the experience of the Clean Development Mechanism (CDM) from the Kyoto Protocol and allows for private sector involvement, although credits must be authorized by host countries <sup>19</sup>.

While these Article 6's mechanisms are primarily government-to-government, they are increasingly relevant to the voluntary and pre-compliance markets, as private entities may seek Paris-aligned credits in anticipation of regulatory or ESG disclosure pressures.

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<sup>17</sup> International Civil Aviation Organization (ICAO). (2023). CORSIA eligible emissions units. ICAO. <https://www.icao.int/environmental-protection/CORSIA>

<sup>18</sup> UNFCCC. (2021). Glasgow Climate Pact – Decision 1/CMA.3. Article 6 rulebook. United Nations Framework Convention on Climate Change.

<sup>19</sup> UNFCCC. (2023). Article 6.4 Supervisory Body reports. United Nations Framework Convention on Climate Change. <https://unfccc.int/process/the-paris-agreement/cooperative-implementation/article-64>

### 3.1.1.2 Non-Regulated (Voluntary) Carbon Markets

The Voluntary Carbon Market operates outside any legal requirement and allows companies, organizations, and individuals to purchase carbon credits on a voluntary basis to offset their own emissions or support climate action beyond regulatory obligations.

In the VCM:

- Credits are issued by independent standards such as Verra’s VCS, Gold Standard, Plan Vivo, or American Carbon Registry (ACR)<sup>20</sup>.
- Buyers use these credits to make claims such as “carbon neutral,” “climate positive,” or “net zero,” typically as part of corporate ESG strategies or brand leadership.
- The market is self-regulated, relying on standards, registries, third-party auditors, and market integrity initiatives (e.g. IC-VCM, VCMI) to maintain credibility and avoid greenwashing<sup>21</sup>.

Although participation is voluntary, the VCM represents a growing share of global climate finance, particularly in developing countries. It offers a flexible tool for engaging the private sector and can complement regulated mechanisms. However, the absence of formal governmental oversight raises challenges around transparency, integrity, and alignment with national climate targets (as explored further in Section 3.3).

Table 1: Classification of Carbon Markets

Category	Subcategory	Regulatory Basis	Examples
Regulated	Mandatory	Legal/sectoral obligation	EU ETS, Korea ETS, CORSIA
	Non-Mandatory (Governed)	Paris Agreement	Article 6.2 and 6.4 mechanisms
Non-Regulated	Voluntary Carbon Markets (VCMs)	Private, non-binding	Verra VCS, Gold Standard, Plan Vivo, ACR

<sup>20</sup> Verra. (2024). About the Verified Carbon Standard (VCS). Verra. <https://verra.org>

<sup>21</sup> Voluntary Carbon Markets Integrity Initiative (VCMI). (2023). Claims code of practice. VCMI. <https://vcmintegrity.org>

### 3.1.2 Key stakeholders in carbon markets

A variety of stakeholders are involved across the carbon market value chain, especially in VCMs.

#### 3.1.2.1 On the supply side

the primary actors are project developers (or activity developers) who design and implement projects that prevent or remove emissions – for instance, reforesting land, deploying renewable energy, or distributing clean cookstoves. Project developers invest upfront (often with help from investors or NGOs) to generate carbon credits according to a chosen carbon standard. Also on the supply side are the standards organizations (also called carbon crediting programs or offset standards) such as Verra’s Verified Carbon Standard (VCS) and the Gold Standard. These bodies set the rules for project design, methodologies, monitoring, and verification; they certify projects and issue the credits that can be traded. A crucial stakeholder group supporting integrity are the third-party verifiers – usually referred to as Validation and Verification Bodies (VVBs) – which are independent auditors accredited by the standards. VVBs validate that a project’s design meets the standard’s requirements and later verify that the emission reductions actually occurred, ensuring the credits issued represent real, measurable climate benefits<sup>22 23</sup>. Meanwhile, local communities and indigenous peoples often have a stake in projects (especially nature-based projects in forestry or land use), either as partners, beneficiaries, or rights-holders of the lands involved<sup>24</sup>. Host country governments are increasingly important stakeholders too – they may provide letters of approval or non-objection for projects, align projects with national climate strategies, and (especially under Article 6) authorize which credits can be exported or counted outside the country<sup>25</sup>.

#### 3.1.2.2 On the demand side

The key players are the buyers of carbon credits. These include private companies (corporations in various industries), organizations, or even individuals that voluntarily

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<sup>22</sup> The Carbon Credit Lifecycle. (2022, August 6). CarbonCredits.com. <https://carboncredits.com/the-carbon-credit-lifecycle/>

<sup>23</sup> Tang, Y., Martin, S., & Riordan, R. (2024, May). Understanding voluntary carbon markets: Key considerations for professional accountants and purchasers on the carbon credit life cycle. Chartered Professional Accountants of Canada, International Federation of Accountants, and Institute for Sustainable Finance (Smith School of Business, Queen’s University). <https://smith.queensu.ca/centres/isf/pdfs/projects/voluntary-carbon-markets-full-EN.pdf>

<sup>24</sup> World Bank. (2022). Voluntary carbon markets: A primer on how they relate to the Paris Agreement. <https://vcmprimer.org/chapter-3-carbon-markets-and-the-paris-agreement/>

<sup>25</sup> Granziera, B., Malvar, K. H., & Verdieck, J. (n.d.). Article 6 Explainer: Questions and answers about the COP decisions on carbon markets and what they mean for NDCs, nature, and the voluntary and compliance carbon markets. The Nature Conservancy. <https://www.nature.org/content/dam/tnc/nature/en/documents/c/m/CM-TNC-Article-6-Explainer.pdf>

purchase credits to offset their emissions or meet self-imposed climate goals<sup>26</sup>. Many companies use voluntary offsets as part of their ESG (Environmental, Social, Governance) and climate neutrality pledges – for instance, to compensate for emissions they cannot yet eliminate, thereby claiming “carbon neutrality” for products or operations. Other demand-side actors are market intermediaries such as brokers, traders, and exchange platforms. These intermediaries facilitate transactions by matching sellers and buyers, providing marketplaces (like carbon exchanges), and sometimes structuring derivative products. Investors (including climate-focused funds or impact investors) also participate by financing projects in exchange for a share of future credits or profits. Finally, an emerging category of stakeholders are carbon market governance initiatives and watchdogs – for example, the Integrity Council for the Voluntary Carbon Market (IC-VCM) and the Voluntary Carbon Markets Integrity Initiative (VCMI) – which involve experts, NGOs, and international bodies aiming to improve standards and transparency in the VCM<sup>27</sup>. Also, research institutions and think tanks play an extended role by analyzing market trends and integrity (e.g. Ecosystem Marketplace reports on market size, or university studies on offset quality), while regulators and policymakers monitor the market and consider if/when to impose oversight (most VCM activity is not government-regulated, but there is ongoing debate about regulatory gaps). In summary, the VCM ecosystem spans from project-level actors (communities, developers, verifiers) to international standard setters and end-users of credits, all of whose interactions determine the market’s effectiveness<sup>28</sup>.

Table 2: Summary of stakeholders in the VCM ecosystem

Category	Stakeholders
Supply side	<ul style="list-style-type: none"> <li>- Project Developers / Activity Developers</li> <li>- Standards Organizations (Carbon Crediting Programs, e.g., Verra VCS, Gold Standard)</li> <li>- Validation &amp; Verification Bodies (VVBs)</li> <li>- Local Communities &amp; Indigenous Peoples</li> <li>- Host Country Governments</li> </ul>
Demand side	<ul style="list-style-type: none"> <li>- Private Companies / Corporations</li> <li>- Individuals &amp; Organizations</li> <li>- Market Intermediaries (Brokers, Traders, Exchanges)</li> </ul>

<sup>26</sup> World Bank. (2022). Voluntary carbon markets: A primer on how they relate to the Paris Agreement. <https://vcmprimer.org/chapter-3-carbon-markets-and-the-paris-agreement/>

<sup>27</sup> Tang, Y., Martin, S., & Riordan, R. (2024, May). Understanding voluntary carbon markets: Key considerations for professional accountants and purchasers on the carbon credit life cycle. Chartered Professional Accountants of Canada, International Federation of Accountants, and Institute for Sustainable Finance (Smith School of Business, Queen’s University). <https://smith.queensu.ca/centres/isf/pdfs/projects/voluntary-carbon-markets-full-EN.pdf>

<sup>28</sup> Battocletti, V., Enriques, L., & Romano, A. (2024, April 11). The voluntary carbon market: Market failures and policy implications. University of Colorado Law Review, 95. <https://lawreview.colorado.edu/print/volume-95/the-voluntary-carbon-market-market-failures-and-policy-implications/>

	<ul style="list-style-type: none"> <li>- Investors (Funds, Impact Investors)</li> <li>- Governance Initiatives (IC-VCM, VCMI)</li> <li>- Research Institutions &amp; Think Tanks</li> <li>- Regulators &amp; Policymakers</li> </ul>
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### 3.2 Additionality: a cornerstone of carbon credit integrity

Additionality is a fundamental principle underpinning the environmental integrity of carbon credits. It ensures that credited emission reductions or removals would not have occurred in the absence of carbon market incentives. Without additionality, carbon credits risk rewarding business-as-usual activities and undermining the credibility of voluntary carbon markets. As such, additionality is a core eligibility criterion across major carbon standards and a central element of emerging integrity frameworks.

In practice, additionality seeks to answer a simple but critical question: Would the project have been implemented anyway, without revenues from carbon credits? If the answer is yes, the project cannot be considered additional and should not generate carbon credits. To address this question rigorously, carbon standards typically assess additionality across several complementary dimensions.

#### 3.2.1 Institutional and regulatory additionality

Institutional and regulatory additionality requires that a project does not arise from an existing legal or regulatory obligation. Projects mandated by law, compulsory standards, or binding public planning instruments are not considered additional, as their implementation would occur regardless of carbon finance. Similarly, projects that fall within a country’s unconditional Nationally Determined Contribution measures are generally excluded from crediting, since they are already committed under national climate policy<sup>29</sup>.

#### 3.2.2 Financial additionality

Financial additionality examines whether a project would be economically viable without carbon credit revenues. This assessment typically involves an economic or financial analysis demonstrating that, in the absence of carbon income, the project would face barriers such as insufficient returns, lack of access to conventional financing, prohibitively high upfront investment costs, or an unfavorable cost structure. Carbon revenues are therefore shown to play a decisive role in enabling the project to proceed<sup>30</sup>.

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<sup>29</sup> IC-VCM. (2024). Core Carbon Principles (CCP) v1.0. Integrity Council for the Voluntary Carbon Market. <https://icvcm.org>

### 3.2.3 Technological additionality

Technological additionality focuses on the deployment of technologies that are not yet widely adopted or that would remain inaccessible without carbon market incentives. This may be due to high capital costs, implementation complexity, limited local capacity, or elevated perceived risks among investors and project developers. By supporting such technologies, carbon markets can help accelerate innovation and diffusion beyond prevailing market practices<sup>30</sup>.

## 3.3 The mechanics of voluntary carbon markets

Voluntary carbon markets operate through a rigorous, multi-stage process that ensures greenhouse gas emission reductions or removals are real, measurable, and verifiable. While the terminology may vary slightly across different standards, the VCM project cycle typically involves the following seven stages.



Figure 2: VCMs' project cycle

### 3.3.1 Project Design

The process begins when a project developer identifies a climate-positive activity – such as reforestation, renewable energy, or improved cookstoves – capable of generating carbon reductions. At this stage, a Project Design Document (PDD) is prepared. This

<sup>30</sup> Verra. (2023). Verified Carbon Standard (VCS) program rules, version 4.5. Verra.

document outlines the project's objectives, location, technical approach, baseline scenario (i.e., what emissions would occur without the project), and expected emissions reductions. A crucial component is the selection of an approved methodology, which dictates how GHG impacts are calculated, monitored, and reported. Methodologies are provided by recognized standards like Verra's VCS, Gold Standard, Plan Vivo, and CDM methodologies accepted by other programs. The developer also formulates a monitoring plan to track emissions reductions over time<sup>31</sup>.

### 3.3.2 Validation

Before implementation, the project undergoes an independent validation by a Validation and Verification Body (VVB) accredited by the chosen carbon standard. The VVB reviews the PDD and confirms that the project design aligns with the methodological and regulatory requirements of the standard. It ensures, for example, that the project is "additional" (i.e., it wouldn't have occurred without carbon finance), and that baselines and emission estimates are sound<sup>32 33</sup>.

### 3.3.3 Project Implementation (Development)

Once validated, the developer proceeds to implement the project. This stage includes procuring equipment (e.g., wind turbines, cookstoves), conducting reforestation or conservation activities, or making efficiency upgrades. Monitoring protocols outlined in the PDD are applied to collect data on emission reductions. This stage may span several months or years depending on project type. Early financing often comes from grants, impact investors, or advance purchases of future carbon credits<sup>34</sup>.

### 3.3.4 Verification

These safeguards typically include assigning different personnel within the VVB for each stage and adhering to ISO 14065 standards on impartiality.

After a defined monitoring period (typically one to three years), the project undergoes verification. During this stage, a Validation and Verification Body (VVB) reviews the monitoring reports, assesses the quality and completeness of the underlying data, and conducts site visits where necessary to confirm that the project has been implemented as designed. Verification is a critical integrity safeguard, as it provides independent

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<sup>31</sup> Verra (2024). Project Cycle Overview – <https://verra.org>

UNECA (2024). Carbon Markets: A Primer – <https://akmh.uneca.org>

<sup>32</sup> CarbonCredits.com (2024). Lifecycle of a Carbon Credit – <https://carboncredits.com/the-carbon-credit-lifecycle>

<sup>33</sup> ICROA (2023). Quality Assurance in VCMs – <https://www.icroa.org/>

<sup>34</sup> Plan Vivo (2022). Project Requirements – <https://www.planvivo.org>

WWF (2019). Making Sense of the Voluntary Carbon Market – <https://wwf.panda.org>

assurance that the reported emission reductions or removals have actually occurred and are accurately quantified. Only reductions that have been successfully verified are eligible for the issuance of carbon credits<sup>35</sup>.

While most major carbon standards—including Verra’s Verified Carbon Standard (VCS), Gold Standard, Plan Vivo, and the American Carbon Registry (ACR)—allow the same VVB to carry out both validation and verification, they impose strict requirements to manage potential conflicts of interest and preserve auditor independence. These safeguards typically include the assignment of separate audit teams within the VVB for each stage, internal quality control procedures, and full compliance with ISO 14065, which sets out international requirements for impartiality, competence, and transparency in greenhouse gas validation and verification activities.

Table 3: Carbon Credit Validation vs Verification

Dimension	Validation	Verification
Timing	Ex ante	Ex post
Focus	Project design & eligibility	Actual results & data
Main object	PDD / project documentation	Monitoring report
Core risks addressed	Additionality, baseline, design flaws	Over-crediting, data errors
Frequency	Once (or when design changes)	Recurrent
Outcome	Project registration	Credit issuance

**3.3.5 Credit Issuance**

Following successful verification, the project is registered with the standard’s official registry (e.g. Verra Registry, Gold Standard Impact Registry). The standard then issues a quantity of carbon credits – typically 1 credit per 1 tonne of CO<sub>2</sub>e reduced – into the project’s registry account. Each credit carries a unique serial number and metadata including project type, location, vintage year, and co-benefits. At this stage, the carbon credits become a certified, tradable commodity<sup>36</sup>.

**3.3.6 Credit Transfer (Trading)**

Once issued, credits may be transferred (sold) to buyers in the carbon market. Transfers can happen directly between project developers and corporate buyers or through intermediaries such as brokers, resellers, or online platforms. Credits can be bought and sold multiple times on the secondary market, with registry updates ensuring traceability.

<sup>35</sup> Smith School of Enterprise and the Environment, University of Oxford (2024). Understanding Voluntary Carbon Markets – <https://smith.queensu.ca>

Gold Standard (2023). Validation & Verification Manual – <https://www.goldstandard.org>

<sup>36</sup> Verra Registry (2025). Project Registry Overview – <https://registry.verra.org>

UNECA (2024). Carbon Markets: A Primer (Table: Credit Issuance Process)

The trading price depends on credit type, co-benefits, project geography, and buyer priorities (e.g. a mangrove restoration credit may trade at a premium)<sup>37</sup>.

### 3.3.7 Credit Retirement

The final stage is credit retirement, where a carbon credit is permanently removed from circulation in a registry, typically by the final buyer (e.g. a company or NGO) to claim an offset against its emissions. Retirement ensures that no one else can reuse the credit, eliminating the risk of double counting. Retired credits serve as the documented proof of climate action and are publicly recorded in the registry<sup>38</sup>.

Throughout these stages, transparency and tracking are maintained via the registries and emerging meta-data systems. For instance, the World Bank's Climate Warehouse initiative is piloting an international meta-registry to interconnect various registries and avoid double counting as markets grow. The entire process from project conception to credit retirement can be illustrated as a cycle where investment flows into climate projects, projects generate verifiable emissions reductions, those are converted to credits, and credits are purchased and used by others to address their emissions – with revenue looping back to fund more projects. When done properly, this cycle results in additional climate action beyond what mandatory measures achieve and directs private finance to mitigation activities in often underfunded sectors or regions.

### 3.3.8 Standards and methodologies in VCMs

As noted, voluntary carbon markets rely on standards to ensure credibility. The major international standards include: Verra's Verified Carbon Standard (VCS) – the largest program by volume, covering a wide array of project types; Gold Standard – known for stringent sustainable development criteria and popular for renewable energy and community projects; Plan Vivo – a framework focusing on community-based forestry and agroforestry projects; Climate Action Reserve (CAR) and American Carbon Registry (ACR) – which originated in North America and cover various project categories. These programs issue tradable credits (often labeled VERs – Verified Emission Reductions, or VCU – Verified Carbon Units) that are functionally equivalent (1 credit = 1 tonne CO<sub>2</sub>e) but may carry different reputational value. Underpinning all these are robust methodologies and accounting principles. Many standards base their quantification rules on internationally recognized norms like ISO 14064-2 (an ISO standard for quantifying and reporting GHG reductions at the project level) and the GHG Protocol for

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<sup>37</sup> VCM Primer (2023). How the Market is Structured – <https://vcmprimer.org>

Xpansiv CBL (2025). VCM Trading Overview – <https://www.xpansiv.com>

<sup>38</sup> Gold Standard Foundation. (2024). Gold Standard Impact Registry. Retrieved [access date], from <https://impactregistry.goldstandard.org>

Project Accounting. For example, VCS methodologies often reference ISO 14064 guidelines, and the WRI/WBCSD GHG Protocol provides widely accepted criteria for additionality, baseline setting, and monitoring. Moreover, some standards incorporate or align with sector-specific frameworks: e.g. forest carbon projects might use methodologies compatible with REDD+ (Reducing Emissions from Deforestation and Degradation) frameworks, or jurisdictional programs (like ART/TREES for large-scale REDD+)<sup>39 40</sup>.

In practice, a project developer chooses a standard and then applies a specific methodology under that standard (or in some cases develops a new methodology subject to approval). Each methodology defines eligible project activities and how to calculate emissions impact. For instance, methodologies exist for afforestation/reforestation, avoided deforestation, renewable energy installations, energy efficiency, methane capture (landfills, livestock), improved cookstoves, soil carbon sequestration, and many more – reflecting the diversity of ways to cut GHGs. The Verified Carbon Standard (VCS), for example, has methodologies for everything from improved forest management to rice cultivation methane reduction. Gold Standard has its own methods but also accepts some CDM methodologies with added sustainability requirements. Plan Vivo emphasizes participatory, community-led project design in its standards. ISO 14064-2 and the GHG Project Protocol are more like overarching guidance documents – they outline how to demonstrate additionality, how to handle uncertainties, etc., and many VCM standards incorporate these principles to ensure consistency. Additionally, beyond carbon-centric standards, there are co-benefit certification schemes (like the Climate, Community & Biodiversity Standards, or Social Carbon, etc.) that projects can pursue alongside carbon certification to validate social and environmental co-benefits<sup>41 42</sup>.

Overall, the use of well-recognized standards and methodologies is what lends the VCM its credibility. They provide the “rulebook” that projects must follow, covering baseline establishment, additionality testing, leakage prevention (ensuring the project’s

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<sup>39</sup> Kollmuss, A., Zink, H., & Polycarp, C. (2008, March 10). Making sense of the voluntary carbon market: A comparison of carbon offset standards [PDF]. WWF-Germany/Stockholm Environment Institute and Tricorona. Retrieved from [https://www.globalcarbonproject.org/global/pdf/WWF\\_2008\\_A%20comparison%20of%20C%20offset%20Standards.pdf](https://www.globalcarbonproject.org/global/pdf/WWF_2008_A%20comparison%20of%20C%20offset%20Standards.pdf)

<sup>40</sup> WWF. (2008, March 10). A comparison of carbon offset standards—Making sense of the voluntary carbon market. WWF News. Retrieved from WWF website: [https://wwf.panda.org/wwf\\_news/?126700/A-Comparison-of-Carbon-Offset-Standards-Making-Sense-of-the-Voluntary-Carbon-Market](https://wwf.panda.org/wwf_news/?126700/A-Comparison-of-Carbon-Offset-Standards-Making-Sense-of-the-Voluntary-Carbon-Market)

<sup>41</sup> World Wide Fund for Nature (WWF). (2008, March 10). A comparison of carbon offset standards—making sense of the voluntary carbon market. WWF. Retrieved from the WWF website: [https://wwf.panda.org/wwf\\_news/?126700/A-Comparison-of-Carbon-Offset-Standards-Making-Sense-of-the-Voluntary-Carbon-Market](https://wwf.panda.org/wwf_news/?126700/A-Comparison-of-Carbon-Offset-Standards-Making-Sense-of-the-Voluntary-Carbon-Market)

<sup>42</sup> CarbonCredits.com. (2022, August 10). The carbon credit lifecycle. Retrieved from <https://carboncredits.com/the-carbon-credit-lifecycle/>

reductions aren't negated by emissions shifting elsewhere), permanence (especially for sequestration projects, ensuring carbon stored isn't later released), and robust monitoring. High-quality credits are those that meet these strict criteria. For example, additionality is a cornerstone (Cf. Section 3.2). Likewise, for projects like forestry, standards impose buffer reserves and insurance mechanisms to address non-permanence (e.g., some credits are set aside in case of forest fire reversals). These safeguards are necessary to address the known challenges in carbon offsetting and differentiate credible credits from dubious ones.

In the following sections, we further discuss integrity issues, but it's important to note here that the proliferation of standards has also introduced complexity and fragmentation in the market. Efforts like the IC-VCM's Core Carbon Principles aim to harmonize what constitutes a "high-quality" credit across programs, indicating a maturing market seeking consistent benchmarks<sup>43 44</sup>.

### **3.3.9 Offset claims and contribution claims in voluntary carbon markets**

In voluntary carbon markets, it is increasingly important to distinguish between offset claims and contribution claims, as they reflect fundamentally different uses of carbon credits.

An offset claim is made when a buyer uses carbon credits to compensate for its own greenhouse gas emissions, implying a one-to-one neutralization of emissions (for example, claiming "carbon neutrality" for a product, activity, or organization). Such claims are typically associated with the retirement of credits against a defined emissions boundary and are subject to growing scrutiny, as they risk being perceived as a substitute for direct emissions reductions. By contrast, a contribution claim does not assert that emissions have been neutralized; instead, it recognizes the purchase of carbon credits as a financial contribution to global climate mitigation beyond the buyer's value chain. Under a contribution claim, emissions remain fully reported, and credits are framed as a mechanism to support additional mitigation activities, particularly in developing countries. The key difference therefore lies not in the carbon credit itself, but in how it is accounted for and communicated: offset claims reduce reported net emissions, whereas contribution claims emphasize climate finance and collective action without altering the buyer's emissions footprint.

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<sup>43</sup> Granziera, B., Malvar, K. H., & Verdieck, J. (n.d.). Article 6 Explainer: Questions and answers about the COP decisions on carbon markets and what they mean for NDCs, nature, and the voluntary and compliance carbon markets. The Nature Conservancy.

<https://www.nature.org/content/dam/tnc/nature/en/documents/c/m/CM-TNC-Article-6-Explainer.pdf>

<sup>44</sup> Tang, Y., Martin, S., & Riordan, R. (2024, May). Understanding voluntary carbon markets: Key considerations for professional accountants and purchasers on the carbon credit life cycle. Chartered Professional Accountants of Canada, International Federation of Accountants, and Institute for Sustainable Finance (Smith School of Business, Queen's University).

This distinction has become central to the credibility and integrity of voluntary carbon markets, and is increasingly reflected in emerging international guidance on responsible corporate climate claims<sup>45</sup>.

Table 4: Comparison offset claim vs contribution claim

<b>Dimension</b>	<b>Offset claim</b>	<b>Contribution claim</b>
Core purpose	Compensate (neutralize) the buyer’s own emissions	Support global climate mitigation
Accounting treatment	Emissions are netted out (partially or fully)	Emissions remain fully reported
Typical wording (from the buyer standpoint)	“Carbon neutral”, “Emissions offset”, “Net zero for X”	“We contribute to climate mitigation”, “We finance emission reductions”
Role of carbon credits	Substitute for residual emissions	Climate finance instrument
Reputational and regulatory risk	High and increasing	Lower and more future-proof
Alignment with emerging guidance	Increasingly restricted	Strongly encouraged

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<sup>45</sup> ClimateSeed. (2020, October 2). Climate contribution vs. carbon offsetting. <https://climateseed.com/blog/climate-contribution-vs-carbon-offsetting>

## 3.4 The Global Dynamics Voluntary Carbon Market

This section draws on the recent report *The Dynamics of Voluntary Carbon Markets: An Empirical Analysis of the Carbon Credits Lifecycle* by the World Federation of Exchanges<sup>46</sup>. The study represents a comprehensive empirical dataset on the lifecycle of voluntary carbon credits to date, covering more than 2.4 billion credits across multiple registries, project categories, and geographies. The report's quantitative findings, complemented by the inputs highlighted in the accompanying presentation, shed light on the structural features of the global VCM market, inefficiencies in issuance and retirement, and the evolving demand landscape.

### 3.4.1 Scale and Distribution of Issuances and Retirements

By the end of 2024, approximately 2.4 billion voluntary carbon credits had been issued globally, with 56% already retired. Although projects are spread across 143 countries, emerging and developing economies dominate, hosting nearly three-quarters of all projects and generating 75% of the issued credits. The most significant volumes are linked to Forestry & Land Use and Renewable Energy projects. Registries, however, play uneven roles in the lifecycle.

- **Verra (VCS)** accounts for 57% of issuances and 58% of retirements but has the longest issuance lag (3.23 years).
- **Gold Standard** holds a 16% issuance share, with a focus on Household & Community projects.
- **Climate Action Reserve (CAR)** shows the highest retirement ratio (76%), while the American Carbon Registry (ACR) maintains a niche in industrial and chemical processes.

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<sup>46</sup> Liu, Y., & Gurrola-Pérez, P. (2025, February). The dynamics of voluntary carbon markets: An empirical analysis of the carbon credits lifecycle. World Federation of Exchanges.

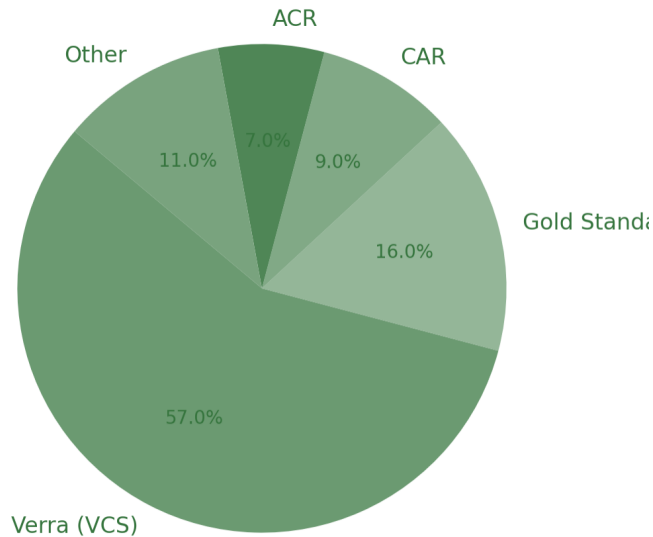


Figure 3: Share of Issuances by Registry

#### Share of Retirements by Registry

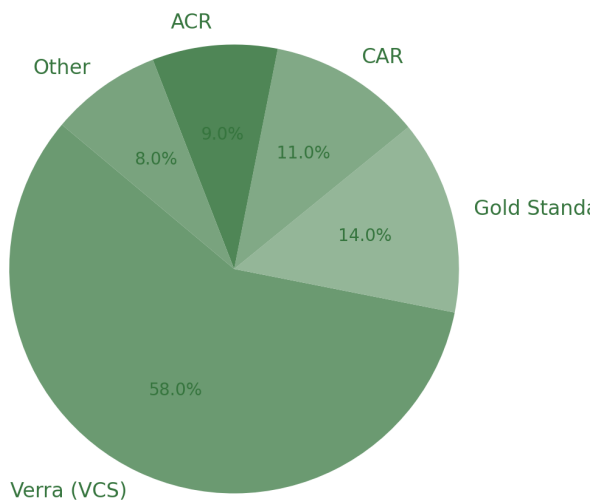


Figure 4: Share of Retirements by Registry

### 3.4.2 Market Imbalances and Supply-Demand Dynamics

Between 2017 and 2021, the market experienced rapid expansion, with issuances growing by 142% and peaking at 300 million tCO<sub>2</sub>e. However, since 2021, issuance volumes have declined by 12%, dropping to 264 million tCO<sub>2</sub>e in 2024, despite continued growth in the number of projects. This contraction stems from the slowdown in large-scale renewable energy projects and heightened scrutiny over the credibility of forestry credits.

Retirements, in contrast, have grown more slowly, reaching 190 million tCO<sub>2</sub>e in 2024 (72% of credits issued that year). This widening supply-demand imbalance has created downward pressure on prices, reduced liquidity, and undermined confidence in market integrity.

### 3.4.3 Carbon Credits Pricing

Carbon credit prices in voluntary carbon markets vary widely and reflect a complex interplay of technical, economic, and regulatory factors. The table below illustrates this price dispersion by ranking carbon credit categories from low to high average prices in 2024, ranging from legacy reduction and avoidance projects to high-cost engineered carbon removal technologies such as biochar, enhanced rock weathering, bioenergy with carbon capture and storage, and direct air capture.

This wide price spectrum underscores the fact that carbon credits are not homogeneous commodities. Rather, their market value is shaped by several interrelated dimensions.

Project quality plays a central role: Credits associated with higher integrity, stronger additionality, robust monitoring, reporting and verification, and closer alignment with evolving standards and integrity frameworks tend to command a premium.

Project type is another key determinant, with nature-based projects generally producing lower-cost credits than technology-based or engineered removals, largely due to differences in development costs, technical complexity, risk profiles, and perceived durability of carbon storage.

Geography also matters, as credits generated in developing countries are often priced lower, reflecting differences in land and labor costs as well as higher perceived regulatory and political risks. Credit vintage, referring to the year in which emission reductions or removals occur, further influences prices, with newer vintages typically attracting higher demand and prices in line with improving methodologies and rising buyer expectations.

While all credits in voluntary markets undergo third-party verification, additional certifications and quality labels can increase buyer confidence and, in turn, market value.

Finally, buyer intent and compliance considerations significantly affect pricing: buyers seeking to demonstrate leadership, support co-benefits such as biodiversity conservation and community development, or meet emerging compliance requirements—such as those under CORSIA—tend to favor higher-quality credits, thereby reinforcing price differentiation across the market<sup>48</sup>.

Table 5: Voluntary Carbon Market Credit Prices by Project Category, 2024 (USD/tCO<sub>2</sub>e)

(For categories from 1 to 12, data is sourced from “Ecosystem marketplace”<sup>47</sup>. For categories from 13 to 17, data is sourced from “Sylvera”<sup>48</sup>)

Rank (Low → High)	Category	Average price 2024 (USD/tCO <sub>2</sub> e)
1	Renewable Energy <sup>49</sup>	2.67
2	Energy Efficiency / Fuel Switching	3.05
3	Transportation	3.24
4	Chemical Processes / Industrial Manufacturing	3.66
5	REDD+	6.03
6	Waste Disposal	6.72
7	Household / Community Devices	7.30
8	Agriculture	7.66
9	Agroforestry	14.11
10	Improved Forest Management (IFM)	14.97
11	Afforestation, Reforestation & Revegetation	20.44
12	Blue Carbon	29.72
13	Biochar	177
14	Enhanced Rock Weathering	200
16	Bioenergy with carbon capture and storage	389
17	Direct air capture	500

### 3.4.4 Issuance Lags and Retirement Age

One of the most important lifecycle findings is the delay between carbon removal and credit issuance. On average, it takes 2.45 years for a credit to be issued, with a median lag of 1.93 years and extremes up to 21 years. This inefficiency raises transaction costs and slows the flow of capital to developers. Variability across sectors is also notable:

- **Chemical process projects** issue the fastest (1.15 years).
- **Transport projects** are the slowest (4.81 years).  
Registry choice matters too: CAR is the fastest (1.25 years), Verra the slowest (3.23 years).

The average retirement age of credits is 4.43 years, but this also varies widely: Household & Community projects retire quickly (3.07 years), while Transport projects linger much longer (8.99 years). Interestingly, investor preferences shifted after 2021,

<sup>47</sup> Forest Trends’ Ecosystem Marketplace. (2025). State of the voluntary carbon market 2025: Meeting the moment—Renewing trust in carbon finance. Forest Trends Association. <https://www.ecosystemmarketplace.com>

<sup>48</sup> Sylvera. (2025). Carbon offset prices: What they are and why they vary. <https://www.sylvera.com/blog/carbon-offset-price>

<sup>49</sup> The value and demand for carbon credits from typical Grid-Connected Photovoltaic (PV) projects have been declining in the Voluntary Carbon Market (VCM) unless the project includes features that prove higher integrity or additionality, such as storage/batteries.

with end-users increasingly retiring older vintages, reflecting both growing supply of backlogged credits and changing risk perceptions.

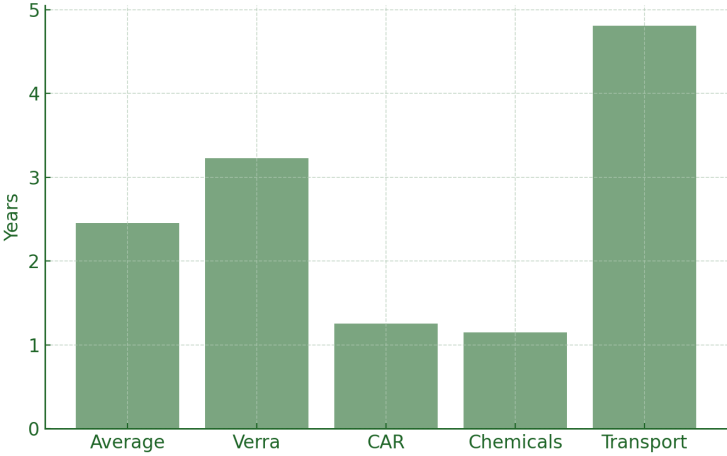


Figure 5: Issuance Lag (years) by Registry / Sector

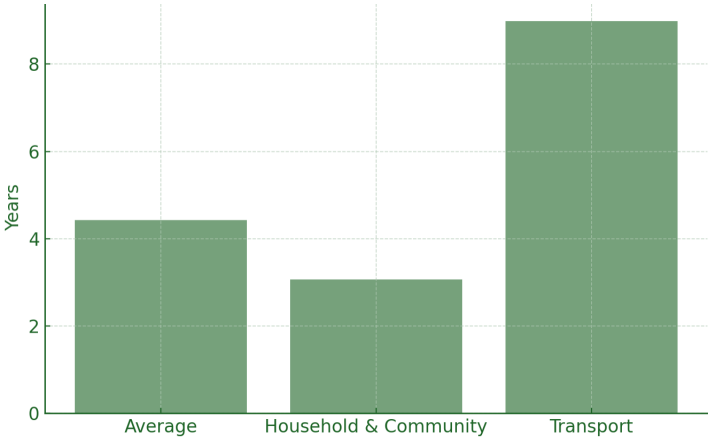


Figure 6: Retirement Age (years) by Sector

**3.4.5 Changing Buyer Profiles**

In 2010, the top ten entities accounted for nearly 90% of retirements. By 2024, their share had fallen to 60%, with smaller firms and even individuals now representing a substantial share of demand. Over half (54%) of retirements are now for fewer than 10 tCO<sub>2</sub>e, pointing to the democratization of VCM demand.

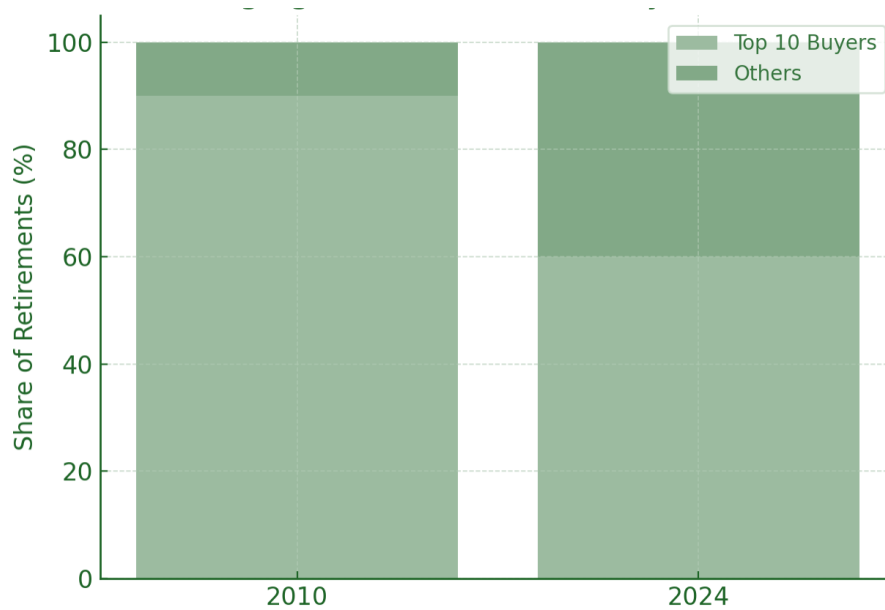


Figure 7: Changing Concentration of Buyers in VCM

### 3.4.6 Implications for Market Design

The findings highlight structural inefficiencies in the carbon credit lifecycle—particularly issuance delays, uneven registry performance, and credibility concerns in certain project categories. Addressing these bottlenecks requires greater standardization and automation of MRV, more transparency in pricing and trading, and the development of exchange-based platforms to improve liquidity, efficiency, and price discovery. These reforms are essential to restore confidence and unlock the full scaling potential of voluntary carbon markets.

## 3.5 Linking voluntary carbon markets to Article 6 of the Paris Agreement

### 3.5.1 Overview of Article 6

Article 6 of the Paris Agreement provides a framework for countries to cooperate in achieving their Nationally Determined Contributions (NDCs) through both market and non-market approaches. Importantly, Article 6 is generally understood to relate to the conditional component of NDCs—that is, the portion of emissions reductions that countries commit to achieving subject to the availability of international support, including finance, technology transfer, and capacity building. In this context, Article 6 recognizes that some countries may over-achieve their mitigation efforts or mobilize additional mitigation beyond their unconditional commitments, and can transfer these outcomes to others to promote cost-effective global climate action.

Article 6 is structured around three pillars. Article 6.2 covers “cooperative approaches,” under which countries engage in bilateral or multilateral transfers of mitigation outcomes (Internationally Transferred Mitigation Outcomes, or ITMOs). These transfers require explicit authorization by host countries and must be accompanied by corresponding adjustments to national emissions accounts to avoid double counting. For example, if Country A transfers 1 million tonnes of CO<sub>2</sub> reductions to Country B, Country A must apply a +1 Mt adjustment to its emissions balance, while Country B may apply a –1 Mt adjustment toward its NDC achievement, ensuring that the same mitigation outcome is not claimed twice.

Article 6.4 establishes a centralized, UN-supervised crediting mechanism—often referred to as the Paris Agreement Crediting Mechanism (PACM)—which builds on the project-based logic of the former Clean Development Mechanism (CDM), while introducing stronger safeguards, standardized methodologies, and a mandatory share of proceeds for adaptation. Emission reductions generated under Article 6.4 (A6.4ERs) may be used by countries toward their NDCs only if authorized and subject to corresponding adjustments; alternatively, they may be cancelled for other purposes, such as voluntary climate mitigation contributions. Article 6.8, finally, addresses non-market approaches, including cooperation on climate finance, technology transfer, and capacity building, without the transfer of mitigation outcomes.

Taken together, Article 6 provides a structured pathway for mobilizing international cooperation and climate finance in support of countries’ conditional mitigation ambitions, while preserving the environmental integrity of the Paris Agreement through robust accounting and transparency rules.

The rules for Article 6 were agreed in principle in late 2021 (the “Article 6 rulebook” from Glasgow) and refined in subsequent COPs, but detailed implementation (such as registries, approval processes, and methodologies) is still underway as of 2025<sup>50 51 52</sup>.

### 3.5.2 Relevance of Article 6 to VCMs

Although Article 6 is an agreement between countries, it has significant implications for voluntary carbon markets. One key issue is the potential double counting or double claiming of emission reductions between the voluntary sphere and national inventories. Under the Paris regime, virtually all countries have emissions targets (NDCs). If a project in country X sells a carbon credit to a company in country Y (for voluntary offsetting), that reduction might also be contributing to country X’s own NDC achievement. This raises the concern that the same reduction could be “claimed” by the company (voluntarily) and by country X (towards its NDC), undermining the integrity of global accounting.

To avoid this, some voluntary market actors are seeking to align with Article 6 frameworks. In practice, this means securing host country authorization for voluntary projects and applying corresponding adjustments even if the buyer is a private entity. For example, a forestry project in Ghana selling credits to a European corporation might obtain an official letter that authorizes the transfer of those reductions out of Ghana’s NDC – effectively converting them into Article 6.2 compliant credits with corresponding adjustments. Such credits could be seen as “Paris-aligned” voluntary offsets. Indeed, a debate in the VCM community has been whether all voluntary credits should, in the future, come with a corresponding adjustment to ensure no double claiming. However, not all scenarios require it – if the company’s use of the credit is purely additional (not counted toward any country’s NDC), some argue a corresponding adjustment isn’t strictly necessary. Still, voluntary standards are responding: Gold Standard and Verra have begun developing tagging systems in their registries for credits that have host country authorization under Article 6. The aim is to increase transparency about whether a voluntary credit is also counted toward an NDC. Meanwhile, initiatives like the IC-VCM and VCMi have discussed recommending that corporate claims after 2025 use

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<sup>50</sup> Granziera, B., Malvar, K. H., & Verdieck, J. (n.d.). Article 6 Explainer: Questions and answers about the COP decisions on carbon markets and what they mean for NDCs, nature, and the voluntary and compliance carbon markets. The Nature Conservancy.

<https://www.nature.org/content/dam/tnc/nature/en/documents/c/m/CM-TNC-Article-6-Explainer.pdf>

<sup>51</sup> de Wit, E. (2025, February). Article 6: Opportunities for the private sector (with Harriet Salisbury, Charlie Bevis & Joel Harriss). Norton Rose Fulbright. Retrieved from <https://www.nortonrosefulbright.com/en-no/knowledge/publications/59122fe9/article-6-a-guide-for-the-private-sector>

<sup>52</sup> VCM Primer (2023). How the Market is Structured – <https://vcmprimer.org>

authorized (adjusted) credits to be considered high-integrity, though definitive guidance is still evolving<sup>53 54</sup>.

### 3.5.3 Convergence of Article 6.4 and the voluntary market

A critical question is how the new Article 6.4 mechanism will interact with existing voluntary market standards. Article 6.4 will create UN-issued credits (A6.4ERs) from approved projects – potentially very similar in concept to today’s VCM credits, but under an international regulatory umbrella. Some observers expect a degree of competition: companies seeking carbon offsets might prefer Article 6.4 credits (perceived as having UN oversight and guaranteed corresponding adjustments) over voluntary credits, which could draw finance away from private standards.

The VCM Primer notes that Article 6.4 will “*compete with standards that offer the certification of VCM projects*” and companies may choose to invest in Article 6-approved activities rather than voluntary credits. On the other hand, there may also be convergence and integration. It’s likely that many methodologies and project types in Article 6.4 will be derived from or overlap with existing voluntary methodologies. In fact, as of late 2024, the Article 6.4 Supervisory Body was working to adapt some CDM and VCS methodologies for the new mechanism, indicating technical alignment. Additionally, Article 6.4 allows for credits to be issued without authorization for NDC use – these would be labeled as “mitigation contribution” units (sometimes called MCUs) which host countries don’t count toward their NDC and thus don’t require corresponding adjustments. Such units could effectively function as voluntary offsets (a country might issue Article 6.4 credits for projects but decide not to authorize them for sale to other countries, instead leaving them for voluntary buyers as contributions to climate finance). This shows a possible pathway where the Article 6.4 mechanism feeds into the voluntary market for non-NDC-offsetting purposes.

In the long run, one could envision a more unified carbon market architecture where the distinction between “compliance” and “voluntary” blurs: if all credits are transparently accounted and authorized as needed, corporates could buy either a national ITMO or a voluntary credit with equal confidence of no double counting. We are not fully there yet –

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<sup>53</sup> Granziera, B., Malvar, K. H., & Verdieck, J. (n.d.). Article 6 Explainer: Questions and answers about the COP decisions on carbon markets and what they mean for NDCs, nature, and the voluntary and compliance carbon markets. The Nature Conservancy.

<https://www.nature.org/content/dam/tnc/nature/en/documents/c/m/CM-TNC-Article-6-Explainer.pdf>

<sup>54</sup> VCM Primer (2023). How the Market is Structured – <https://vcmprimer.org>

current voluntary standards continue to operate separately, but they are adjusting their practices in light of Article 6<sup>55 56</sup>.

### 3.5.4 Role of governments and implications for Morocco

Governments play a pivotal role in connecting VCMs with Article 6. Host country governments decide whether and how to let voluntary projects contribute to or sell outside their NDC. As noted, they may require letters of approval or non-objection for projects registering under a voluntary standard, to signal whether those emission reductions are additional to the NDC efforts. Some governments are developing frameworks to authorize certain projects for Article 6.2 transfers. For instance, countries like Ghana and Rwanda have said they will only authorize credits from mitigation that is part of their “conditional” NDC (the portion requiring outside support). Others, like Zambia, plan to allow only higher-cost mitigation to be sold (keeping cheap reductions for domestic achievement). These policies directly shape what happens with voluntary projects domestically.

A host country might also impose benefit-sharing rules for voluntary projects – e.g. Kenya requires a percentage of voluntary project revenues to go to local communities. All these measures are ways governments ensure voluntary carbon activities align with national priorities and Article 6 integrity provisions<sup>57</sup>.

Morocco, in particular, is actively preparing to engage in Article 6. As of late 2024, Morocco announced it is launching an Article 6 framework and expects to enter into its first Internationally Transferred Mitigation Outcome (ITMO) offtake agreements by 2025. In other words, Morocco plans to authorize and sell some of its emission reductions to partner countries or buyers under Article 6.2. This involves setting up institutional arrangements for approving projects and tracking transfers. For voluntary market stakeholders, Morocco’s framework could mean that developers of carbon projects in Morocco will need government approval if they intend to sell credits internationally (whether to countries or companies overseas). Moroccan authorities will likely ensure such projects align with the nation’s NDC (which aims for a 45.5% reduction by 2030, partly conditional on support). We might see Morocco designating certain sectors or project types open for Article 6 cooperation (e.g. renewable energy, waste management)

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<sup>55</sup> VCM Primer (2023). How the Market is Structured – <https://vcmprimer.org>

<sup>56</sup> de Wit, E. (2025, February). Article 6: Opportunities for the private sector (with Harriet Salisbury, Charlie Bevis & Joel Harriss). Norton Rose Fulbright. Retrieved from <https://www.nortonrosefulbright.com/en-mo/knowledge/publications/59122fe9/article-6-a-guide-for-the-private-sector>

<sup>57</sup> Granziera, B., Malvar, K. H., & Verdieck, J. (n.d.). Article 6 Explainer: Questions and answers about the COP decisions on carbon markets and what they mean for NDCs, nature, and the voluntary and compliance carbon markets. The Nature Conservancy. <https://www.nature.org/content/dam/tnc/nature/en/documents/c/m/CM-TNC-Article-6-Explainer.pdf>

and perhaps others reserved for its own NDC goals. Additionally, Morocco’s engagement with Article 6 could spur the development of domestic regulations for the VCM – such as defining how voluntary projects should seek a letter of no-objection or how to avoid double counting in its inventory. Since Morocco is preparing regulations now, it has the opportunity to create a synergistic environment where VCM projects are encouraged but with clear rules: likely requiring registration with a national body, contribution to sustainable development locally, and clarity on whether their credits will be exported (with corresponding adjustments) or counted domestically. For Moroccan companies interested in offsetting, the government could also play a role by recognizing certain voluntary credits (perhaps even creating a domestic voluntary market standard or registry)<sup>58 59 60</sup>.

In summary, the trajectory is that voluntary markets and Article 6 mechanisms are drawing closer together. Article 6 brings robust accounting that, if applied to VCM credits, can enhance their integrity (resolving the double-claim issue), while the voluntary market brings a wealth of private-sector innovation, capital, and established methodologies that Article 6 can draw upon. Many expect a “new generation” of carbon markets to emerge where the distinction between a compliance credit and a voluntary credit is less stark, as all credits will ultimately need to contribute to global net-zero goals. Nonetheless, during this transition, close attention is needed to ensure voluntary efforts genuinely add to (and do not undermine) countries’ own climate ambitions.

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<sup>58</sup> United Nations Framework Convention on Climate Change (UNFCCC). (2024, January 18). A6.4 – Form AC-001 Morocco: Morocco’s participation in the Article 6.4 mechanism [PDF]. UNFCCC. Retrieved from [https://unfccc.int/sites/default/files/resource/A6.4\\_Form\\_AC\\_001\\_Morocco.pdf](https://unfccc.int/sites/default/files/resource/A6.4_Form_AC_001_Morocco.pdf)

<sup>59</sup> Granziera, B., Malvar, K. H., & Verdieck, J. (n.d.). Article 6 Explainer: Questions and answers about the COP decisions on carbon markets and what they mean for NDCs, nature, and the voluntary and compliance carbon markets. The Nature Conservancy. <https://www.nature.org/content/dam/tnc/nature/en/documents/c/m/CM-TNC-Article-6-Explainer.pdf>

<sup>60</sup> <https://carbon-pulse.com/343354/#:~:text=Morocco%20will%20launch%20and%20implement,sidelines%20of%20COP29%20in%20Baku>

## 3.6 Benefits and challenges of VCMs

### 3.6.1 Benefits of voluntary carbon markets

When designed and used correctly, VCMs can provide significant environmental and socio-economic benefits.

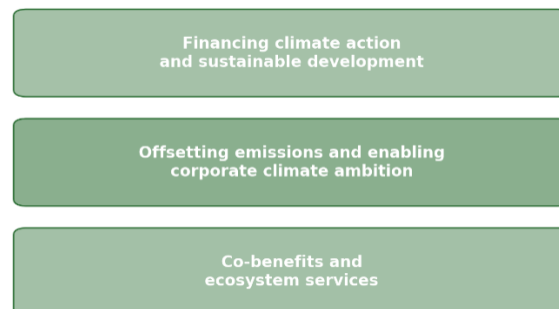


Figure 8: Benefits of voluntary carbon markets

#### ➤ Financing climate action and sustainable development

Perhaps the greatest benefit of VCMs is that they mobilize private finance for emissions reduction projects around the world. This is especially impactful in developing countries and communities that may otherwise lack funding for climate-friendly projects. Carbon credit revenues make projects like reforestation, conservation, or clean energy viable by covering the costs and providing returns to developers. For example, the Katingan Mentaya peatland conservation project in Indonesia – often cited in VCM literature – generated millions of offsets per year, channeling an estimated \$37.5 million annually to protect forests and local livelihoods. Voluntary markets thus help *“unlock the funds necessary to develop these projects and reach the goals of the Paris Agreement,”* by leveraging capital from companies and individuals willing to pay for extra reductions. This is crucial because public finance alone is insufficient for the massive investment needed in climate mitigation. Furthermore, VCM projects often come with co-benefits: they can create local jobs (e.g. forest rangers, project technicians), improve health (e.g. cleaner cookstoves reducing indoor air pollution), preserve biodiversity (forest and wetlands projects protect ecosystems), and empower communities (through profit-sharing or community-led project components). In Africa, where historically the share of carbon finance has been low, VCMs are seen as a tool for both climate and development. In fact, African leaders launched the Africa Carbon Markets Initiative (ACMI) in 2022 to massively scale up VCM activity on the continent – aiming to produce 300 million carbon credits per year by 2030 and 1.5 billion by 2050, which could unlock \$6 billion in revenue by 2030 and support 30 million jobs. This illustrates the development hopes pinned on voluntary

carbon finance as a driver of green growth and funding for Nationally Determined Contributions. Morocco and other African countries see voluntary carbon projects as a way to attract foreign investment in sectors like renewable energy, waste, and forestry, contributing to both national climate targets and local economic goals<sup>61 62</sup>.

➤ **Offsetting emissions and enabling corporate climate ambition**

VCMs provide a mechanism for companies (and individuals) to compensate for their carbon footprint (under “Offset claims”, cf. section 3.2.9), especially emissions that are hard to abate in the near term. By purchasing and retiring carbon credits, organizations can offset their emissions to fulfill “carbon neutral” pledges or meet interim targets on the path to net-zero. This flexibility is valuable for companies in sectors where direct emissions reductions are technologically or economically challenging (e.g. aviation, shipping, heavy industry). High-quality offsets allow such entities to take responsibility for residual emissions while they work on longer-term internal reductions. In many corporate sustainability strategies, offsets via the VCM are one component of climate action – after prioritizing emissions avoidance and reduction, remaining emissions can be offset as a last resort. The benefit here is twofold: it encourages corporate climate ambition (firms set bolder goals knowing they can offset what they cannot yet cut) and it directs private-sector money to global mitigation projects. Some jurisdictions even give recognition or incentives for voluntary offsets (e.g. in certain countries, voluntary offsets might confer tax benefits or count towards CSR contributions). Moreover, through carbon offset purchases, companies often engage with new climate initiatives and can enhance their brand and stakeholder relationships – demonstrating climate leadership and meeting consumer or investor expectations for action. From an ethical standpoint, voluntary offsets also facilitate a form of climate solidarity: typically, the bulk of voluntary credit buyers are in developed nations or high-emitting industries, while many projects are in developing regions. This flow of funds aligns with the principle of common but differentiated responsibility, effectively having those with greater means or historical emissions pay for reductions elsewhere<sup>63 64</sup>.

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<sup>61</sup> Battocletti, V., Enriques, L., & Romano, A. (2024, April 11). The voluntary carbon market: Market failures and policy implications. University of Colorado Law Review, 95.

<https://lawreview.colorado.edu/print/volume-95/the-voluntary-carbon-market-market-failures-and-policy-implications/>

<sup>62</sup> United Nations Economic Commission for Africa (UNECA). (June 2023). Carbon markets for Africa: A primer [PDF]. UNECA. Retrieved from

<https://akmh.uneca.org/sites/default/files/OIBC/4/Carbon%20Markets%20-%20A%20primer.pdf>

<sup>63</sup> Battocletti, V., Enriques, L., & Romano, A. (2024, April 11). The voluntary carbon market: Market failures and policy implications. University of Colorado Law Review, 95.

<https://lawreview.colorado.edu/print/volume-95/the-voluntary-carbon-market-market-failures-and-policy-implications/>

<sup>64</sup> Granziera, B., Malvar, K. H., & Verdieck, J. (n.d.). Article 6 Explainer: Questions and answers about the COP decisions on carbon markets and what they mean for NDCs, nature, and the voluntary and

### ➤ **Co-benefits and ecosystem services**

Many carbon projects, especially nature-based solutions (like reforestation, avoided deforestation, wetland restoration), produce significant co-benefits beyond carbon. Forest conservation projects not only sequester CO<sub>2</sub> but also protect biodiversity and water cycles, and often support indigenous land rights. Renewable energy projects can improve local air quality and reduce reliance on fossil fuel imports. Efficient cookstove projects reduce fuel wood consumption (helping forests) and improve household health for women and children. These additional benefits are frequently monitored and reported. Standards like the Gold Standard require sustainable development outcomes (e.g. number of jobs created, health improvements) alongside carbon accounting. Buyers increasingly value these co-benefits for ESG reporting – a credit that not only offsets emissions but also contributes to the UN Sustainable Development Goals has extra appeal. As a result, VCM can incentivize holistic sustainability projects. Some projects even combine carbon finance with adaptation or community resilience efforts, creating integrated climate solutions. In Morocco, for example, a hypothetical voluntary project might involve restoring oases or rangelands – sequestering carbon in soils, while also improving water management and agricultural productivity for local farmers (multi-benefit outcomes). Such synergies underscore the appeal of well-designed carbon projects: they address climate change and directly improve lives<sup>65</sup>.

### **3.6.2 Challenges**

Despite its potential, the voluntary carbon market faces several challenges and criticisms that must be managed to ensure it truly delivers climate benefits:

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compliance carbon markets. The Nature Conservancy.

<https://www.nature.org/content/dam/tnc/nature/en/documents/c/m/CM-TNC-Article-6-Explainer.pdf>

<sup>65</sup> Granziera, B., Malvar, K. H., & Verdieck, J. (n.d.). Article 6 Explainer: Questions and answers about the COP decisions on carbon markets and what they mean for NDCs, nature, and the voluntary and compliance carbon markets. The Nature Conservancy.

<https://www.nature.org/content/dam/tnc/nature/en/documents/c/m/CM-TNC-Article-6-Explainer.pdf>



Figure 9: Challenges of voluntary carbon markets

### ➤ Integrity and quality of credits

A major challenge is ensuring that every carbon credit sold represents a real, additional, and permanent reduction or removal of 1 ton of CO<sub>2</sub>e. There have been numerous cases and studies suggesting that some credits in the market do *not* live up to their claims. Issues such as lack of additionality, overstated baselines (overestimating what emissions would have been, thus over-crediting “phantom” reductions), and non-permanence (forest projects that later experience fires or logging, negating the carbon benefit) can undermine confidence. For instance, independent research in 2023 found that many REDD+ forest conservation projects were credited with far more reductions than what was actually achieved on the ground. If buyers purchase such inflated credits, global emissions are not actually offset – this is a serious credibility problem. Verification and standards oversight are supposed to catch these issues, but the quality varies. Some older projects under loose methodologies generated cheap credits that are viewed as low integrity (often the target of “carbon offset is greenwashing” critiques).

The good news is the market is responding: initiatives like the IC-VCM have formulated Core Carbon Principles to tighten quality requirements, and rating agencies (e.g. Sylvera, BeZero) now score projects on their likelihood of delivering promised climate outcomes. Still, buyer beware applies – companies must do due diligence to buy high-quality credits, otherwise they risk claims of greenwashing or even fraud. Ensuring integrity also means addressing leakage (making sure a project’s emission reductions aren’t cancelled out by emissions shifting elsewhere – something standards attempt to account for) and robust

monitoring throughout a project’s life. The challenge of quality is ongoing: the market’s credibility hinges on only genuine climate benefits being sold<sup>66 67 68</sup>.

### ➤ **Transparency and oversight**

The voluntary market has been criticized for opacity and lack of centralized oversight. Unlike regulated markets, there is no single regulator. Information on project performance or credit ownership can sometimes be fragmented. This can lead to double counting risks, where the same reduction might be counted twice in different contexts (as discussed with Article 6, or even two companies accidentally buying the same credit from unscrupulous intermediaries – though registry systems largely prevent selling the exact same credit twice). Double claiming at the country level (host country and buyer country both claiming the emission reduction) is a particular concern addressed in the previous section. The governance of VCMs is being strengthened through collaborations (for example, the aforementioned IC-VCM and the VCM Integrity Initiative involve governments and NGOs aiming to provide guidance), but enforcement is tricky since participation is voluntary. There is also the challenge of fragmentation: multiple standards and registries exist, and not all are equal. Some national or small-scale standards may issue credits that international markets view with skepticism. A lack of universal benchmarking made it difficult for buyers to compare credits. Efforts to increase transparency include the development of meta-registries and databases (the UNFCCC’s Carbon Offset Platform, or the World Bank’s Climate Warehouse prototype) and requirements for public disclosure of corporate offset usage. Nonetheless, until robust global oversight or alignment with Article 6 becomes the norm, the onus is on market participants to maintain transparency. Voluntary markets have historically been a bit of a “wild west,” but this is changing as they scale and attract greater scrutiny.

### ➤ **Double-counting and claims issues**

As highlighted, double counting of emissions reductions is a critical issue. If not managed, it can undermine the climate benefit of VCM projects. Double counting can occur in various ways: two different entities (or countries) claiming the same reduction, or a single reduction being sold multiple times (which registry systems prevent by retiring

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<sup>66</sup> <https://www.worldbank.org/content/dam/documents/sanctions/other-documents/2025/apr/Cooksey.B.IntegrityRisks.pdf#:~:text=that%3A%20%E2%80%98%E2%80%A6%20the%20current%20design,%E2%80%9925>

<sup>67</sup> CarbonCredits.com. (2022, August 10). The carbon credit lifecycle. Retrieved August 6, 2024, from <https://carboncredits.com/the-carbon-credit-lifecycle/>

<sup>68</sup> Tang, Y., Martin, S., & Riordan, R. (2024, May). Understanding voluntary carbon markets: Key considerations for professional accountants and purchasers on the carbon credit life cycle. Chartered Professional Accountants of Canada, International Federation of Accountants, and Institute for Sustainable Finance (Smith School of Business, Queen’s University).

serial numbers after sale). The Paris Agreement context introduced the risk of double claiming between a host country and a credit buyer. Without Article 6 alignment, a country could count a project's reductions toward its NDC, while a company simultaneously uses the credits – meaning globally the emission reduction is counted twice. That's why some voluntary standards (Gold Standard in particular) have advocated that post-2020 credits should have corresponding adjustments if they are to be used for offsetting claims. Until this is resolved uniformly, there's a risk that some credits (especially those from countries on track to meet their NDCs) could face the criticism of enabling “double claiming.” Companies must be cautious in making claims: the VCM's Claims Code (released in 2023) provides guidelines on what kinds of claims are acceptable (e.g. a company should not use offsets to claim it is aligned with Paris goals unless those offsets have adjustments, etc.). Misleading claims – like saying “100% carbon neutral” while relying on low-quality offsets – are a reputational and even legal risk (advertising standards in some countries are cracking down on greenwashing). Thus, the market's challenge is not just to avoid actual double counting, but also to clearly communicate what a credit represents and what claims it justifies, to maintain public trust<sup>69</sup>.

### ➤ **Complexity and market access**

The process of developing a carbon project and navigating the market is complex and often costly. Preparing validation documents, monitoring reports, undergoing verification, and paying fees to standards can be a heavy burden – often tens or hundreds of thousands of dollars in transaction costs. For small community projects or projects in least-developed countries, this can be prohibitive. There is a risk that the VCM becomes dominated by larger projects or aggregators, leaving out smaller, community-driven initiatives (or eating into their share of revenue). Efforts are needed to streamline methodologies and provide upfront finance or capacity-building for smaller actors. Additionally, the rules and methodologies themselves are technical; keeping up with methodological updates or new reporting requirements (like when standards revise baselines or impose new buffer rules) adds to the complexity for project developers. On the buyer side, the plethora of standards and project types can be confusing – buyers may not easily tell which credits are truly robust. This complexity can deter potential participants or lead to suboptimal choices (e.g. chasing the cheapest credit rather than the most impactful due to lack of understanding). Simplifying access – through standardized contracts, clearer rating systems, or perhaps digital monitoring innovations

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<sup>69</sup> Granziera, B., Malvar, K. H., & Verdieck, J. (n.d.). Article 6 Explainer: Questions and answers about the COP decisions on carbon markets and what they mean for NDCs, nature, and the voluntary and compliance carbon markets. The Nature Conservancy.  
<https://www.nature.org/content/dam/tnc/nature/en/documents/c/m/CM-TNC-Article-6-Explainer.pdf>

(like using satellite data to reduce verification costs) – is an ongoing challenge for scaling the VCM.

### ➤ **Market volatility and uncertainty**

As a market largely driven by voluntary demand, the VCM has experienced boom-bust cycles. Prices for voluntary credits have historically been quite low (often just a few dollars per tonne for generic credits) due to oversupply from certain project types (like old hydro projects or industrial gas credits) and inconsistent demand. There's a challenge in establishing a stable, predictable price signal that could incentivize long-term projects (e.g. forestry which requires decades of commitment). Recently, demand has been rising as more companies make net-zero pledges, and initiatives like the Taskforce on Scaling Voluntary Carbon Markets (led by Mark Carney and others in 2021) have worked on creating standard market infrastructure to boost liquidity and confidence. However, the market remains vulnerable to changes in public sentiment (e.g. exposés of low-quality offsets can reduce demand for a period) and regulatory changes (if compliance markets expand, they might either absorb some voluntary projects or conversely make offsets redundant if emissions are capped). The uncertainty can also be a challenge for project developers: investing in a project hoping to sell credits at a certain price years down the line carries risk if the market price falls or if standards evolve (for example, some projects developed under earlier lax rules lost favor and their credits became unsellable)<sup>70</sup>.

### **3.6.3 VCMs overcoming challenges**

In light of these challenges, several measures are being pursued to bolster the VCM's effectiveness. These include the Core Carbon Principles (CCPs) as a global quality benchmark<sup>71</sup>, national regulations for transparency (some countries are creating voluntary market registries or requiring project disclosure), integration with Article 6 accounting to resolve double counting, and increasing stakeholder engagement to ensure projects are beneficial and welcomed by local communities (preventing issues like lack of local consent or benefit sharing, which have caused backlash in some REDD+ projects).

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<sup>70</sup> Battocletti, V., Enriques, L., & Romano, A. (2024, April 11). The voluntary carbon market: Market failures and policy implications. *University of Colorado Law Review*, 95. <https://lawreview.colorado.edu/print/volume-95/the-voluntary-carbon-market-market-failures-and-policy-implications/>

<sup>71</sup> A set of high-level integrity criteria developed by the Integrity Council for the Voluntary Carbon Market (ICVCM) to define what constitutes a credible carbon credit. They assess whether credits represent real, additional, and verifiable climate benefits, providing a common quality benchmark across voluntary carbon market standards. The first carbon credits in Africa to be publicly associated with the CCP label were issued by BURN through its clean-cooking projects in Kenya.

The rise of carbon credit rating agencies—such as BeZero Carbon, Calyx Global, Renoster, and Sylvera—and specialized data platforms like AlliedOffsets, Trove Research, or Ecosystem Marketplace is improving information symmetry. These actors help buyers identify high-quality credits, benchmark projects against global standards, and discourage the proliferation of poor-quality credits<sup>72 73</sup>.

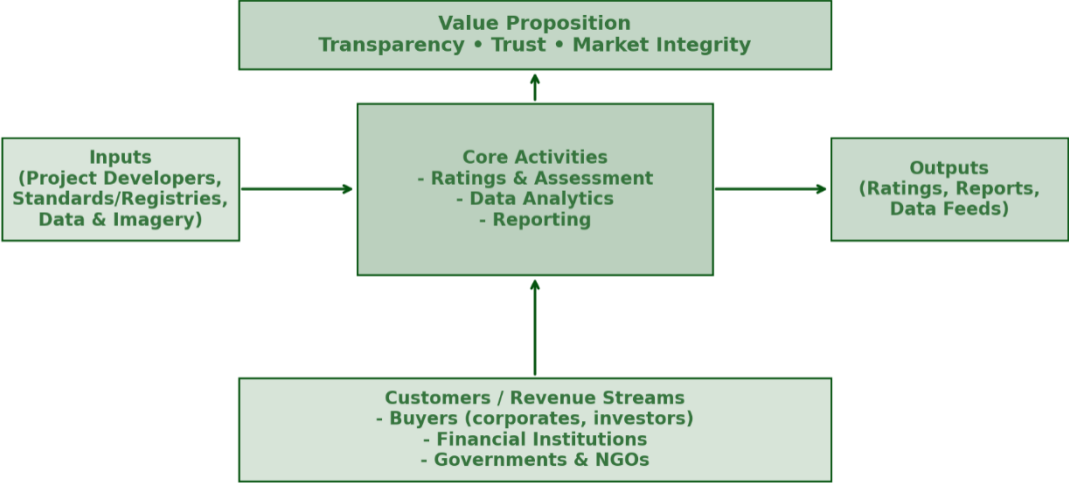


Figure 10: carbon credit rating agency business model

Finally, a nuanced challenge is the philosophical one: some argue that offsets could be a distraction, allowing companies or countries to delay cutting their own emissions by buying their way out, potentially undermining the deep decarbonization needed. This criticism often surfaces in media: if offsets are cheap, a company might do “business as usual” and simply offset everything, which doesn’t solve the climate crisis long-term if underlying emissions aren’t reduced. The counterargument is that offsets are meant to be a bridge and a finance mechanism, not a substitute for direct action. To address this, initiatives like the VCMi emphasize that companies should meet certain internal reduction criteria before relying on offsets for claims. Many companies also now adopt the “mitigation hierarchy” – reduce first, offset the unavoidable remainder. Maintaining this balance is key to the credibility of voluntary offsets as a climate tool.

In conclusion, voluntary carbon markets come with significant promise as well as significant challenges. They can accelerate funding for climate solutions and engage a

<sup>72</sup> Tang, Y., Martin, S., & Riordan, R. (2024, May). Understanding voluntary carbon markets: Key considerations for professional accountants and purchasers on the carbon credit life cycle. Chartered Professional Accountants of Canada, International Federation of Accountants, and Institute for Sustainable Finance (Smith School of Business, Queen’s University).

<sup>73</sup> World Bank. (2022). Navigating Decisions on Carbon Markets. World Bank Group. <https://documents1.worldbank.org/curated/en/099741211072431295/pdf/IDU190e6edbe1d5ea1413c195781f644b2a5ebca.pdf>

broad set of actors in emissions reductions, complementing government policies. Real-world examples show both success stories (projects that measurably cut emissions and uplift communities) and cautionary tales (credits that didn't deliver, or projects that caused controversy). For countries like Morocco and others in Africa, a well-regulated, high-integrity VCM could attract investment and contribute to climate targets, but it requires putting guardrails in place (ensuring alignment with NDCs, protecting community interests, etc.). As the market matures, driven by initiatives to standardize and Article 6 integration, many of these challenges are being actively addressed. The next few years will likely determine how effectively the VCM can scale up while maintaining trust. If successful, voluntary carbon markets will be a valuable piece of the broader climate solution puzzle – financing emission reductions that would not happen otherwise, and engaging the private sector to go above and beyond what regulation requires in the race to a net-zero world<sup>74</sup>.

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<sup>74</sup> Battocletti, V., Enriques, L., & Romano, A. (2024, April 11). The voluntary carbon market: Market failures and policy implications. *University of Colorado Law Review*, 95. <https://lawreview.colorado.edu/print/volume-95/the-voluntary-carbon-market-market-failures-and-policy-implications/>



## 4. THE DYNAMIC OF VOLUNTARY CARBON MARKETS IN MOROCCO

## 4. The dynamic of Voluntary Carbon Markets in Morocco

### 4.1 Voluntary carbon credits issued in Morocco

The Voluntary Carbon Market is emerging as a complementary tool to compliance markets, enabling Morocco to attract climate finance while supporting its ambitious renewable energy and sustainability goals. Although the country has made progress in building a diverse pipeline of projects, actual issuances and retirements remain modest. This chapter provides an overview of Morocco’s VCM, using project-level data consolidated from international registries<sup>75</sup>.

#### 4.1.1 Project Portfolio

Morocco hosts 14 VCM projects, registered under the two leading international standards: 8 under Verra’s Verified Carbon Standard (VCS) and 6 under the Gold Standard (GS). The portfolio is heavily concentrated in renewable energy, while also showing initial diversification into agriculture, forestry, and waste management<sup>76 77</sup>.

Table 6: Summary of Morocco’s carbon credits portfolio

Dimension	Breakdown
Number of projects per registry	<ul style="list-style-type: none"> <li>- Verra VCS: 8</li> <li>- Gold Standard: 6</li> </ul>
Scope	<ul style="list-style-type: none"> <li>- Renewable Energy: 11</li> <li>- Waste: 1</li> <li>- Forestry &amp; Land Use: 1</li> <li>- Agriculture: 1</li> </ul>
Project Type	<ul style="list-style-type: none"> <li>- Wind: 5</li> <li>- Solar (Centralized): 5</li> <li>- Solar (Distributed): 1</li> <li>- Landfill Methane: 1</li> <li>- Afforestation/Reforestation: 1</li> <li>- Sustainable Agriculture: 1</li> </ul>
Credit Nature	<ul style="list-style-type: none"> <li>- Reduction: 12</li> </ul>

<sup>75</sup> Barbara K Haya, Pamela Quartson, Tyler Bernard, Aline Abayo, Xinyun Rong, Ivy S So, Micah Elias. (2025). Voluntary Registry Offsets Database v2025-07, Berkeley Carbon Trading Project, University of California, Berkeley. Retrieved from: <https://gspp.berkeley.edu/berkeley-carbon-trading-project/offsets-database>.

<sup>76</sup> Data as of July 2025

<sup>77</sup> Strictly speaking, CDM is not considered part of the VCM, because it was created as a compliance mechanism initially. But in practical usage, CERs are often traded in voluntary contexts when buyers (companies, institutions) choose them to offset emissions voluntarily. VCM standards and platforms like Verra VCS or Gold Standard explicitly list CERs as eligible for voluntary offsetting, although demand for CERs is far lower compared to newer VCM standards

	<ul style="list-style-type: none"> <li>- Removal: 1 (impermanent)</li> <li>- Mixed: 1</li> </ul>
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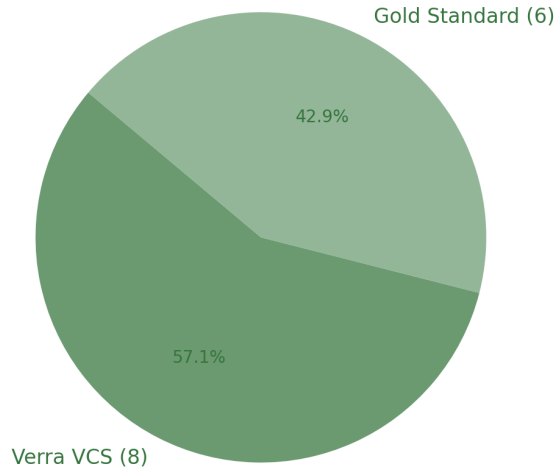


Figure 11: Moroccan projects by registry

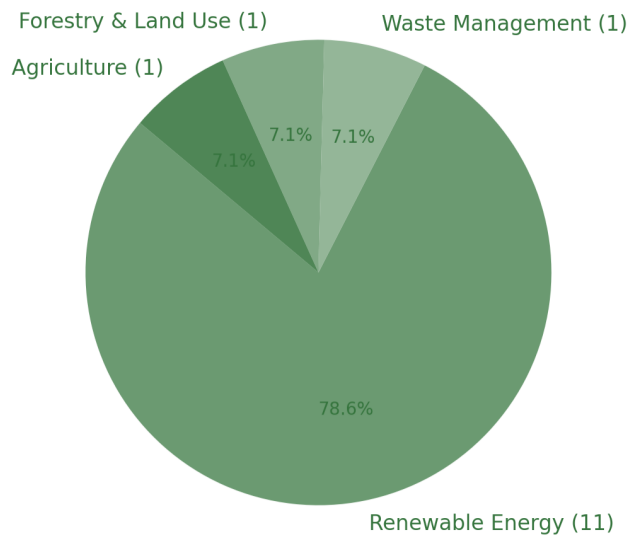


Figure 12: Moroccan carbon projects by Scope

#### 4.1.2 Mitigation Potential

The Estimated Annual Emission Reductions (EAER) across all projects reach more than 4.4 million tCO<sub>2</sub>e per year. Most of this comes from large-scale solar and agriculture projects.

Table 7: Estimated Annual Emission Reductions for Moroccan carbon credits (VCMs)

Project Type	EAER (tCO <sub>2</sub> e/year)
Solar – Centralized	1,941,553
Sustainable Agriculture	1,808,055
Wind	604,598
Landfill Methane	64,000
Solar – Distributed	7,537
Afforestation/Reforestation	6,660
<b>Total</b>	<b>4,432,403</b>

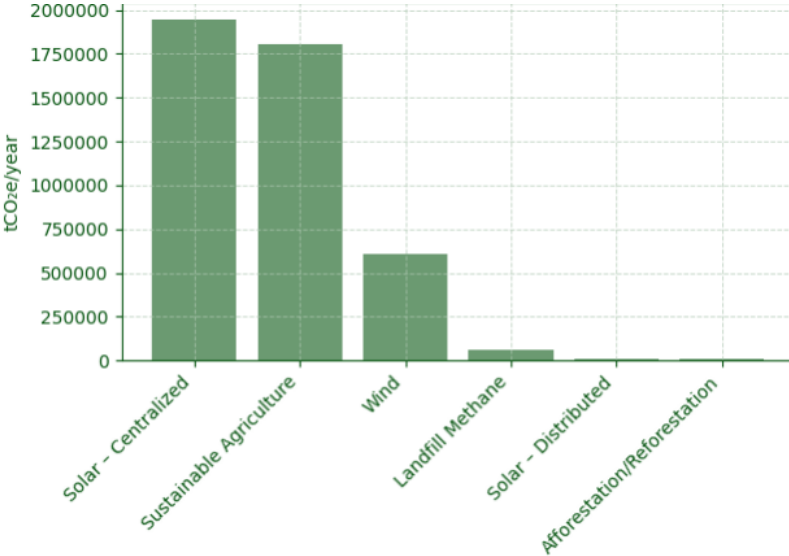


Figure 13: Estimated Annual Emission Reductions by Project Type – solar and agriculture dominate Morocco’s mitigation potential

**4.1.3 From Estimates to issuances: Explaining the Gap**

Although Morocco’s EAER exceeds 4.4 million tCO<sub>2</sub>e/year, only 1.22 million credits have been issued to date. This gap is typical of VCMs worldwide and arises from verification lags, implementation delays, differences between projected and actual performance, and market timing strategies by developers.

## Credits Issued

So far, Moroccan projects have issued about 1.22 million credits, overwhelmingly from renewable energy.

Table 8: Estimated carbon credits (VCMs) issued in Morocco

Project Type	Credits Issued	Share of Total
Solar – Centralized	821,716	67%
Wind	401,506	33%
Solar – Distributed	760	<1%
Afforestation/Reforestation	0	0%
Landfill Methane	0	0%
Sustainable Agriculture	0	0%
<b>Total</b>	<b>1,223,982</b>	<b>100%</b>

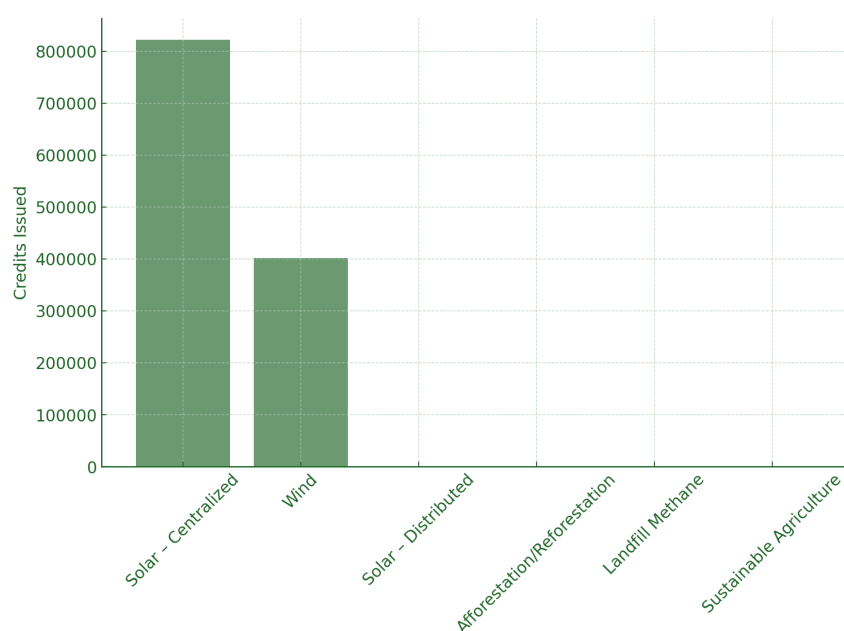


Figure 14: Credits Issued by Project Type

### 4.1.4 Retirements and Remaining Credits

Of the credits issued, about 32% have been retired while the majority remain available in registries.

Table 9 : Statistics on Moroccan carbon credits retirements and remaining credits (VCMs)

Category	Credits
Total Credits Issued	1,223,982
Total Credits Retired	390,106
Total Credits Remaining	833,876

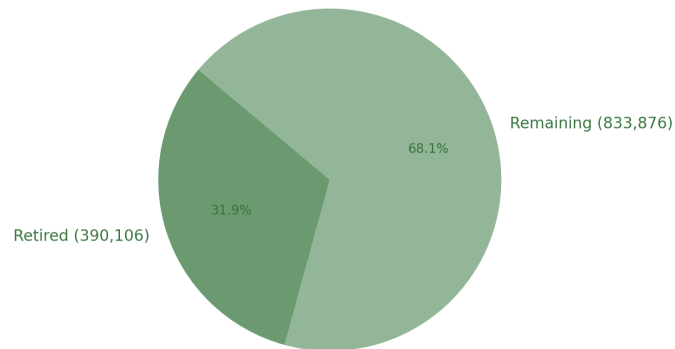


Figure 15: Issued Credits: Retired vs Remaining – 32% retired, 68% available.

#### 4.1.5 Summary

retirements Morocco’s VCM participation is at a formative stage. With a project portfolio anchored in renewable energy, the country shows significant mitigation potential but modest issuances and so far.

Key takeaways:

- Portfolio: 14 projects, dominated by wind and solar.
- Potential: 4.4 MtCO<sub>2</sub>e/year EAER, mostly from large-scale solar and agriculture.
- Issuances: 1.22 million credits, almost all from renewables.
- Retirements: 32% of issued credits, with the remainder available for sale.

To scale its impact, Morocco will need to accelerate verification cycles, diversify project types, and enhance market visibility. With the right enabling policies and international partnerships, Morocco can grow into a competitive supplier of high-quality credits in Africa.

## 4.2 Morocco vs other North African Countries: Comparative Snapshot of VCM Activity

Within North Africa, three countries—Egypt, Morocco, and Tunisia—have projects registered in the voluntary carbon markets. While Morocco and Egypt both host 8 projects each, Tunisia trails with only 2. In terms of mitigation potential (EAER), Egypt leads with nearly 3.8 million tCO<sub>2</sub>e/year, followed by Morocco with 2.35 million, and Tunisia with 0.15 million. Egypt also dominates issuances with over 2 million credits compared to Morocco’s 402,000, while Tunisia has yet to issue any. However, Morocco is the only country with retirements (86,500 credits), signaling actual market uptake.

Table 10: Comparing Moroccan VCMs to other north African countries

Country	Projects	EAER (tCO <sub>2</sub> e/year)	Credits Issued	Credits Retired	Credits Remaining
<b>Egypt</b>	20	5,862,535	3,612,016	553,173	3,058,843
<b>Morocco</b>	14	4,432,403	1,223,982	390,106	833,876
<b>Tunisia</b>	3	164,381	0	0	0

### 4.2.1 Number of Projects

Egypt and Morocco are the most active, with 20 and 14 projects respectively, while Tunisia lags far behind with only 3. Morocco has consolidated a strong position in the regional landscape, though Egypt dominates in terms of scale.

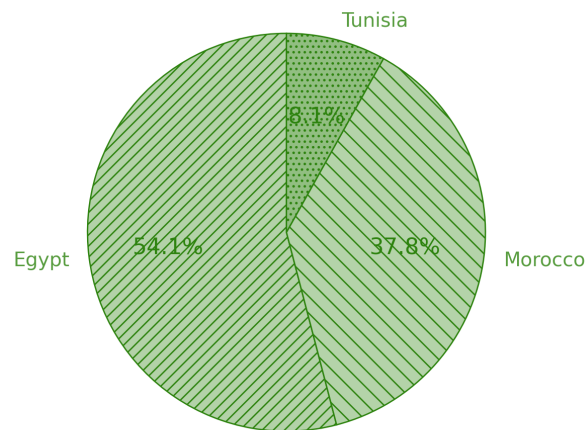


Figure 16: Distribution of VCM Projects Across North African Countries

### 4.2.2 Mitigation Potential (EAER)

Egypt's nearly 5.9 million tCO<sub>2</sub>e/year mitigation potential reflects its large-scale solar and wind projects. Morocco follows with 4.43 million tCO<sub>2</sub>e/year, supported by a balanced mix of solar, wind, and agriculture projects. Tunisia remains marginal with 164,000 tCO<sub>2</sub>e/year, mostly at the conceptual stage.

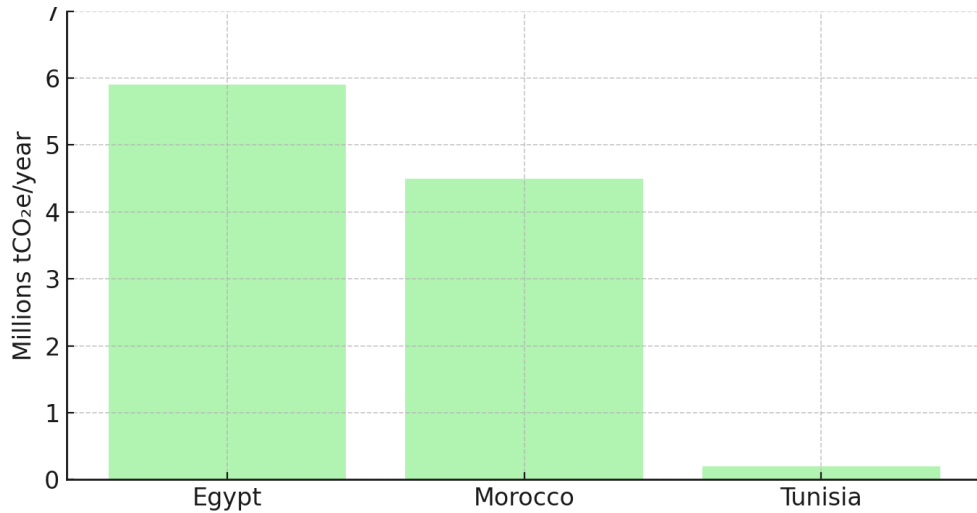


Figure 17: Estimated Annual Emission Reductions (EAER)

### 4.2.3 Credits Issued and Retired

Egypt has issued more than 3.6 million credits, positioning it as the regional leader in supply, although retirements remain modest at 553,173. Morocco has issued fewer credits (1.22 million) but leads in credibility with 390,106 credits already retired (≈32% of issuances), signaling strong buyer confidence. Tunisia has not yet issued or retired any credits.

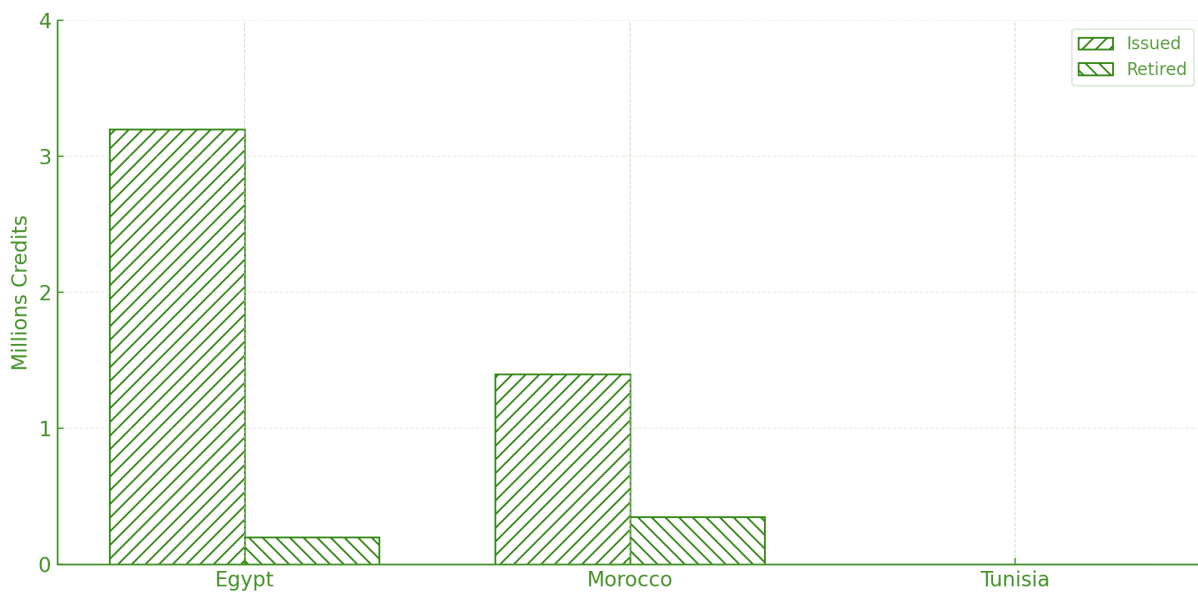


Figure 18: Credits Issued and Retired by North African Countries

#### 4.2.4 Credits Remaining

Egypt retains the largest available supply with over 3 million credits still in registries, compared to Morocco's 833,876. Tunisia has none. This underscores Egypt's dominance in pipeline volume, while Morocco distinguishes itself through earlier retirements and higher buyer engagement.

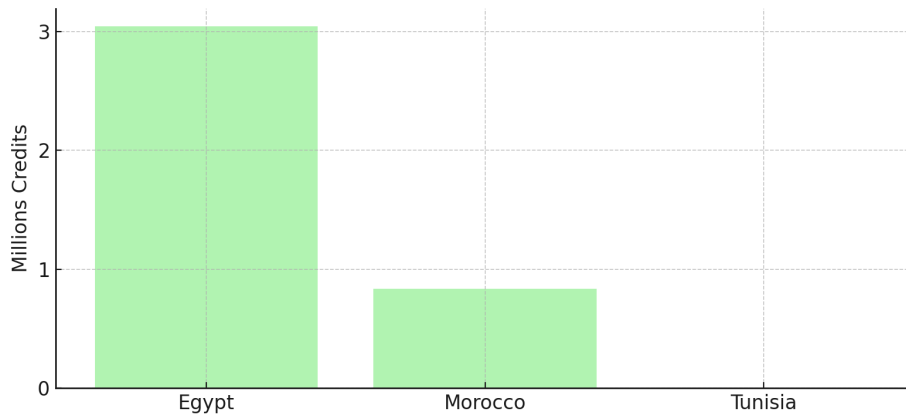


Figure 19: Credits Remaining by country

#### 4.2.5 Summary

Egypt, Morocco, and Tunisia illustrate different trajectories in the voluntary carbon markets. Egypt currently has the largest activity with 20 projects, a mitigation potential of about 5.9 MtCO<sub>2</sub>e/year, and more than 3.6 million credits issued. This outcome reflects the development of several large-scale renewable energy projects, supported by international financing and partnerships.

Morocco has 14 projects with a mitigation potential of 4.43 MtCO<sub>2</sub>e/year. Although the total number of issued credits (1.22 million) is lower than Egypt's, Morocco shows a relatively high proportion of retirements (32% of issuances). This indicates a level of market engagement, with credits being used rather than remaining entirely in registries. Morocco's portfolio is more diversified, spanning solar, wind, and agriculture, but the average project scale is smaller compared to Egypt.

Tunisia's participation is still limited. With three projects, 0.16 MtCO<sub>2</sub>e/year of potential, and no credits issued or retired, activity remains at an early stage. Project pipelines are modest, and no significant market transactions have yet taken place.

## 4.3 Morocco vs leading Sub-Saharan African countries: Comparative Snapshot of VCM Activity

### 4.3.1 Overview

In Sub-Saharan Africa, several countries—Kenya, Democratic Republic of the Congo (DRC), Uganda, South Africa, Ghana, Rwanda, Ethiopia, and Tanzania—have positioned themselves as leaders in the voluntary carbon market (VCM). Their project pipelines and issuance volumes far exceed Morocco’s, reflecting both earlier engagement with the VCM and the large-scale adoption of forestry, land use, and household/community energy projects.

Table 11: VCMs per country comparison table (Morocco & SSA countries)

Country	Projects	EAER (tCO <sub>2</sub> e/yr)	Credits Issued	Credits Retired	Credits Remaining
Kenya	325	73,746,005	75,289,023	39,339,562	35,949,461
DRC	50	53,655,773	44,048,688	20,290,465	23,758,223
Uganda	283	21,951,806	29,390,592	19,864,055	9,526,537
South Africa	129	26,878,740	17,490,245	14,461,577	3,028,668
Ghana	57	7,904,498	14,233,622	9,842,581	4,391,041
Rwanda	213	15,069,215	13,976,482	4,270,358	9,706,124
Ethiopia	84	8,129,234	12,413,023	9,293,009	3,120,014
Tanzania	69	16,409,662	7,487,123	5,141,214	2,345,909
Morocco	14	4,432,403	1,223,982	390,106	833,876

### 4.3.2 Number of Projects

Kenya leads by a wide margin with 325 projects, followed by Uganda (283) and Rwanda (214). South Africa also maintains a sizable portfolio (129). Morocco, with just 14 projects, is at the bottom of the ranking, highlighting its modest pipeline relative to Sub-Saharan peers.

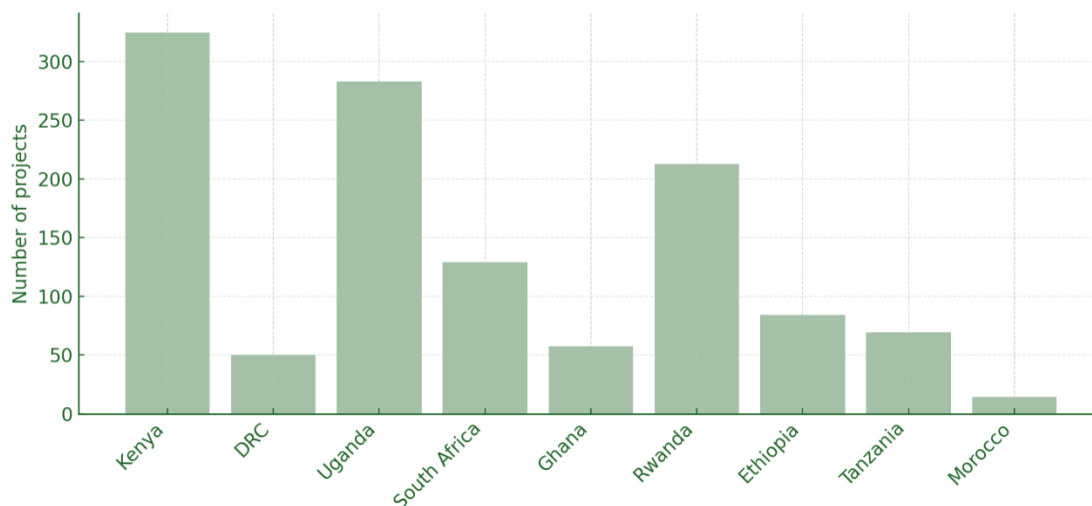


Figure 20: Number of VCMs projects Morocco vs SSA countries

### 4.3.3 Mitigation Potential (EAER)

In terms of Estimated Annual Emission Reductions (EAER), Kenya emerges as the regional leader, with nearly 74 million tCO<sub>2</sub>e/year, driven largely by large-scale household energy and land-use projects. It is followed by the Democratic Republic of Congo (DRC), which achieves roughly 54 million tCO<sub>2</sub>e/year, reflecting the country’s strong presence in forest-based mitigation. Other Sub-Saharan African countries—including South Africa (26.9 million), Uganda (22 million), Tanzania (16.4 million), and Rwanda (15.1 million)—also contribute sizeable volumes. By contrast, Morocco’s EAER remains modest at 4.43 million tCO<sub>2</sub>e/year, a level consistent with its smaller project pipeline and the absence of large-scale forestry or land-use initiatives that dominate mitigation volumes in Sub-Saharan Africa.

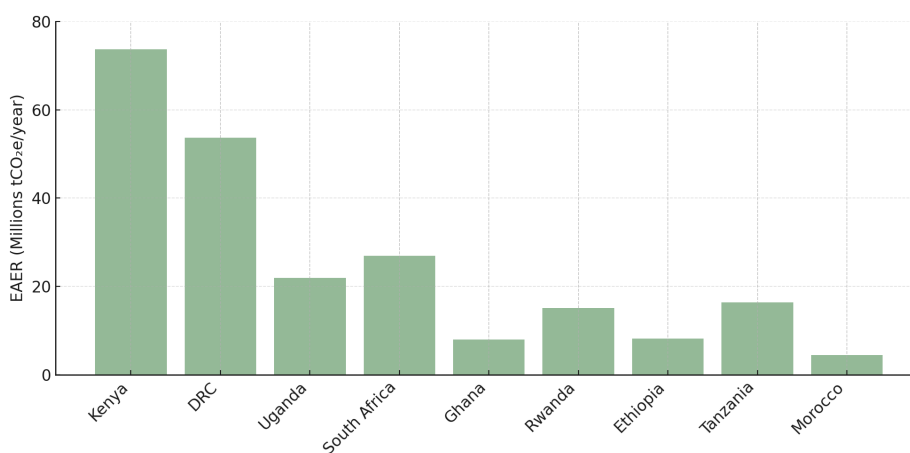


Figure 21: Mitigation Potential (EAER) Morocco vs SSA countries

### 4.3.4 Credits Issued and Retired

Across the comparison group, Kenya records the highest volume of issued credits, exceeding 75 million, followed by the Democratic Republic of Congo with around 44 million, and Uganda with close to 29 million. At the lower end of the spectrum, Morocco has issued approximately 1.22 million credits, reflecting a more limited project pipeline.

Retirement patterns show notable variation between countries. South Africa has retired about 83% of the credits it has issued, while Ethiopia and Ghana display similarly high ratios of roughly 75% and 69%, respectively. Morocco's retirement ratio of around 32% indicates a moderate level of market activity when compared to its Sub-Saharan African peers.

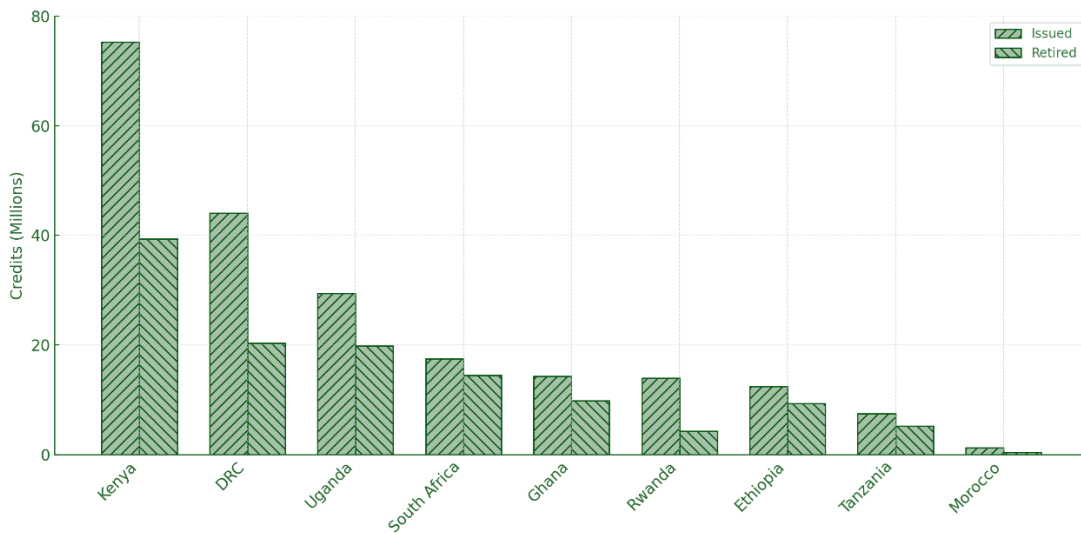


Figure 22: Credits Issued and Retired Morocco vs SSA countries

### 4.3.5 Credits Remaining

In terms of remaining credits, Kenya and the DRC hold the largest available supply, with approximately 36 million and 24 million credits still unused, respectively. Other Sub-Saharan African countries also maintain varying levels of remaining supply, reflecting the scale and maturity of their project portfolios. By comparison, Morocco has about 834,000 credits remaining, a level that highlights its relatively limited footprint within the overall supply landscape.

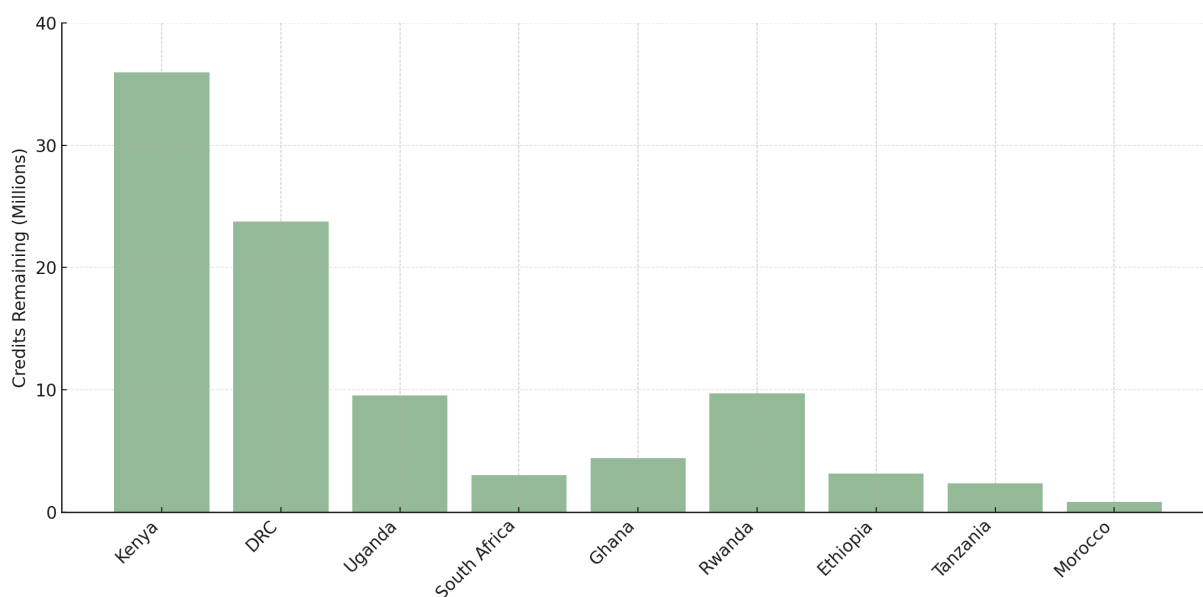


Figure 23: Credits Remaining by country

### 4.3.6 Summary

While Morocco has made progress in developing VCM projects, it remains a marginal actor compared to Sub-Saharan leaders. Countries such as Kenya, Uganda, and Rwanda have scaled household and community energy projects, which are highly replicable and cost-effective. DRC and Ethiopia have leveraged their vast tropical forest endowments to implement large-scale REDD+ projects that generate exceptionally high issuance volumes. Meanwhile, South Africa and Ghana rely on more diversified portfolios, supported by stronger institutional ecosystems.

Morocco, by contrast, is constrained not only by its sectoral concentration and late entry into the market but also by its geography and natural resource base. Unlike Central and East African countries, Morocco does not have the extensive tropical forests or rural biomass reliance that underpin large-scale REDD+ or cookstove projects. Its comparative advantage lies in wind and solar projects and potentially sustainable agriculture and dryland restoration, but these typically yield fewer credits per project.

As a result, Morocco has issued just over 1.2 million credits, with ~32% retired, compared to tens of millions in Sub-Saharan countries. Its early retirements demonstrate credibility, but its scale remains insufficient to compete with continental leaders. Closing this gap will require diversification into land-use and community-level projects, acceleration of MRV cycles, and stronger market infrastructure, adapted to Morocco's ecological and socio-economic realities.

## 4.4 Selection of Moroccan case studies

### 4.4.1 Case Study 1: Oualidia Wind Farm

#### ➤ Project Overview

The Oualidia Wind Farm Project is a grid-connected renewable energy initiative located in the coastal region of Oualidia, Morocco. Developed under the Verified Carbon Standard (VCS), the project involves the installation of modern wind turbines with a total capacity of approximately 35.6 MW. The project is registered in the VCS registry and applies methodology ACM0002 – Grid-connected electricity generation from renewable sources, adapted for wind energy.

The project's primary objective is to displace fossil fuel-based electricity generation in Morocco's national grid, reducing greenhouse gas emissions and supporting Morocco's broader energy transition targets.

Table 12: Key data Snapshot for carbon credits issuance by AERA Group

Category	Details
Project Type	Grid-connected Wind Farm
Project developer	AERA Group
Location	Oualidia, Morocco
Capacity	35.6 MW
Methodology	ACM0002 (VCS)
Registry	Verified Carbon Standard (VCS)
Estimated Annual Emission Reductions	~ 54 114 tCO <sub>2</sub> e/year

#### ➤ Project Design and Implementation

The Oualidia Wind Farm consists of a series of wind turbines strategically positioned along Morocco's Atlantic coast, benefiting from strong and consistent wind resources. The project was developed by a Moroccan subsidiary of an international renewable energy company, with financing support structured around carbon credit revenues.

- **Technology:** Modern onshore wind turbines, grid-connected
- **Capacity:** 35.6 MW
- **Baseline Scenario:** In the absence of the project, equivalent electricity would have been generated from Morocco's thermal power plants, primarily coal and fuel oil

- **Innovation Highlight:** Early use of carbon finance to de-risk renewable energy investments in Morocco, prior to the massive scale-up of solar and wind under the Noor and Tarfaya projects

#### ➤ **Climate Impact (Carbon Performance)**

The Oualidia Wind Farm generates significant carbon reductions by displacing fossil fuels in the national grid.

- **Estimated Annual Emission Reductions (EAER):** ~90,000 tCO<sub>2</sub>e/year
- **Total Expected Credits (first crediting period):** Over 1 million tCO<sub>2</sub>e
- **Methodology Applied:** ACM0002 (CDM/VCS)
- **Registry:** Verified Carbon Standard (VCS)

These credits are verified and issued through the VCS Impact Registry, where they can be sold to international buyers seeking high-quality renewable energy offsets.

#### ➤ **Sustainable Development Co-Benefits**

Beyond carbon reductions, the project has delivered multiple co-benefits aligned with Morocco's sustainable development priorities:

- **Economic Benefits:** Job creation during construction and operation; contracts for local service providers; increased tax revenues for local authorities.
- **Social Benefits:** Training programs for Moroccan engineers and technicians, strengthening local capacity in renewable energy.
- **Environmental Benefits:** Displacement of fossil fuels reduces local air pollution; project development included environmental safeguards to minimize impacts on bird migration routes.

The Oualidia Wind Farm thus contributes to Morocco's twin objectives of decarbonization and green industrial development.

#### ➤ **Outlook and Replicability**

The Oualidia project paved the way for Morocco's subsequent large-scale renewable energy initiatives. Its success demonstrated the potential for wind power to contribute meaningfully to national electricity supply and to generate tradable carbon assets. Looking ahead:

- **Expansion Potential:** Morocco continues to expand wind capacity, with a target of 5 GW by 2030.

- **Integration into NDCs:** Future wind projects can be structured to contribute to Morocco’s NDC and Article 6.4 mechanisms.
- **Replicability:** The Oualidia experience shows how small-to-medium-scale wind farms can be replicated in other coastal and inland regions of North Africa, blending carbon finance with national renewable energy strategies.

#### 4.4.2 Case Study 2: Ouarzazate IV Solar CSP Project

##### ➤ Project Overview

The Ouarzazate IV Solar Project is part of Morocco’s Noor Solar Complex, located in Ouarzazate province. Registered under the Verified Carbon Standard (VCS, Project ID 2036), this initiative adds 72 MW of photovoltaic (PV) capacity to the Noor complex, complementing the Concentrated Solar Power (CSP) plants already in operation.

The project’s main objective is to generate renewable electricity that displaces fossil-fuel-based generation on Morocco’s national grid, thereby reducing greenhouse gas (GHG) emissions while advancing Morocco’s clean energy transition.

Table 13: Key Data Snapshot for carbon credits issuance by Numerco Limited

Category	Details
Project Type	Utility-scale Solar PV
Project developer	Numerco Limited
Location	Ouarzazate, Morocco
Capacity	72 MW
Methodology	ACM0002 (VCS)
Registry	VCS (Project ID 2036)
Estimated Annual Emission Reductions	150,272 tCO <sub>2</sub> e/year

##### ➤ Project Design and Implementation

The project involves the deployment of utility-scale photovoltaic technology, designed to integrate with existing Noor CSP infrastructure.

- **Technology:** Utility-scale solar PV modules
- **Capacity:** 72 MW
- **Baseline Scenario:** Continued reliance on fossil-fuel generation (primarily coal and oil) in Morocco’s national grid
- **Innovation Highlight:** Demonstrates how Morocco is diversifying within renewables by combining CSP with PV to balance cost, efficiency, and scalability

### ➤ **Climate Impact (Carbon Performance)**

The project generates carbon credits by replacing carbon-intensive electricity.

- **Estimated Annual Emission Reductions (EAER):** ~120,000 tCO<sub>2</sub>e/year
- **Total Expected Credits (first crediting period):** ~1.7 million tCO<sub>2</sub>e
- **Methodology Applied:** ACM0002 (Grid-connected renewable electricity generation)
- **Registry:** Verified Carbon Standard (VCS, ID 2036).

### ➤ **Sustainable Development Co-Benefits**

- **Economic:** Large-scale job creation during construction; ongoing operations support skilled employment; boosts Morocco's local renewable energy industry
- **Social:** Energy security strengthened by reducing dependence on imported fossil fuels; lower electricity generation costs for consumers over time
- **Environmental:** Significant reduction of air pollution associated with coal; avoided water stress compared to coal plants, thanks to dry-cooling systems in PV modules

### ➤ **Outlook and Replicability**

The Ouarzazate IV project is a landmark in Morocco's renewable energy expansion, showcasing how voluntary carbon markets can support large-scale clean energy. The project model is replicable across North Africa, where solar resources are abundant, and can be expanded under Article 6.4 frameworks to channel more international investment.

## **4.4.3 Case Study 3: Tourba Carbon farming**

### ➤ **Project Overview**

The Tourba Soil Carbon Pilot Project represents an innovative approach to carbon markets in Morocco, linking agricultural resilience with carbon sequestration. Developed in partnership with the OCP Group, the project applies regenerative agriculture practices to enhance soil organic carbon stocks and generate verified carbon credits under the VCS framework.

It is one of the first Moroccan agricultural carbon projects designed to tap into the voluntary carbon market, illustrating how farming can be both a climate mitigation and adaptation strategy.

Table 14: Key Data Snapshot for carbon credits issuance by Tourba

Category	Details
Project Type	Soil Carbon / Agriculture
Project developer	Tourba (InnovX)
Location	Morocco (pilot sites across agricultural regions)
Scale	Thousands of hectares (scalable to millions)
Methodology	VM0042 (VCS – Agricultural Land Management)
Registry	VCS
Estimated Annual Emission Reductions	~ 1,808,055 tCO <sub>2</sub> e/year (pilot)

➤ **Project Design and Implementation**

The pilot engages Moroccan farmers in adopting sustainable practices that improve soil health.

- **Technology:** Regenerative agriculture and soil carbon enhancement (reduced tillage, compost use, optimized fertilizer application, cover crops). In addition, Tourba leverages a sophisticated MRV system to accurately assess soil carbon sequestration at scale. This system uses: Remote sensing technology, artificial Intelligence, biogeochemical models and soil sampling<sup>78</sup>.
- **Scale:** Pilot phase launched with thousands of hectares, scalable to millions
- **Baseline Scenario:** Conventional farming practices that deplete soil carbon and degrade productivity
- **Innovation Highlight:** Direct linkage between a major industrial actor (OCP Group), smallholder farmers, and the voluntary carbon market—unprecedented in Morocco

➤ **Climate Impact (Carbon Performance)**

- **Estimated Annual Emission Reductions (EAER):** ~40,000 tCO<sub>2</sub>e/year (pilot phase)

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<sup>78</sup> The data collection and monitoring platform developed for the pilot phase reduced service costs per hectare by 60-80% (<https://www.ocpgroup.ma/en/farmer-solutions/carbon-farming>)

- **Total Expected Credits (scaling):** Up to 1 million tCO<sub>2</sub>e over 10 years, depending on uptake
- **Methodology Applied:** VM0042 (Improved Agricultural Land Management).
- **Registry:** Verified Carbon Standard (VCS)

➤ **Sustainable Development Co-Benefits**

- **Economic:** Farmers benefit from new revenue streams by selling carbon credits; improved soil fertility reduces input costs
- **Social:** Strengthens rural livelihoods, builds farmer resilience to drought, and enhances food security
- **Environmental:** Increases soil water retention, reduces erosion, and supports biodiversity through regenerative practices

➤ **Outlook and Replicability**

The Tourba pilot offers a blueprint for agricultural carbon finance in Africa. By scaling regenerative agriculture, Morocco can position itself as a leader in soil carbon markets, linking climate action with food security. This approach is highly replicable across other semi-arid regions in Africa facing similar climate and agricultural challenges.



## **5.** VCM KEY OPPORTUNITIES AND CHALLENGES FOR MOROCCO

## 5. VCM key opportunities and challenges for Morocco

### 5.1 Key Opportunities

Morocco’s voluntary carbon market is still at an early stage but offers several structural advantages and emerging opportunities. The country has already built a strong reputation in renewable energy and is now exploring pathways to expand into agriculture, land-use, and innovative sequestration solutions. Its geographical position, trade relations, and climate policy framework also create a favorable context for engaging with international buyers and aligning with global carbon governance. Benchmarking against countries that have recently expanded their VCM participation—such as Kenya, South Africa, Ghana, Chile, and Thailand—shows that Morocco shares several enabling conditions that have helped comparable economies scale credit supply within a relatively short timeframe.



Figure 24: Key VCM opportunities for Morocco

#### 5.1.1 Abundance of Renewable Energy Potential

Morocco is widely recognized as one of Africa’s renewable energy pioneers. With abundant solar irradiation across its southern and interior regions and strong wind resources along the Atlantic coast, Morocco has developed large-scale assets such as the Noor Ouarzazate solar complex and the Tafaya wind farm. These projects have already contributed to positioning the country as a clean-energy hub in Africa.

From a benchmarking perspective, several emerging economies have historically relied on renewable-energy projects as a major source of carbon credits. In countries such as South Africa and Egypt, large wind and solar installations were formally registered under the Clean Development Mechanism, and multiple projects progressed through verification and credit-issuance procedures. For example, Egypt’s wind farms at Zafarana were among the earliest large-scale renewable projects in Africa to generate certified

emission reductions<sup>79</sup>. Similar patterns were observed in Vietnam, where renewable-energy projects represented a dominant share of early crediting activity before market rules and additionality criteria became more stringent<sup>80</sup>.

While global scrutiny over renewable-energy crediting has increased, these benchmarks show that such credits remain viable when bundled with energy storage or linked to clear co-benefits—such as industrial decarbonization, access to energy, rural electrification, or community development. Morocco can leverage these experiences to structure renewable-energy projects that meet evolving integrity standards while contributing to the country’s long-term low-carbon strategy.

### 5.1.2 Agriculture and Land-Based Carbon Sequestration

Agriculture accounts for a substantial share of Morocco’s economy and employs a large part of the workforce. This sector offers significant potential for carbon sequestration, particularly in dryland and semi-arid regions. Conservation tillage, agroforestry, rangeland restoration, and soil carbon enhancement are among the practices that can improve both carbon outcomes and climate resilience.

A concrete Moroccan example is Tourba, an initiative that integrates regenerative agriculture with carbon measurement and credit issuance. The program has demonstrated how improved soil management can generate verified credits while enhancing yields, water efficiency, and soil fertility.

Experience from other countries shows that dryland and smallholder carbon farming are increasingly viable in voluntary markets. The Kenya Agricultural Carbon Project (KACP) – one of the first large-scale soil carbon initiatives – pioneered this approach. Launched in 2009 with support from the World Bank BioCarbon Fund, over its 20-year crediting period, KACP is projected to reduce nearly 2 million tCO<sub>2</sub>e, generating carbon revenue for farmers as a co-benefit of climate-smart agriculture<sup>81</sup>. In the Sahel, countries such as Niger and Senegal are integrating carbon methodologies into Great Green Wall initiatives, which focus on rangeland and soil regeneration in similarly arid contexts and aims to restore 100 million hectares by 2030 and sequester an estimated 250 million tons of CO<sub>2</sub> in the process<sup>82</sup>.

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<sup>79</sup> Ministry of Foreign Affairs of Japan. (2007). Box 1. Using ODA to Promote the Clean Development Mechanism (CDM). In Japan's ODA White Paper 2007.

<https://www.mofa.go.jp/policy/oda/white/2007/ODA2007/html/box/bx01001.htm>

<sup>80</sup> GreenUp. (n.d.). Vietnam’s Carbon Credit Landscape: Growth, Challenges, and Future Directions.

<https://greenup.asia/vietnam-carbon-credit-initiatives-renewable-energy/>

<sup>81</sup> The New Climate. (n.d.). From Soil to Carbon Credits: How high transaction costs threaten the Kenya Agricultural Carbon Project that reduces carbon. <http://thenewclimate.ca/from-soil-to-carbon-credits-how-high-transaction-costs-threaten-the-kenya-agricultural-carbon-project-that-reduces-carbon/>

<sup>82</sup> United Nations Environment Programme. (n.d.). A green wall to promote peace and restore nature in Africa's Sahel region. <https://www.unep.org/news-and-stories/story/green-wall-promote-peace-and-restore-nature-africas-sahel-region>

These benchmarks confirm that, although Morocco cannot replicate the large REDD+ programs of Central Africa due to limited forestry potential, it can play a competitive role in dryland carbon farming, soil carbon enhancement, and biochar, all of which are gaining market traction and may command premium credit prices given their resilience and water-efficiency co-benefits.

### 5.1.3 Integration with Global Markets

Morocco's proactive engagement with international climate governance gives it a strategic advantage in connecting its voluntary market with emerging compliance mechanisms. Importantly, Morocco has already formalized its participation. The country has signed bilateral cooperation agreements under Article 6.2 of the Paris Agreement with Switzerland, Norway, and Singapore, placing it among the early adopters of international carbon trading frameworks. These agreements establish the foundations for project authorization, registry interoperability, and the application of corresponding adjustments, ensuring that Moroccan credits can meet the stringent integrity requirements expected in international markets.

Benchmark countries demonstrate the value of early Article 6 readiness. Ghana has established bilateral agreements with Switzerland and is among the first in Africa to operationalize Article 6 transactions. Thailand has integrated its domestic T-VER voluntary program with Article 6 procedures to allow credits to serve multiple compliance functions<sup>83</sup>. Chile is upgrading its national MRV architecture and mitigation registry to support dual VCM-compliance use of units<sup>84</sup>.

Morocco's geographical proximity to Europe—its largest trading partner—also provides an advantage. As European corporations face stricter disclosure requirements and reputational pressures, companies increasingly seek nearby, reliable, and “Paris-aligned” sources of high-integrity credits. Countries such as Uruguay and Colombia have used similar positioning to attract European buyers; Morocco can draw from this experience to strengthen its market attractiveness.

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<sup>83</sup> Norton Rose Fulbright. (2023). Opportunities for Article 6 engagement in the Asia Pacific region. <https://www.nortonrosefulbright.com/en-us/knowledge/publications/35a4026d/opportunities-for-article-6-engagement-in-the-asia-pacific-region>

<sup>84</sup> Thai T-VER credits can be converted to Article 6 ITMOs or used domestically (for a planned carbon tax), giving them dual compliance value

### 5.1.4 Other Emerging Opportunities

Beyond renewable energy and agriculture, Morocco can expand into a range of additional crediting niches.

#### **Waste management and methane capture.**

Benchmarks from Brazil, South Africa, and Turkey show that landfill-gas recovery and organic waste-to-energy projects have historically generated large and stable credit volumes, all while supporting sustainable city management and climate targets<sup>85</sup>.

#### **Blue carbon and ecosystem restoration.**

Countries including Kenya and Indonesia have begun monetizing mangrove and coastal ecosystem restoration, often securing above-average prices due to strong biodiversity and community co-benefits<sup>86</sup> <sup>87</sup>. Morocco's coastal wetlands, oases, and seagrass habitats—though smaller in scale—could position the country within this high-value niche.

#### **Corporate climate commitments.**

Domestic climate policies have played a key role in stimulating credit demand in some countries. In South Africa, for example, companies purchase local offsets to comply with carbon tax regulations, creating a structured demand channel<sup>88</sup>. In Egypt and Nigeria, while no formal offset requirements are currently enforced, there is growing momentum toward carbon market activation, driven by national climate strategies and private sector interest. Morocco's industrial players, with net-zero pathways (Like OPC Group) that could catalyze a stable internal demand for high-quality credits.

#### **Regional leadership.**

Kenya, Ghana, and South Africa have positioned themselves as regional carbon-service hubs for East, West, and Southern Africa. With its institutional capacity, francophone reach, and investment in measurement, reporting, and verification (MRV) systems, Morocco can play a comparable role for North and West Africa—supporting registry

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<sup>85</sup> BeZero Carbon. (n.d.). Sector Snapshot: Landfill. <https://bezerocarbon.com/insights/sector-snapshot-landfill>

<sup>86</sup> United Nations. (n.d.). Kenyan coastal villagers earning a living from selling carbon credits. <https://www.un.org/sw/Nairobi-unic/story3>

<sup>87</sup> International Finance Corporation (IFC). (2023). Deep blue: Opportunities for blue carbon finance in coastal ecosystems. <https://www.ifc.org/content/dam/ifc/doc/2023-delta/deep-blue-opportunities-for-blue-carbon-finance-in-coastal-ecosystems-optimized.pdf>

<sup>88</sup> Republic of South Africa. (2019). Carbon Tax Act, 2019 (Act No. 15 of 2019). Government Gazette.

development, Article 6 implementation, and technical assistance to neighboring countries.

## 5.2 Key Challenges

While Morocco has promising opportunities in voluntary carbon markets, several structural and systemic challenges currently limit the country’s ability to scale its participation. These challenges relate not only to technical and institutional gaps but also to the maturity of the broader ecosystem, from awareness and capacity to regulatory clarity. Addressing these barriers is essential if Morocco is to position itself as a competitive and credible player in global carbon markets.

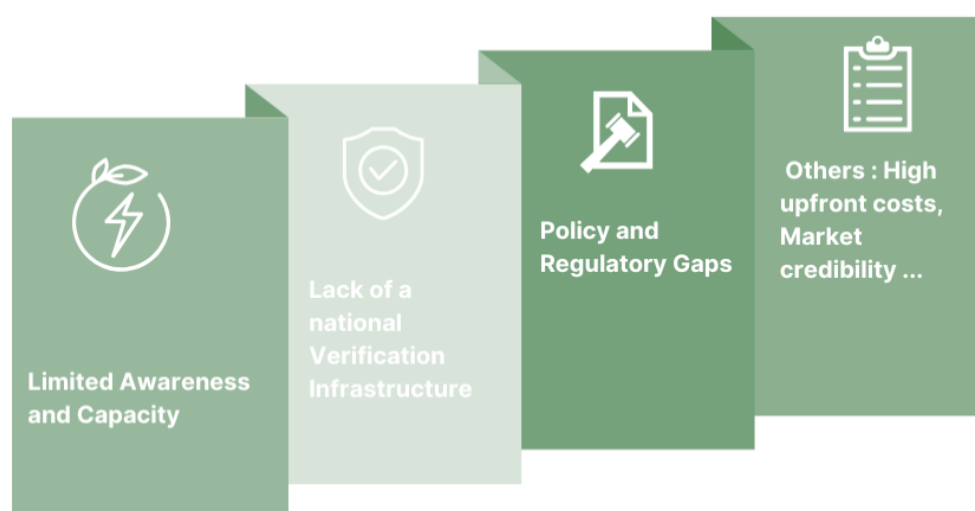


Figure 25: Challenges of VCMs in Morocco

### 5.2.1 Limited Awareness and Capacity

Awareness of voluntary carbon markets among Moroccan businesses, investors, and even policymakers remains relatively low. Many stakeholders—particularly in agriculture, SMEs, and local communities—have limited knowledge of how carbon credits are generated, verified, and monetized. This lack of familiarity reduces the pipeline of potential projects and discourages private investment.

Capacity gaps are also significant. Developing high-quality carbon projects requires expertise in MRV (measurement, reporting, and verification), baseline setting, and project finance. Morocco currently lacks a strong base of carbon project developers and technical consultants compared to regional leaders like Kenya or South Africa. Without targeted training and technical assistance, potential projects may fail to meet international standards, limiting their eligibility in registries.

### 5.2.2 Lack of a national Verification Infrastructure

High-integrity carbon credits rely on strong verification systems. Morocco does not yet have sufficient domestic validation and verification bodies (VVBs) accredited under major registries such as Verra or Gold Standard. As a result, Moroccan project developers must rely on international auditors, increasing costs and delaying timelines.

In addition, local data infrastructure for tracking emissions reductions and sequestration—particularly in agriculture and land-use sectors—is fragmented. Without standardized monitoring protocols, project developers face difficulties in demonstrating additionality and permanence, which are critical for credibility in international markets. This weakens Morocco's attractiveness to buyers seeking transparency and environmental integrity.

### 5.2.3 Policy and Regulatory Gaps

While Morocco has made strides in climate policy, including its Nationally Determined Contribution and renewable energy strategies, the regulatory framework for carbon markets remains incomplete. Key gaps include:

- **Authorization and registry infrastructure:** A key challenge is the lack of clarity on authorization procedures in the future. Developers need visibility on whether VCM projects will require approval from the Ministry of Energy Transition, if credits will be subject to corresponding adjustments, and how projects will integrate with Morocco's NDCs.
- **Incentive structures:** Developers also face high upfront costs, long timelines, and uncertain credit prices. Without incentives—such as tax breaks, technical support, or price-stability mechanisms—Morocco risks lagging behind other African countries in attracting VCM investment.

Without a clear and predictable regulatory environment, investors face uncertainty. This limits the flow of international climate finance and slows down the development of a credible national carbon market ecosystem.

### 5.2.4 Other Challenges

Several additional issues further constrain Morocco's VCM participation:

- **High upfront costs:** Many project types (e.g., soil carbon, waste-to-energy) require substantial early investment in MRV and certification before credits are issued.

- **Market credibility concerns:** International buyers are increasingly demanding “high-integrity” credits with strong safeguards. Morocco’s limited track record makes it vulnerable to reputational risks if projects are perceived as low-quality.
- **Competing priorities:** Policymakers may prioritize adaptation and water security over carbon mitigation, potentially slowing the development of market mechanisms.
- **Fragmented coordination:** Morocco has established the “Commission Nationale sur le Changement Climatique et la Diversité Biologique” (CNCCDB) to serve as a national coordination platform on climate and biodiversity themes. This body brings together ministries, agencies, private sector and other stakeholders, and provides a forum for consultation and alignment of national policies. However, despite its existence, coordination across stakeholders remains fragmented. Multiple ministries, agencies, and private actors are engaged in climate initiatives, but overlaps and gaps persist in the absence of a fully empowered central coordination mechanism on carbon markets.

An aerial photograph of a two-lane asphalt road that curves through a dense, lush green forest. A single white car is visible on the road, moving away from the viewer. The road has a double yellow line in the center and white dashed lines on the edges. The overall color palette is dominated by various shades of green and grey.

## **6.** POLICY RECOMMENDATIONS TO UNLEASH THE POTENTIAL OF VCMS IN MOROCCO

## 6. Policy Recommendations to Unleash the Potential of VCMs in Morocco

To fully realize the potential of voluntary carbon markets, Morocco must address the challenges identified in Chapter 5 while building on its comparative advantages. Policy action is required at multiple levels: regulatory certainty, institutional capacity, financing access, and integration with national climate goals.

The list of recommendations is as follows:

Table 15: Summary of the proposed recommendations

Themes	Recommendations
1. Enhancing Regulatory Frameworks	<ul style="list-style-type: none"> <li>- For a certain category of projects, establish a national authorization process for VCM credits with clear criteria for alignment with Article 6</li> <li>- Create a unified national registry interoperable with international systems</li> <li>- Clarify the relationship between voluntary standards and national frameworks</li> <li>- Reinforce the role of CNCCDB as the coordination body for carbon activities, ensuring its mandate is fully operationalized with adequate resources and authority</li> </ul>
2. Capacity Building	<ul style="list-style-type: none"> <li>- Launch training programs for project developers, MRV experts, and auditors.</li> <li>- Establish certified training modules with universities and capacity building centers.</li> <li>- Conduct awareness campaigns for businesses, cooperatives, and investors.</li> <li>- Support accreditation of local validation and verification bodies (VVBs)</li> </ul>
3. Facilitating Access to Finance	<ul style="list-style-type: none"> <li>- Create a VCM project incubation fund with donor and government support.</li> <li>- Promote public-private partnerships for large-scale projects.</li> <li>- Offer risk-sharing instruments (guarantees, insurance).</li> <li>- Facilitate linkages with international carbon buyers and financiers.</li> </ul>
4. Others / Cross cutting	<ul style="list-style-type: none"> <li>- Build regional cooperation platforms with African partners</li> <li>- Position Morocco as a VCM hub for francophone Africa.</li> <li>- Promote digital MRV and blockchain registries.</li> <li>- Establish multi-stakeholder dialogue platforms.</li> </ul>

In order to make the recommendations more actionable, each table in this section includes three columns:

Table 16: Description of the urgency of the recommendations

Level	Description	Examples
● <b>Low</b>	Straightforward measures which can be implemented quickly	Awareness campaigns, basic training.
● <b>Medium</b>	Requires coordination across actors or moderate investment	Accreditation of local verifiers, fiscal incentives.
● <b>High</b>	Systemic reforms or major investments	National carbon registry, Article 6 alignment.

## 6.1 Enhancing Regulatory Frameworks

For Morocco to fully unlock the potential of voluntary carbon markets, regulatory clarity and strategic integration are inseparable. Clear procedures on authorization, registries, and Article 6 alignment are essential for investor confidence, while ensuring that voluntary projects also reinforce Morocco’s NDC 3.0, the Long-Term Low Emissions Development Strategy (LT-LEDS 2050), and sectoral adaptation and mitigation plans.

Table 17: Classification of recommendations related to enhancing regulatory frameworks

Recommendation	Rationale	Complexity of Implementation
For a certain category of projects, establish a national authorization process for VCM credits (under CNCCDB/Ministry of Energy Transition) with clear criteria for alignment with Article 6 <sup>89</sup>	Provides developers with certainty on whether credits are subject to corresponding adjustments and eligibility for export	● Medium – requires legal clarification, ministerial decrees, and coordination with UNFCCC reporting obligations
Create a unified national registry interoperable with international systems (e.g., Climate Warehouse)	Ensures transparency, avoids double counting, and strengthens Morocco’s credibility in global markets	● High – involves significant IT investment, capacity building, and international interoperability testing
Clarify the relationship between voluntary standards and national frameworks	Helps developers anticipate whether credits will count toward national targets, be exported, or remain purely voluntary, reducing uncertainty (while developers already use Verra, Gold Standard, or	● Medium – mainly requires policy guidance and alignment with existing international methodologies

<sup>89</sup> While alignment with Article 6 is important for credibility and flexibility, the authorization process for VCM projects should reflect the distinct nature of voluntary markets—particularly their bottom-up, non-sovereign-driven structure—and avoid imposing overly burdensome requirements that may not be appropriate outside the scope of government-to-government or compliance-based transactions

	other IC-VCMI-recognized programs, national rules should specify how such projects interact with Morocco's NDCs and Article 6 requirements)	
Reinforce the role of CNCCDB as the coordination body for carbon activities, ensuring its mandate is fully operationalized with adequate resources and authority	Prevents fragmentation across ministries and ensures coherent decision-making	● Medium – depends on political support, institutional mandates, and budget allocation

## 6.2 Capacity Building

Technical and institutional capacity gaps limit Morocco's ability to generate high-quality credits. Building local expertise is essential to reduce dependence on foreign consultants and verifiers.

Table 18: Classification of recommendations related to capacity building

Recommendation	Rationale	Complexity of Implementation
Launch training programs for project developers, MRV experts, and auditors.	Builds domestic expertise and lowers project development costs.	● Low – can be rolled out with support from universities and NGOs.
Establish certified training modules with universities and capacity building centers.	Creates a sustainable talent pipeline and professional recognition.	● Medium – requires curriculum development and institutional agreements.
Conduct awareness campaigns for businesses, cooperatives, and investors.	Expands the pool of potential project developers and buyers.	● Low – simple to implement with government and media support.
Support accreditation of local validation and verification bodies (VVBs).	Reduces reliance on costly international verifiers and shortens approval timelines.	● Medium – requires coordination with international standards bodies.

## 6.3 Facilitating Access to Finance

Carbon projects require upfront investments in MRV and certification before credits are issued, which is a major barrier for SMEs and cooperatives.

Table 19: Classification of recommendations related to facilitating access to finance

Recommendation	Rationale	Complexity of Implementation
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Create a VCM project incubation fund with donor and government support.	De-risks early-stage development and attracts private co-investors.	● High – requires new financial instruments and donor partnerships.
Promote public-private partnerships for large-scale projects.	Leverages state capacity while mobilizing private capital.	● Medium – needs regulatory support and investor matchmaking.
Offer risk-sharing instruments (guarantees, insurance).	Increases investor confidence and lowers cost of capital.	● Medium – requires coordination with banks and insurers.
Facilitate linkages with international carbon buyers and financiers.	Opens access to export markets and enhances Morocco’s integration in global value chains.	● Low – achievable with trade missions and digital platforms.

## 6.4 Integrating Carbon Markets with National Climate Goals

Voluntary carbon markets must complement Morocco’s NDCs and national strategies, avoiding conflicts and maximizing synergies.

Table 20: Classification of recommendations related to integrating carbon markets with national climate goals

Recommendation	Rationale	Complexity of Implementation
Establish a government approval mechanism for VCM projects (cf. recommendation 6.1)	Ensures compliance with NDC accounting and prevents double counting.	● Medium – requires policy development and coordination with UNFCCC reporting.
Align VCM activities with sectoral strategies (energy, water, agriculture).	Guarantees coherence with national climate priorities.	● Medium – requires inter-ministerial coordination.
Prioritize projects delivering co-benefits (biodiversity, rural development, gender equality).	Enhances integrity and buyer attractiveness of Moroccan credits.	● Low – can be implemented through project selection criteria.
Ensure interoperability of domestic MRV systems with global platforms.	Builds trust and positions Morocco as a credible international partner.	● High – requires technical infrastructure and international cooperation.

## 6.5 Other Recommendations

Several cross-cutting initiatives can strengthen Morocco’s ecosystem and position the country as a regional leader.

Table 21: Classification of other recommendations

Recommendation	Rationale	Complexity of Implementation
Build regional cooperation platforms with African partners.	Harmonizes standards and strengthens Africa’s global bargaining power.	● Medium – requires diplomatic engagement and regional institutions.

Position Morocco as a VCM hub for francophone Africa.	Leverages institutional strengths and creates new revenue streams.	● High – requires significant capacity building and institutional reforms.
Promote digital MRV and blockchain registries.	Cuts costs, increases transparency, and attracts tech-savvy investors.	● Medium – requires partnerships with technology providers.
Establish multi-stakeholder dialogue platforms.	Encourages trust, reduces fragmentation, and improves governance.	● Low – can be initiated through regular forums and roundtables.

## Conclusion and final thoughts

This white book has examined the current state, opportunities, and challenges of voluntary carbon markets in Morocco, situating the country's experience within both regional and global contexts. The analysis has shown that while Morocco possesses significant potential—anchored in its renewable energy resources, agricultural systems, and emerging innovation platforms—its engagement in voluntary markets remains at an early stage compared to some peers.

The evidence points to a number of enabling conditions that will be critical for Morocco's next steps. These include establishing clear regulatory procedures and a national registry, strengthening measurement and verification systems, building domestic capacity among developers and auditors, and creating effective incentive mechanisms for private sector participation. Ensuring coherence with NDC 3.0 and Morocco's long-term decarbonization strategy will also be essential to maximize the credibility and impact of voluntary carbon activities.

Voluntary carbon markets cannot be viewed in isolation. They represent one instrument within a broader climate finance architecture that Morocco is building to achieve its adaptation and mitigation goals, while also pursuing sustainable development priorities. By addressing the identified barriers and implementing the recommendations outlined, Morocco can expand its role in global carbon markets, attract international investment, and ensure that projects deliver both climate and socio-economic benefits.

The road ahead will require coordination across institutions, consistent engagement with international standards, and strong collaboration with the private sector and local communities. With these elements in place, voluntary carbon markets can become a meaningful lever in Morocco's transition toward a resilient and low-carbon future.

## Appendix: Glossary of Terms

### **Additionality**

The principle that emission reductions or removals from a carbon project would not have occurred without the incentive of carbon finance. A cornerstone of credit integrity in VCMs.

### **Afforestation/Reforestation (A/R)**

Project type involving planting trees on land that has not previously been forested (afforestation) or restoring degraded forests (reforestation), generating removal credits.

### **Article 6 (Paris Agreement)**

Framework for international cooperation on climate mitigation. Article 6.2 covers bilateral/multilateral trading of mitigation outcomes (ITMOs), while Article 6.4 establishes a UN-supervised crediting mechanism.

### **Biochar**

Charred organic material used as a soil amendment. It locks carbon in a stable form while improving soil fertility and water retention, offering sequestration and resilience benefits.

### **Carbon Border Adjustment Mechanism (CBAM)**

EU regulation imposing a carbon price on imports of carbon-intensive products. Relevant for Morocco's exporters as it may drive demand for carbon reduction/offset projects.

### **Carbon Credit**

A tradable unit representing one metric tonne of CO<sub>2</sub> equivalent (tCO<sub>2</sub>e) avoided, reduced, or removed by a certified project.

### **Carbon Neutrality**

A state where an entity balances its GHG emissions with equivalent removals or offsets, often through a combination of internal reductions and carbon credit retirements.

### **Carbon Registry**

Official database where credits are issued, transferred, and retired. Examples: Verra Registry, Gold Standard Impact Registry. Ensures transparency and prevents double counting.

### **Clean Development Mechanism (CDM)**

A Kyoto Protocol mechanism allowing emission reduction projects in developing countries to earn Certified Emission Reductions (CERs), which can be traded and sold. Predecessor to some current VCM methodologies.

**Co-Benefits**

Additional social, economic, or environmental benefits from carbon projects, such as biodiversity protection, job creation, or improved health.

**Corresponding Adjustment**

Accounting measure under Article 6 to prevent double counting of emission reductions between countries' NDCs and voluntary buyers.

**EAER (Estimated Annual Emission Reductions)**

The projected annual amount of GHG emissions (tCO<sub>2</sub>e) a project expects to reduce or remove, based on methodology and baseline.

**Greenwashing**

Misleading claims about climate action, e.g., using low-integrity credits or overstating offset impacts. A reputational risk for companies in the VCM.

**Integrity Council for the Voluntary Carbon Market (IC-VCM)**

Independent governance body setting the **Core Carbon Principles** to define high-quality credits.

**Landfill Methane Project**

A project that captures and uses or flares methane emissions from waste sites, preventing a potent GHG from being released.

**Leakage**

Increase in emissions outside a project's boundaries caused by the project itself (e.g., deforestation shifting to another area). Needs to be accounted for in methodologies.

**Mitigation Hierarchy**

Principle that companies should first avoid and reduce emissions before using offsets to address residual ones.

**MRV (Monitoring, Reporting, Verification)**

Systematic process to track emission reductions. Critical for ensuring credibility and integrity of issued credits.

**Nationally Determined Contributions (NDCs)**

Countries' official emission reduction pledges under the Paris Agreement. Morocco's updated NDC commits to 18.3% unconditional and up to 45.5% conditional reductions by 2030.

**Permanence**

The durability of emission reductions/removals. Particularly relevant for forestry/land-use projects vulnerable to reversal by fires or logging.

**Project Developer**

Entity that designs, implements, and manages a carbon project. Responsible for ensuring compliance with methodologies and standards.

**REDD+**

“Reducing Emissions from Deforestation and Forest Degradation.” A framework for crediting avoided deforestation and promoting sustainable forest management.

**Retirement**

The act of permanently canceling a carbon credit so it cannot be resold, allowing a buyer to claim the associated offset.

**Tourba**

A Moroccan initiative pioneering regenerative agriculture and soil carbon projects. Demonstrates how sustainable farming practices can generate credits while improving yields and water efficiency.

**Validation and Verification Bodies (VVBs)**

Independent accredited entities that validate project design and verify achieved emission reductions before credits are issued.

**Verra VCS (Verified Carbon Standard)**

The largest voluntary standard, covering a wide range of project types (renewable energy, land use, waste, etc.).

**Voluntary Carbon Market (VCM)**

A market where companies, organizations, or individuals purchase carbon credits on a voluntary basis, outside regulatory obligations, to offset emissions or support climate goals.

## Appendix: List of carbon credits / Morocco

Project Name	Project Developer	Type	Reduction / Removal	Total Credits Issued	Total Credits Retired	Total Credits Remaining	Estimated Annual Emission Reductions	Registry
Jbel Sendouq-Khalladi ("Khalladi") wind farm project in Morocco	ACWA Khalladi	Wind	Reduction	34.439	34.402	37	143960	Gold Standard
Solar Drip Irrigation for Smallholder Farmers in Morocco	atmosfair gGmbH	Solar - Distributed	Reduction	760	0	760	7537	Gold Standard
Greenlandfill_Meknès	Suez Atlas	Landfill Methane	Reduction	0	0	0	64000	Gold Standard
Ouarzazate II & III Concentrated Solar Power Project	Deactivated Projects	Solar - Centralized	Reduction	0	0	0	700000	Gold Standard
Ouarzazate I Concentrated Solar Power Project	MASEN	Solar - Centralized	Reduction	0	0	0	278695	Gold Standard
Jbel Sendouq-Khalladi ("Khalladi") wind farm project in Morocco	ACWA Khalladi	Wind	Reduction	316.720	2.100	314.620	220239	Gold Standard
FOUM ELOUED WIND FARM PROJECT	Energie Eolienne du Maroc	Wind	Reduction	0	0	0	141991	Verra
Oualidia 1&2 Wind Projects	AERA Group	Wind	Reduction	0	0	0	44294	Verra
Oualidia 1&2 Wind Projects.	AERA Group	Wind	Reduction	50.347	50.000	347	54114	Verra
Ouarzazate II Concentrated Solar Power Project	Numerco Limited	Solar - Centralized	Reduction	556.706	140.014	416.692	406293	Verra
OUARZAZATE III CONCENTRATED SOLAR POWER PROJECT	Numerco Limited	Solar - Centralized	Reduction	127.480	86.623	40.857	406293	Verra
OUARZAZATE IV CONCENTRATED SOLAR POWER PROJECT	Numerco Limited	Solar - Centralized	Reduction	137.530	76.967	60.563	150272	Verra
TOURBA - IMPROVED AGRICULTURAL PRACTICES TOWARDS CARBON FARMING	Innov X	Sustainable Agriculture	Mixed	0	0	0	1808055	Verra
TAFILALET AGROFORESTRY SYSTEM MOROCCO	Multiple Proponents	Afforestation/Reforestation	Impermanent Removal	0	0	0	6660	Verra

## Appendix: List of references

Akhmouch, A., & Correia, F. N. (2016). The 12 OECD Principles on Water Governance: When science meets policy. *Utilities Policy*, 43, 14–20.

<https://doi.org/10.1016/j.jup.2016.06.004>

Barbara K Haya, Pamela Quartson, Tyler Bernard, Aline Abayo, Xinyun Rong, Ivy S So, Micah Elias. (2025). Voluntary Registry Offsets Database v2025-07, Berkeley Carbon Trading Project, University of California, Berkeley. Retrieved from:

<https://gspp.berkeley.edu/berkeley-carbon-trading-project/offsets-database>.

Battocletti, V., Enriques, L., & Romano, A. (2024, April 11). *Voluntary carbon markets: Market failures and policy implications*. Oxford Business Law Blog.

<https://www.law.ox.ac.uk/business-law-blog/blog/2024/04/voluntary-carbon-market-market-failures-and-policy-implications>

BeZero Carbon. (n.d.). Sector Snapshot: Landfill.

<https://bezercarbon.com/insights/sector-snapshot-landfill>

CarbonCredits.com. (2022, August 10). *The carbon credit lifecycle*. Retrieved August 27, 2024, from <https://carboncredits.com/the-carbon-credit-lifecycle/>

Climate Change Tracker. (n.d.). Morocco: Progress and recent impact – Greenhouse gas emissions. Climate Change Tracker. Retrieved November 25, 2025, from

<https://climatechangetracker.org/nations/greenhouse-gas-emissions/morocco/progress-and-recent-impact>

ClimateSeed. (2020, October 2). Climate contribution vs. carbon offsetting.

<https://climaseed.com/blog/climate-contribution-vs-carbon-offsetting>

Ecosystem Marketplace. (2023). *State of the voluntary carbon markets 2023*. Forest Trends. <https://www.ecosystemmarketplace.com/carbon-markets>

Forest Trends' Ecosystem Marketplace. (2025). State of the voluntary carbon market 2025: Meeting the moment—Renewing trust in carbon finance. Forest Trends Association.

<https://www.ecosystemmarketplace.com>

Gold Standard. (2024). *Impact registry*. Retrieved August 27, 2025, from

<https://registry.goldstandard.org/>

Greenhouse Gas Protocol. (2015/2024). *Corporate standard & scope 2 guidance*. World Resources Institute & World Business Council for Sustainable Development.

<https://ghgprotocol.org>

Granziera, B., Malvar, K. H., & Verdieck, J. (n.d.). *Article 6 explainer*. The Nature Conservancy. <https://www.tnc.org/content/dam/tnc/nature/en/documents/c/m/CM-TNC-Article-6-Explainer.pdf>

GreenUp. (n.d.). Vietnam's Carbon Credit Landscape: Growth, Challenges, and Future Directions. <https://greenup.asia/vietnam-carbon-credit-initiatives-renewable-energy/>

IC-VCM. (2024). *Core Carbon Principles (CCP) v1.0*. Integrity Council for the Voluntary Carbon Market. <https://icvcm.org>

IC-VCM & VCMI. (2023–2024). *Joint statements on high-integrity claims*. <https://vcmintegrity.org>

ICAP. (2024). *Emissions trading worldwide: Status report 2024*. International Carbon Action Partnership. <https://icapcarbonaction.com>

ICAO. (2023). *CORSIA emissions unit eligibility criteria (EUC)*. International Civil Aviation Organization. <https://www.icao.int/environmental-protection/CORSIA>

International Finance Corporation (IFC). (2023). *Deep blue: Opportunities for blue carbon finance in coastal ecosystems*. <https://www.ifc.org/content/dam/ifc/doc/2023-delta/deep-blue-opportunities-for-blue-carbon-finance-in-coastal-ecosystems-optimized.pdf>

IMF. (2023). *World economic outlook 2023*. International Monetary Fund.

IETA. (2023). *The voluntary carbon market: 2023 update*. International Emissions Trading Association. <https://www.ieta.org>

ISO. (2018). *ISO 14064-1:2018 — Greenhouse gases: Part 1 — Specification with guidance at the organizational level*. International Organization for Standardization.

ISO. (2019a). *ISO 14064-2:2019 — Greenhouse gases: Part 2 — Specification with guidance at the project level*. International Organization for Standardization.

ISO. (2019b). *ISO 14064-3:2019 — Greenhouse gases: Part 3 — Validation and verification requirements*. International Organization for Standardization.

ISO. (2020). *ISO 14065:2020 — General principles and requirements for bodies validating and verifying environmental information*. International Organization for Standardization.

Kingdom of Morocco. (2025, September 30). Morocco Nationally Determined Contribution (NDC 3.0). United Nations Framework Convention on Climate Change. [https://unfccc.int/sites/default/files/2025-10/MOROCCO%20NDC%203.0%20\\_30.9.25.pdf](https://unfccc.int/sites/default/files/2025-10/MOROCCO%20NDC%203.0%20_30.9.25.pdf)

Ministry of Energy Transition and Sustainable Development (Morocco). (2023). *National low carbon strategy 2050*. Rabat: Government of Morocco.

Ministry of Foreign Affairs of Japan. (2007). Box 1. Using ODA to Promote the Clean Development Mechanism (CDM). In Japan's ODA White Paper 2007. <https://www.mofa.go.jp/policy/oda/white/2007/ODA2007/html/box/bx01001.htm>

NEFCO. (2025, June). *Article 6 of the Paris Agreement and voluntary carbon markets*. Nordic Environment Finance Corporation.

NGFS. (2023). *Climate scenarios, v3.1*. Network for Greening the Financial System.

Norton Rose Fulbright. (2023). Opportunities for Article 6 engagement in the Asia Pacific region. <https://www.nortonrosefulbright.com/en-us/knowledge/publications/35a4026d/opportunities-for-article-6-engagement-in-the-asia-pacific-region>

Norton Rose Fulbright. (2022). *Article 6: A guide for the private sector*. <https://www.nortonrosefulbright.com/en-mo/knowledge/publications/59122fe9/article-6-a-guide-for-the-private-sector>

NRGI. (2023). *Carbon markets and resource-rich economies*. Natural Resource Governance Institute.

OCP Group. (n.d.). Carbon farming. OCP Group. Retrieved December 14, 2025, from <https://www.ocpgroup.ma/en/farmer-solutions/carbon-farming>

Pagop, S. C., & Savard, L. (2024). *Carbon markets and the green transition in Africa*. CIRANO. <https://cirano.qc.ca/en/summaries/2024RP-05>

Plan Vivo. (2024). *Plan Vivo standard and registry*. <https://www.planvivo.org>

Pörtner, H.-O., Roberts, D. C., Poloczanska, E. S., Mintenbeck, K., Tignor, M., Alegría, A., ... & Yoon, J. (2022). Technical summary. In *Climate change 2022: Impacts, adaptation, and vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the IPCC* (pp. 3–33). Cambridge University Press. <https://doi.org/10.1017/9781009325844.002>

Republic of South Africa. (2019). Carbon Tax Act, 2019 (Act No. 15 of 2019). Government Gazette.

Shell & BCG. (2021). *Nature-based solutions scoping study*. Shell International & Boston Consulting Group.

Stockholm Environment Institute. (2024, May 28). *Roadmap for a low-carbon transformation in Morocco*. SEI. <https://www.sei.org>

Tang, Y., Martin, S., & Riordan, R. (2024, May). *Understanding voluntary carbon markets*. Institute for Sustainable Finance, Smith School of Business, Queen's University.

TCFD. (2017). *Final report: Recommendations of the Task Force on Climate-related Financial Disclosures*. <https://www.fsb-tcfd.org>

The New Climate. (n.d.). From Soil to Carbon Credits: How high transaction costs threaten the Kenya Agricultural Carbon Project that reduces carbon. <http://thenewclimate.ca/from-soil-to-carbon-credits-how-high-transaction-costs-threaten-the-kenya-agricultural-carbon-project-that-reduces-carbon/>

TNFD. (2023). *Final recommendations v1.0*. Taskforce on Nature-related Financial Disclosures. <https://tnfd.global>

United Nations. (n.d.). Kenyan coastal villagers earning a living from selling carbon credits. <https://www.un.org/sw/Nairobi-unic/story3>

United Nations Environment Programme. (n.d.). A green wall to promote peace and restore nature in Africa's Sahel region. <https://www.unep.org/news-and-stories/story/green-wall-promote-peace-and-restore-nature-africas-sahel-region>

UNDP. (2024). *Carbon market development: Country readiness guidance*. United Nations Development Programme.

UNECA. (2023). *Carbon markets: A primer*. United Nations Economic Commission for Africa. <https://akmh.uneca.org/sites/default/files/OIBC/4/Carbon%20Markets%20-%20A%20primer.pdf>

UNEP. (2021, November). *Morocco launches its national low-carbon strategy 2050*. United Nations Environment Programme.

UNEP DTU/CCC. (2022). *CDM transition guidance*.

UNFCCC. (2022). *A6.4 Form AC\_001 Morocco*. UNFCCC Secretariat. <https://unfccc.int>

UNFCCC. (2023). *Article 6.4 mechanism rules, modalities and procedures*. UNFCCC Secretariat.

Sylvera. (2025). Carbon offset prices: What they are and why they vary. <https://www.sylvera.com/blog/carbon-offset-price>

United Nations Africa Renewal. (2022, June). *New revenue streams: Africa's renewable energy potential*. United Nations Department of Global Communications.

Verra. (2024). *Verified Carbon Standard (VCS) registry*. <https://verra.org>

Verra. (2023). *Verified Carbon Standard (VCS) program rules, version 4.5*. Verra.

VCM Global Dialogue. (2021, September 14). *Draft narrative and action agenda*.  
<https://vcmintegrity.org>

VCMI. (2023). *Claims code of practice*. Voluntary Carbon Markets Integrity Initiative.

World Bank. (2021–2024). *Carbon pricing dashboard*. World Bank.  
<https://carbonpricingdashboard.worldbank.org>

World Bank. (2022). *Navigating decisions on carbon markets*. World Bank.  
<https://documents.worldbank.org/en/publication/documents-reports/documentdetail/099040924013528667>

World Bank. (2023). *State and trends of carbon pricing 2023*. World Bank.  
<https://openknowledge.worldbank.org/handle/10986/39606>

World Bank. (2024). *State and trends of carbon pricing 2024*. World Bank.

World Bank. (2024). *Scaling voluntary carbon markets in developing countries*. World Bank.

World Bank & Bank Al-Maghrib (BAM). (2024). *Double trouble? Addressing climate and financial risks in Morocco*. World Bank.  
<https://documents.worldbank.org/en/publication/documents-reports/documentdetail>